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EXPERIMENT DATA REPORT FOR LOFT POWER ASCENSION EXPERIMENT L2-3

Peter G. Prassinos Bobby M. Galusha
Donald B. Engelman

JULY 1979

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EG&G Idaho, Inc.

IDAHO NATIONAL ENGINEERING LABORATORY

DEPARTMENT OF ENERGY

IDAHO OPERATIONS OFFICE UNDER CONTRACT DE-AC07-76ID01570

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ABSTRACT

Experiment L2-3 of the Loss-of-Fluid Test (LOFT) Facility Power Ascension Series (Experiment Series L2) was performed to obtain data for analytical code assessment and to further understand the thermal-hydraulic behavior which occurs during a postulated loss-of-coolant accident in a pressurized water reactor. The specific objectives of Experiment L2-3 were to determine the thermal-hydraulic behavior of the nuclear core and the thermal-mechanical response of the fuel rod cladding with a maximum linear heat generation rate of 39.4 kW/m. The LOFT facility was configured to simulate a postulated loss-of-coolant accident in a commercial pressurized water reactor (~1000 MWe) resulting from a 200% double-ended offset shear break in the cold leg of the primary coolant system. The initial conditions in the primary coolant system were: hot leg temperature 592.9 K, cold leg temperature 560.7 K, pressure 15.06 MPa, and intact loop flow 199.7 kg/s. During system depressurization into a simulated containment, emergency core cooling water was injected into the primary coolant system cold leg to provide data on the effects of emergency core cooling on system thermal-hydraulic response. The experiment was successful in accomplishing the objectives. Recorded data for Experiment L2-3 are presented.

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SUMMARY

Experiment L2-3 was performed as part of the Loss-of-Fluid Test (LOFT) Program conducted by EG&G Idaho, Inc., for the U.S. Nuclear Regulatory Commission. This test is part of the Power Ascension Series (Experiment Series L2) which was designed to investigate the response of the LOFT nuclear core to the blowdown, refill, and reflood transients during loss-of-coolant experiments (LOCEs) conducted at gradually increasing power levels. Experiment L2-3, conducted at 39.4 kW/m (36.7 MW), had the following objectives:

(1) Determination of core-wide and spatial variations of fuel rod cladding thermal response

(2) Identification of thermal-hydraulic phenomena and determination of effects of thermal-hydraulic phenomena on fuel rod cladding thermal response

(3) Determination of emergency core cooling system (ECCS) performance and core reflood characteristics

(4) Determination of the integrity of the fuel rod cladding

(5) Determination of principal variables of temperature, pressure, density, mass flow, and mass inventory as functions of time associated with the core, primary cooling system coolant, and ECC sufficient for comparison with and assessment of code predictions.

The LOFT integral test facility is a highly instrumented, pressurized water reactor test system designed for the simulation of loss-of-coolant accidents (LOCAs) representative of commercial (~1000 MWe) four-loop pressurized water reactors (PWRs). 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 free-wheeling pump, simulated steam generator, and two quick-opening blowdown valve assemblies

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

(5) An ECC injection system consisting of a low-pressure injection system (LPIS) pump, a high-pressure injection system (HPIS) pump, and an accumulator.

For the performance of the Experiment L2-3 LOCE, the LOFT test system was assembled to represent a postulated 200% double-ended offset shear of the pump discharge piping in the cold leg of a commercial PWR.

Experiment L2-3 was initiated from primary coolant system initial conditions of: temperature 592.9 K (hot leg), 560.7 K (cold leg), and an intact loop flow rate of 199.7 kg/s. The initial power level was 36.7 MW with a maximum linear heat generation rate of 39.4 kW/m. To determine system thermal-hydraulic response, scaled ECC was directed into the primary coolant system cold leg injection line through use of an accumulator, a HPIS pump, and a LPIS pump. The accumulator initiated injection at 16 s, and HPIS flow and LPIS flow were initiated at 14 and 29 s after rupture, respectively.

Experiment L2-3 satisfied the specified objectives. Data were successfully collected and processed from 856 of the 888 data channels used during Experiment L2-3. Of the instruments which malfunctioned, none impacted the success of the experiment. This report presents data in the form of graphs in engineering (standard international) units. In conjunction with data obtained from direct measurement, chosen computed variables are included to facilitate the analysis of the system thermal-hydraulic behavior.

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ACRONYMS

ACC	Accumulator
BL	Broken loop
BST	Blowdown suppression tank
BSTSS	Blowdown suppression tank spray system
BWST	Borated water storage tank
CCW	Counterclockwise
C	Centerline
CL	Cold leg
CW	Clockwise
DAVDS	Data acquisition and visual display system
DC	Downcomer
DTT	Drag disc — turbine transducer
ECC	Emergency core cooling or coolant
ECCS	Emergency core coolant system
FF	Free field
HL	Hot leg
HPIS	High-pressure injection system
LOCA	Loss-of-coolant accident
LOCE	Loss-of-coolant experiment
LOFT	Loss-of-fluid test
LP	Lower plenum
LPIS	Low-pressure injection system
OD	Outside diameter
ppm	Parts per million
PWR	Pressurized water reactor
QEUD	Qualified engineering unit data

QOBV	Quick-opening blowdown valve
RABV	Reflood assist bypass valve
RMS	Root mean square
rpm	Revolutions per minute
SCS	Secondary coolant system
SG	Steam generator
T_o	Time of blowdown initiation
XRO	Orifice

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EXPERIMENT DATA REPORT FOR LOFT POWER ASCENSION EXPERIMENT L2-3

I. INTRODUCTION

The Loss-of-Fluid Test (LOFT) 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 Department of Energy. The LOFT Program objectives are to:

(1) Provide data required to evaluate the adequacy and improve the analytical methods currently used to predict the hypothetical loss-of-coolant accident (LOCA) response of commercial (~1000 MWe) pressurized water reactors (PWRs). The performance of engineered safety features, with particular emphasis on the emergency core cooling system (ECCS) and the quantitative margins of safety inherent in the performance of engineered safety features, is of primary interest.

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

In order to meet these objectives, the LOFT integral[a] test facility was designed to simulate the major components of a four-loop, commercial PWR to produce data on the thermal, hydraulic, nuclear, and structural processes expected to occur during a LOCA. A detailed description of the LOFT facility can be found in Reference 1.

The LOFT Power Ascension Series (Experiment Series L2) was designed to provide large-scale blowdown system data for a PWR. Parameters varied for Experiment Series L2 include initial power level, primary coolant pump operation, time of ECCS injection, and fuel pressurization.

The specific experiment series objectives are to:

(1) Run a full-power, double-ended cold leg break experiment at nominal ECCS conditions as quickly as possible consistent with an orderly approach to the full-power experiment

(2) Use a sequence of events in this experiment series which is representative of "best estimate" plant conditions with various 10 CFR, Part 50, Appendix K hardware conditions

(3) Provide a comparison of nonnuclear and nuclear experimental data to determine and separate the effects of hydraulic forces (and vessel heat transfer) and nuclear heat on the blowdown

(4) Provide data on thermal-hydraulic and fuel behavior for evaluation and assessment of computer models and codes used to predict large pressurized water reactor LOCA response.

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

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Experiment L2-3 was conducted in the LOFT facility at a maximum linear heat generation rate of 39.4 kW/m (36.7 MW). This power level is about 75% of the LOFT rated thermal power of 50 MW and corresponds to the nominal full power operation of a commercial PWR. The primary objectives of Experiment L2-3 were to:

(1) Determine core-wide and spatial variations of fuel rod cladding thermal response

(2) Identify thermal-hydraulic phenomena and determine effects of thermal-hydraulic phenomena on fuel rod cladding thermal response

(3) Determine ECCS performance and core reflood characteristics

(4) Determine the integrity of the fuel rod cladding

(5) Determine principal variables of temperature, pressure, density, mass flow, and mass inventory as functions of time associated with the core, primary coolant system, and ECC sufficient for comparison with and assessment of code predictions.

Experiment L2-3 was conducted from initial temperature in the primary coolant system intact loop of 592.9 and 560.7 K in the hot and cold legs, respectively, and system pressure of 15.06 MPa. The experiment simulated a 200% double-ended offset shear in the pump discharge line in the cold leg of a four-loop, commercial PWR. The reactor was operated for a minimum of 20 hours to establish steady state conditions prior to blowdown. The 20-hour period was selected to maintain typicality of fuel fission product inventory with commercial PWRs while keeping fuel depletion to a minimum.

The purpose of this report is to present the data from Experiment L2-3 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 II briefly describes the LOFT configuration. Section III discusses the LOFT instrumentation system and the methods of obtaining certain measurements, and Section IV summarizes Experiment L2-3 initial conditions and experiment procedures. Section V presents the data with supporting information for data interpretation. Appendix A discusses the methods used to verify the consistency and accuracy of the data.

II. SYSTEM CONFIGURATION

The LOFT facility has been designed to simulate the major components and system responses of a commercial PWR during a LOCA. The experiment 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 1, and the LOFT piping configuration is shown in Figure 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 and four triangular (corner) fuel modules, shown in Figure 3 and described in Reference 2. The center assembly is highly instrumented. Two of the corner and one of the square (15 x 15) assemblies are not instrumented. The fuel rods have an active length of 1.67 mm and an outside diameter (OD) of 10.72 mm.

The fuel consists of UO_2 sintered pellets with an average enrichment of 4.0 weight % fissile uranium (U^{235}) and the density 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. Clad 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 circulating coolant pumps in parallel, a pressurizer, a venturi flowmeter, and connecting piping. For Experiment L2-3 the intact loop steam generator inlet and outlet plenums contained low resistance, square-edged orifice plates.

The broken loop consists of a hot leg and a cold leg that are connected to the reactor vessel and the blowdown suppression tank header. Each leg consists of a break plane orifice which determines the break size to be simulated, a quick-opening blowdown valve (QOBV) which simulates a pipe break, a recirculation line, an isolation valve, and connecting piping. The break flow area (each break plane orifice area) in this configuration is 8.4 mm which is 100% of the possible break flow area of each line. The recirculation lines established a small flow from the broken loop to the intact loop to maintain approximately equal loop temperatures prior to blowdown. These recirculation paths are isolated from the system just prior to blowdown initiation.

The broken loop hot leg also contains a simulated steam generator and simulated pump. These simulators have hydraulic orifice plate assemblies which have similar (passive) resistances to flow as an active steam generator and a free-wheeling pump.

The blowdown suppression system simulates the containment backpressure of a commercial PWR. This system comprises the blowdown suppression tank header, the blowdown suppression tank, the nitrogen pressurization system, and the blowdown suppression tank spray system. The blowdown header is connected to the suppression tank downcomers that extend inside the tank and discharge below the water level established as an Experiment L2-3 initial condition. 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 blowdown suppression tank initial pressure. The spray system consists of a centrifugal pump which discharges through a heatup heat exchanger and either three spray headers or a pump recirculation line that contains a cooldown heat exchanger. The spray pump suction can be aligned to either the blowdown suppression tank or the borated water storage tank. The three spray headers have flow rate capacities of 1.3, 3.8, and 13.9 l/s and are located in the blowdown suppression tank along the upper

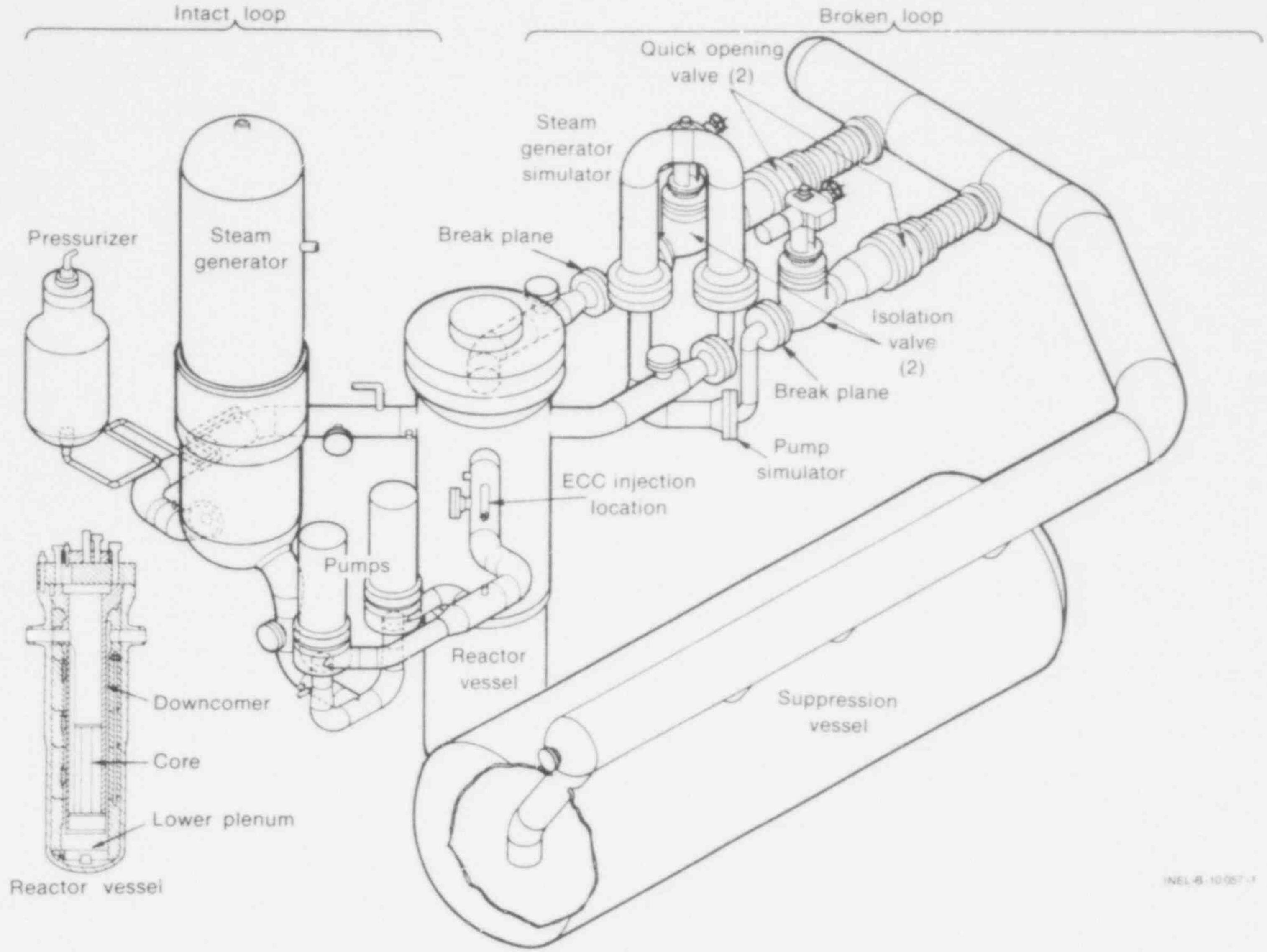

Fig. 1 LOFT major components.

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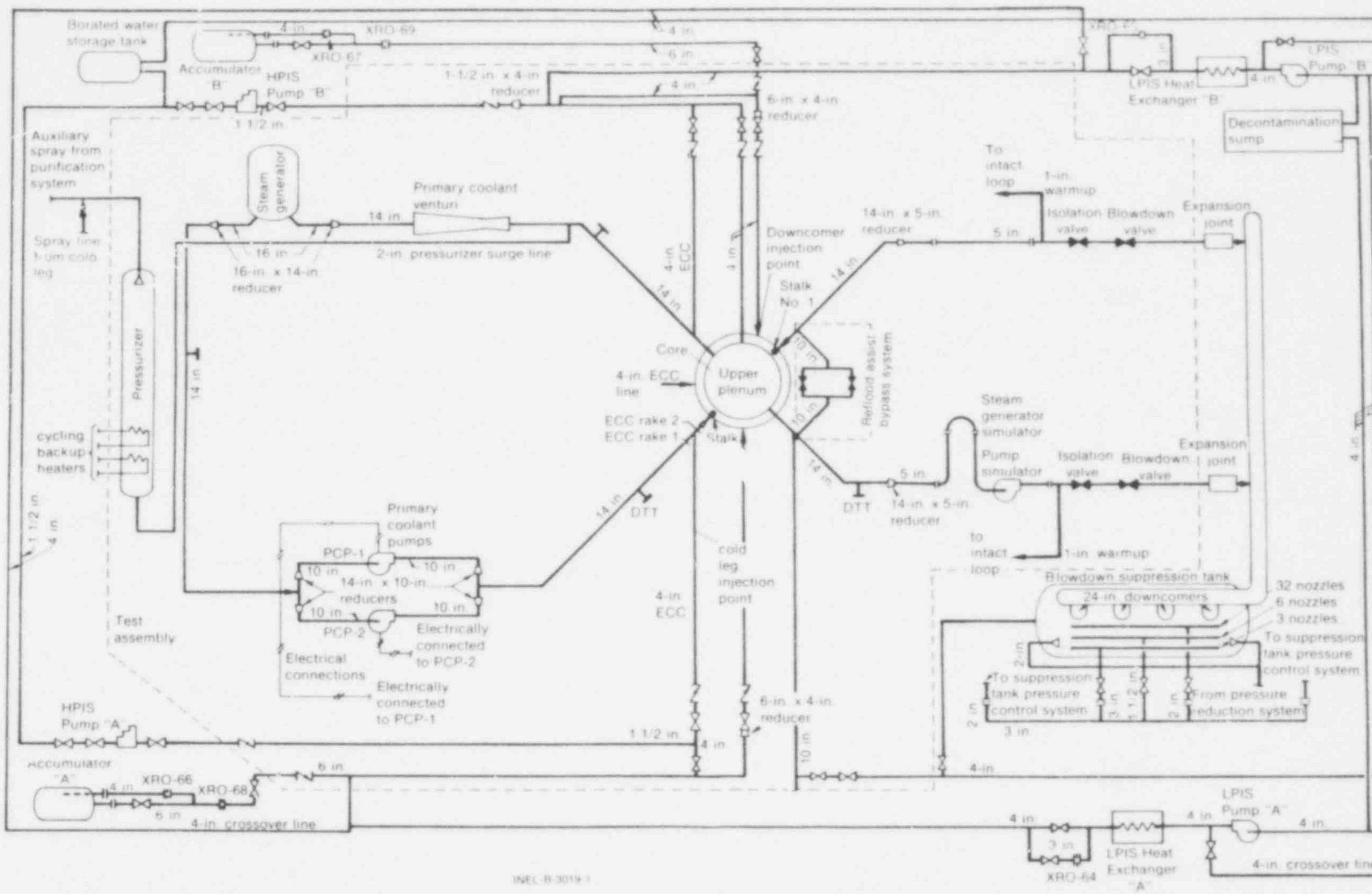

Fig. 2 LOFT piping schematic.

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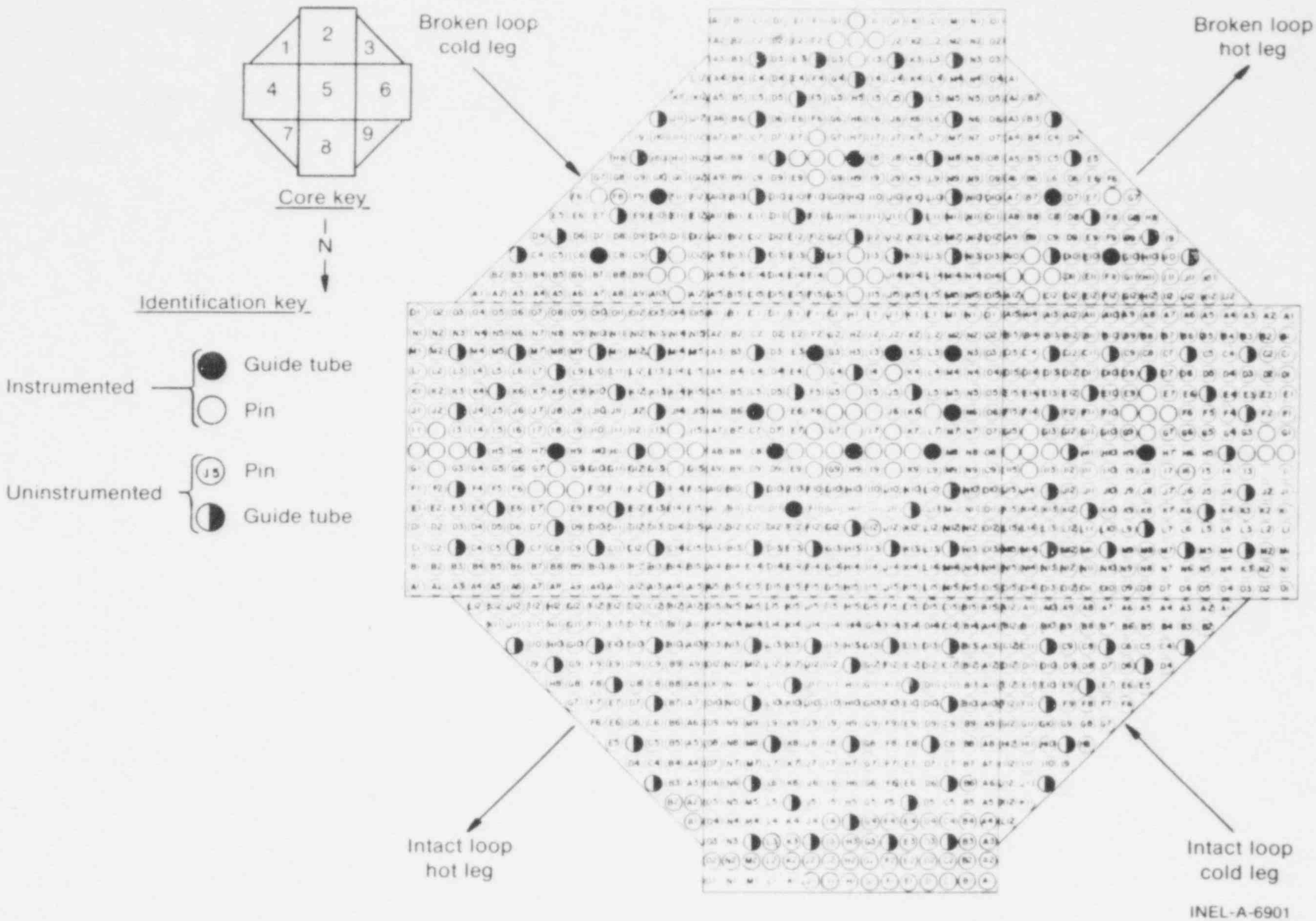

Fig. 3 LOFT Core I configuration showing rod designations.

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centerline. The peak pressure in the blowdown suppression tank was established by predetermined pressure, temperature, and liquid level to simulate the containment backpressure of a commercial PWR. Following Experiment L2-3 initiation, the suppression tank spray system was automatically initiated and adjusted to follow a predetermined pressure history. Therefore, the blowdown effluent was contained within the blowdown suppression tank but provided the peak pressure and predetermined pressure history that would have resulted had the break occurred in a commercial PWR which was discharging into its containment vessel.

The LOFT ECCS simulates the ECCS of a commercial PWR. The accumulator, the high-pressure injection system (HPIS), and the low-pressure injection system (LPIS) were used during this experiment. Each system was arranged to inject scaled flow rates of ECC directly into the primary coolant system cold leg. To provide these scaled flow rates, Accumulator ACC-A, HPIS Pump A, and LPIS Pump A were utilized. Accumulator ACC-A was preset to inject ECC at a system pressure of 4.22 MPa. HPIS Pump A was preset to inject at 1.58 l/s and to initiate upon receipt of a low pressurizer level coincident with a low system pressure signal. Initiation of LPIS Pump A flow began by a valve in the ECC line opening upon receipt of a low system pressure coincident with a low pressurizer signal. The actual recorded values for the ECCS injection setpoints are presented in Section IV.

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III. MEASUREMENTS AND INSTRUMENTATION

The LOFT instrumentation system was designed to measure and record the important events that occur during a LOCE. For Experiment L2-3, 888 channels of data were recorded.

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

Pressure measurements were generally obtained with strain-gage transducers with pressure transmission lines connecting the transducers to the measurement points. Two piezoelectric transducers were used where high-frequency response was desired rather than absolute accuracy. Free-field pressure transducers, in which the sensing elements were inside a bellows arrangement and immersed in the fluid at the measurement location, were also used to eliminate connecting transmission lines and thereby produce higher frequency response without the distortion caused by the lines.

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

Flow velocity measurements were generally obtained directly by use of turbine flowmeters. Momentum flux was measured by drag discs. The presented data for fluid velocity and momentum flux are based on the following flow areas at the instrument locations:

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

Density was measured by gamma densitometers through the use of the attenuation of gamma rays from a Co^{60} source to sense the mass of fluid within the pipes. Each of these densitometers had three beams (Beams A, B, and C) which traversed the lower, middle, and upper parts of the pipe, respectively. In addition, each had a detector (Beam D) located so that it measured background radiation. Figure 4 shows the typical gamma densitometer configuration relative to the piping.

Liquid levels were obtained by means of (a) differential pressure transducers in the pressurizer, accumulators, steam generator secondary, and blowdown suppression tank 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, turn counter, and pulse totalizers. 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. The turns counter and pulse totalizer indicate control rod position by monitoring the turns of the leadscrew. When the control rods are scrammed, the leadscrew is disengaged and the turns counters and pulse totalizers do not give an indication of control rod position.

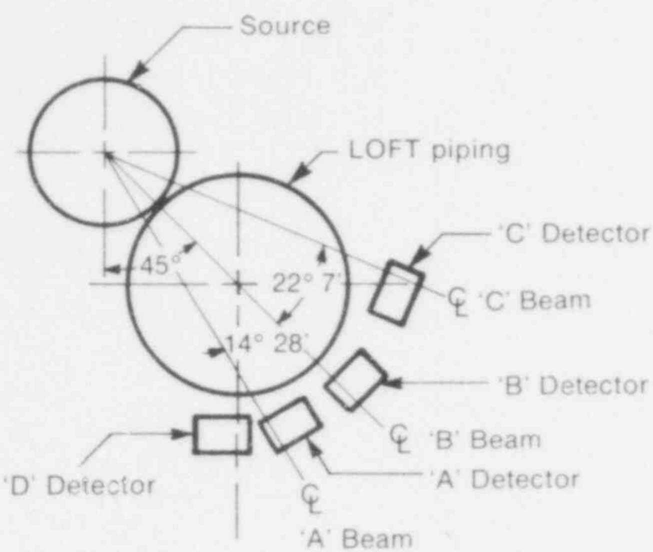

Fig. 4a Relation of source and detector to pipe for DE-BL-1 and DE-PC-2 (view looking toward reactor vessel).

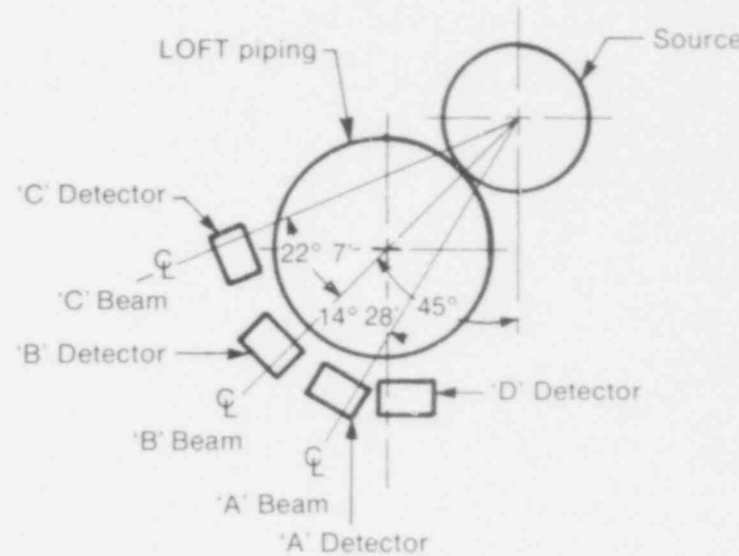

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Fig. 4b Relation of source and detector to pipe for DE-BL-2 and DE-PC-1 (view looking toward reactor vessel).

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

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

Reactivity was measured by boron trifluoride proportional counters, voltmeters, both compensated and uncompensated ionization chambers, and an analog computer.

The prompt power transient was measured by self-powered neutron detectors. Each detector consists of a cylindrical Co^{59} 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 is determined from neutron flux measurements taken with a transversing in-core probe (TIP) at four guide tube locations in the core. This instrument consists of a fission chamber attached to a flexible cable and its own data recording system. The probe is withdrawn and stored outside the core prior to blowdown initiation.

The data acquisition and visual display system (DAVDS) was used to record the measurement data from the various instrumentation systems on a combination of digital recorders, medium-band and 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 multiplex format at the LOFT facility and to perform equipment calibrations, posttest data reduction, and plotting[4]. Immediately following the test, the computer was used to reduce critical channels of the data so that a decision could be made quickly as to the success of the experiment. The recorded FM data were converted into digital form which were then demultiplexed to be compatible with the CDC CYBER 76/173 computer system.

The CDC CYBER 76/173 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. Those measurement comparisons that were determined to be within the accuracy of the particular instrument were labeled as qualified engineering units data (QEUD).

Transducers were generally calibrated under laboratory conditions prior to installation in LOFT. Verification of calibration constants was accomplished by performing special tests during heatup and analyzing initial conditions data. In addition, post-LOCE checks were performed to pinpoint questionable data and to verify data consistency. Appendix A gives a discussion of the techniques used to perform data consistency checks.

Figure 5 shows a piping schematic with instrument locations indicated. Table I gives the nomenclature for LOFT experimental and process instrumentation designations. 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.

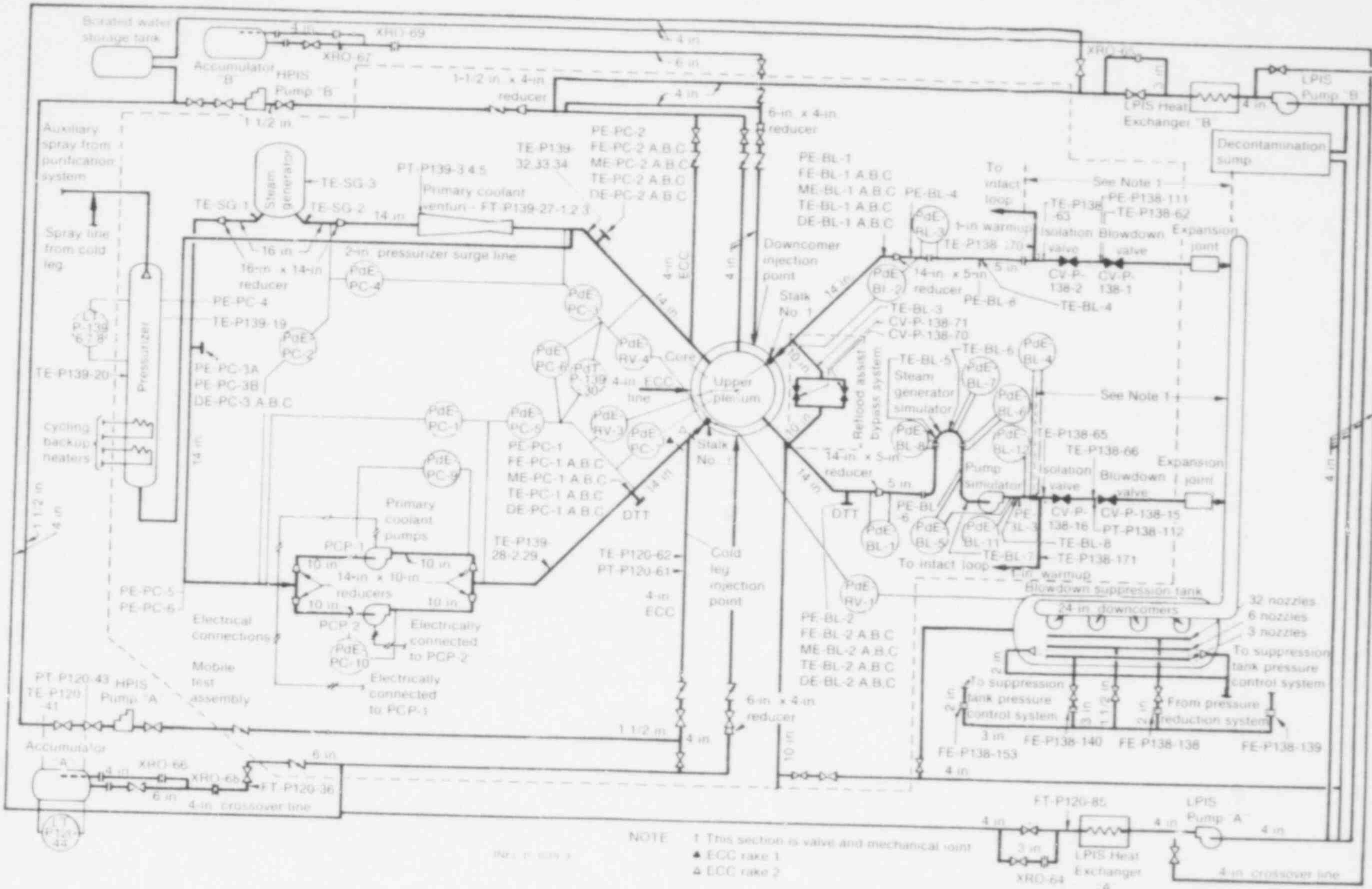

Fig. 3 LOFT piping schematic — with instrumentation.

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TABLE I

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
ME	Momentum flux detector
NE	Neutron detector
PCP	Primary coolant pumps
PdE	Differential pressure element
PE	Pressure element
RPE	Pump speed element
TE	Temperature 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
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
LS	Control rod limit switch
LT	Liquid level transmitter
PdT	Differential pressure transmitter
PT	Absolute pressure transmitter

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TABLE I (continued)

Designations for the different types of process instruments (continued).

RE	Radiation element
TE	Temperature element
TT	Temperature transmitter

Designations for the different systems associated with the process instruments.

P4	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
P140	Primary coolant purification system
P141	Primary component cooling system
T-86	Intermediate range
T-87	Power range
CRDM	Control rod drive mechanism

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

TE-3B11-28

Figures 6 and 7 show isometric views of the major system components with instrument locations indicated and Figures 8 through 17 give more specific locations for instruments located on individual components. Reference 1 may be consulted if additional details of instrument design and locations are desired.

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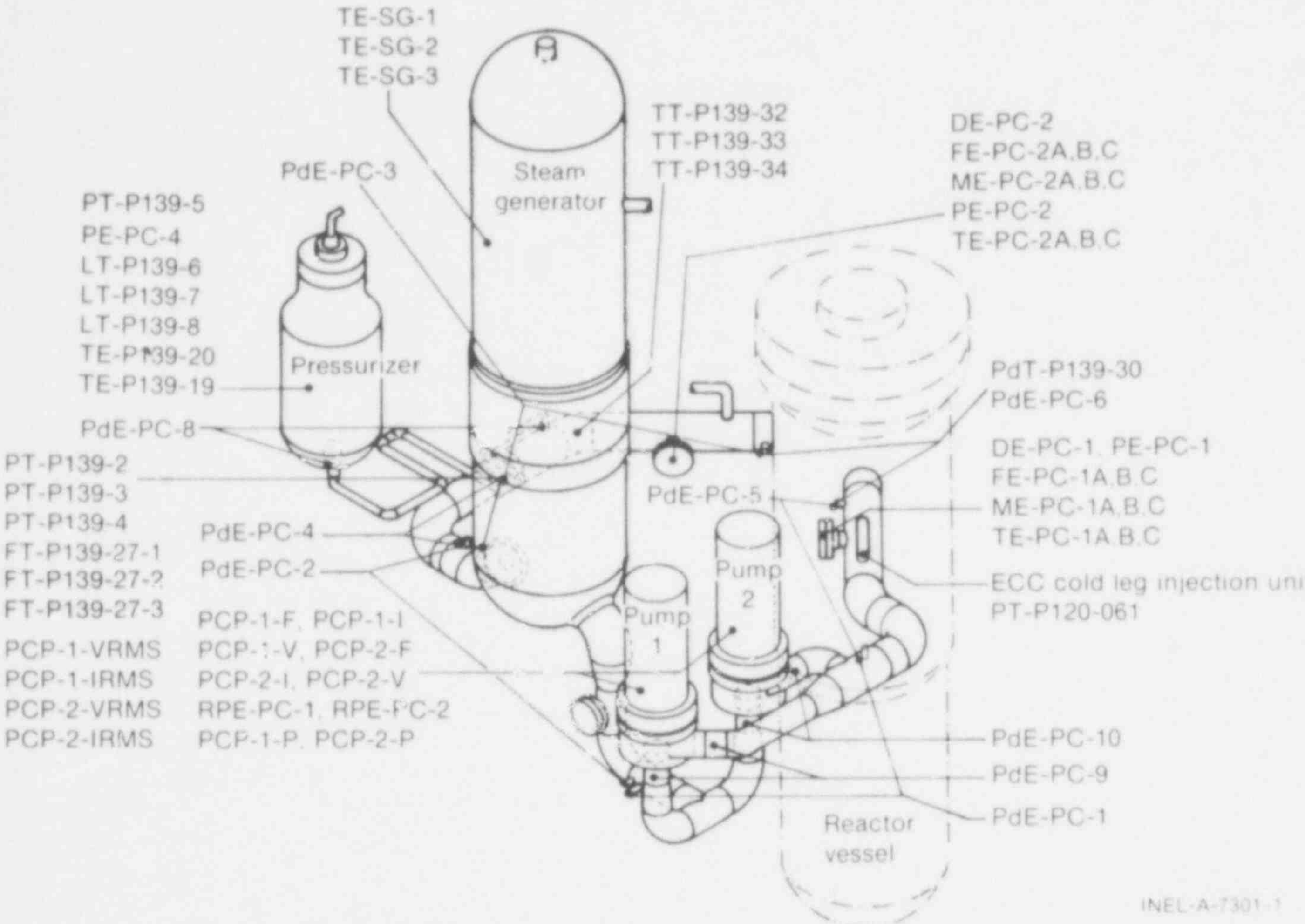

Fig. 6 LOFT thermo-fluids measurements instrumentation for intact loop.

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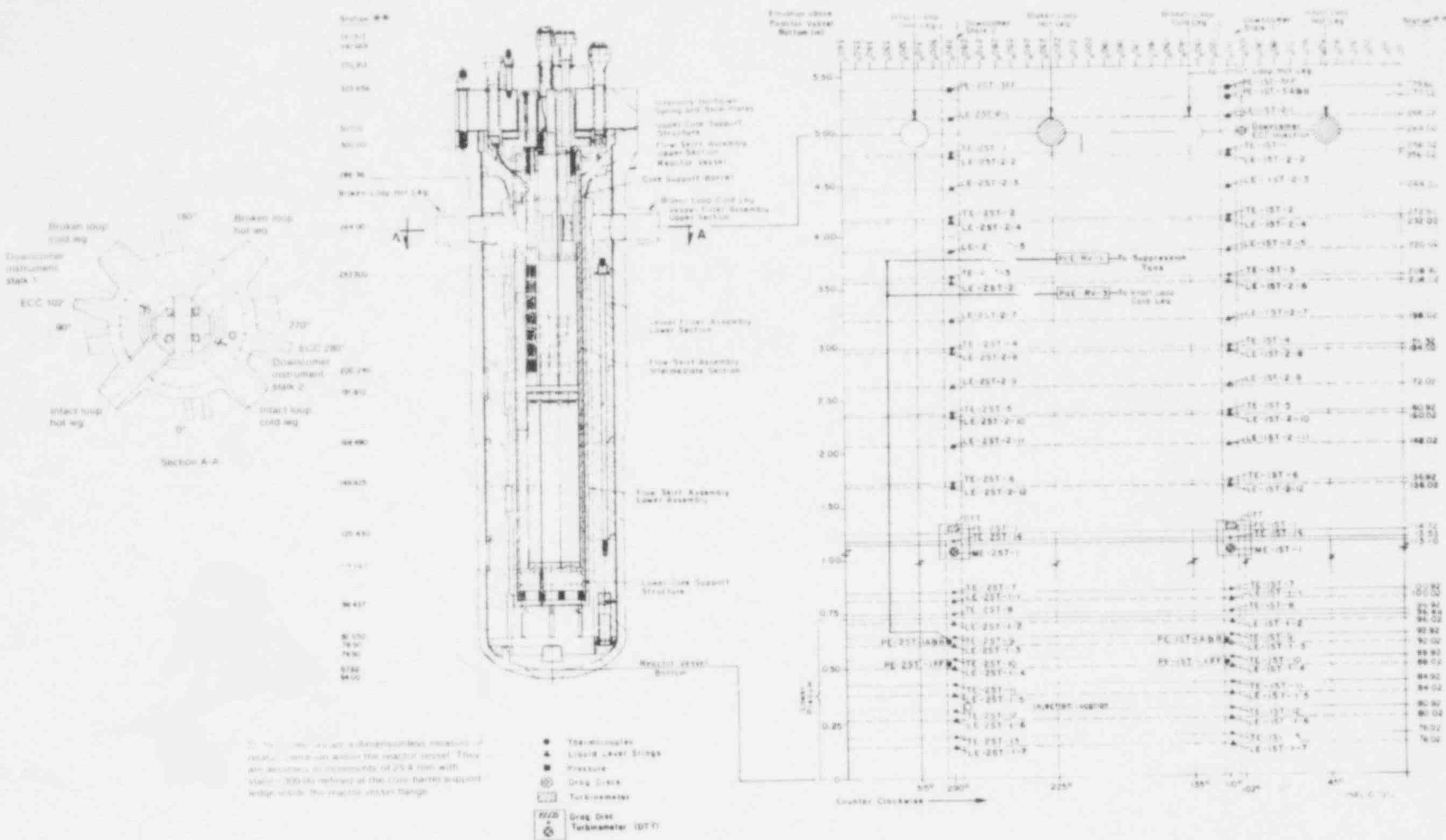

Fig. 8 LOFT reactor vessel instrumentation.

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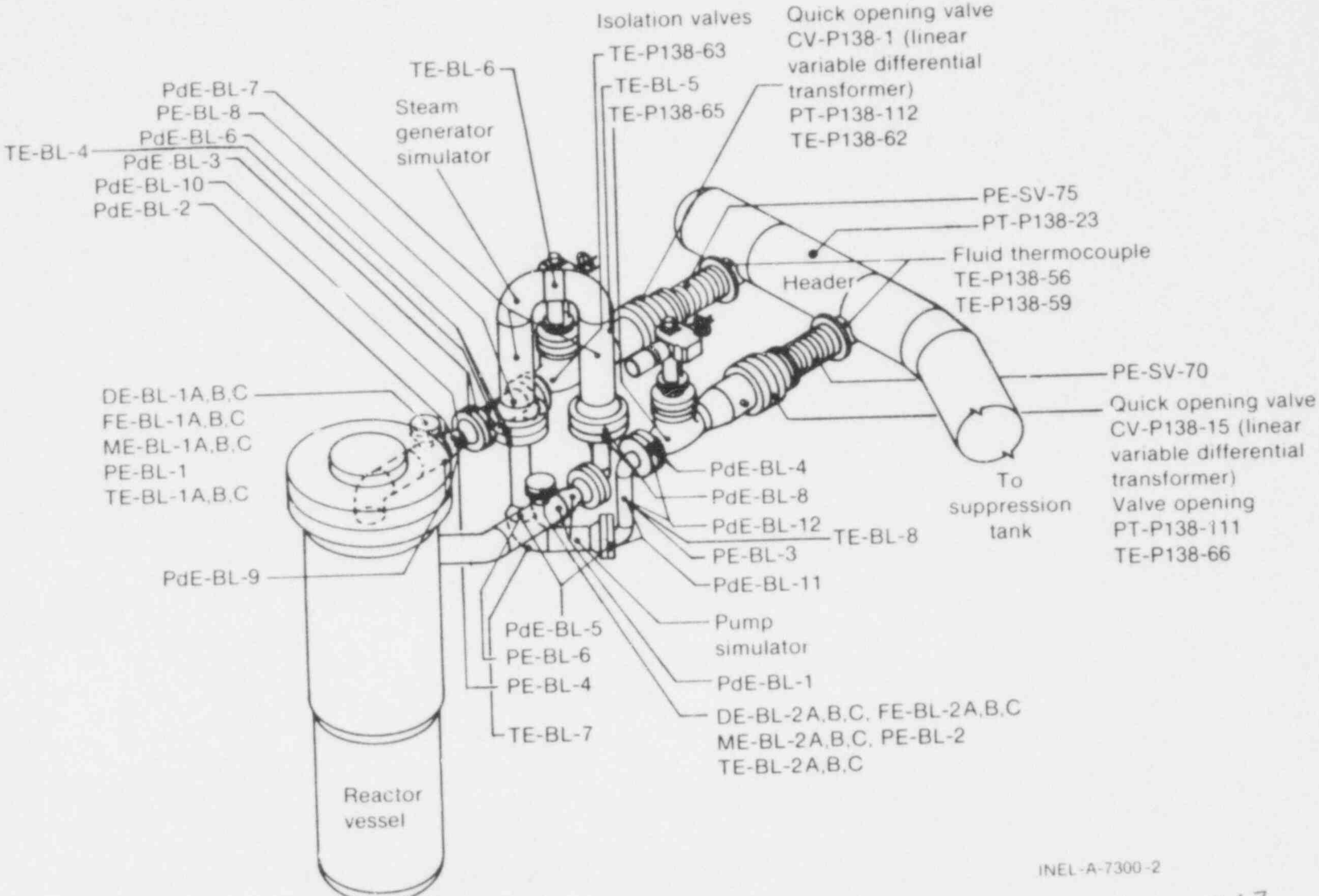

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Fig. 7 LOFT thermo-fluids measurements instrumentation for broken loop.

* 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.

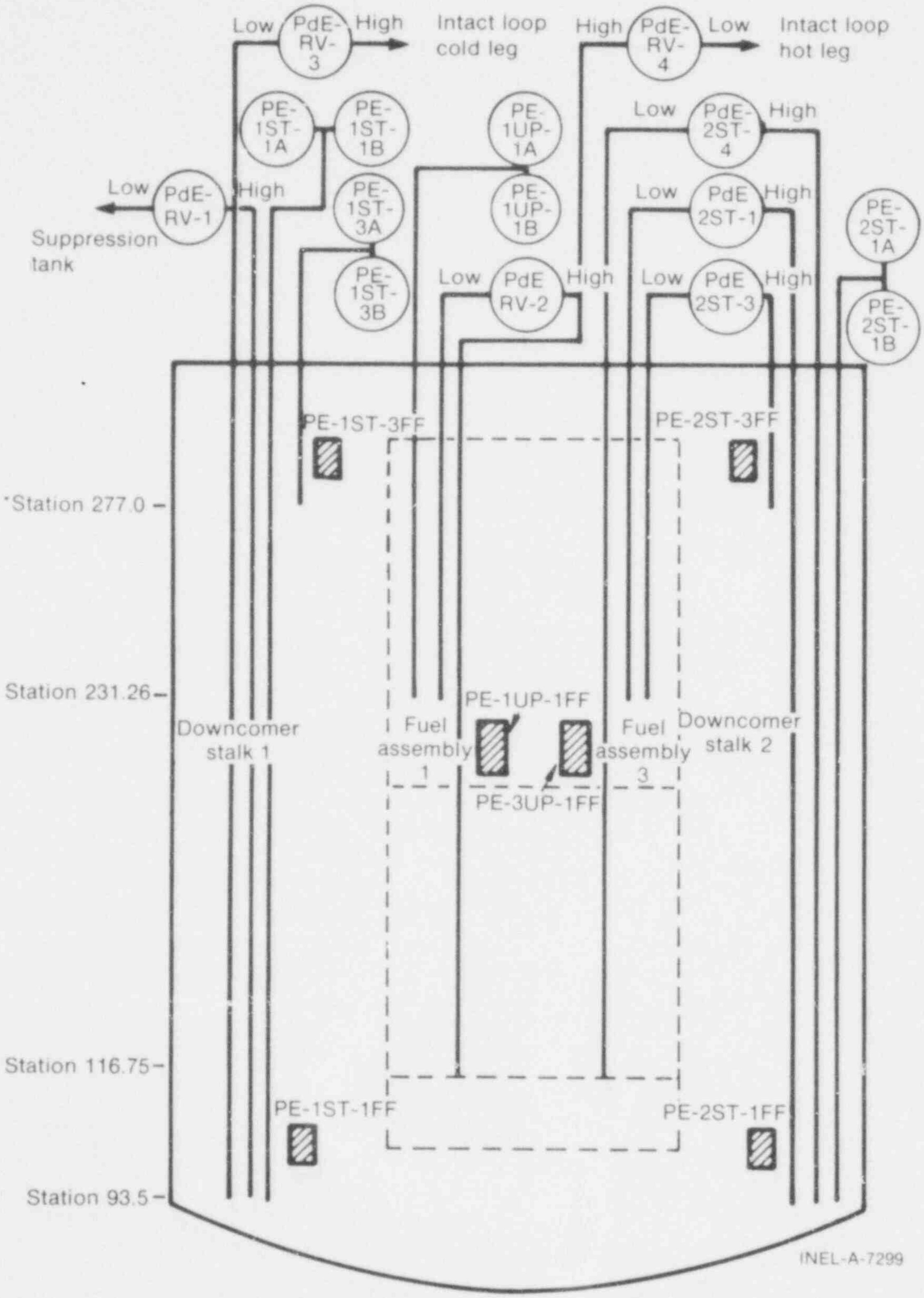

Fig. 9 LOFT reactor vessel pressure and differential pressure instrumentation.

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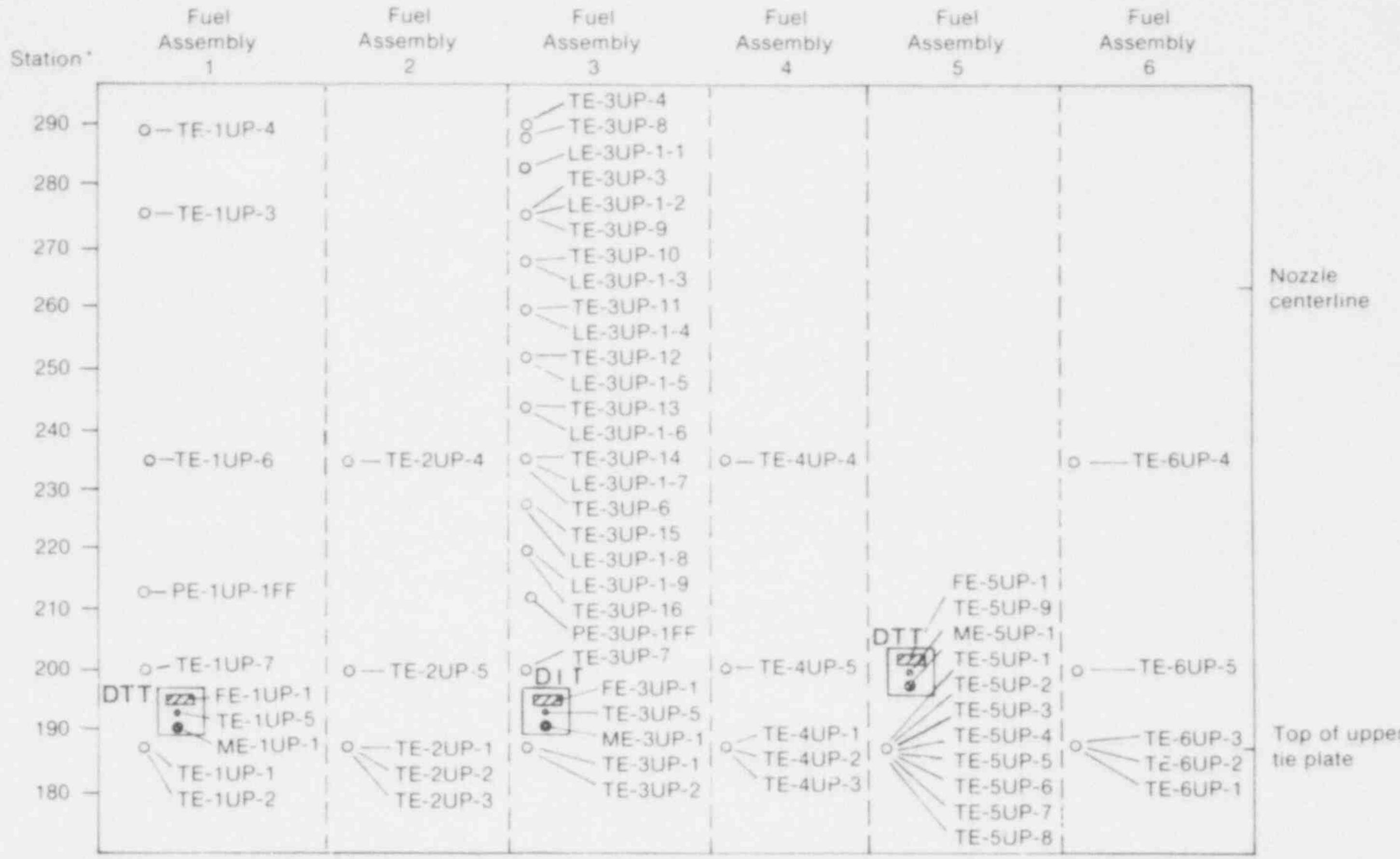

* Station numbers are a dimensionless measure of relative elevation within the reactor vessel. They are assigned in increments of 25.4 mm with station 300.00 defined at the core barrel support ledge inside the reactor vessel flange.

Fig. 10 LOFT reactor vessel upper plenum DTT, LE, and TE elevations.

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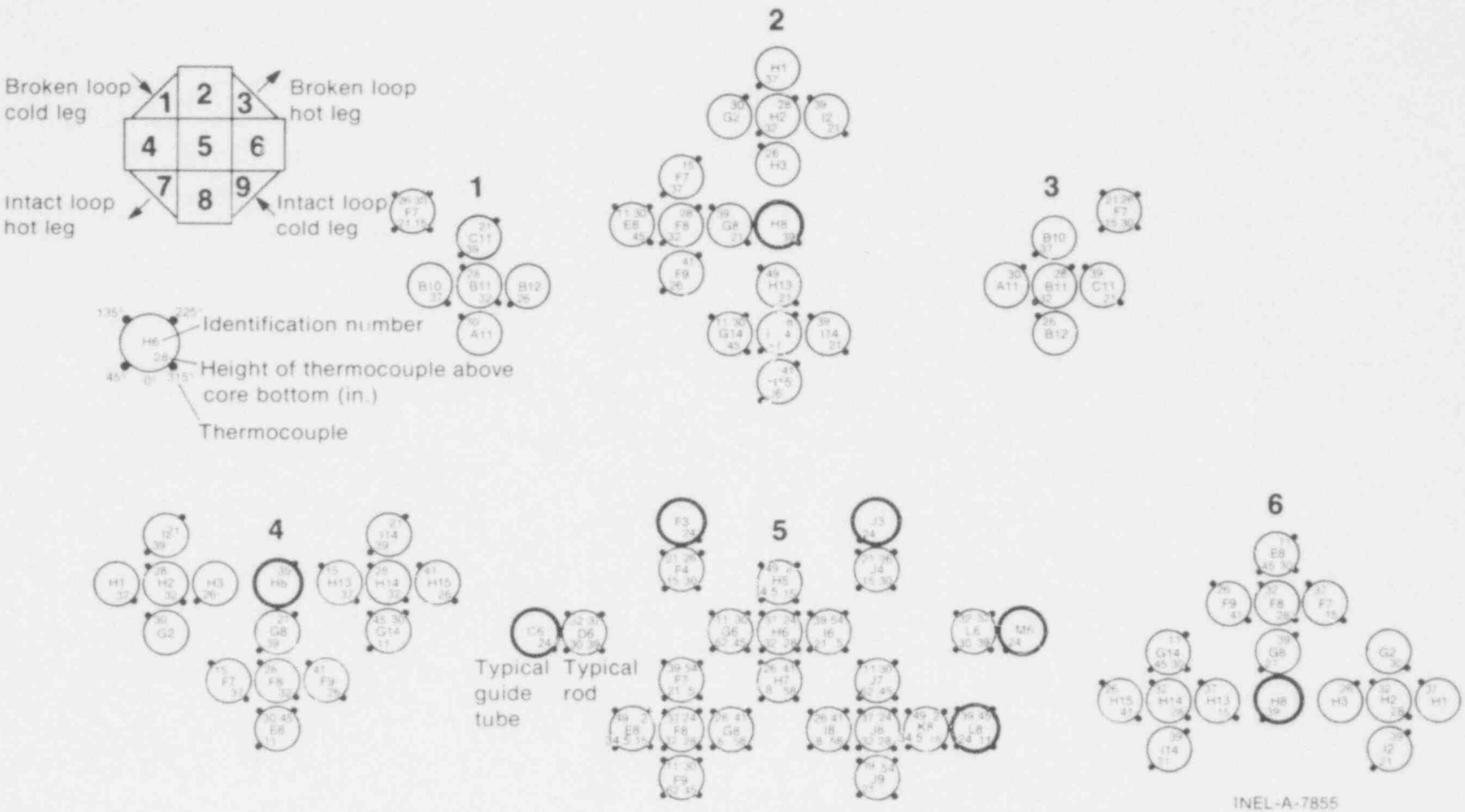

Fig. 11 In-core thermocouple locations for LOFT Core 1.

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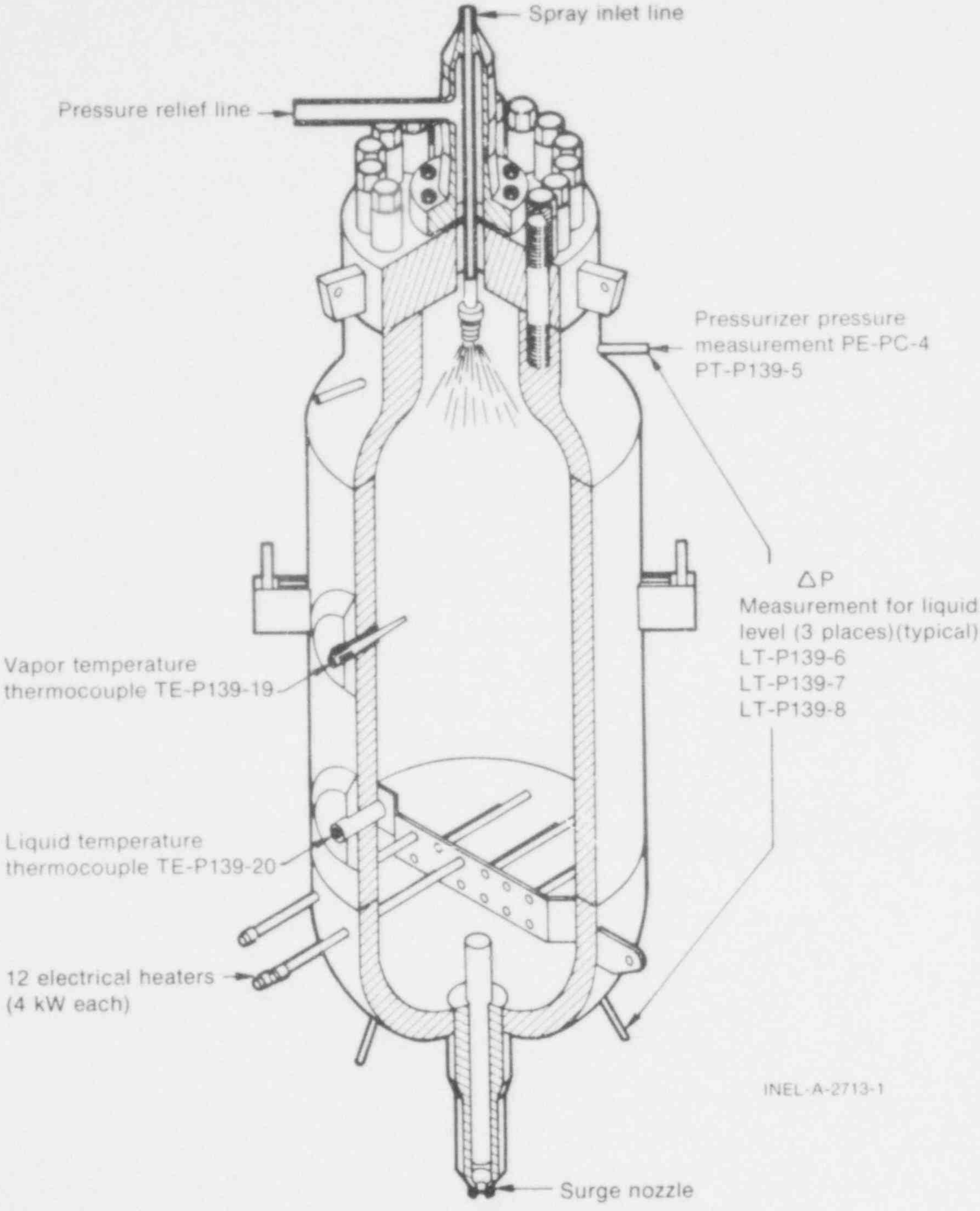

Fig. 12 LOFT pressurizer instrumentation.

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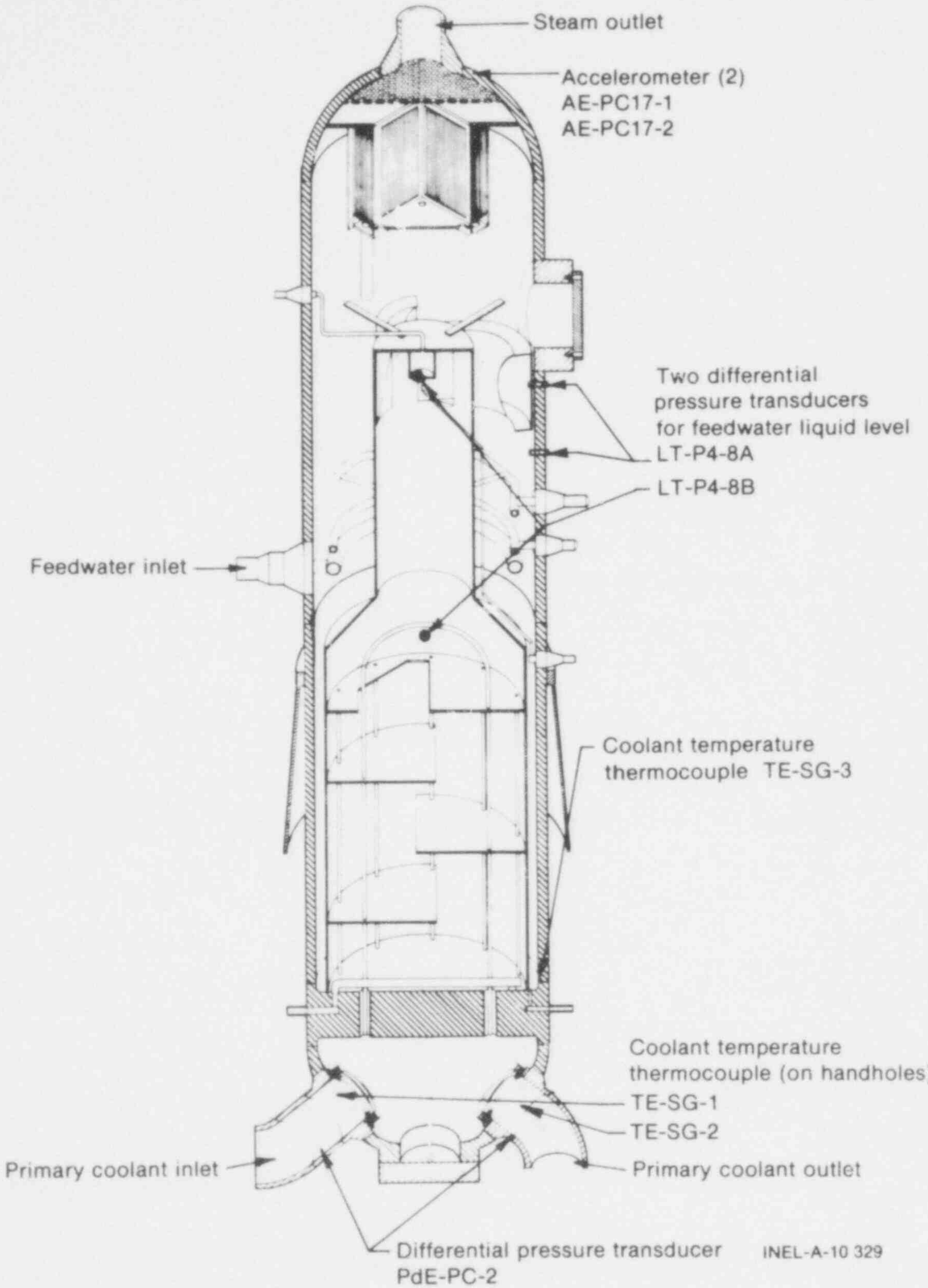

Fig. 13 LOFT steam generator instrumentation.

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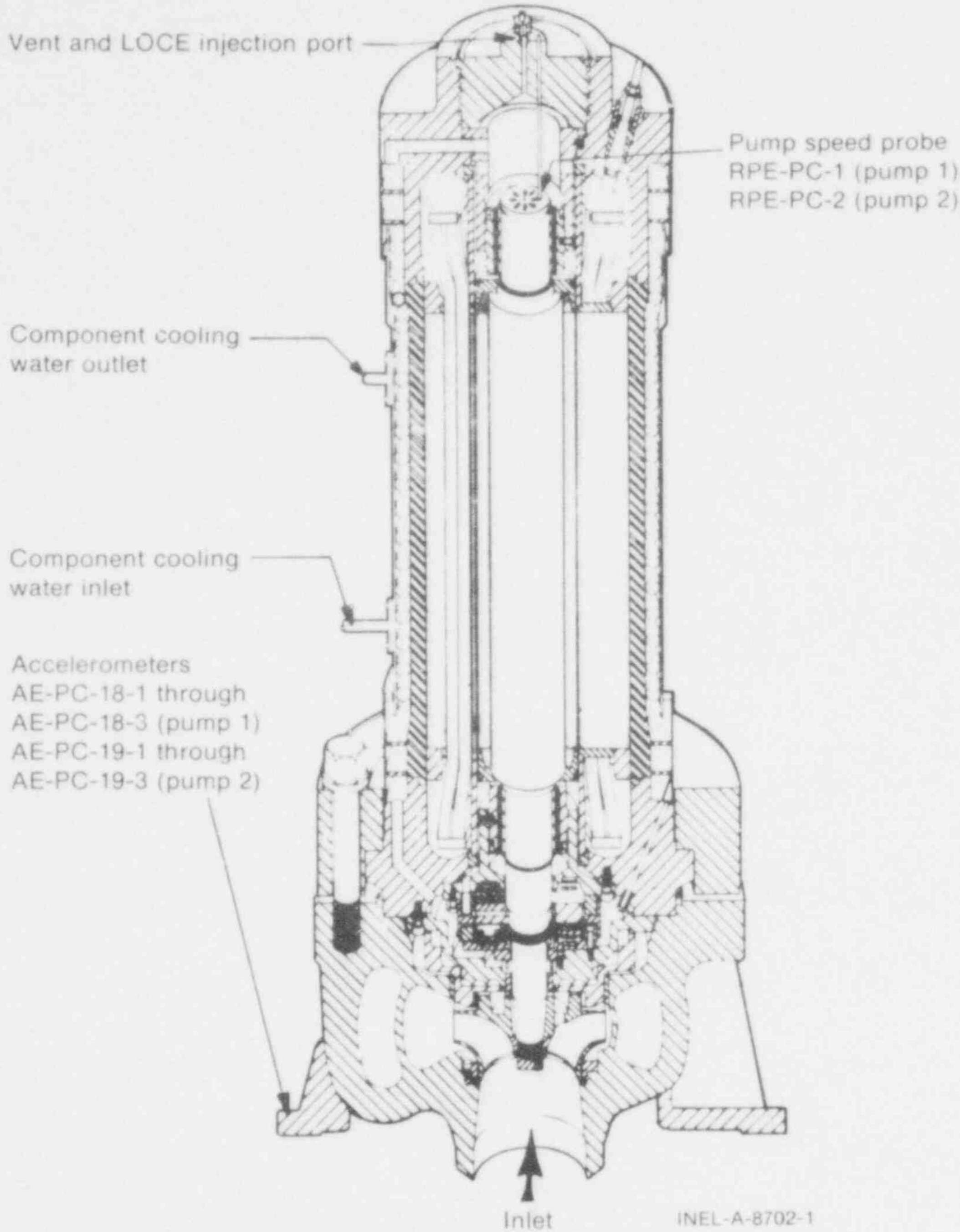

Fig. 14 LOFT intact loop pump instrumentation.

563 176

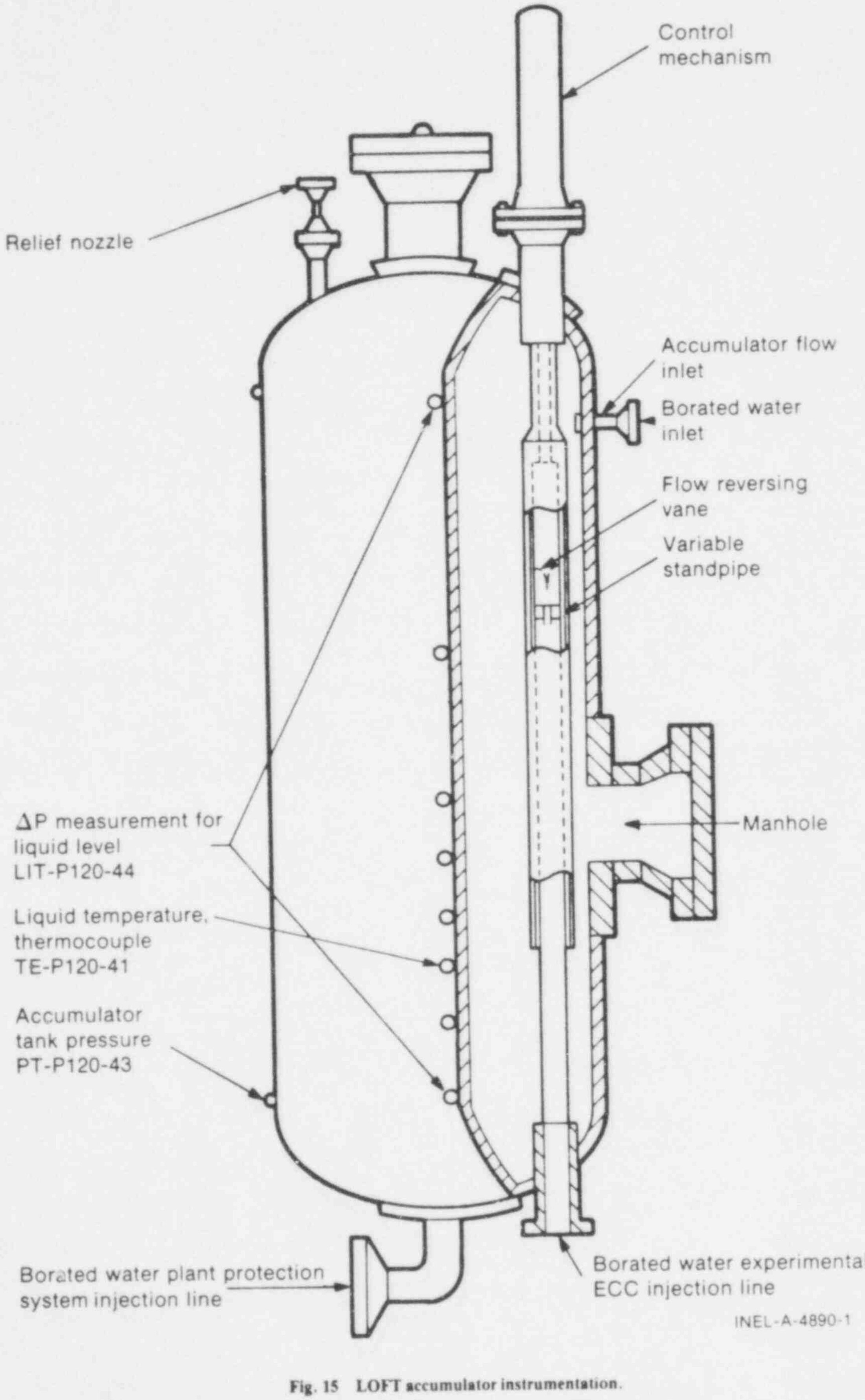

Fig. 15 LOFT accumulator instrumentation.

563 1?7

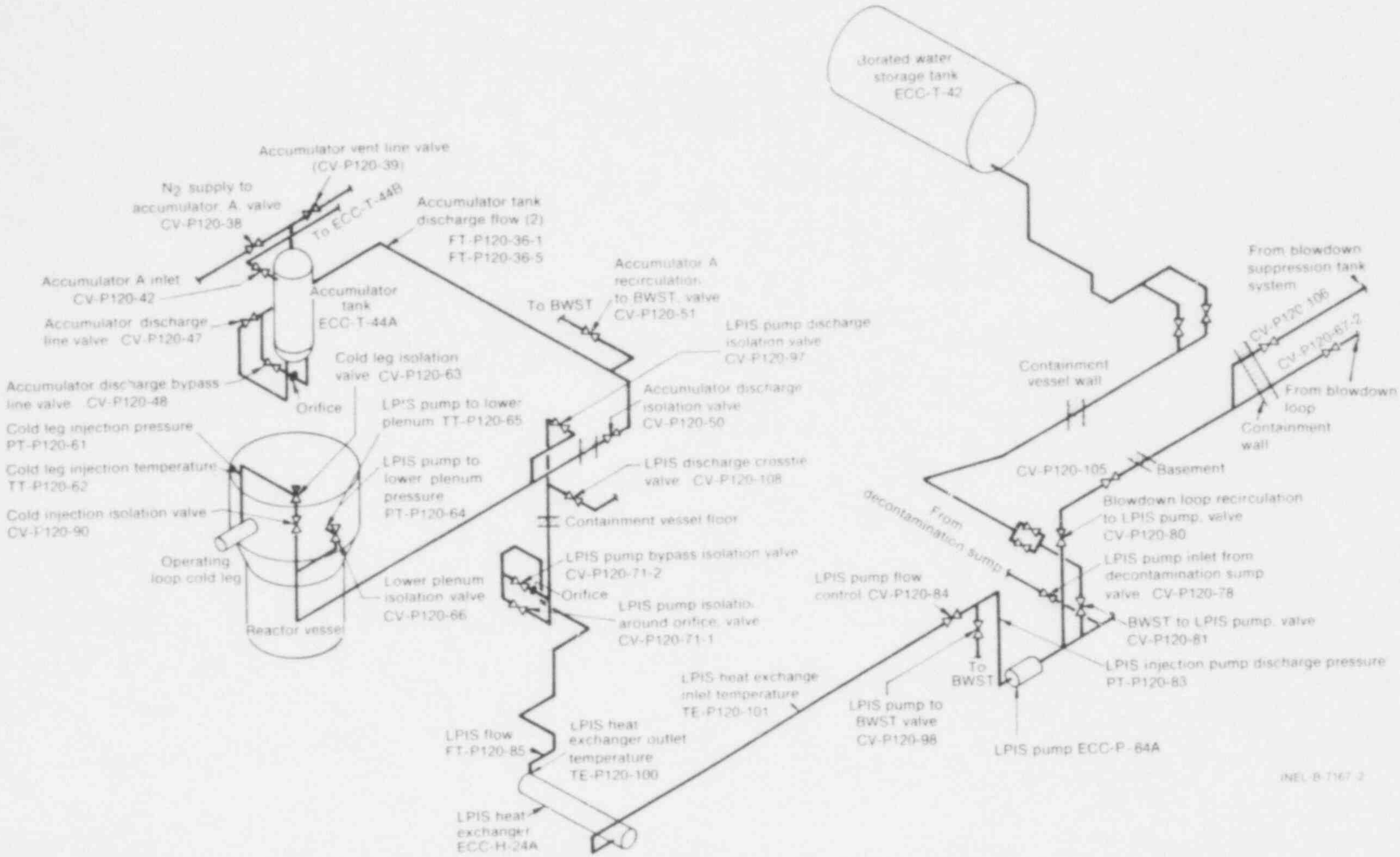

Fig. 16 LOFT ECCS instrumentation.

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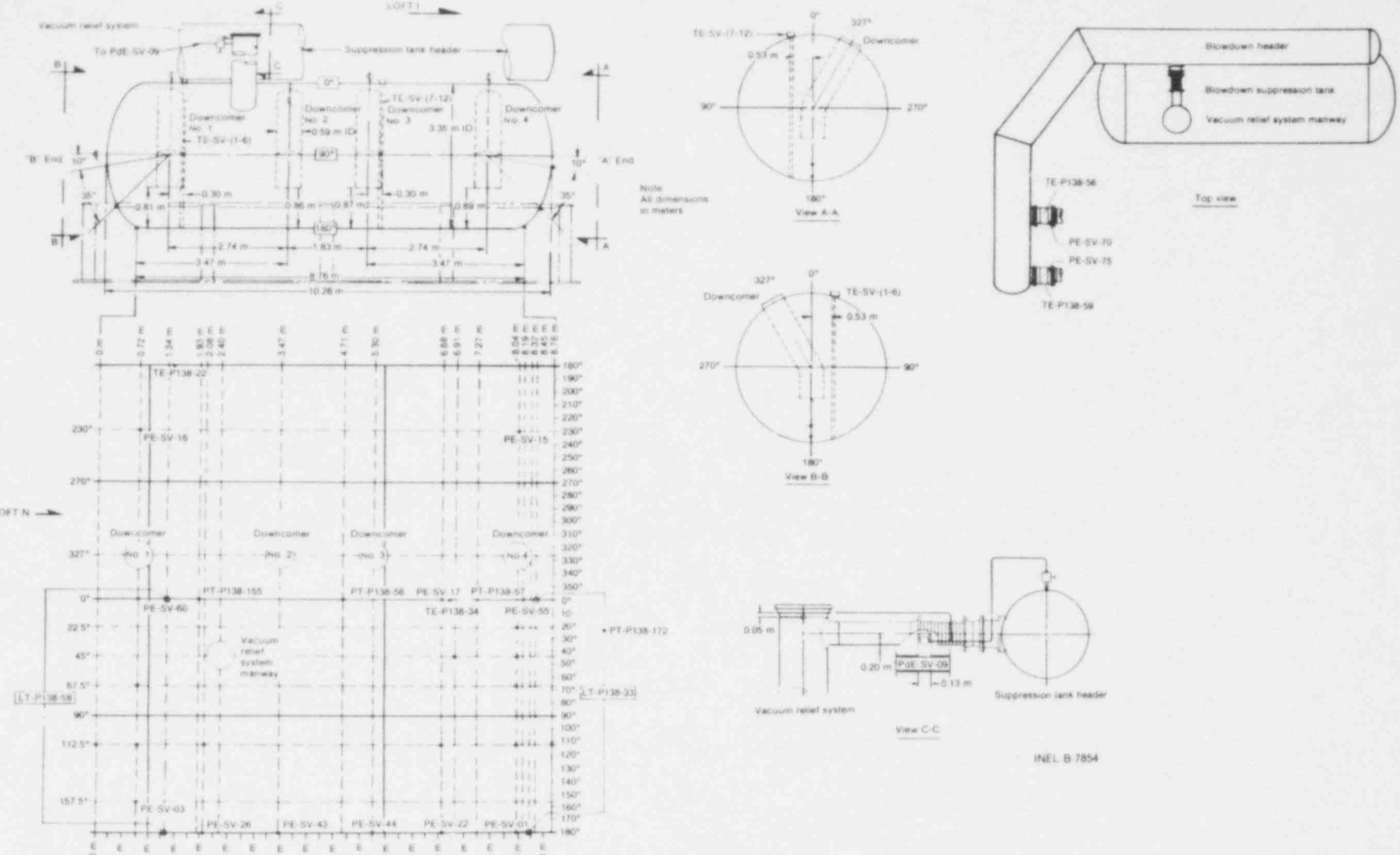

Fig. 17 LOFT blowdown suppression tank instrumentation.

IV. EXPERIMENT PROCEDURES AND INITIAL CONDITIONS

The following test procedures and initial conditions are specific to Experiment L2-3.

1. EXPERIMENT PROCEDURES

In preparation for Experiment L2-3, the primary coolant system was filled and vented and the specified system water chemistry was established. Prior to the heatup of the plant, 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 primary coolant system pressure was hydrostatically increased to 1.46, 3.53, 6.98, 10.43, 13.9, and 15.6 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 20, 40, 50, and 60 Hz with 20 s of data taken at each frequency. Finally, just before heatup of the plant, the appropriate initial conditions were established for the blowdown suppression tank, accumulator, and borated water storage tank.

The plant was stabilized at three different temperatures during heatup: 422, 489, and 555 K. 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 stabilization point, 20 s of data were obtained at 15.6, 13.9, 12.5, 11.1, 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 each of the three heatup temperatures. Before the reactor was brought to critical, the DAVDS was calibrated and the boron concentration in the accumulators, blowdown suppression tank, and borated water storage tank was verified.

After reactor criticality was achieved, a power level of 36.7 MW was maintained until blowdown occurred. A plot of the power level versus time for the 80-hour period prior to blowdown is given in Figure 18. During this time, calorimetric measurements of power level were performed using the secondary coolant system (SCS) feed flow and temperature. The core axial and radial flux profiles were used to calculate the experiment power level. The flow rate was set at 199.8 kg/s and adjustment of the SCS was made to attain the calculated experiment power level. The primary coolant system boron concentration was adjusted to establish a reactor vessel outlet temperature of 592.9 K.

Prior to blowdown, a DAVDS calibration and data integrity check were performed. During this period, the initial-condition water samples were taken from the primary coolant system, the secondary coolant system, and the blowdown suppression tank. The conditions in the intact loop were established to provide 199.7 kg/s flow with temperature in the hot leg and pressure at 592.9 K and 15.06 MPa, respectively, at the time of blowdown initiation. The blowdown isolation valves were opened 10 minutes before blowdown. Purification lines and broken loop recirculation lines to the intact loop were closed.

Immediately prior to blowdown (within 90 s), the DAVDS was activated and data recording was started, coolant flow to the primary coolant pumps was initiated and the pressurizer heaters were turned off. Experiment L2-3 was initiated. QOBV-2 (CV-P138-15) commenced opening 1.9 ms before QOBV-1 (CV-P138-1) and opened to the flow area of a 12-inch Schedule 160 (0.30 mm OD) pipe in 19.1 ms; QOBV-1 opened to the same flow area in 17.2 ms. The sequence of events for Experiment L2-3 is provided in Table II.

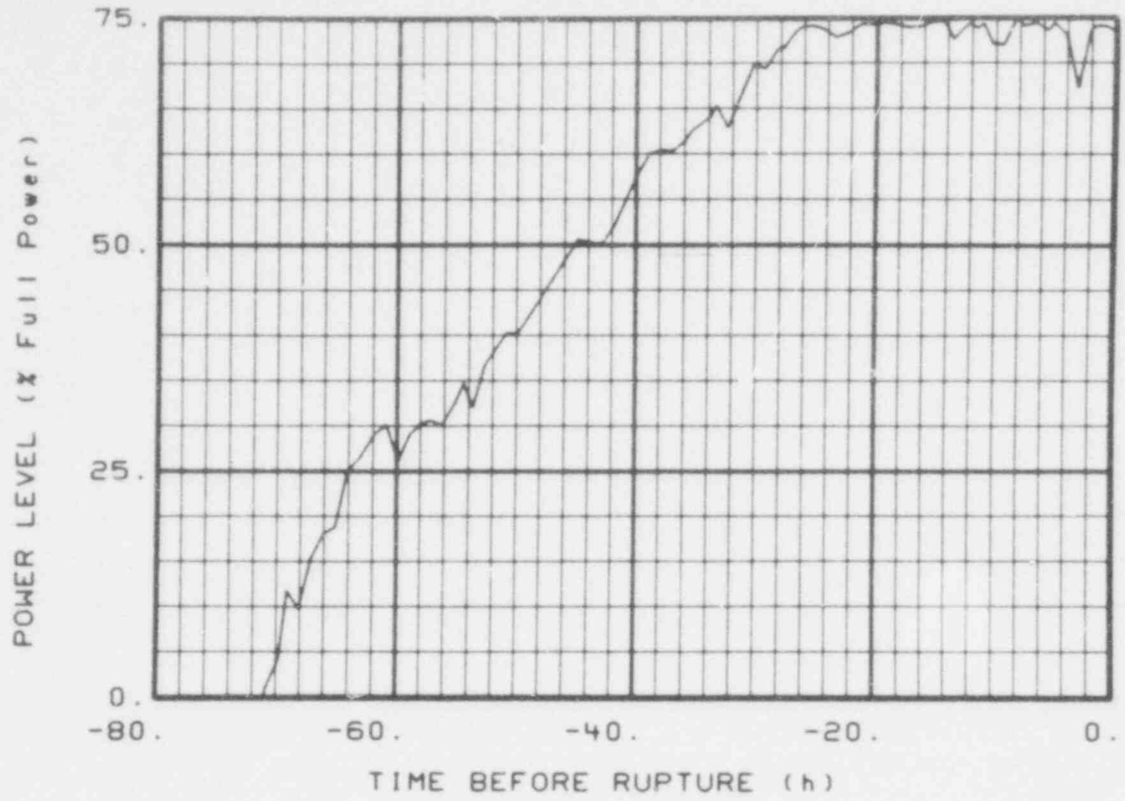

Fig. 18 LOFT power history prior to Experiment L2-3 blowdown (full power = 50 MWt).

Electrical power to the primary system motor generator sets was terminated at 200 s after blowdown initiation and the primary coolant pumps began to coast down under the influence of a flywheel system (316.0 kg/m^2). The primary system motor generator set field breakers were tripped at 215 s before the primary coolant pumps coasted down below 12.5 Hz.

Emergency core coolant injection was directed to the intact loop cold leg during blowdown. Injection from Accumulator ACC-A at a system pressure of 4.18 MPa began approximately 17 s after initiation of blowdown and continued for 32 s. The HPIS flow was initiated by LOCE control 14 s after the initiation of blowdown and was injected at a flow rate of 1.3 l/s. The LPIS flow was initiated by LOCE control 29 s after the initiation of blowdown. Nitrogen gas from Accumulator ACC-A entered the system at 49 s and continued to flow for about 11 s.

Initial conditions were set to produce a peak pressure of 285 kPa in the blowdown suppression tank at which time the blowdown suppression tank spray system (BSTSS) was automatically initiated. The BSTSS was programmed to provide a spray rate proportional to the difference between the actual pressure and the desired pressure. The BSTSS was not capable of following the desired pressure decay exactly because of a pressure pulse caused by accumulator nitrogen entering the suppression tank. This spray was continuous until recording stopped.

The DAVDS recording system obtained approximately 5 minutes of data after simulated rupture. An electrical calibration of the DAVDS was performed following the experiment.

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TABLE II

SEQUENCE OF EVENTS FOR POWER ASCENSION EXPERIMENT L2-3

Event		Time after Blowdown initiation[a] (s)			
LOCE L2-3 initiated		0			
Reactor scram signal received at control room		0.103			
Control rod height above core bottom:		Control rods:			
		2	4	6	8
	1.22 m	0.423	0.423	0.423	0.433
	0.81 m	0.663	0.653	0.653	0.673
	0.28 m	0.983	0.953	01953	0.973
	0.0 m	1.683	1.493	1.653	1.533
Control rods completely inserted		1.683			
HPIS injection initiated		14			
Pressurizer emptied		14			
Accumulator A injection initiated		17			
LPIS injection initiated		29			
Lower plenum filled with liquid		35			
Saturated blowdown ended		40			
Accumulator A liquid line flow ended[b]		49			
Core volume reflooded		55			
Blowdown suppression tank maximum pressure attained		70			
Primary coolant pumps tripped		200			

a. Blowdown initiation time was

Year	Day	Hour	Minutes	(s)
79	132	22	35	22.332

b. Flow measuring point is downstream of level indicator.

2. INITIAL CONDITIONS

The initial conditions (except for the linear heat generation rate conditions) and tolerance bands for Experiment L2-3 are presented in Table III along with the values measured immediately prior to the blowdown initiation. Initial conditions were within specified tolerances except those indicated as out of specification in Table III. None of the conditions that were out of specification impaired the results of the experiment. Table IV gives the linear heat generation rate versus core height for four locations within the LOFT core prior to blowdown initiation. The data for Table IV were obtained from the traversing in-core probe system.

Table V gives the measured fluid temperatures of the primary coolant system immediately prior to blowdown initiation.

TABLE III

INITIAL CONDITIONS FOR POWER ASCENSION EXPERIMENT L2-3

Variable	Specified Value	Measured Value
Primary Coolant System		
Loop resistance	Low steam generator resistance orifices	Low resistance
Mass flow rate (kg/s)	—	199 ± 6.3
Pressure (MPa)[a]	14.95 ± 0.34	15.06 ± 0.03
Cold leg temperature (K)	—	560.7 ± 1.8
Hot leg temperature (K)	591.67 ± 7.2	592.9 ± 1.8
Boron concentration (ppm)	As required to establish temperature	679 ± 4
Reactor Vessel		
Power level (MW)	—	36 ± 1.0
Maximum linear heat generation rate (kW/m)	39.4	39 ± 3.0
Control rod position (above full-in position) (m)	1.372 ± 0.0127	1.37 ± 0.01
Pressurizer		
Stream volume (m^3)	—	0.293 ± 0.008
Water volume (m^3)	—	0.670 ± 0.008
Water temperature (K)	—	615.3 ± 3.0
Pressure (MPa)[a]	14.87 ± 0.34	15.06 ± 0.03
Level (m)	1.13 ± 0.178	1.19 ± 0.01
Broken Loop		
Hot leg temperature (K)	587.6 $^{+0}_{-44}$	
Near vessel (K)	—	565.5 ± 1.8
Near break	—	556.5 ± 1.8
Cold leg temperature (K)	563.8 $^{+0}_{-44}$	
Near vessel	—	554.3 ± 1.8
Near break	—	550.3 ± 1.8
Steam Generator Secondary Side		
Water level (m)	3.162 ± 0.05	3.11 ± 0.025
Water temperature (K)	—	482.1 ± 3
Pressure (MPa)	—	6.18 ± 0.08
Mass flow rate (kg/s)	—	19.5 ± 0.4

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TABLE III (continued)

Variable	Specified Value	Measured Value
ECC Accumulator A		
Gas volume (m^3)	—	0.96 ± 0.03
Water volume injected (m^3)	—	1.71 ± 0.03
Pressure (MPa)	—	4.18 ± 0.05
Temperature (K)	305.4 ± 2.8	307.2 ± 3
Boron concentration (ppm)	3100	3281 ± 17
Suppression Tank		
Liquid level (m)	1.27 ± 0.0254	1.25 ± 0.02
Gas volume (m^3)	—	54.1 ± 0.6
Liquid volume (m^3)	—	28.7 ± 0.6
Downcomer submergence (m)[b]	—	0.39 ± 0.02
Water temperature (K)[c]	356 ± 3.6	350.1 ± 3
Pressure (gas space)[c] (MPa)	0.086 ± 0.007	0.10 ± 0.01
Containment vessel pressure (MPa)	—	0.09 ± 0.01

a. Pressure measurements are expressed as absolute values.

b. Based on average submergence of four downcomers.

c. Out of specification but did not affect results.

d. Out of desired tolerance but within acceptable tolerance.

Table VI specifies the required water chemistry for the primary coolant system, the blowdown suppression tank, and the secondary coolant system. In addition, the results of the water chemistry analyses for these systems are presented for pre-LOCE conditions and for the blowdown suppression tank post-LOCE conditions. The pre-LOCE Accumulator ACC-A boron concentration was 3281 ppm and the borated water storage tank boron concentration was 3296 ppm. These analyses were required to utilize the data from the reactor vessel downcomer liquid level probes.

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TABLE IV

LINEAR HEAT GENERATION RATE PRIOR TO EXPERIMENT L2-3 BLOWDOWN
(Reading Uncertainty ± 7.6%)

Height Above Core Bottom (m)	Linear Heat Generation Rate For Core Position (kW/m)			
	1C7	3C7	5H8	5M3
0.152	8.94	8.94	16.00	15.69
0.305	19.26	19.26	31.38	31.41
0.457	20.29	20.29	32.15	32.57
0.610	22.98	22.98	36.12	36.88
0.762	22.49	22.49	34.09	34.44
0.914	17.94	17.94	27.19	27.51
1.067	16.11	16.11	24.42	24.70
1.219	12.57	12.57	17.97	18.30
1.372	7.33	7.33	11.11	11.24
1.524	3.35	3.35	5.59	5.25
1.676	0.95	0.95	2.13	2.00

TABLE V

PRIMARY COOLANT TEMPERATURES AT BLOWDOWN INITIATION

Location	Detector	Temperature (K)
Intact loop hot leg (near vessel)	TE-PC-002	592.8 ± 1.8
Intact loop steam generator inlet	TE-SG-001	592.4 ± 3.9
Intact loop steam generator outlet	TE-SG-002	562.6 ± 3.9
Intact loop cold leg (near vessel)	TE-PC-001	560.7 ± 1.8
Reactor vessel downcomer:		
Instrument Stalk 1	TE-1ST-002	561.9 ± 5.1
Instrument Stalk 2	TE-2ST-002	561.8 ± 5.1
Reactor vessel lower plenum	TE-5LP-001	562.7 ± 5.1
Reactor vessel upper plenum	TE-1UP-001	603.8 ± 5.1
	TE-3UP-001	599.8 ± 5.1
	TE-5UP-001	610.9 ± 5.1
Broken loop hot leg (near vessel)	TE-BL-002	565.5 ± 1.8
Broken loop cold leg (near vessel)	TE-BL-001	554.3 ± 1.8
Intact loop pressurizer:		
Saturation		615.3 ± 1.6

TABLE VI

WATER CHEMISTRY RESULTS FOR EXPERIMENT L2-3

Parameter	Primary Coolant Intact Loop		Blowdown Suppression Tank			Secondary Coolant System	
	Specified	Pre-LOCE[a]	Specified	Pre-LOCE	Post-LOCE	Specified[b]	Pre-LOCE
pH (each at 298 K)	4.2 to 10.5	5.95	4.2 to 10.5	4.47	5.03	9.0 to 10.2	9.7
Conductivity (μmho/cm^3) (each at 298 K)	60 maximum	3.3	60 maximum	12.1	10.0	2 maximum	0.7
Total gas (cm^3/kg)	100 maximum	19.0	—	8.74	31.50	—	—
Dissolved oxygen (ppm)	0.10 maximum	<0.10	—	—	—	0.005 maximum	0.0042
Lithium (ppm)	0.2 to 2.2	—	—	—	—	—	—
Chloride (ppm)	0.15 maximum	<0.10	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	2.5	1.0 maximum	8.0
Boron (ppm)	—	679	3050	3356	2934	80 maximum	0
Fluoride (ppm)	0.1 maximum	<0.02	0.1 maximum	<0.2	<0.2	0.10 maximum	<0.02
Hydrogen (cm^3/kg)[c]	10 to 60	18.0	—	—	—	—	
Total gross activity (μc/ml)	375 maximum	3.23 (10^{-2})	—	—	9.38 (10^{-3})	—	0
Gross beta and gamma (μc/ml)	—	1.92 (10^{-2})	—	—	9.38 (10^{-3})	250 maximum	0
I^{131} (μc/ml)	0.37 maximum	0	—	0	0	9 x 10^{-4} maximum	0
I^{131} (μc/ml)	0.76 maximum	0	—	0	0	—	0
Sodium (ppm)	—	—	—	—	—	0.1 maximum	0
Suspended solids (ppm)	1.0	3.3	1.0	12.1	10.0	—	0.7

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

b. Specified values revised August 1, 1978.

c. Prior to depressurization.

V. DATA PRESENTATION

The data presented in this report include selected pertinent thermal-hydraulic and nuclear data from LOFT Experiment L2-3. The data have been divided into three categories: qualified engineering units data (QEUD), restrained, and channel failed. The QEUD designation was applied to measurements that have been compared with other measurements and have been found to be within the accuracy of the instrument. These data checks are discussed in detail in Appendix A. The restrained designation is applied to measurements for which the instruments did not fail but the data have some restrictions.

The data were processed to the extent of presenting the data in graphical form in SI units, combining measurements to produce computed variables, and overlaying graphs of corresponding variables at several locations to facilitate comparison. The number of data points shown for each instrument have been reduced, by decimation, to two thousand for ease of plotting. Point values of velocity from the turbine flowmeters have been converted to average values by using the intact loop venturi flowmeter. Computed parameter data from the drag discs, the turbine flowmeters, and the gamma densitometers were filtered with a 4-Hz, low-pass filter prior to presentation.

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

For LOFT Experiment L2-3 the instrumentation system performed well. Of 888 instrument channels recorded during this experiment, 856 instrument channels provided usable data.

Table VII lists Experiment L2-3 instrumentation 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. Instruments which only gave useful information about the experimental initial conditions are also given in Table VIII.

Table IX lists the variables that were computed from the sensor 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 four major sections with the individual plots in each section being presented in alphanumeric order to facilitate comparison and location of desired variables. These data sections include:

(1) EXPERIMENT L2-3 MEASURED VARIABLES SHORT-TERM PLOTS (14 SECONDS OR LESS) — Figures 19 through 56. This section contains the detector outputs, including overlays, which were specifically designed for the short-term transient and, therefore, do not exceed duration.

(2) EXPERIMENT L2-3 MEASURED VARIABLES — INTERMEDIATE TERM PLOTS (90 SECONDS) — Figures 57 through 249.

(3) EXPERIMENT L2-3 MEASURED VARIABLES — LONG-TERM PLOTS (200 AND 310 SECONDS) — Figures 250 through 279.

(4) EXPERIMENT L2-3 COMPUTED VARIABLES — Figures 280 through 296.

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TABLE VII

MEASURED VARIABLES FOR EXPERIMENT L2-3

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
VALVE OPENING								
Intact Loop CV-P004-010	Main steam control valve.	0 to 100%	10 Hz	3.23%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	57	QEUD.[b]
Broken Loop CV-P138-001	Broken loop cold leg between break plane and suppression tank.	0 to 100%	100 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	19	QEUD.
Broken Loop CV-P138-015	Broken loop hot leg between break plane and suppression tank.	0 to 100%	100 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	19	QEUD.
Broken Loop CV-P138-123	1.3 l/s spray header control valve.	0 to 100%	10 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	58	QEUD.
Broken Loop CV-P138-124	3.8 l/s spray header control valve.	0 to 100%	10 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	59	QEUD.
Broken Loop CV-P138-125	13.9 l/s spray header control valve.	0 to 100%	10 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	60	QEUD.
CHORDAL DENSITY								
Broken Loop DE-BL-001A	Broken loop cold leg at DTT flange. Beam line 14° 21 min from -18 line CW looking toward reactor vessel (RV).	0 to 1.0 Mg/m^3	10 Hz	--	Not available			Channel failed.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
CHORDAL DENSITY (continued)								
Broken Loop DE-BL-001B	Broken loop cold leg at DTT flange. Beam line through ℄ of pipe 45° from vertical (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.051 Mg/m^3[c]		61, 250	QEUD.
Broken Loop DE-BL-001C	Broken loop cold leg at DTT flange. Beam line 22° 7 min from -1B line (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.085 Mg/m^3		62	QEUD.
Broken Loop DE-BL-002A	Broken loop hot leg at DTT flange. Beam line 14° 21 min from -2B line (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.07 Mg/m^3		63, 250	QEUD.
Broken Loop DE-BL-002B	Broken loop hot leg at DTT flange. Beam line through ℄ of pipe 45° from vertical (CW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.048 Mg/m^3		64	QEUD.
Broken Loop DE-BL-002C	Broken loop hot leg at DTT flange. Beam line 22° 7 min from -2B line (CW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.084 Mg/m^3		65	QEUD.
Intact Loop DE-PC-001A	Intact loop cold leg at DTT flange. Beam line 14° 21 min from -1B line (CW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.058 Mg/m^3		66, 268	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
CHORDAL DENSITY (continued)								
Intact Loop DE-PC-001B	Intact loop cold leg at DTT flange. Beam line through ℄ pipe 45° from vertical (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.067 Mg/m^3		67, 253	QEUD.
Intact Loop DE-PC-001C	Intact loop cold leg at DTT flange. Beam line 22° 7 min from -1B line (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.097 Mg/m^3		68	QEUD.
Intact Loop DE-PC-002A	Intact loop hot leg at DTT flange. Beam line 14° 21 min from -2B line (CW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	Not available			Channel failed.
Intact Loop DE-PC-002B	Intact loop hot leg at DTT flange. Beam line through ℄ of pipe 45° from vessel (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.067 Mg/m^3		69, 254	QEUD.
Intact Loop DE-PC-002C	Intact loop hot leg at DTT flange. Beam line 22° 7 min from -2B line (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	0.097 Mg/m^3		70	QEUD.
FUEL ASSEMBLY DISPLACEMENT								
Assembly 5 DIE-5UP-001	At top center of Fuel Assembly 5.	±12.7 mm	1 kHz	0.3 mm	0.0 mm 6.35 mm 12.7 mm	0.3 mm[e] 0.33 mm 0.39 mm	20	Restrained[d], magnitude inconsistent with previous experiments.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
FUEL ASSEMBLY DISPLACEMENT (continued)								
Assembly 5 DIE-5UP-002	At top center of Fuel Assembly 5.	±12.7 mm	1 kHz	0.3 mm	0.0 mm 6.35 mm 12.7 mm	0.3 mm 0.33 mm 0.39 mm	20	Restrained, magnitude inconsistent with previous experiments.
FLUID VELOCITY								
Broken Loop FE-BL-001A	Broken loop cold leg at DTT rake bottom.	2.3 to 45.7 m/s	10 Hz	--	--	Not available	--	Channel failed.
Broken Loop FE-BL-001B	Broken loop cold leg at DTT rake center.	2.3 to 45.7 m/s	10 Hz	0.434 m/s	--	2.3 m/s[f]	71, 255	Restrained, electronic adjustment required during T = 0 + 10 s.
Broken Loop FE-BL-001C	Broken loop cold leg at DTT rake top.	2.3 to 45.7 m/s	10 Hz	0.434 m/s	--	2.3 m/s	72, 255	QEUD.
Broken Loop FE-BL-002A	Broken loop hot leg at bottom of DTT flange.	0.6 to 15.0 m/s	10 Hz	0.095 m/s	--	0.9 m/s	73	QEUD.
Broken Loop FE-BL-002B	Broken loop hot leg at middle of DTT flange.	0.6 to 15.0 m/s	10 Hz	0.095 m/s	--	0.9 m/s	74	QEUD.
Broken Loop FE-BL-002C	Broken loop hot leg at top of DTT flange.	0.6 to 15.0 m/s	10 Hz	0.095 m/s	--	0.9 m/s	75	QEUD.
Intact Loop FE-PC-001A	Intact loop cold leg at DTT flange on west side of pipe.	0.6 to 15.0 m/s	10 Hz	0.434 m/s	--	0.9 m/s	76	Restrained, turbine appears to stick after T = 0 + 8 s.
Intact Loop FE-PC-001B	Intact loop cold leg at DTT flange on middle of pipe.	0.6 to 15.0 m/s	10 Hz	0.434 m/s	--	0.9 m/s	77	Restrained, good data, instrument overranged above ~17 m/s.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
FLUID VELOCITY (continued)								
Intact Loop FE-PC-001C	Intact loop cold leg at DTT flange on east side of pipe.	0.6 to 15.0 m/s	10 Hz	--	--	Not available	--	Channel failed.
Intact Loop FE-PC-002A	Intact loop hot leg at DTT flange on west side of pipe.	0.6 to 15.0 m/s	10 Hz	0.434 m/s	--	0.9 m/s	78	QEUD.
Intact Loop FE-PC-002B	Intact loop hot leg at DTT flange on middle of pipe.	0.6 to 15.0 m/s	10 Hz	--	--	Not available	--	Channel failed.
Intact Loop FE-PC-002C	Intact loop hot leg at DTT flange on east side of pipe.	0.6 to 15.0 m/s	10 Hz	0.434 m/s	--	0.9 m/s	79	QEUD.
Reactor Vessel FE-1ST-1	Downcomer Stalk 1, 1.2 m from RV bottom.	0.5 to 9.1 m/s	--	--	--	Not available	--	Channel failed.
Reactor Vessel FE-2ST-1	Downcomer Stalk 2, 1.2 m from RV bottom.	0.5 to 9.1 m/s	--	--	--	Not available	--	Channel failed.
Reactor Vessel FE-1UP-1	Above upper end box of Fuel Assembly 1.	0.5 to 9.1 m/s	--	--	--	Not available	--	Channel failed.
Reactor Vessel FE-3UP-1	Above upper end box of Fuel Assembly 3.	0.5 to 9.1 m/s	--	--	--	Not available	--	Channel failed.
Reactor Vessel FE-5UP-1	Above upper end box of Fuel Assembly 5.	0.5 to 9.1 m/s	--	--	--	Not available	--	Channel failed.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
FLOW RATE								
Blowdown Suppression Tank Spray System FE-P138-138	Suppression tank spray flow rate in the 3.79-l/s header.	0 to 6.3 l/s	10 Hz	0.1 l/s	--	0.1 l/s	256	QEUD.
Blowdown Suppression Tank Spray System FE-P138-139	Suppression tank spray flow rate from pump discharge.	0 to 25.2 l/s	10 Hz	0.36 l/s	--	0.35 l/s	257	QEUD.
Blowdown Suppression Tank Spray System FE-P138-140	Suppression tank spray flow rate in 13.9-l/s header.	0 to 18.9 l/s	10 Hz	0.27 l/s	--	0.27 l/s	257	Restrained, good after T = 0 + 15 s upstream valve closed until T = 0 + 68 s.
Blowdown Suppression Tank Spray System FE-P138-153	Suppression tank spray flow rate in the spray pump recirculation line.	0 to 9.5 l/s	10 Hz	0.13 l/s	--	0.13 l/s	256	QEUD.
FRC-202	Steam generator blowdown flow.	0 to 550 l/s	10 Hz	--	--	Not available	--	Not useful for blowdown analysis, not presented. See Table VIII.
Intact Loop FT-P004-012	Inlet to air cooled condenser inlet header.	0 to 40 kg/s	10 Hz	0.8	--	Not available	--	Restrained, good for initial conditions only, not presented. See Table VIII.
Intact Loop FT-P004-72-2	Flow out of main feedwater pump.	0 to 40 l/s	10 Hz	0.8	--	Not available	--	Restrained, good for initial conditions only, not presented. See Table VIII.
Emergency Core Cooling System FT-P120-36-1	Accumulator A in 6-in. line downstream of orifice.	0 to 126.2 l/s	10 Hz	1.25 l/s	--	3.5 l/s	80, 258	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
FLOW RATE (continued)								
Emergency Core Cooling System FT-P120-36-5	Accumulator A in 6-in. line downstream of orifice.	0 to 37.9 l/s	10 Hz	0.38 l/s	--	3.5 l/s	--	Restrained, good for initial conditions only, not presented.
Emergency Core Cooling System FT-P120-085	LPIS Pump A in 4-in. line between heat exchanger and orifice.	0 to 25.2 l/s	10 Hz	--	--	Not available	81, 258	QEUD.
Emergency Core Cooling System FT-P128-104	HPIS Pump A discharge.	0 to 1.9 l/s	10 Hz	0.02 l/s	--	0.02 l/s	82, 258	QEUD.
Intact Loop FT-P139-27-1	Intact loop hot leg venturi flowmeter (right side facing SG).	0 to 630.0 kg/s	10 Hz	7 kg/s	--	17 kg/s	83	Restrained, good for initial conditions only.
LIQUID LEVEL								
Emergency Core Cooling System LIT-P120-044	Accumulator A.	0 to 2.0 m	10 Hz	--	--	0.02 m	84	QEUD.
Secondary Coolant System LT-P004-008B	Steam generator feedwater level (wide range).	-3.6 to 1.4 m	10 Hz	--	--	0.05 m	85	Restrained, slow response during transient.
Intact Loop LT-P004-042	Condensate receiver level. 1.83 m south of the condensate receiver ℄.	0 to 1.2 m	48 kHz	--	--	Not available	--	Channel failed.
Blowdown Suppression Tank LT-P138-033	Blowdown suppression tank level on north end of tank.	0 to 3.8 m	10 Hz	0.03 m	--	0.06 m	86, 259	Restrained, slow response during transient. Data outside uncertainty bands.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
LIQUID LEVEL (continued)								
Blowdown Suppression Tank LT-P138-058	Blowdown suppression tank level on south end of tank.	0 to 3.4 m	10 Hz	0.03 m	--	0.06 m	86, 259	Restrained, slow response during transient. Data outside uncertainty bands.
Intact Loop LT-P139-006	Pressurizer level on southeast side.	0 to 1.9 m	10 Hz	0.02 m	--	0.04 m	--	Not presented.
Intact Loop LT-P139-007	Pressurizer level on southwest side.	0 to 1.9 m	10 Hz	0.02 m	--	0.04 m	87	Restrained, good for initial conditions only, transient response effected by density change in transmission lines.
Intact Loop LT-139-008	Pressurizer level on north side.	0 to 1.9 m	10 Hz	0.02 m	--	0.04 m	--	Not presented.
MOMENTUM FLUX								
Broken Loop ME-BL-001A	Broken loop cold leg at DTT rake bottom.	2.98 to 74.4 $Mg/m \cdot s^2$	1 kHz	10.71 $Mg/m \cdot s^2$	--	11.43 $Mg/m \cdot s^2$ [f]	88	QEUD.
Broken Loop ME-BL-001B	Broken loop cold leg at DTT rake center.	2.98 to 74.4 $Mg/m \cdot s^2$	1 kHz	--	--	Not available	89	Restrained, unexplained offset after T = 0 + 20 s.
Broken Loop ME-BL-001C	Broken loop cold leg at DTT rake top.	2.98 to 74.4 $Mg/m \cdot s^2$	1 kHz	10.71 $Mg/m \cdot s^2$	--	11.43 $Mg/m \cdot s^2$	90	QEUD.
Broken Loop ME-BL-002A	Broken loop hot leg at bottom of DTT flange.	0.7 to 19.0 $Mg/m \cdot s^2$	1 kHz	2.35 $Mg/m \cdot s^2$	--	3.72 $Mg/m \cdot s^2$	91	QEUD.
Broken Loop ME-BL-002B	Broken loop hot leg at middle of DTT flange.	0.7 to 19.0 $Mg/m \cdot s^2$	1 kHz	2.35 $Mg/m \cdot s^2$	--	3.72 $Mg/m \cdot s^2$	92	Restrained, magnitude and response uncertain.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
MOMENTUM FLUX (continued)								
Broken Loop ME-BL-002C	Broken loop hot leg at top of DTT flange.	0.7 to 19.0 $Mg/m \cdot s^2$	1 kHz	2.35 $Mg/m \cdot s^2$	--	3.72 $Mg/m \cdot s^2$	93	QEUD.
Intact Loop ME-PC-001A	Intact loop cold leg at DTT flange on west side of pipe.	3 to 74.4 $Mg/m \cdot s^2$	1 kHz	10.65 $Mg/m \cdot s^2$	--	11.36 $Mg/m \cdot s^2$	94	QEUD.
Intact Loop ME-PC-001B	Intact loop cold leg at DTT flange on middle of pipe.	3 to 74.4 $Mg/m \cdot s^2$	1 kHz	10.65 $Mg/m \cdot s^2$	--	11.36 $Mg/m \cdot s^2$	95	Restrained, questionable magnitude after T = 0 + 18 s.
Intact Loop ME-PC-001C	Intact loop cold leg at DTT flange on east side of pipe.	3 to 74.4 $Mg/m \cdot s^2$	1 kHz	10.65 $Mg/m \cdot s^2$	--	11.36 $Mg/m \cdot s^2$	96	QEUD.
Intact Loop ME-PC-002A	Intact loop hot leg on DTT flange on west side of pipe.	1 to 21 $Mg/m \cdot s^2$	1 kHz	Not available	--	Not available	97	QEUD.
Intact Loop ME-PC-002B	Intact loop hot leg on DTT flange at middle of pipe.	1 to 21 $Mg/m \cdot s^2$	1 kHz	Not available	--	Not available	98	Restrained, magnitude and response uncertain.
Intact Loop ME-PC-002C	Intact loop hot leg on DTT flange on east side of pipe.	1 to 21 $Mg/m \cdot s^2$	1 kHz	--	--	--	99	QEUD.
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 kHz	0.74 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	100, 260	Restrained, may not indicate magnitude of downcomer flow.
Reactor Vessel ME-2ST-001	Downcomer Stalk 2, 1.16 m above RV bottom.	0.3 to 5.2 $Mg/m \cdot s^2$	1 kHz	0.74 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	101, 261	Restrained, may not indicate magnitude of downcomer flow.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
MOMENTUM FLUX (continued)								
Reactor Vessel ME-1UP-001	Fuel Assembly 1 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 kHz	0.74 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	102, 262	Restrained, questionable magnitude.
Reactor Vessel ME-3UP-001	Fuel Assembly 3 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 kHz	0.74 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	103, 263	Restrained, questionalbe magnitude.
Reactor Vessel ME-5UP-001	Fuel Assembly 5 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 kHz	Not available	--	Not available	--	Channel failed.
NEUTRON DETECTION								
Reactor Vessel NE-2H8-33.5	Neutron detector in Fuel Assembly 2.	0 to 39 Local kW/m	10 kHz	Not available	--	Not available[g]	21, 104	Restrained, initial kW/m valid, measures neutrons minus gammas after T = 0.
Reactor Vessel NE-4H8-33.5	Neutron detector in Fuel Assembly 4.	0 to 39 Local kW/m	10 Hz	Not available	--	Not available	22, 105	Restrained, initial kW/m valid, measures neutrons minus gammas after T = 0.
Reactor Vessel NE-5D8-33.5	Neutron detector in Fuel Assembly 5.	0 to 39 Local kW/m	10 Hz	Not available	--	Not available	23, 106	Restrained, initial kW/m valid, measures neutrons minus gammas after T = 0.
Reactor Vessel NE-6H8-33.5	Neutron detector in Fuel Assembly 6.	0 to 39 Local kW/m	10 Hz	Not available	--	Not available	24, 107	Restrained, initial kW/m valid, measures neutrons minus gammas after T = 0.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
ELECTRICAL FREQUENCY								
Intact Loop PCP-1-F	Intact loop Pump 1.	0 to 75 Hz	10 Hz	0.75 Hz	--	0.75 Hz[h]	--	Not presented.
Intact Loop PCP-2-F	Intact loop Pump 2.	0 to 75 Hz	10 Hz	0.75 Hz	--	0.75 Hz	--	Not presented.
ELECTRICAL POWER								
Intact Loop PCP-1-P	Intact loop Pump 1.	0 to 1 MW	100 Hz	0.05 MW	--	0.05 MW	108, 264	QEUD.
Intact Loop PCP-2-P	Intact loop Pump 2.	0 to 1 MW	100 Hz	0.05 MW	--	0.05 MW	108, 265	QEUD.
DIFFERENTIAL PRESSURE								
Broken Loop PDE-BL-001	Broken loop hot leg from flange in front of SG simulator to pipe in front of reflood assist bypass system tee.	±0.3 MPa (differential)	100 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	109	QEUD.
Broken Loop PDE-BL-002	Broken loop cold leg from flange in front of spool piece to pipe in front of reflood assist bypass system tee.	±3.5 MPa (differential)	100 Hz	0.00088 MPa	0 MPa 5 MPa 10 MPa	0.00088 MPa 0.01 MPa 0.01 MPa	110	QEUD.
Broken Loop PDE-BL-003	Broken loop cold leg across break plane.	±10.3 MPa (differential)	100 Hz	0.025 MPa	0 MPa 5 MPa 10 MPa	0.025 MPa 0.026 MPa 0.028 MPa	111	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
DIFFERENTIAL PRESSURE (continued)								
Broken Loop PDE-BL-004	Broken loop hot leg across break plane.	±10.3 MPa (differential)	100 Hz	0.025 MPa	0 MPa 5 MPa 10 MPa	0.025 MPa 0.026 MPa 0.028 MPa	111	QEUD.
Broken Loop PDE-BL-005	Broken loop hot leg across pump simulator.	±3.5 MPa (differential	100 Hz	0.0033 MPa	0 MPa 0.5 MPa 1.0 MPa 1.4 Mpa	0.0033 MPa 0.0033 MPa 0.0035 MPa 0.0036 MPa	112	QEUD.
Broken Loop PDE-BL-006	Broken loop hot leg across SG simulator outlet flange.	±0.7 MPa (differential)	10 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	113	QEUD.
Broken Loop PDE-BL-007	Broken loop hot leg across SG simulator.	±0.7 MPa (differential)	100 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	114	QEUD.
Broken Loop PDE-BL-008	Broken loop hot leg across SG simulator inlet flange.	±0.2 MPa (differential)	10 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	115	QEUD.
Broken Loop PDE-BL-009	Broken loop across 14-to-5-in. contraction to middle of 5-in. pipe.	±0.7 MPa (differential)	10 Hz	--	Not available		--	Channel failed.
Broken Loop PDE-BL-010	Broken loop from middle of 5-in. pipe to to break plane.	±0.7 MPa (differential)	10 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	116	QEUD.
Broken Loop PDE-BL-011	Broken loop pump simulator outlet to Station BL-3.	±3.5 MPa (differential)	100 Hz	0.0033 MPa	0.0 MPa 0.5 MPa 1.0 MPa 1.4 MPa	0.0033 MPa 0.0033 MPa 0.0035 MPa 0.0036 MPa	117	Restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-BL-012. Data inconsistent with system behavior.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
DIFFERENTIAL PRESSURE (continued)								
Broken Loop PDE-BL-012	Broken loop Station BL-3 to break plane inlet.	±3.5 MPa (differential)	100 Hz	0.0033 MPa	0.0 MPa 0.5 MPa 1.0 MPa 1.4 MPa	0.0033 MPa 0.0033 MPa 0.0035 MPa 0.0036 MPa	118	Restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-BL-012. Data inconsistent with system behavior.
Intact Loop PDE-PC-001	Intact loop cold leg across primary coolant pumps.	±0.7 MPa (differential)	10 Hz	0.0017 MPa	0.0 MPa 0.35 MPa 0.7 MPa	0.0017 MPa 0.0017 MPa 0.0019 MPa	119	QEUD.
Intact Loop PDE-PC-002	Intact loop across SG.	±0.35 MPa (differential)	10 Hz	0.00088 MPa	0.0 MPa 0.15 MPa 0.30 MPa	0.00088 MPa 0.0009 MPa 0.0009 MPa	120	QEUD.
Intact Loop PDE-PC-003	Intact loop hot leg piping, RV to surge line junction.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa 0.05 MPa 0.10 MPa	0.00049 MPa 0.00050 MPa 0.00052 MPa	121	Restrained, no comparative data after T = 0.
Intact Loop PDE-PC-004	Intact loop hot leg piping, RV to SG inlet.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa 0.05 MPa 0.10 MPa	0.00049 MPa 0.00050 MPa 0.00052 MPa	122	Restrained, questionalbe offset, initial magnitude above instrument calibration.
Intact Loop PDE-PC-005	Intact loop cold leg primary coolant pumps to RV nozzle.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa 0.05 MPa 0.10 MPa	0.00049 MPa 0.00050 MPa 0.00052 MPa	123	QEUD.
Intact Loop PDE-PC-006	Intact loop reactor vessel outlet to inlet.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa 0.05 MPa 0.10 MPa	0.00049 MPa 0.00050 MPa 0.00052 MPa	124	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
DIFFERENTIAL PRESSURE (continued)								
Intact Loop PDE-PC-007	Intact loop cold leg RV inlet to broken loop cold leg RV inlet.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa [illegible]05 MPa 0.10 MPa	0.00049 MPa 0.00050 MPa 0.00052 MPa	125	QEUD.
Intact Loop PDE-PC-008	Intact loop across pressurizer surge line.	±10.34 MPa (differential)	10 Hz	0.025 MPa	0 MPa 5 MPa 10 MPa	0.025 MPa 0.0258 MPa 0.028 MPa	126	QEUD.
Intact Loop PDE-PC-009	Intact loop across pump 1.	±0.7 MPa (differential)	10 Hz	0.0017 MPa	0.0 MPa 0.3 MPa 0.6 MPa	0.0017 MPa 0.0017 MPa 0.0018 MPa	127	QEUD.
Intact Loop PDE-PC-010	Intact loop across pump 2.	±0.7 MPa (differential)	1 kHz	0.0017 MPa	0.0 MPa 0.3 MPa 0.6 MPa	0.0017 MPa 0.0017 MPa 0.0018 MPa	127	QEUD.
Reactor Vessel PDE-RV-001	Lower plenum to BDST.	±10.34 MPa (differential)	10 Hz	0.025 MPa	0 MPa 5 MPa 10 kPa	0.25 MPa 0.258 MPa 0.02[illegible] MPa	128	Restrained, good after subcooled blowdown only.
Reactor Vessel PDE-RV-002	Fuel Assembly 1 from lower end box to upper end box.	±172 kPa	10 Hz	1.2 kPa	0 kPa 100 kPa 170 kPa	1.2 kPa 0.23 kPa 0.391 kPa	129	Restrained, dynamic tap.
Reactor Vessel PDE-RV-003	Intact loop cold leg inlet to bottom of downcomer.	±0.1 MPa (differential)	10 Hz	0.00049 MPa	0.0 MPa 0.05 MPa 0.1[illegible] [illegible]Pa	0.00049 MPa 0.00050 MPa 0.00052 MPa	130	QEUD.
Reactor Vessel PDE-RV-004	Upper plenum to the RV outlet nozzle in the intact loop hot leg.	±0.2 MPa (differential)	10 Hz	0.0012 MPa	0.0 MPa 0.1 MPa 0.2 MPa	0.0012 MPa 0.00122 MPa 0.00126 MPa	131	Restrained, questionalbe magnitude.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
DIFFERENTIAL PRESSURE (continued)								
Blowdown Suppression Tank PDE-SV-009	Suppression tank across the vacuum breaker line.	±69.0 kPa	10 Hz	0.49 kPa	0 kPa 30 kPa 69 kPa	0.49 kPa 0.492 kPa 0.502 kPa	132	QEUD.
Reactor Vessel PDE-2ST-001	Bottom of 2 ST to FA#3 upper end box.	±69 kPa	10 Hz	0.49 kPa	0 kPa 30 kPa 69 kPa	0.49 kPa 0.492 kPa 0.502 kPa	133	Restrained, good for initial conditions only.
Reactor Vessel PDE-2ST-003	Top of downcomer Stalk 2, Fuel Assembly 3 upper plenum.	±173 kPa	10 Hz	1.2 kPa	0 kPa 100 kPa 173 kPa	1.2 kPa 1.22 kPa 1.26 kPa	133	Restrained, good for initial conditions only.
Reactor Vessel PDE-2ST-004	Bottom of downcomer Stalk 2, Fuel Assembly 3 lower end box.	±69 kPa	10 Hz	0.49 kPa	0 kPa 30 kPa 69 kPa	0.49 kPa 0.492 kPa 0.502 kPa	134	Restrained, long transmission lines, data do not return to 0.
Intact Loop PDT-P139-27-1	Primary coolant flow, Channel A.	0 to 0.199 MPa (differential)	10 Hz	0.002 MPa	--	0.002 MPa	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Intact Loop PDT-P139-27-2	Primary coolant flow, Channel B.	0 to 0.199 MPa (differential)	10 Hz	0.002 MPa	--	0.002 MPa	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Intact Loop PDT-P139-27-3	Primary coolant flow, Channel C.	0 to 0.199 MPa (differential)	10 Hz	0.002 MPa	--	0.002 MPa	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Intact Loop PDT-P139-030	Across RV just beyond intact loop inlet and and outlet nozzles.	0 to 0.3 MPa (differential)	10 Hz	--	--	Not available	--	Channel failed.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE[d]								
Broken Loop PE-BL-001	Broken loop cold leg at DTT flange.	0.1 to 20.8 MPa[i]	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	25, 135, 138	QEUD.
Broken Loop PE-BL-002	Broken loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	26, 135, 137	QEUD.
Broken Loop PE-BL-003	Broken loop hot leg downstream of pump simulator.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	26, 136, 137	Restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-BL-012. Data inconsistent with system behavior.
Broken Loop PE-BL-004	Broken loop cold leg at inlet of spool piece.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	25, 136	QEUD.
Broken Loop PE-BL-006	Broken loop hot leg at outlet of SG simulator.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	26, 137	QEUD.
Broken Loop PE-BL-008	Broken loop cold leg at center of spool piece.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	25, 138	QEUD.
Intact Loop PE-PC-001	Intact loop cold leg at DTT flange.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	27, 139	QEUD.
Intact Loop PE-PC-002	Intact loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 kHz	0.036 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	27, 139	QEUD.
Intact Loop PE-PC-004	Intact loop pressurizer vapor space.	0.1 to 20.8 MPa	10 Hz	0.036 MPa	0.1 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	139	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE (continued)								
Intact Loop PE-PC-005	Intact loop reference pressure.	0.1 to 20.8 MPa	10 Hz	--	--	--	140, 269	QEUD.
Intact Loop PE-PC-006	Intact loop reference pressure.	0.1 to 20.8 MPa	10 Hz	--	--	--	141, 270	QEUD.
Blowdown Suppression System PE-SV-001	Blowdown suppression tank bottom under Downcomer 4 (north end), 180° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	0.008 MPa	0.1 MPa 0.5 MPa 0.8 MPa	0.008 MPa 0.008 MPa 0.008 MPa	28, 142	QEUD.
Blowdown Suppression System PE-SV-003	Blowdown suppression tank across from Downcomer 1 (south end), 157.5° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	0.008 MPa	0.1 MPa 0.5 MPa 0.8 MPa	0.008 MPa 0.008 MPa 0.008 MPa	28, 142	QEUD.
Blowdown Suppression System PE-SV-014	Blowdown suppression tank header above Downcomer 4, 327° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	143	QEUD.
Blowdown Suppression System PE-SV-015	Blowdown suppression tank across from Downcomer 4, 230° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	144	QEUD.
Blowdown Suppression System PE-SV-016	Blowdown suppression tank across from Downcomer 1, 230° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	144	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE (continued)								
Blowdown Suppression System PE-SV-017	Blowdown suppression tank, 1.38 m north of Downcomer 3 ℄, 327° from top vertical (CW looking north).	0.1 to 0.7 MPa	10 Hz	Not available	--	Not available	--	Channel failed.
Blowdown Suppression System PE-SV-018	Blowdown suppression tank header above Downcomer 1.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	29, 143	QEUD.
Blowdown Suppression System PE-SV-022	Blowdown suppression tank bottom, 1.38 m north of Downcomer 3 ℄.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	29, 145	QEUD.
Blowdown Suppression System PE-SV-026	Blowdown suppression tank bottom between Downcomer 1 and 2.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	30, 145	QEUD.
Blowdown Suppression System PE-SV-043	Blowdown suppression tank bottom under Downcomer 2.	0.1 to 0.7 MPa	10 Hz	--	--	Not available	--	Channel failed.
Blowdown Suppression System PE-SV-044	Blowdown suppression tank bottom under Downcomer 2.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	31, 146, 266	QEUD.
Blowdown Suppression System PE-SV-055	Blowdown suppression tank top, 0.15 m north of Downcomer 4 ℄.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	147	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE (continued)								
Blowdown Suppression System PE-SV-060	Blowdown suppression tank top above Downcomer 1.	0.1 to 0.7 MPa	10 Hz	0.008 MPa	--	0.008 MPa	147	QEUD.
Blowdown Suppression System PE-SV-070	Bellows between broken loop and blowdown suppression tank header.	0.1 to 3.5 MPa	10 Hz	0.008 MPa	--	0.008 MPa	32, 267	QEUD.
Blowdown Suppression System PE-SV-075	Blowdown suppression tank header.	0.1 to 3.5 MPa	1 kHz	0.008 MPa	--	0.008 MPa	32, 268	QEUD.
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 kHz	0.036 MPa	0.1 MPa 10.0 MPa 20.5 MPa	0.199 MPa 0.199 MPa 0.200 MPa	148	QEUD.
Reactor Vessel PE-1ST-001B	Downcomer Stalk 1, 0.62 m above RV bottom, narrow range (0 to 1.4 MPa).	0.1 to 1.4 MPa	10 Hz	--	0.1 MPa 0.8 MPa 1.5 MPa	0.019 MPa 0.021 MPa 0.024 MPa	149	Restrained, low range instrument, good after T = 0 + 25 s, overranged above 1.4 MPa.
Reactor Vessel PE-1ST-001FF	Downcomer Stalk 1, 0.55 m above RV bottom.	0.1 to 20.8 MPa	1 kHz	0.32 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	--	Not presented.
Reactor Vessel 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 kHz	0.03 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	148	QEUD.
Reactor Vessel PE-1ST-003B	Downcomer Stalk 1, 5.32 m above RV bottom, narrow range (0 to 1.4 MPa).	0.1 to 1.4 MPa	10 Hz	--	0.1 MPa 0.8 MPa 1.5 MPa	0.02 MPa 0.021 MPa 0.024 MPa	149	Restrained, low range instrument, good after T = 0 + 25 s, overranged above 1.4 MPa.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o		Figure	Comments
					Reading	Uncertainty (±)		
PRESSURE (continued)								
Reactor Vessel PE-1ST-003FF	Downcomer Stalk 1, 5.39 m above RV bottom.	0.1 to 20.8 MPa	1 kHz	0.32 MPa	0.1 MPa 10 MPa 20 MPa	0.28 MPa 0.29 MPa 0.34 MPa	--	Not presented.
Reactor Vessel PE-1UP-001A	Above Fuel Assembly 1 upper end box, high range.	0.1 to 20.8 MPa	1 kHz	0.03 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	33, 150	QEUD.
Reactor Vessel PE-1UP-001B	Above Fuel Assembly 1 upper end box, low range. (0 to 1.4 MPa)	0.1 to 1.4 MPa	10 Hz	--	0.1 MPa 0.8 MPa 1.5 MPa	0.02 MPa 0.021 MPa 0.024 MPa	150	Restrained, good after T = 0 + 25 s. Low range measurement. Overranged above 1.4 MPa.
Reactor Vessel PE-1UP-001FF	Above Fuel Assembly 1 upper end box.	0.1 to 20.8 MPa	1 kHz	0.32 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	--	Not presented.
Reactor Vessel 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 kHz	0.03 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	151	QEUD.
Reactor Vessel PE-2ST-001B	Downcomer Stalk 2, 0.62 m above RV bottom, narrow range (0 to 1.4 MPa).	0.1 to 1.4 MPa	10 Hz	--	0.1 MPa 0.8 MPa 1.5 MPa	0.02 MPa 0.021 MPa 0.024 MPa	151	Restrained, good after T = 0 + 25 s. Low range measurement. Overranged above 1.4 MPa.
Reactor Vessel PE-2ST-001FF	Downcomer Stalk 2, 0.55 m above RV bottom.	0.1 to 20.8 MPa	1 kHz	--	Not available		--	Channel failed.
Reactor Vessel PE-2ST-003FF	Downcomer Stalk 2, 5.39 m above RV bottom.	0.1 to 20.8 MPa	1 kHz	0.32 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	--	Not presented.
Reactor Vessel PE-3UP-001FF	Above Fuel Assembly 3 upper end box.	0.1 to 20.8 MPa	10 Hz	Not available	Not available		--	Channel failed.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE (continued)								
Secondary Coolant System PT-P004-010A	In 10-in. line from steam generator.	0.1 to 8.4 MPa	10 Hz	0.110 MPa	--	0.110 MPa	152	Restrained, good for initial conditions only. Appears to follow expected pressure after T = 0.
Secondary Coolant System PT-P004- 34	Downstream of main feedwater pump.	0 to 10.3 MPa	10 Hz	0.075 MPa	--	Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Secondary Coolant System PT-P004-085	Upstream of inlet to air cooled condenser header.	0 to 2.8 MPa	10 Hz	0.075 MPa	--	0.075 MPa	--	Not presented.
Emergency Core Cooling System PT-P120-043	Accumulator A, 0.69 m above water outlet.	0.1 to 7.0 MPa	1 kHz	0.055 MPa	--	0.055 MPa	153	QEUD.
Emergency Core Cooling System PT-P120-061	Emergency core cooling injection.	0.1 to 20.8 MPa	10 Hz	0.158 MPa	--	0.158 MPa	154	QEUD.
Emergency Core Cooling System PT-P120-083	LPIS Pump A discharge.	0.1 to 7.0 MPa	10 Hz	Not available	--	Not available	--	Channel failed.
Broken Loop PT-P138-023	Blowdown header.	0.1 to 1.4 MPa	1 kHz	Not available	--	Not available	--	Not presented.
Blowdown Suppression Tank PT-P138-055	Blowdown suppression tank, Channel A, high range.	0.1 to 0.7 MPa	10 Hz	Not available	--	Not available	155	QEUD.
Blowdown Suppression Tank PT-P138-056	Blowdown suppression tank, Channel B, high range.	0.1 to 0.7 MPa	10 Hz	Not available	--	Not available	155	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PRESSURE (continued)								
Blowdown Suppression Tank PT-P138-057	Blowdown suppression tank, Channel C, high range.	0.1 to 0.7 MPa	10 Hz	Not available	--	Not available	155	QEUD.
Broken Loop PT-P138-111	Broken loop cold leg QOBV inlet between isolation valve and QOBV.	0.1 to 13.9 MPa	100 Hz	Not available	--	Not available	34	Restrained, good for establishing T = 0 only.
Broken Loop PT-P138-112	Broken loop hot leg QOBV inlet between isolation valve and QOBV.	0.1 to 13.9 MPa	100 Hz	Not available	--	Not available	34	Restrained, good for establishing T = 0 only.
Blowdown Suppression Tank Spray System PT-P138-172	Blowdown suppression tank, low range.	0.1 to 0.14 MPa	10 Hz	Not available	--	Not available	--	Channel failed.
Intact Loop PT-P139-002	Intact loop hot leg at venturi on bottom.	0.1 to 20.8 MPa	10 Hz	0.25 MPa	--	0.25 MPa	--	Restrained, good except during subcooled blowdown. Not presented.
Intact Loop PT-P139-003	Intact loop hot leg at venturi on left side when looking toward SG.	0.1 to 20.8 MPa	10 Hz	0.25 MPa	--	0.25 MPa	--	Restrained, good except during subcooled blowdown. Not presented.
Intact Loop PT-P139-004	Intact loop hot leg at venturi on right side when looking toward SG.	0.1 to 20.8 MPa	10 Hz	0.25 MPa	--	0.25 MPa	--	Restrained, good except during subcooled blowdown. Not presented.
Intact Loop PT-P139-005	1.86 m above pressurizer bottom (vapor space).	10.3 to 17.2 MPa	10 Hz	0.12 MPa	--	0.12 MPa	156	Restrained, good to T = 0 + 13 s. High range measurement.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
PUMP SPEED								
Intact Loop RPE-PC-001	Intact loop Pump 1 speed.	0 to 10 000 rpm	10 Hz	8.825 rpm	1000 rpm 2000 rpm 3000 rpm 4000 rpm	7.65 rpm 8.825 rpm 10.10 rpm 11.66 rpm	157	QEUD.
Intact Loop RPE-PC-002	Intact loop Pump 2 speed.	0 to 10 000 rpm	10 Hz	--	--	Not available	--	Channel failed.
REACTIVITY								
Reactor Vessel RE-TRM-86-5	Transient reactivity meter. In shield tank.	±0.145 Rho	10 Hz	±0.01 Rho	--	Not available	51	Restrained, good for initial conditions only, slow reactivity response.
Reactor Vessel RE-TRM-86-6	Transient reactivity meter. In shield tank.	±0.145 Rho	10 Hz	±0.01 Rho	--	Not available	52	Restrained, good for initial conditions only, slow reactivity response.
Reactor Vessel RE-T-77-1A2	Power range Channel A-level.	0 to 100% power	10 Hz	3%	--	3%	53	Restrained, shows neutron signal at shield tank detector location.
Reactor Vessel RE-T-77-2A2	Power range Channel B-level.	0 to 100% power	10 Hz	3%	--	3%	54	Restrained, shows neutron signal at shield tank detector location.
Reactor Vessel RE-T-77-3A2	Power range Channel C-level.	0 to 100% power	10 Hz	3%	--	3%	55	Restrained, shows neutron signal at shield tank location.
Reactor Vessel RE-T-87-4A2	Power range Channel D-level.	0 to 100% power	10 Hz	3%	--	3%	56	Restrained, shows neutron signal at shield tank location.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE								
Broken Loop TE-BL-001A	Broken loop cold leg at DTT rake bottom.	255.2 to 588.6 K	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	158, 271	QEUD.
Broken Loop TE-BL-001B	Broken loop cold leg at DTT rake center.	255.2 to 588.6 K	1 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	158, 271	QEUD.
Broken Loop TE-BL-001C	Broken loop cold leg at DTT rake top.	255.2 to 588.6 K	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	158, 271	QEUD.
Broken Loop TE-BL-002A	Broken loop hot leg at bottom of DTT flange.	255.2 to 588.6 K	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	159, 272	QEUD.
Broken Loop TE-BL-002B	Broken loop hot leg at middle of DTT flange.	255.2 to 588.6 K	1 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	159, 272	QEUD.
Broken Loop TE-BL-002C	Broken loop hot leg at top of DTT flange.	255.2 to 588.6 K	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	159, 272	QEUD.
Broken Loop TE-BL-003	Reflood assist bypass system near CV-P138-71.	255.2 to 588.6 K	2.3 Hz	5.0 K	Not available		--	Not presented.
Broken Loop TE-BL-004	Cold leg broken loop 8 inch pipe (external).	255 to 590 K	10 Hz	Not available	Not available		--	Not presented.
Broken Loop TE-BL-005	Steam generator simulator input (external).	255 to 590 K	10 Hz	Not available	Not available		--	Not presented.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Broken Loop TE-BL-006	Steam generator simulator output (external).	255 to 590 K	10 Hz	Not available	Not available		--	Not presented.
Broken Loop TE-BL-007	Pump simulator inlet (external).	255 to 590 K	10 Hz	Not available	Not available		--	Not presented.
Broken Loop TE-BL-008	Pump simulator outlet (external).	255 to 590 K	10 Hz	Not available	Not available		--	Not presented.
Intact Loop TE-PC-001A	Intact loop cold leg at DTT flange on west side of pipe.	255.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	160	QEUD.
Intact Loop TE-PC-001B	Intact loop cold leg at DTT flange on middle of pipe.	255.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	160	QEUD.
Intact Loop TE-PC-001C	Intact loop cold leg at DTT flange on east side of pipe.	255.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	160	QEUD.
Intact Loop TE-PC-002A	Intact loop hot leg at DTT flange on west side of pipe.	255 to 980 K	1 kHz	3 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	161	QEUD.
Intact Loop TE-PC-002B	Intact loop hot leg at DTT flange at middle of pipe.	255 to 980 K	1 kHz	3 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	161	QEUD.
Intact Loop TE-PC-002C	Intact loop hot leg at DTT flange on east side of pipe.	255 to 980 K	1 kHz	Not available	--	Not available	--	Channel failed.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o		Figure	Comments
					Reading	Uncertainty (±)		
TEMPERATURE (continued)								
Emergency Core Cooling System TE-P120-041	Accumulator A temperature.	255.2 to 366.3 K	10 Hz	--	--	Not available	162	QEUD.
Emergency Core Cooling System TE-P120-100	ECCS LPIS HX A outlet.	250 to 480 K	10 Hz	Not available	--	Not available	--	QEUD. Not presented.
Blowdown Suppression Tank TE-P138-022	Suppression tank bottom (1.384 m, 180°).	250 to 420 K	10 Hz	4 K	--	Not available	--	Channel failed.
Blowdown Suppression Tank TE-P138-034	Suppression tank top (6.724 m, 0°).	250 to 480 K	10 Hz	5 K	--	Not available	--	Not presented.
Broken Loop TE-P138-063	Broken loop cold leg isolation valve inlet.	283 to 620 K	10 Hz	4.46 K	--	Not available	--	Not presented.
Broken Loop TE-P138-065	Broken loop hot leg isolation valve inlet.	283 to 616 K	10 Hz	4.46 K	--	Not available	--	Channel failed.
Blowdown Suppression Tank TE-P138-137	Outlet of suppression tank spray system heat exchanger.	250 to 420 K	10 Hz	4 K	--	Not available	--	Not presented.
Blowdown Suppression Tank Spray System TE-138-141	Temperature of spray in the 3.79-l/s header.	255.2 to 420 K	10 Hz	4 K	--	5.2 K	279	QEUD.
Blowdown Suppression Tank Spray System TE-P138-142	Temperature of spray pump BS-P-83 discharge.	255.2 to 420 K	10 Hz	Not available	--	Not available	--	Channel failed.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Blowdown Suppression Tank Spray System TE-P138-143	Temperature of spray in 13.88-l/s header.	255.2 to 420 K	10 Hz	4 K	--	5.2 K	163, 279	QEUD.
Intact Loop TE-P139-019	Pressurizer vapor temperature, 0.86 m above the heater rods.	588.6 to 644.1 K	10 Hz	Not available	--	Not available	--	Channel failed.
Intact Loop TE-P139-020	Pressurizer liquid temperature, 0.36 m above heater rods.	283 to 644.1 K	10 Hz	4.55 K	--	4.8 K	164	Restrained, may indicate metal temperature after pressurizer empties.
Intact Loop TE-SG-001	Intact loop cold leg SG outlet.	255.4 to 977.4 K	1 kHz	3.9 K	400 K 450 K 500 K 550 K	3.9 K 4.3 K 4.8 K 5.2 K	165	Restrained, good for initial conditions only, transient response uncertain.
Intact Loop TE-SG-002	Intact loop hot leg SG inlet.	255.4 to 977.4 K	1 kHz	3.9 K	400 K 450 K 500 K 550 K	3.9 K 4.3 K 4.8 K 5.2 K	165	Restrained, good for initial conditions only, transient response uncertain.
Secondary Coolant System TE-SG-003	SG secondary side.	255.4 to 588.6 K	1 kHz	3.9 K	500 K 550 K	4.8 K 5.2 K	165	Restrained, may indicate metal temperature.
Blowdown Suppression System TE-SV-001	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank C_L, 2.72 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	166, 273	QEUD.
Blowdown Suppression System TE-SV-002	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank, C_L, 2.36 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	167, 274	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Blowdown Suppression System TE-SV-003	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank C_L, 1.9 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	168, 275	QEUD.
Blowdown Suppression System TE-SV-004	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank C_L, 1.45 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	169, 276	QEUD.
Blowdown Suppression System TE-SV-005	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank C_L, 0.99 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	Not available		--	Channel failed.
Blowdown Suppression System TE-SV-006	Blowdown suppression tank, 0.3 m north of Downcomer 1, 0.53 m east of tank C_L, 0.37 m of tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	171, 276	QEUD.
Blowdown Suppression System TE-SV-007	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank C_L, 2.72 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	166, 273	QEUD.
Blowdown Suppression System TE-SV-008	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank C_L, 2.36 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	167, 274	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Blowdown Suppression System TE-SV-009	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank ℄, 1.9 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	168, 275	Restrained, data good except for noise spike at T = 0.
Blowdown Suppression System TE-SV-010	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank ℄, 1.45 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	169, 276	QEUD.
Blowdown Suppression System TE-SV-011	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank ℄, 0.99 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	170, 277	QEUD.
Blowdown Suppression System TE-SV-012	Blowdown suppression tank, 0.3 m north of Downcomer 3, 0.53 m east of tank ℄, 0.37 m from tank bottom.	253.2 to 477.4 K	1 kHz	2.7 K	300 K 350 K 400 K	2.7 K 3.1 K 3.5 K	171, 278	QEUD.
Reactor Vessel TE-1A11-030	Fuel Assembly 1, Row A, Column 11, 0.762 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K[j] 6.5 K 4.8 K 5.2 K	35, 203	QEUD.
Reactor Vessel TE-1B10-037	Fuel Assembly 1, Row B, Column 10, 0.940 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	36, 203	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-1B11-028	Fuel Assembly 1, Row B, Column 11, 0.711 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	36, 203	QEUD.
Reactor Vessel TE-1B11-032	Fuel Assembly 1, Row B, Column 11, 0.813 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	36, 203	QEUD.
Reactor Vessel TE-1B12-026	Fuel Assembly 1, Row B, Column 12, 0.660 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	36, 203	QEUD.
Reactor Vessel TE-1C11-021	Fuel Assembly 1, Row C, Column 11, 0.533 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	35, 204	QEUD.
Reactor Vessel TE-1C11-039	Fuel Assembly 1, Row C, Column 11, 0.991 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	Not available		--	Channel failed.
Reactor Vessel TE-1F7-015	Fuel Assembly 1, Row F, Column 7, 0.381 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	205	QEUD.
Reactor Vessel TE-1F7-021	Fuel Assembly 1, Row F, Column 7, 0.533 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	205	QEUD.
Reactor Vessel TE-1F7-026	Fuel Assembly 1, Row F, Column 7, 0.660 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	205	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-1F7-030	Fuel Assembly 1, Row F, Column 7, 0.762 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	205	QEUD.
Reactor Vessel TE-1LP-001	Fuel Assembly 1 lower end box.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	182	QEUD.
Reactor Vessel TE-1LP-002	Fuel Assembly 1 lower end box.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	182	QEUD.
Reactor Vessel TE-1ST-001	Downcomer Stalk 1, 4.8 m from RV bottom.	253.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	172	QEUD.
Reactor Vessel TE-1ST-002	Downcomer Stalk 1, 4.2 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	172, 180	QEUD.
Reactor Vessel TE-1ST-003	Downcomer Stalk 1, 3.59 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	172	QEUD.
Reactor Vessel TE-1ST-004	Downcomer Stalk 1, 2.98 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	172	QEUD.
Reactor Vessel TE-1ST-005	Downcomer Stalk 1, 2.37 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	173	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-1ST-006	Downcomer Stalk 1, 1.76 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	173	QEUD.
Reactor Vessel TE-1ST-007	Downcomer Stalk 1, 0.85 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-1ST-008	Downcomer Stalk 1, 0.74 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	173	QEUD.
Reactor Vessel TE-1ST-009	Downcomer Stalk 1, 0.64 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	174	QEUD.
Reactor Vessel TE-1ST-010	Downcomer Stalk 1, 0.54 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-1ST-011	Downcomer Stalk 1, 0.44 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	174	QEUD.
Reactor Vessel TE-1ST-012	Downcomer Stalk 1, 0.34 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	175	QEUD.
Reactor Vessel TE-1ST-013	Downcomer Stalk 1, 0.24 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	175	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_0 Reading	After T_0 Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-1ST-014	Downcomer Stalk 1, 1.17 m from RV bottom (inside of DTT).	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	175, 181	QEUD.
Reactor Vessel TE-1UP-001	Fuel Assembly 1 upper end box.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	183	QEUD.
Reactor Vessel TE-1UP-002	Fuel Assembly 1 upper end box.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	183	QEUD.
Reactor Vessel TE-1UP-003	Fuel Assembly 1 support column above reactor vessel.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	--	Not presented.
Reactor Vessel TE-1UP-004	Fuel Assembly 1 support column above reactor vessel.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	--	Not presented.
Reactor Vessel TE-1UP-005	DTT FE-1UP-1 above Fuel Assembly 1.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	184	QEUD.
Reactor Vessel TE-1UP-006	Fuel Assembly 1 support column.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	185	QEUD.
Reactor Vessel TE-1UP-007	Fuel Assembly 1 support column.	310 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	185	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2E8-011	Cladding on Fuel Assembly 2, Row E, Column 8 at 0.28 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	206	QEUD.
Reactor Vessel TE-2E8-030	Cladding on Fuel Assembly 2, Row E, Column 8 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	206	QEUD.
Reactor Vessel 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	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	206	QEUD.
Reactor Vessel TE-2F7-015	Cladding on Fuel Assembly 2, Row F, Column 7 at 0.38 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	207	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	207	QEUD.
Reactor Vessel TE-2F8-028	Cladding on Fuel Assembly 2, Row F, Column 8 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	207	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2F8-032	Cladding on Fuel Assembly 2, Row F, Column 8 at 0.81 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	207	QEUD.
Reactor Vessel TE-2F9-026	Cladding on Fuel Assembly 2, Row F, Column 9 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	207	QEUD.
Reactor Vessel TE-2F9-041	Cladding on Fuel Assembly 2, Row F, Column 9 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	208	QEUD.
Reactor Vessel TE-2G02-030	Cladding on Fuel Assembly 2, Row G, Column 2 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	208	QEUD.
Reactor Vessel TE-2G08-021	Cladding on Fuel Assembly 2, Row G, Column 8 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	208	QEUD.
Reactor Vessel TE-2G08-039	Cladding on Fuel Assembly 2, Row G, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	208	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	37, 208	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	37, 209	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	37, 209	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	209	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	209	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	209	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_0 Reading	After T_0 Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2H03-026	Cladding on Fuel Assembly 2, Row H, Column 3 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	210	QEUD.
Reactor Vessel TE-2H08-039	Guide tube for Fuel A[illegible]mbly 2, Row H, [illegible]n 8 at 0.99 m [illegible] bottom of fuel	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	210, 248	QEUD.
Reactor Vessel TE-2H13-021	[illegible]dding on Fuel Assembly 2, Row H, Column 13 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 210	QEUD.
Reactor Vessel TE-2H13-049	Cladding on Fuel Assembly 2, Row H, Column 13 at 1.24 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 210	QEUD.
Reactor Vessel TE-2H14-028	Cladding on Fuel Assembly 2, Row H, Column 14 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 210	QEUD.
Reactor Vessel TE-2H14-032	Cladding on Fuel Assembly 2, Row H, Column 14 at 0.81 m above bottom of fuel rod.	422 to 15[illegible]	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 211	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2H15-026	Cladding on Fuel Assembly 2, Row H, Column 15 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 211	QEUD.
Reactor Vessel TE-2H15-041	Cladding on Fuel Assembly 2, Row H, Column 15 at 1.04 m above bottom of fuel rod.	422 to 1533	10 K	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	38, 211	QEUD.
Reactor Vessel TE-2I02-021	Cladding on Fuel Assembly 2, Row I, Column 2 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	211	QEUD.
Reactor Vessel TE-2I2-039	Cladding on Fuel Assembly 2, Row I, Column 2 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	211	QEUD.
Reactor Vessel TE-2I14-021	Cladding on Fuel Assembly 2, Row I, Column 14 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	37, 212	QEUD.
Reactor Vessel TE-2I14-039	Cladding on Fuel Assembly 2, Row I, Column 14 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	37, 212	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2LP-001	Fuel Assembly 2 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.5 K 4.6 K 5.1 K	186	QEUD.
Reactor Vessel TE-2LP-002	Fuel Assembly 2 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.5 K 4.6 K 5.1 K	186	QEUD.
Reactor Vessel TE-2LP-003	Fuel Assembly 2 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.5 K 4.6 K 5.1 K	186	QEUD.
Reactor Vessel TE-2ST-001	Downcomer Stalk 2, 4.8 m from RV bottom.	253.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	176	QEUD.
Reactor Vessel TE-2ST-002	Downcomer Stalk 2, 4.2 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	176, 180	QEUD.
Reactor Vessel TE-2ST-003	Downcomer Stalk 2, 3.59 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	176	QEUD.
Reactor Vessel TE-2ST-004	Downcomer Stalk 2, 2.98 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-2ST-005	Downcomer Stalk 2, 2.37 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	177	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2ST-006	Downcomer Stalk 2, 1.76 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-2ST-007	Downcomer Stalk 2, 0.85 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	178	QEUD.
Reactor Vessel TE-2ST-008	Downcomer Stalk 2, 0.74 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-2ST-009	Downcomer Stalk 2, 0.64 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	178	QEUD.
Reactor Vessel TE-2ST-010	Downcomer Stalk 2, 0.54 m from RV bottom.	253.2 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	178	QEUD.
Reactor Vessel TE-2ST-011	Downcomer Stalk 2, 0.44 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-2ST-012	Downcomer Stalk 2, 0.34 m from RV bottom.	253.2 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-2ST-013	Downcomer Stalk 2, 0.24 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	179	QEUD.
Reactor Vessel TE-2ST-014	Downcomer Stalk 2, 1.17 m from RV bottom.	253.2 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	179, 181	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-2UP-001	Fuel Assembly 2 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	187	QEUD.
Reactor Vessel TE-2UP-002	Fuel Assembly 2 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	187	QEUD.
Reactor Vessel TE-2UP-003	Fuel Assembly 2 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	187	QEUD.
Reactor Vessel TE-2UP-004	Fuel Assembly 2 support column.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	188	QEUD.
Reactor Vessel TE-2UP-005	Fuel Assembly 2 support column.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.6 K 6.4 K 4.6 K 5.1 K	188	QEUD.
Reactor Vessel TE-3A11-030	Cladding on Fuel Assembly 3, Row A, Column 11 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	39, 213	QEUD.
Reactor Vessel TE-3B10-037	Cladding on Fuel Assembly 3, Row B, Column 10 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	40, 213	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o		Figure	Comments
					Reading	Uncertainty (±)		
TEMPERATURE (continued)								
Reactor Vessel TE-3B11-028	Cladding on Fuel Assembly 3, Row B, Column 11 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	40, 213	QEUD.
Reactor Vessel TE-3B11-032	Cladding on Fuel Assembly 3, Row B, Column 11 at 0.81 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	40, 214	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	40, 214	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	39, 214	QEUD.
Reactor Vessel TE-3C11-039	Cladding on Fuel Assembly 3, Row C, Column 11 at 0.91 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	39, 214	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	215	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 F 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	215	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	215	QEUD.
Reactor Vessel TE-3F7-030	Cladding on Fuel Assembly 3, Row F, Column 7 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	215	QEUD.
Reactor Vessel TE-3LP-001	Fuel Assembly 3 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	189	QEUD.
Reactor Vessel TE-3LP-002	Fuel Assembly 3 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	189	QEUD.
Reactor Vessel TE-3UP-001	Fuel Assembly 3 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	190	QEUD.
Reactor Vessel TE-3UP-002	Fuel Assembly 3 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	190	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	 Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-3UP-003	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	190	QEUD.
Reactor Vessel TE-3UP-004	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	190	QEUD.
Reactor Vessel TE-3UP-005	DTT FE-3UP-1 above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	191	QEUD.
Reactor Vessel TE-3UP-006	Support column.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	191	QEUD.
Reactor Vessel TE-3UP-007	Support column.	311 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-3UP-008	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	191	QEUD.
Reactor Vessel TE-3UP-009	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-3UP-010	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	192	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-3UP-011	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	192	QEUD.
Reactor Vessel TE-3UP-012	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	192	QEUD.
Reactor Vessel TE-3UP-013	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	193	QEUD.
Reactor Vessel TE-3UP-014	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	193	QEUD.
Reactor Vessel TE-3UP-015	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	193	QEUD.
Reactor Vessel TE-3UP-016	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	193	QEUD.
Reactor Vessel TE-4E8-011	Cladding on Fuel Assembly 4, Row E, Column 8 at 0.28 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	216	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o: Reading	After T_o: Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-4E8-030	Cladding on Fuel Assembly 4, Row E, Column 8 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	216	QEUD.
Reactor Vessel TE-4E8-045	Cladding on Fuel Assembly 4, Row E, Column 8 at 1.14 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	216	QEUD.
Reactor Vessel TE-4F7-015	Cladding on Fuel Assembly 4, Row F, Column 7 at 0.38 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	217	QEUD.
Reactor Vessel TE-4F7-037	Cladding on Fuel Assembly 4, Row F, Column 7 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	217	QEUD.
Reactor Vessel TE-4F8-028	Cladding on Fuel Assembly 4, Row F, Column 8 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	217	QEUD.
Reactor Vessel TE-4F8-032	Cladding on Fuel Assembly 4, Row F, Column 8 at 0.87 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	217	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-4F9-026	Cladding on Fuel Assembly 4, Row F, Column 9 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	218	QEUD.
Reactor Vessel TE-4F9-041	Cladding on Fuel Assembly 4, Row F, Column 9 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	218	QEUD.
Reactor Vessel TE-4G02-030	Cladding on Fuel Assembly 4, Row G, Column 2 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	218	QEUD.
Reactor Vessel TE-4G08-021	Cladding on Fuel Assembly 4, Row G, Column 8 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	218	QEUD.
Reactor Vessel TE-4G08-039	Cladding on Fuel Assembly 4, Row G, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	219	QEUD.
Reactor Vessel TE-4G14-011	Cladding on Fuel Assembly 4, Rod G, Column 14 at 0.28 m above bottom of fuel rod.	422 to 1533 K	10 Hz	Not available	Not available		--	Channel failed.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	41, 219	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	41, 219	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	220	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	220	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	220	QEUD.
Reactor Vessel TE-4H03-026	Cladding on Fuel Assembly 4, Row H, Column 3 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	220	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	Not available	Not available		--	Channel failed.
Reactor Vessel TE-4H13-015	Cladding on Fuel Assembly 4, Row H, Column 13 at 0.38 m above bottom of fuel rod.	422 to 1533 K	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel TE-4H13-037	Cladding on Fuel Assembly 4, Row H, Column 13 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	42, 221	QEUD.
Reactor Vessel TE-4H14-028	Cladding on Fuel Assembly 4, Row H, Column 14 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	42, 221	QEUD.
Reactor Vessel TE-4H14-032	Cladding on Fuel Assembly 4, Row H, Column 14 at 0.81 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	42, 221	QEUD.
Reactor Vessel TE-4H15-026	Cladding on Fuel Assembly 4, Row H, Column 15 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	42, 221	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-4H15-041	Cladding on Fuel Assembly 4, Row H, Column 15 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	42, 221	QEUD.
Reactor Vessel TE-4I02-021	Cladding on Fuel Assembly 4, Row I, Column 2 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	222	QEUD
Reactor Vessel TE-4I02-039	Cladding on Fuel Assembly 4, Row I, Column 2 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	222	QEUD.
Reactor Vessel TE-4I14-021	Cladding on Fuel Assembly 4, Row I, Column 14 at 0.58 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	41, 222	QEUD.
Reactor Vessel TE-4I14-039	Cladding on Fuel Assembly 4, Row I, Column 14 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	41, 222	QEUD.
Reactor Vessel TE-4LP-001	Fuel Assembly 4 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	194	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-4LP-002	Fuel Assembly 4 lower end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	194	QEUD.
Reactor Vessel TE-4LP-003	Fuel Assembly 4 lower end box.	311 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	194	QEUD.
Reactor Vessel TE-4UP-001	Fuel Assembly 4 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	195	QEUD.
Reactor Vessel TE-4UP-002	Fuel Assembly 4 upper end box.	311 to 977.4 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	195	QEUD.
Reactor Vessel TE-4UP-003	Fuel Assembly 4 upper end box.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	195	QEUD.
Reactor Vessel TE-4UP-004	Fuel Assembly 4 support column.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	196	QEUD.
Reactor Vessel TE-4UP-005	Fuel Assembly 4 support column.	311 to 977.4 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	196	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	249	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	223	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	223	QEUD.
Reactor Vessel TE-5D6-037	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	223	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	223	QEUD.
Reactor Vessel 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	10 Hz	Not available	Not available		--	Channel failed.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	224	QEUD.
Reactor Vessel 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	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	224	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	224	QEUD.
Reactor Vessel TE-5F3-024	Cladding on Fuel Assembly 5, Row F, Column 3 at 1.61 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	249	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	43, 224	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	43, 225	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	43, 225	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	43, 225	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	225	QEUD.
Reactor Vessel 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	10 Hz	Not available	Not available		--	Channel failed.
Reactor Vessel 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	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	226	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	226	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	226	QEUD.
Reactor Vessel 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 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	226	QEUD.
Reactor Vessel 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 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	226	QEUD.
Reactor Vessel TE-5F8-037	Cladding on Fuel Assembly 5, Row F, Column 8 at 0.99 m above bottom of fuel rod.	420 to 1810 K	1 kHz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	227	QEUD.
Reactor Vessel 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 kHz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	227	QEUD.
Reactor Vessel 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	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	22[illegible]	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	227	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	227	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	44, 228	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	44, 228	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	44, 228	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	44, 228	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	229	QEUD.
Reactor Vessel 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	10 Hz	5.0 K	400 K 450 K 500 K 550 K	5.6 K 6.3 K 4.6 K 5.0 K	2229	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	229	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	229	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	45, 230	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	45, 230	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	45, 230	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	45, 230	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	46, 231	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	46, 231	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	46, 231	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	46, 231	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	47, 232	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	47, 232	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	47, 232	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	47, 232	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	48, 233	QEUD.
Reactor Vessel TE-5I6-021	Cladding on Fuel Assembly 5, Row I, Column 6 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	48, 233	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
Reactor Vessel TE-5I6-039	Cladding on Fuel Assembly 5, Row I, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	48, 233	QEUD
Reactor Vessel TE-5I6-054	Cladding on Fuel Assembly 5, Row I, Column 6 at 1.37 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	48, 233	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	234	QEUD.
Reactor Vessel TE-5I8-026	Cladding on Fuel Assembly 5, Row I, Column 8 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	[illegible]	QEUD.
Reactor Vessel TE-5I8-041	Cladding on Fuel Assembly 5, Row I, Column 8 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	234	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	234	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	249	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	235	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	235	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	235	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	235	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	236	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	236	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	236	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	236	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	237	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	237	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	237	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-5J8-037	Cladding on Fuel Assembly 5, Row J, Column 8 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	237	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	238	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	238	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	238	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	238	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	238	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	239	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	239	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	239	QEUD.
Reactor Vessel TE-5LP-001	Fuel Assembly 5 lower end box.	311 to 977.4 K	10 Hz	5.1	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	197	QEUD.
Reactor Vessel TE-5LP-002	Fuel Assembly 5 lower end box.	311 to 977.4 K	10 Hz	5.1	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	197	QEUD.
Reactor Vessel TE-5LP-003	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 kHz	5.1	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	197	QEUD.
Reactor Vessel TE-5LP-004	Fuel Assembly 5 lower end box.	311 to 977.4 K	10 Hz	5.1	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	197	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 K	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	240	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	240	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	240	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	240	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	241	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	241	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	241	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	241	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	241	QEUD.
Reactor Vessel TE-5UP-001	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.3 K 4.6 K 5.1 K	198	QEUD.
Reactor Vessel TE-5UP-002	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	198	QEUD.
Reactor Vessel TE-5UP-003	Fuel Assembly 5, upper end box.	311 to 978 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	198	QEUD.
Reactor Vessel TE-5UP-004	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	198	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-5UP-005	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	198	QEUD.
Reactor Vessel TE-5UP-006	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	199	QEUD.
Reactor Vessel TE-5UP-007	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	199	QEUD.
Reactor Vessel TE-5UP-008	Fuel Assembly 5, upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	199	QEUD.
Reactor Vessel TE-5UP-009	Fuel Assembly 5, upper end box.	311 to 978 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	199	QEUD.
Reactor Vessel TE-6E8-011	Cladding on Fuel Assembly 6, Row E, Column 8 at 0.28 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	242	QEUD.
Reactor Vessel TE-6E8-030	Cladding on Fuel Assembly 6, Row E, Column 8 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	242	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	242	QEUD.
Reactor Vessel TE-6F7-015	Cladding on Fuel Assembly 6, Row F, Column 7 at 0.38 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	242	QEUD.
Reactor Vessel TE-6F7-037	Cladding on Fuel Assembly 6, Row F, Column 7 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	242	QEUD.
Reactor Vessel TE-6F8-028	Cladding on Fuel Assembly 6, Row F, Column 8 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	243	QEUD.
Reactor Vessel TE-6F8-032	Cladding on Fuel Assembly 6, Row F, Column 8 at 0.81 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	243	QEUD.
Reactor Vessel TE-6F9-026	Cladding on Fuel Assembly 6, Row F, Column 9 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	243	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-6F9-041	Cladding on Fuel Assembly 6, Row F, Column 9 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	243	QEUD.
Reactor Vessel TE-6G02-030	Cladding on Fuel Assembly 6, Row G, Column 2 at 0.76 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	243	QEUD.
Reactor Vessel TE-6G08-021	Cladding on Fuel Assembly 6, Row G, Column 8 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	244	QEUD.
Reactor Vessel TE-6G08-039	Cladding on Fuel Assembly 6, Row G, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	244	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	49, 244	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	49, 244	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	49, 244	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	245	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	245	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	245	QEUD.
Reactor Vessel TE-6H03-026	Cladding on Fuel Assembly 6, Row H, Column 3 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	245	QEUD.
Reactor Vessel 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	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	248	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-6H13-015	Cladding on Fuel Assembly 6, Row H, Column 13 at 0.38 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 246	QEUD.
Reactor Vessel TE-6H13-037	Cladding on Fuel Assembly 6, Row H, Column 13 at 0.94 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 246	QEUD.
Reactor Vessel TE-6H14-028	Cladding on Fuel Assembly 6, Row H, Column 14 at 0.71 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 246	QEUD.
Reactor Vessel TE-6H14-032	Cladding on Fuel Assembly 6, Rod H, Column 14 at 0.81 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 246	QEUD.
Reactor Vessel TE-6H15-026	Cladding on Fuel Assembly 6, Row H, Column 15 at 0.66 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 246	QEUD.
Reactor Vessel TE-6H15-041	Cladding on Fuel Assembly 6, Row H, Column 15 at 1.04 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	50, 247	QEUD.

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TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-6I02-021	Cladding on Fuel Assembly 6, Row I, Column 2 at 0.53 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	247	QEUD.
Reactor Vessel TE-6I02-039	Cladding on Fuel Assembly 6, Row I, Column 2 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	247	QEUD.
Reactor Vessel TE-6I14-021	Cladding on Fuel Assembly 6, Row I, Column 14 at 0.53 m above bottom of rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	49, 247	QEUD.
Reactor Vessel TE-6I14-039	Cladding on Fuel Assembly 6, Row I, Column 14 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	5.2 K	400 K 450 K 500 K 550 K	5.8 K 6.5 K 4.8 K 5.2 K	49, 247	QEUD.
Reactor Vessel TE-6LP-001	Fuel Assembly 6 lower end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	200	QEUD.
Reactor Vessel TE-6LP-002	Fuel Assembly 6 lower end box.	311 to 978 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	200	QEUD.
Reactor Vessel TE-6LP-003	Fuel Assembly 6 lower end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	200	QEUD.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o Reading	After T_o Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Reactor Vessel TE-6UP-001	Fuel Assembly 6 upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	201	QEUD.
Reactor Vessel TE-6UP-002	Fuel Assembly 6 upper end box.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	201	QEUD.
Reactor Vessel TE-6UP-003	Fuel Assembly 6 upper end box.	311 to 978 K	1 kHz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	201	QEUD.
Reactor Vessel TE-6UP-004	Fuel Assembly 6 support column	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	202	QEUD.
Reactor Vessel TE-6UP-005	Fuel Assembly 6 support column.	311 to 978 K	10 Hz	5.1 K	400 K 450 K 500 K 550 K	5.7 K 6.4 K 4.6 K 5.1 K	202	QEUD.
Secondary Coolant System TT-P004-004	Secondary coolant system feedwater.	366 to 505 K	10 Hz	Not available		Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Emergency Core Cooling System TT-P120-062	Cold leg injection in 4-in. line upstream of cold leg injection point.	280 to 620 K	10 Hz	3 K	--	Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.

TABLE VII (continued)

VARIABLE System Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After T_o: Reading	After T_o: Uncertainty (±)	Figure	Comments
TEMPERATURE (continued)								
Intact Loop TT-P139-032	Intact loop hot leg primary coolant, Channel A.	533 to 616 K	10 Hz	1 K	--	Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Intact Loop TT-P139-033	Intact loop hot leg primary coolant, Channel A.	533 to 616 K	10 Hz	1 K	--	Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.
Intact Loop TT-P139-034	Intact loop hot leg primary coolant, Channel A.	533 to 616 K	10 Hz	1 K	--	Not available	--	Restrained, good for initial conditions only. Not presented. See Table VIII.

a. Recording Frequency is the measurement channel bandwidth at the ± 3 db level.

b. QEUD -- qualified engineering units data where measurements have been compared to other measurements and found to be within the accuracy of the instrument.

c. Lassahn, Gordon D., LOFT Experimental Measurements Uncertainties Analyses, Vol. XVI, LOFT Three-Beam Gamma Densitometer System, TREE-NUREG-1089 (February 1979).

d. Restrained data -- measurements from instruments that did not fail, but the data have some restrictions.

e. Biladeau, Garre L., LOFT Experimental Measurements Uncertainties Analyses, Vol. VI, LOFT Linear Variable Differential Transformer Displacement Transducer Uncertainty Analysis, TREE-NUREG-1089 (February 1978).

f. Silverman, Sandor, LOFT Experimental Measurements Uncertainties Analyses, Vol. XIV, LOFT Drag Disc-Turbine Transducer Uncertainty Analysis, TREE-NUREG-1089 (November 1978).

g. Lassahn, Gordon, D., LOFT Experimental Measurements Uncertainties Analyses, Vol. VII, LOFT Self-Powered Neutron Detector Uncertainty Analysis, TREE-NUREG-1089 (August 1978).

h. Goodrich, Jr., Lorenzo D., LOFT Experimental Measurements Uncertainties Analyses, Vol. XV, LOFT Primary Coolant Pump Speed Measurement Uncertainty Analysis, TREE-NUREG-1089 (April 1978).

i. Pressure measurements are presented as absolute values.

j. Measured peak clad temperatures may be in error by ±20 K, measured departure from nucleate boiling times may in error ±0.5 s, and measured quench times may be in error by ±5 s.

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TABLE VIII

MEASURED VARIABLES GOOD FOR INITIAL CONDITIONS

Measurement	Location	Initial Condition
FRC-202	Steam generator blowdown flow	0.026 ± 0.0018 l/s
FT-P004-012	Inlet to air cooled condenser heater	19.6 ± 0.038 kg/s
FT-P004-72-2	Flow from main feedwater pump	19.15 ± 0.086 kg/s
PDT-P138-27-1	Primary coolant flow, Channel A	0.022 ± 0.002 MPa
PDT-P138-27-2	Primary coolant flow, Channel B	0.018 ± 0.002 MPa
PDT-P138-27-3	Primary coolant flow, Channel C	0.020 ± 0.002 MPa
PT-P004-034	Pressure downstream of main feedwater pump.	7.58 ± 0.075 MPa
TT-P004-004	Secondary coolant system feedwater temperature	482 ± 3 K
TT-120-062	Temperature at cold leg injection point	357 ± 3 K
TT-P139-032	Primary coolant system venturi temperature, Channel A	590.6 ± 1 K
TT-P139-033	Primary coolant system venturi temperature, Channel B	590.0 ± 1 K
TT-P139-034	Primary coolant system venturi temperature, Channel C	590.3 ± 1 K

TABLE IX

COMPUTED VARIABLES FOR EXPERIMENT L2-3

Variable Location Detectors	Units	Uncertainty	Calculation Method	Figure	Remarks
DENSITY, AVERAGE	Mg/m^3		Density, average: 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 $\bar{\rho} = \frac{1}{A} \rho(\bar{r})dA$ where A = cross-sectional area of the pipe $\rho(\bar{r})$ = chordal profile. The assumed profiles are as follows: (1) For homogeneous flow the average results directly in $\bar{\rho} = \frac{(\rho_A + \rho_B + \rho_C)}{3}$ where $_A$, $_B$, and $_C$, = density along gamma densitometer beam lines A, B, and C. (2) For tilted stratified flow, $\rho(\bar{r}) = \rho_\ell - \frac{\rho_\ell - \rho_g}{1 + \exp[-4a(x-b)]}$		The individual beam densities were filtered with a 4-Hz filter prior to being used in the average calculation. DE-BL-1A failed and was not used in the averaging calculation.
Broken Loop Cold Leg DE-BL-1A (ρ_A) DE-BL-1B (ρ_B) } DE-BL-105 DE-BL-1C (ρ_C)	Mg/m^3	$\pm 0.13\ Mg/m^3$ [a]		280	Restrained, averaging calculation appears correct.
Broken Loop Hot Leg DE-BL-2A (ρ_A) DE-BL-2B (ρ_B) } DE-BL-205 DE-BL-2C (ρ_C)	Mg/m^3	$\pm 0.15\ Mg/m^3$ [a]		281	Restrained, averaging calculation appears correct.
Intact Loop Cold Leg DE-PC-1A (ρ_A) DE-PC-1B (ρ_B) } DE-PC-105 DE-PC-1C (ρ_C)	Mg/m^3	$\pm 0.16\ Mg/m^3$ [a]		282	Restrained, averaging calculation appears correct.
Intact Loop Hot Leg DE-PC-2A (ρ_A) PE-PC-2B (ρ_B) } DE-PC-205 DE-PC-2C (ρ_C)	Mg/m^3	$\pm 0.15\ Mg/m^3$ [a]		283	Restrained, averaging calculation appears correct. DE-PC-2A failed was not used in the averaging calculation.

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TABLE IX (continued)

Variable Location Detectors	Units	Uncertainty	Calculation Method	Figure	Remarks
DENSITY, AVERAGE (continued)			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, $\rho(\bar{r}) = \begin{cases} \rho_c & \text{for } r < R-D \\ \rho_\ell & \text{for } r > R-D \end{cases}$ 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. (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. $\bar{\rho} = 0.34485\ \rho_A + 0.40034\ \rho_B + 0.25481\ \rho_C$.		
LIQUID LEVEL			The liquid distribution was interpreted from the voltage output of the conductivity probes using the following criteria.		
Downcomer and Lower Plenum					
LE-1ST-1 and -2	mm	b	(1) A response time of 550 ms during dryout or wetting was assumed.	292	Restrained, slow response.
LE-2ST-1 and -2	mm	b			The conductivity probes needed for this calculation failed.

TABLE IX (continued)

Variable Location Detectors	Units	Uncertainty	Calculation Method	Figure	Remarks
Core			(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.		
LE-1F10	mm	b		293	Restrained, slow response.
LE-3F10	mm	b		294	Restrained, slow response.
LE-5E11	mm	b		295	Restrained, slow response.
Upper Plenum			(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-3UP-1	mm	b		296	Restrained, slow response.
			Engineering judgement was required at times on each conductivity probe in order to best satisfy the above criteria.		
			Caution should be exercised in applying the in-core liquid level data to the core as a whole because as the in-core liquid level stings are located at "cold spots" (that is, along guide tubes rather than fuel rods) in the core. Prior to the first rewet these liquid level plots indicate more fluid than is present at the surrounding hotter fuel rods due to the effects of a strong radial temperature profile.		
MASS FLOW RATE	kg/s		Mass flow rate $= \bar{\rho} \ (K\Delta P)/\bar{\rho}^{\ 1/2} A$		
Broken Loop Cold Leg			where:		
PDE-BL-2 (ΔP) } FR-BL-116	MPa (differential)	[illegible].75 kg/s[c]	$\bar{\rho}$ = average fluid density at measurement location.	288	Restrained. Compares well with other mass-flow calculations.
DE-BL-1 ($\bar{\rho}$) } FR-BL-116	Mg/m^3				
Broken Loop Hot Leg					
PDE-BL-1 (ΔP) } FR-BL-216	MPa (differential)	$\pm$23.7 kg/s[c]		289	
DE-BL-2 ($\bar{\rho}$) } FR-BL-216	Mg/m^3				

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TABLE IX (continued)

Variable Location Detectors	Units	Uncertainty	Calculation Method	Figure	Remarks
TEMPERATURE, AVERAGE	K		Arithmetic average.		
TE-BL-001		±2.88 K		290	Restrained, averaging calculation appears correct.
TE-BL-002		±2.88 K		290	Restrained, averaging calculation appears correct.
TE-PC-001		±2.94 K		291	Restrained, averaging calculation appears correct.
TE-PC-002		±2.94 K		291	Restrained, averaging calculation appears correct.
VELOCITY, AVERAGE	m/s		Arithmetic average. (Based on a flow area of 0.0634 m^2.)		
FE-BL-001		±0.59 m/s		284	Restrained, averaging calculation appears correct.
FE-BL-002		±0.49 m/s		285	Restrained, averaging calculation appears correct.
FE-PC-001		±0.59 m/s		286	Restrained, averaging calculation appears correct.
FE-PC-002		±0.59 m/s		287	Restrained, averaging calculation appears correct.

a. Lassahn, Gordon D., LOFT Three-Beam Densitometer Data Interpretation, TREE-NUREG-1111 (October 1977).

b. The uncertainty in each conductivity probe for (d) LE-1ST-1 and LE-2ST-1 is ±4.5% of range, (b) LE-1ST-2 and LE-2ST-2 is ±7.1% of range, and (c) LE-1F10, LE-3F10, LE-5E11 and LE-3UP-1 is ±2.9% of range. All conductivity probes have a response time of 340 ms.

c. Chappel, John R., LOFT Broken Loop Mass Flow Measurements Uncertainty Analysis, TREE-NUREG-1191 (November 1977). Integral uncertainty over entire blowdown transient was ±7% of reading.

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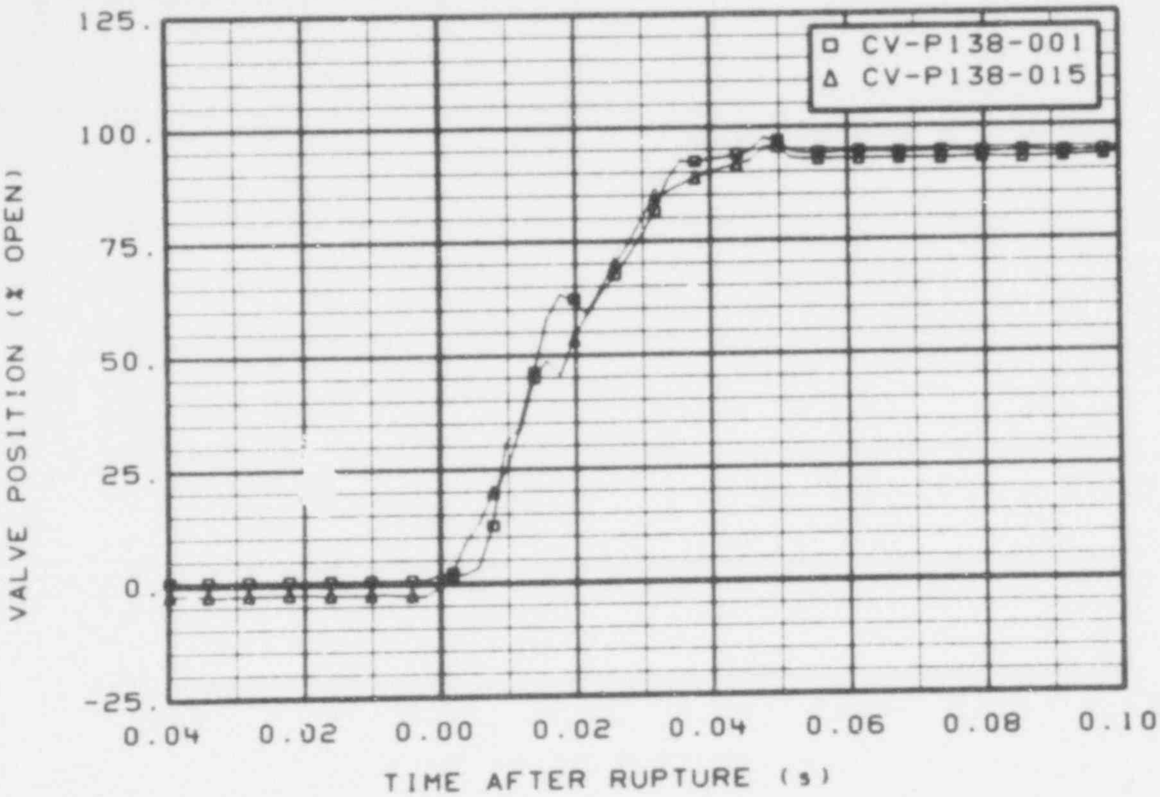


Fig. 19 Valve opening (%) for broken loop QOBV cold leg valve (CV-P138-001) and hot leg valve (CV-P138-015) (QEUD).

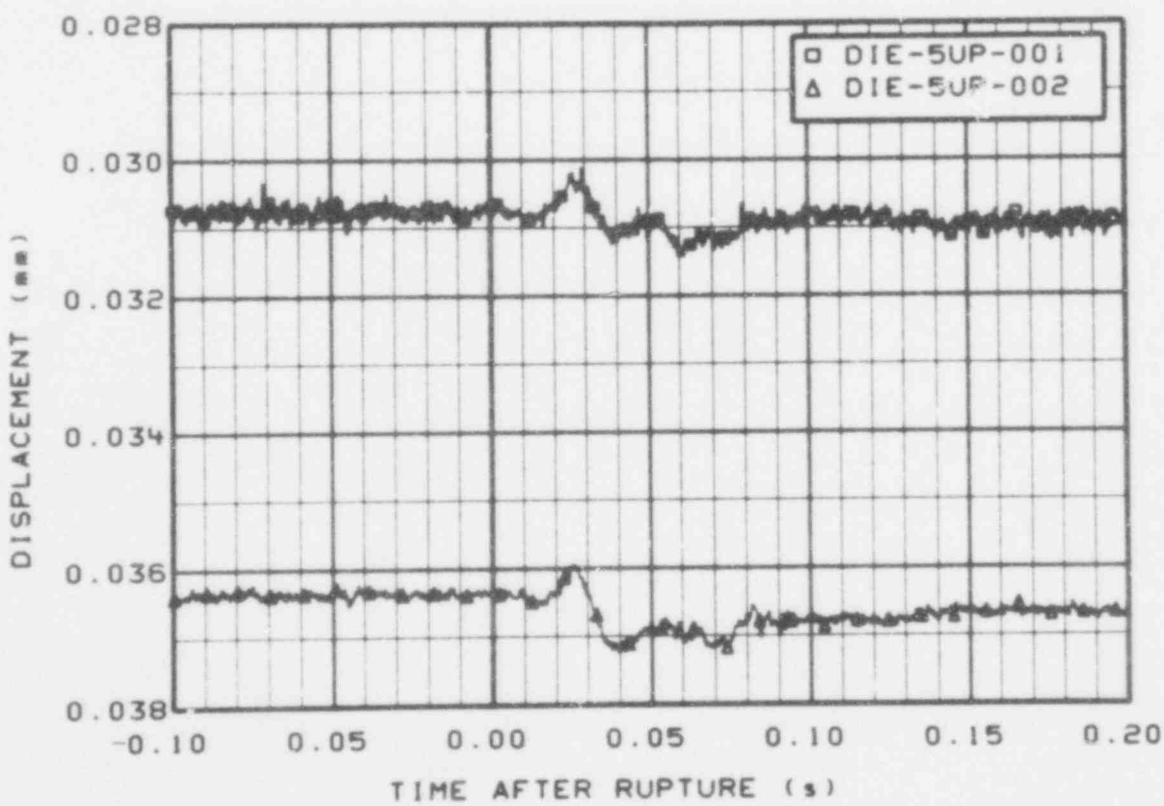


Fig. 20 Displacement of Fuel Assembly 5 relative to upper head (DIE-5UP-001, and -002) (restrained; magnitude inconsistent with previous experiments).

563 269

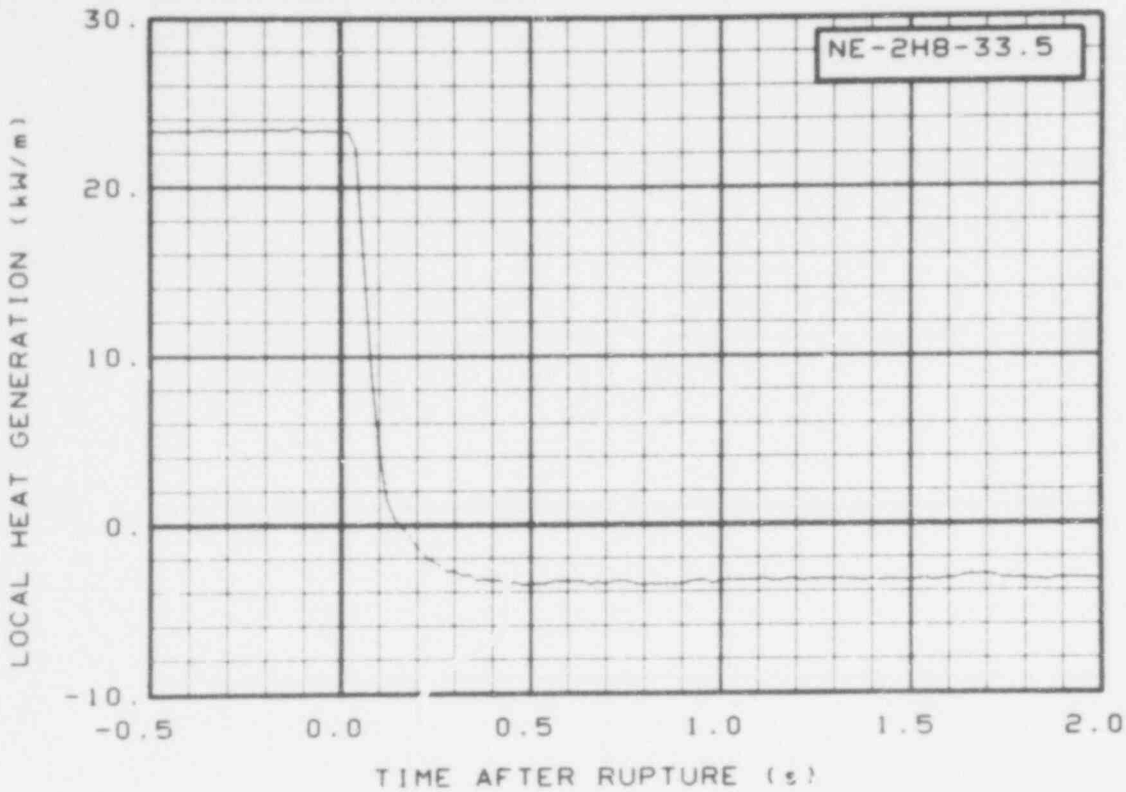


Fig. 21 Local heat generation rate for Fuel Assembly 2, Rod H8 (NE-2H8-33.5) (restrained, initial kW/m valid, measures neutrons minus gammas after T = 0).

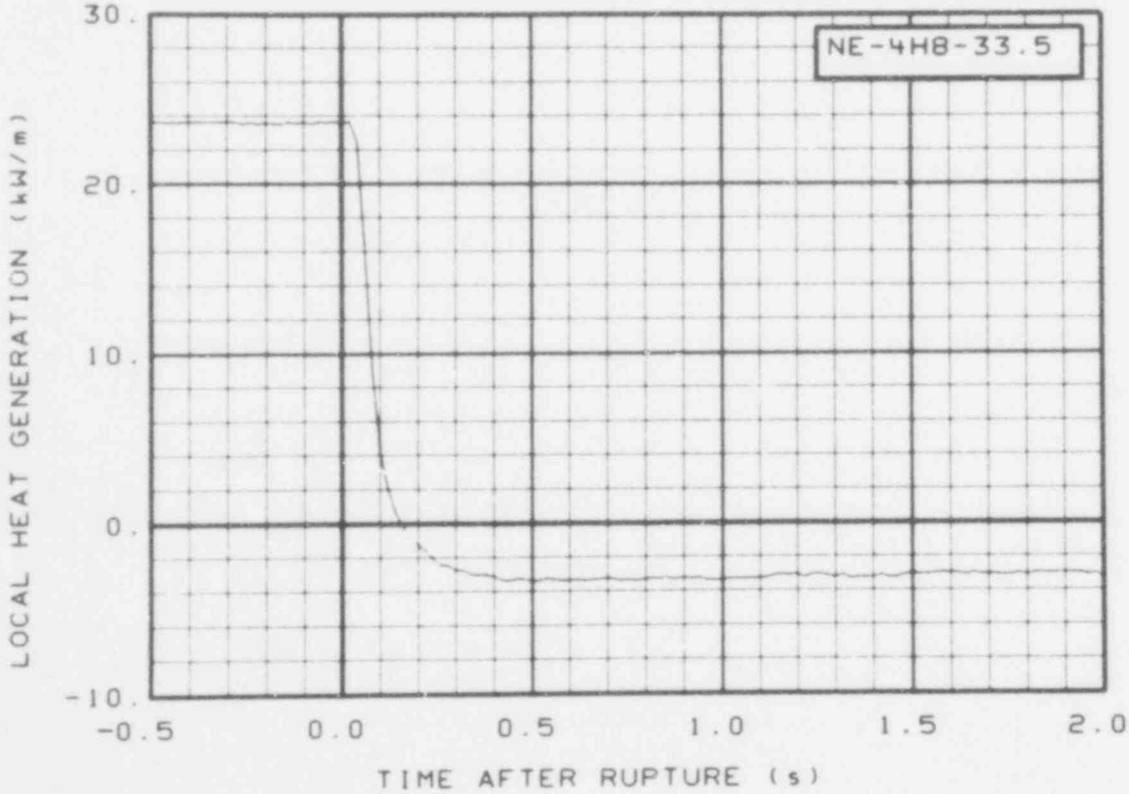


Fig. 22 Local heat generation rate for Fuel Assembly 4, Rod H8 (NE-4H8-33.5) (restrained, initial kW/m valid, measures neturons minus gammas after T = 0).

563 269

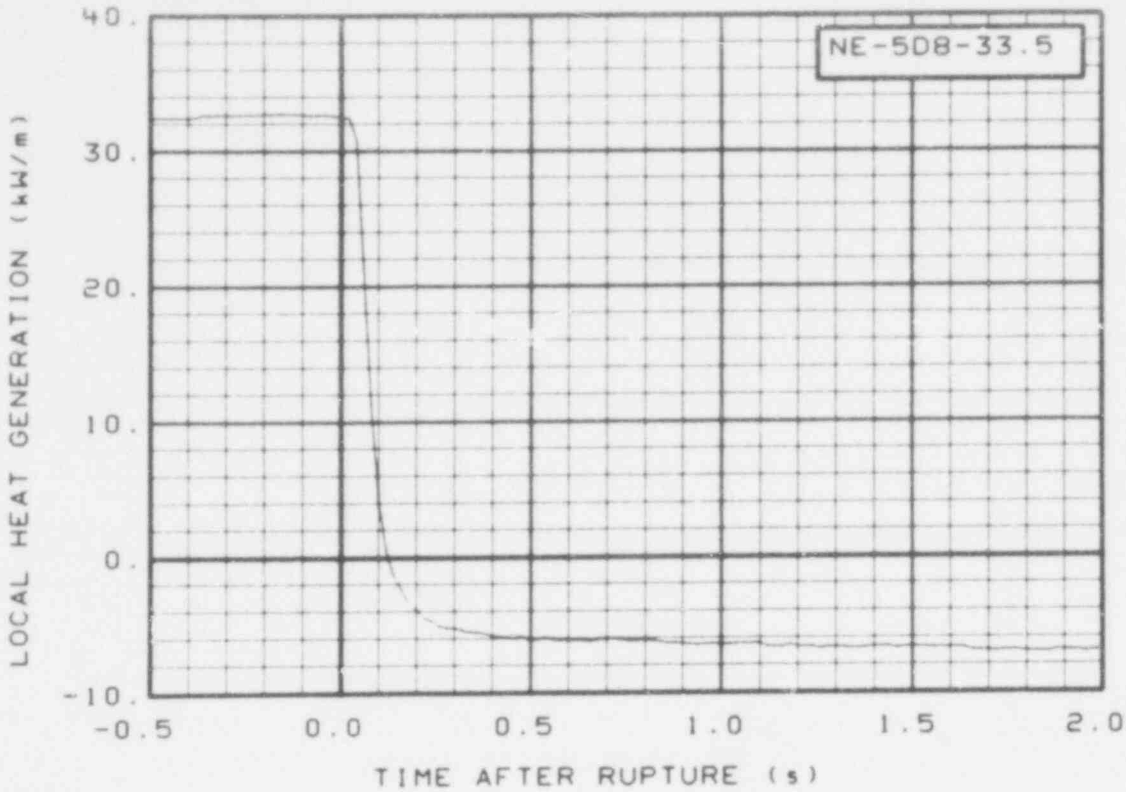


Fig. 23 Local heat generation rate for Fuel Assembly 5, Rod D8 (NE-5D8-33.5) (restrained, initial kW/m valid, measures neutrons minus gammas after T = 0).

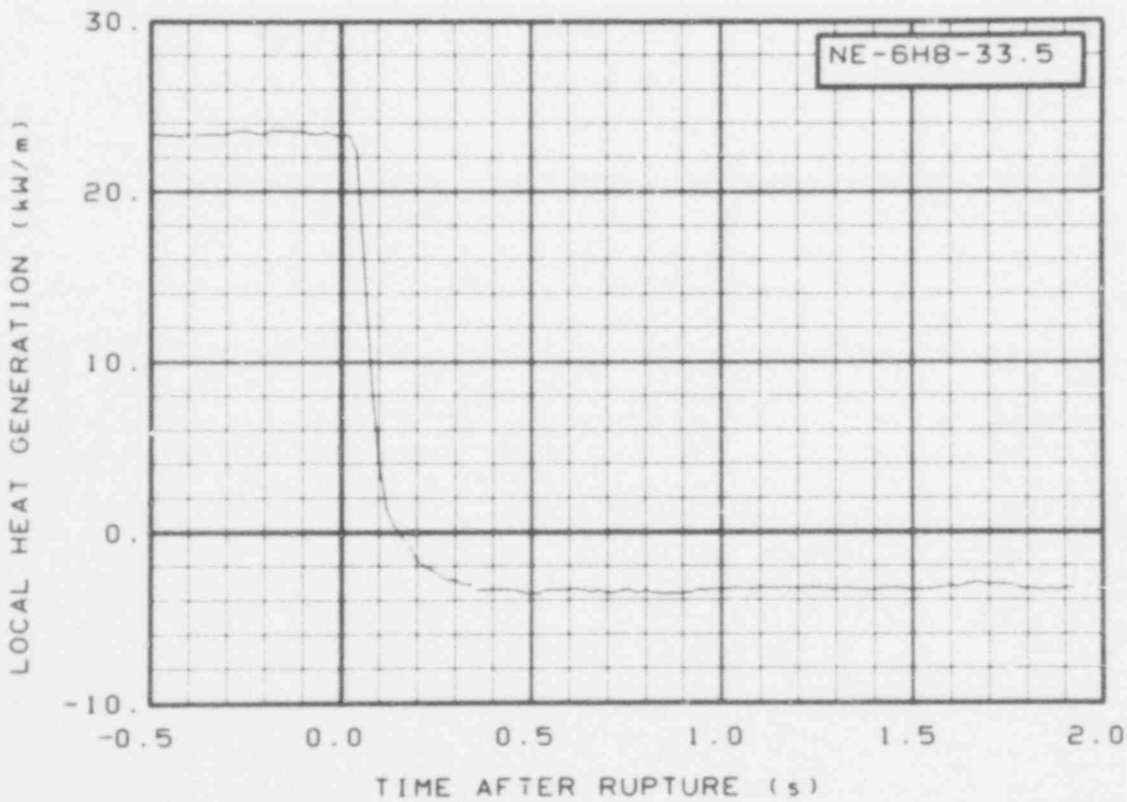


Fig. 24 Local heat generation rate for Fuel Assembly 6, Rod H8 (NE-6H8-33.5) (restrained, initial kW/m valid, measures neutrons minus gammas after T = 0).

563 270

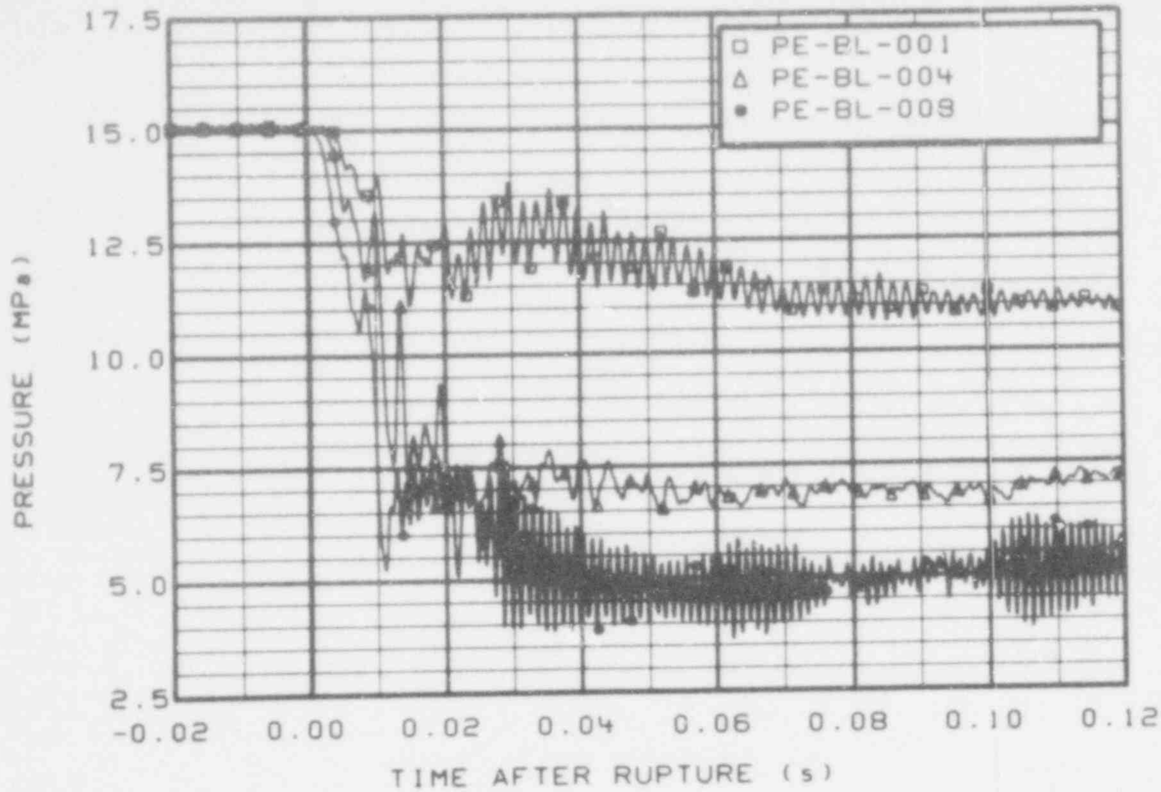


Fig. 25 Pressure in broken loop cold leg (PE-BL-001, -004, and -008) (QEUD).

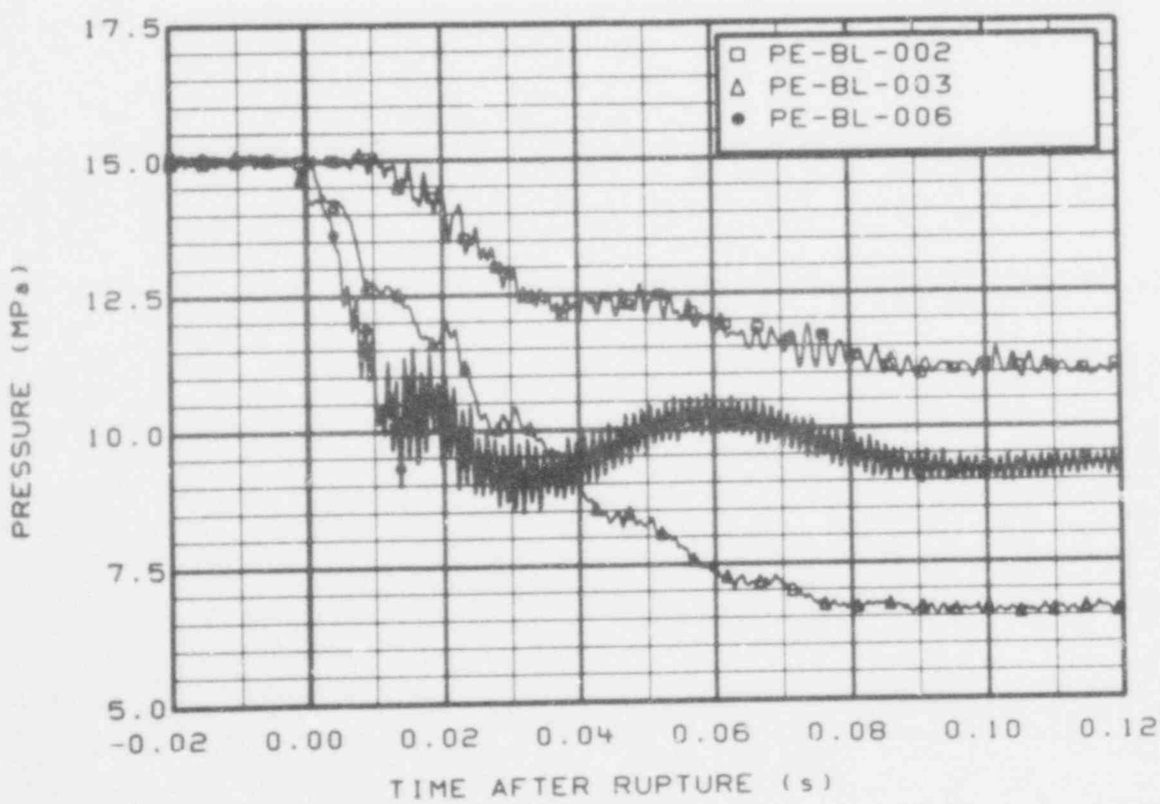


Fig. 26 Pressure in broken loop hot leg (PE-BL-002, -003, and -006) (PE-BL-002 and -006 - QEUD. PE-BL-003 — restrained, common pressure tap to PE-BL-003, PdE-BL-011, and PdE-BL-012, data inconsistent with system behavior).

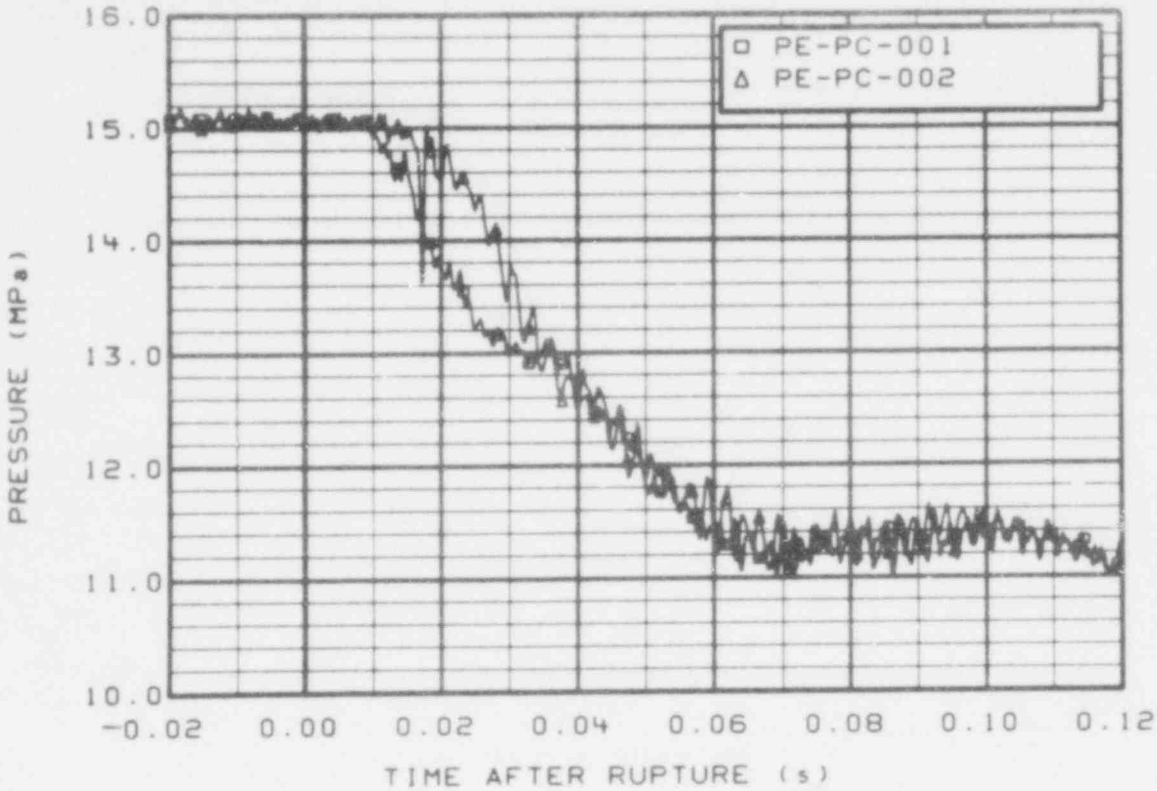


Fig. 27 Pressure in intact loop cold leg and hot leg (PE-PC-001 and -002) (QEUD).

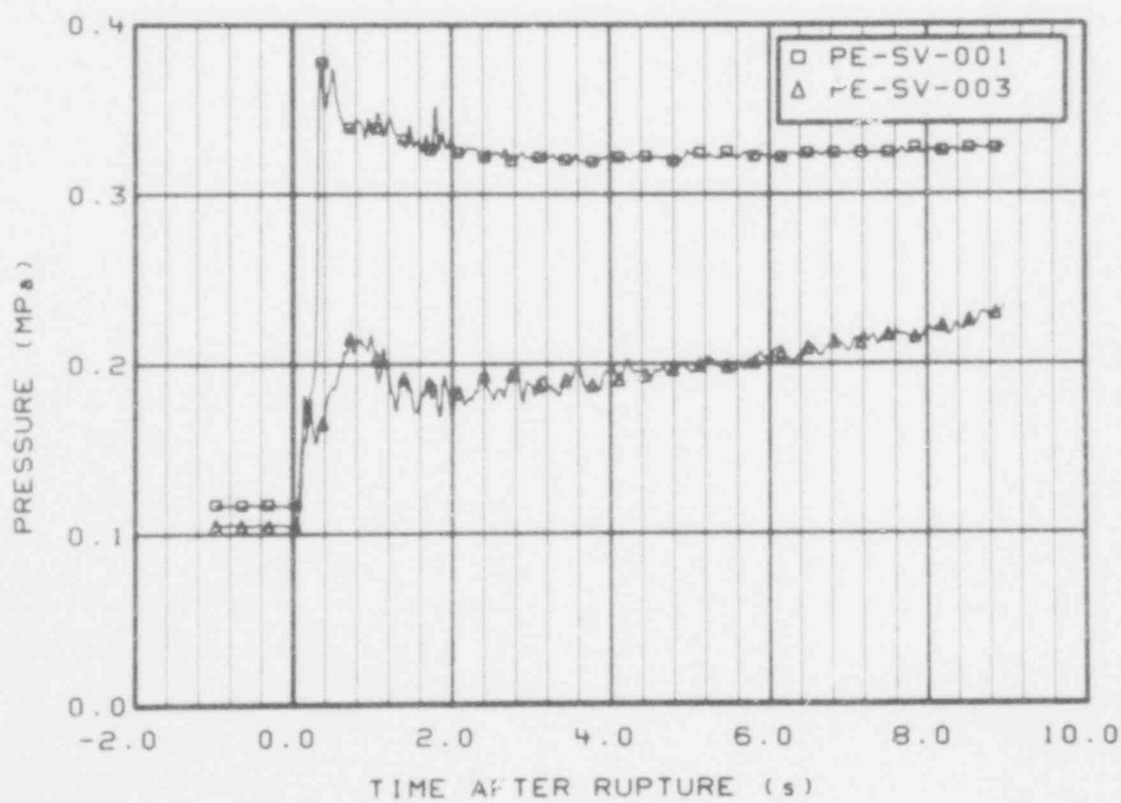


Fig. 28 Pressure in blowdown suppression tank bottom under Downcomer 1, 157.5° (PE-SV-001 and -003) (QEUD).

563 273

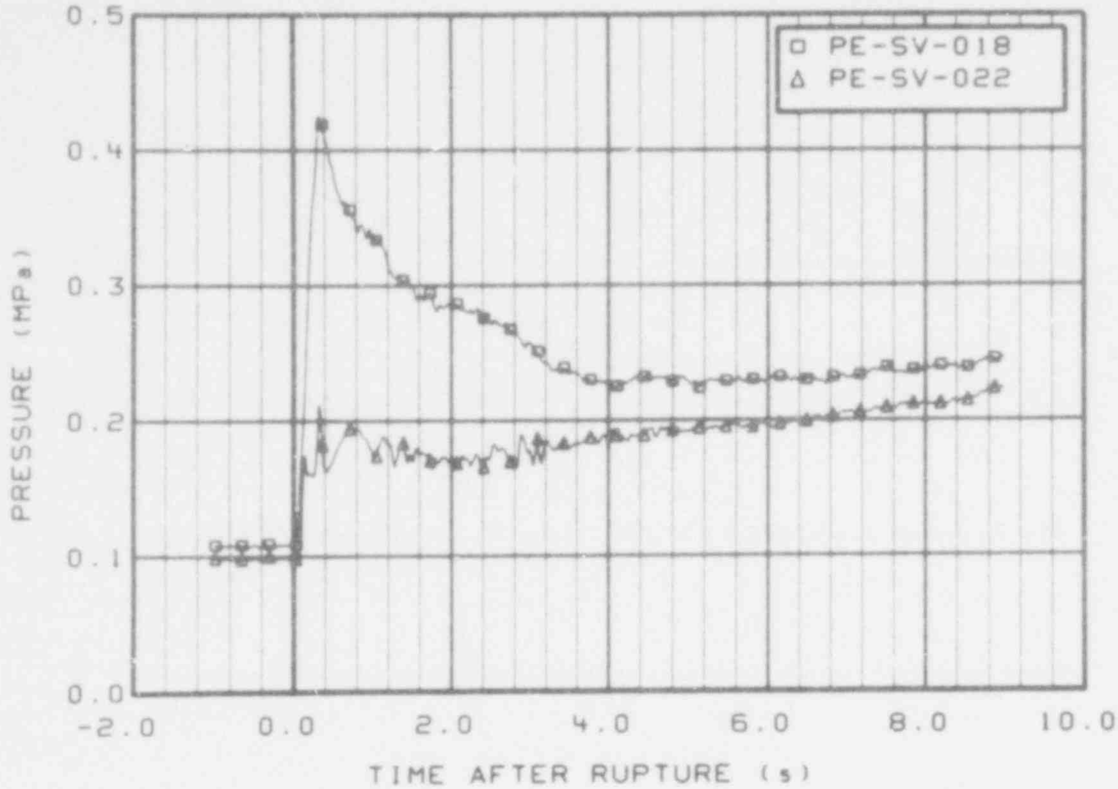


Fig. 29 Pressure in blowdown suppression tank bottom, 1.38 m north of Downcomer 3, 180° (PE-SV-018 and -022) (QEUD).

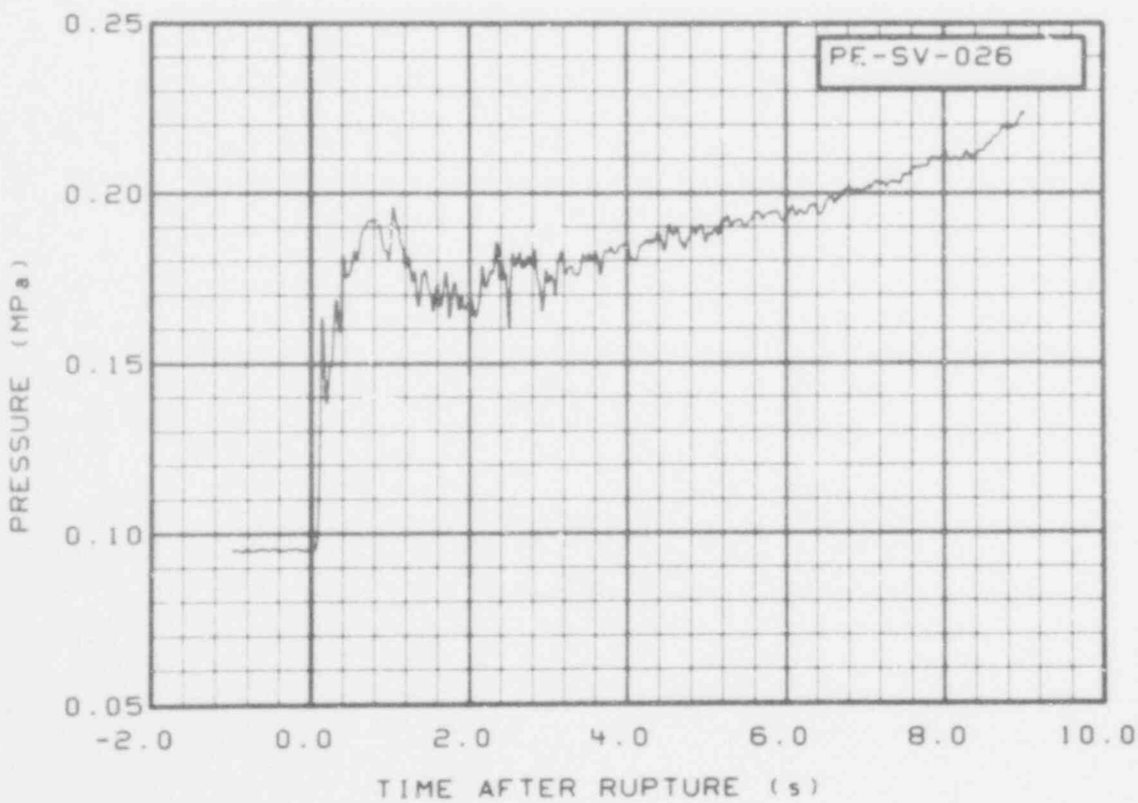


Fig. 30 Pressure in blowdown suppression tank bottom, 1.379 m south of Downcomer 2, 180° (PE-SV-026) (QEUD).

563 273

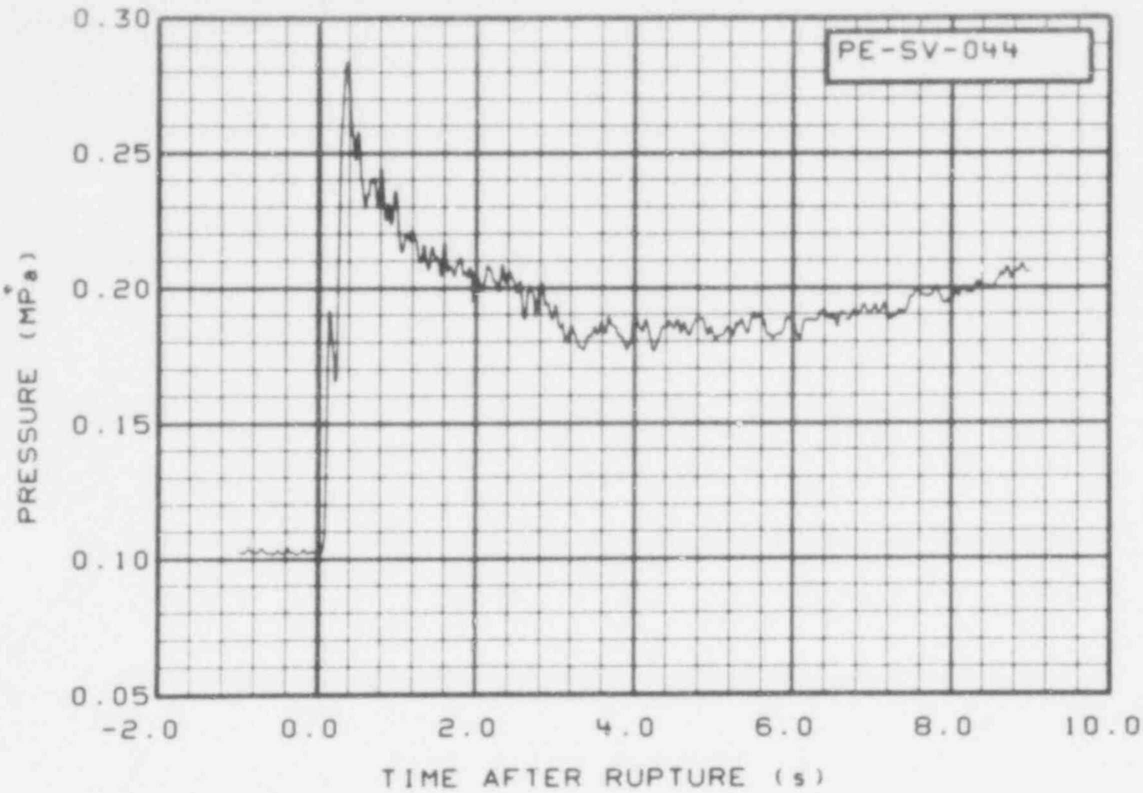


Fig. 31 Pressure in blowdown suppression tank bottom under Downcomer 3, 180° (PE-SV-044) (QEUD).

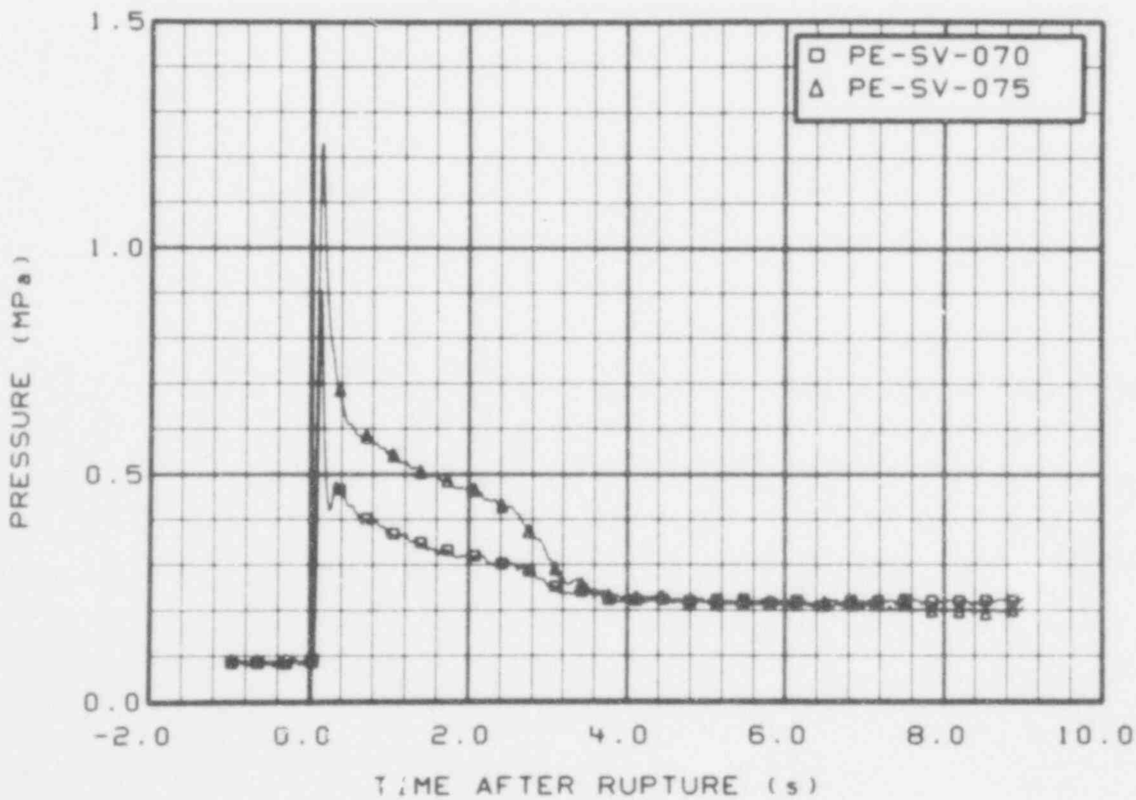


Fig. 32 Pressure in bellows between broken loop and blowdown suppression tank header (hot leg PE-SV-070 and cold leg PE-SV-075) (QEUD).

563 278

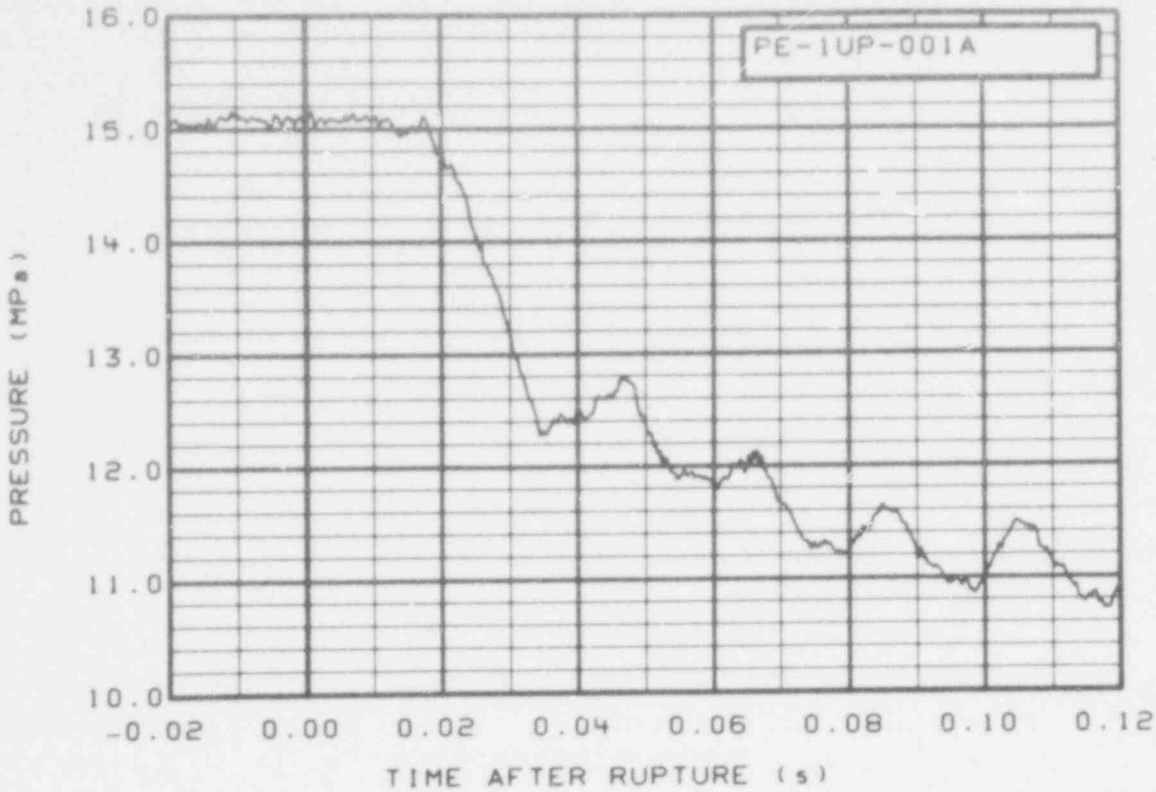


Fig. 33 Pressure in reactor vessel above Fuel Assembly 1 upper end box (PE-1UP-001A) (QEUD).

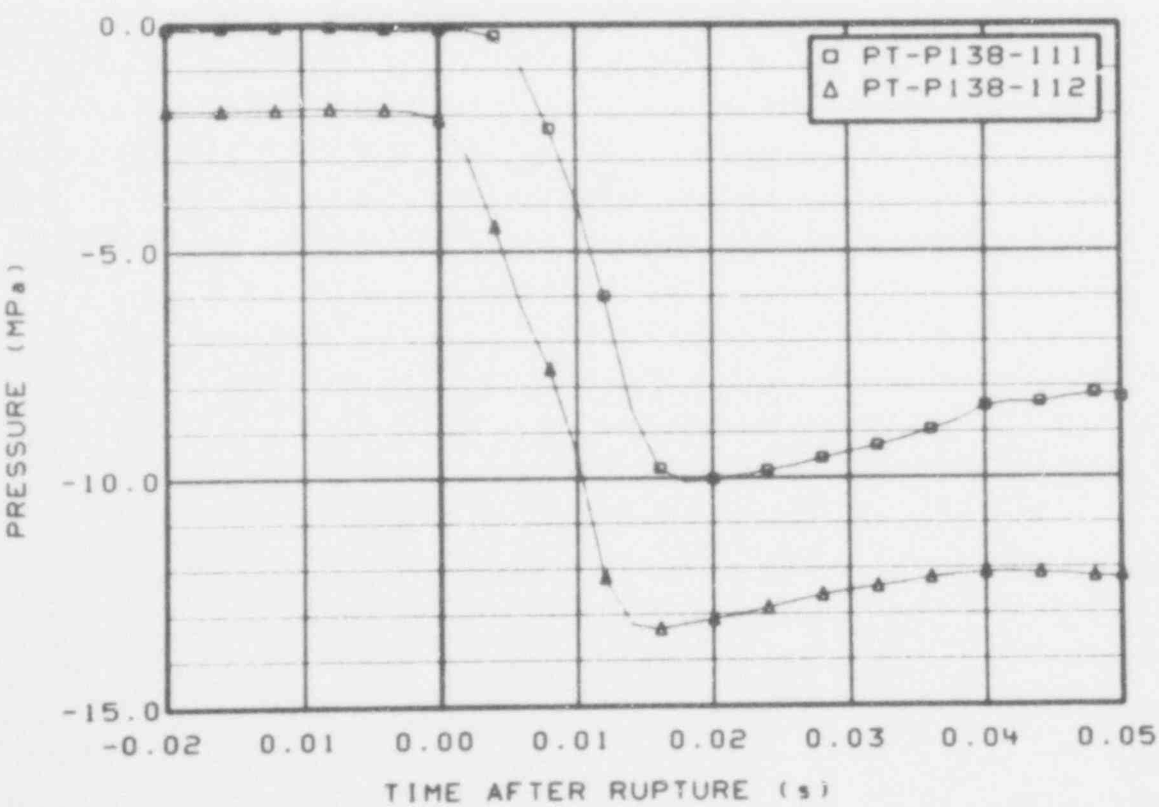


Fig. 34 Pressure in broken loop QOBV inlets (PT-P138-111 and -112) (restrained, good for establishing T = 0 only).

563 275

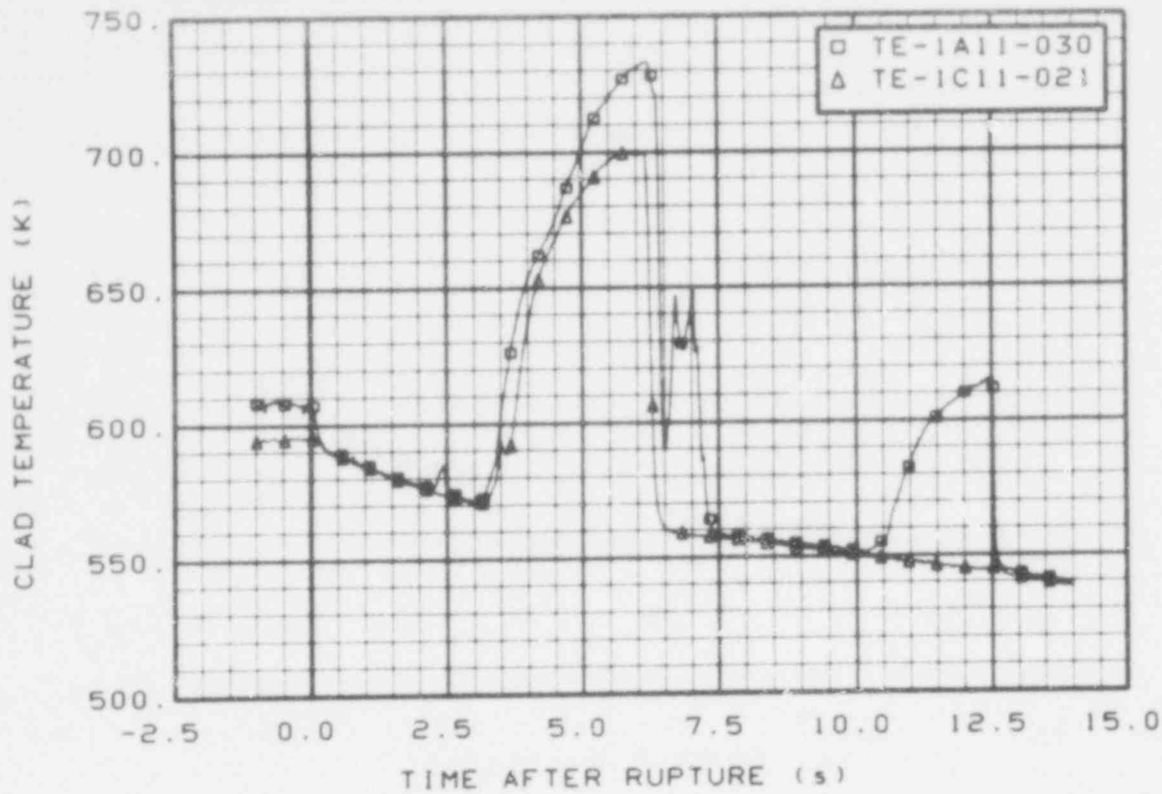


Fig. 35 Temperature of cladding on Fuel Assembly 1, Rods A11 and C11 (TE-1A11-030 and TE-1C11-021) (QEUD).

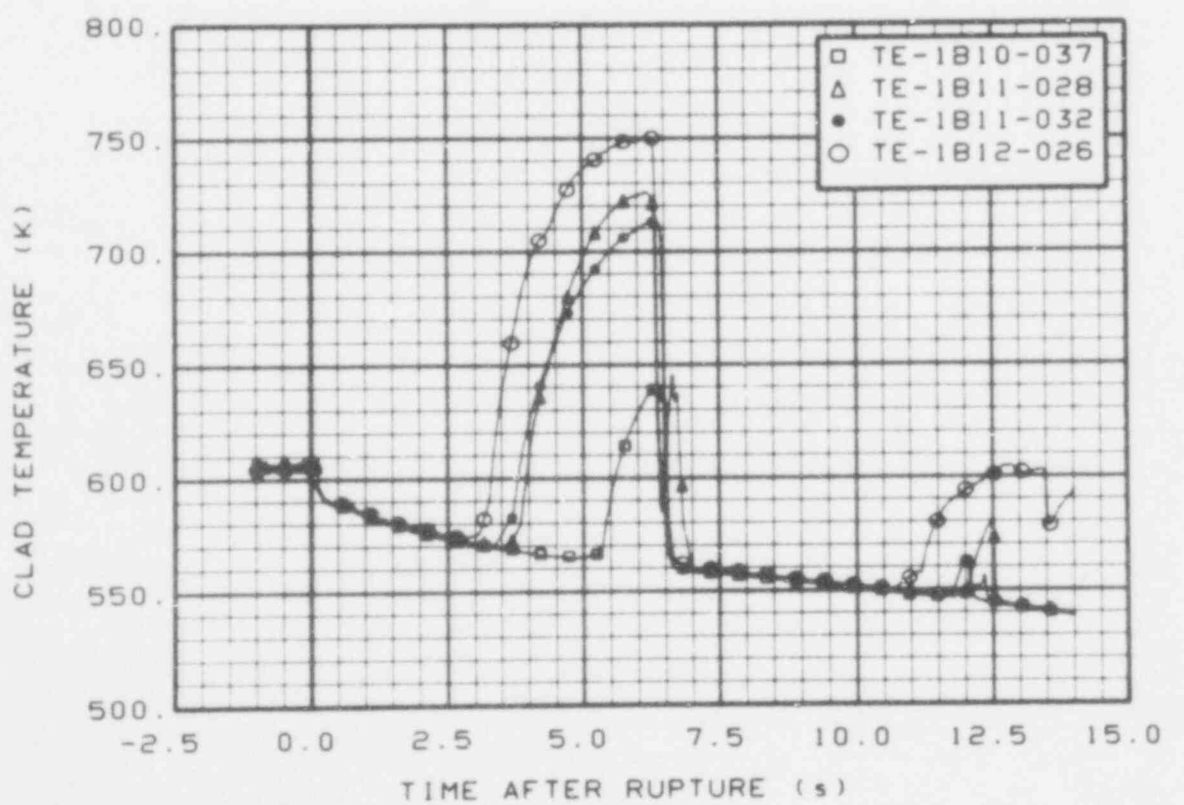


Fig. 36 Temperature of cladding on Fuel Assembly 1, Rods B10, B11, and B12 (TE-1B10-037, TE-1B11-028 and -032, and TE-1B12-026) (QEUD).

563 276

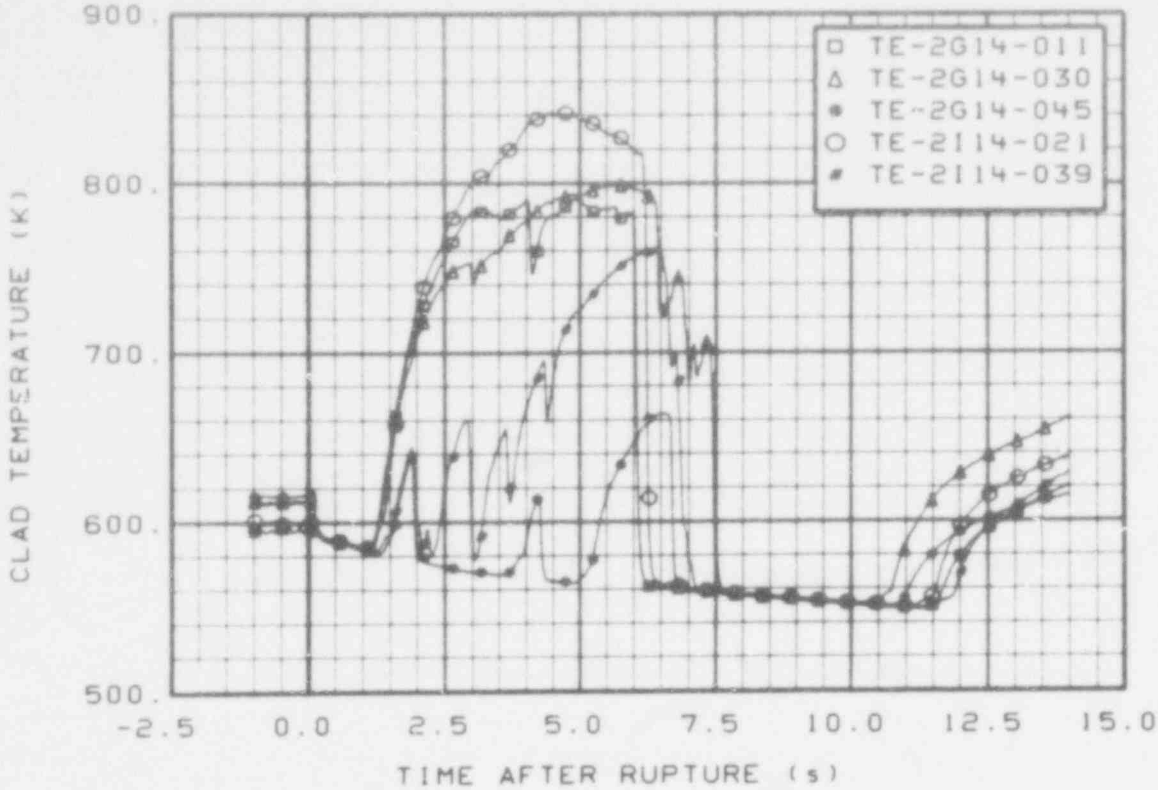


Fig. 37 Temperature of cladding on Fuel Assembly 2, Rods G14 and I14 (TE-2G14-011, -030, and -045 and TE-2I14-021 and -039) (QEUD).

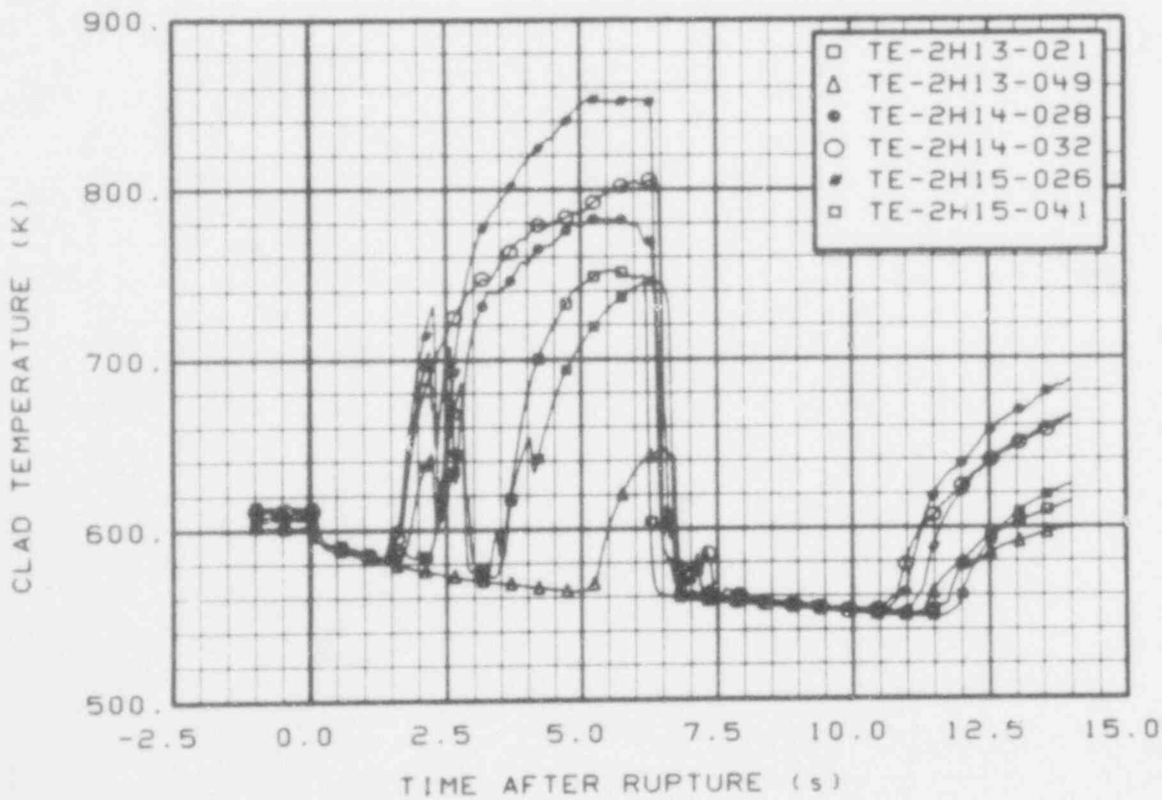


Fig. 38 Temperature of cladding on Fuel Assembly 2, Rods H13, H14, and H15 (TE-2H13-021, and -049, TE-2H14-028 and -032, and TE-2H15-026 and -041) (QEUD).

563 277

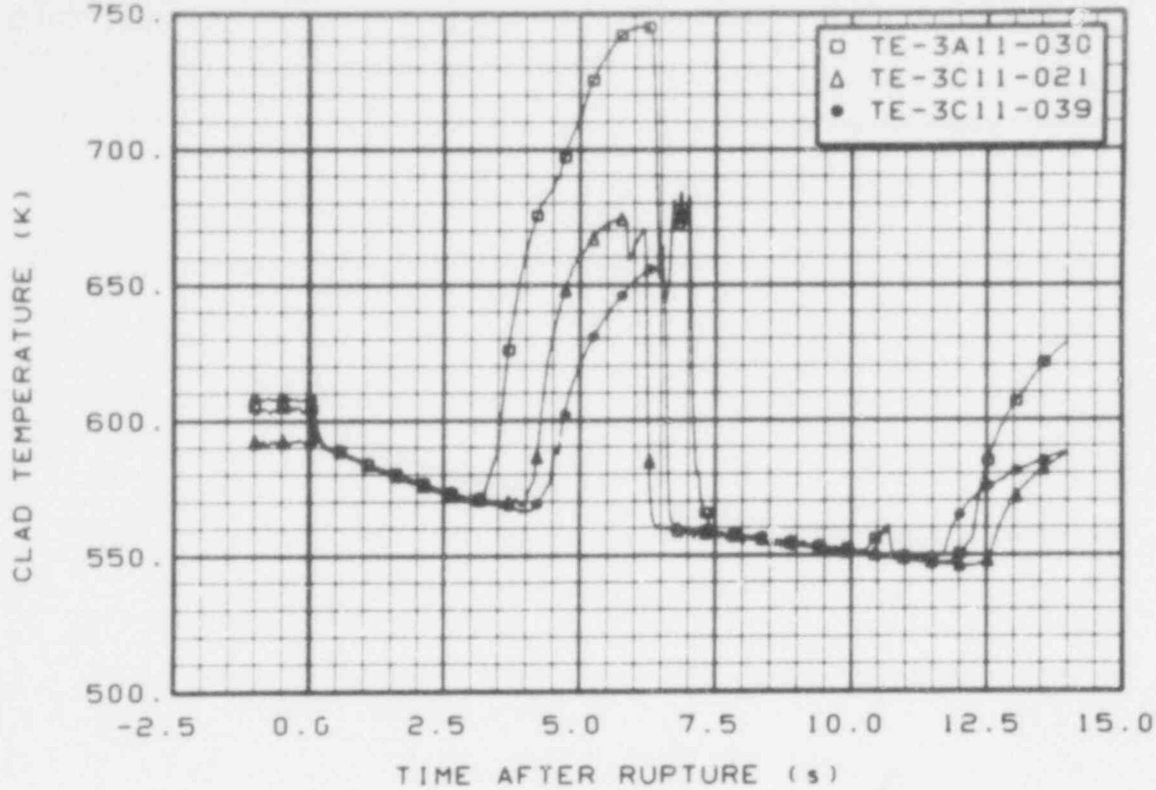


Fig. 39 Temperature of cladding on Fuel Assembly 3, Rods A11 and C11 (TE-3A11-030 and TE-3C11-021 and -039) (QEUD).

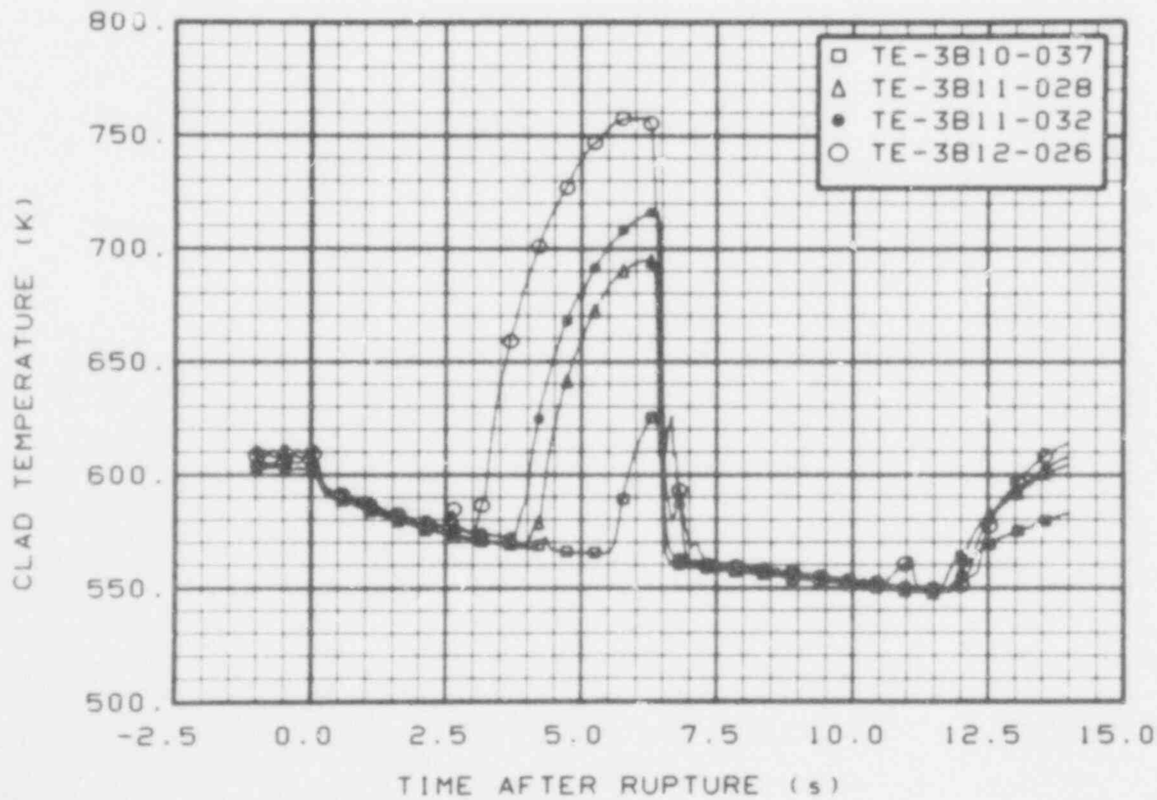


Fig. 40 Temperature of cladding on Fuel Assembly 3, Rods B10, B11, and B12 (TE-3B10-037, TE-3B11-028 and -032, and TE-3B12-026) (QEUD).

563 278

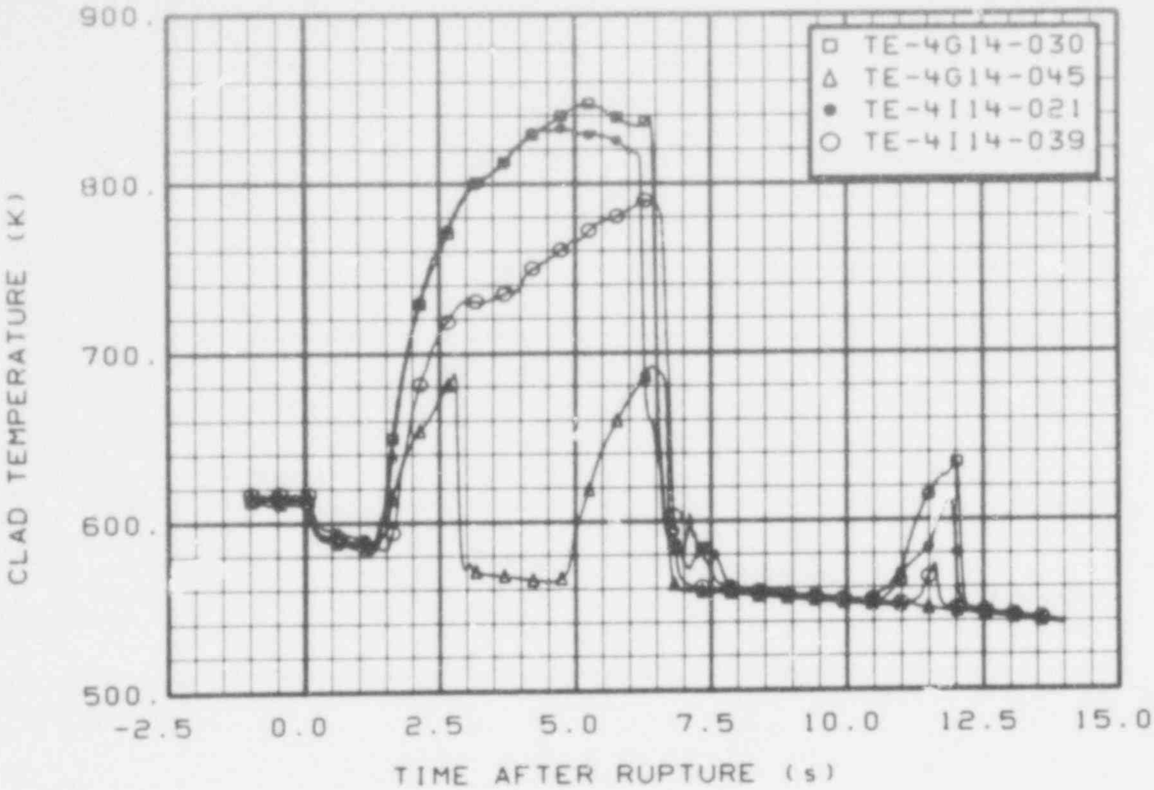


Fig. 41 Temperature of cladding on Fuel Assembly 4, Rods G14, I14 (TE-4G14-030, -045 and TE-4I14-021 and -039) (QEUD).

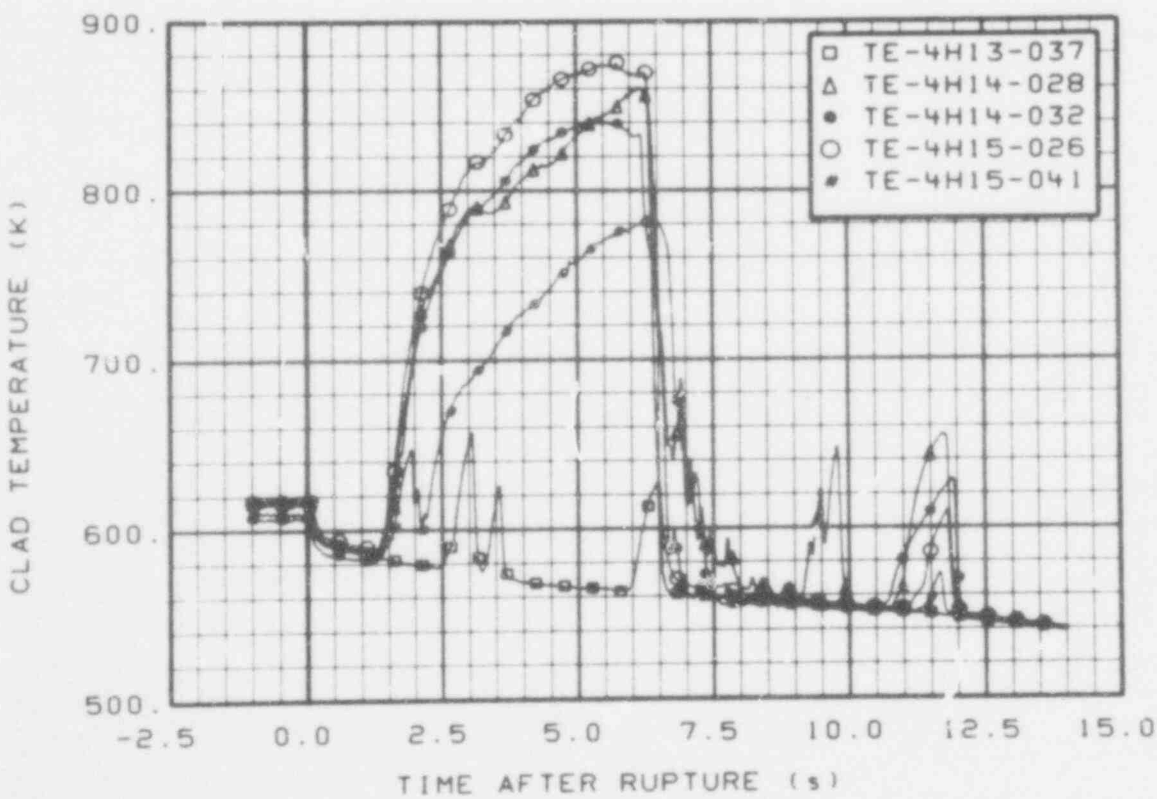


Fig. 42 Temperature of cladding on Fuel Assembly 4, Rods H13, H14, and H15 (TE-4H13-037, TE-4H14-028 and -032, and TE-4H15-026 and -041) (QEUD).

563 279

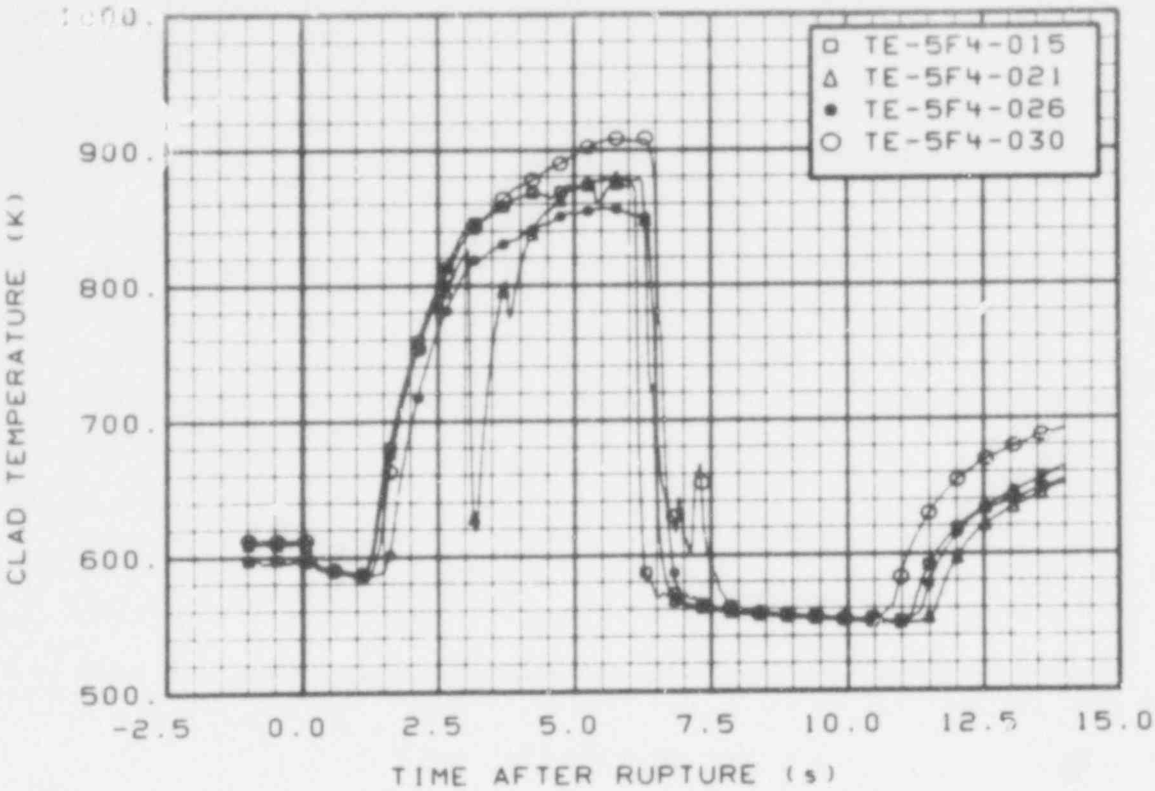


Fig. 43 Temperature of cladding on Fuel Assembly 5, Rod F4 (TE-5F4-015, -021, -026, and -030) (QEUD).

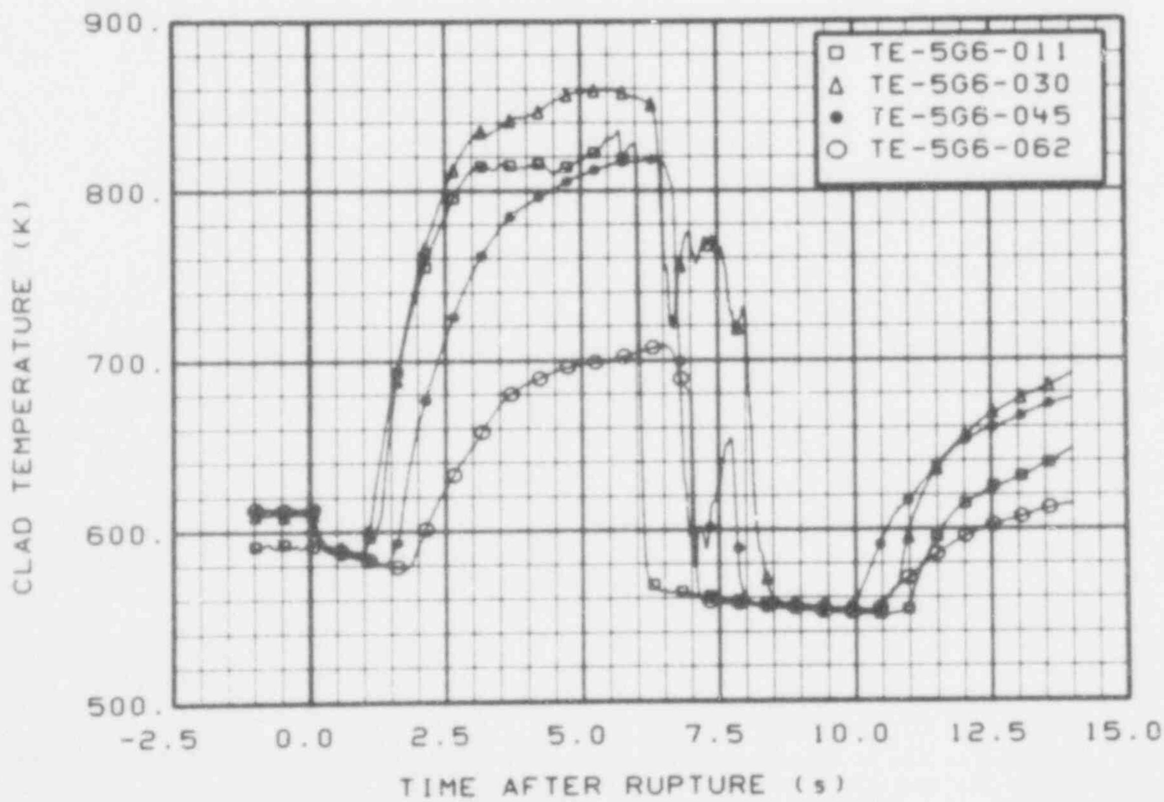


Fig. 44 Temperature of cladding on Fuel Assembly 5, Rod G6 (TE-5G6-011, -030, -045, and -062) (QEUD).

563 280

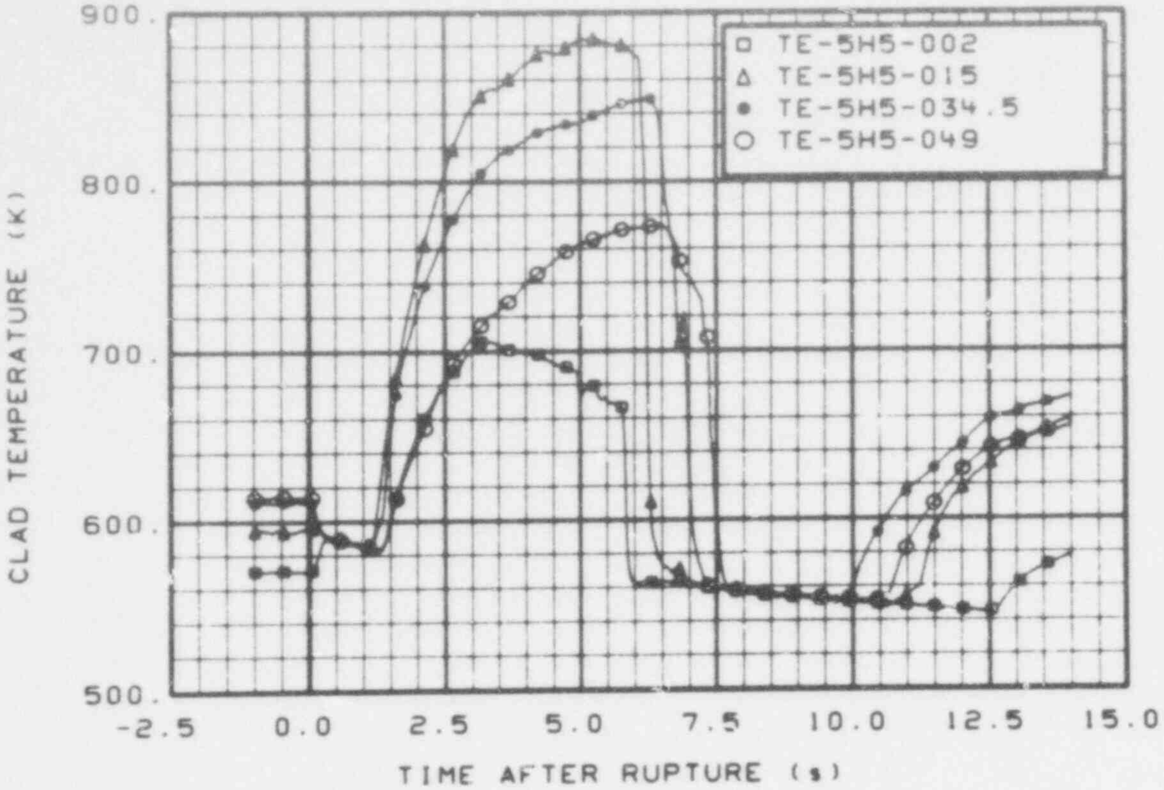


Fig. 45 Temperature of cladding on Fuel Assembly 5, Rod H5 (TE-5H5-002, -015, -034.5, and -049) (QEUD).

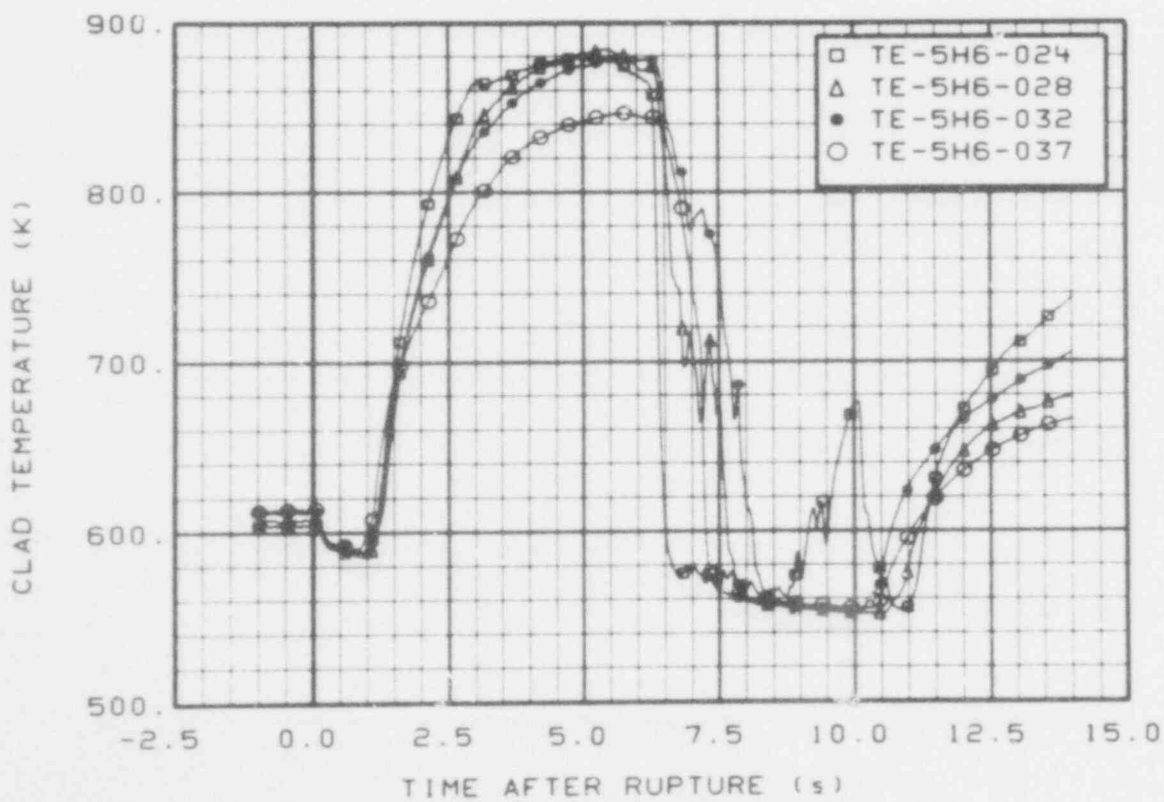


Fig. 46 Temperature of cladding on Fuel Assembly 5, Rod H6 (TE-5H6-024, -028, -032, and -037) (QEUD).

563 281

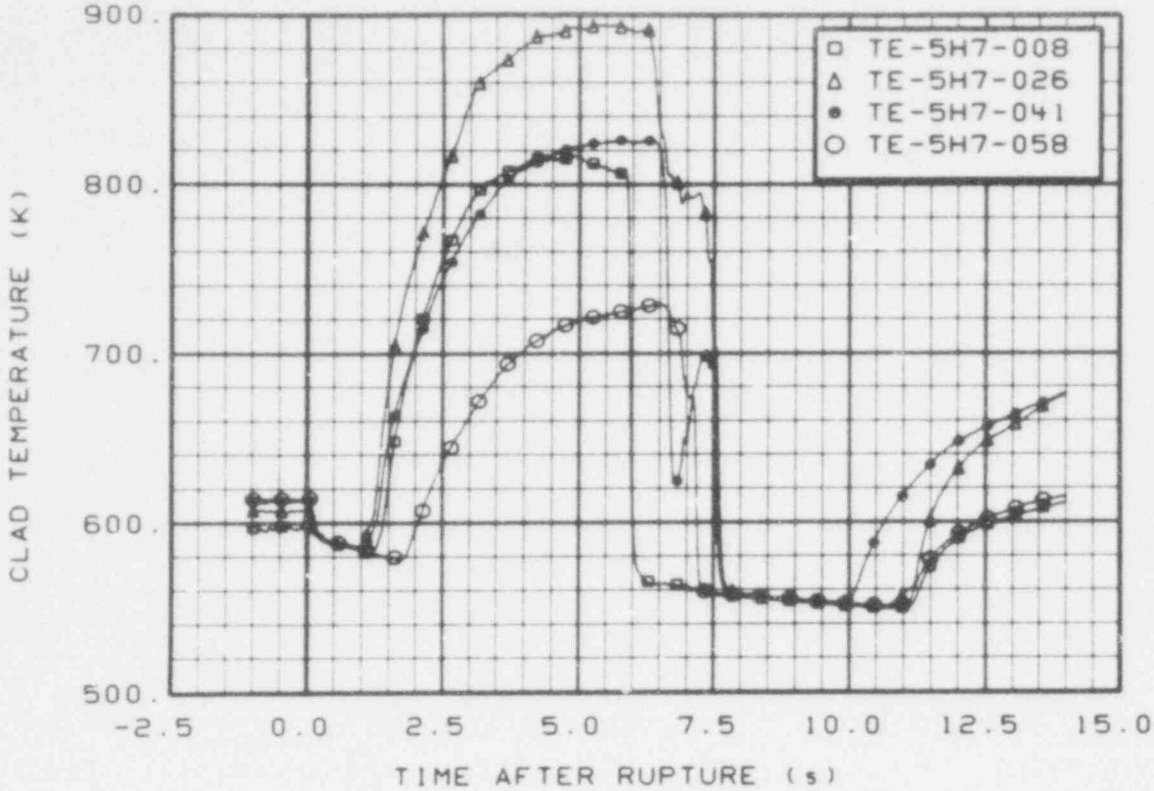


Fig. 47 Temperature of cladding on Fuel Assembly 5, Rod H7 (TE-5H7-008, -026, -041, and -058) (QEUD).

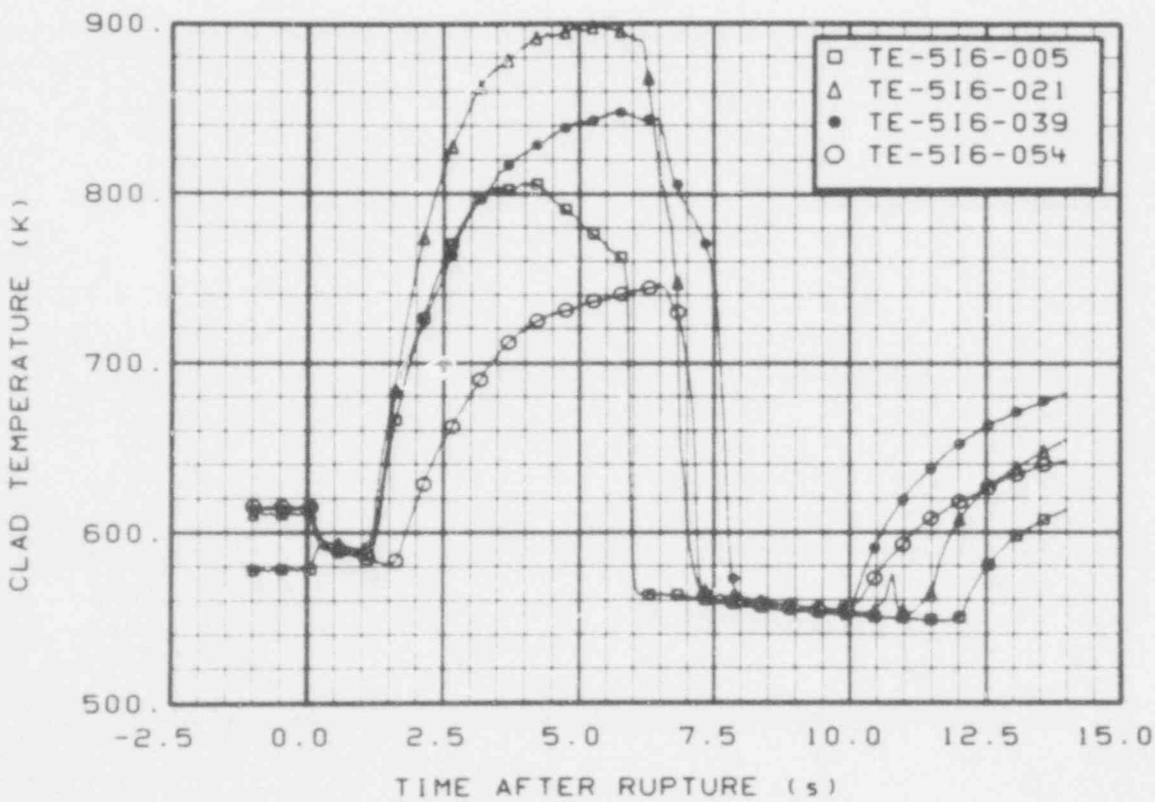


Fig. 48 Temperature of cladding on Fuel Assembly 5, Rod I6 (TE-5I6-005, -021, -039, and -054) (QEUD).

563 202

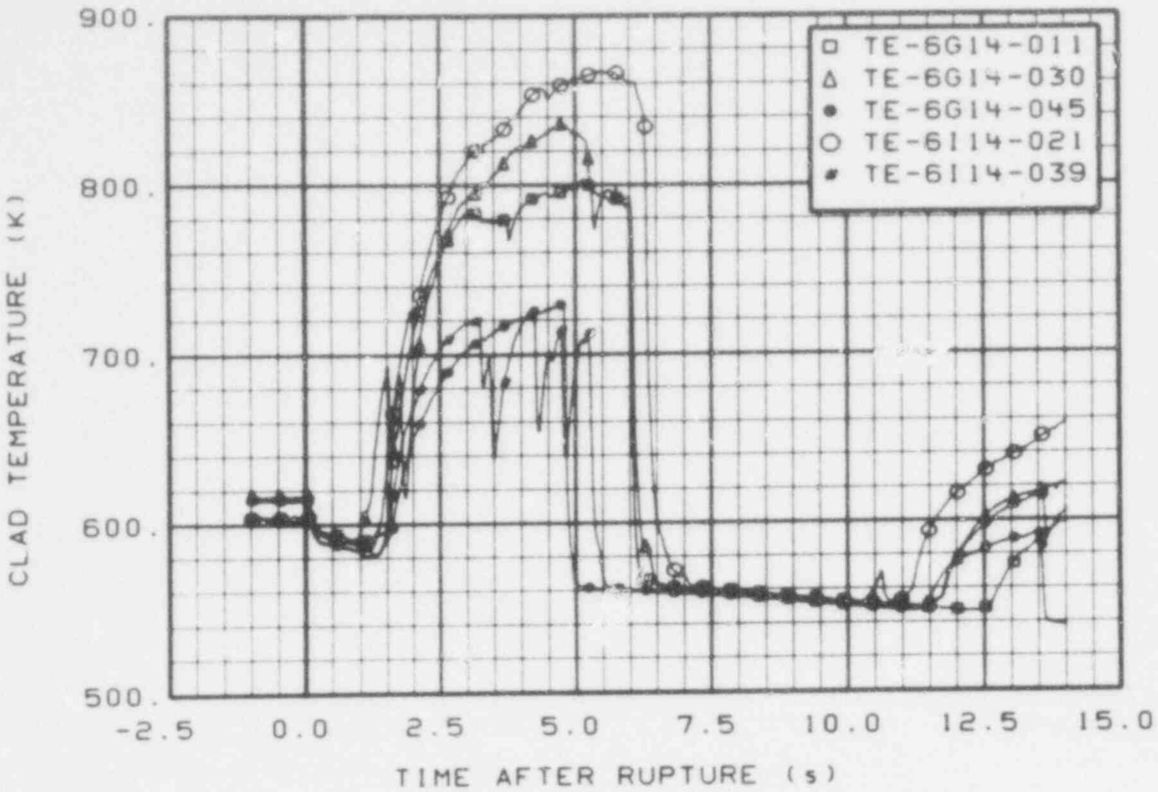


Fig. 49 Temperature of cladding on Fuel Assembly 6, Rod G14 and I14 (TE-6G14-011, -030, -045; and TE-6I14-021 and -039) (QEUD).

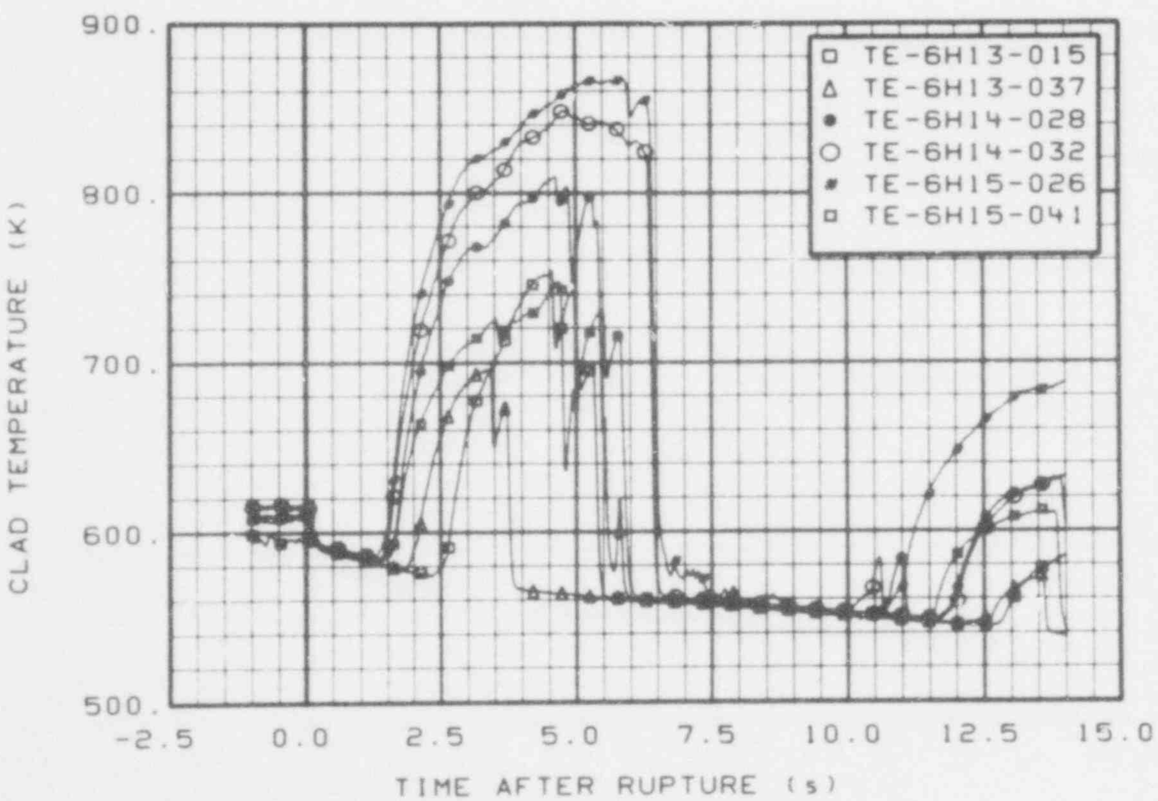


Fig. 50 Temperature of cladding on Fuel Assembly 6, Rod H13, H14, and H15 (TE-6H13-015 and -037, TE-6H14-028 and -032, and TE-6H15-026 and -041) (QEUD).

563 283

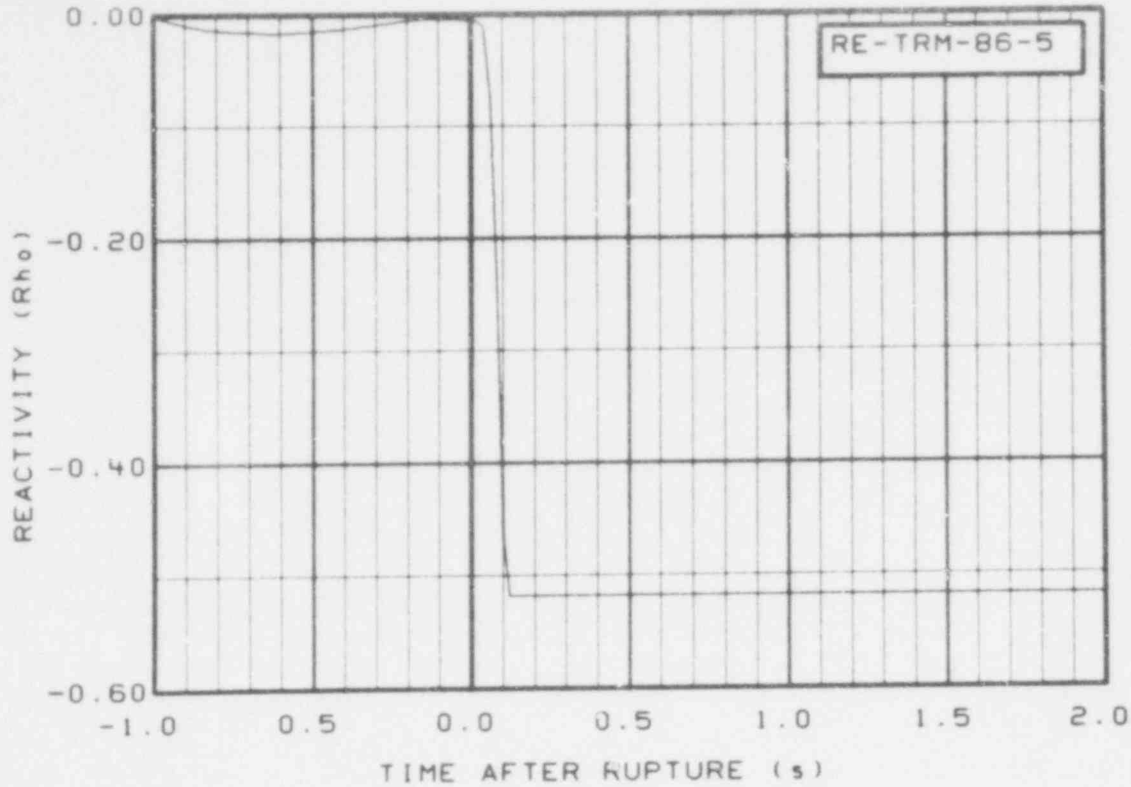


Fig. 51 Reactivity in LOFT Core 1 (RE-TRM-86-5) (restrained, good for initial conditions only, slow reactivity response).

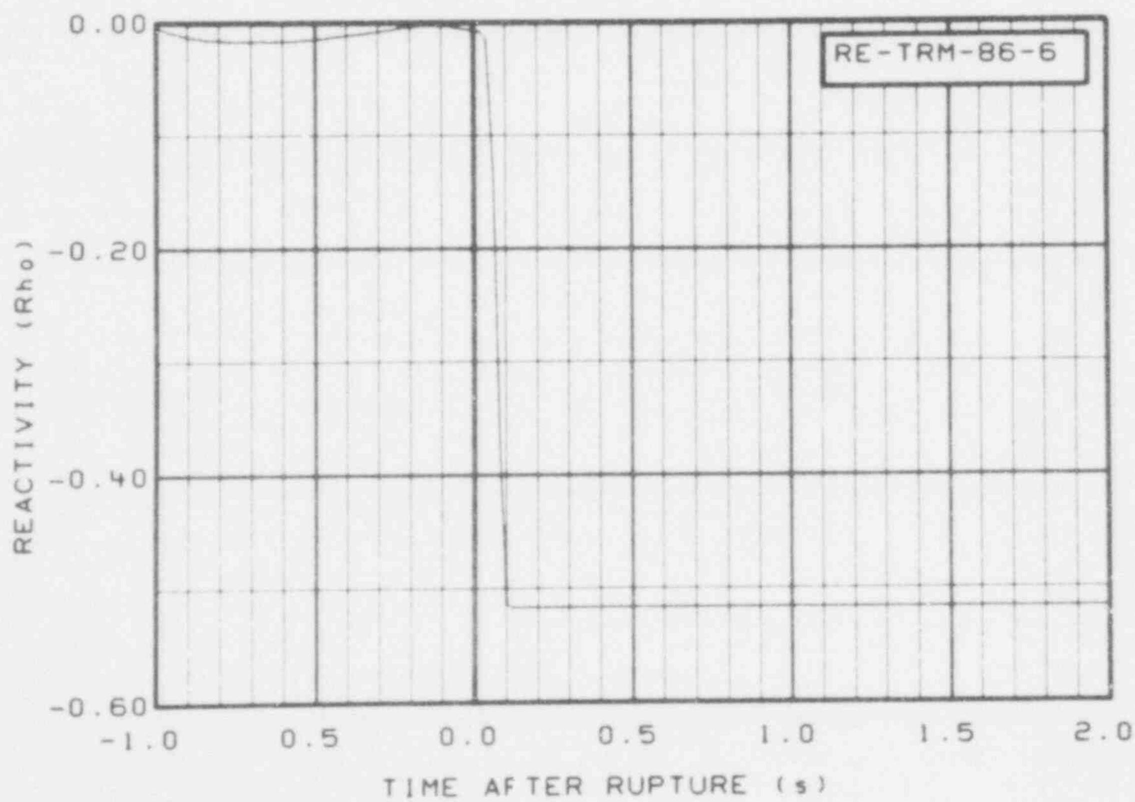


Fig. 52 Reactivity in LOFT Core 1 (RE-TRM-86-6) (restrained, good for initial conditions only, slow reactivity response).

563 209

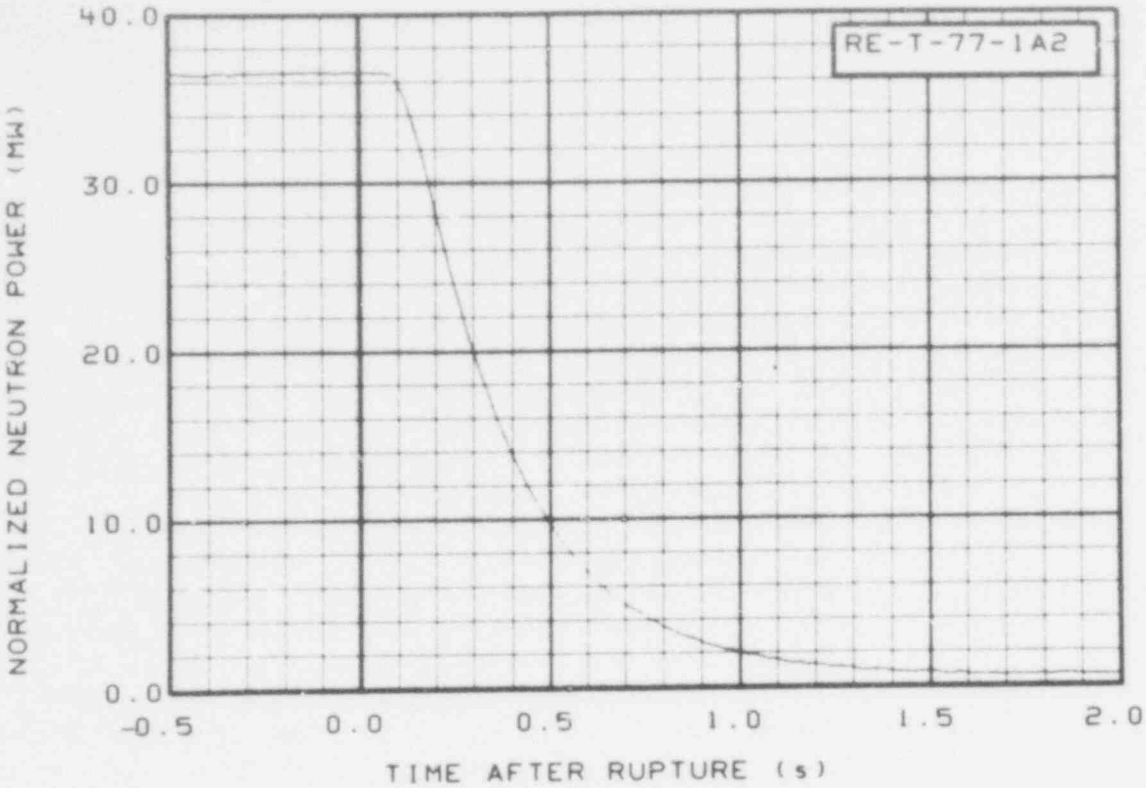


Fig. 53 Local average power, Channel A (RE-T-77-1A2) (restrained, shows neutron signal at shield tank detector location).

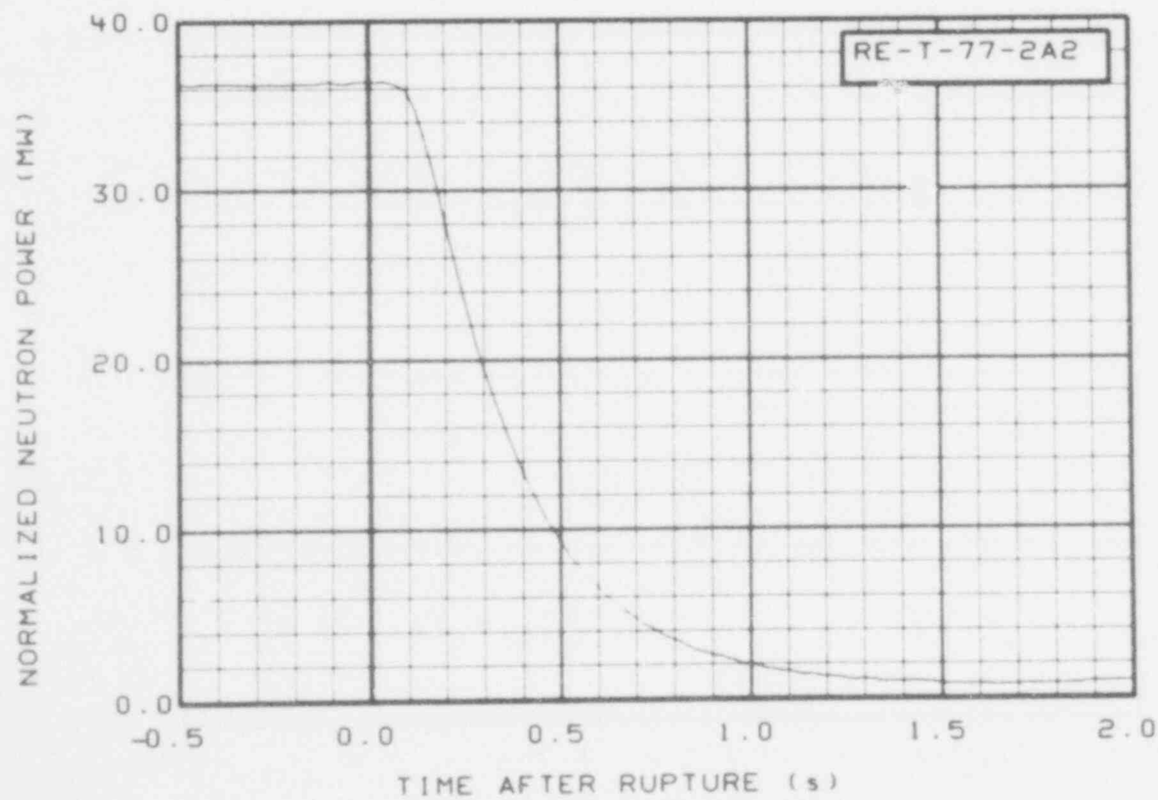


Fig. 54 Normalized neutron power Channel B (RE-T-77-2A2) (restrained, shows neutron signal at shield tank detector location).

563 285

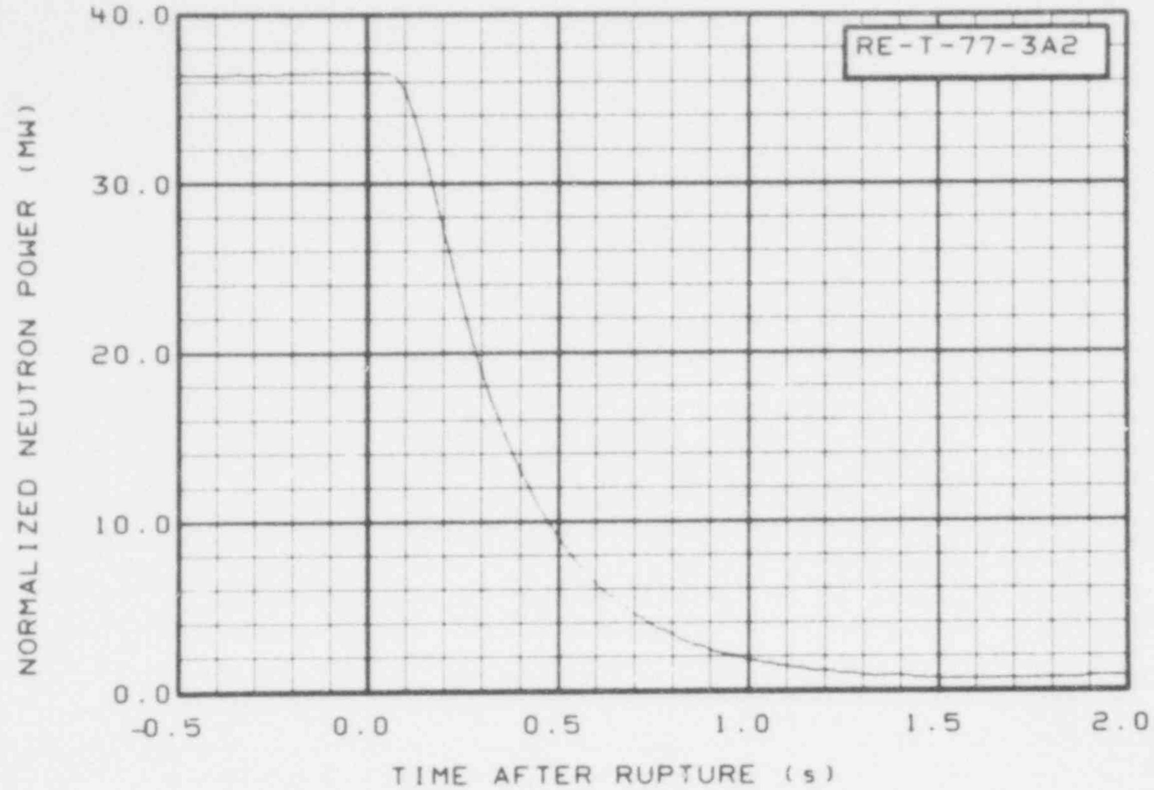


Fig. 55 Normalized neutron power, Channel C (RE-T-77-3A2) (restrained, shows neutron signal at shield tank detector location).

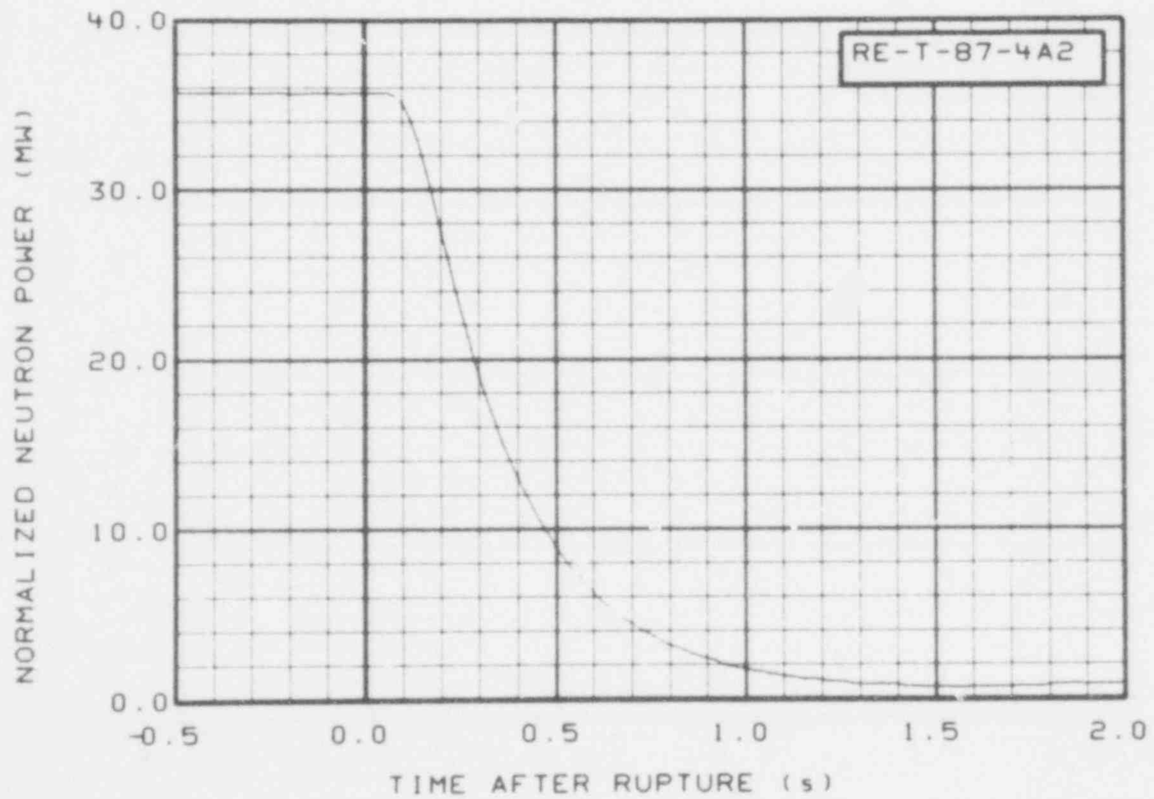


Fig. 56 Normalized neutron power, Channel D (RE-T-87-4A2) (restrained, shows neutron signal at shield tank detector location).

563 206

563 287

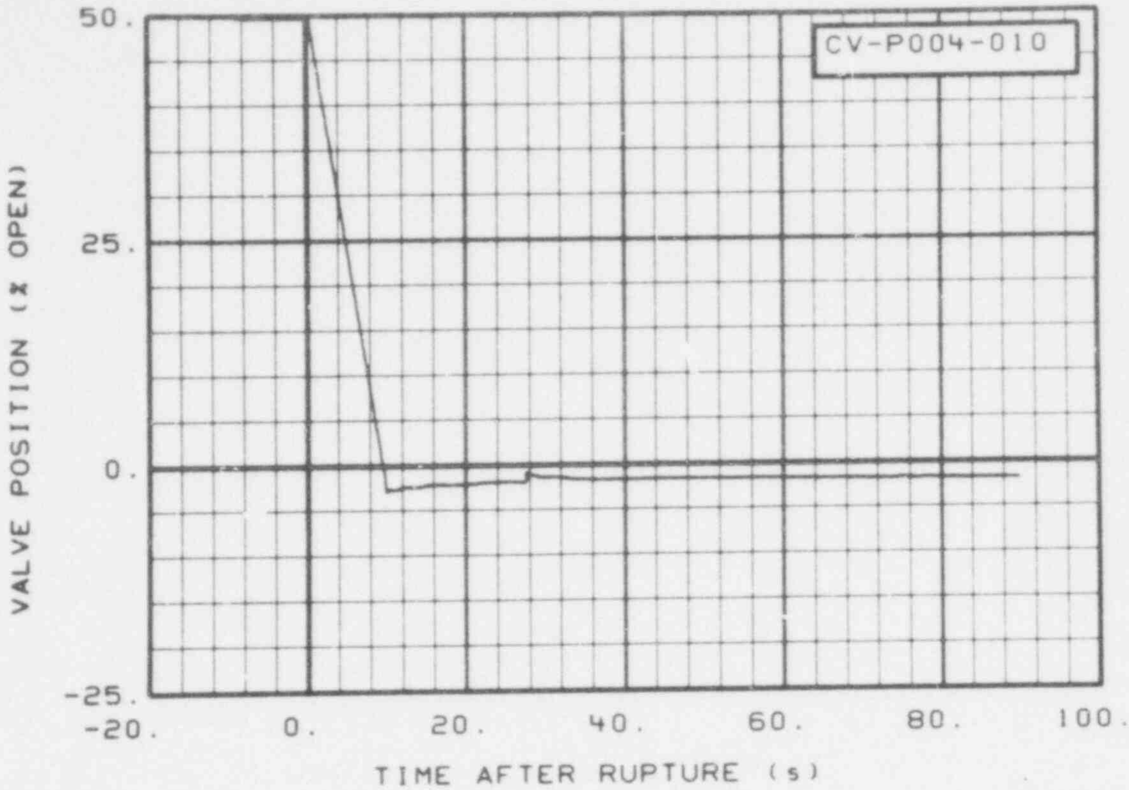


Fig. 57 Valve position for secondary coolant system steam flow control valve (CV-P004-010) (QEUD).

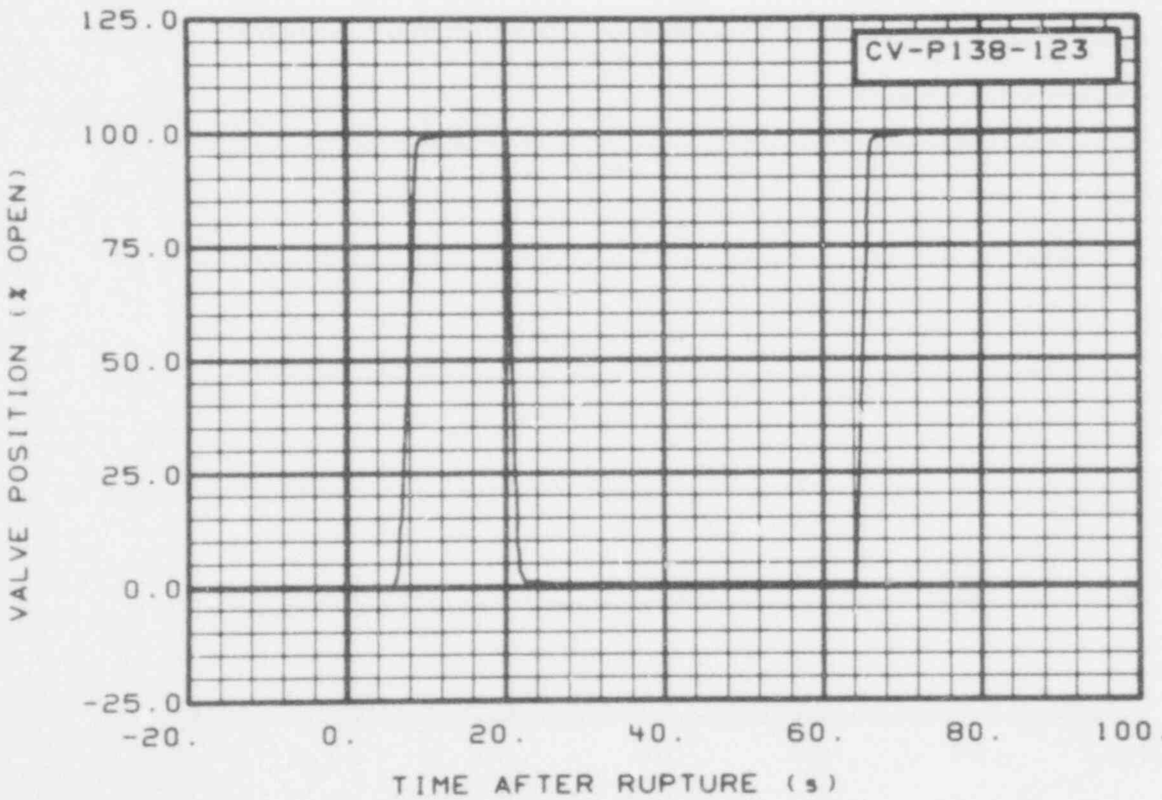


Fig. 58 Valve position for blowdown suppression tank spray system 1.3 l/s header (CV-P138-123) (QEUD).

563 289

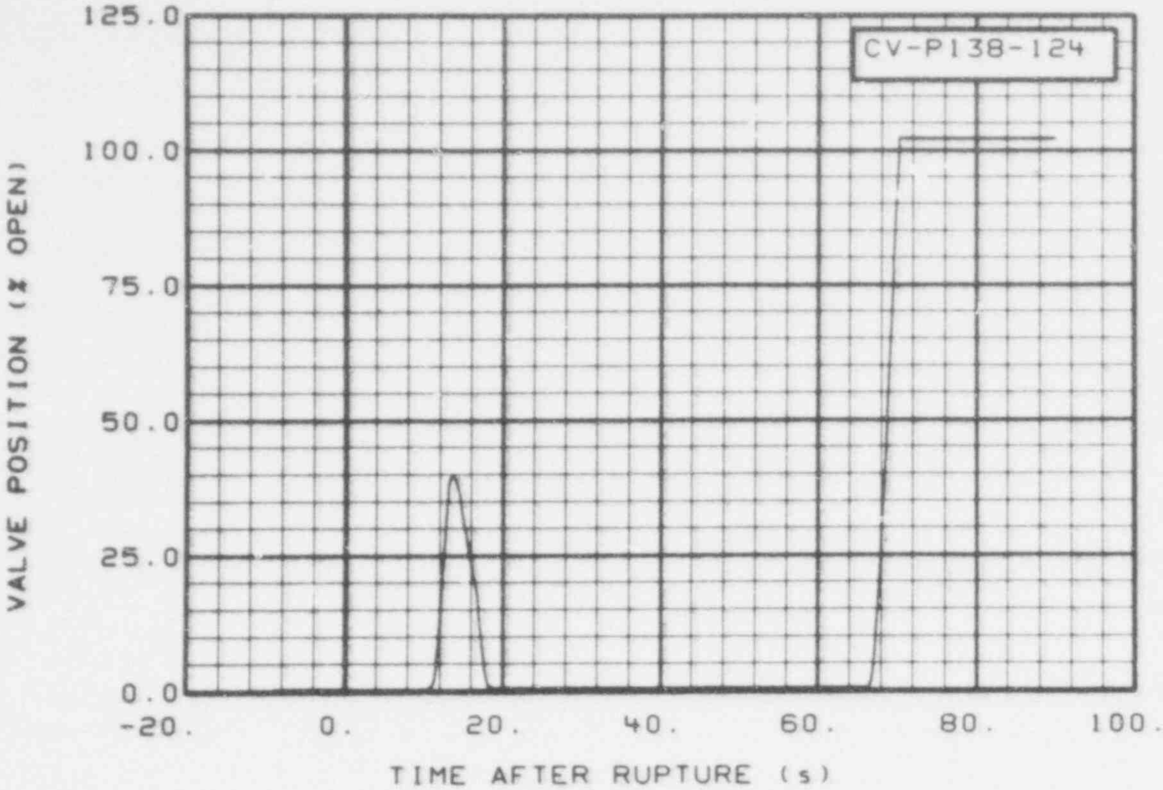


Fig. 59 Valve position for blowdown suppression tank spray system 3.8 l/s header (CV-P138-124) (QEUD).

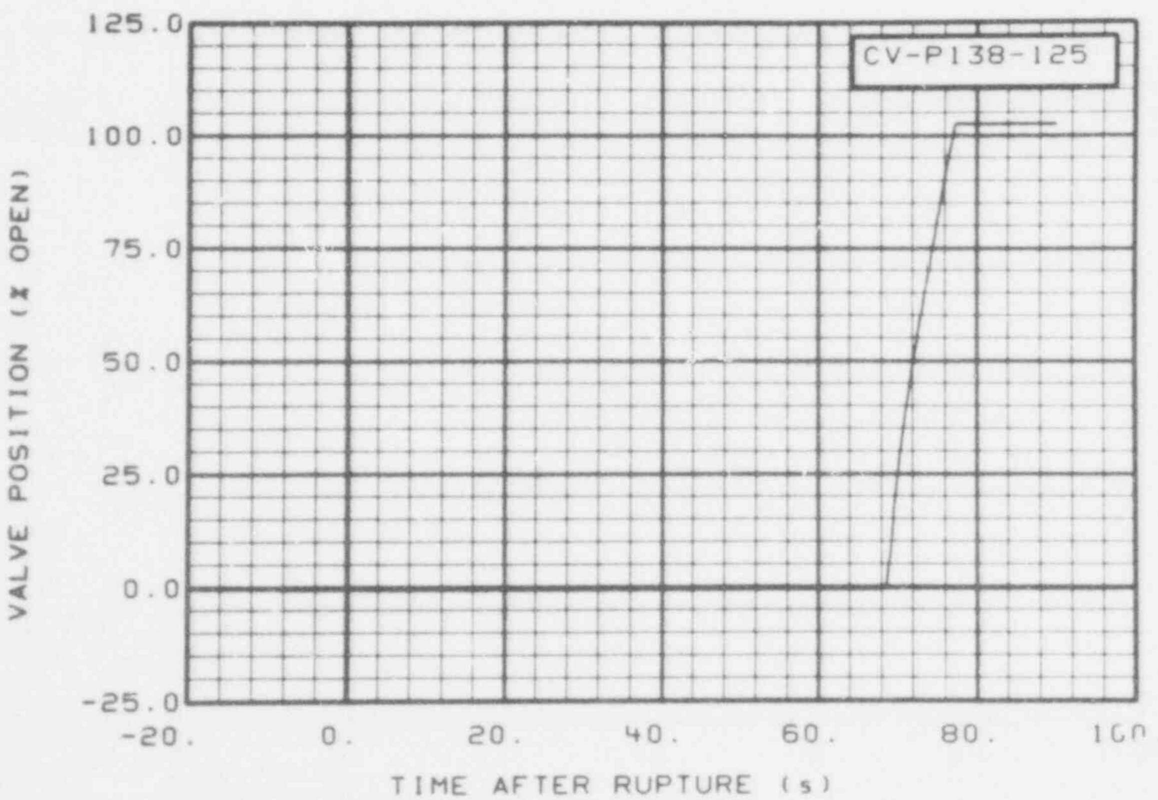


Fig. 60 Valve position for blowdown suppression tank spray system 13.9 l/s header (CV-P138-125) (QEUD).

563 290

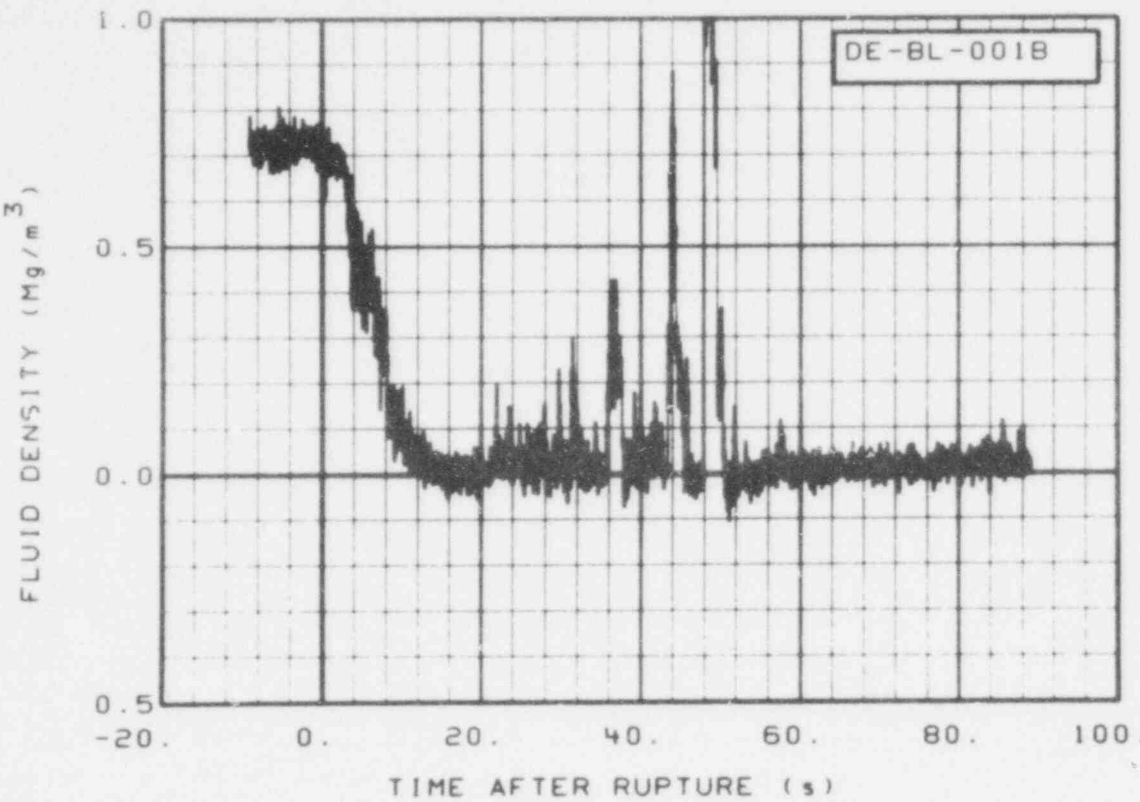


Fig. 61 Fluid density in broken loop cold leg, chordal density (DE-BL-001B) (QEUD).

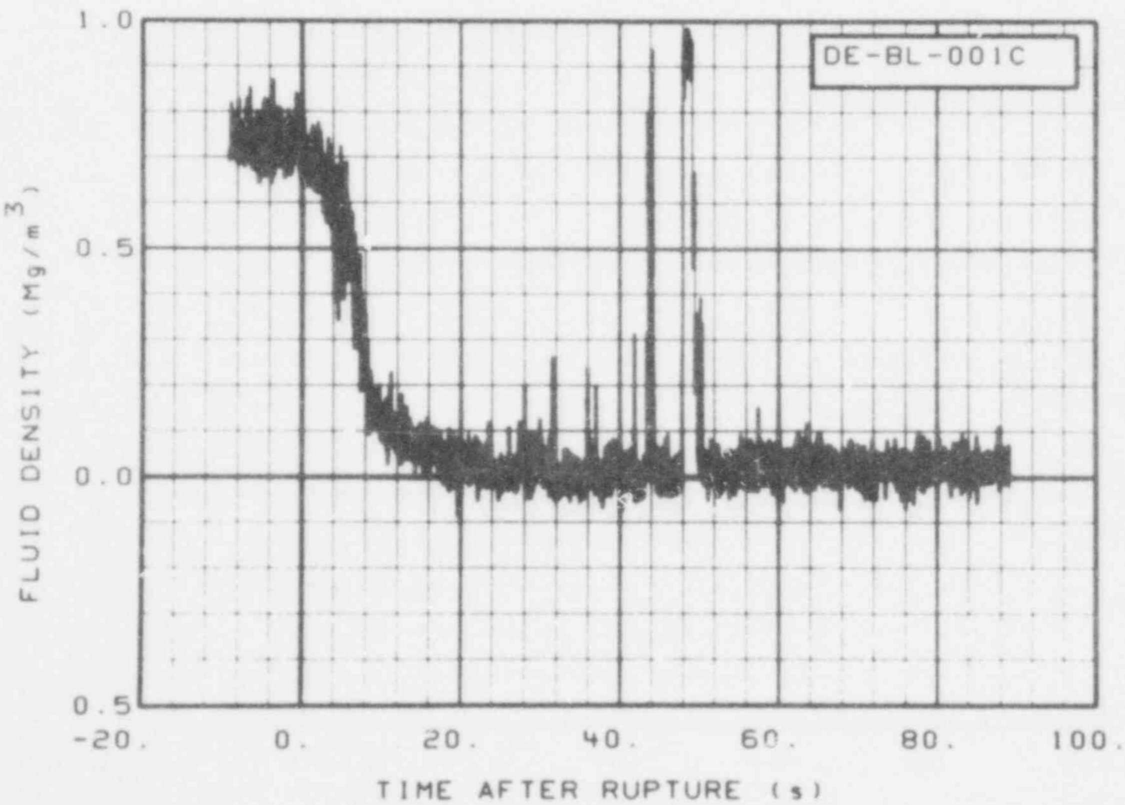


Fig. 62 Fluid density in broken loop cold leg, chordal density (DE-BL-001C) (QEUD).

563 291

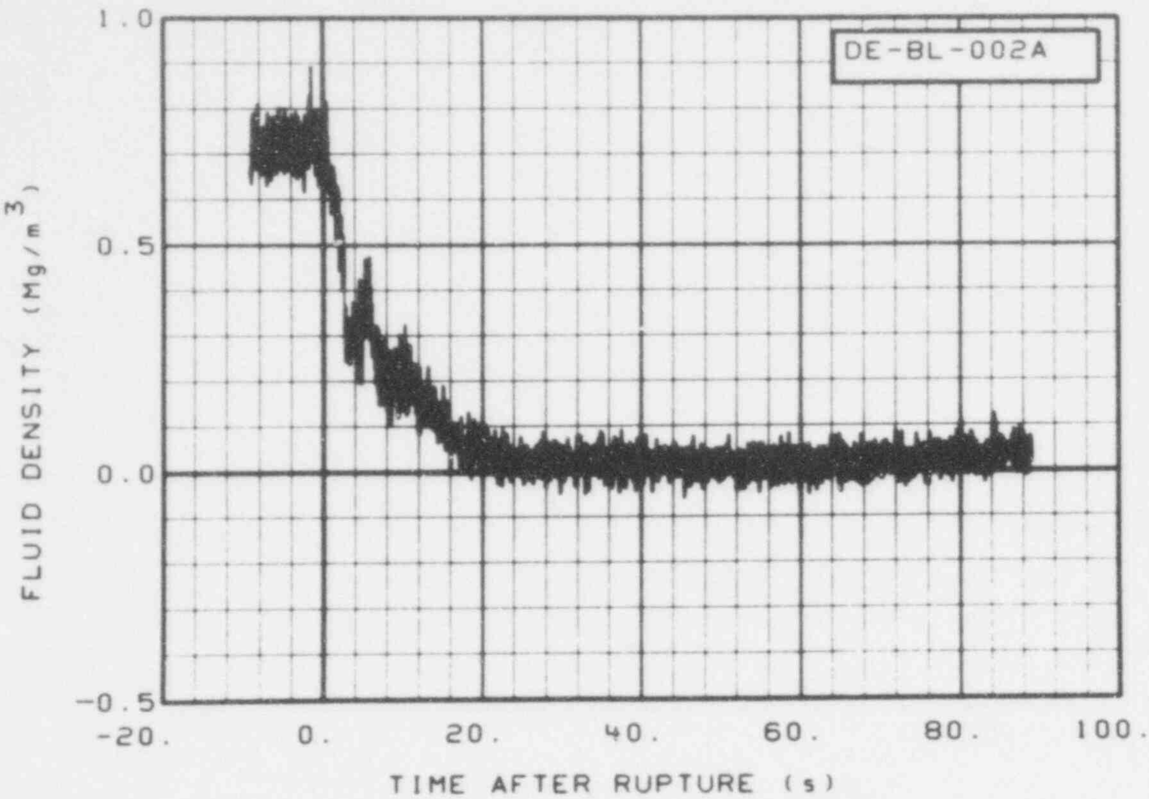


Fig. 63 Fluid density in broken loop hot leg, chordal density (DE-BL-002A) (QEUD).

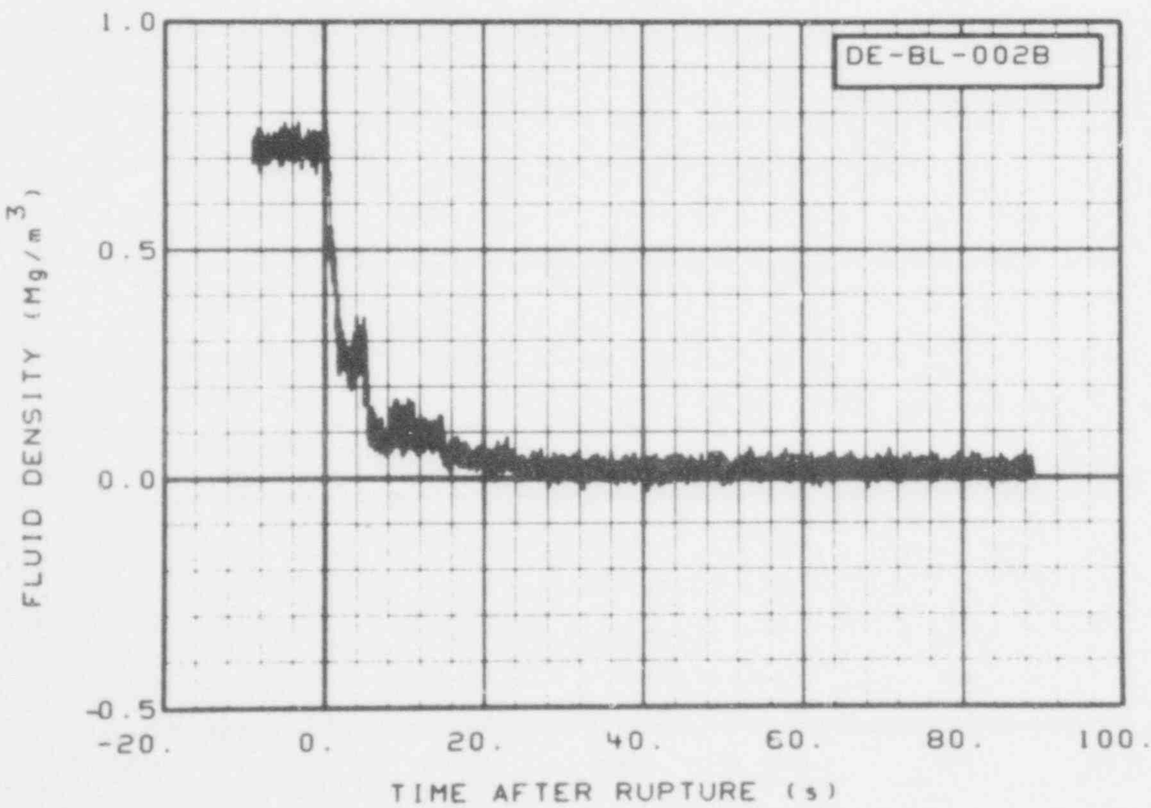


Fig. 64 Fluid density in broken loop hot leg, chordal density (DE-BL-002B) (QEUD).

563 292

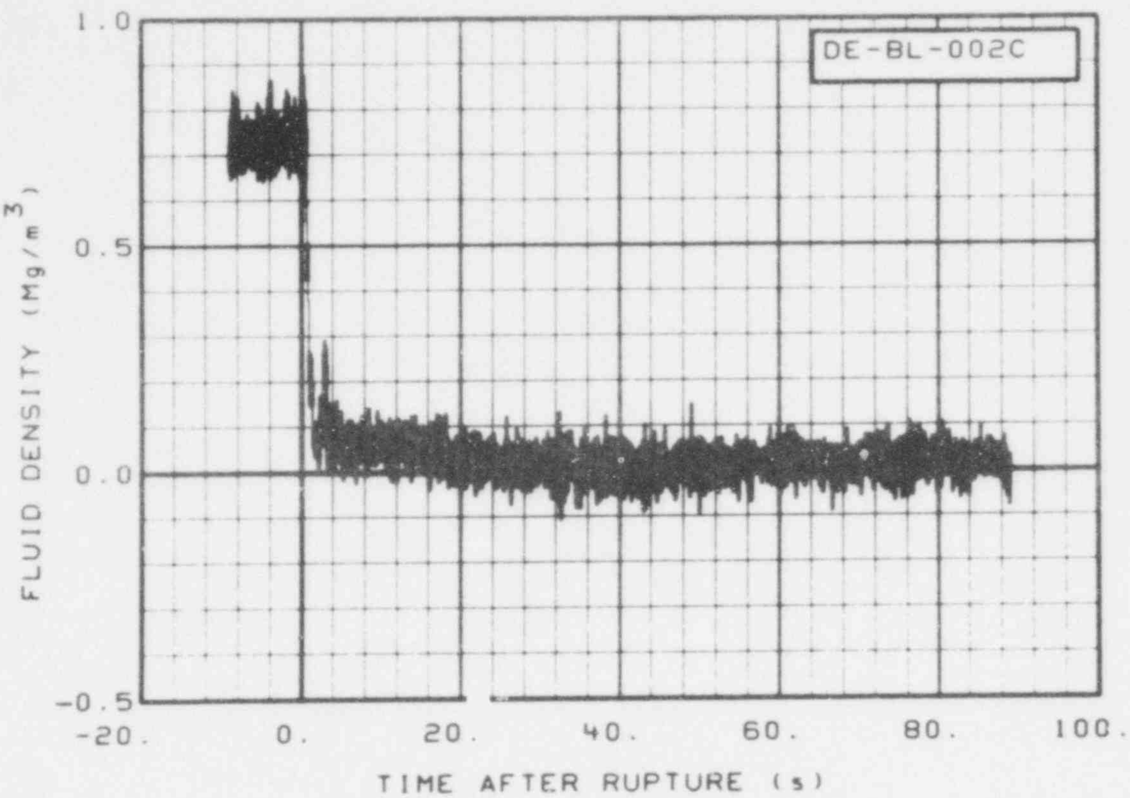


Fig. 65 Fluid density in broken loop hot leg, chordal density (DE-BL-002C) (QEUD).

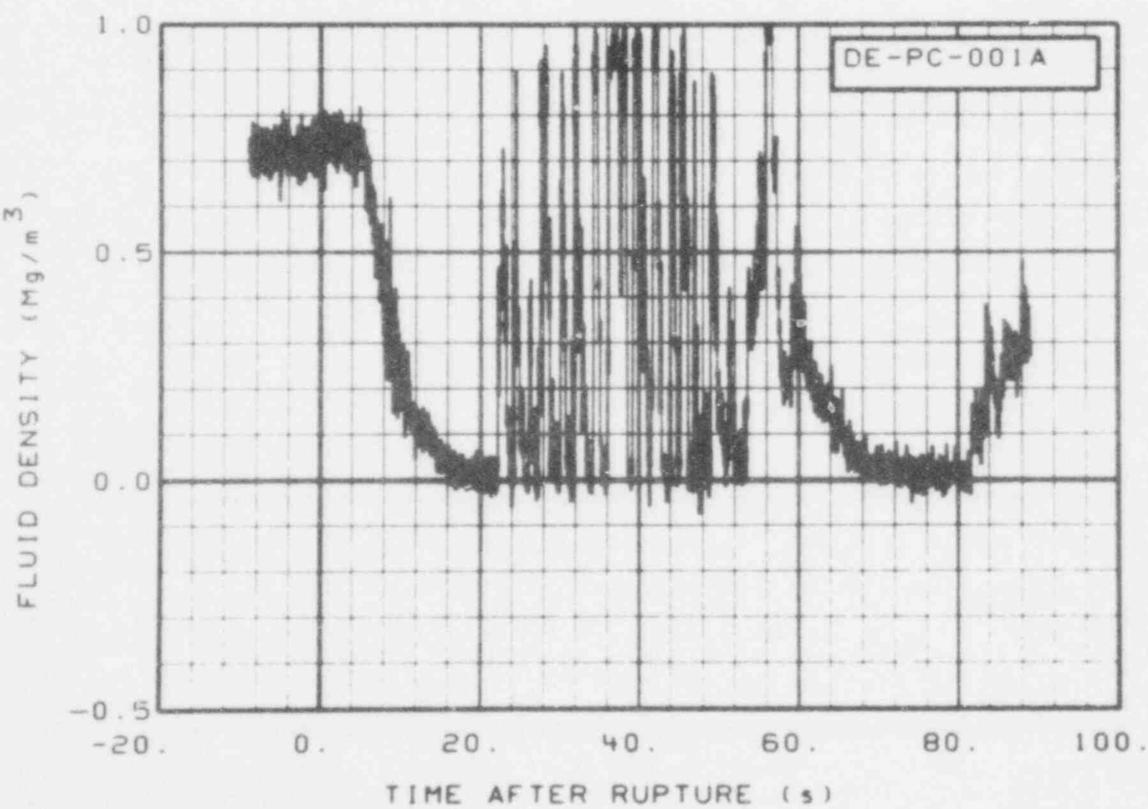


Fig. 66 Fluid density in intact loop cold leg, chordal density (DE-PC-001A) (QEUD).

563 293

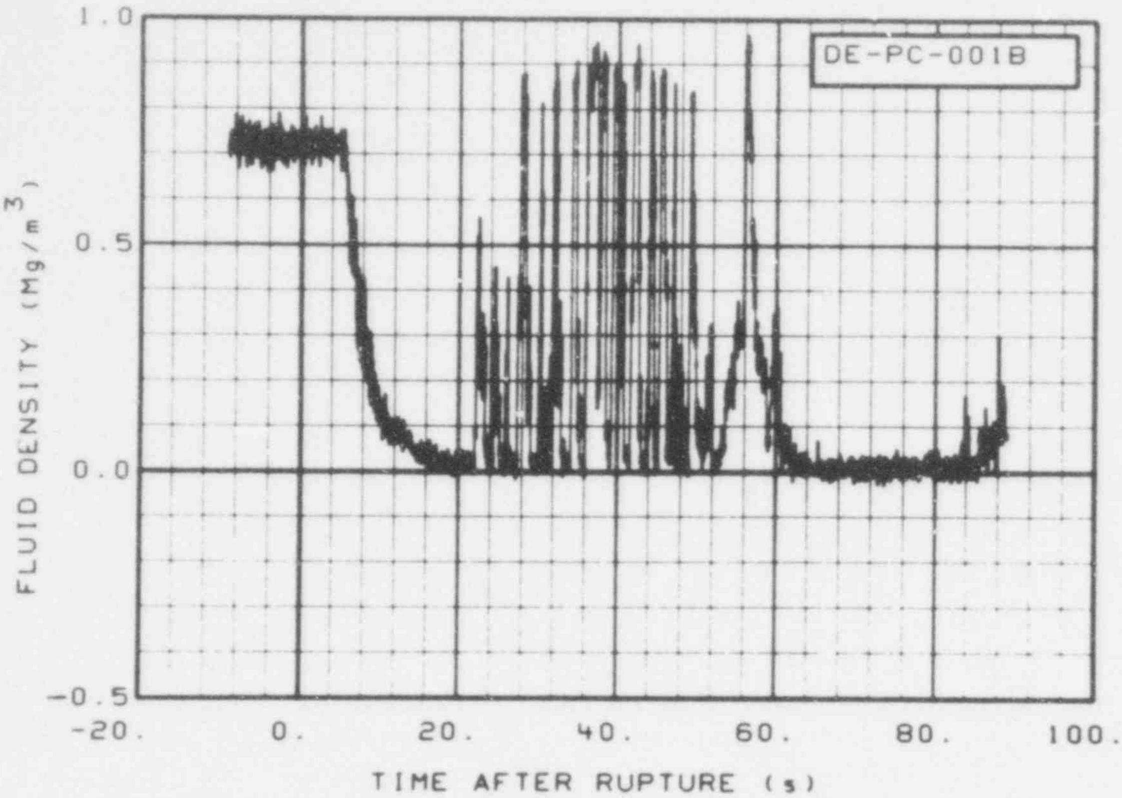


Fig. 67 Fluid density in intact loop cold leg, chordal density (DE-PC-001B) (QEUD).

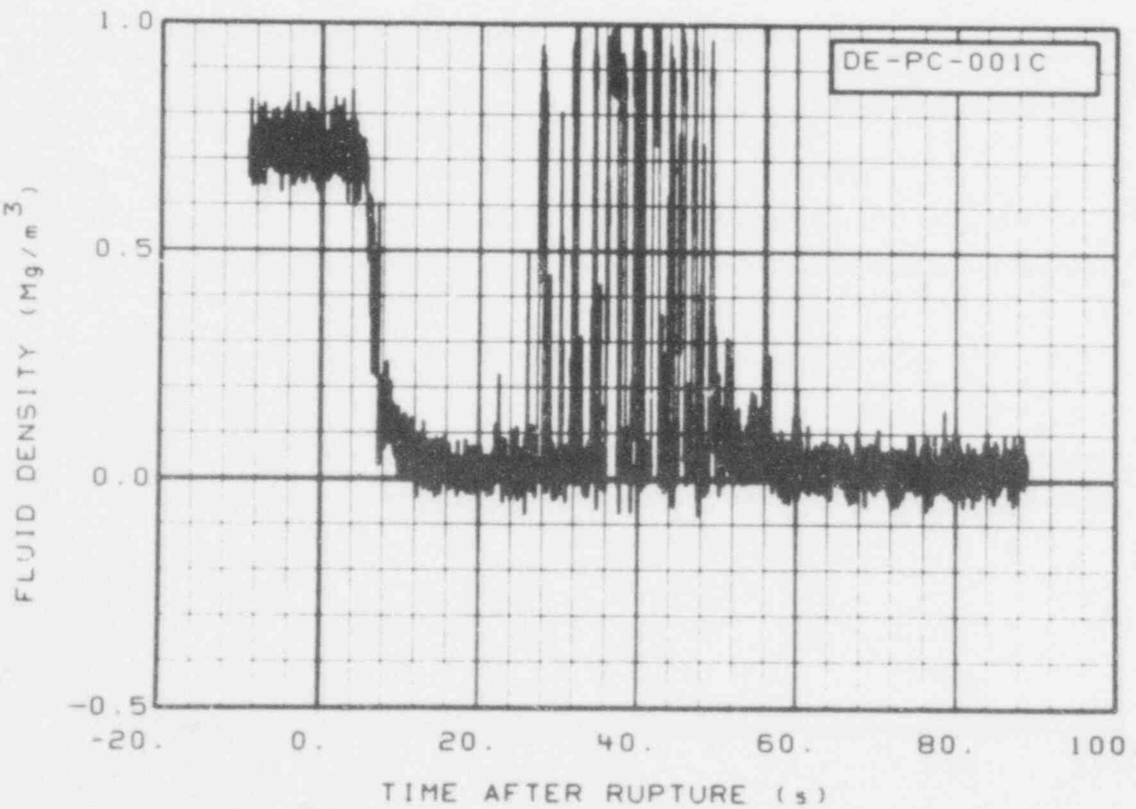


Fig. 68 Fluid density in intact loop cold leg, chordal density (DE-PC-001C) (QEUD).

563 274

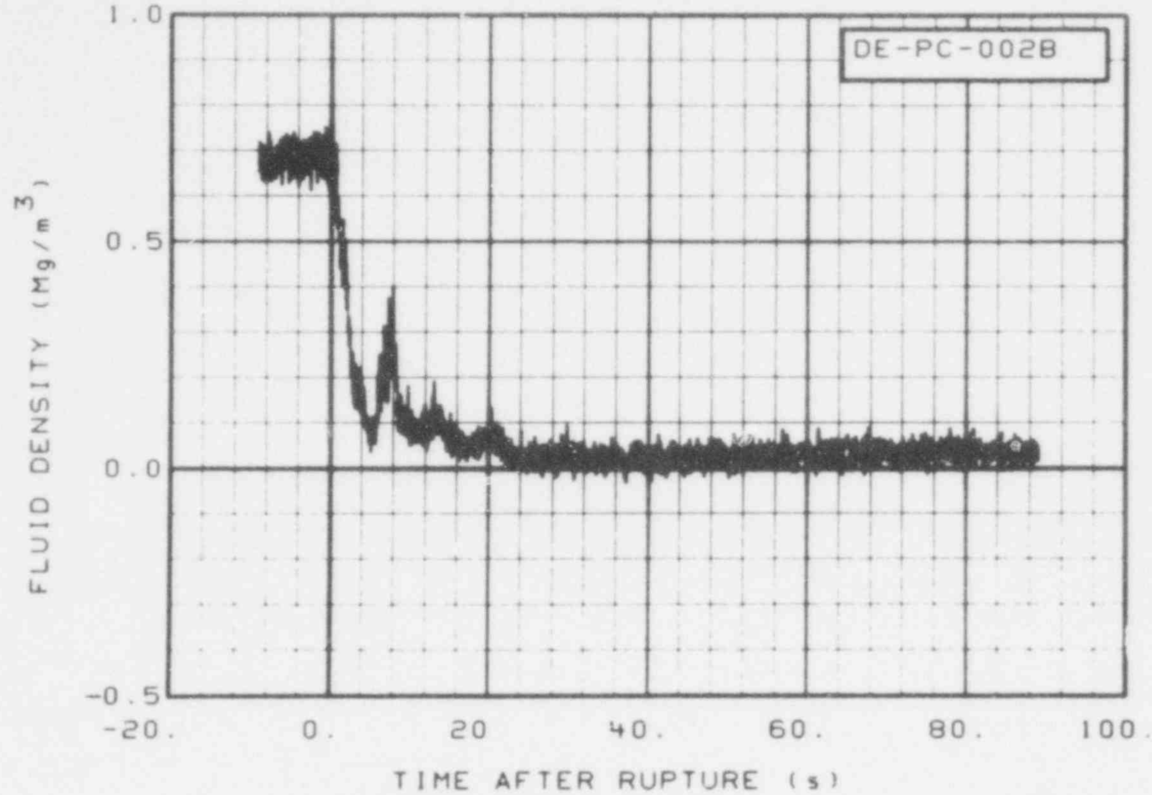


Fig. 69 Fluid density in intact hot leg, chordal density (DE-PC-002B) (QEUD).

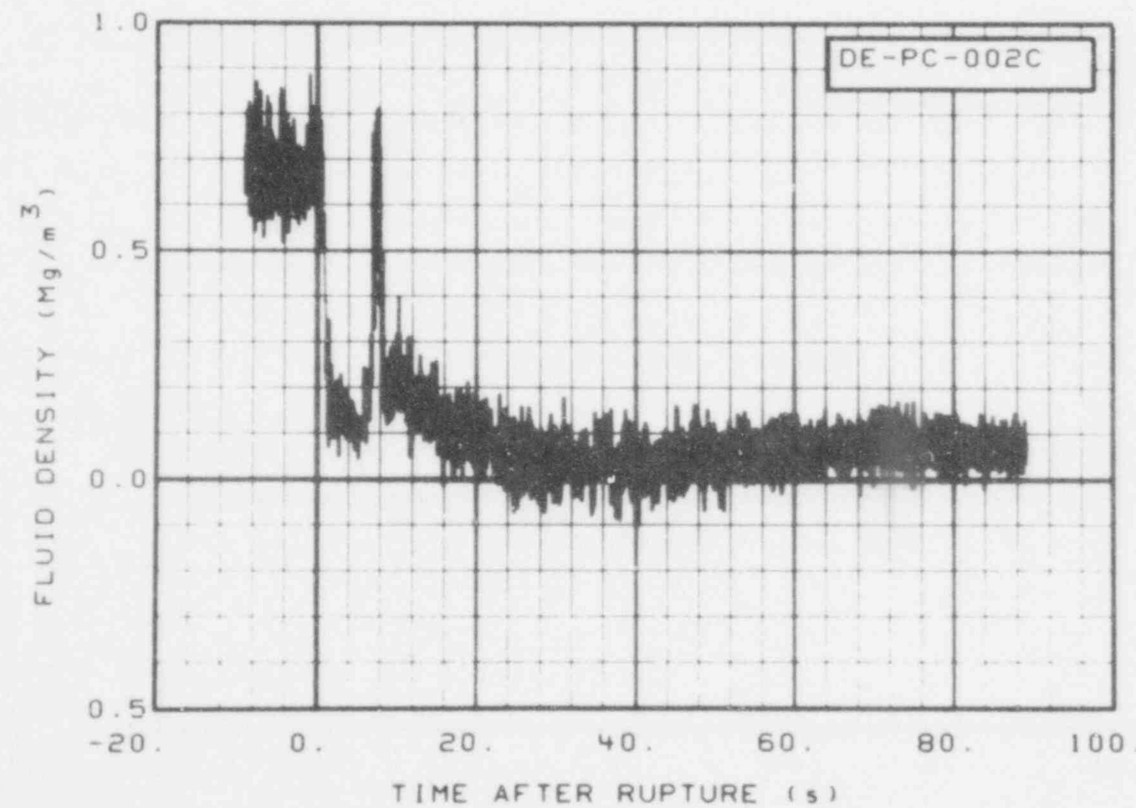


Fig. 70 Fluid density in intact loop hot leg, chordal density (DE-PC-002C) (QEUD).

563 275

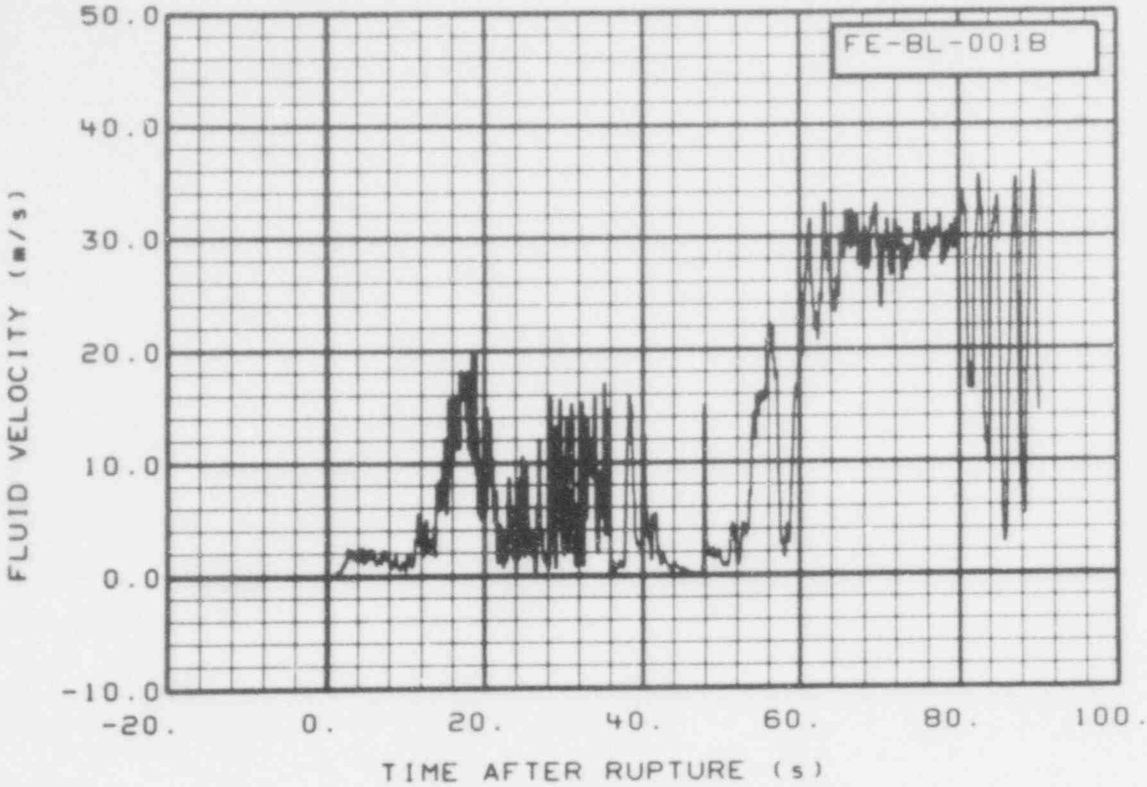


Fig. 71 Fluid velocity in broken loop cold leg at DTT flange middle of pipe (FE-BL-001B) (restrained, electronic adjustment required during T = 0 + 10 s).

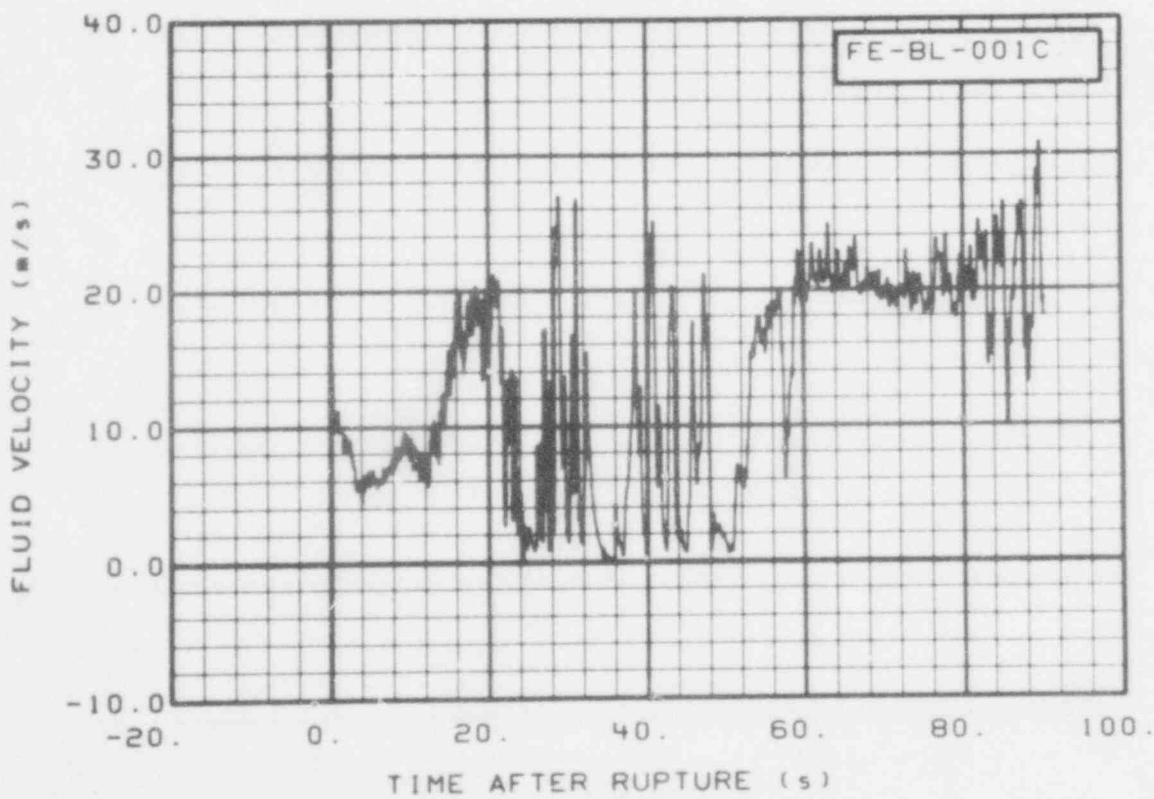


Fig. 72 Fluid velocity in broken loop cold leg at DTT flange on top of pipe (FE-BL-001C) (QEUD).

563 276

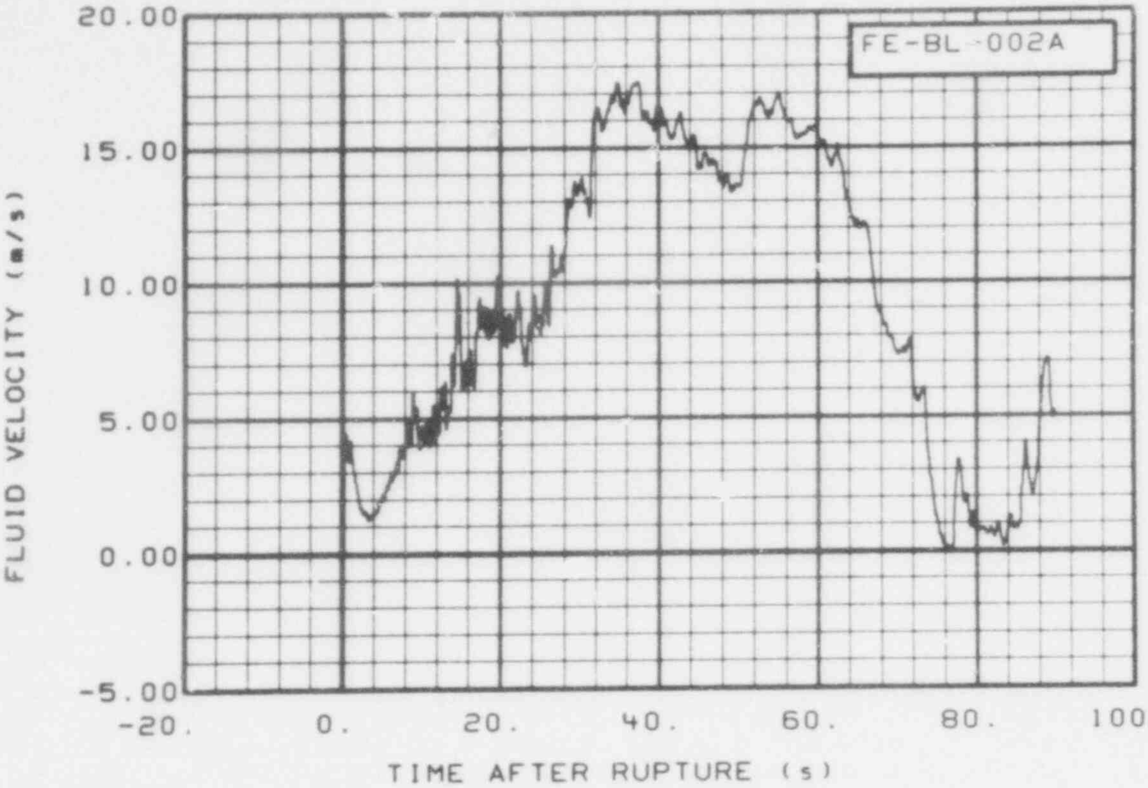


Fig. 73 Fluid velocity in broken loop hot leg at DTT flange on bottom of pipe (FE-BL-002A) (QEUD).

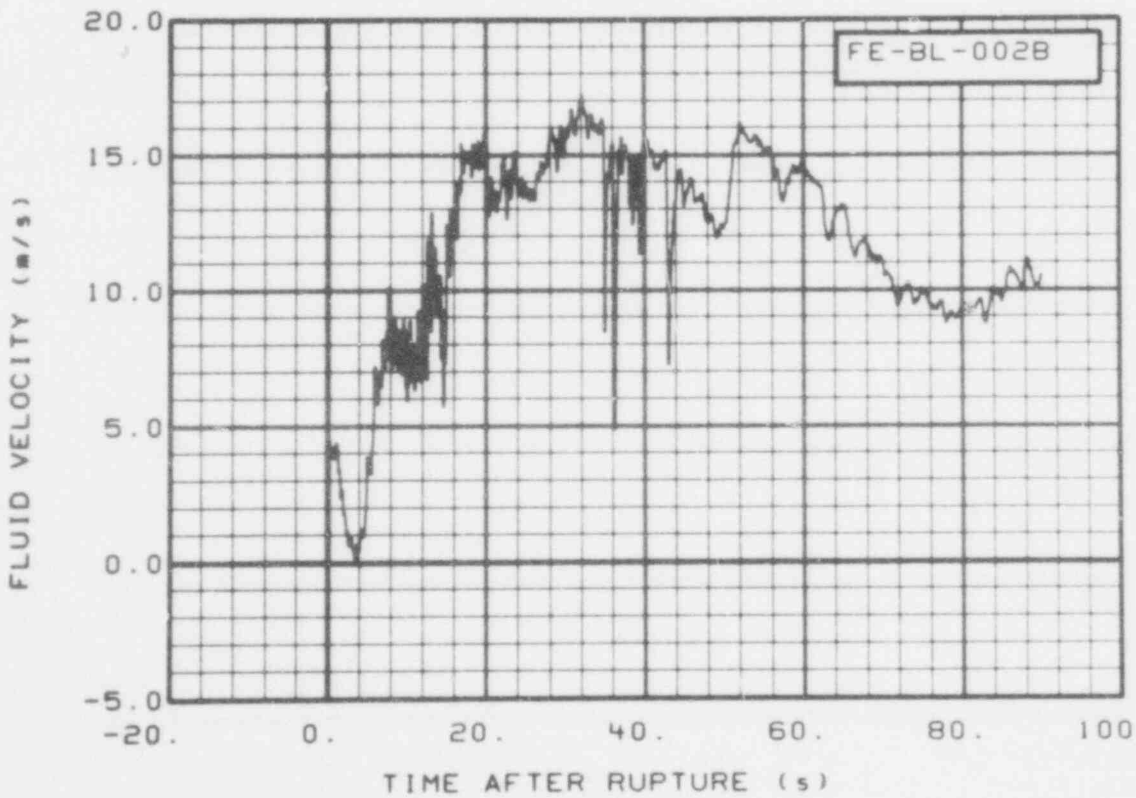


Fig. 74 Fluid velocity in broken loop hot leg at DTT flange on middle of pipe (FE-BL-002B) (QEUD).

563 297

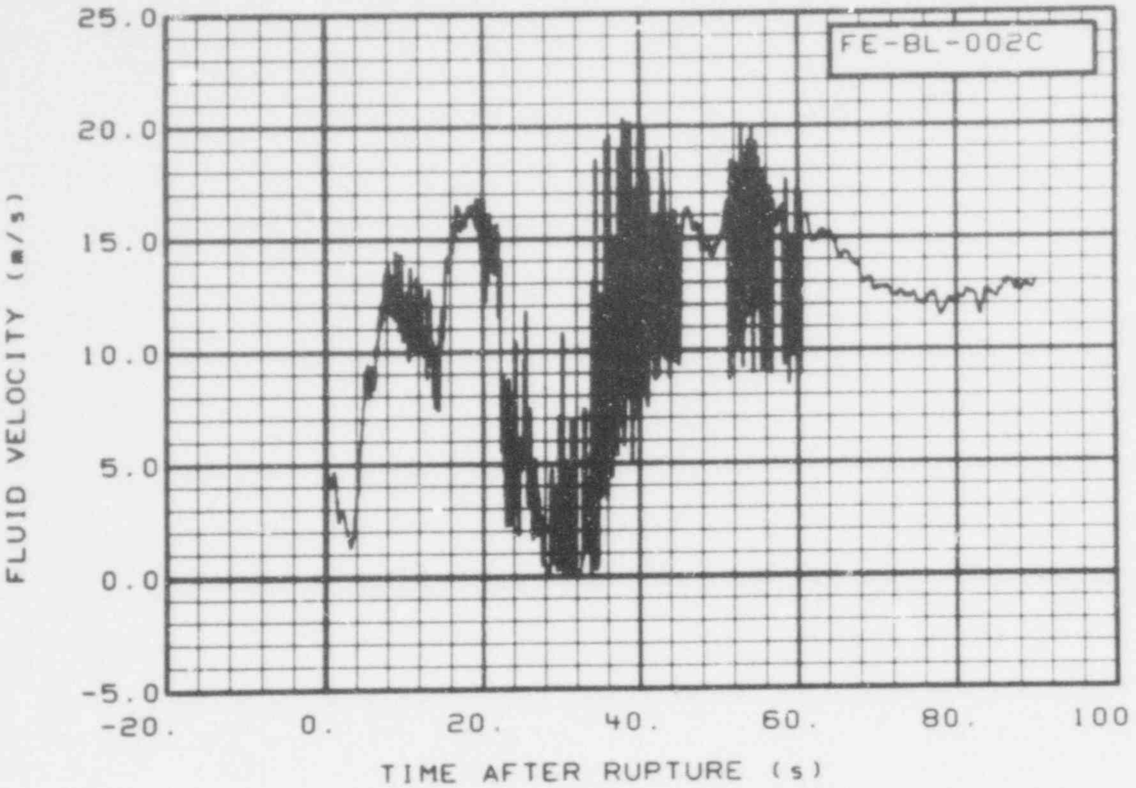


Fig. 75 Fluid velocity in broken loop hot leg at DTT flange on top of pipe (FE-BL-002C) (QEUD).

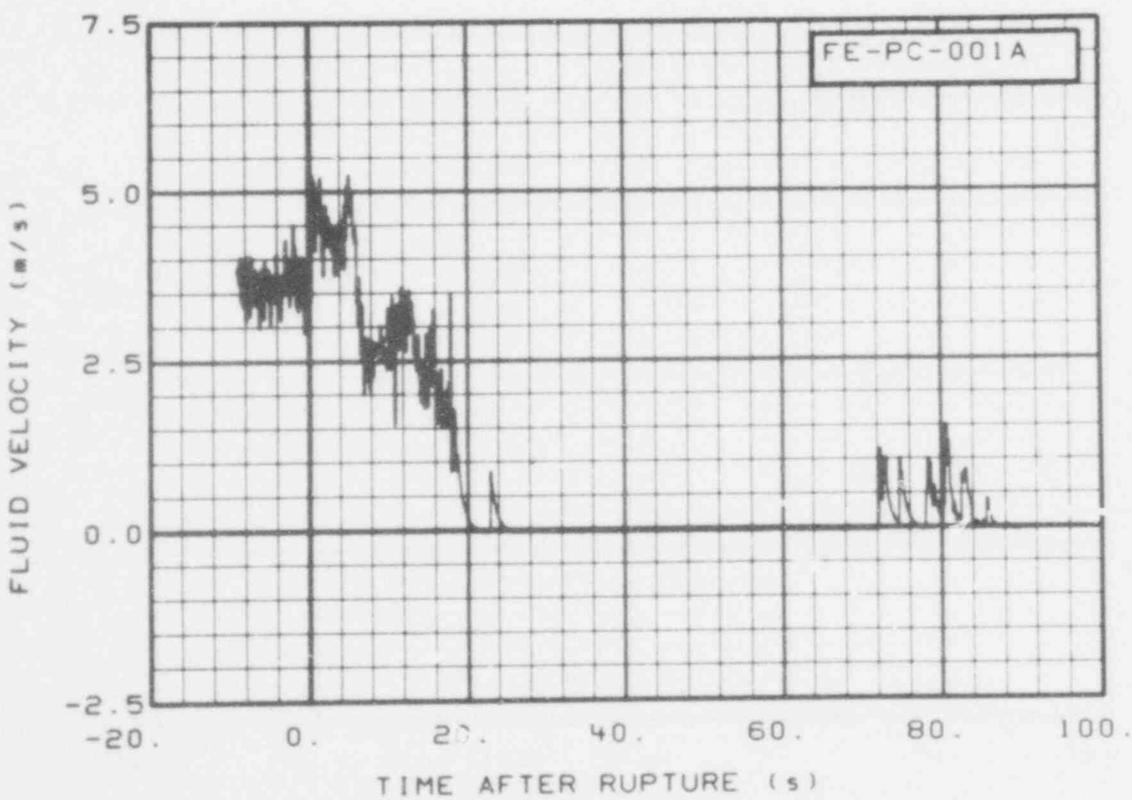


Fig. 76 Fluid velocity in intact loop cold leg at DTT flange on west side of pipe (FE-PC-001A) (restrained, turbine appears to stick after T = 0 + 8 s).

563 298

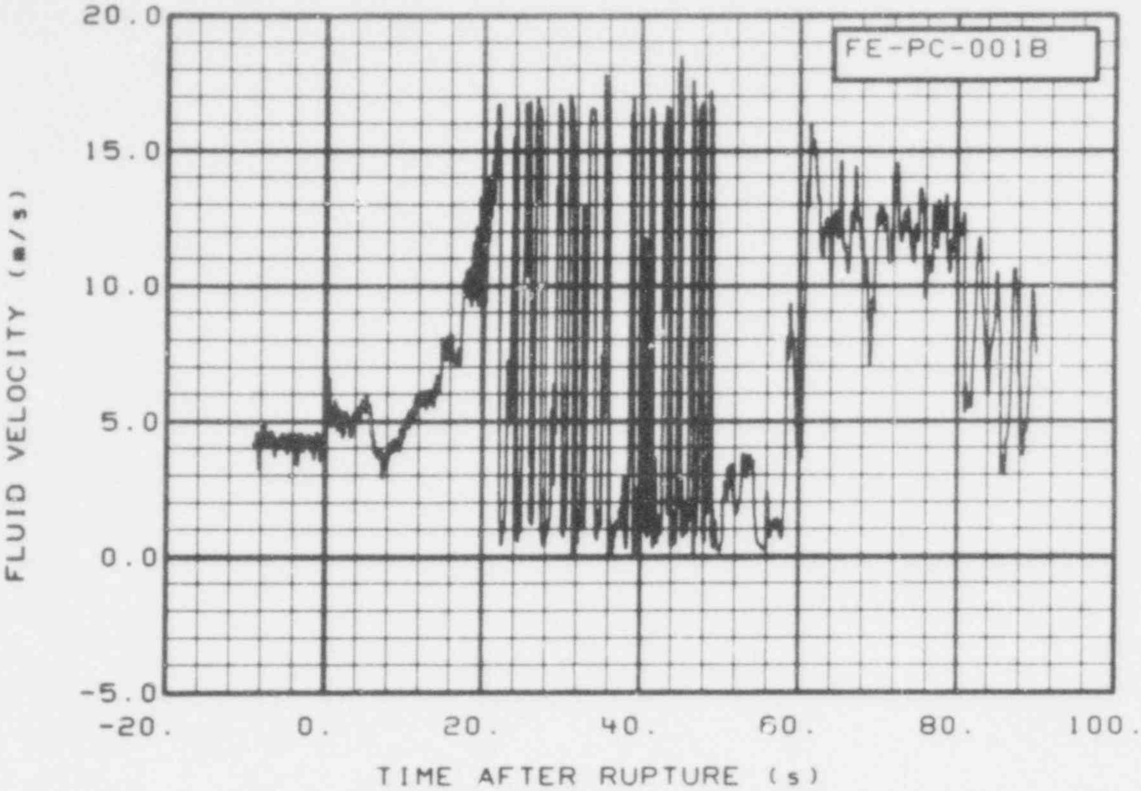


Fig. 77 Fluid velocity in intact loop cold leg at DTT flange at middle of pipe (FE-PC-001B) (restrained, good data, instrument overranged above ~17 m/s).

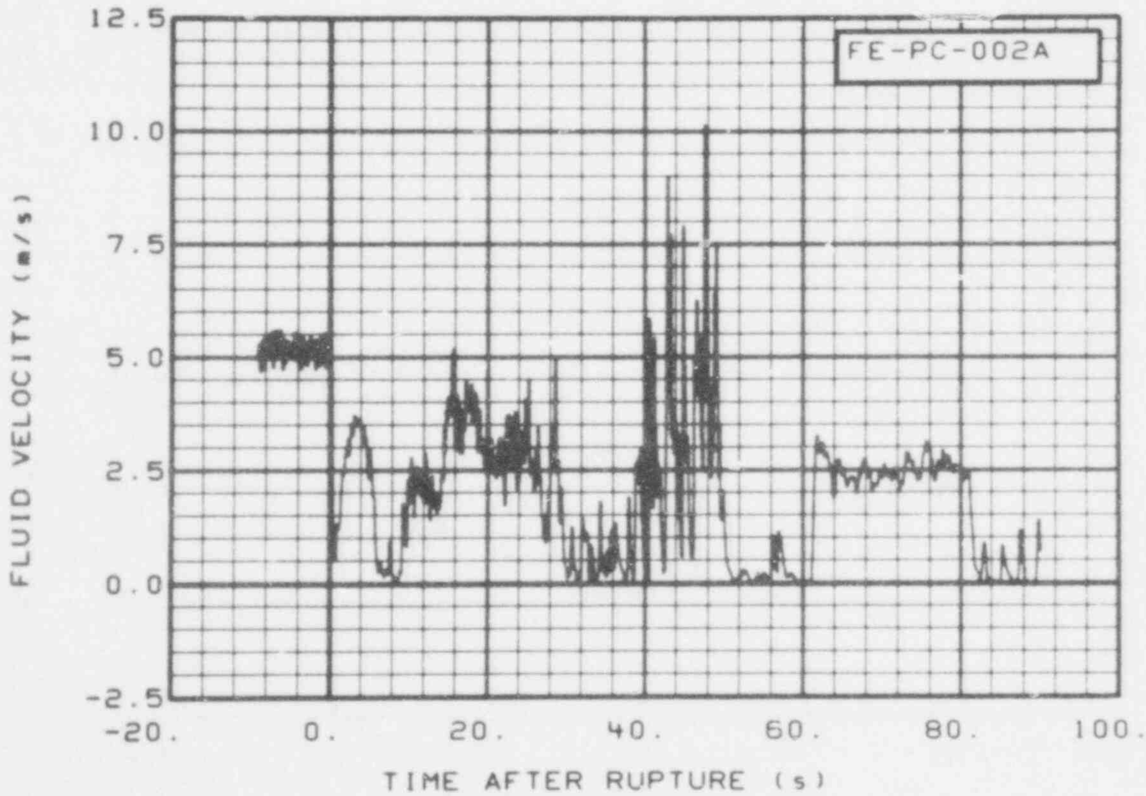


Fig. 78 Fluid velocity in intact loop hot leg at DTT flange on west side of pipe (FE-PC-002A) (QEUD).

563 2??

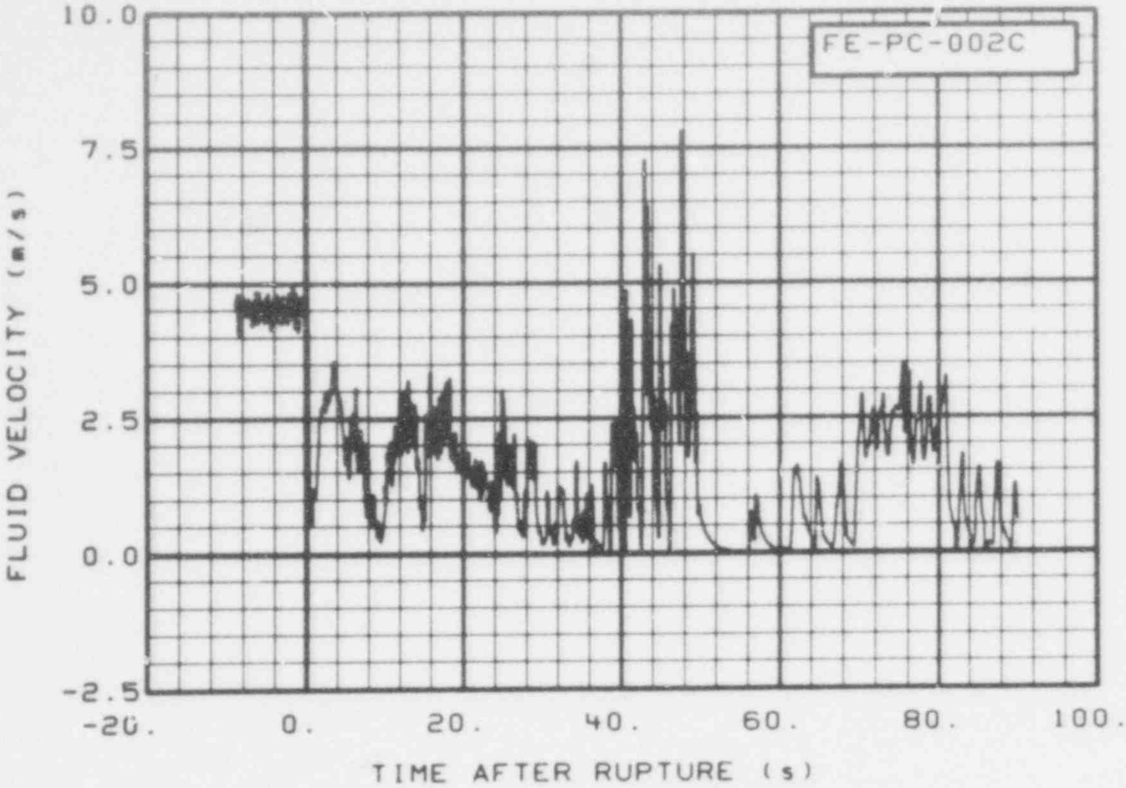


Fig. 79 Fluid velocity in intact loop hot leg at DTT flange on east side of pipe (FE-PC-002C) (QEUD).

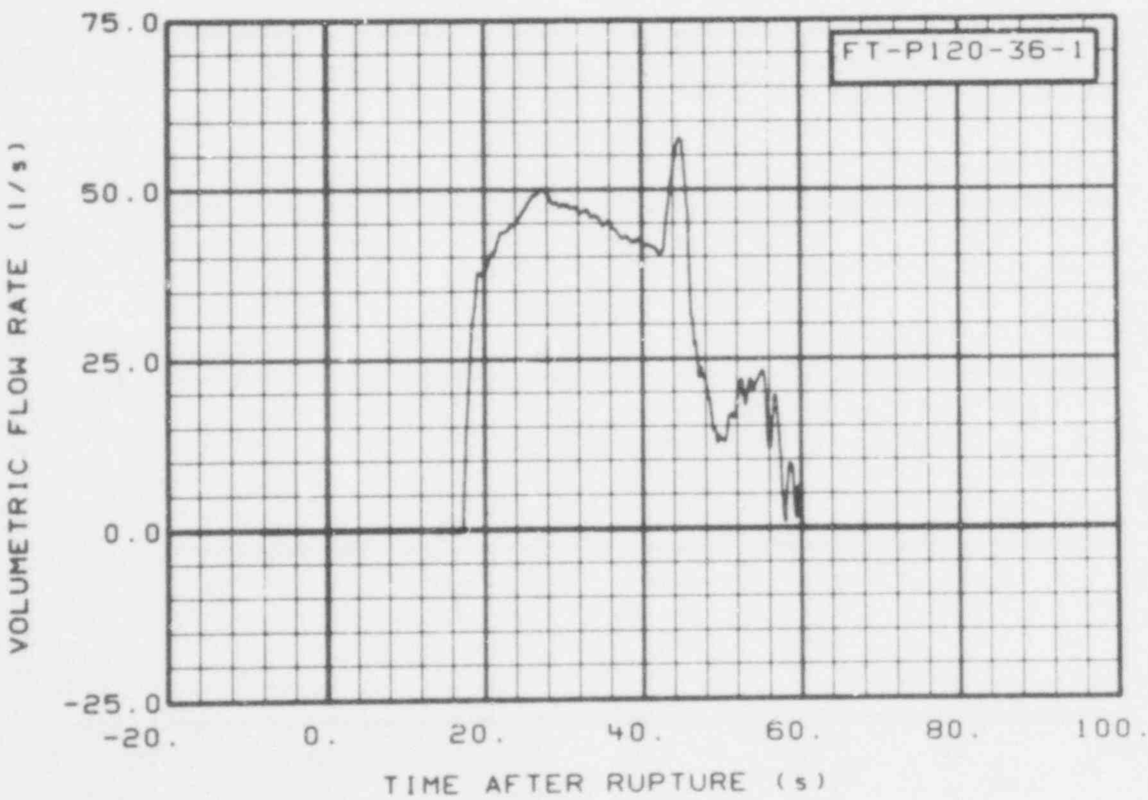


Fig. 80 Flow rate in ECCS Accumulator A discharge, high range (FT-P120-36-1) (QEUD).

563 300

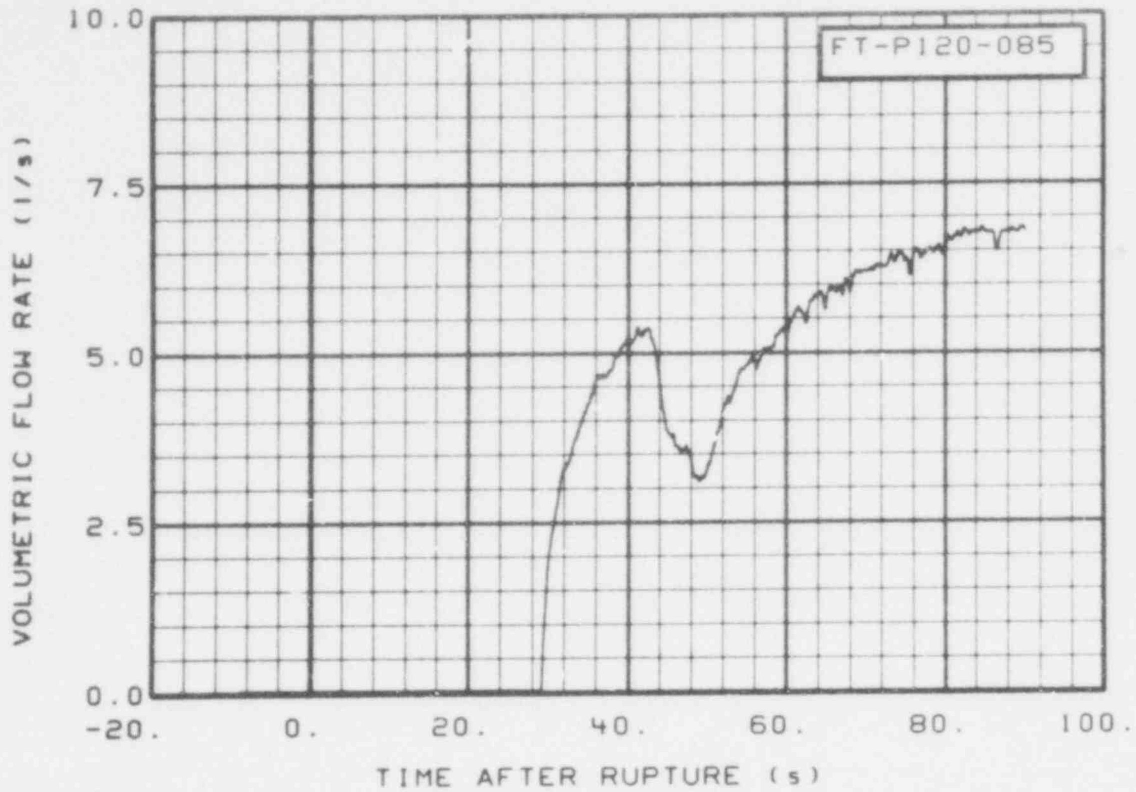


Fig. 81 Flow rate in ECCS LPIS Pump A discharge (FT-P120-085) (QEUD).

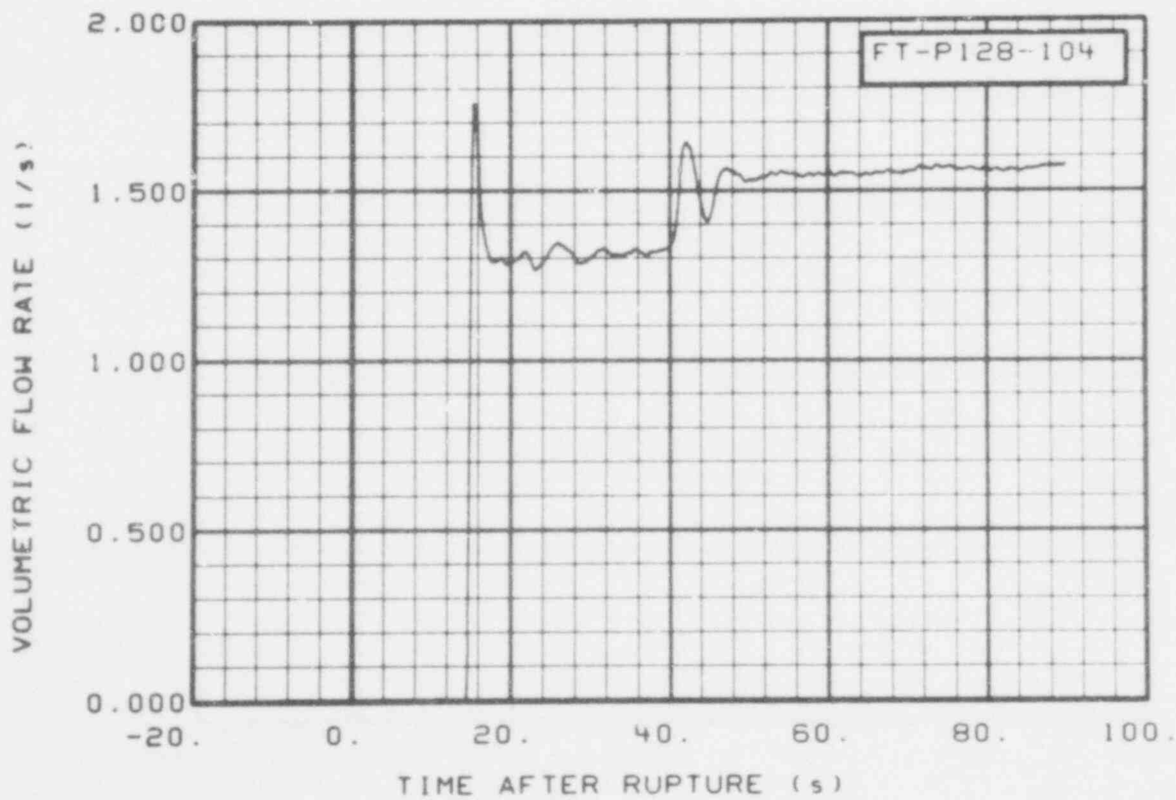


Fig. 82 Flow rate in ECCS HPIS Pump A discharge (FT-P128-104) (QEUD).

563 301

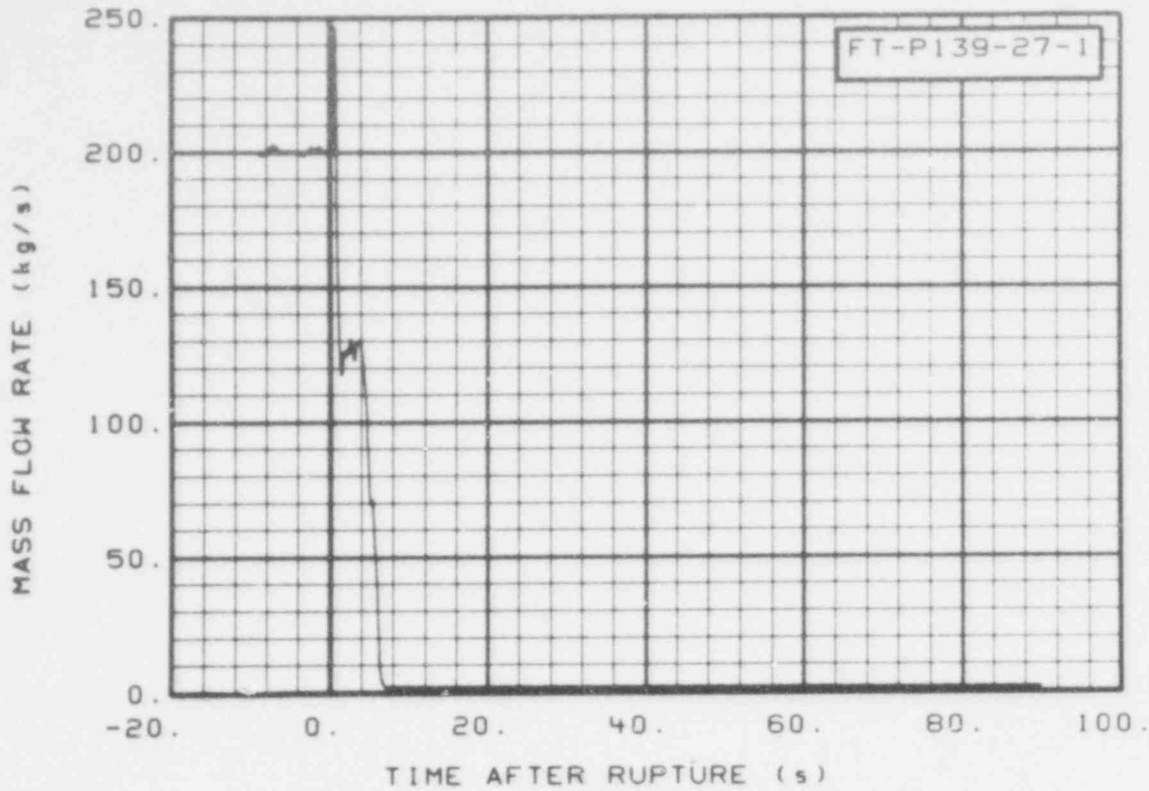


Fig. 83 Flow rate in intact loop hot leg venturi (FT-P139-27-1) (restrained, good for initial conditions only).

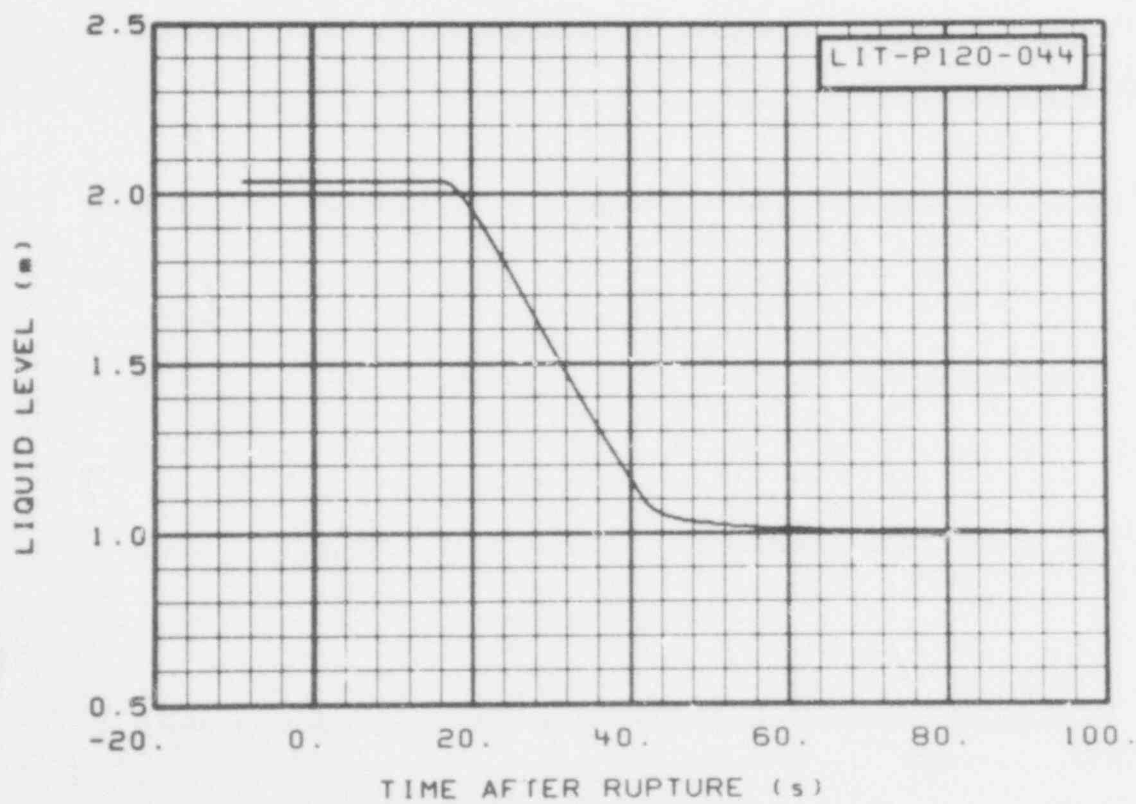


Fig. 84 Liquid level in ECCS Accumulator A (LIT-P120-044) (QEUD).

563 302

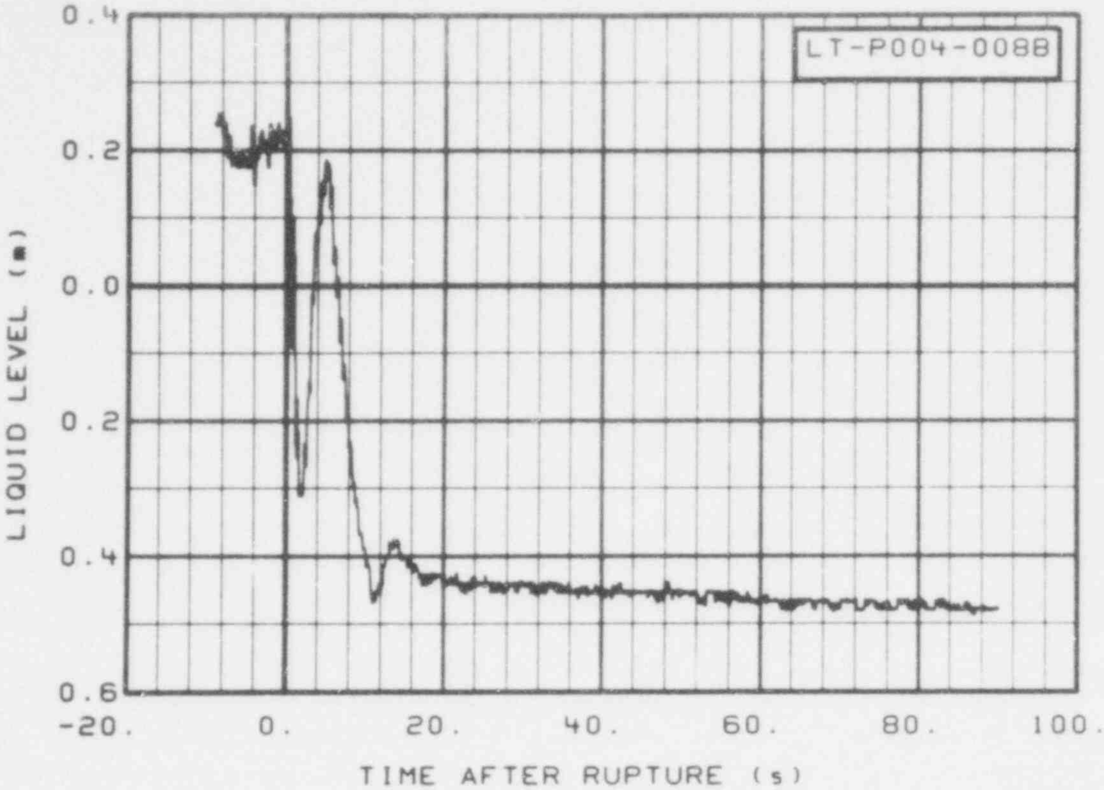


Fig. 85 Liquid level in steam generator secondary side (LT-P004-008B) (restrained, slow response during transient).

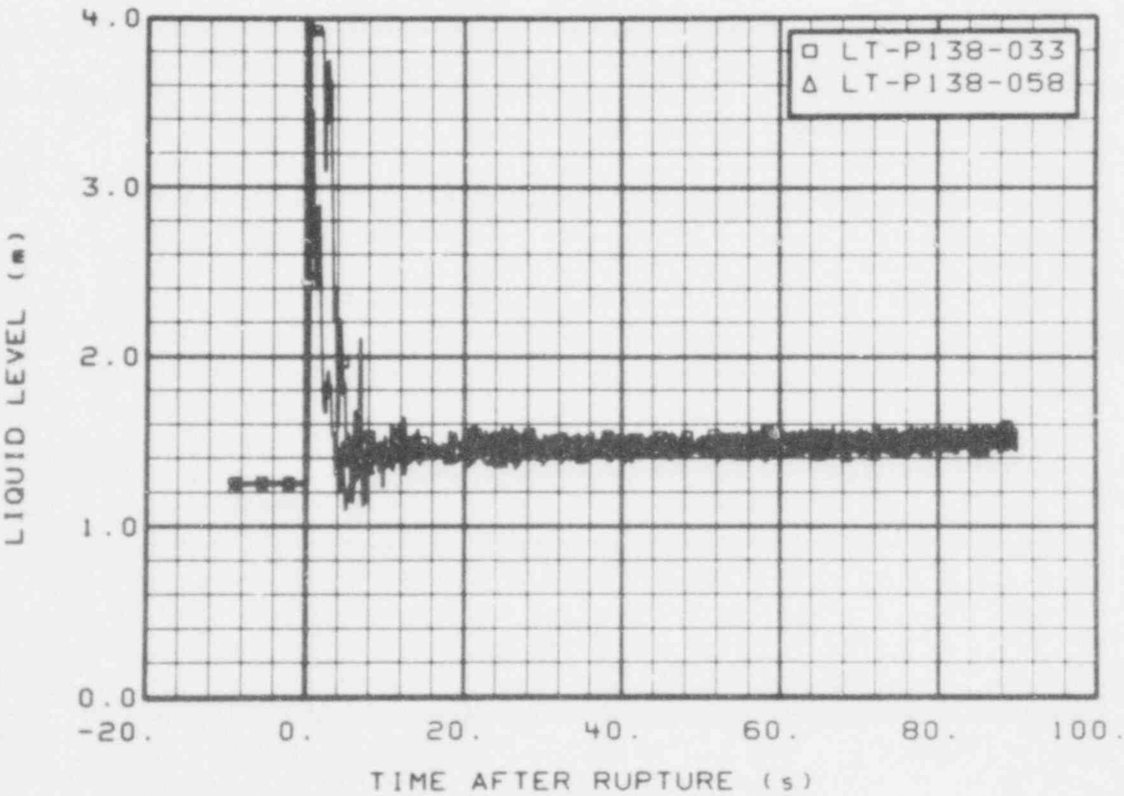


Fig. 86 Liquid level in blowdown suppression tank (LT-P138-033 and -058) [(restrained, slow response during transient, data outside uncertainty bands (mass flow)].

563 303

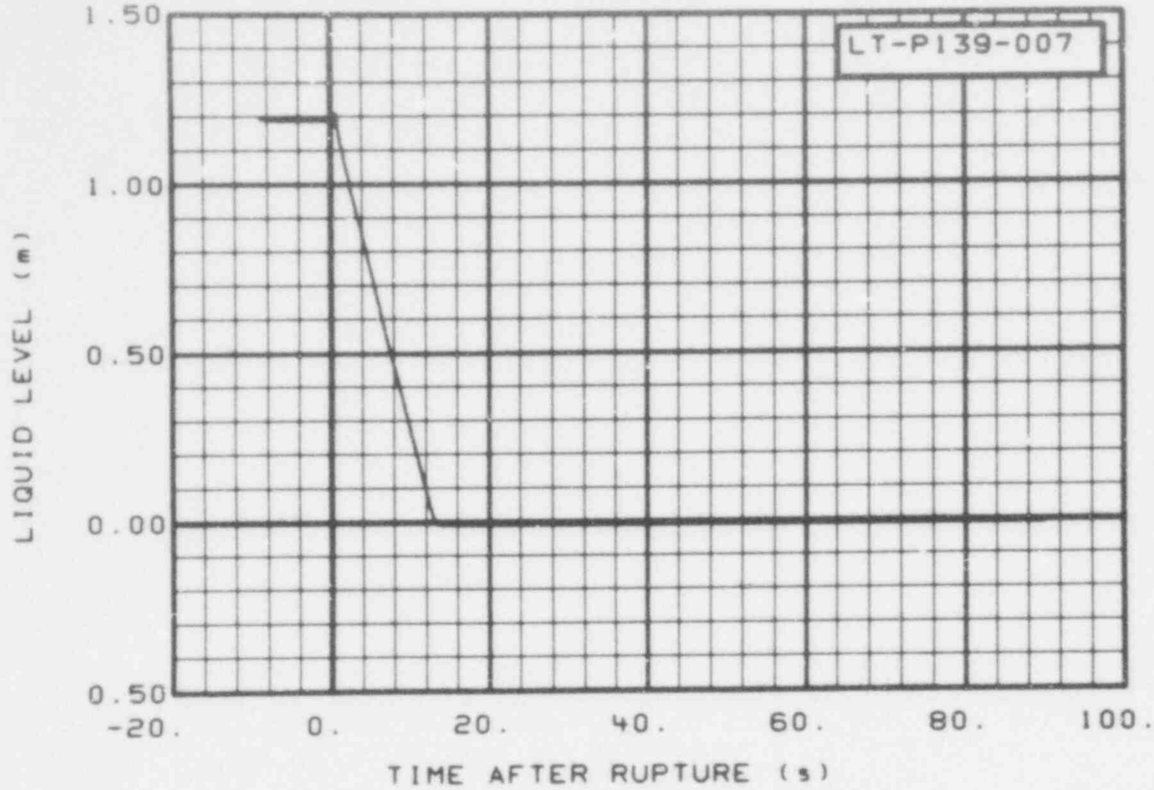


Fig. 87 Liquid level in pressurizer (LT-P139-007) (restrained, good for initial conditions only, transient response affected by density change in transmission lines).

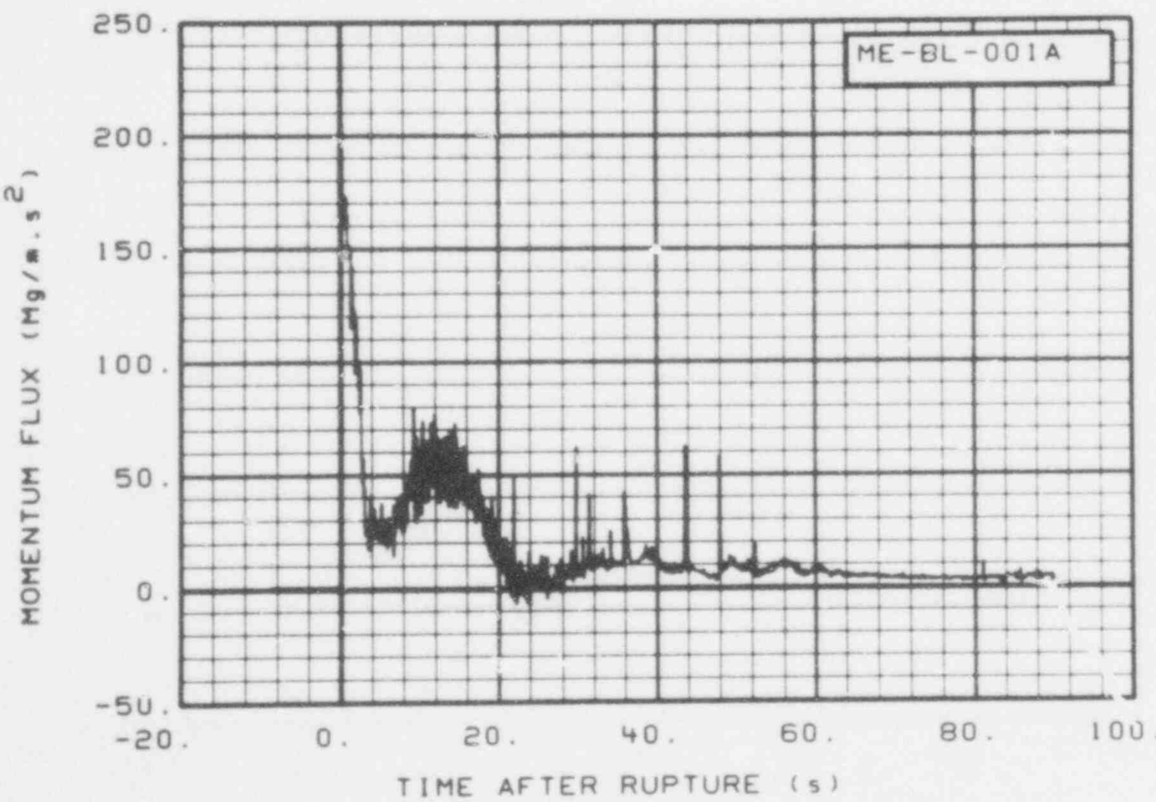


Fig. 88 Momentum flux in broken loop cold leg at DTT flange on bottom of pipe (ME-BL-001A) (QEUD).

563 304

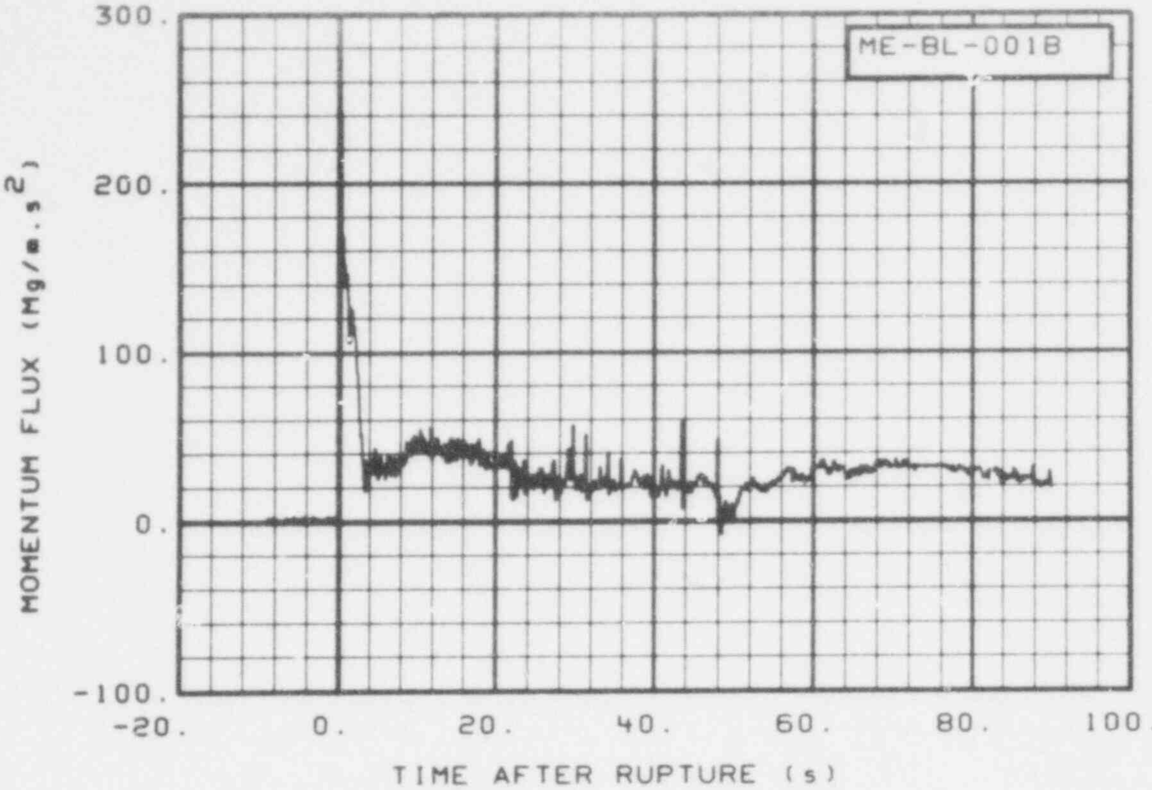


Fig. 89 Momentum flux in broken loop cold leg at DTT flange in middle of pipe (ME-BL-001B) (restrained, unexplained offset after T = 0 + 20 s).

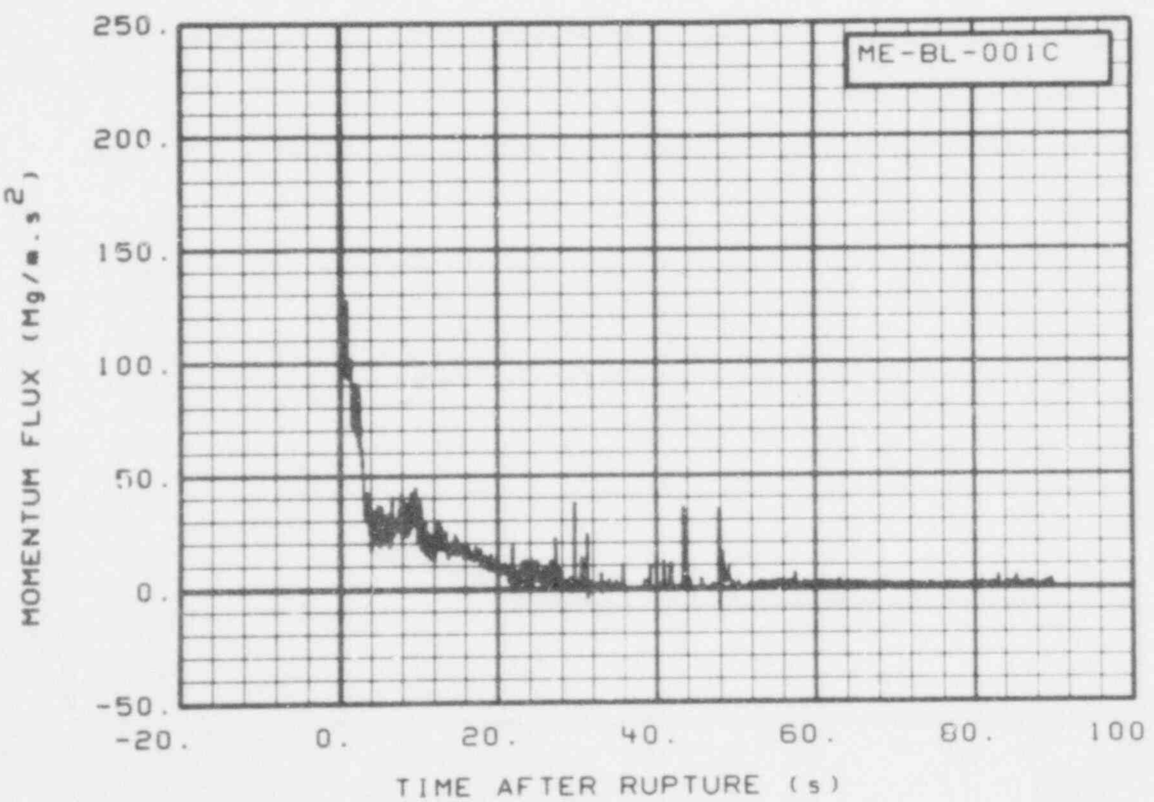


Fig. 90 Momentum flux in broken loop cold leg at DTT flange on top of pipe (ME-BL-001C) (QEUD).

563 305

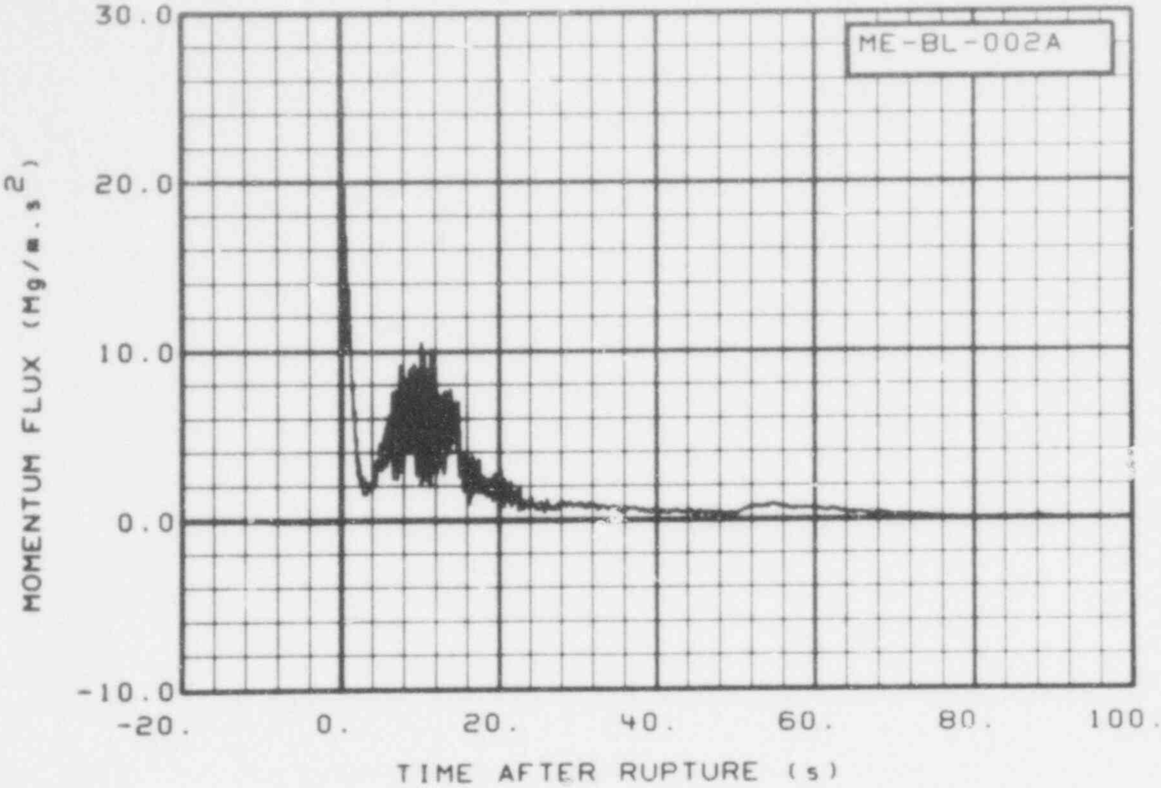


Fig. 91 Momentum flux in broken loop hot leg at DTT flange on bottom of pipe (ME-BL-002A) (QEUD).

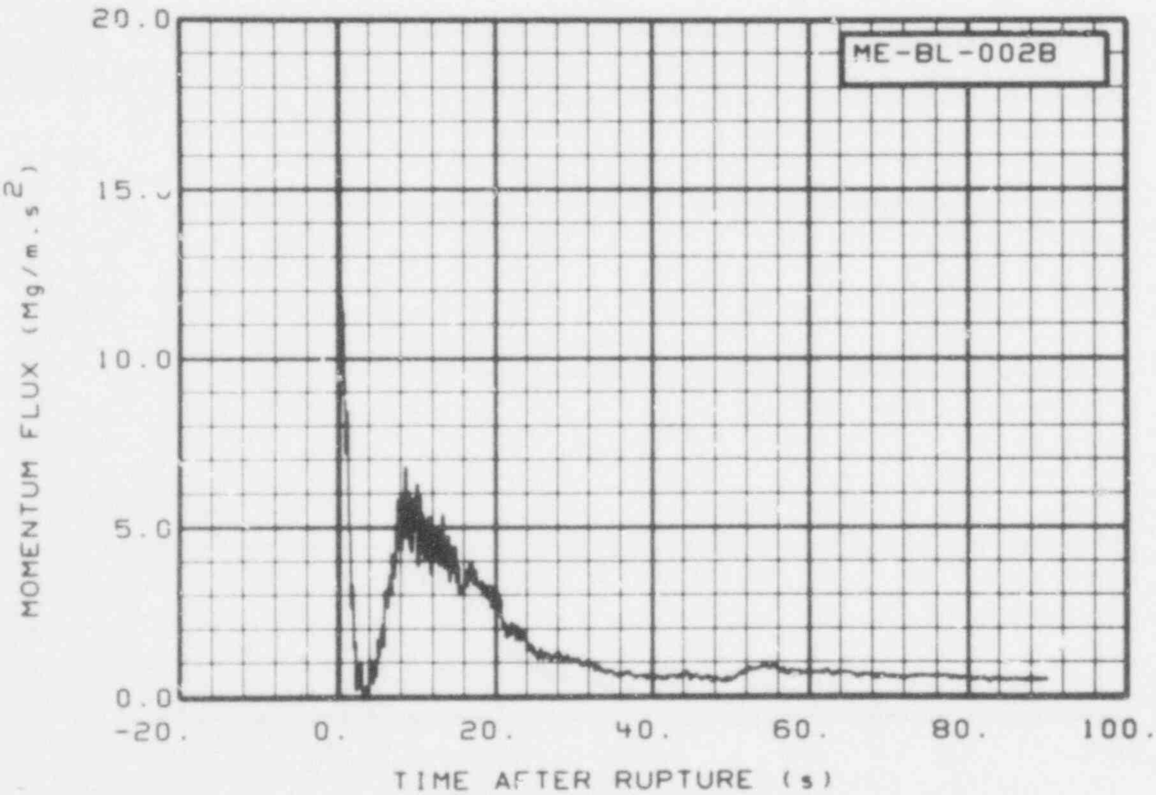


Fig. 92 Momentum flux in broken loop hot leg at DTT flange in middle of pipe (ME-BL-002B) (restrained, magnitude and response uncertain).

563 306

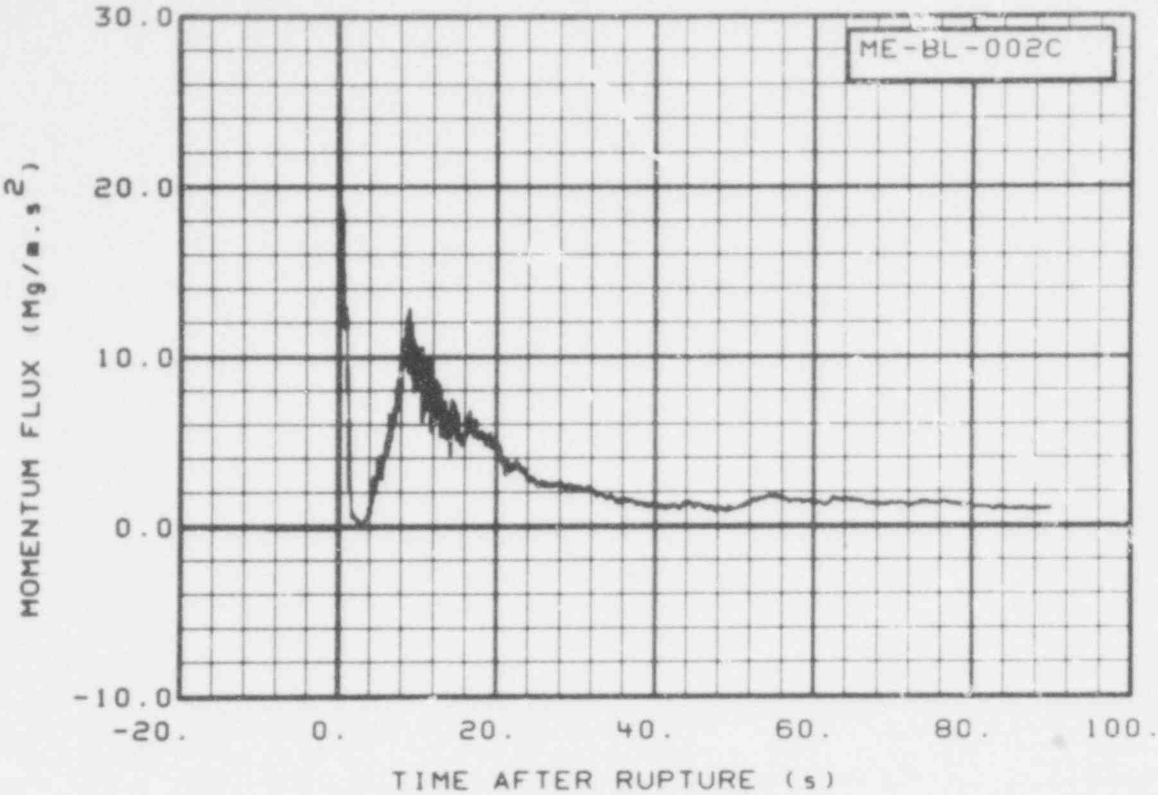


Fig. 93 Momentum flux in broken loop hot leg at DTT flange on top of pipe (ME-BL-002C) (QEUD).

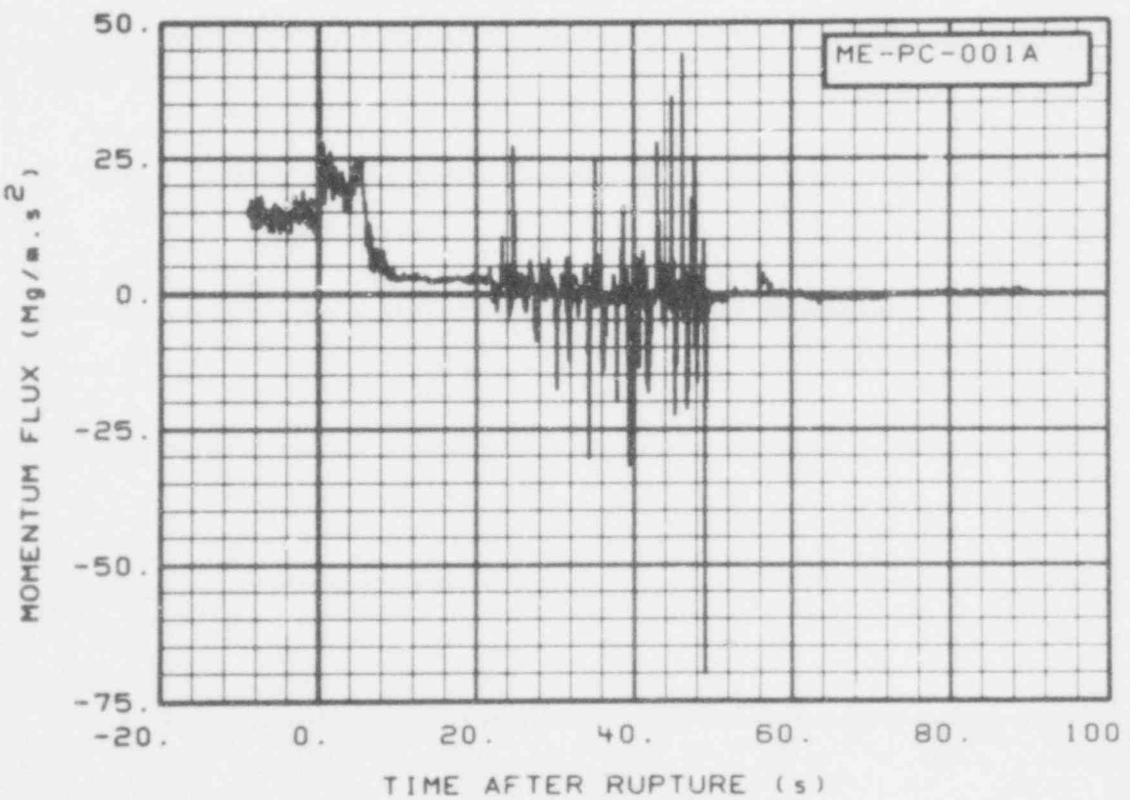


Fig. 94 Momentum flux in intact loop cold leg on west side of pipe (ME-PC-001A) (QEUD).

563 307

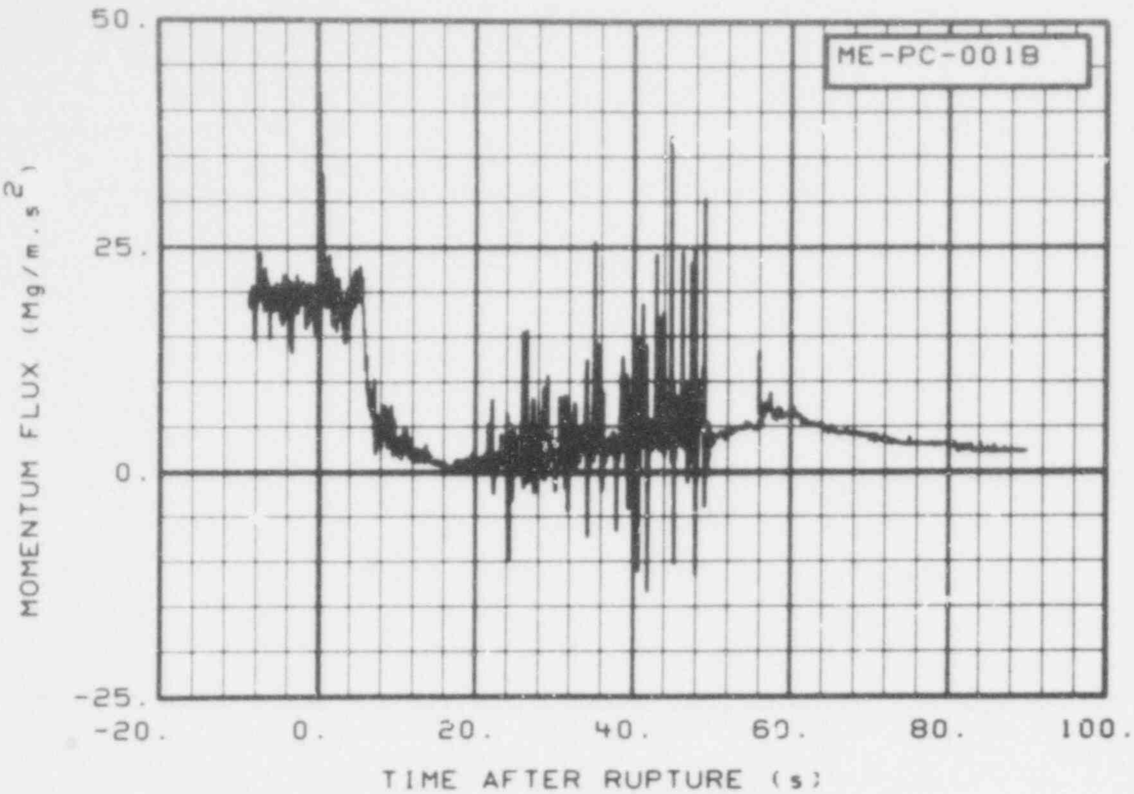


Fig. 95 Momentum flux in intact loop cold leg , middle of pipe (ME-PC-001B) (restrained, questionable magnitude after ı = 0 + 18 s).

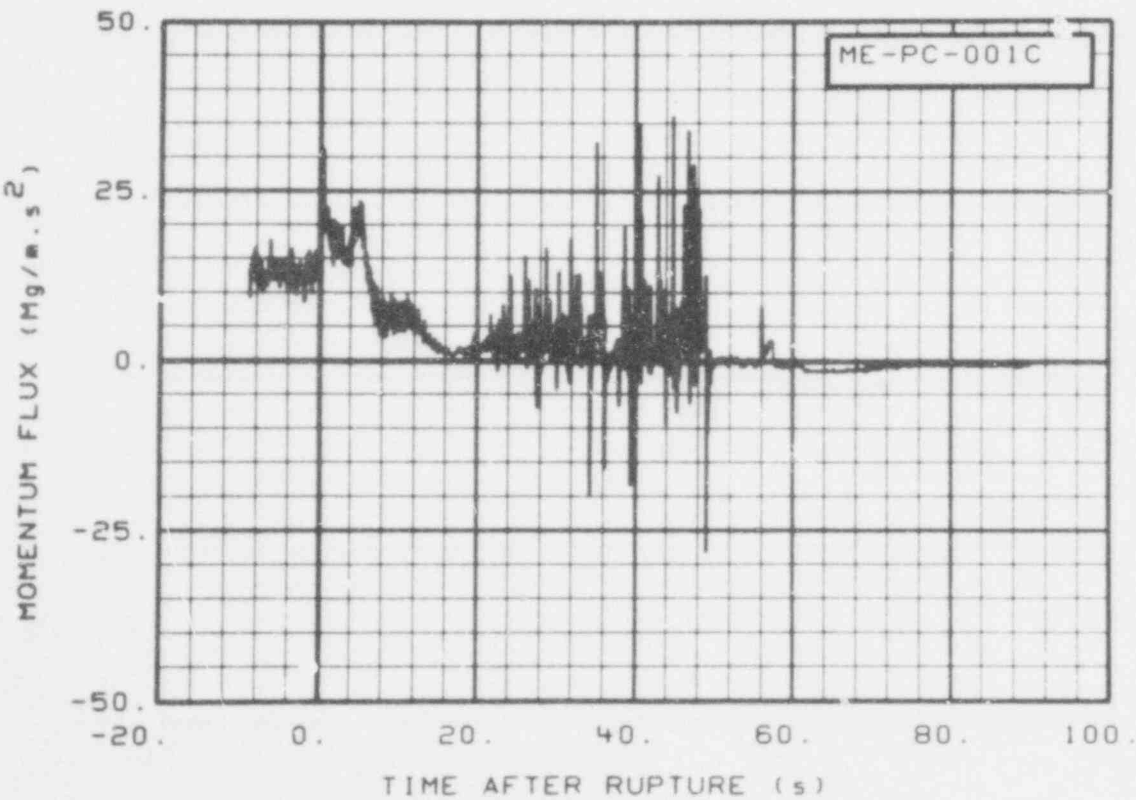


Fig. 96 Momentum flux in intact loop cold leg on east side of pipe (ME-PC-001C) (QEUD).

563 308

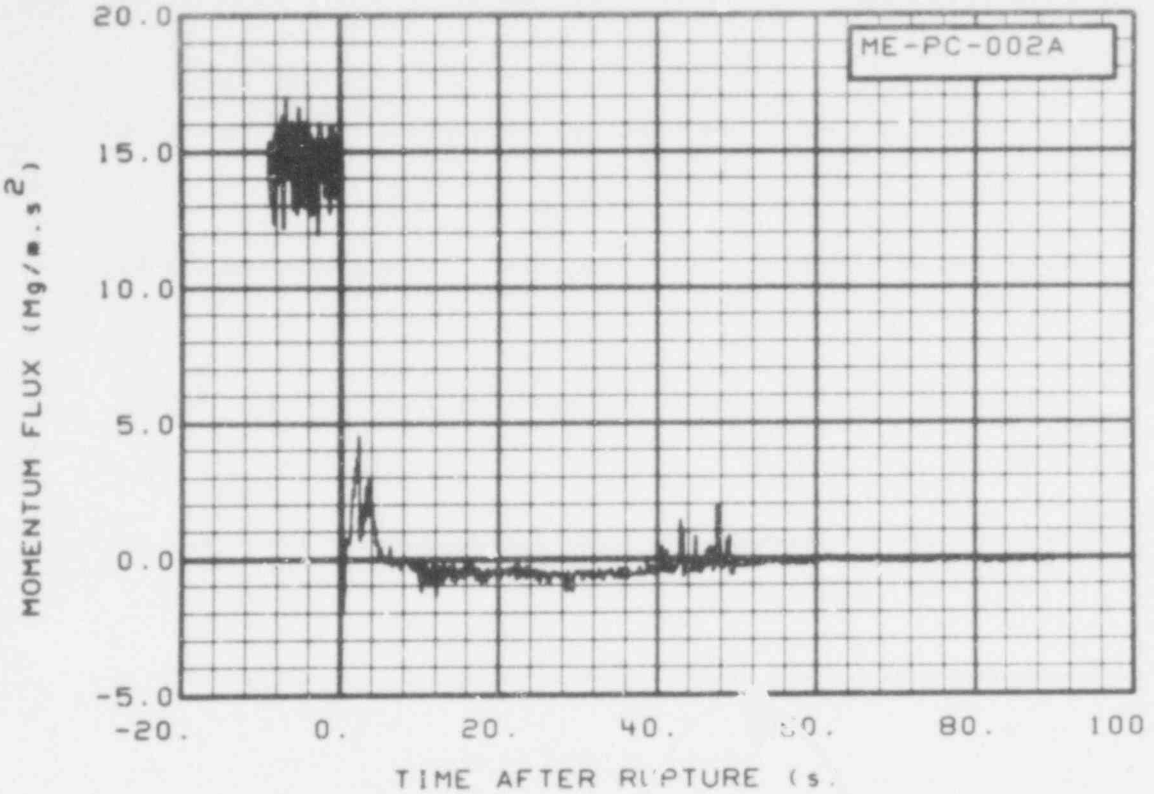


Fig. 97 Momentum flux in intact loop hot leg on west side of pipe (ME-PC-00[illegible]) (QEU[illegible]).

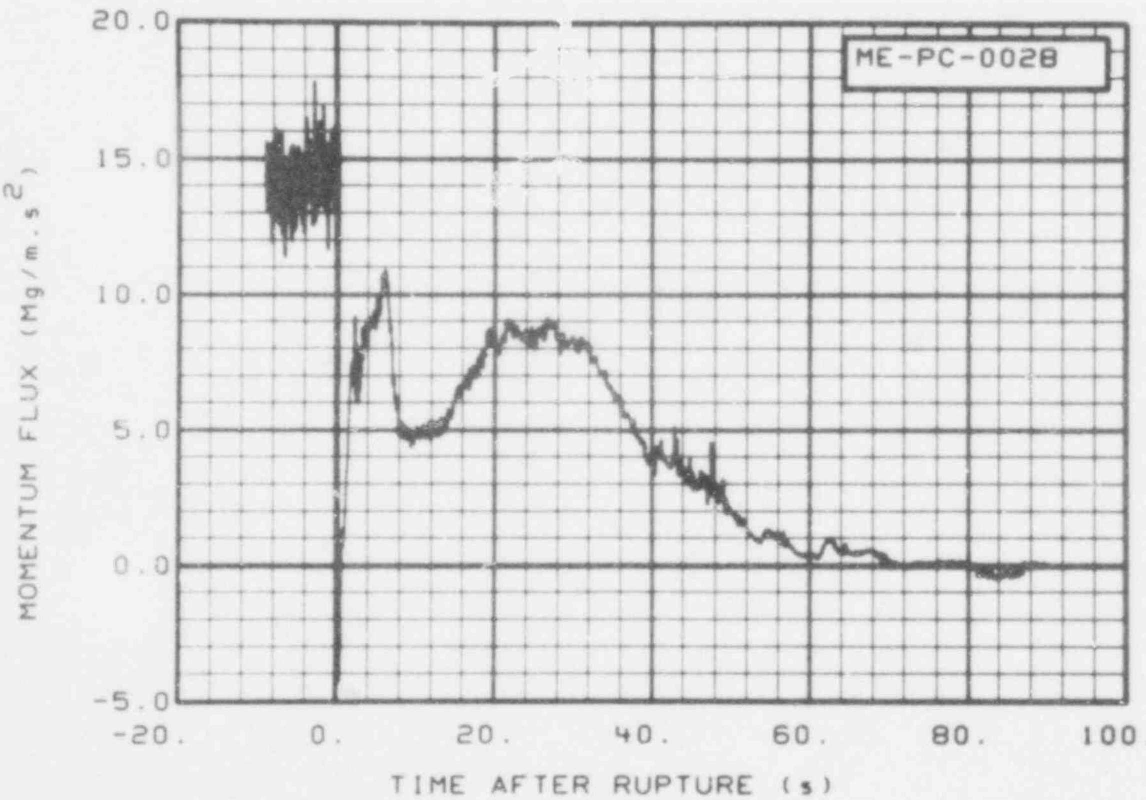


Fig. 98 Momentum flux in intact loop hot leg in middle of pipe (ME-PC-002B) (restrained, magnitude and response uncertain).

563 309

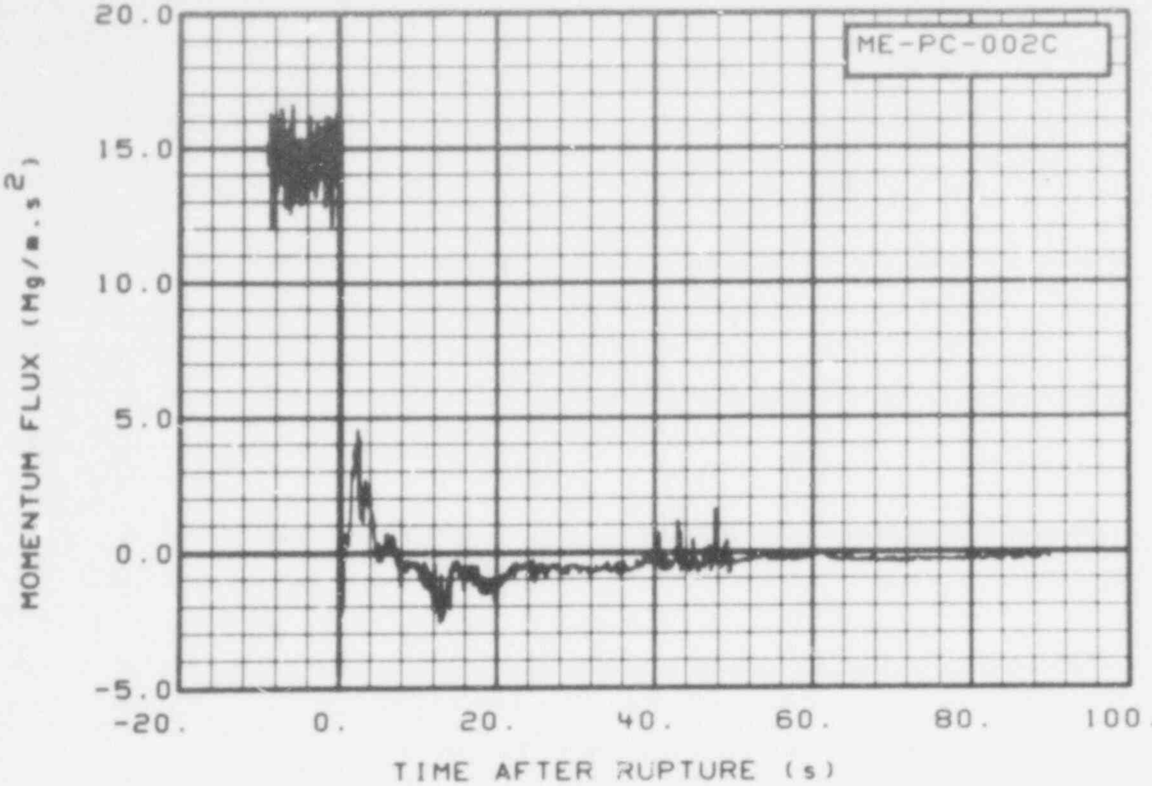


Fig. 99 Momentum flux in intact loop hot leg on east side of pipe (ME-PC-002C) (QEUD).

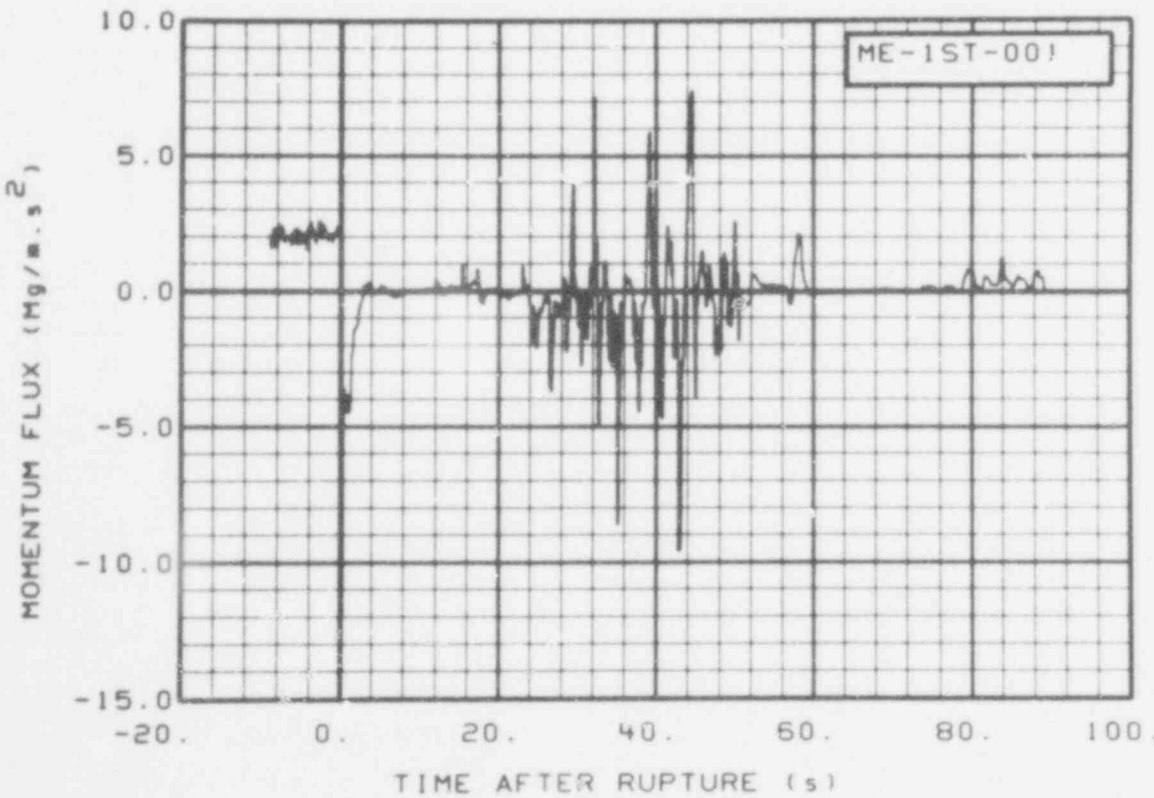


Fig. 100 Momentum flux in reactor vessel Downcomer Stalk 1, 1.13 m above reactor vessel bottom (ME-1ST-001) (restrained, may not indicate magnitude of downcomer flow).

563 310

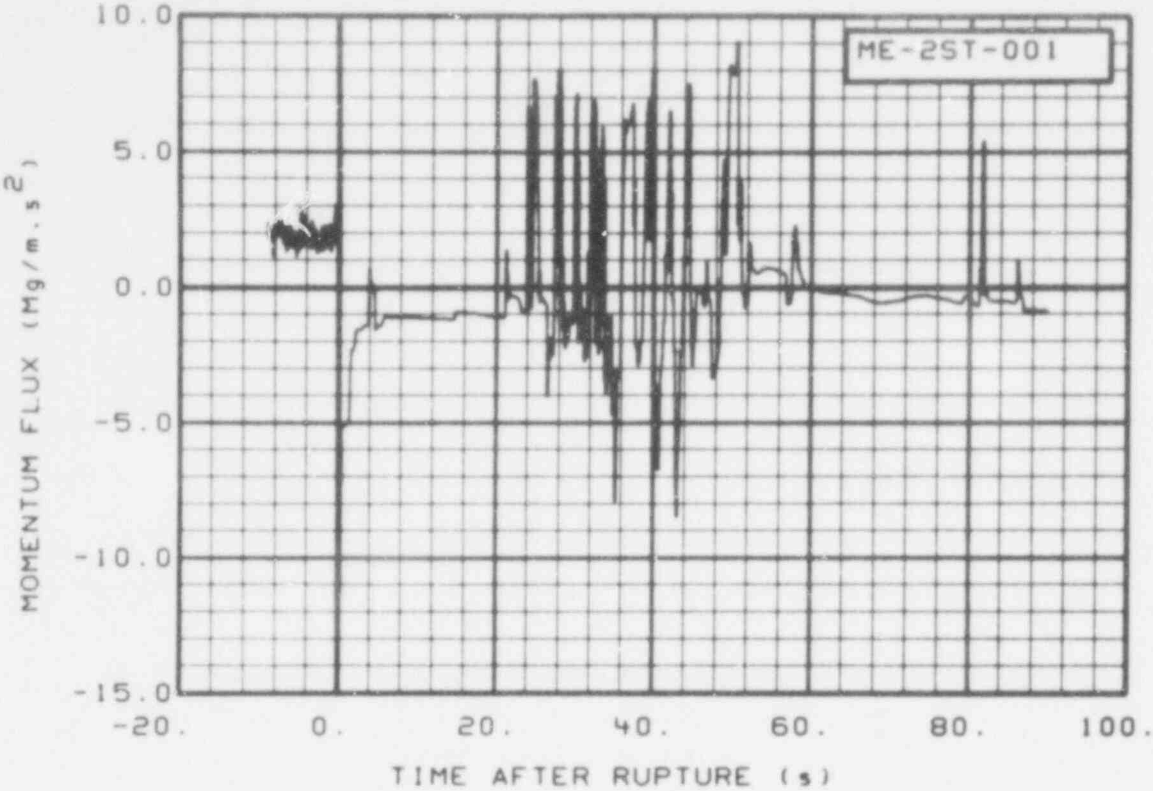


Fig. 101 Momentum flux in reactor vessel Downcomer Stalk 2, 1.13 m above reactor vessel bottom (ME-2ST-001) (restrained, may not indicate magnitude of downcomer flow).

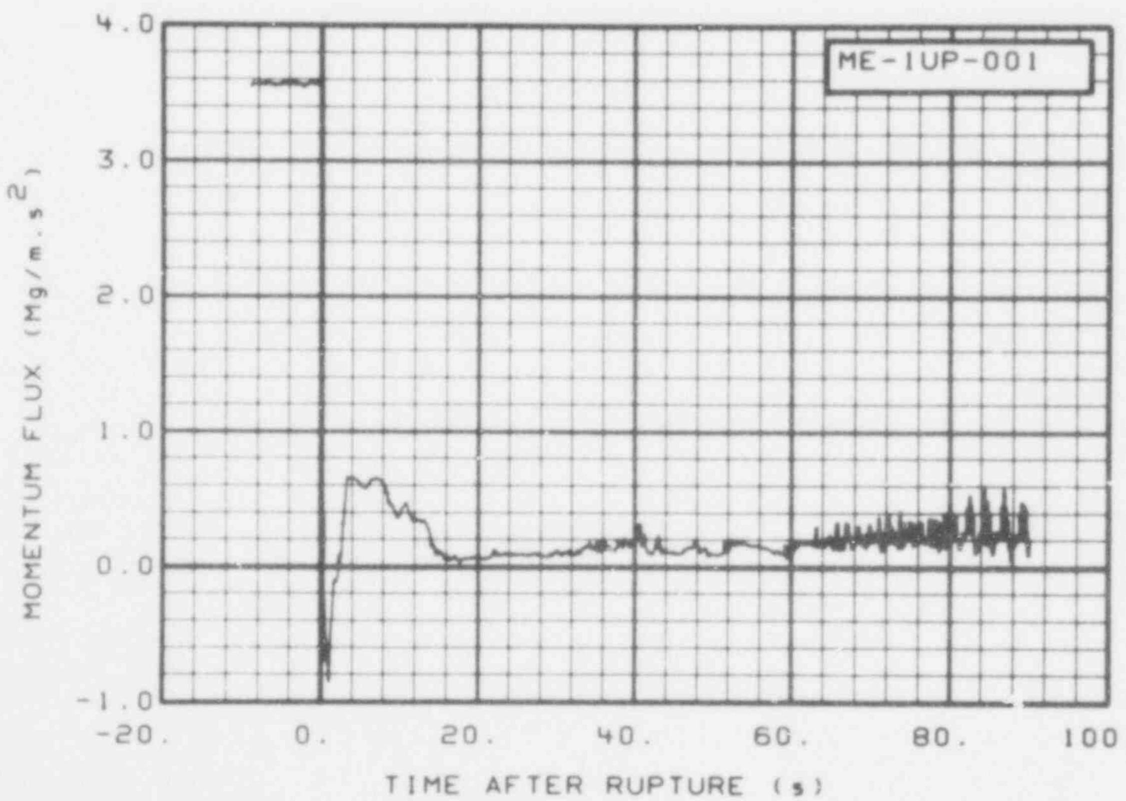


Fig. 102 Momentum flux in reactor vessel above upper end boxes of Fuel Assembly 1 (ME-1UP-001) (restrained, questionable magnitude).

563 311

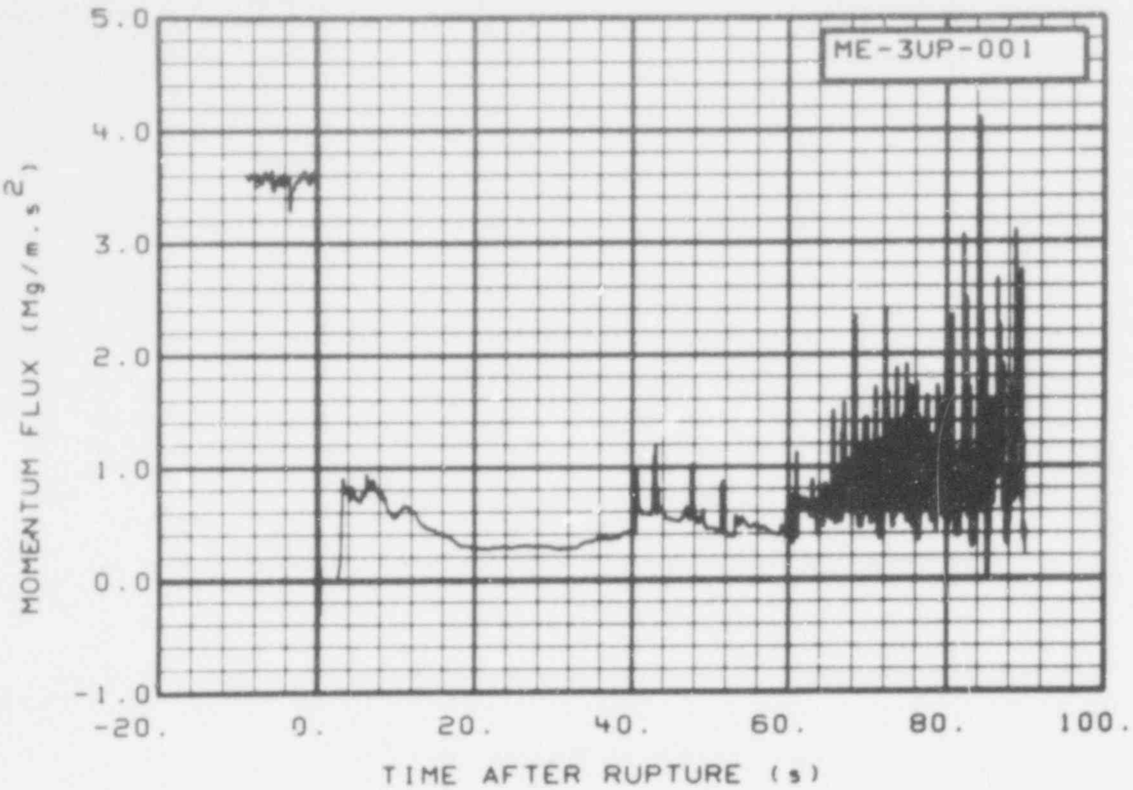


Fig. 103 Momentum flux in reactor vessel above upper end boxes of Fuel Assembly 3 (ME-3UP-001) (restrained, questionable magnitude).

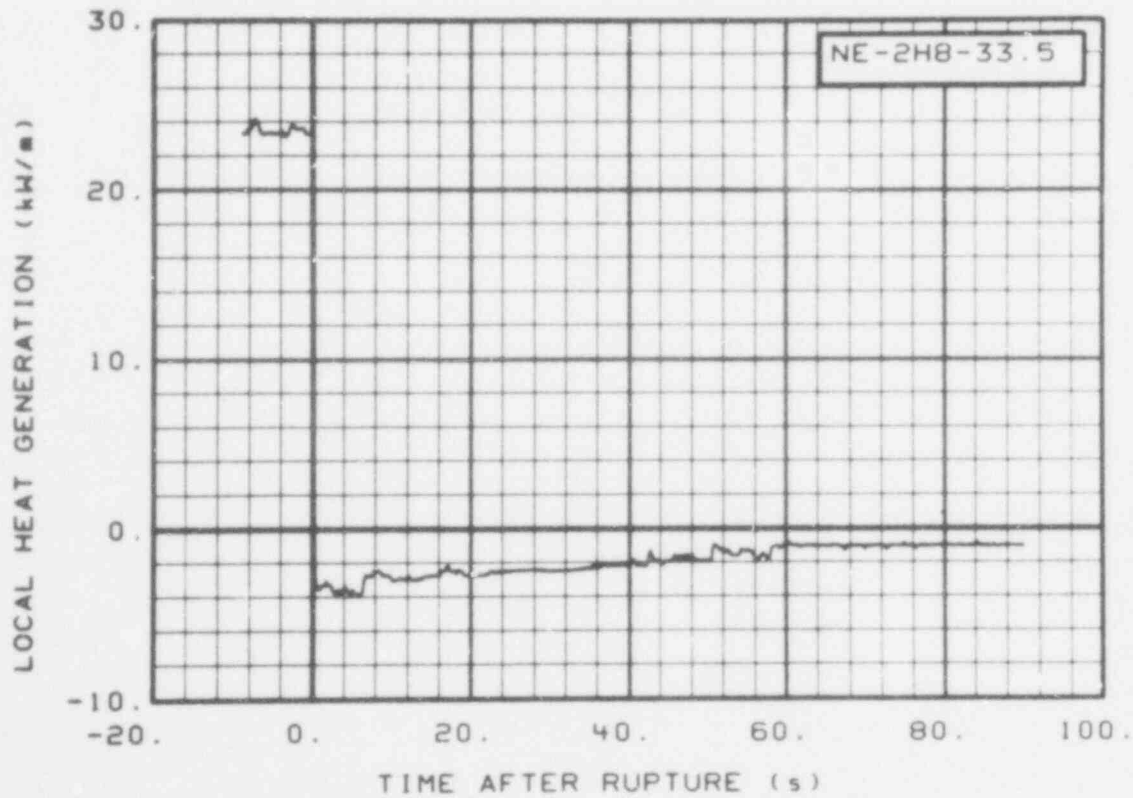


Fig. 104 Local heat generation rate for Fuel Assembly 2, Rod H8 (NE-2H8-33.5) (restrained, initial kW/m valid, measures neutrons minus gammas after T = 0).

563 312

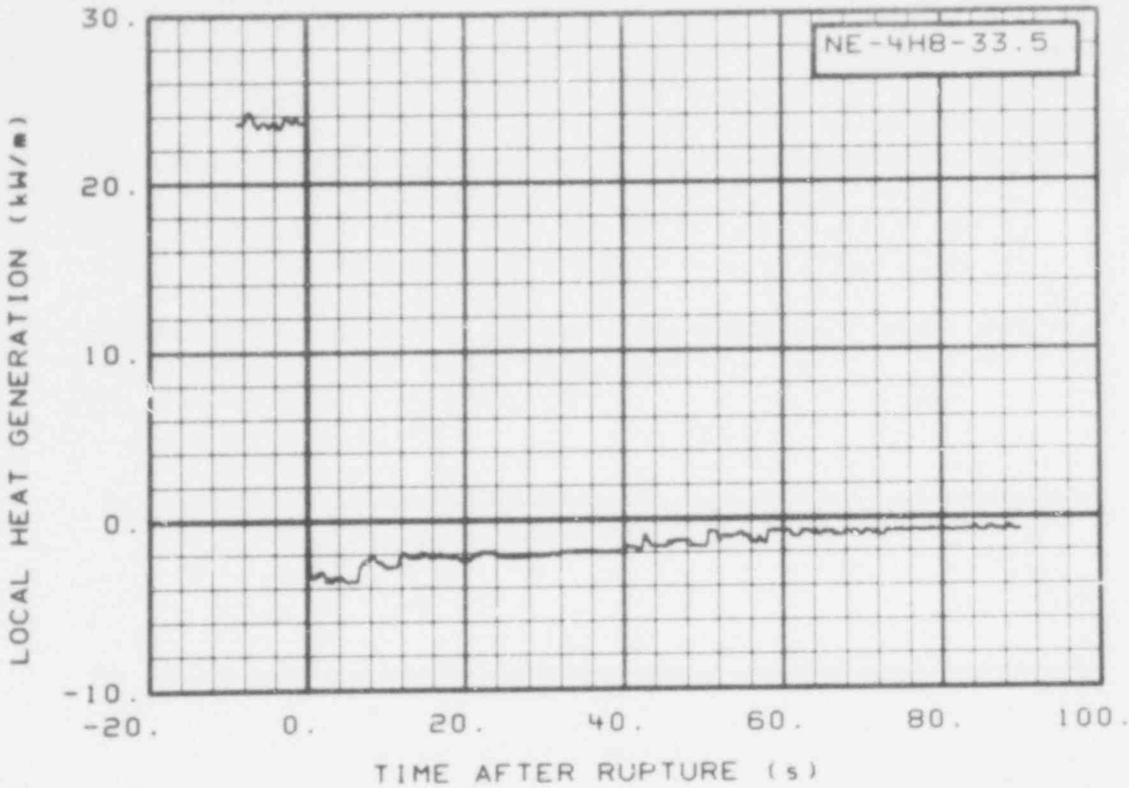


Fig. 105 Local heat generation rate for Fuel Assembly 4, Rod H8 (NE-4H8-33.5) (restrained, initial kW/m valid measures neutrons minus gammas after T = 0).

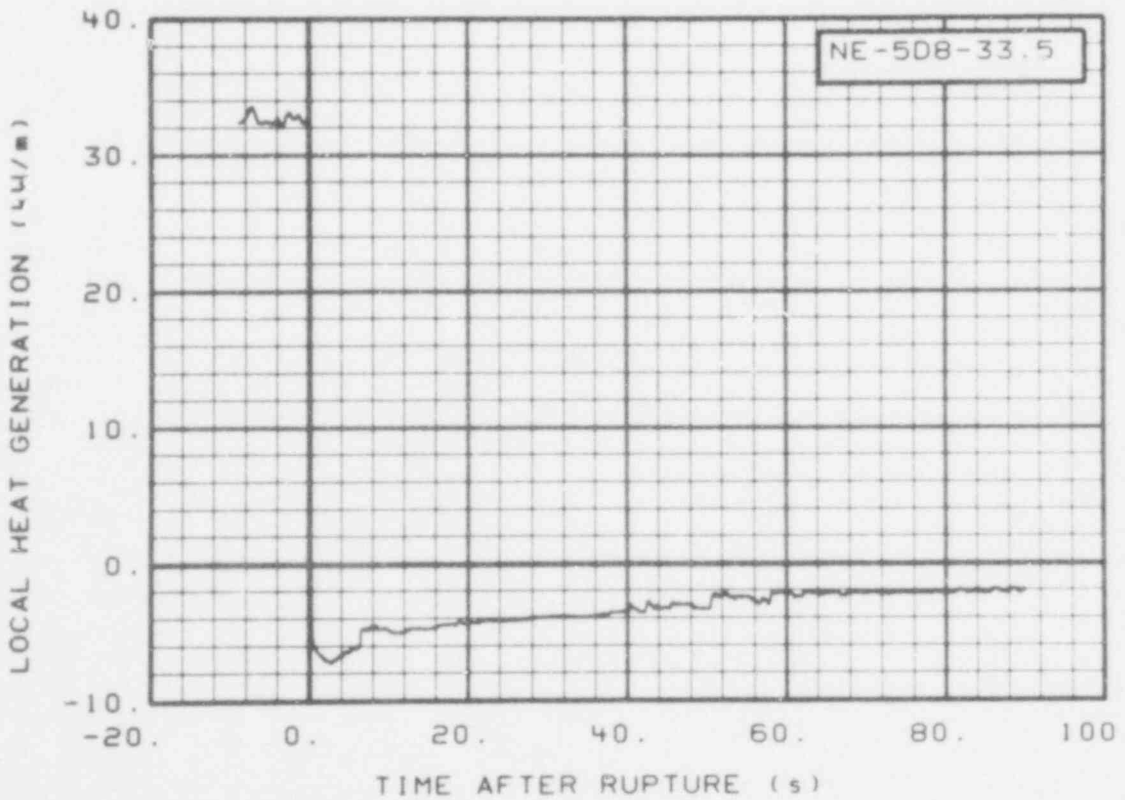


Fig. 106 Local heat generation rate for Fuel Assembly 5, Rod D8 (NE-5D8-33.5) (restrained, initial kW/m valid measures neutrons minus gammas after T = 0).

563 313

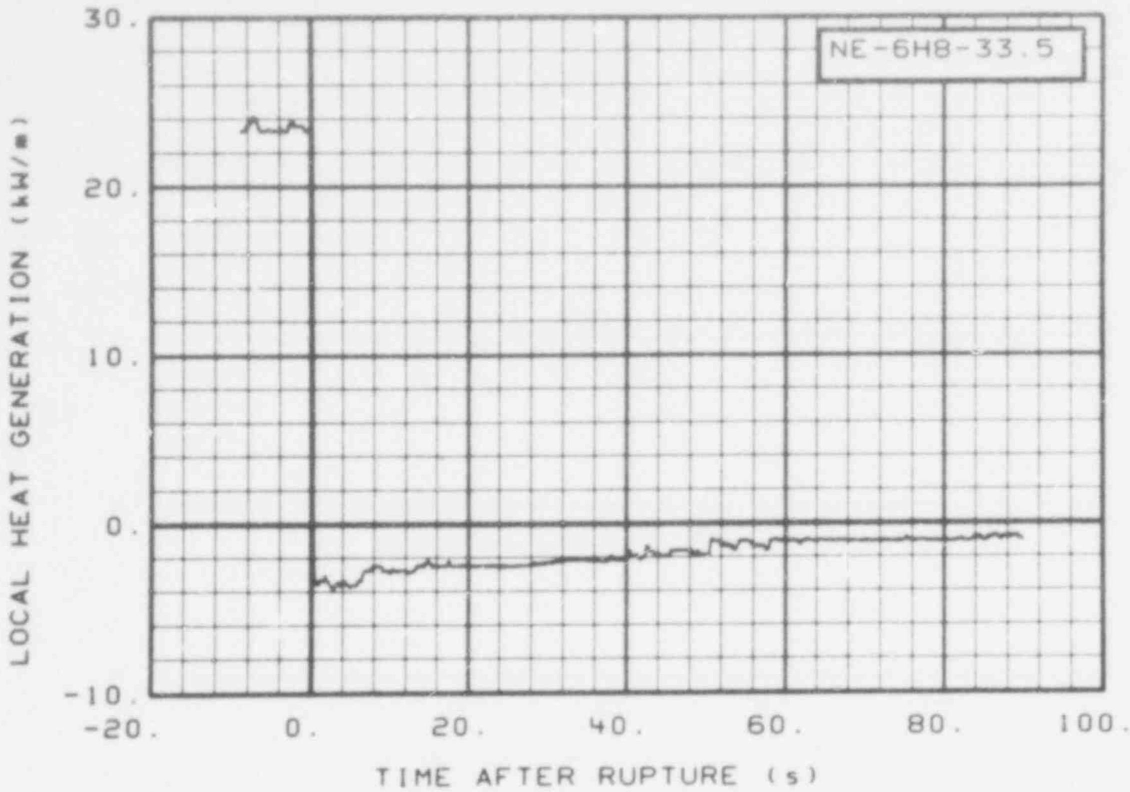


Fig. 107 Local heat generation rate for Fuel Assembly 6, Rod H8 (NE-6H8-33.5) (restrained, initial kW/m valid, measures neutrons minus gammas after T = 0).

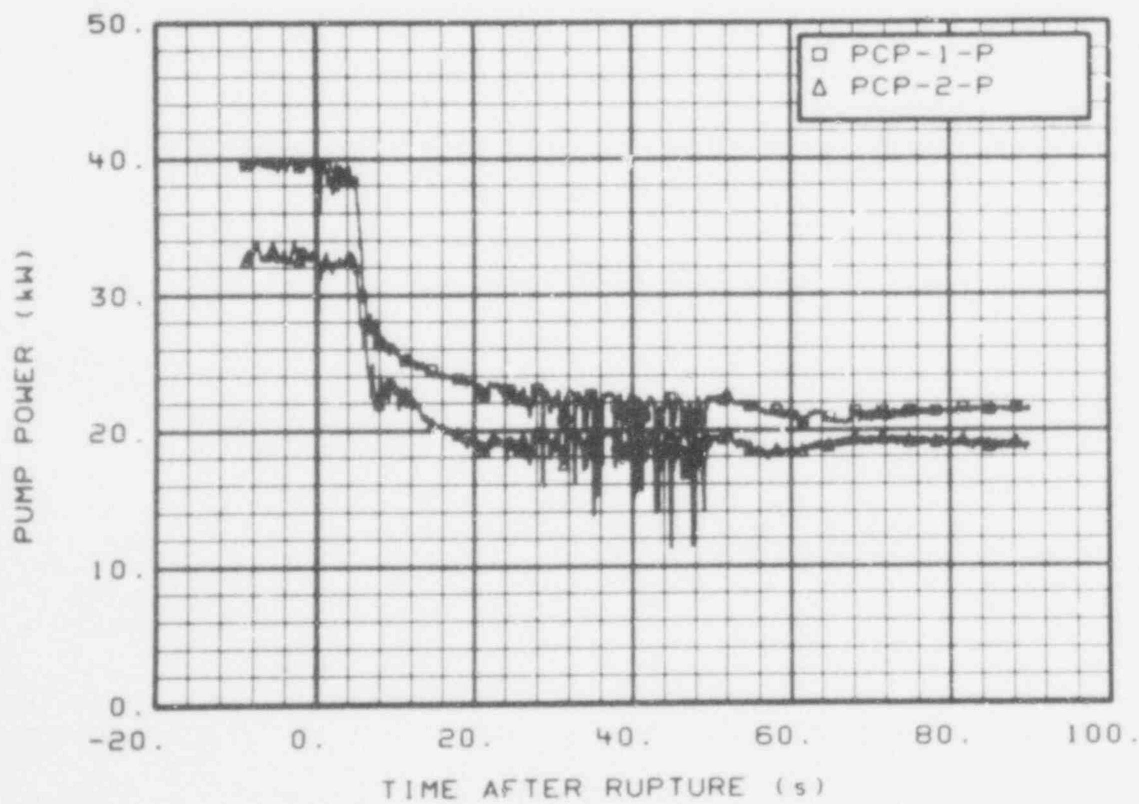


Fig. 108 Primary coolant pump power (PCP-1-P and -2-P) (QEUD).

563 314

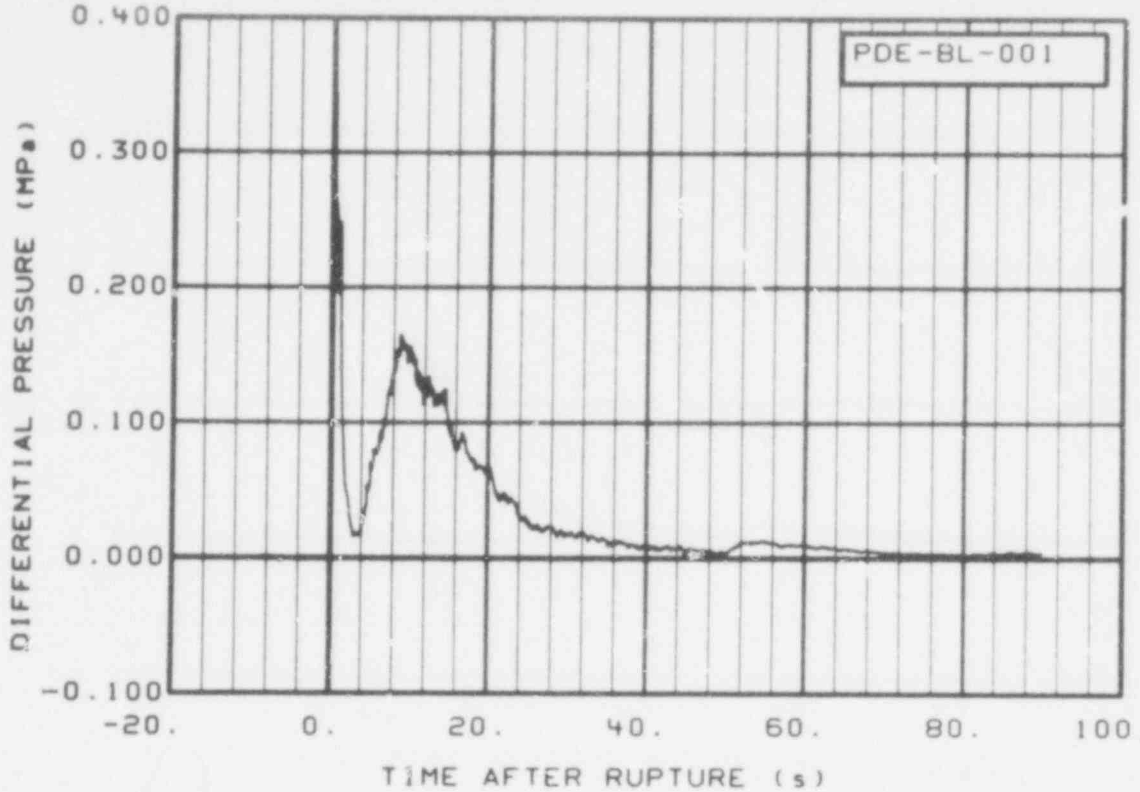


Fig. 109 Differential pressure in broken loop hot leg across 14-to-5-in. contraction (PDE-BL-001) (QEUD).

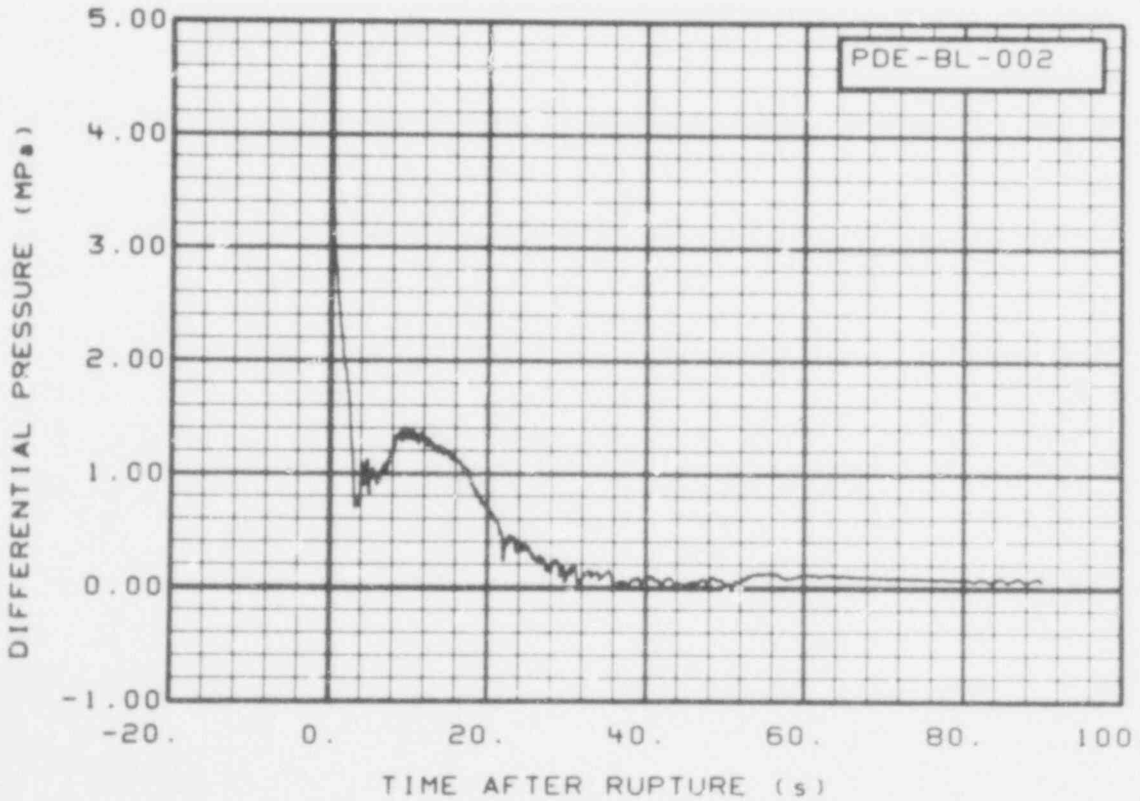


Fig. 110 Differential pressure in broken loop cold leg across 14-to-5-in. contraction (PDE-BL-002) (QEUD).

563 315

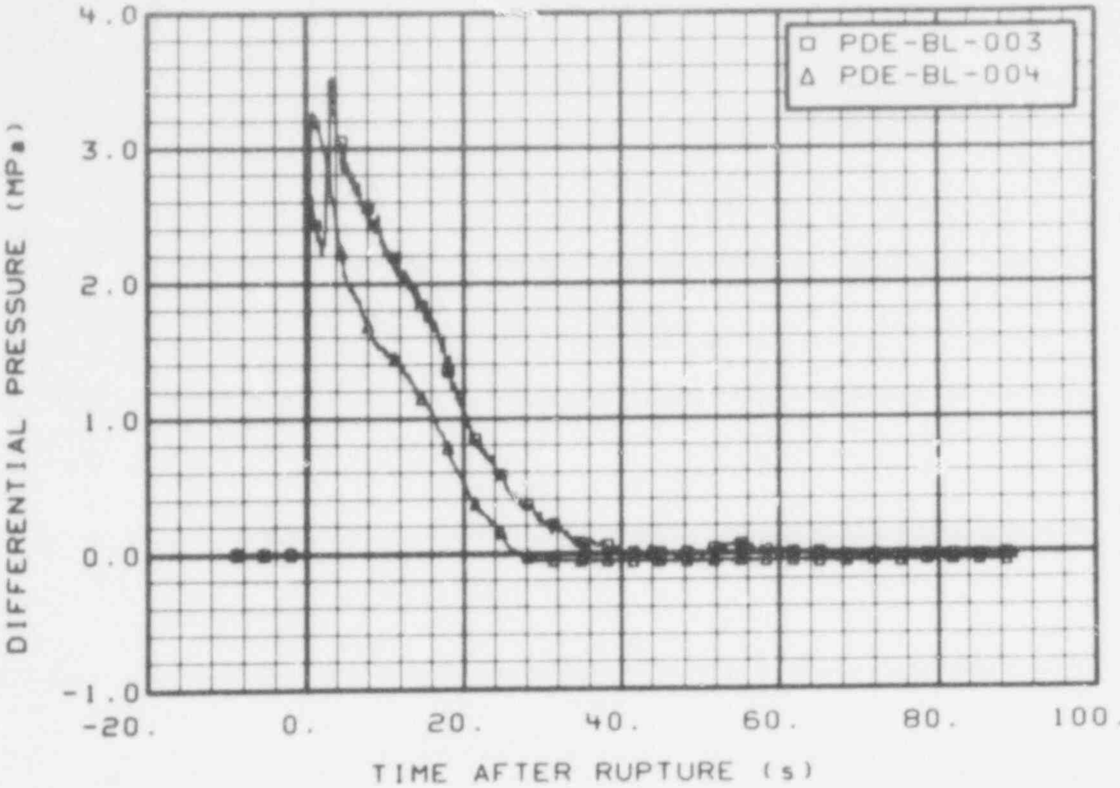


Fig. 111 Differential pressure in broken loop across break planes (PDE-BL-003 and -004) (QEUD).

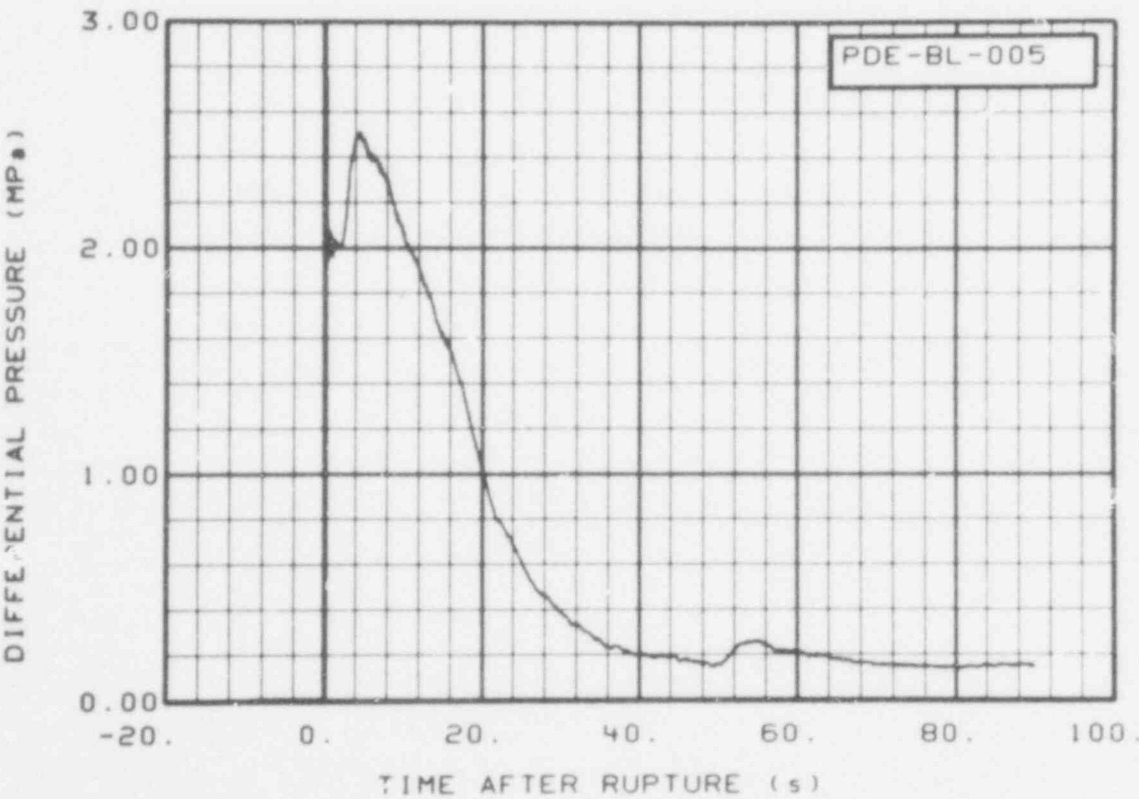


Fig. 112 Differential pressure in broken loop hot leg across pump simulator (PDE-BL-005) (QEUD).

563 316

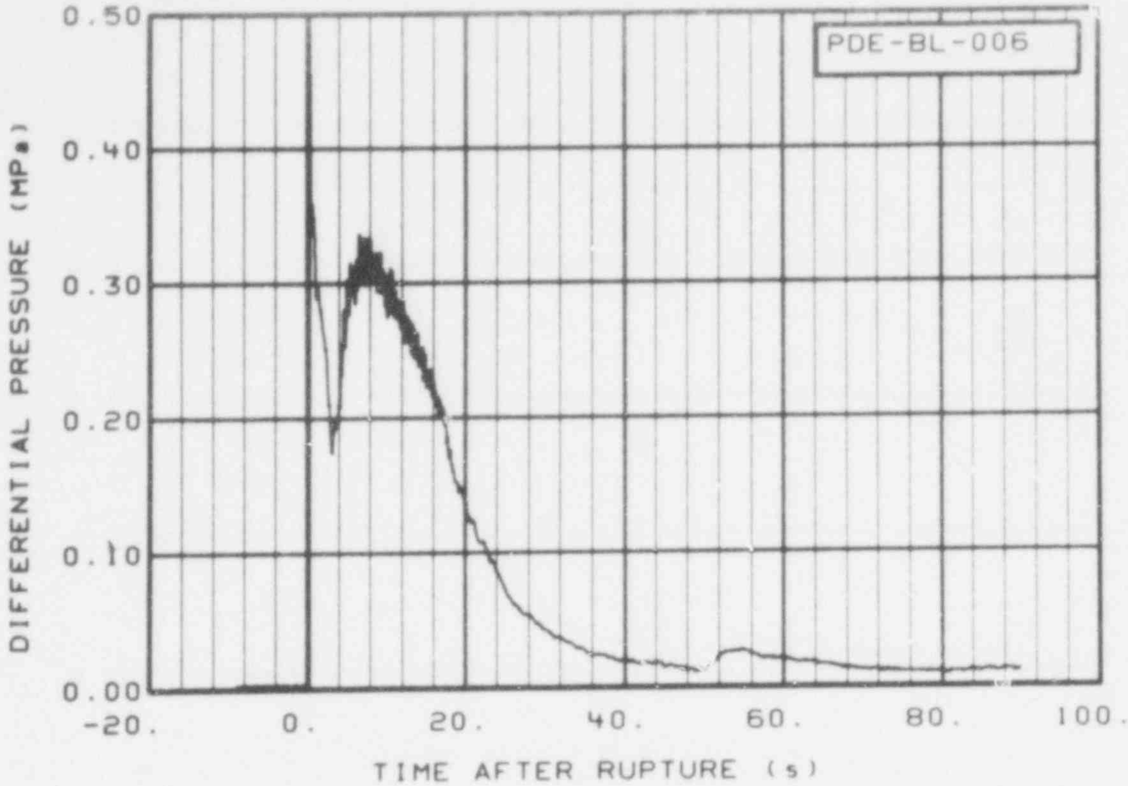


Fig. 113 Differential pressure in broken loop hot leg across steam generator outlet flange (PDE-BL-006) (QEUD).

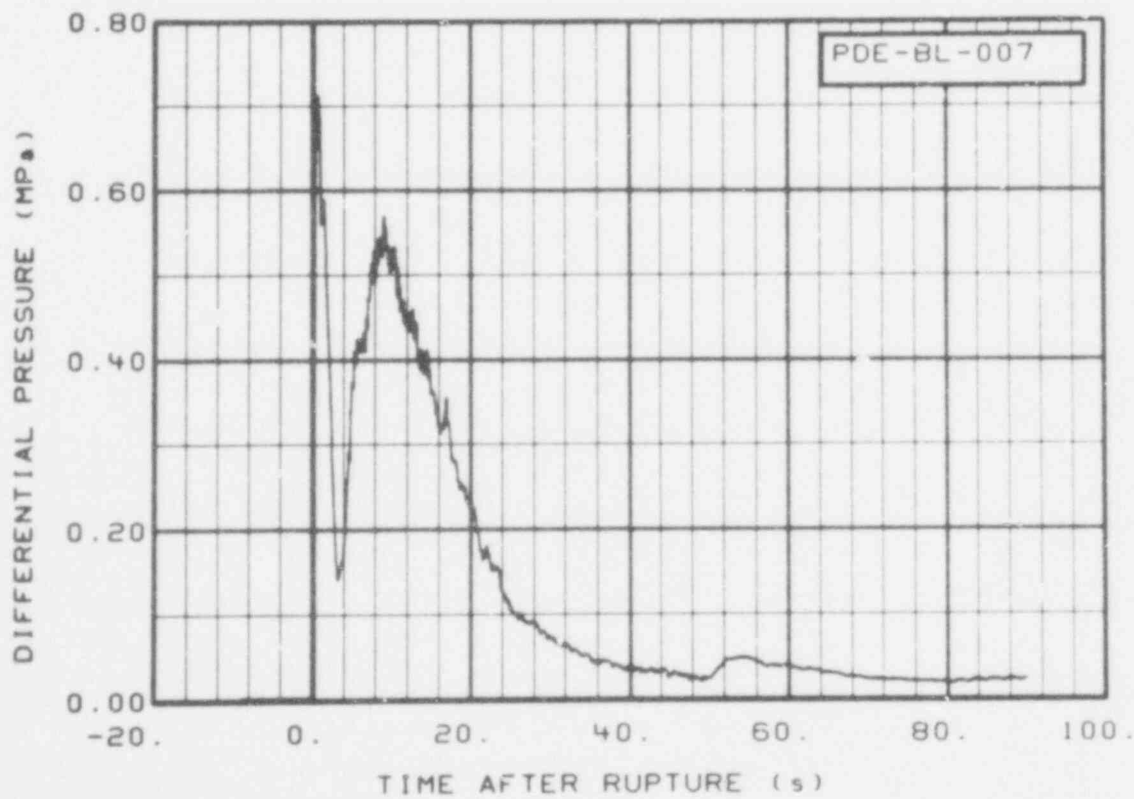


Fig. 114 Differential pressure across steam generator simulator (PDE-BL-007) (QEUD).

563 317

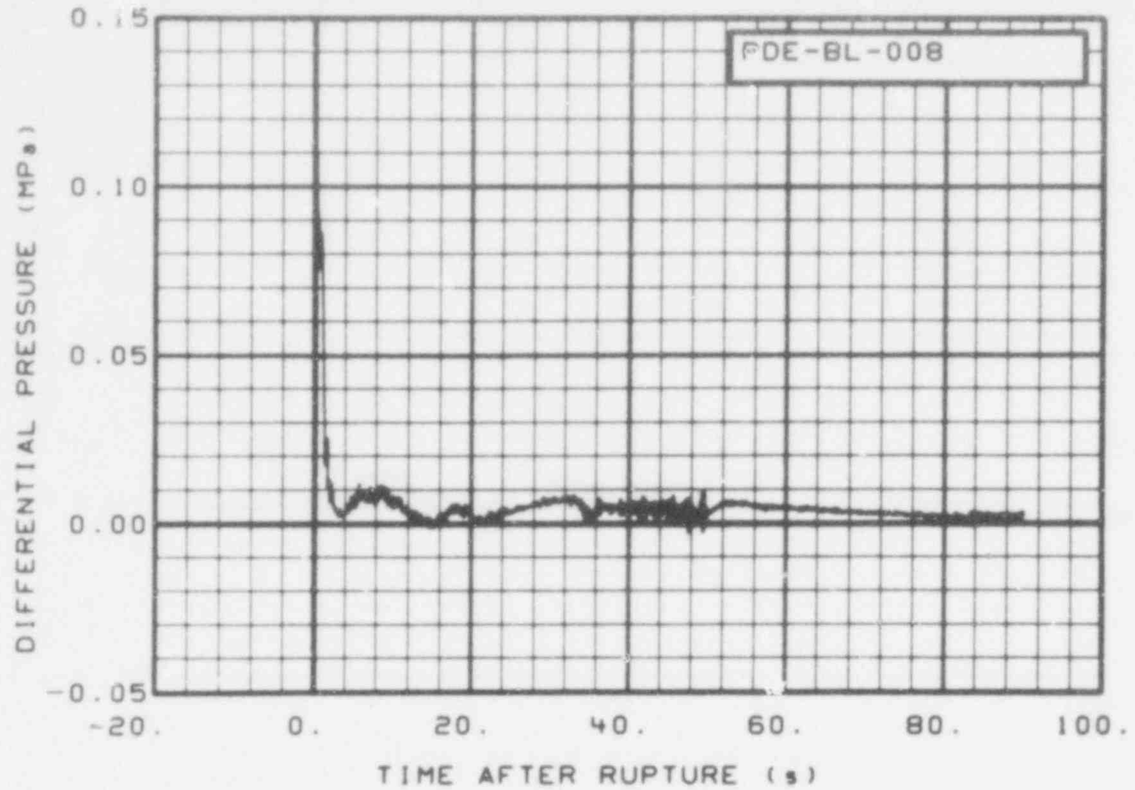


Fig. 115 Differential pressure in broken loop hot leg across steam generator simulator inlet flange (PDE-BL-008) (QEUD).

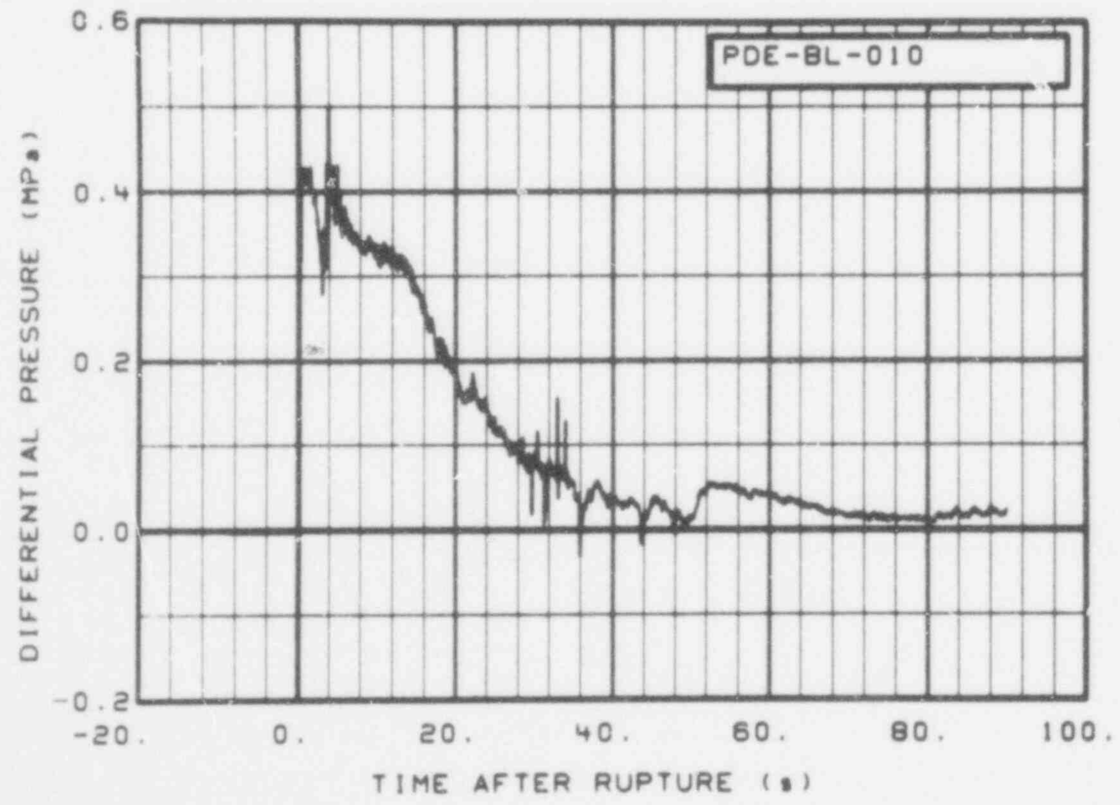


Fig. 116 Differential pressure in broken loop from middle of 5-in. pipe to break plane (PDE-BL-010) (QEUD).

563 318

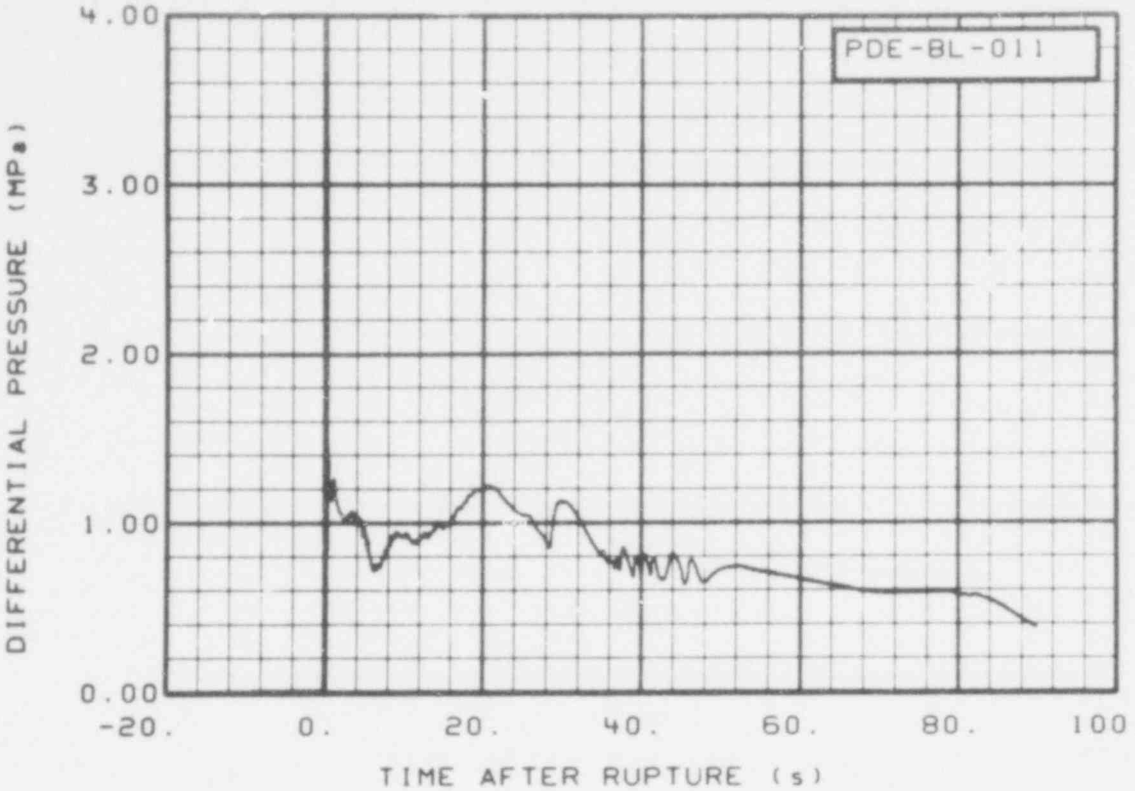


Fig. 117 Differential pressure in broken loop hot leg from ps outlet to PE-BL-3 (PDE-BL-011) (restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-012, data inconsistent with system behavior).

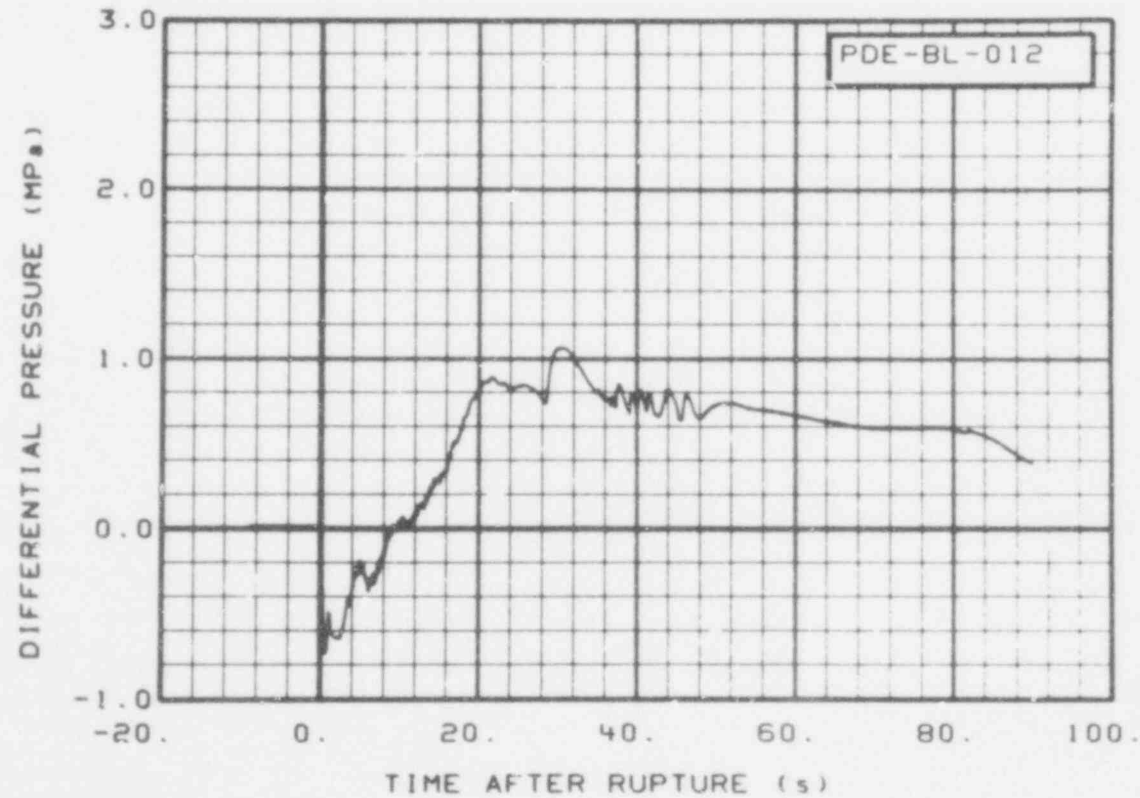


Fig. 118 Differential pressure in broken loop hot leg from PE-BL-3 to break plane inlet (PDE-BL-012) (restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-BL-012, data inconsistent with system behavior).

563 319

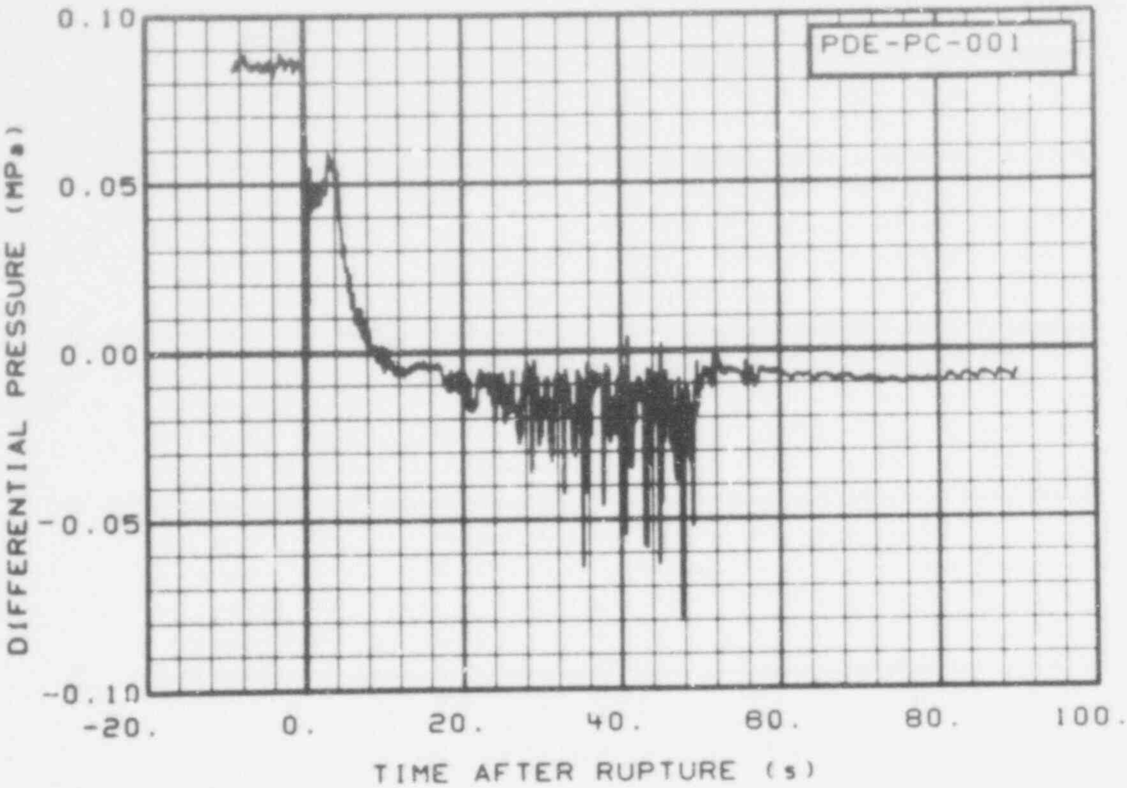


Fig. 119 Differential pressure in intact loop cold leg across primary coolant Pumps 1 and 2 (PDE-PC-001) (QEUD).

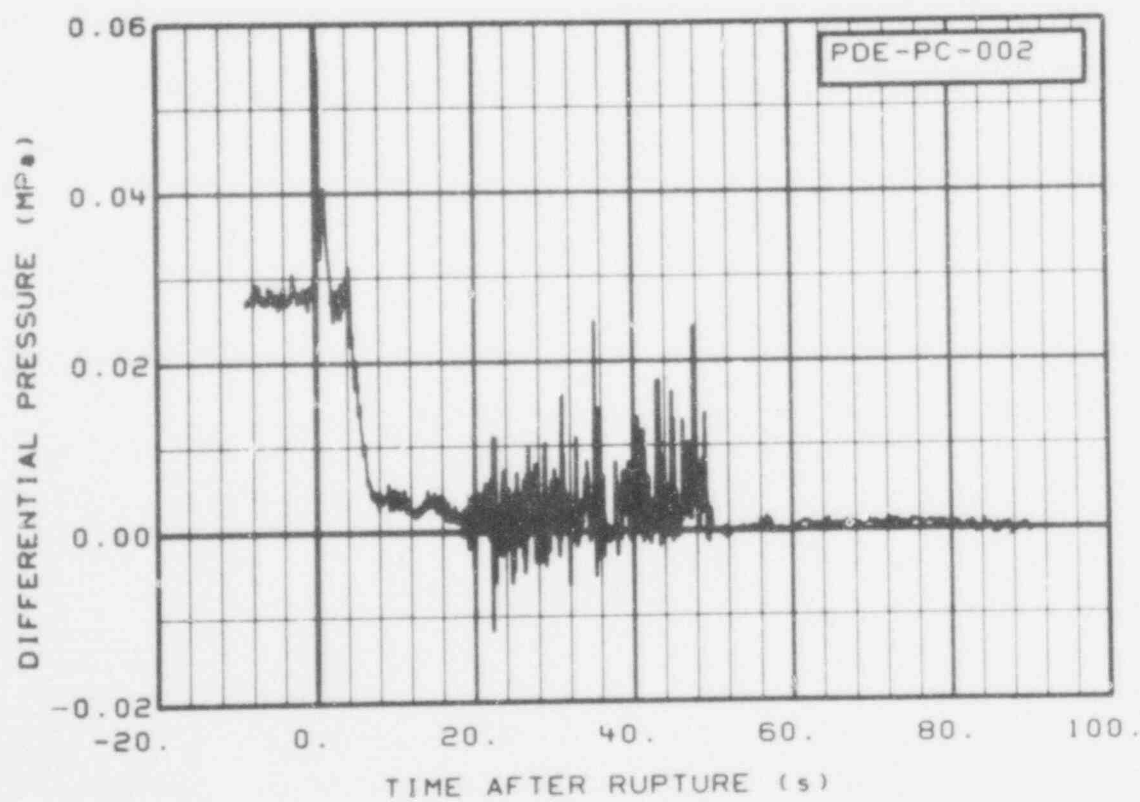


Fig. 120 Differential pressure in intact loop across the steam generator (PDE-PC-002) (QEUD).

563 320

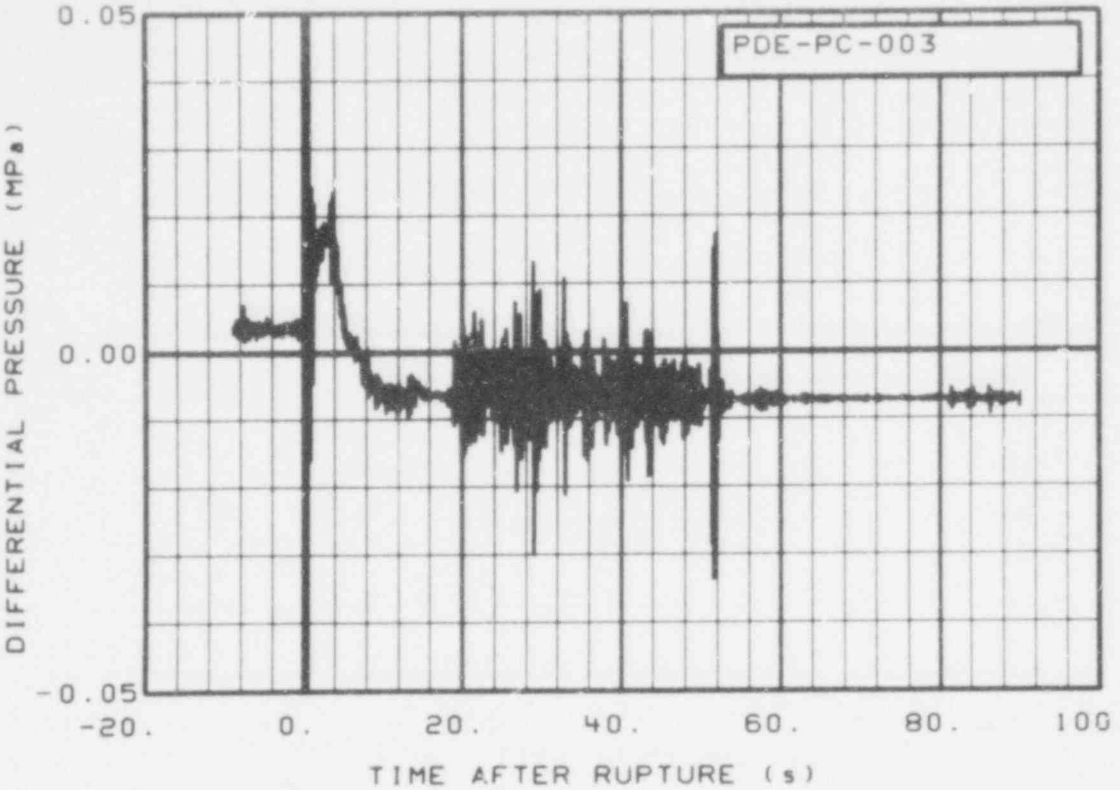


Fig. 121 Differential pressure in intact loop hot leg piping from reactor vessel outlet to the flow venturi (PDE-PC-003) (restrained, no comparative data after T = 0).

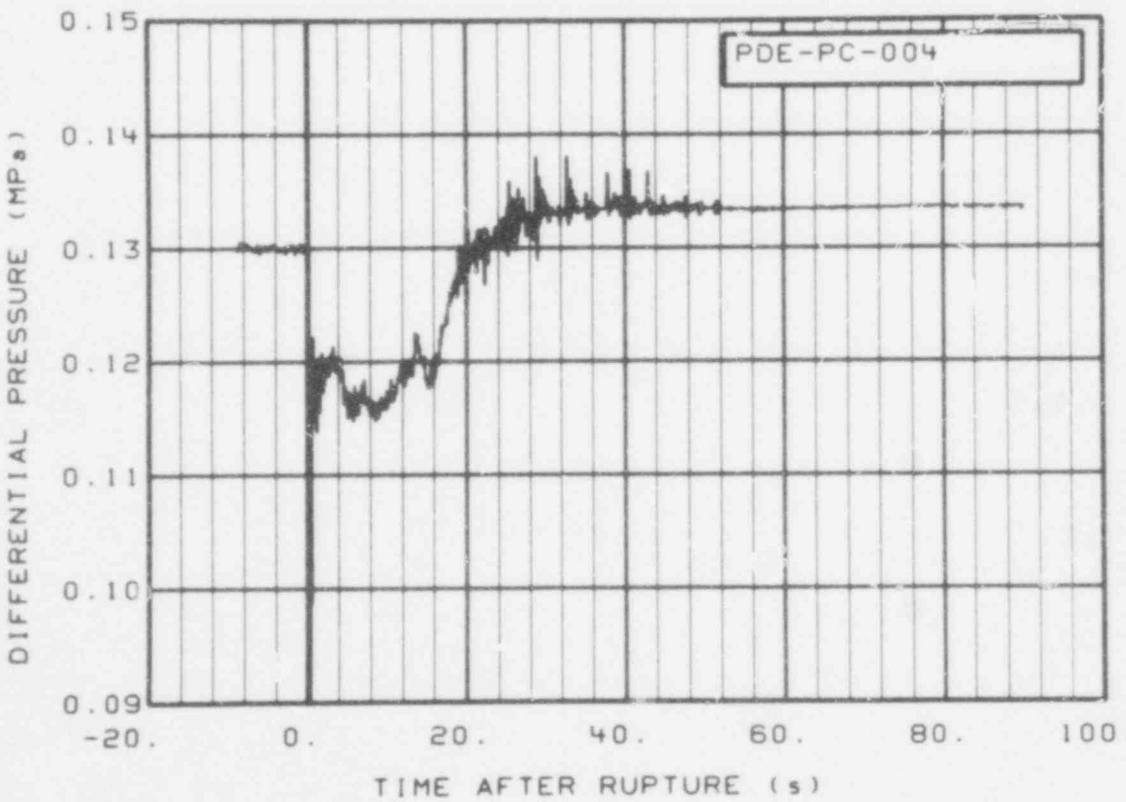


Fig. 122 Differential pressure in intact loop hot leg piping from reactor vessel outlet to steam generator inlet (PDE-PC-004) (restrained, questionable offset, initial magnitude above instrument calibration).

563 321

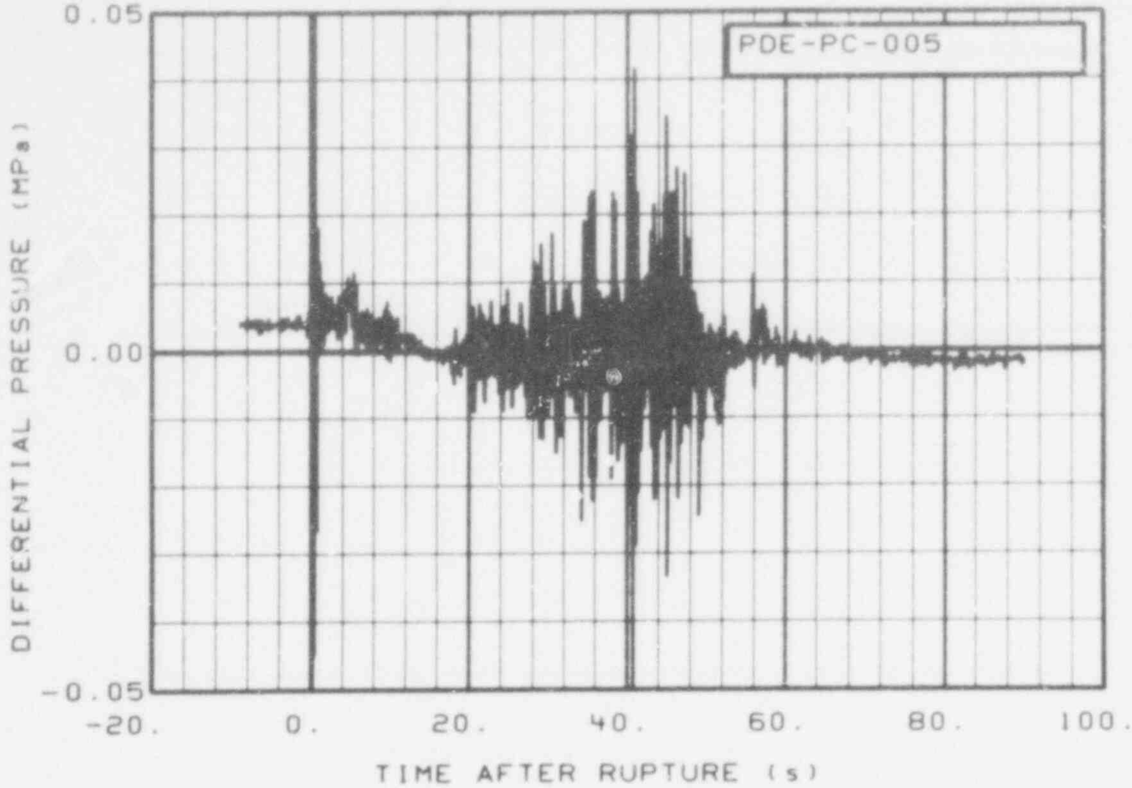


Fig. 123 Differential pressure in intact loop cold leg primary coolant pump discharge to reactor vessel inlet nozzel (PDE-PC-005) (QEUD).

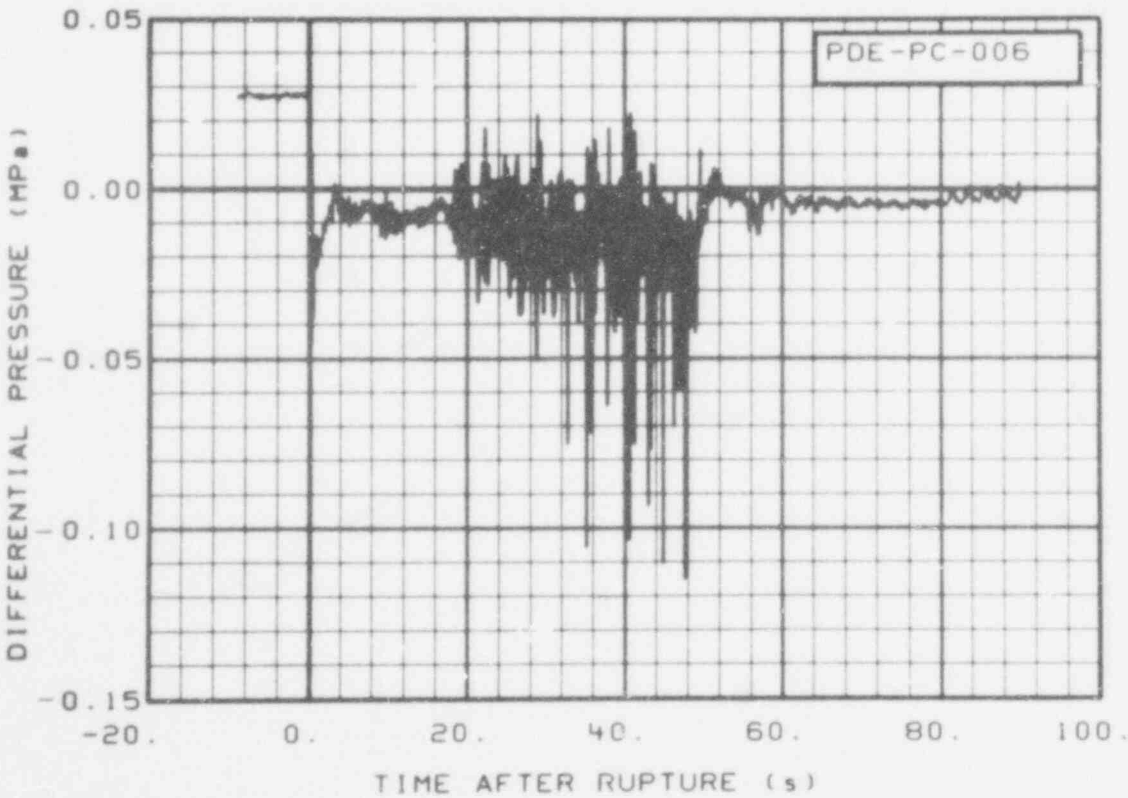


Fig. 124 Differential pressure in intact loop across reactor vessel (PDE-PC-006) (QEUD).

553 322

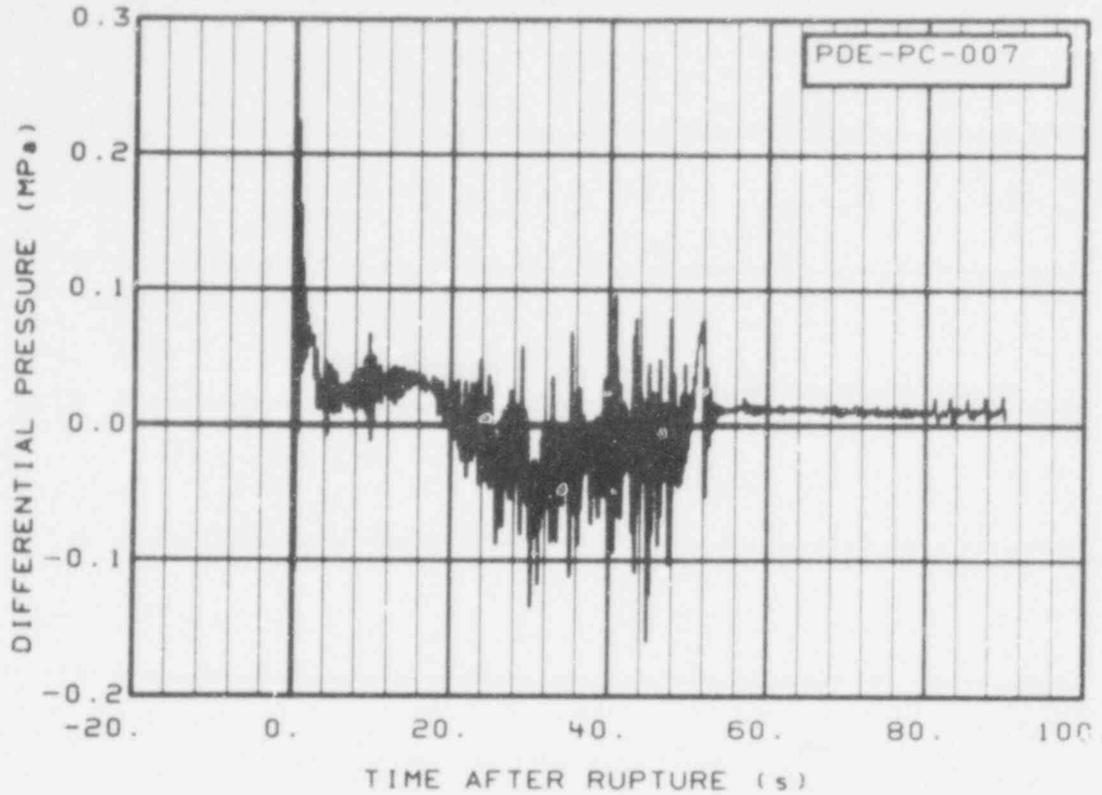


Fig. 125 Differential pressure in intact loop cold leg reactor vessel inlet to broken loop cold leg reactor vessel inlet (PDE-PC-007) (QEUD).

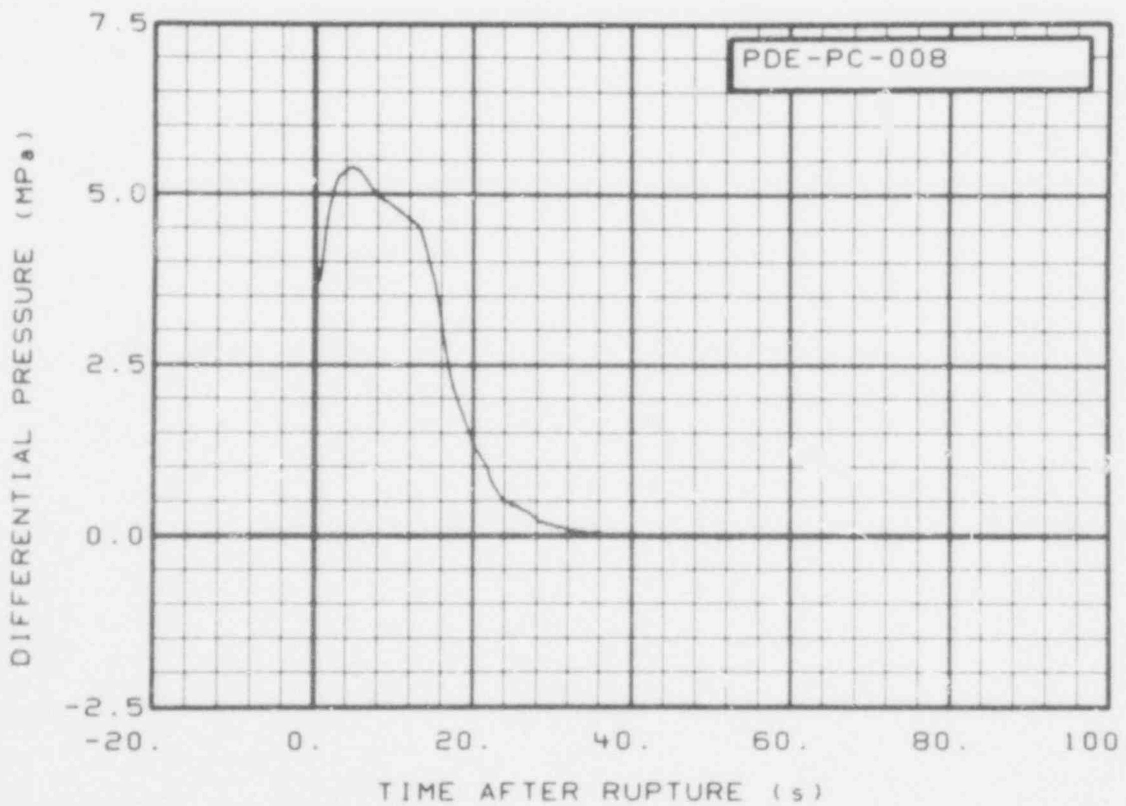


Fig. 126 Differential pressure in intact loop across surge line (PDE-PC-008) (QEUD).

563 323

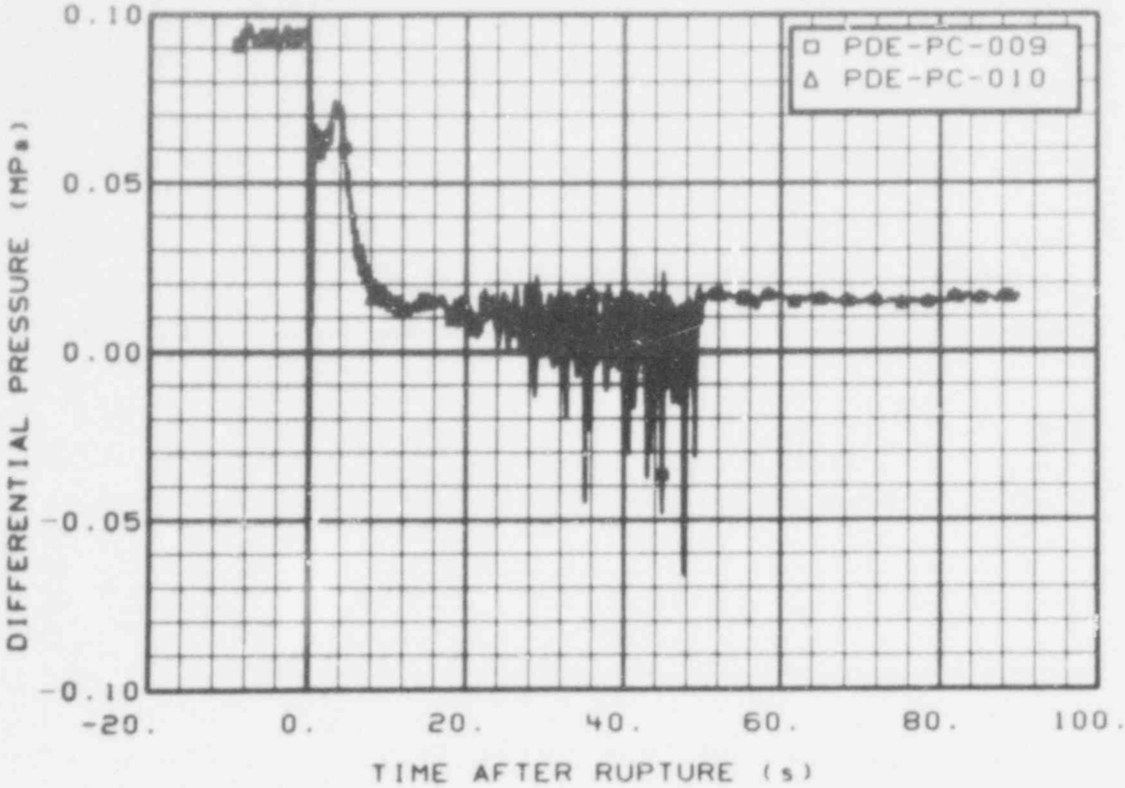


Fig. 127 Differential pressure in intact loop across primary coolant Pumps 1 and 2 (PDE-PC-009 and -010) (QEUD).

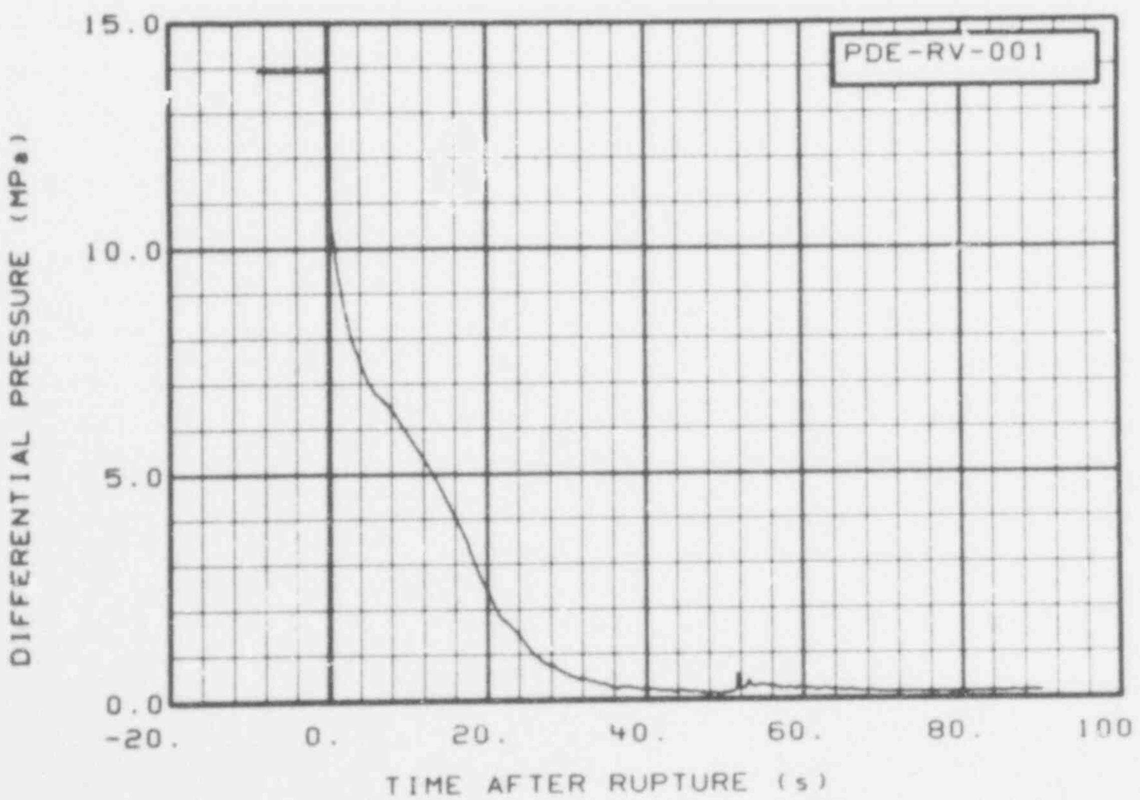


Fig. 128 Differential pressure from reactor vessel downcomer to blowdown suppression tank (PDE-RV-001) (restrained, overranged prior to T = 0, useable after subcooled blowdown).

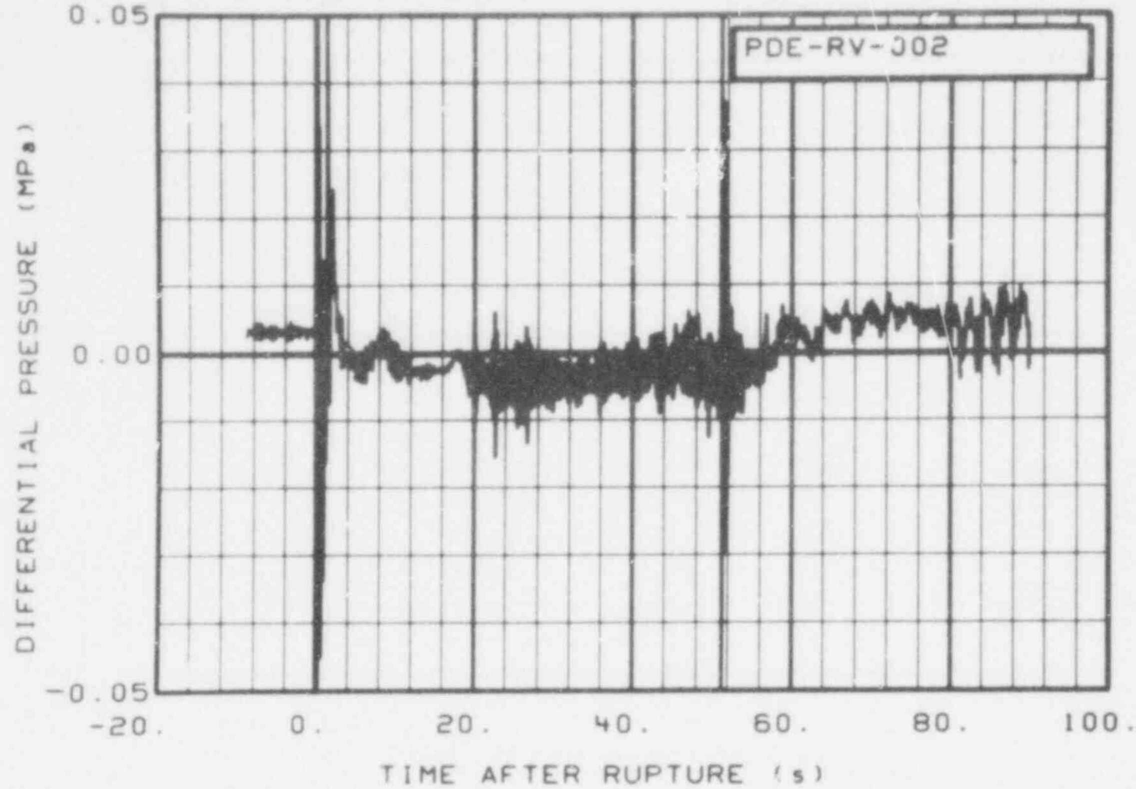


Fig. 129 Differential pressure in reactor vessel core from upper end box to lower end box of Fuel Assembly 1 (PDE-RV-002) (restrained, dynamic tap).

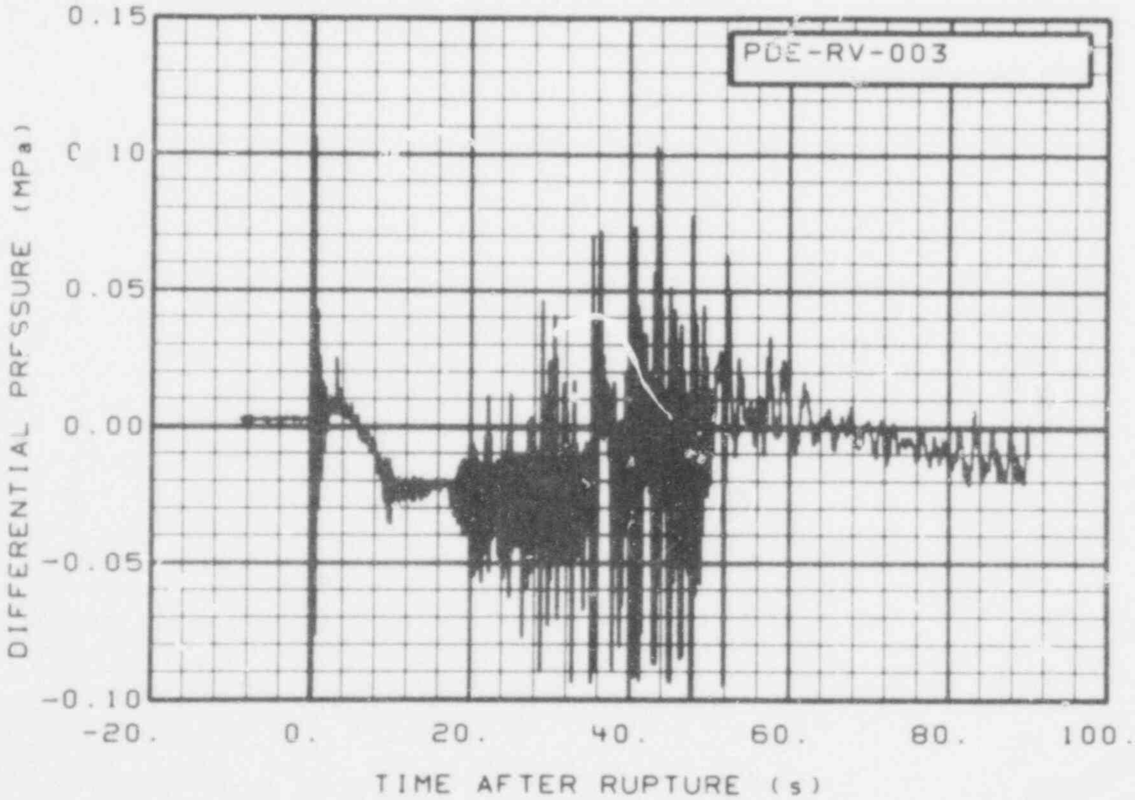


Fig. 130 Differential pressure in reactor vessel intact loop cold leg inlet to reactor vessel bottom (PDE-RV-003) (QEUD).

563 325

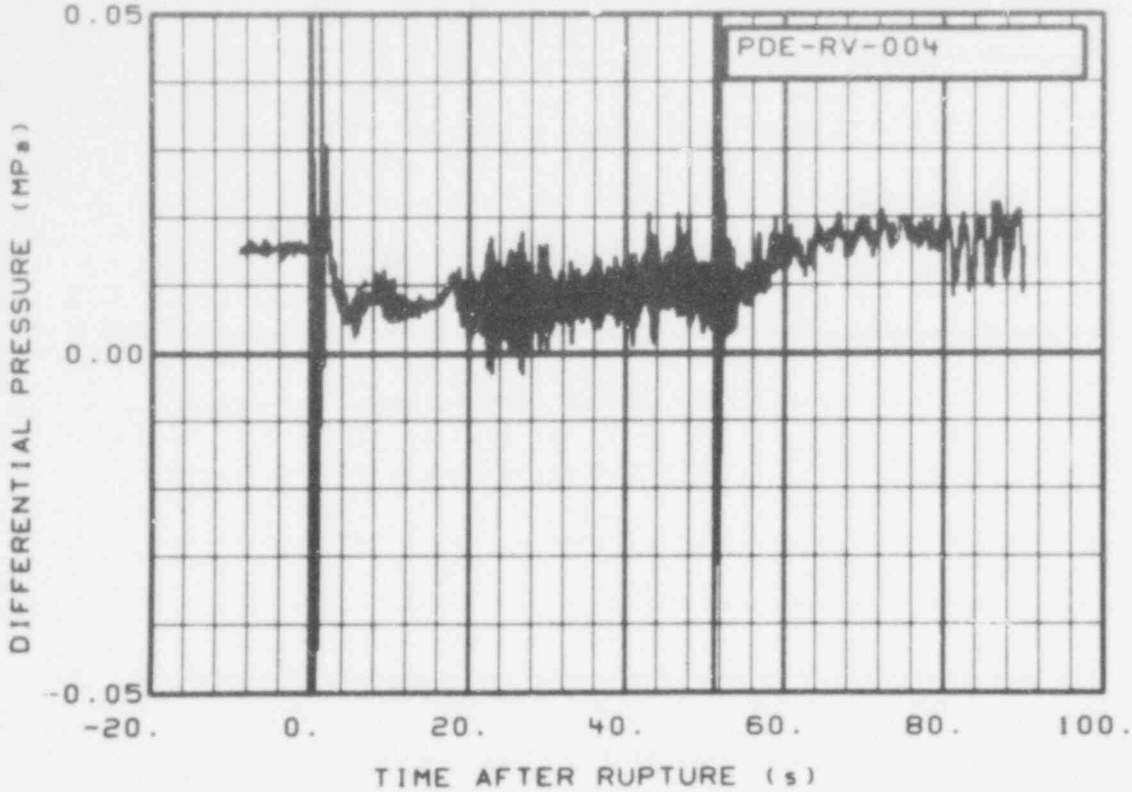


Fig. 131 Differential pressure in reactor vessel lower plenum to intact loop hot leg reactor vessel outlet nozzle (PDE-RV-004) (restrained, questionable magnitude).

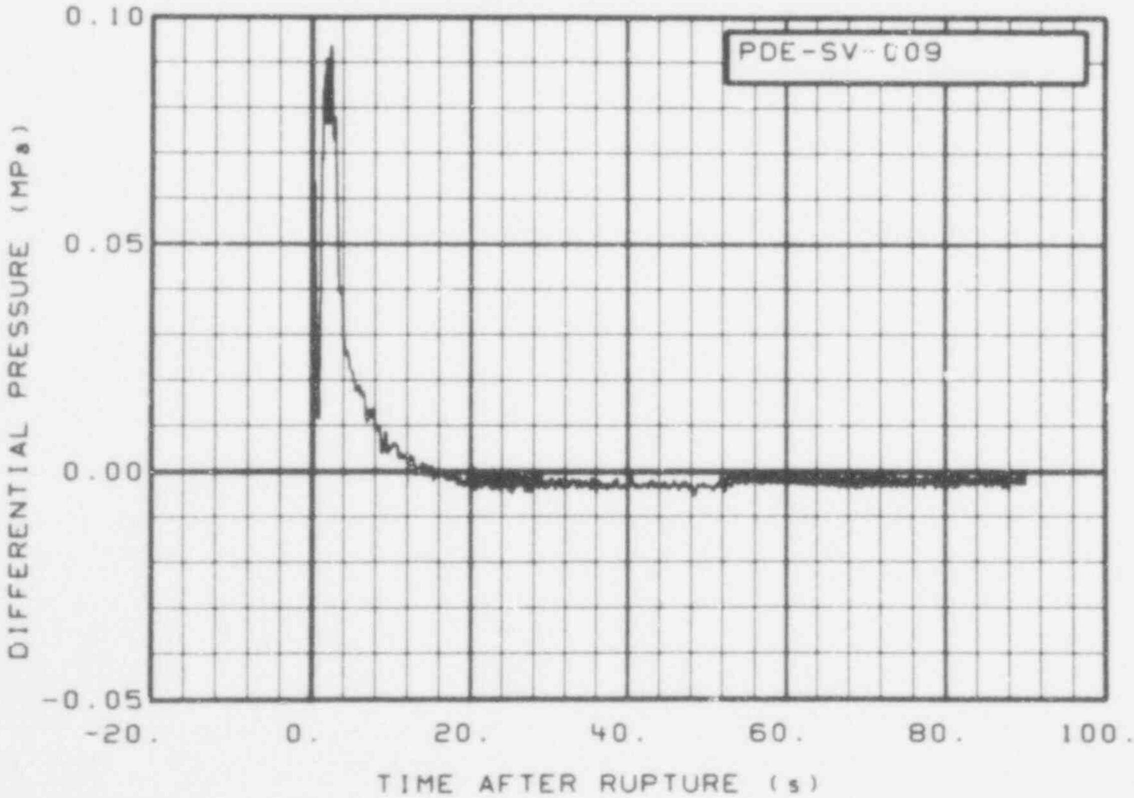


Fig. 132 Differential pressure in blowdown suppression tank across vacuum breaker (PDE-SV-009) (QEUD).

563 326

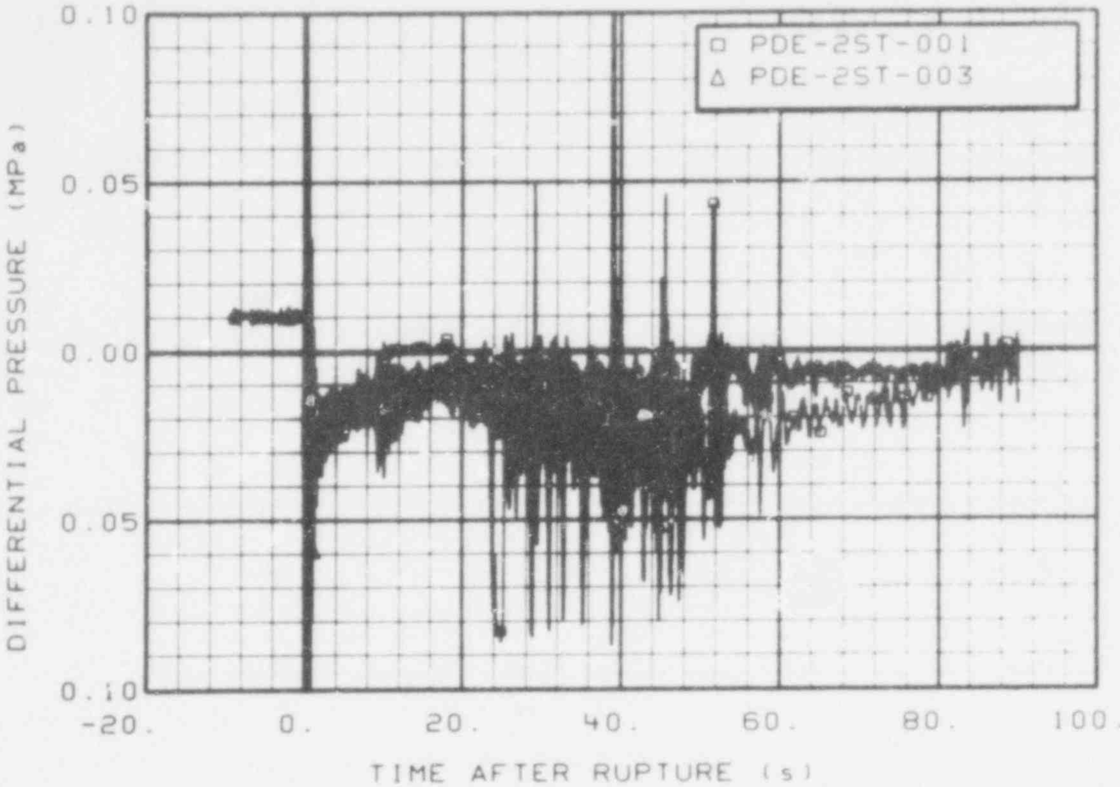


Fig. 133 Differential pressure in reactor vessel from top of Downcomer Stalk 2 to upper plenum above Fuel Assembly 3 (PDE-2ST-001 and -003) (restrained, good for initial conditions only).

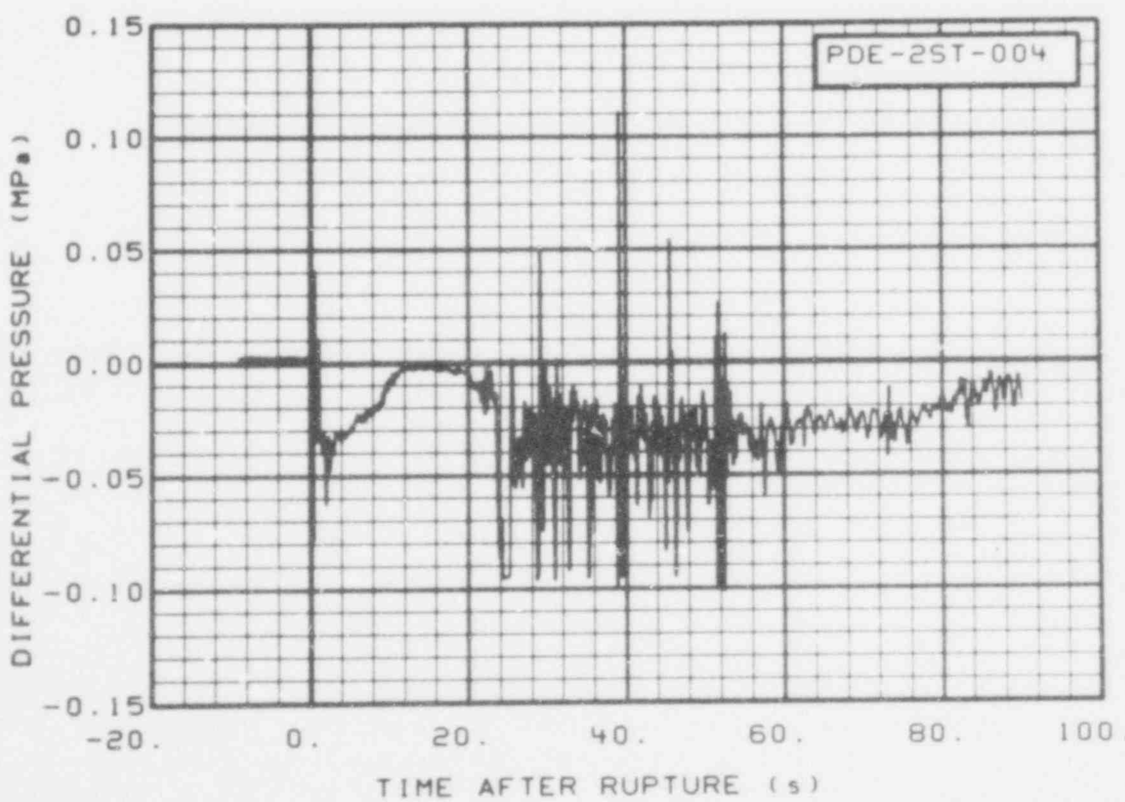


Fig. 134 Differential pressure in reactor vessel from bottom of Downcomer Stalk 2 to lower end box of Fuel Assembly 3 (PDE-2ST-0004) (restrained, long transmission lines, data do not return to zero).

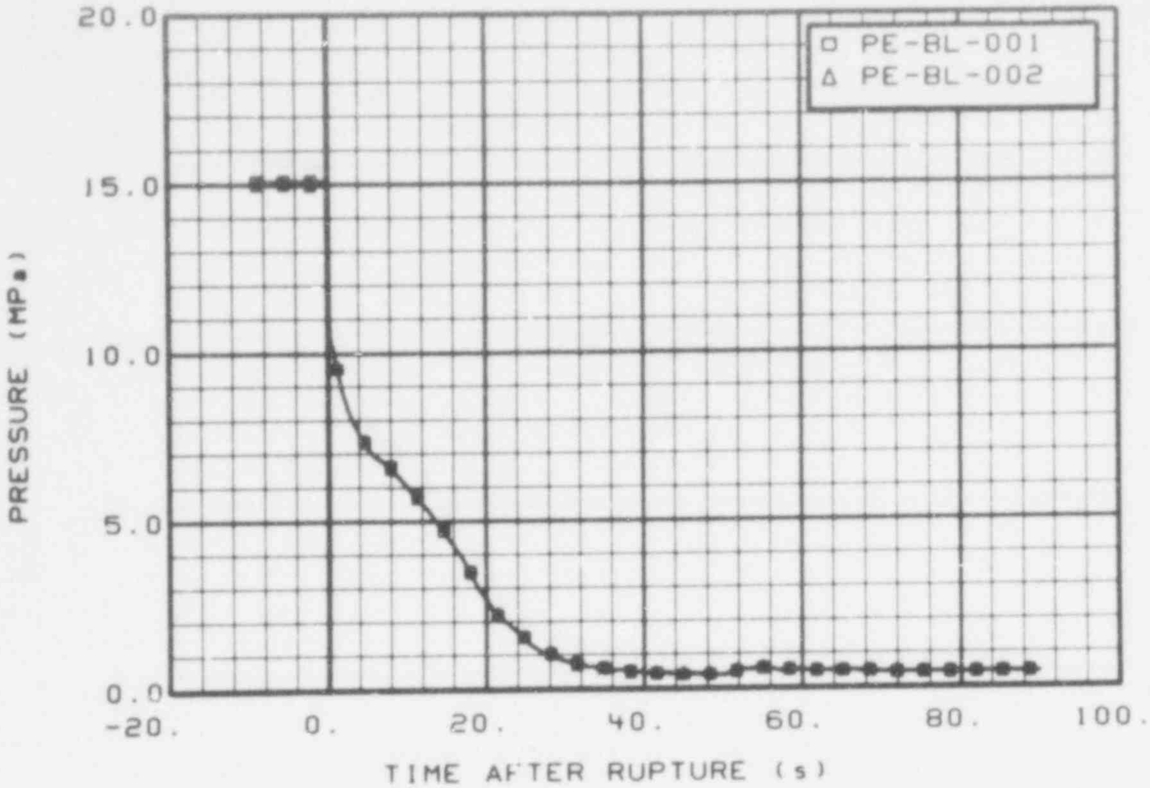


Fig. 135 Pressure in broken loop cold and hot leg (PE-BL-001 and -002) (QEUD).

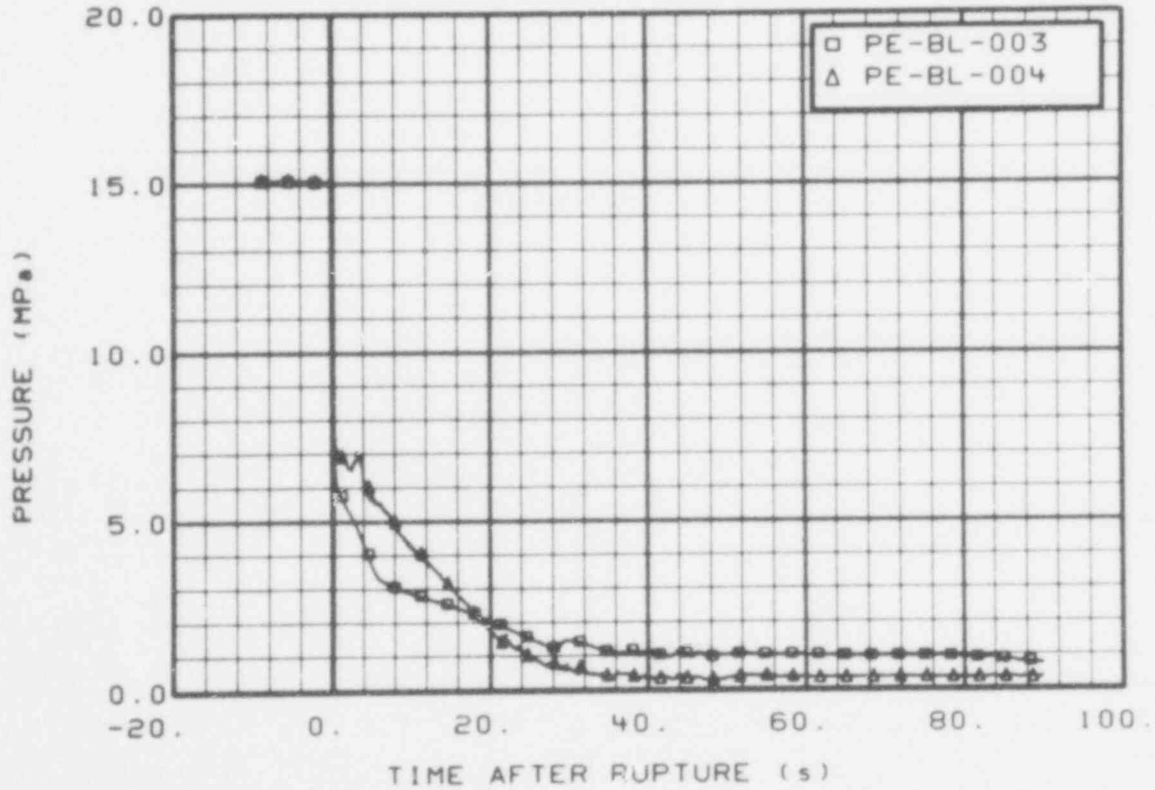


Fig. 136 Pressure in broken loop upstream of break planes (PE-BL-003 and -004) (PE-BL-003 — restrained, common pressure tap to PE-BL-003, PdE-BL-011, and PdE-BL-012, data inconsistent with system behavior; PE-BL-004 — QEUD).

563 328

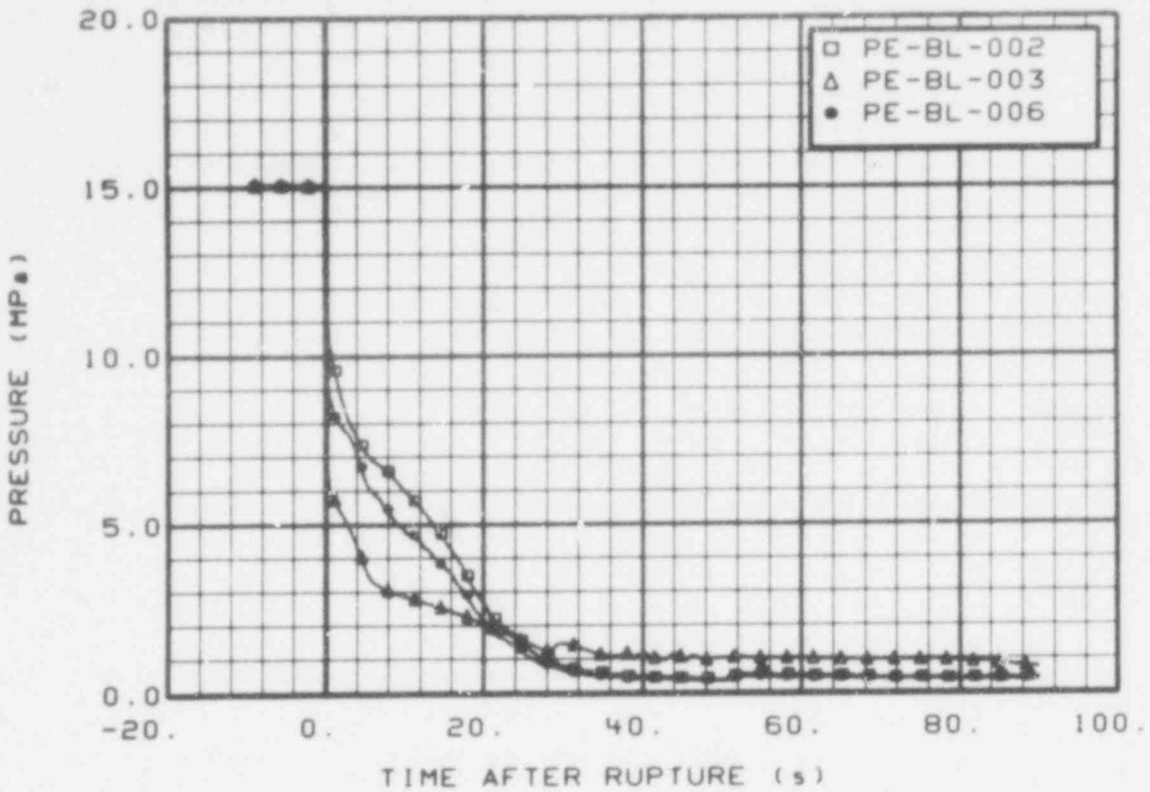


Fig. 137 Pressure in broken loop hot leg (PE-BL-002, -003 and -006) (PE-BL-002 and -006 -- QEUD, PE-BL-003 — restrained, common pressure tap to PE-BL-003, PDE-BL-011, and PDE-BL-012, data inconsistent with system behavior).

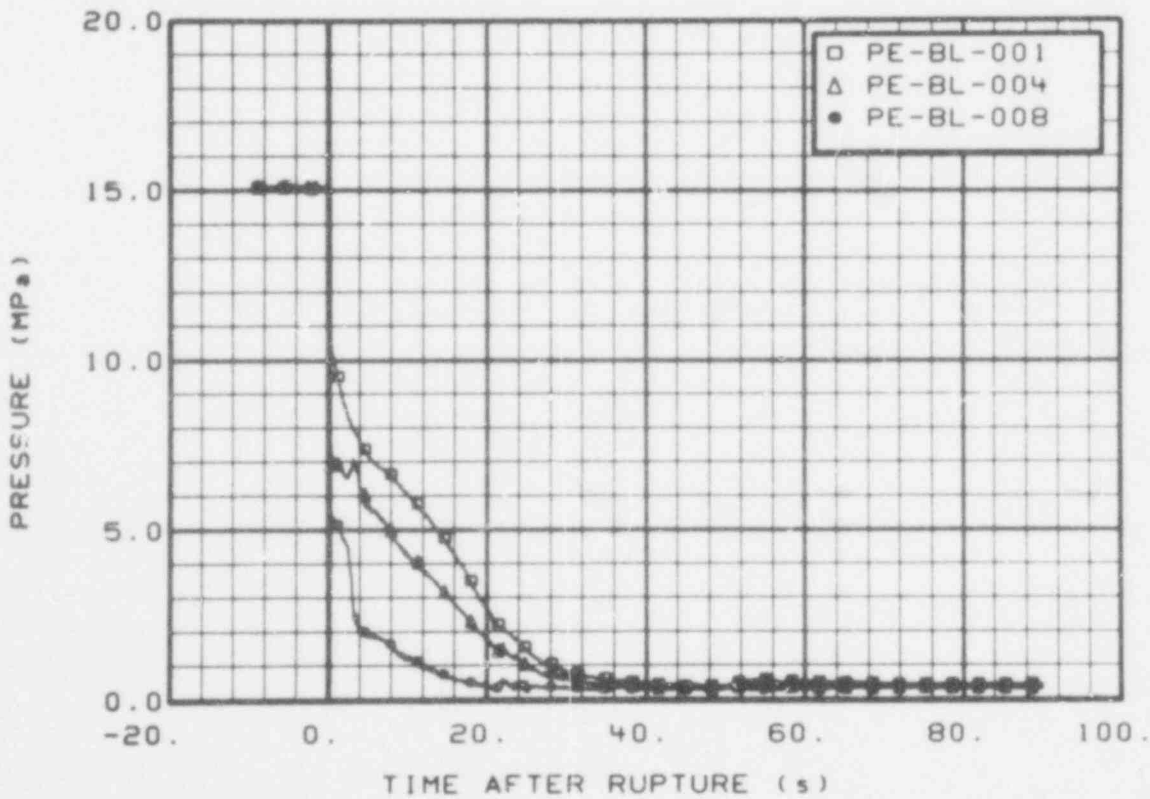


Fig. 138 Pressure in broken loop cold leg (PE-BL-001, -004, and -008) (QEUD).

563 329

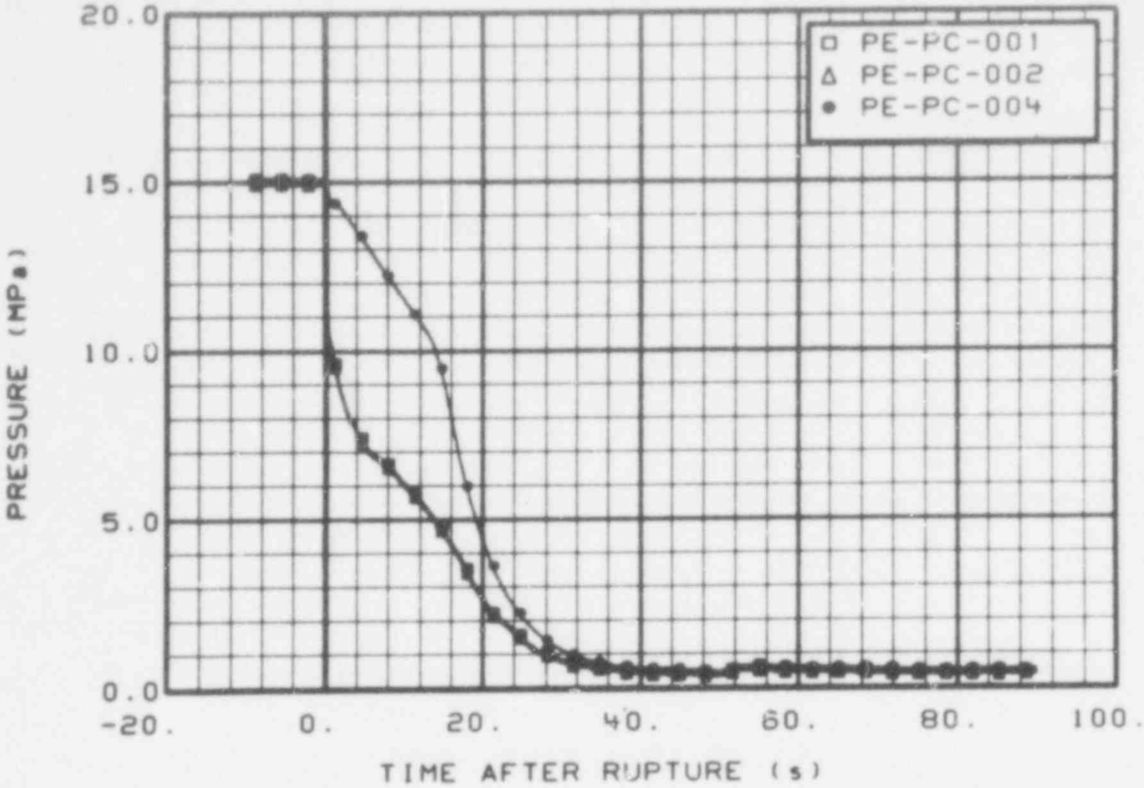


Fig. 139 Pressure in intact loop cold leg, hot leg and pressurizer (PE-PC-001, -002, and -004) (QEUD).

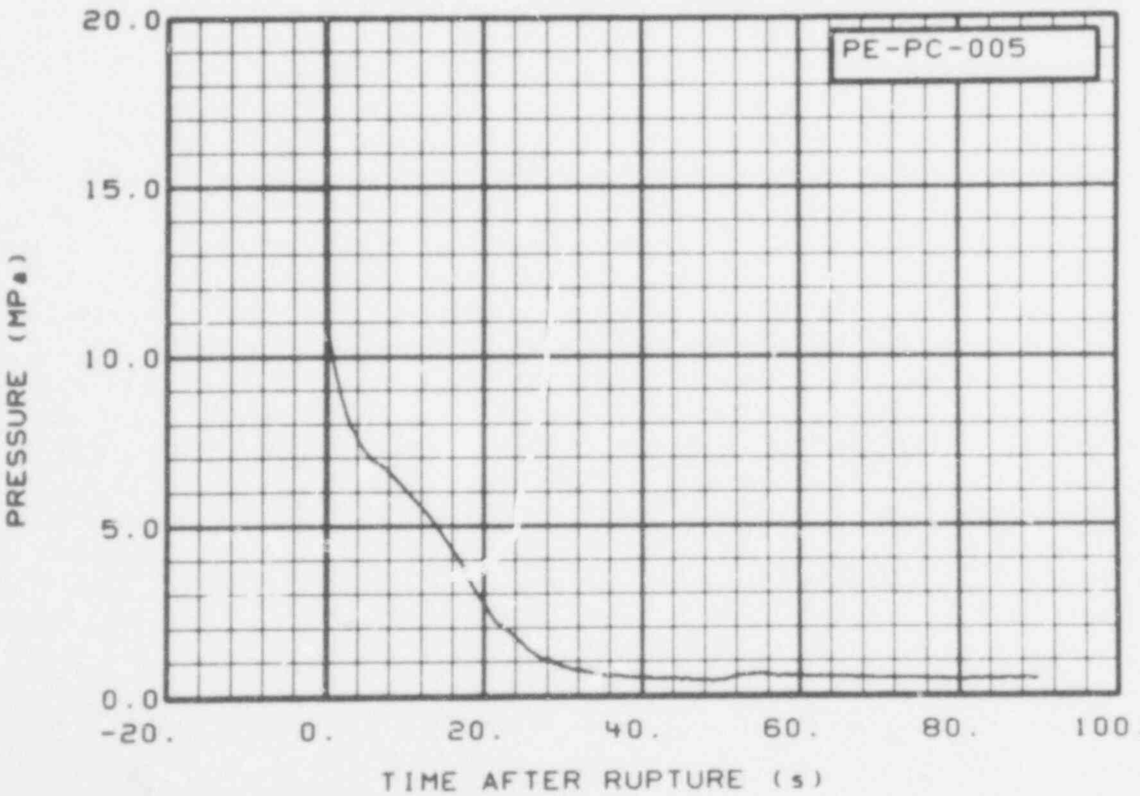


Fig. 140 Reference pressure in intact loop (PE-PC-005) (QEUD).

563 330

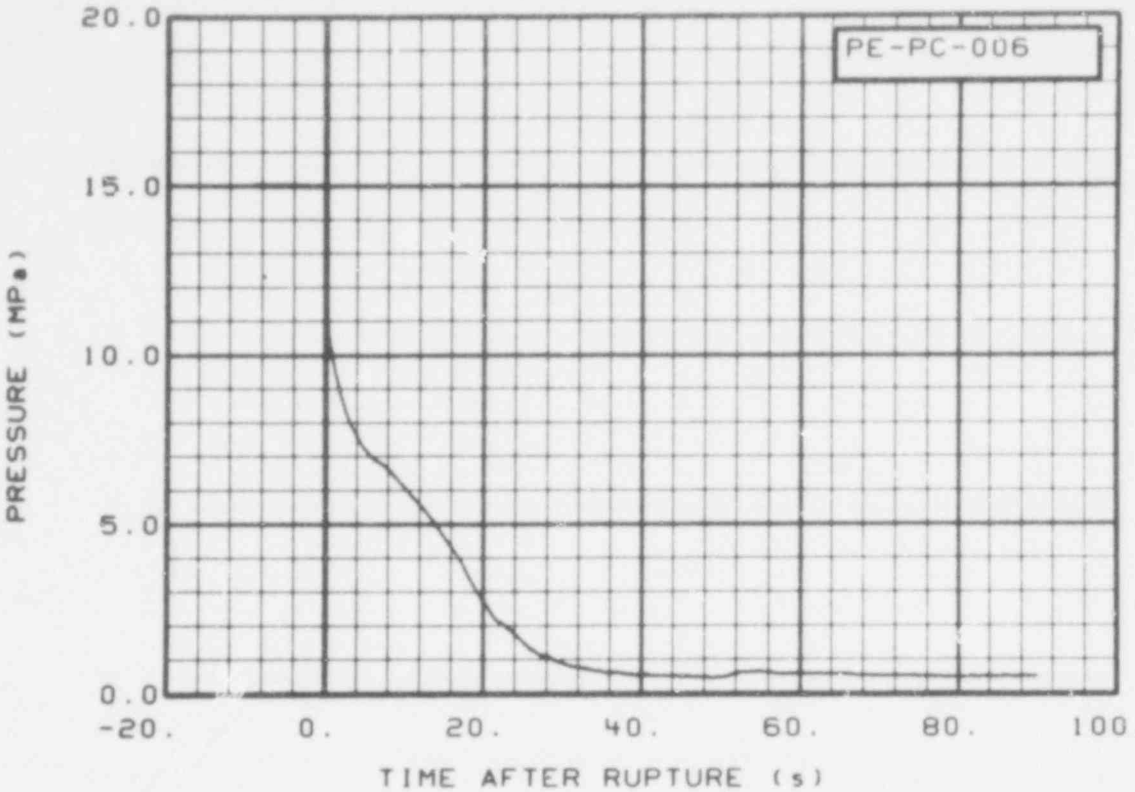


Fig. 141 Reference pressure in intact loop (PE-PC-006) (QEUD).

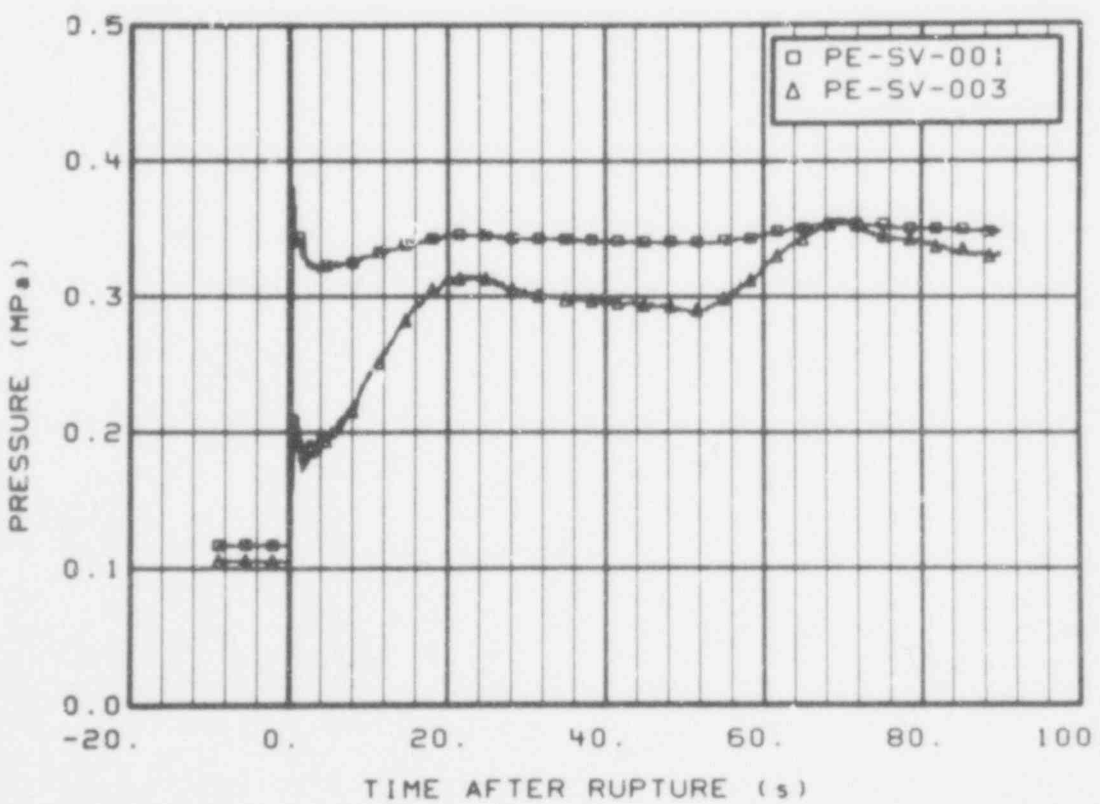


Fig. 142 Pressure in blowdown suppression tank under Downcomer 1 (PE-SV-001 and -003) (QEUD).

563 331

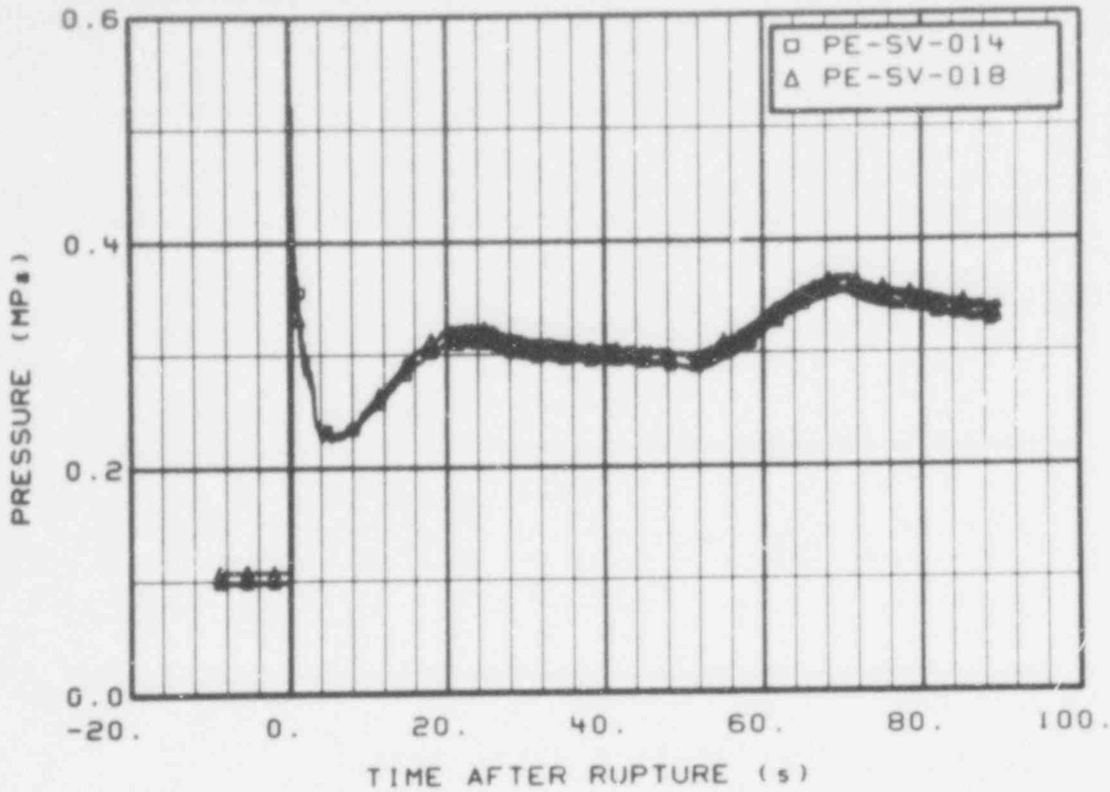


Fig. 143 Pressure in blowdown suppression tank header above Downcomer 4 (PE-SV-014 and -018) (QEUD).

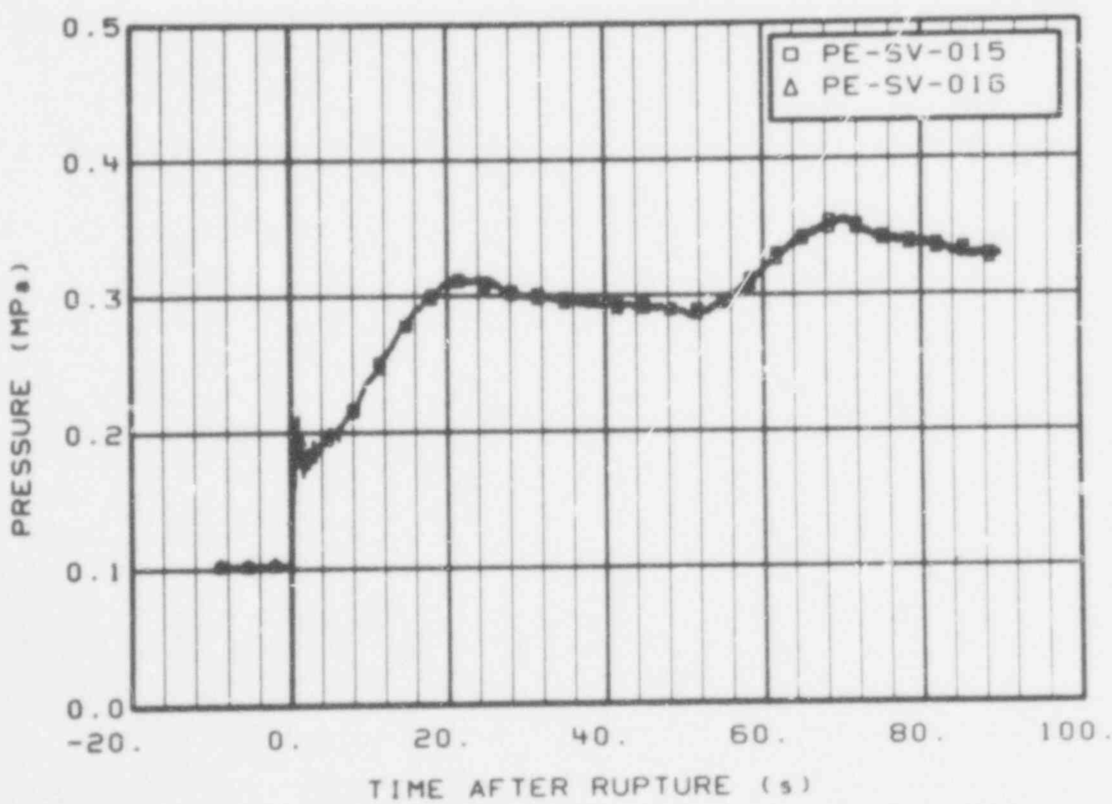


Fig. 144 Pressure in blowdown suppression tank submerged near Downcomers 4 and 1 (PE-SV-015 and -016) (QEUD).

563 332

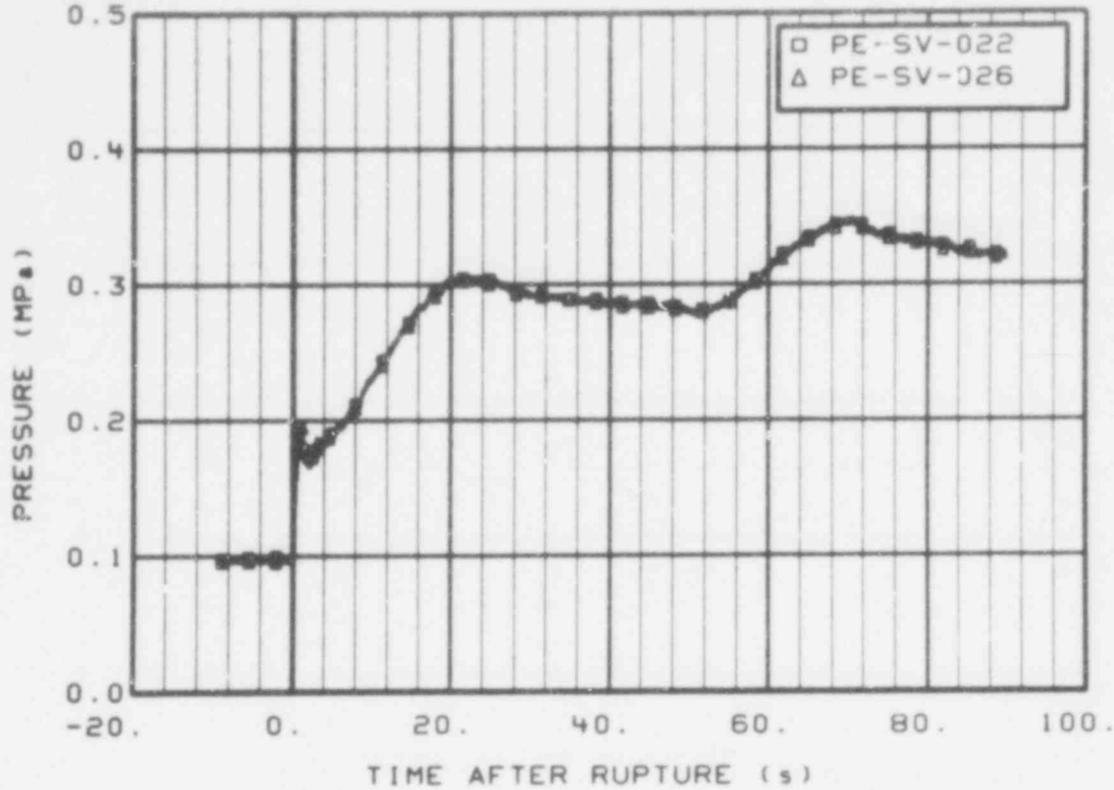


Fig. 145 Pressure in blowdown suppression tank bottom north of Downcomer 3 and south of Downcomer 2 (PE-SV-022 and -026) (QEUD).

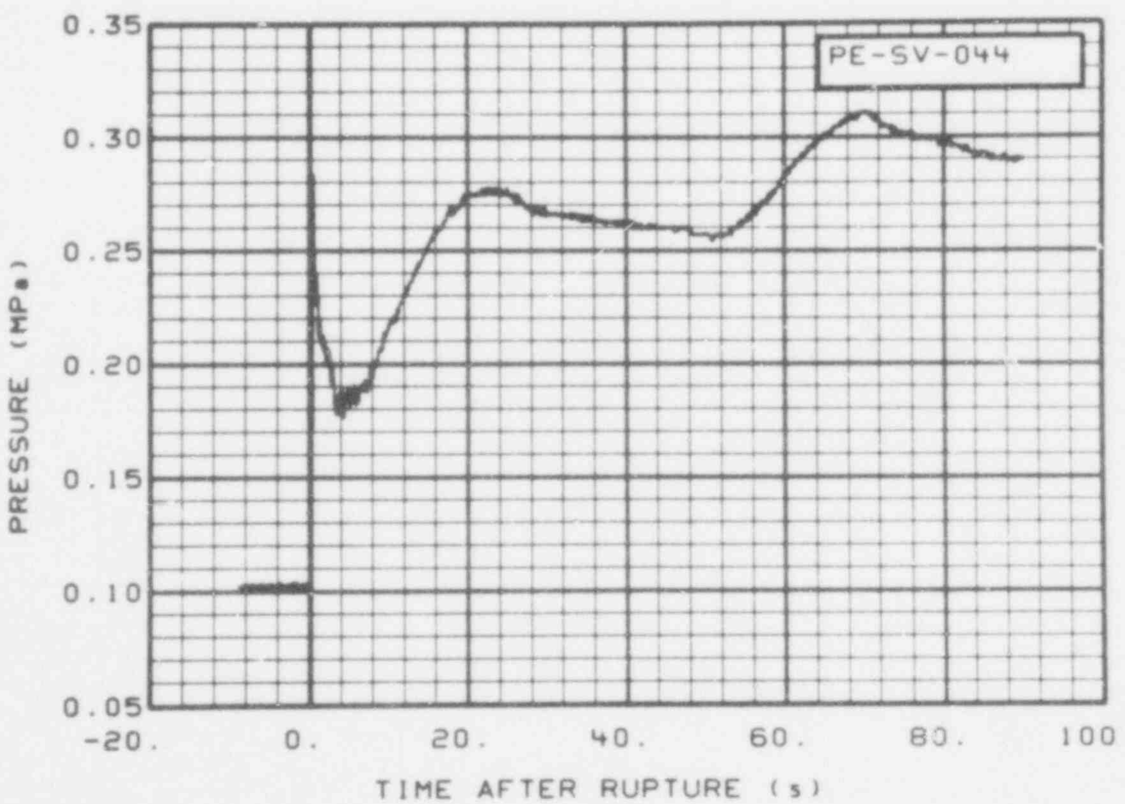


Fig. 146 Pressure in blowdown suppression tank bottom under Downcomer 2 and under Downcomer 3 (PE-SV-044) (QEUD).

563 333

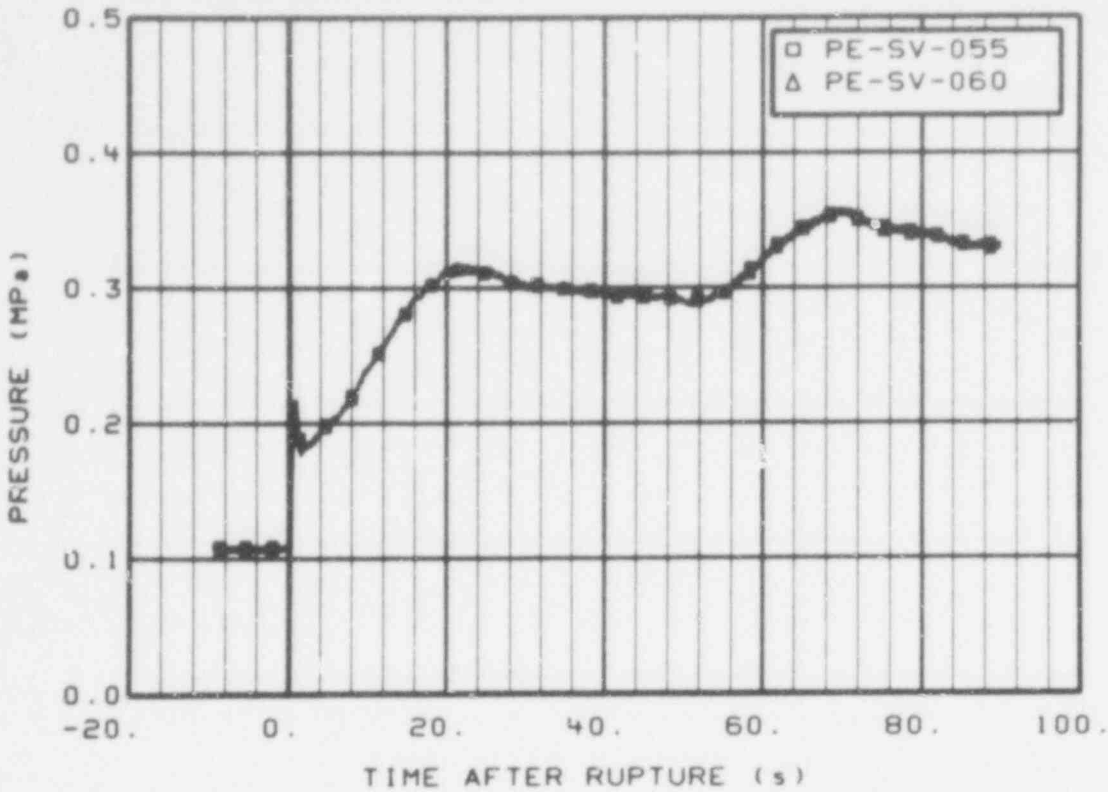


Fig. 147 Pressure in blowdown suppression tank top north of Downcomer 4 and above Downcomer 1 (PE-SV-055 and -060) (QEUD).

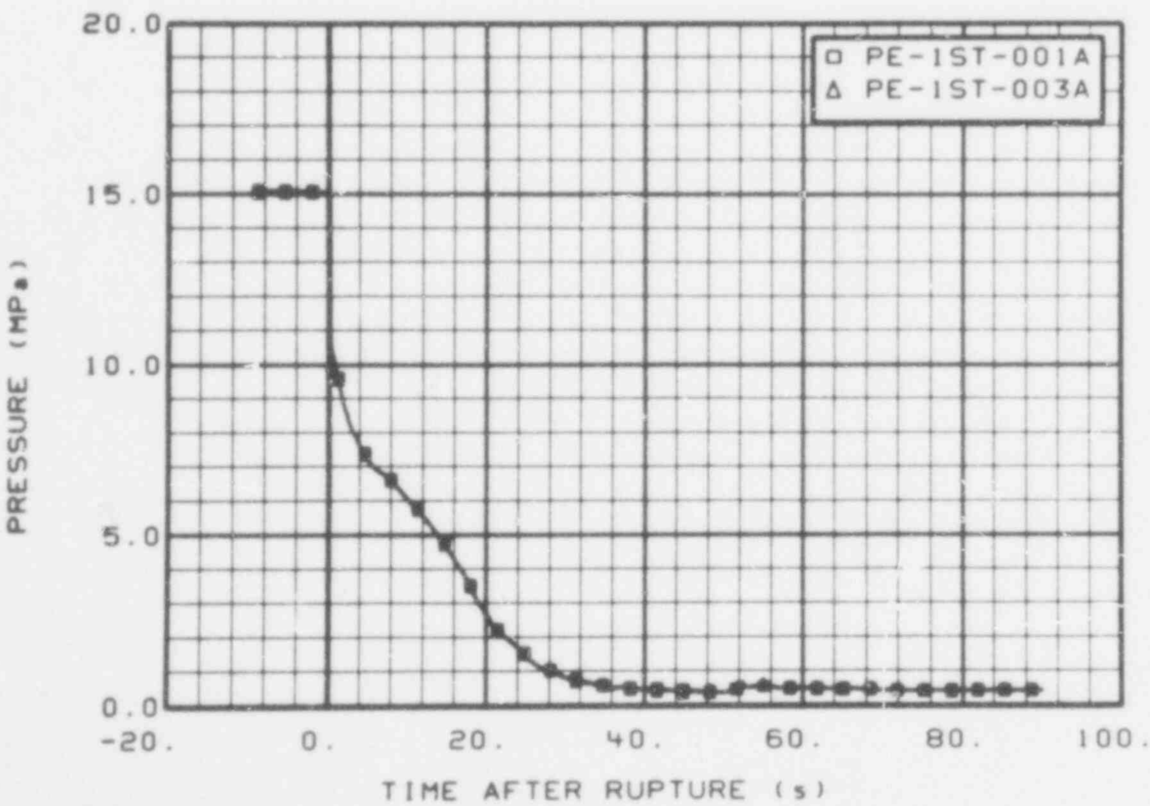


Fig. 148 Pressure in reactor vessel Downcomer Instrument Stalk 1 high range (PE-1ST-001A and -003A) (QEUD).

563 334

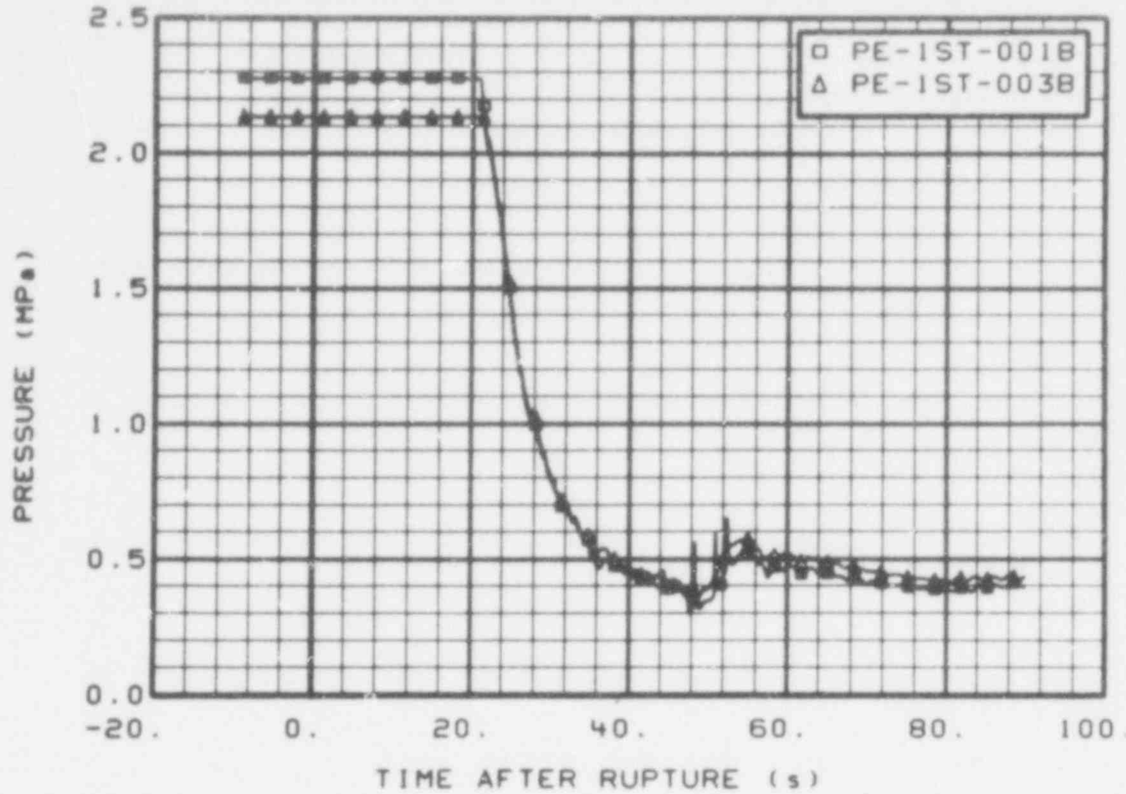


Fig. 149 Pressure in reactor vessel Downcomer Instrument Stalk 1, 0.62 and 5.32 m above reactor vessel bottom, low range (PE-1ST-001B and -003B) (restrained, low range instrument good after T = 25 s, overranged above 1.4 MPa).

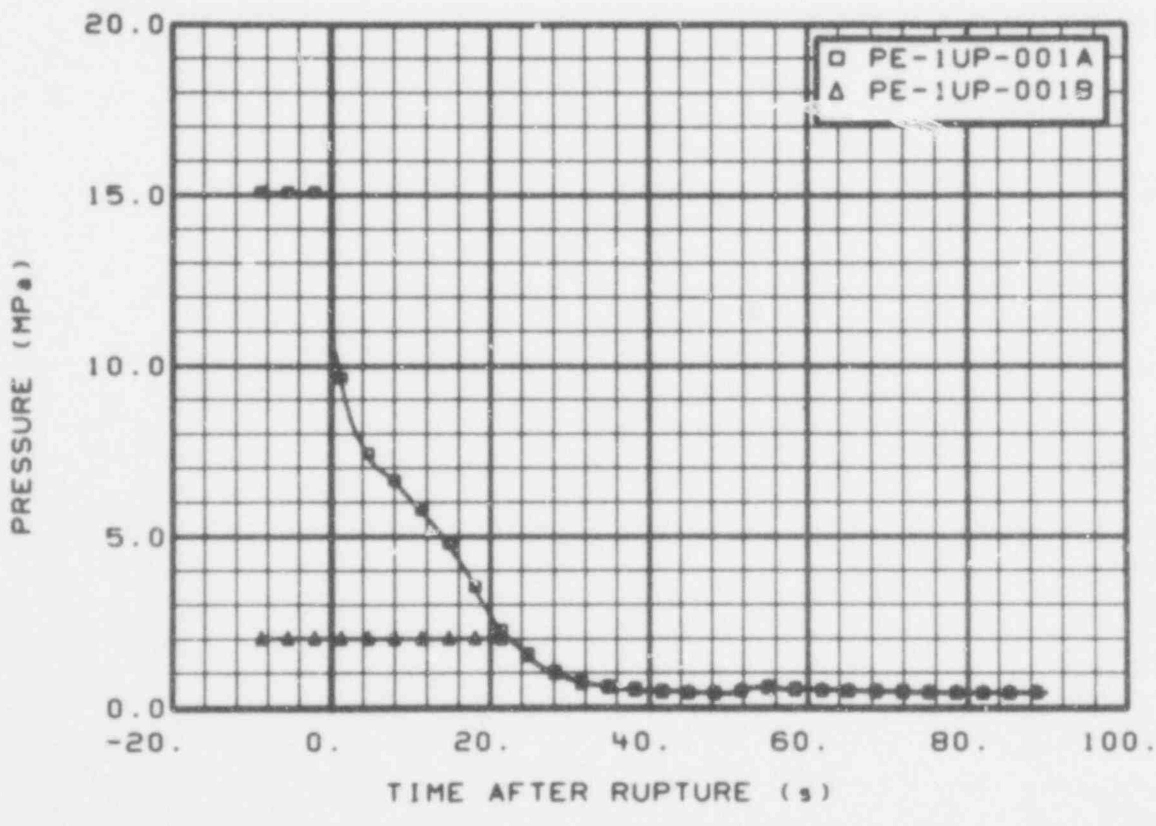


Fig. 150 Pressure in reactor vessel above upper end box of Fuel Assembly 1, high and low ranges (PE-1UP-001A and -001B) (PE-1UP-001A — QEUD and PE-1UP-001B — restrained, good after T = 25 s, low range instrument, overranged above 1.4 MPa).

563 335

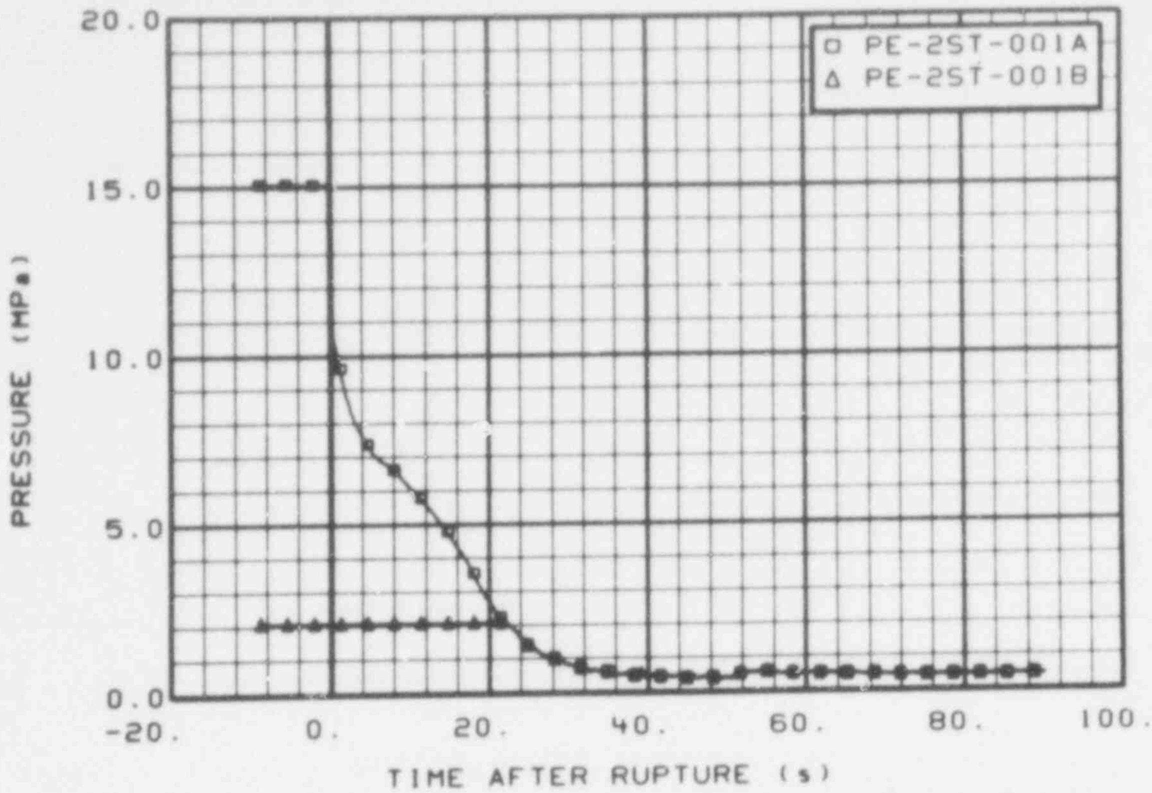


Fig. 151 Pressure in reactor vessel Downcomer Instrument Stalk 2, high range (PE-2ST-001A — QEUD. PE-2ST-001B — restrained, good after T = 25 s, low range measurement, overranged above 1.4 MPa).

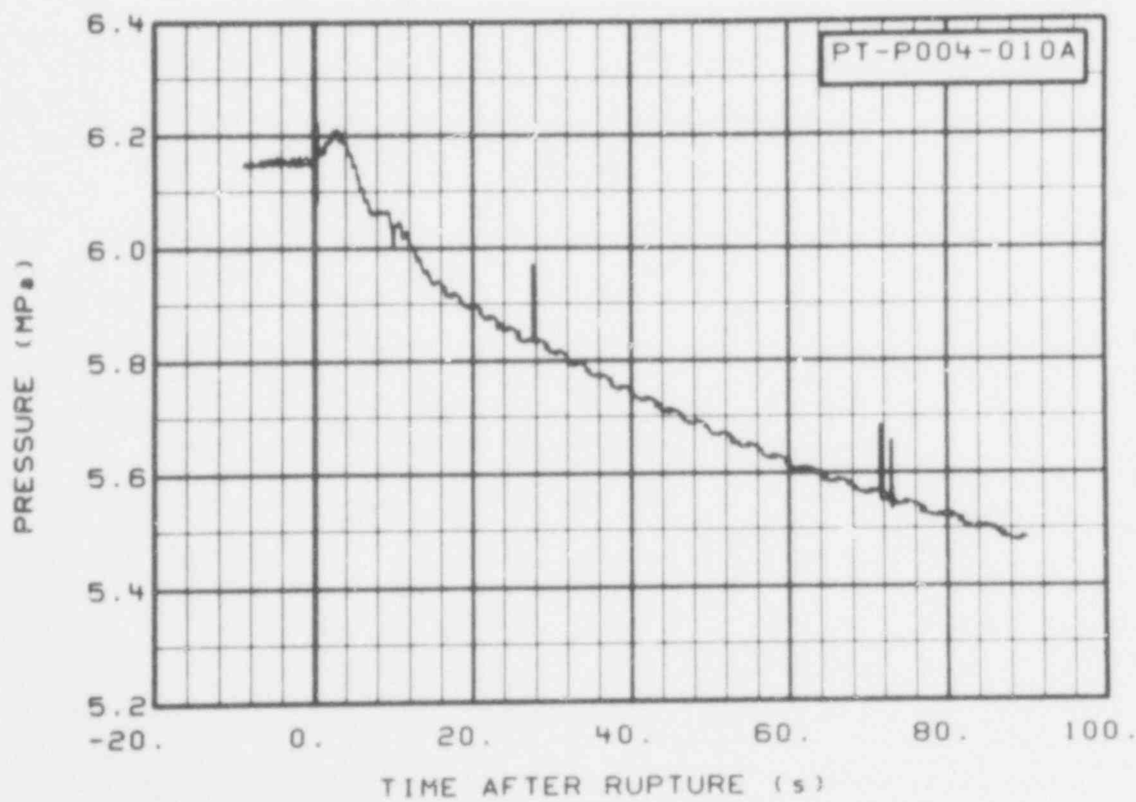


Fig. 152 Pressure in steam generator secondary side outlet 10-in. line (PT-P004-010A) (restrained, good for initial conditions, appears to follow expected pressure after T = 0).

563 336

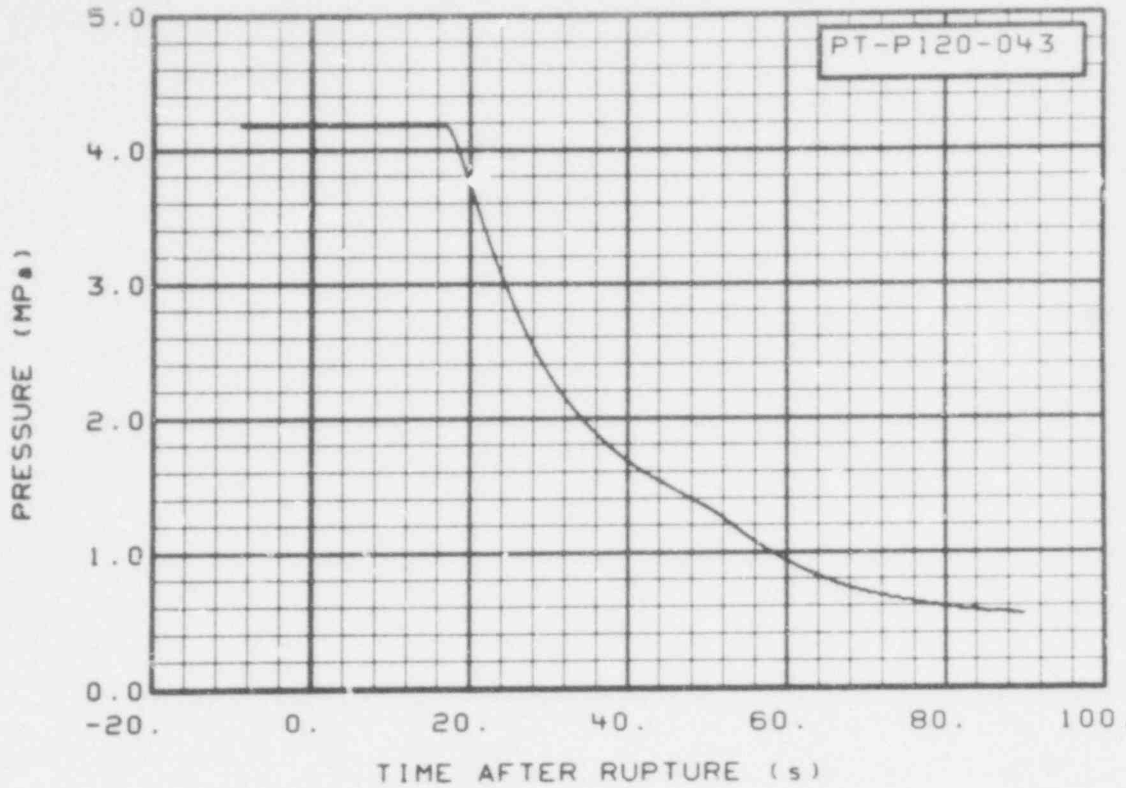


Fig. 153 Pressure in ECCS Accumulator A (PT-P120-043) (QEUD).

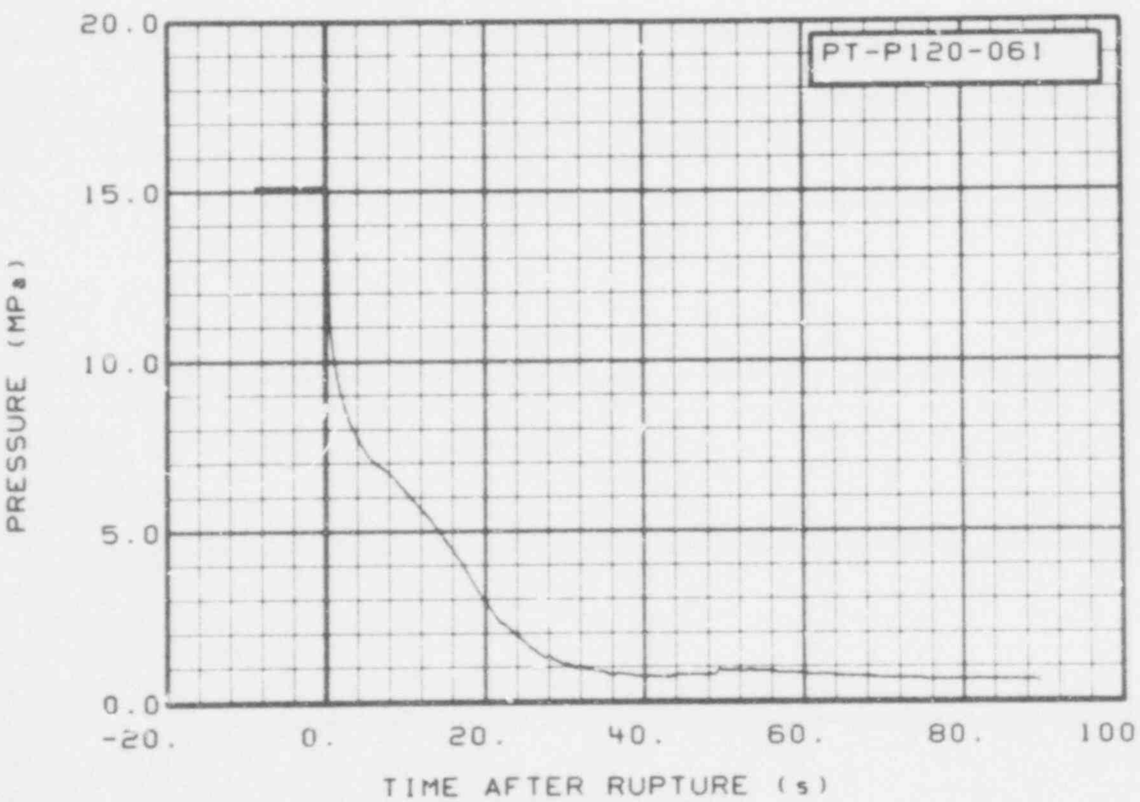


Fig. 154 Pressure in ECCS cold leg injection point (PT-P120-061) (QEUD).

563 337

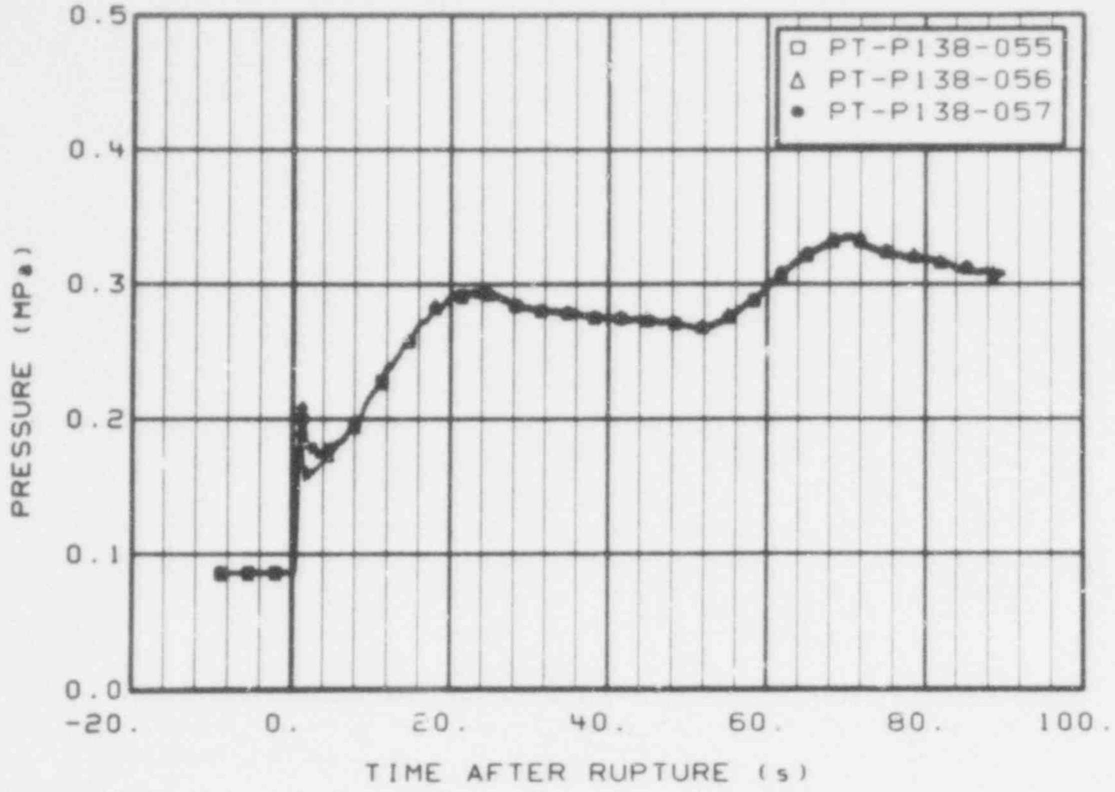


Fig. 155 Pressure in blowdown suppression tank vapor space (PT-P138-055, -056, -057) (QEUD).

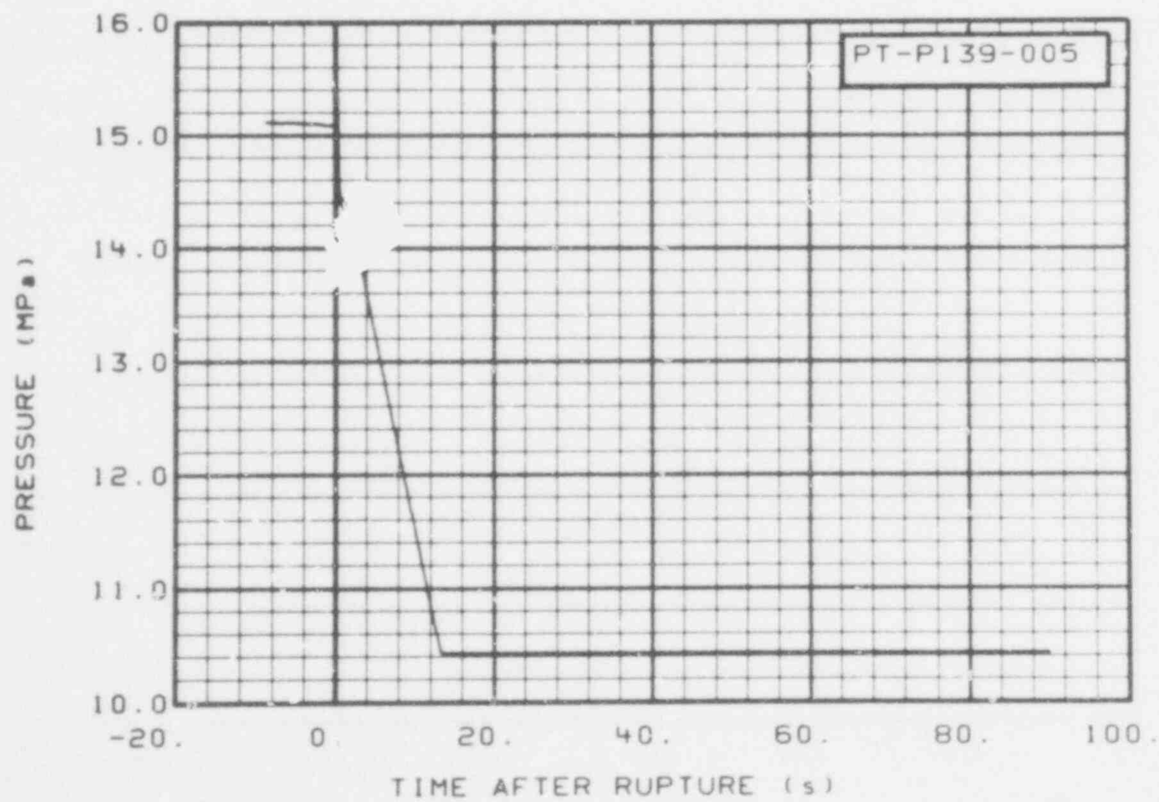


Fig. 156 Pressure in pressurizer (PT-P139-005) (restrained, good to T = 13 s, high range instrument).

563 338

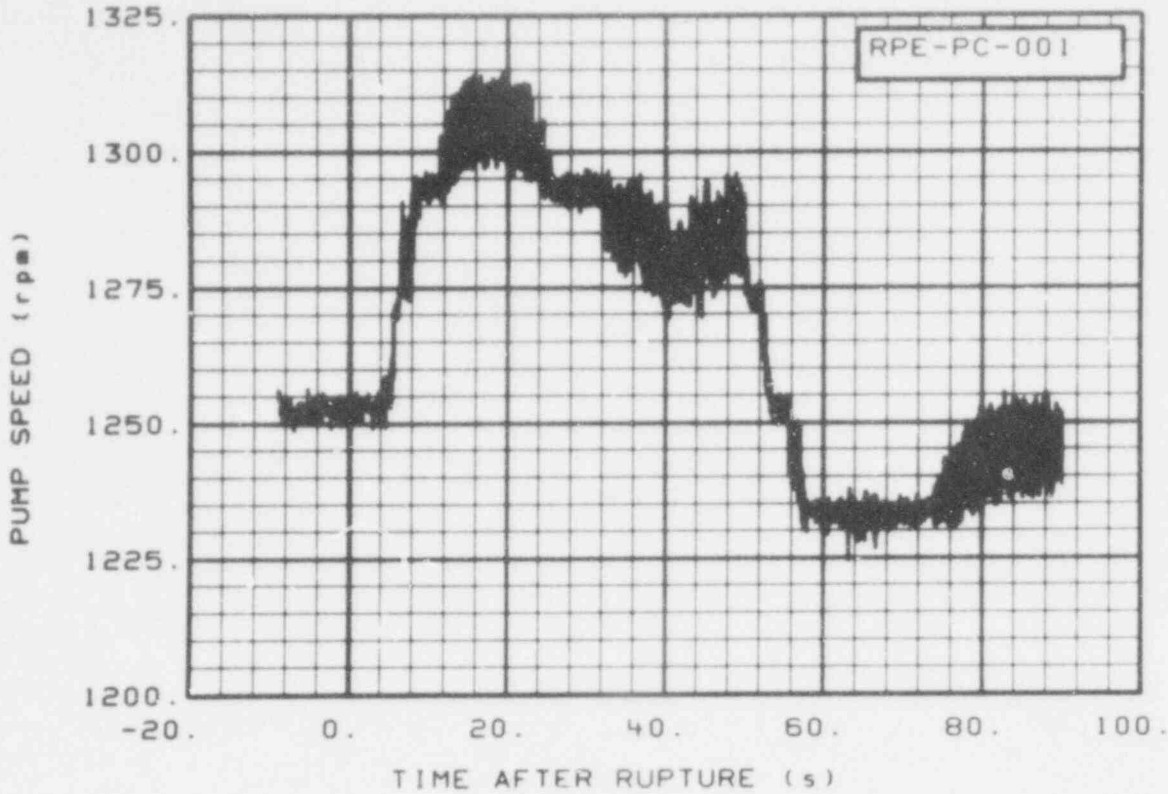


Fig. 157 Pump speed for intact loop Pump 1 (RPE-PC-001) (QEUD).

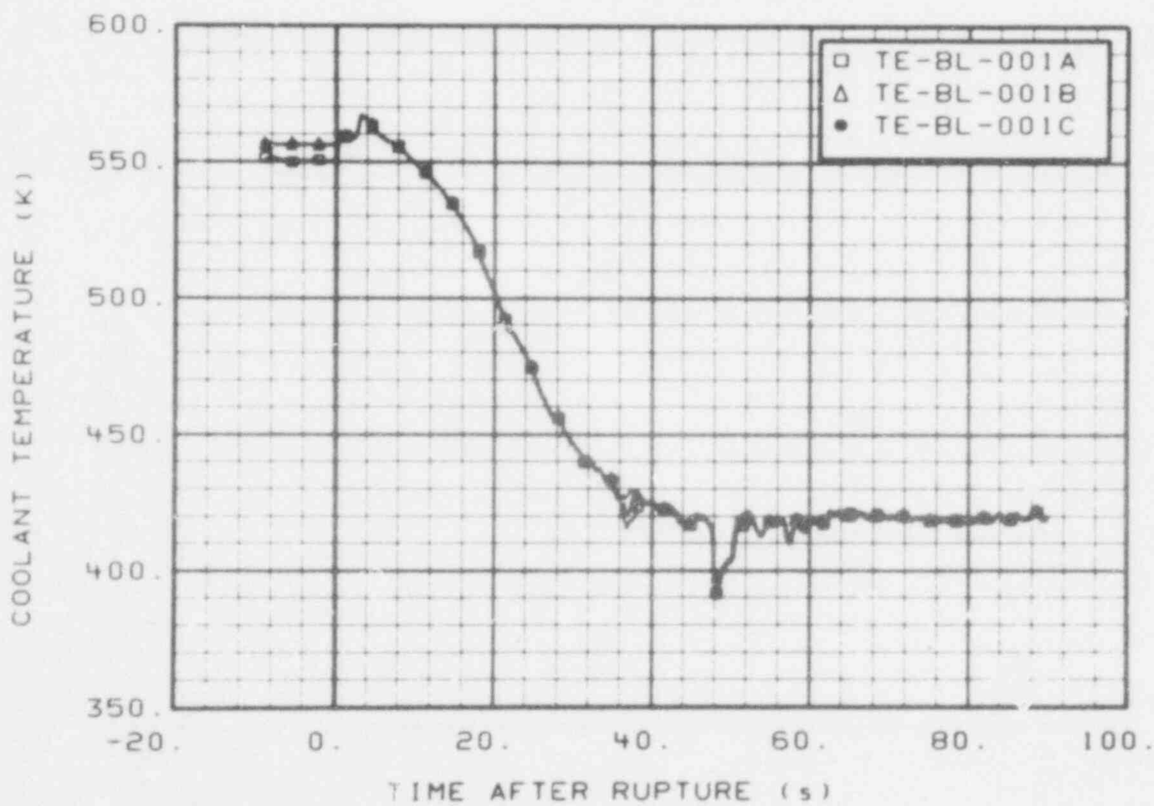


Fig. 158 Coolant temperature in broken loop cold leg bottom, middle, and top at DTT flange (TE-BL-001A, -001B, and -001C) (QEUD).

563 337

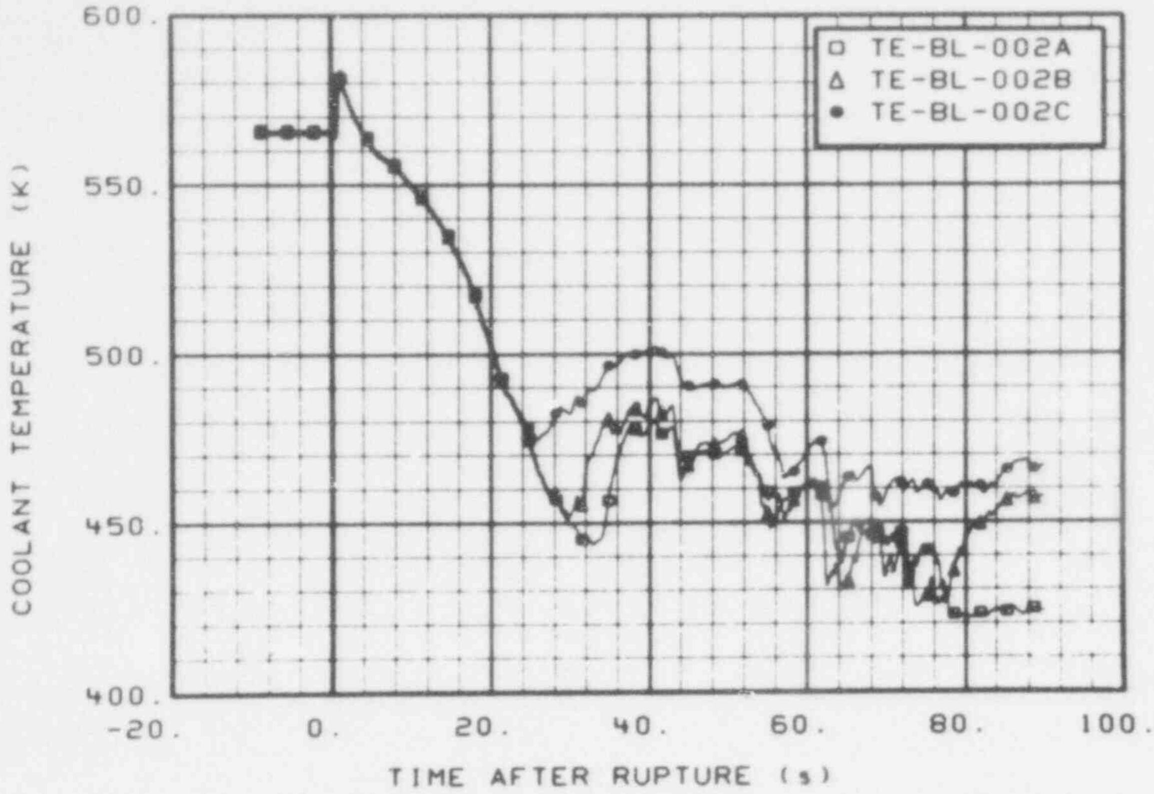


Fig. 159 Coolant temperature in broken loop hot leg bottom, middle, and top at DTT flange (TE-BL-002A, -002B, and -002C) (QEUD).

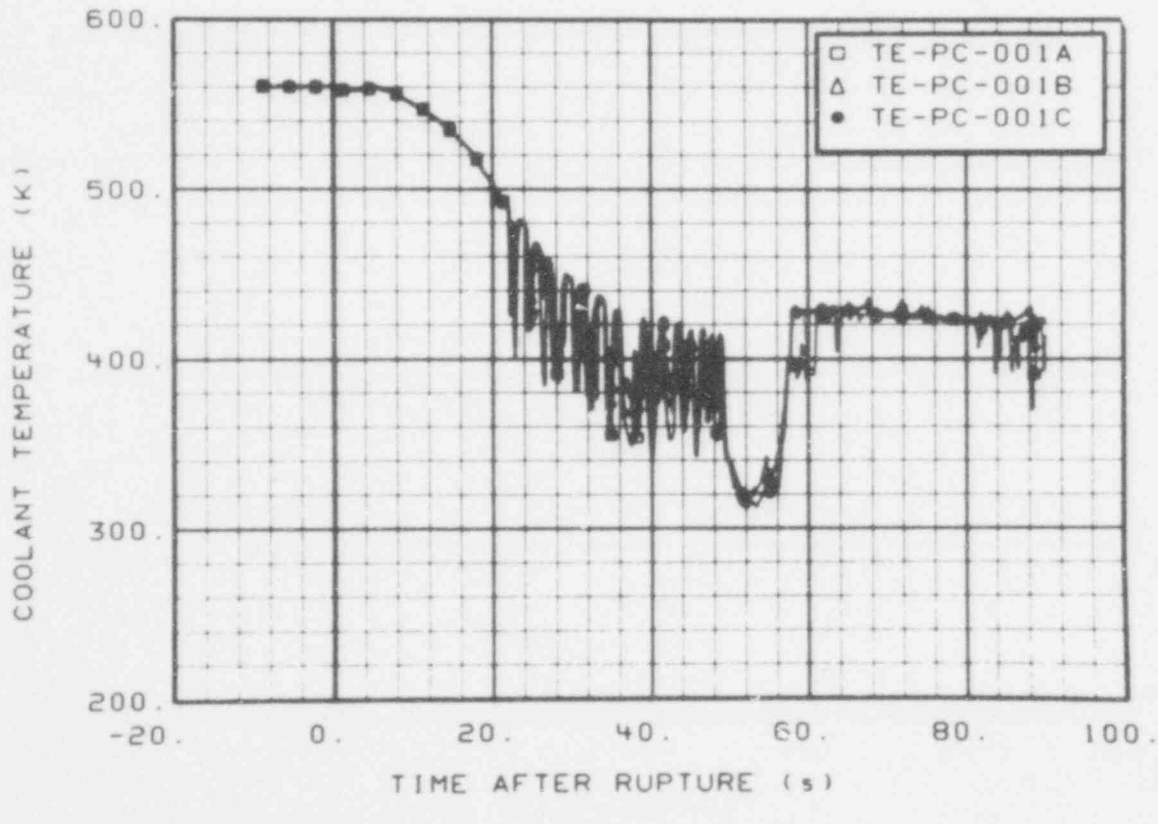


Fig. 160 Coolant temperature in intact loop cold leg west, middle, and east of pipe at DTT flange (TE-PC-001A, -001B, and -001C) (QEUD).

563 340

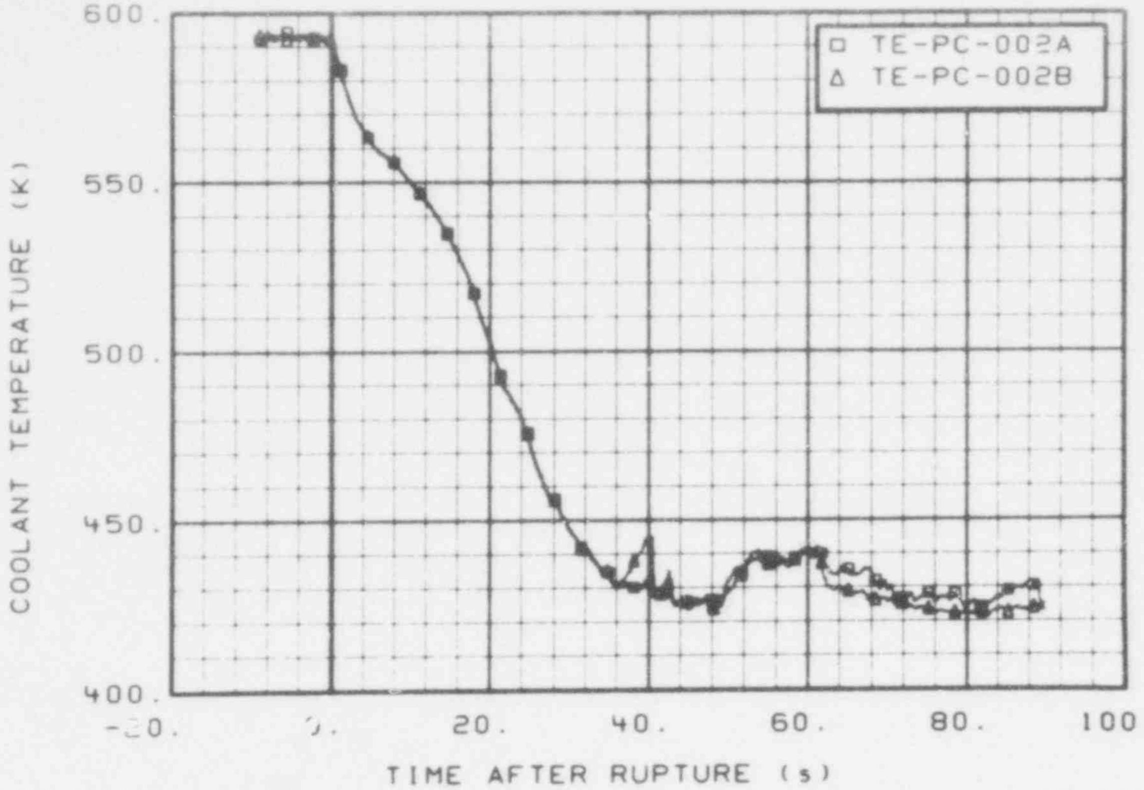


Fig. 161 Coolant in intact loop hot leg middle and west of pipe (TE-PC-002A, and -002B) (QEUD).

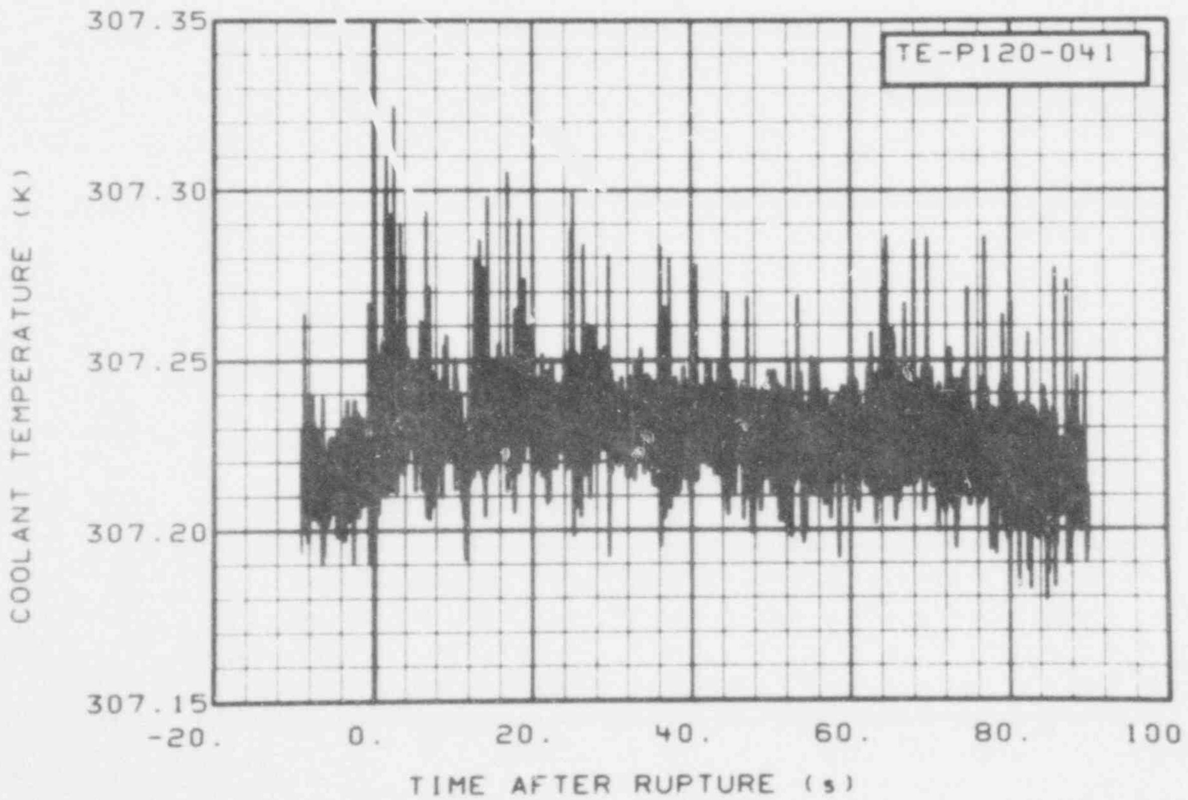


Fig. 162 Coolant temperature in ECCS Accumulator A (TE-P120-041) (QEUD).

563 311

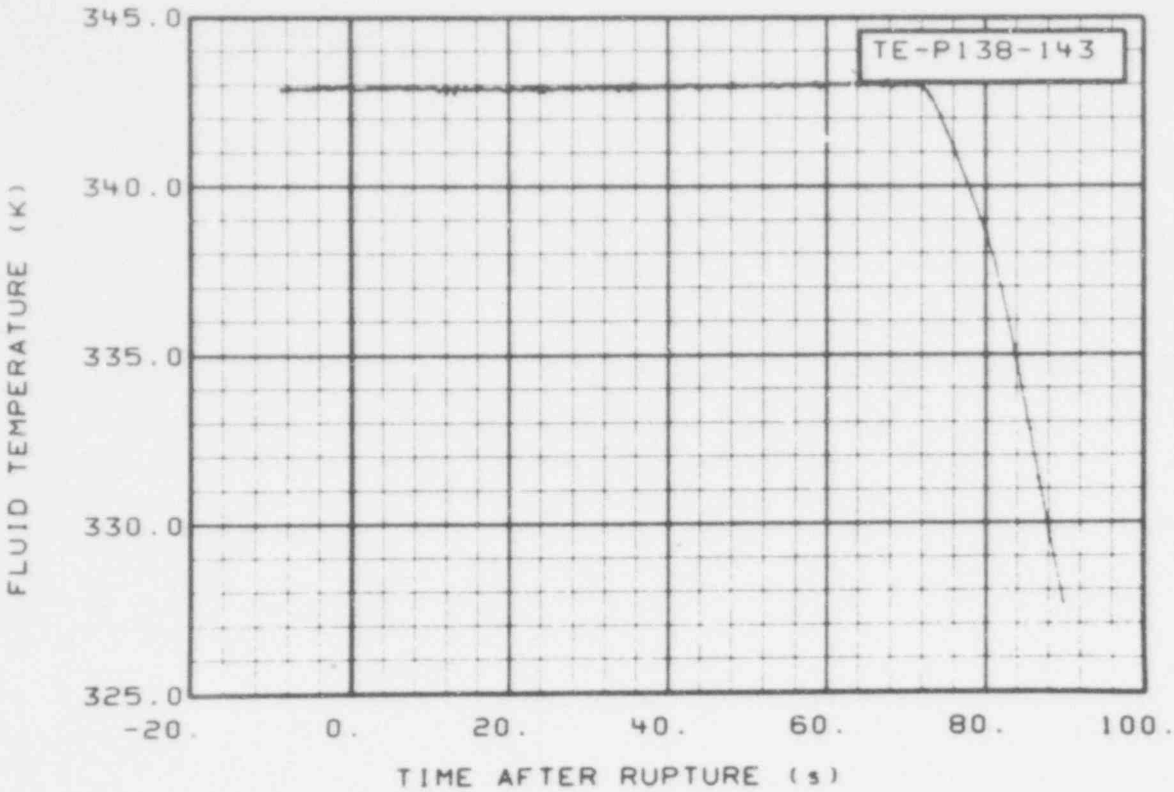


Fig. 163 Coolant temperature in blowdown suppression tank 13.9 l/s spray header (TE-P138-143) (QEUD).

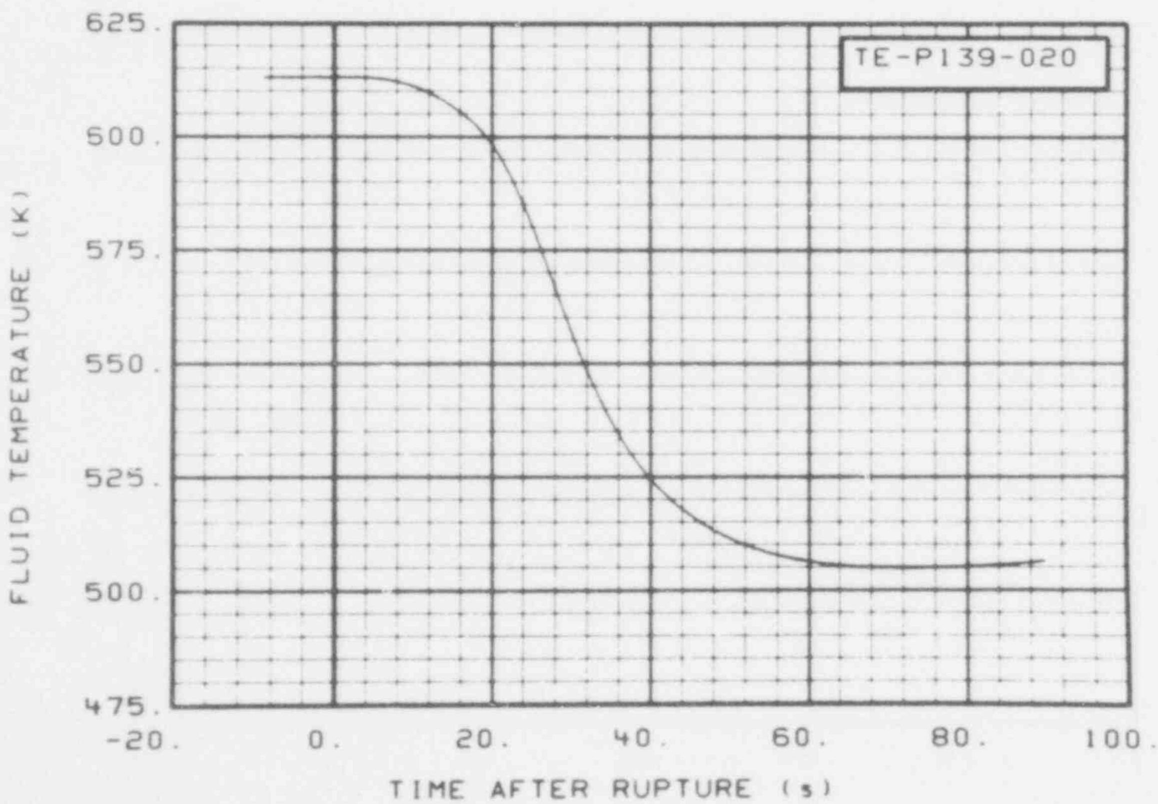


Fig. 164 Fluid temperature in intact loop pressurizer vapor and liquid (TE-P139-020) (restrained, may indicate metal temperature after pressurizer empties).

563 342

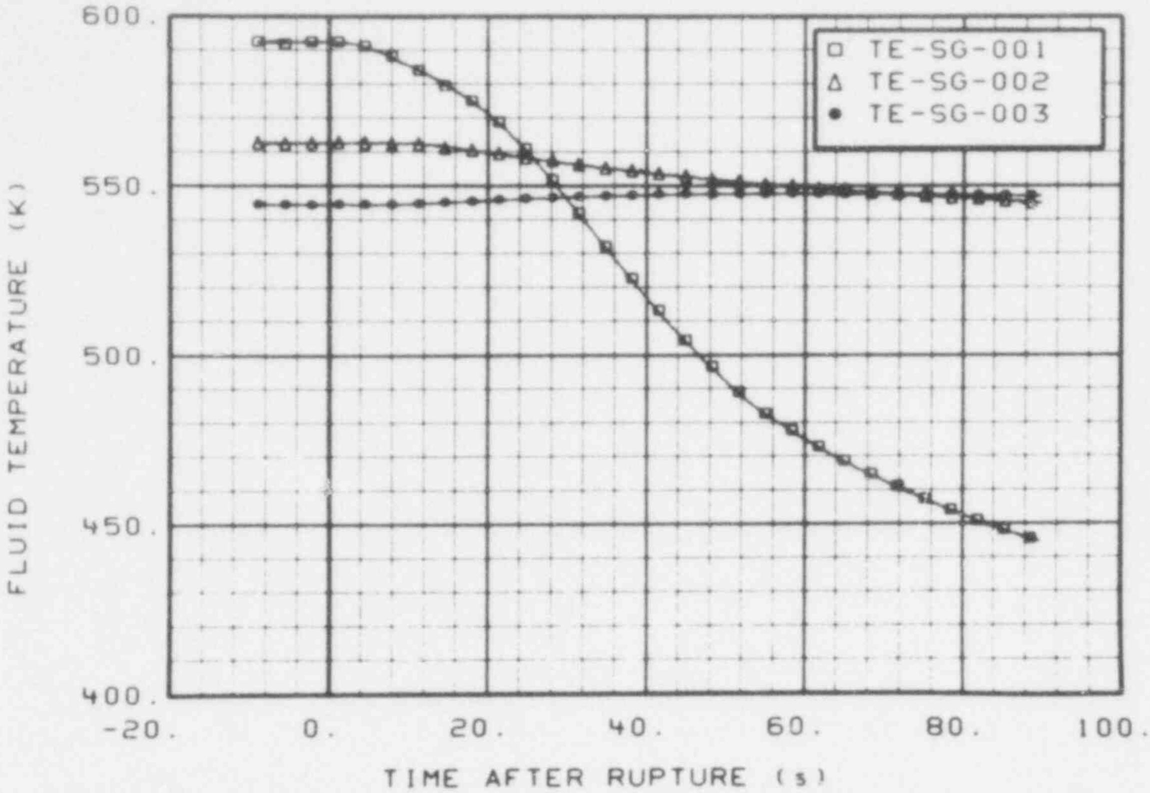


Fig. 165 Fluid temperature in steam generator intact loop inlet plenum, outlet plenum, and secondary side (TE-SG-001, -002, and -003) (TE-SG-001 and -002 — restrained, good for initial conditions only; TE-SG-003 — restrained, may indicate metal temperature).

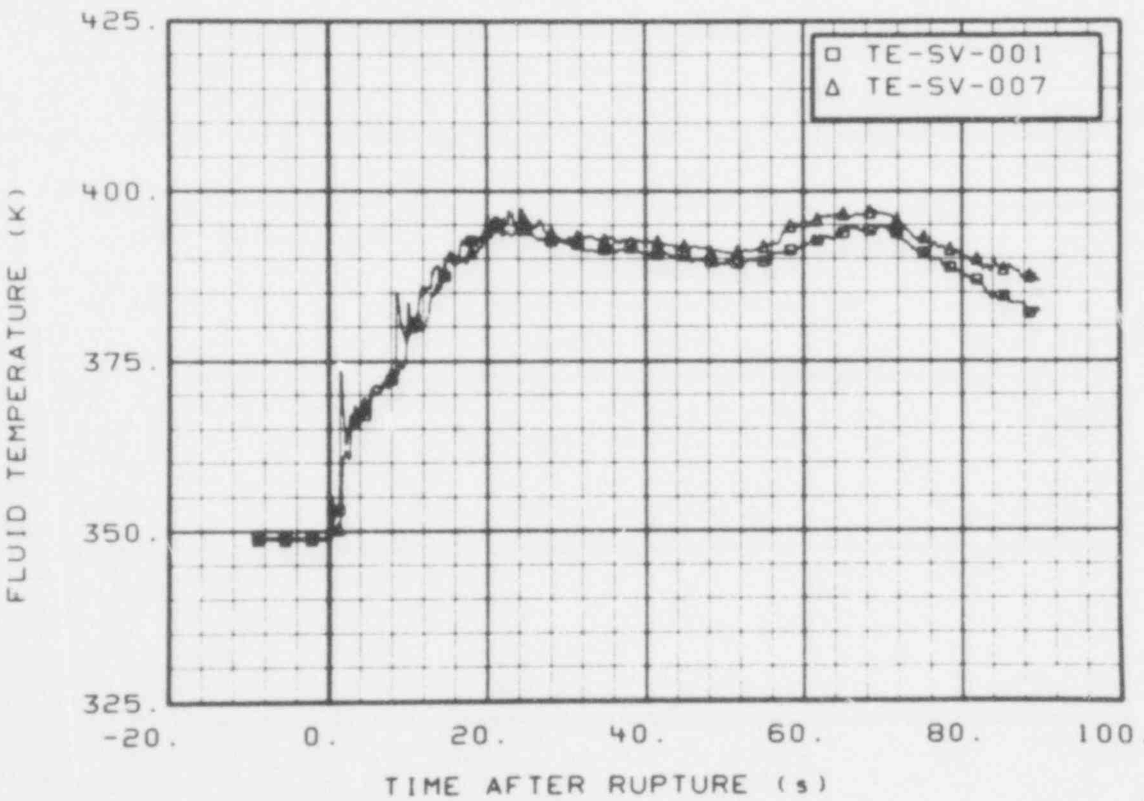


Fig. 166 Fluid temperature in blowdown suppression tank 2.723 m above tank bottom (TE-SV-001 and -007) (QEUD).

563 343

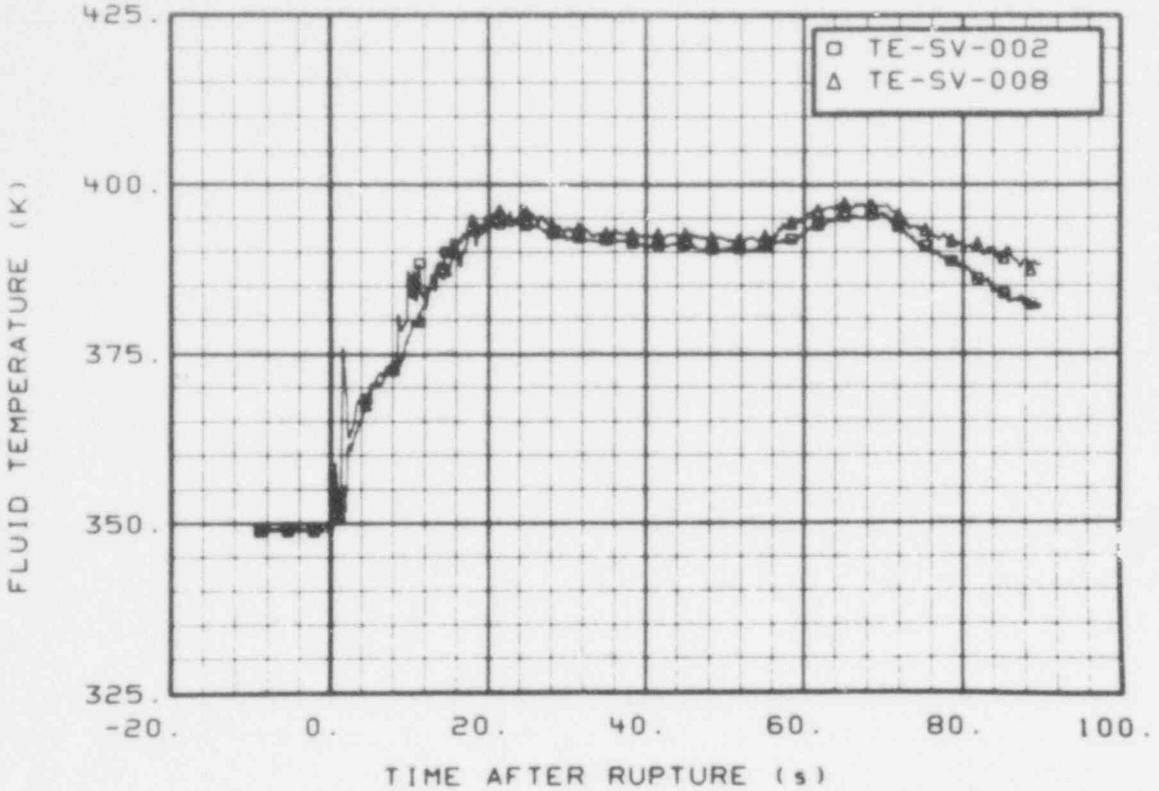


Fig. 167 Fluid temperature in blowdown suppression tank 2.362 m above tank bottom (TE-SV-002 and -008) (QEUD).

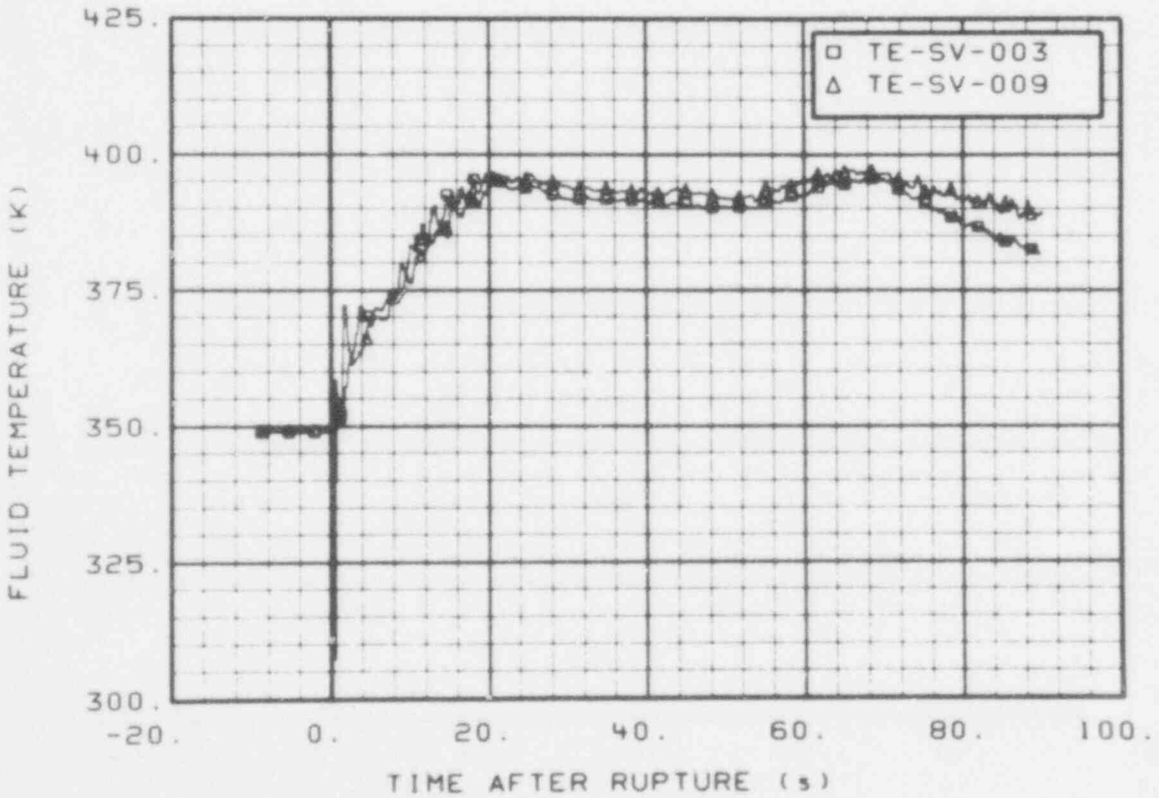


Fig. 168 Fluid temperature in blowdown suppression tank 1.897 m above tank bottom (TE-SV-003 and-009) (TF-SV-003 - QEUD; TE-SV-009 — restrained, unexplained noise spike at T = 0, data appear good otherwise).

563 344

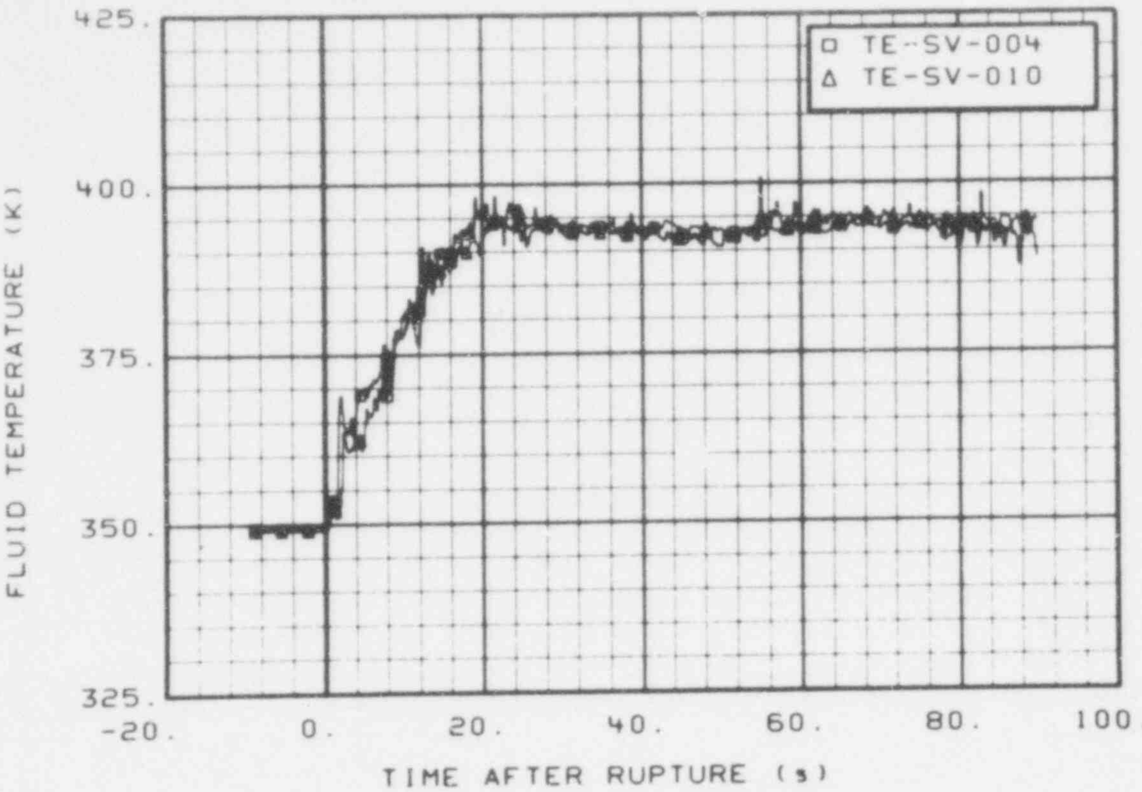


Fig. 169 Fluid temperature in blowdown suppression tank 1.453 m above tank bottom (TE-SV-004 and -010) (QEUD).

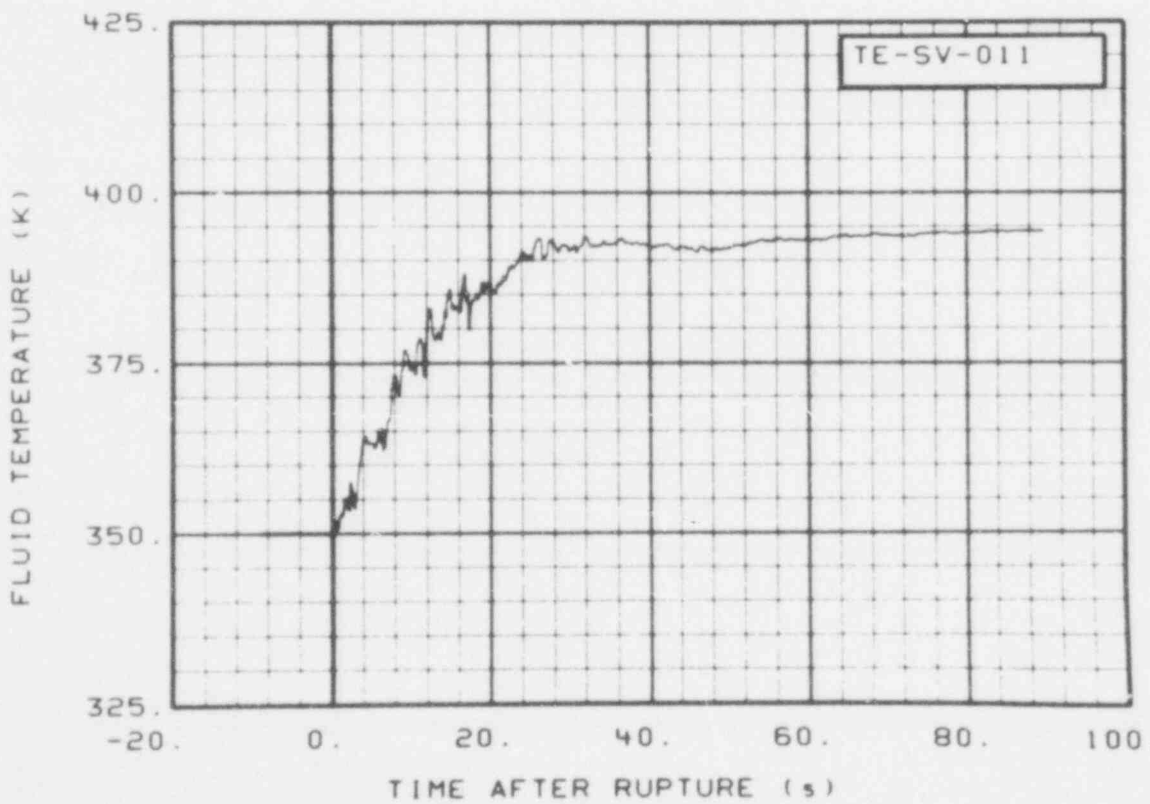


Fig. 170 Fluid temperature in blowdown suppression tank 0.991 m above tank bottom (TE-SV-011) (QEUD).

563 345

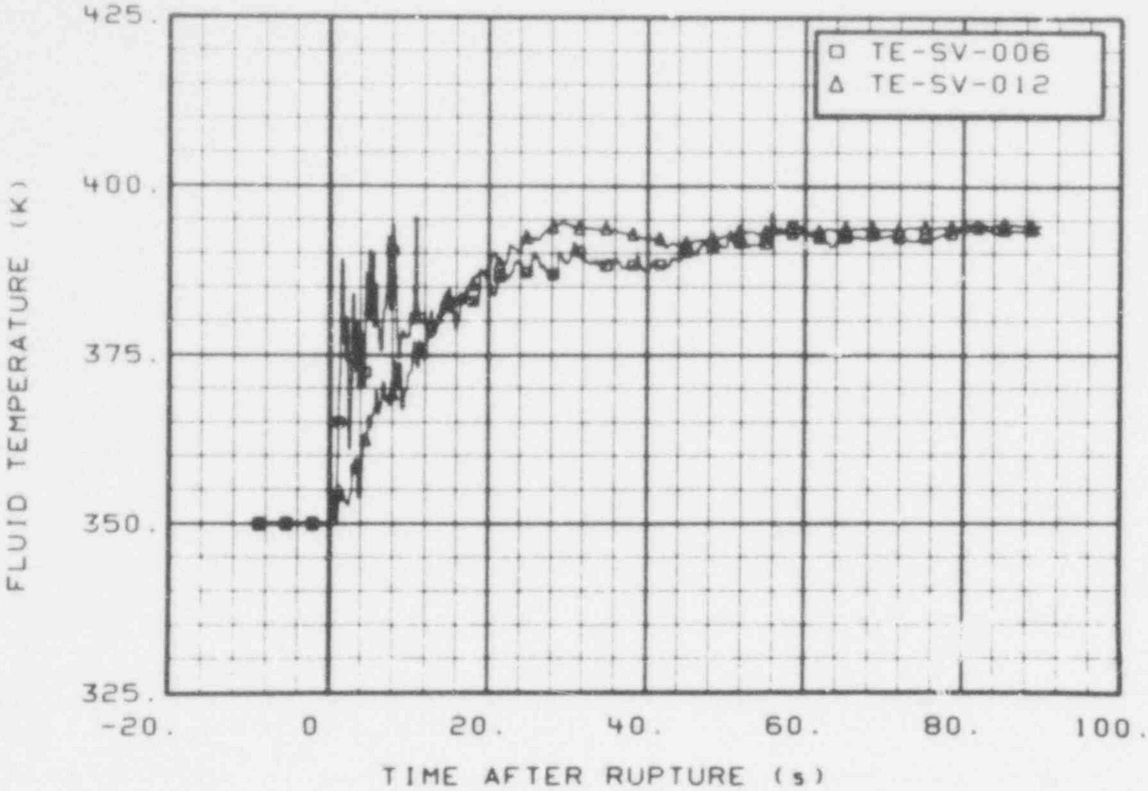


Fig. 171 Fluid temperature in blowdown suppression tank 0.373 m above tank bottom (TE-SV-006 and -012) (QEUD).

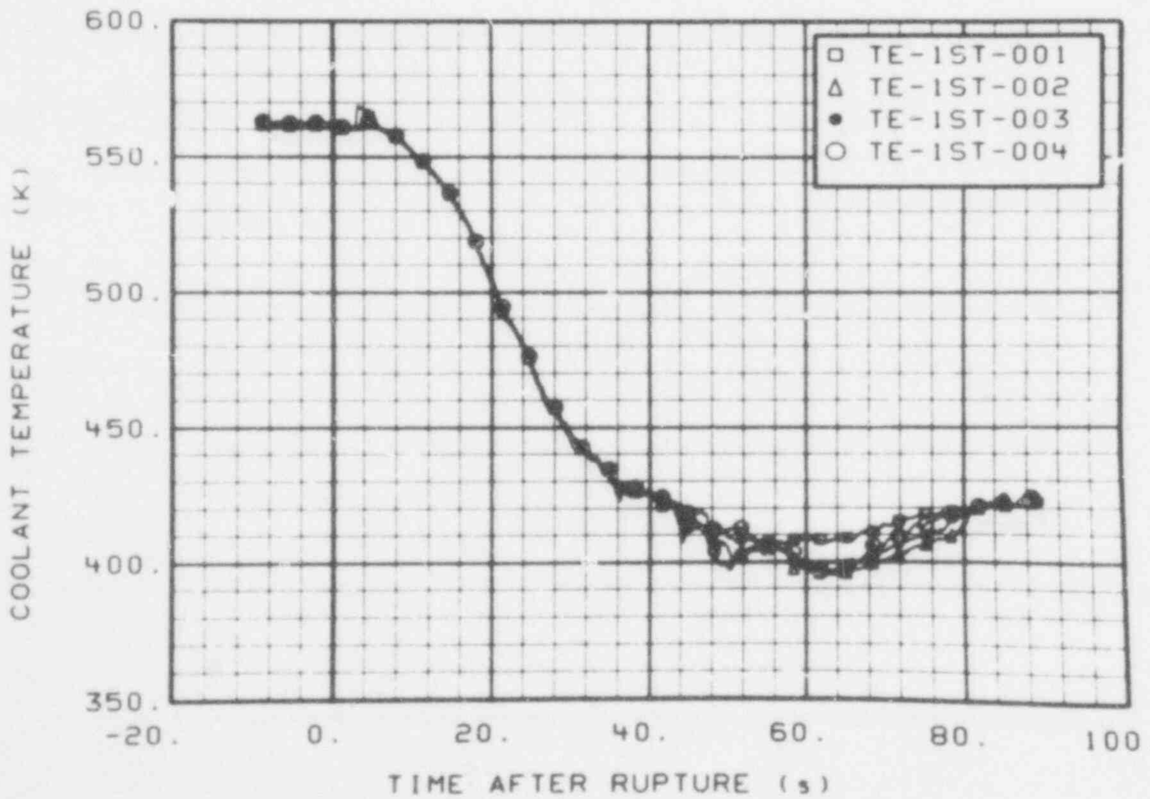


Fig. 172 Coolant temperature in reactor vessel Downcomer Instrument Stalk 1 (TE-1ST-001, -002, -003, and -004) (QEUD).

563 346

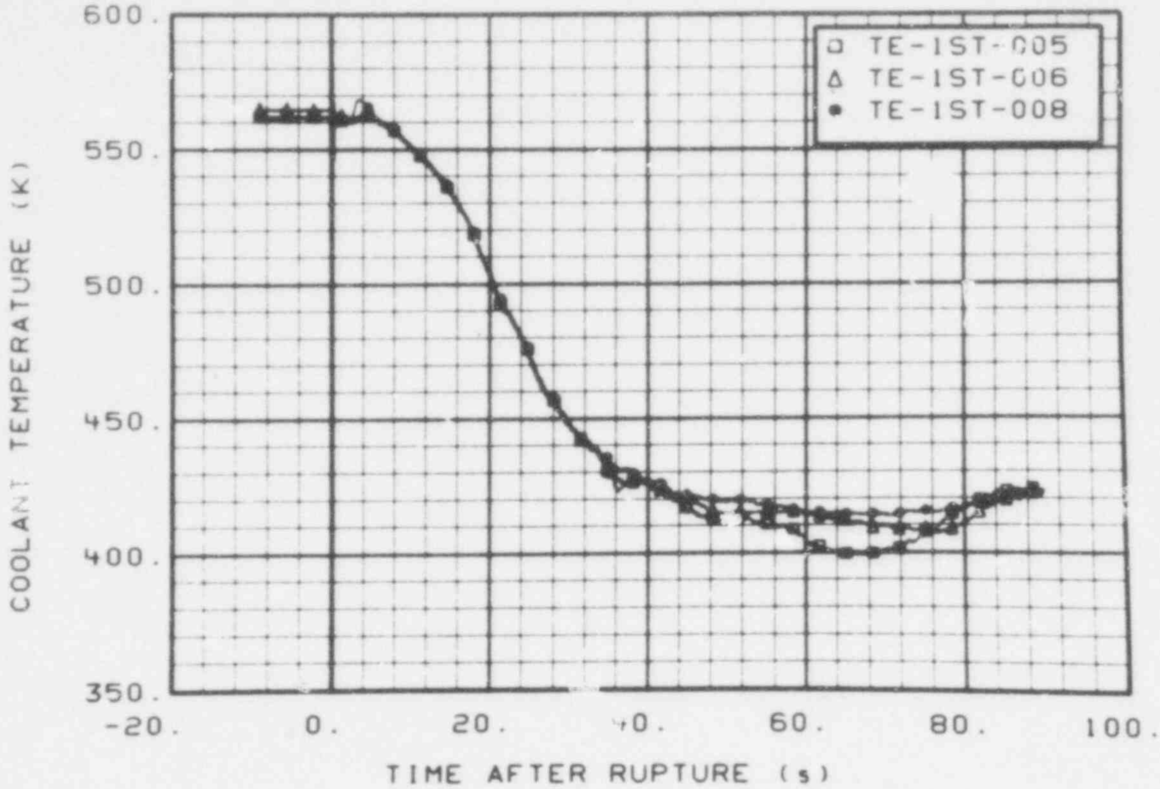


Fig. 173 Coolant temperature in reactor vessel Downcomer Instrument Stalk 1 (TE-1ST-005, -006, and -008) (QEUD).

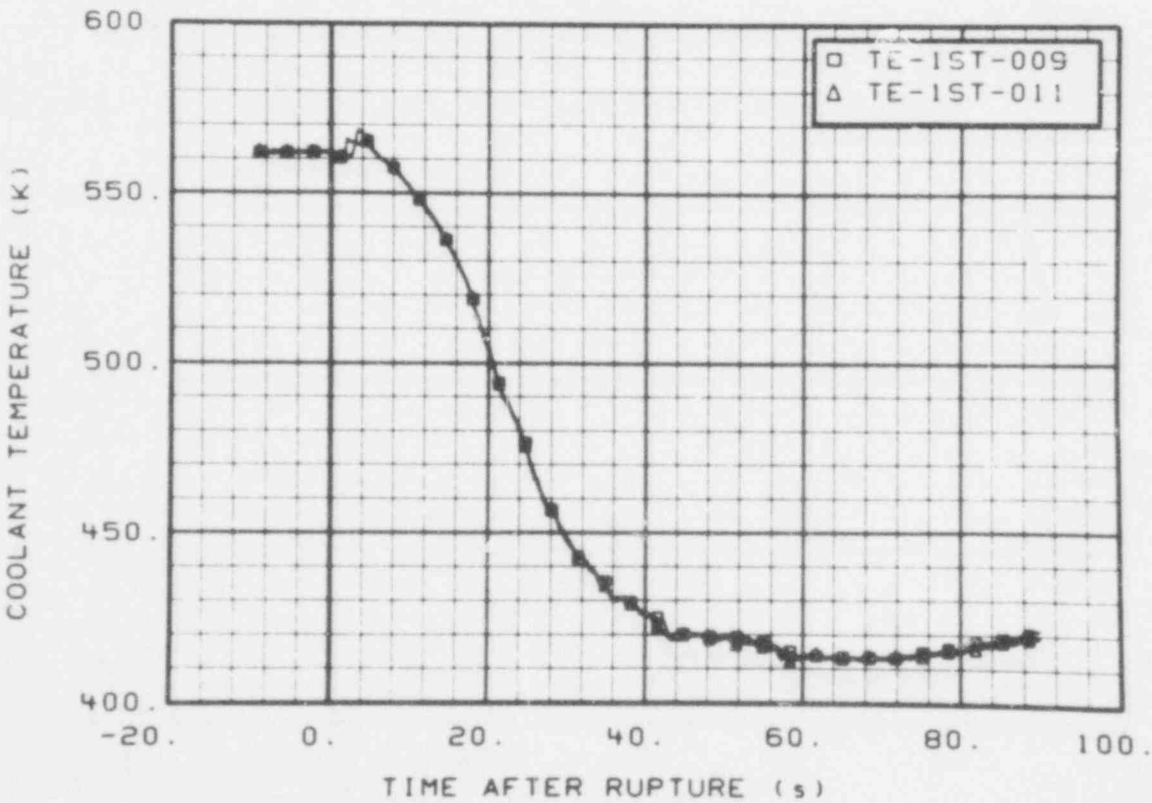


Fig. 174 Coolant temperature in reactor vessel Downcomer Instrument Stalk 1 (TE-1ST-009, and -011) (QEUD).

563 347

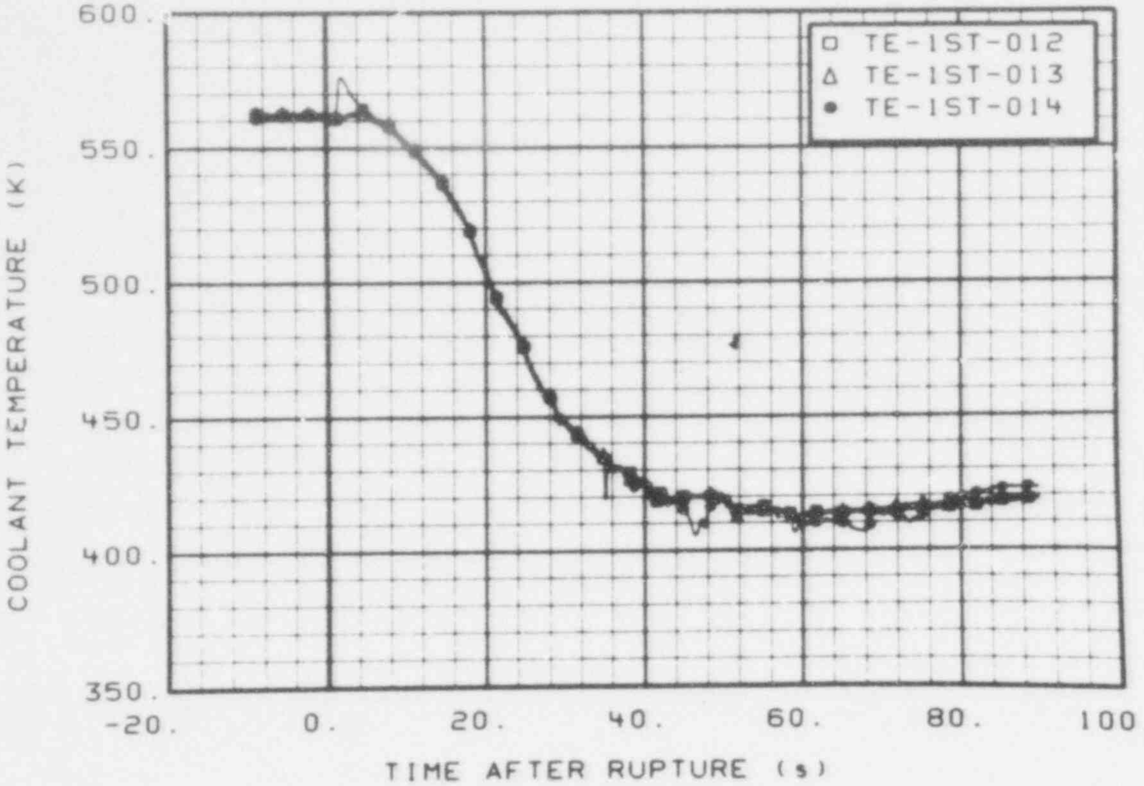


Fig. 175 Coolant temperature in reactor vessel Downcomer Instrument Stalk 1 (TE-1ST-012, -013, and -014) (QEUD).

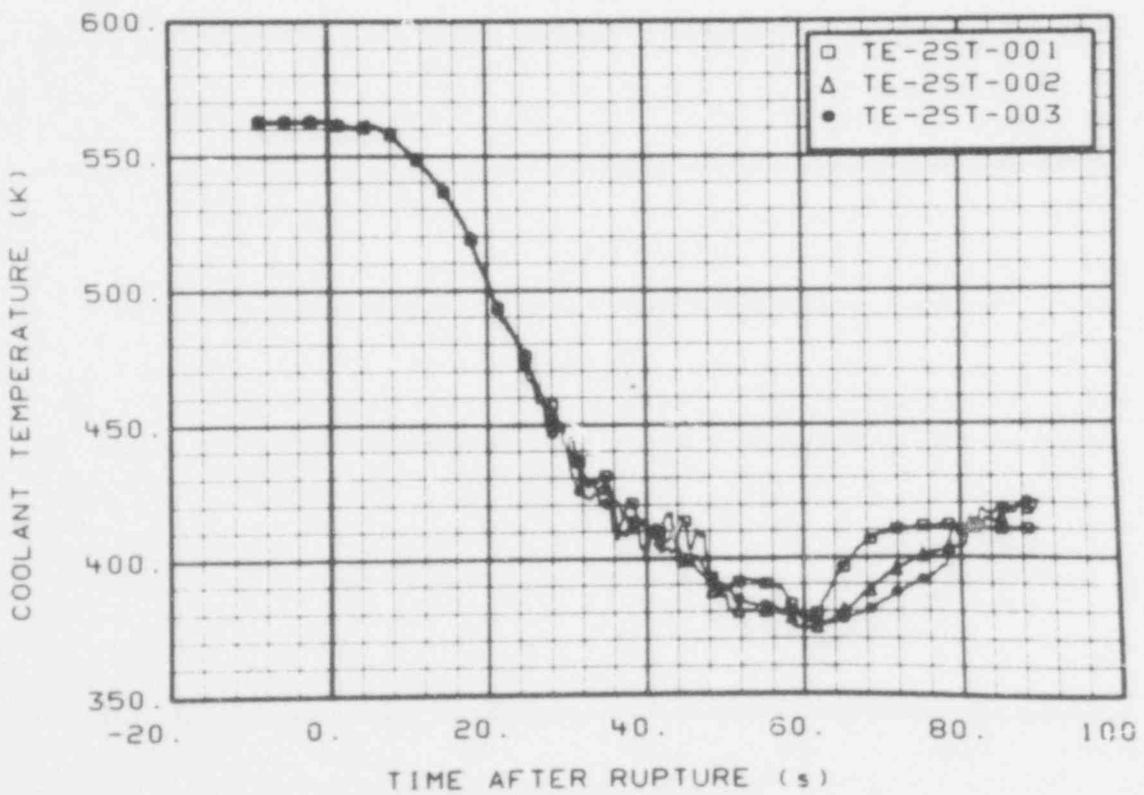


Fig. 176 Coolant temperature in reactor vessel Downcomer Instrument Stalk 2 (TE-2ST-001, -002, and -003) (QEUD).

563 348

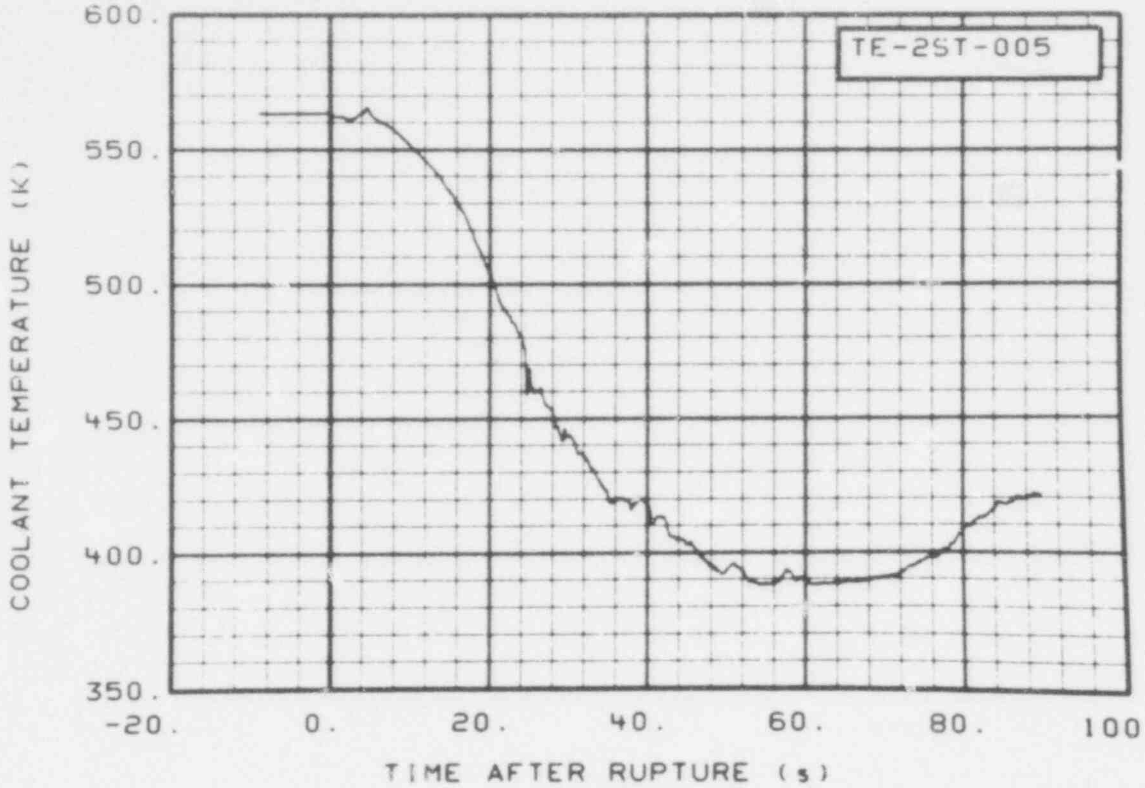


Fig. 177 Coolant temperature in reactor vessel Downcomer Instrument Stalk 2 (TE-2ST-005) (QEUD).

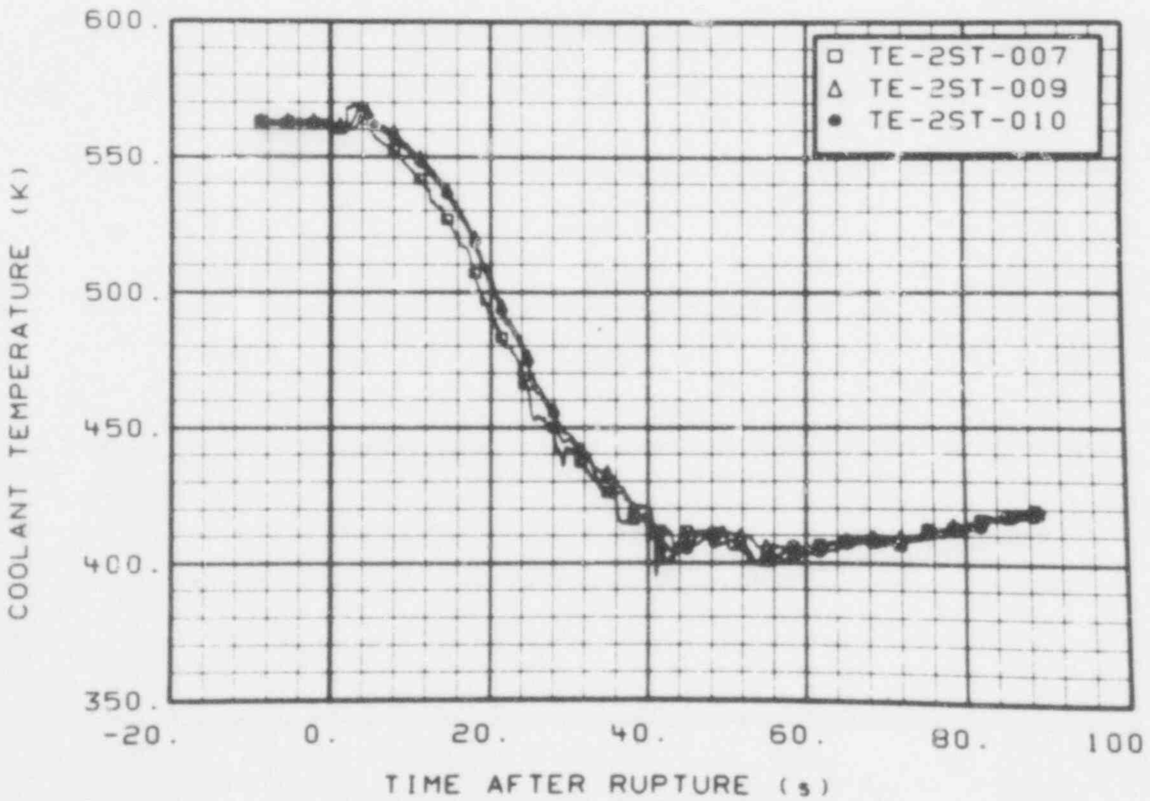


Fig. 178 Coolant temperature in reactor vessel Downcomer Instrument Stalk 2 (TE-2ST-007, -009 and -010) (QEUD).

563 312

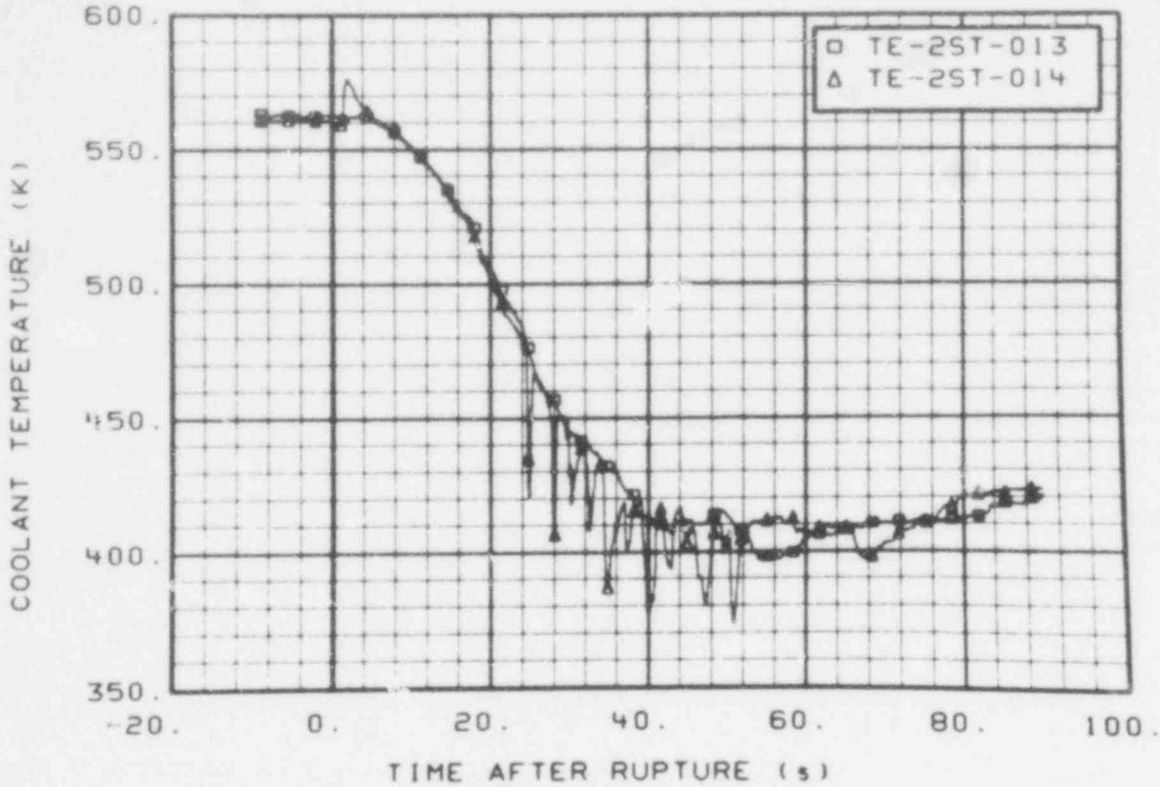


Fig. 179 Coolant temperature in reactor vessel Downcomer Instrument Stalk 2 (TE-2ST-013 and -014) (QEUD).

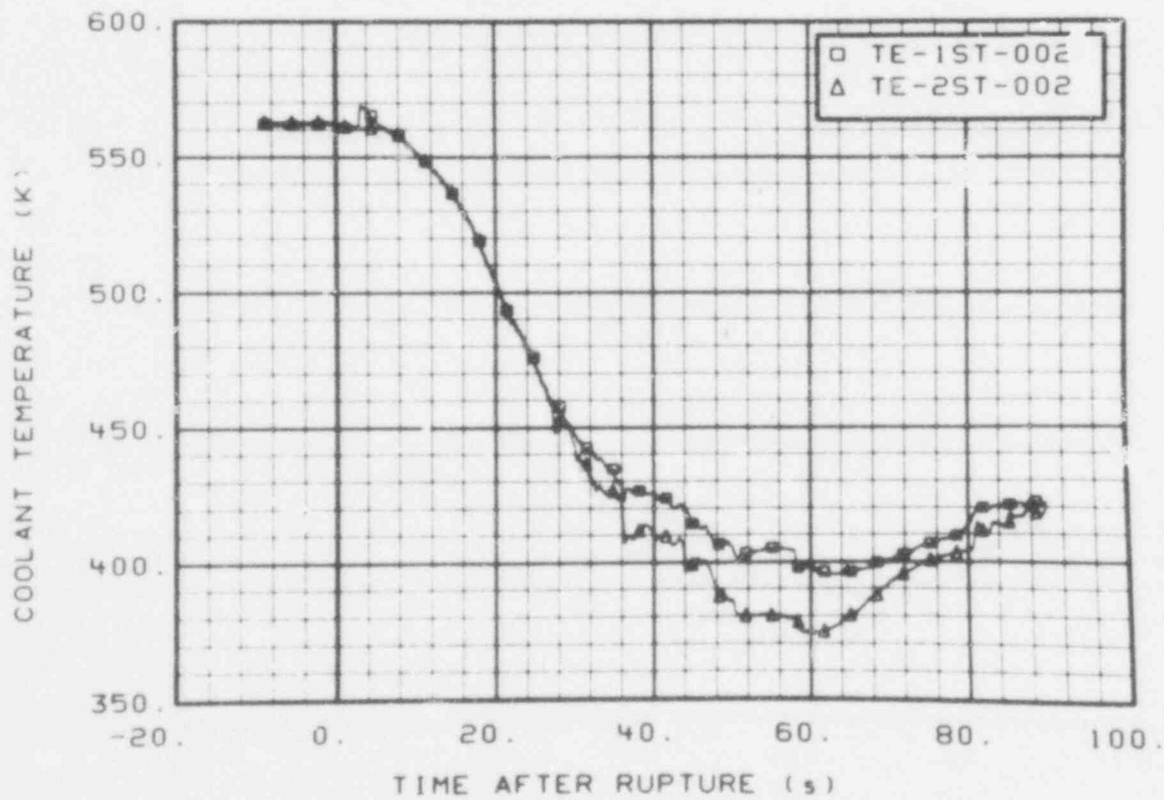


Fig. 180 Coolant temperature in reactor vessel Downcomer Instrument Stalks 1 and 2, 4.2 m above reactor vessel bottom (TE-1ST-002 and TE-2ST-002) (QEUD).

563 350

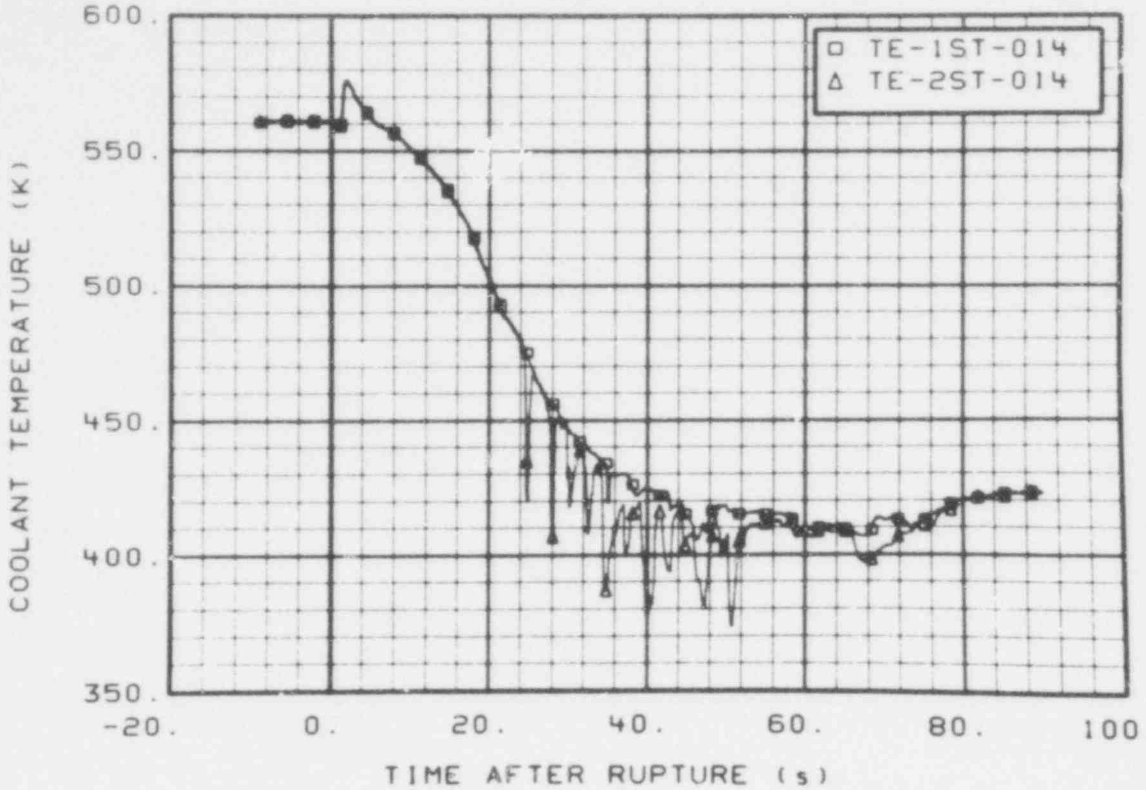


Fig. 181 Coolant temperature in reactor vessel Downcomer Instrument Stalks 1 and 2, 11.7 m above reactor vessel bottom (TE-1ST-014 and TE-2ST-014) (QEUD).

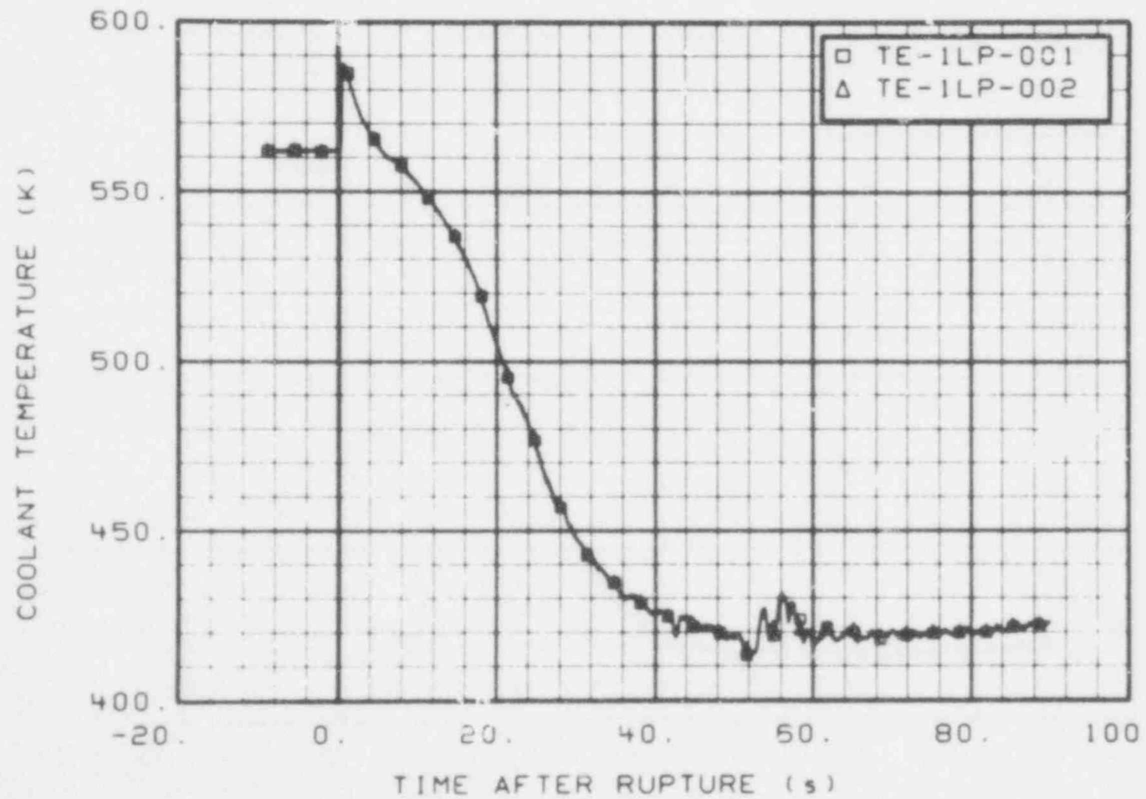


Fig. 182 Coolant temperature in reactor vessel at lower end box of Fuel Assembly 1 (TE-1LP-001 and -002) (QEUD).

563 351

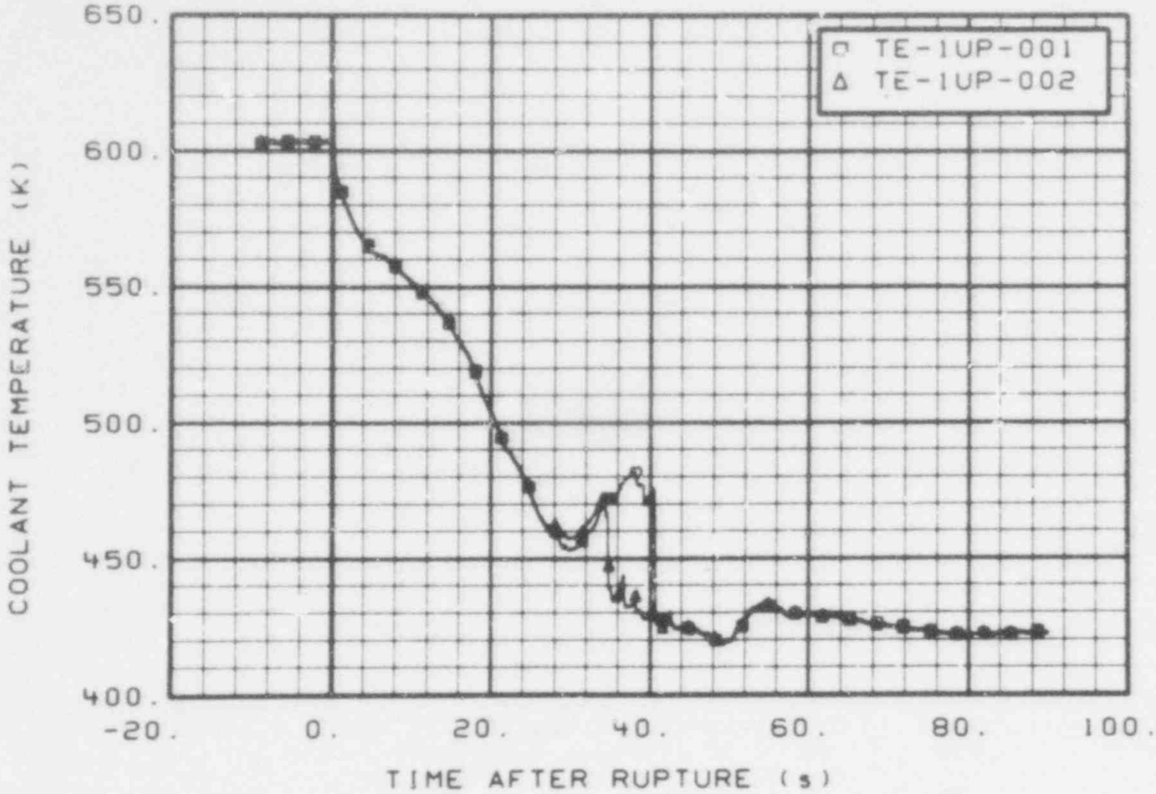


Fig. 183 Coolant temperature in reactor vessel at upper end box of Fuel Assembly 1 and above outlet nozzle (TE-1UP-001 and -002) (QEUD).

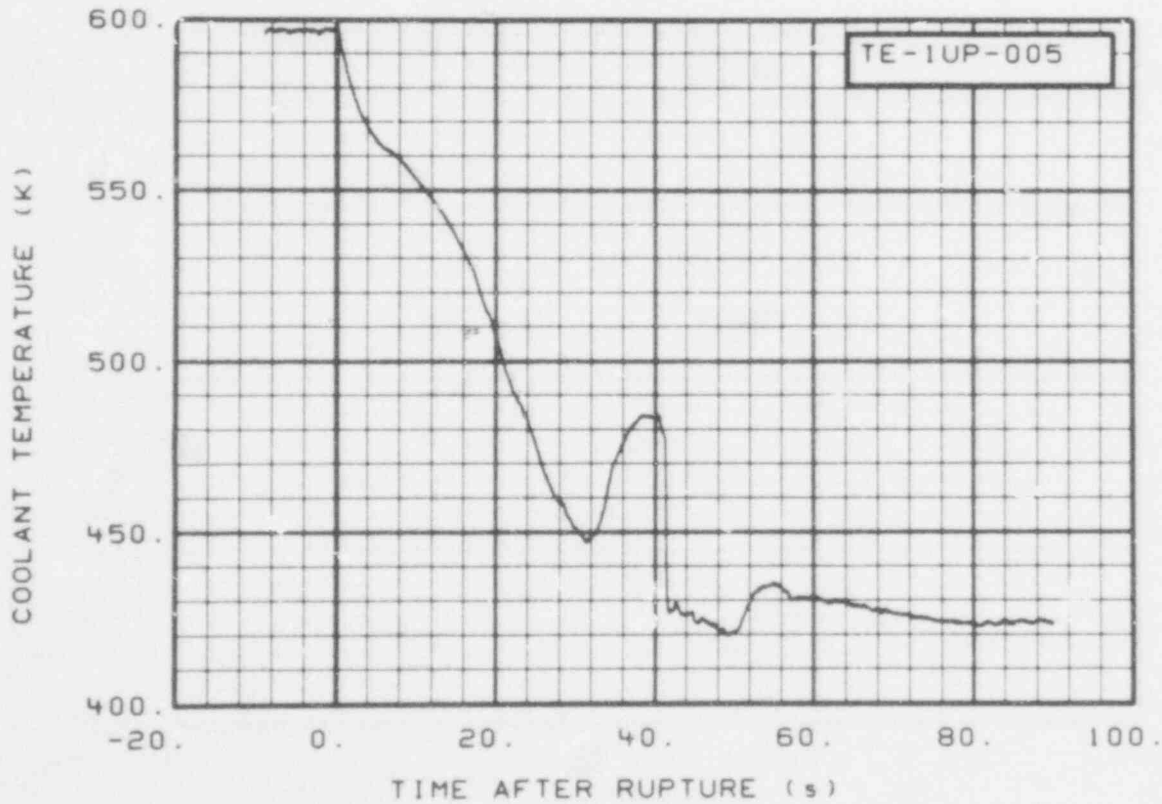


Fig. 184 Coolant temperature in reactor vessel above outlet nozzle and DTT FE-1UP-1 (TE-1UP-005) (QEUD).

563 352

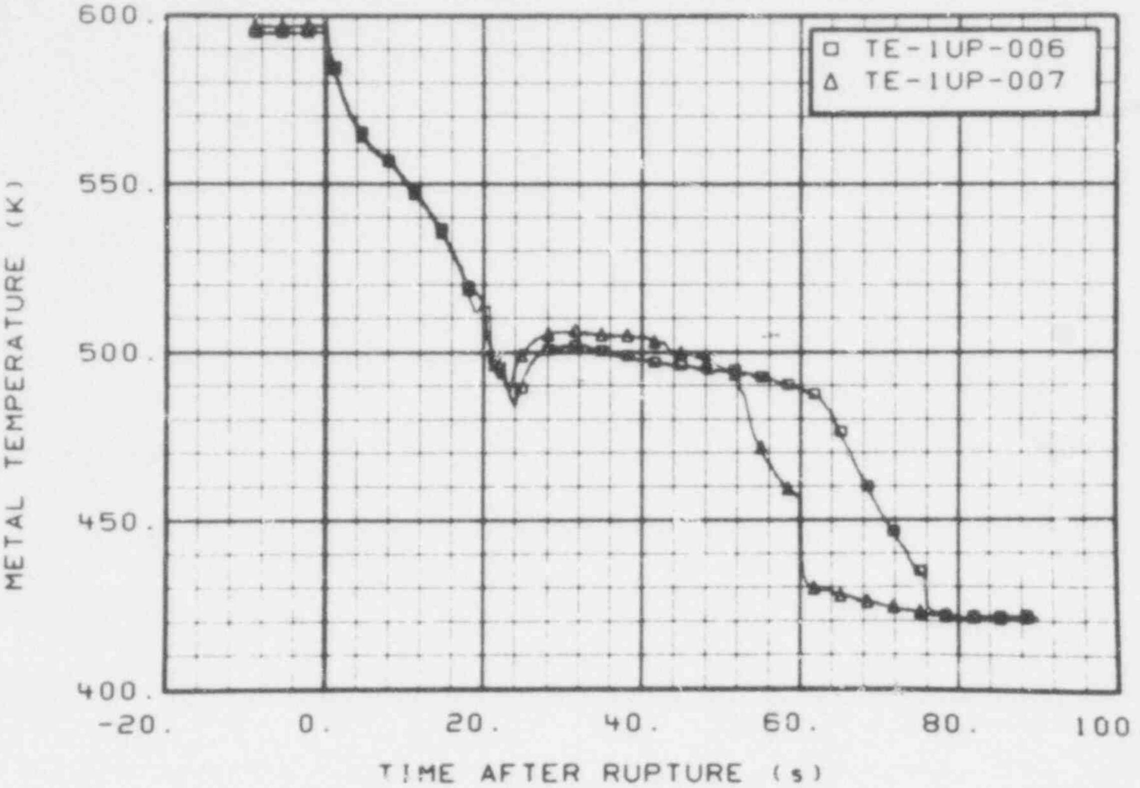


Fig. 185 Metal temperature on Fuel Assembly 1 upper core support column (TE-1UP-006 and -007) (QEUD).

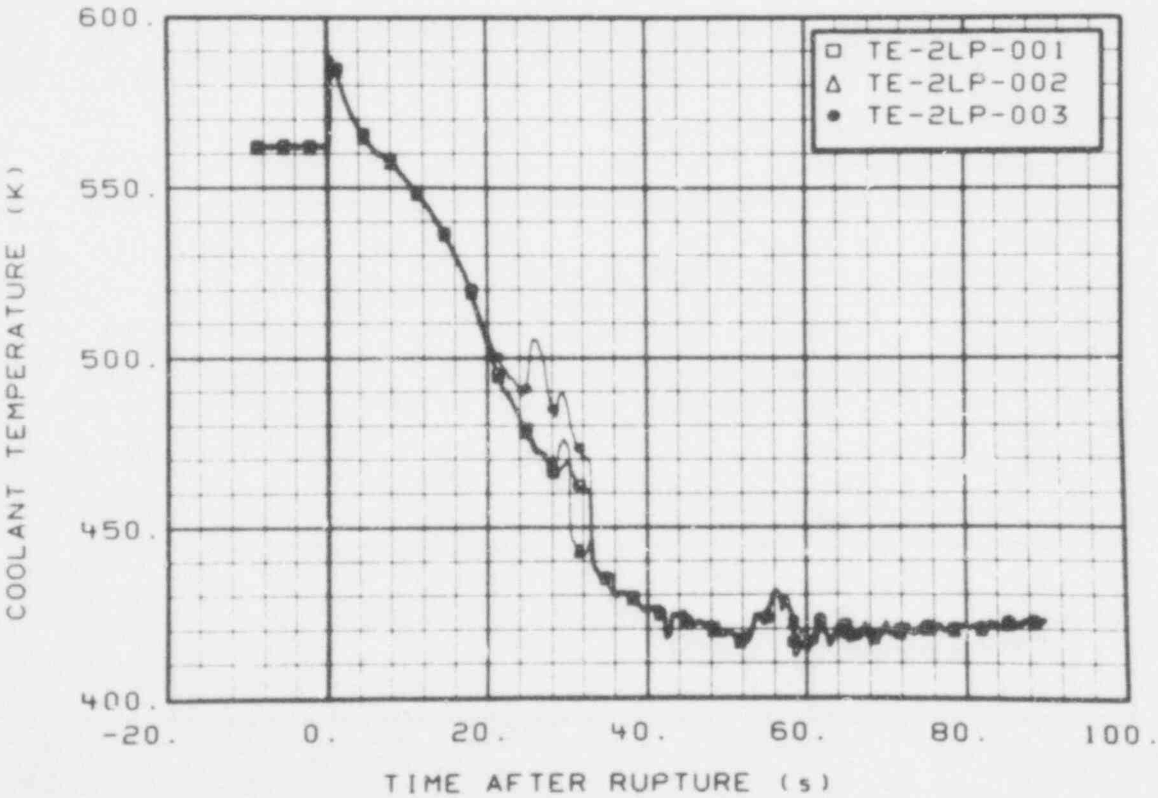


Fig. 186 Coolant temperature in reactor vessel at Fuel Assembly 2 lower end box (TE-2LP-001, 002, and -003) (QEUD).

563 353

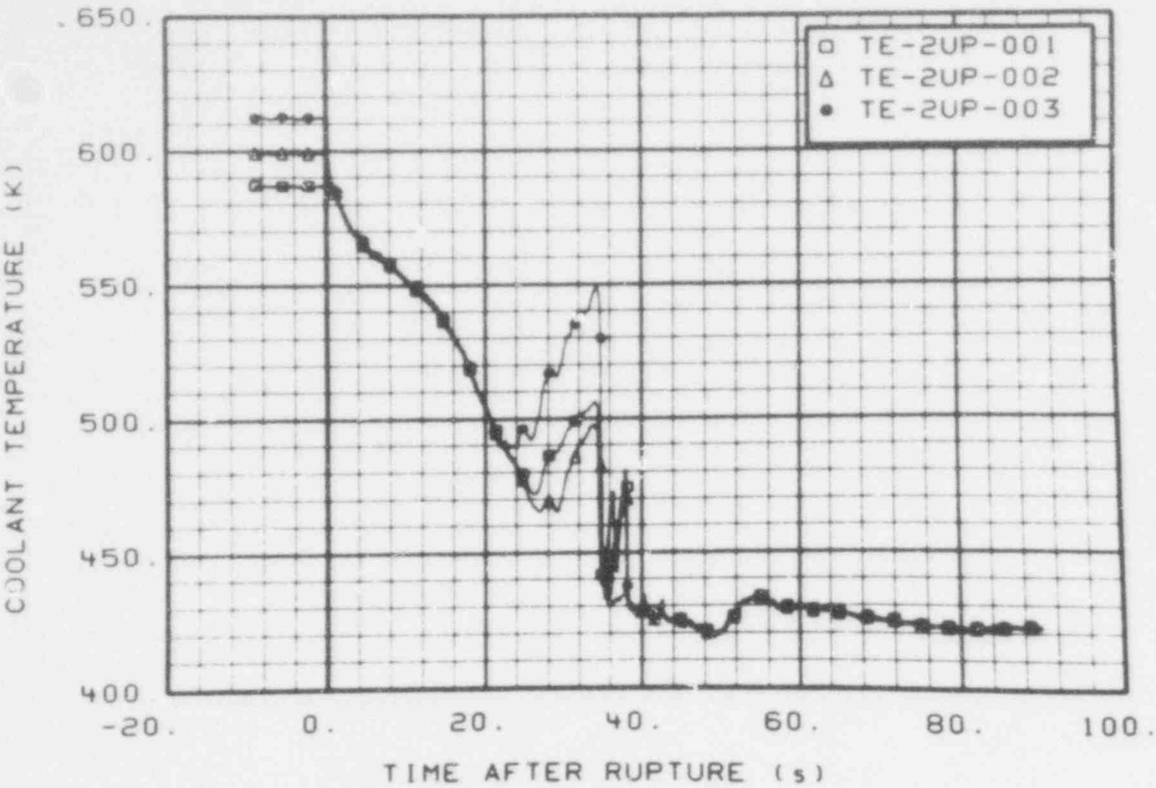


Fig. 187 Coolant temperature in reactor vessel at Fuel Assembly 2 upper end box (TE-2UP-001, 002, and -003) (QEUD).

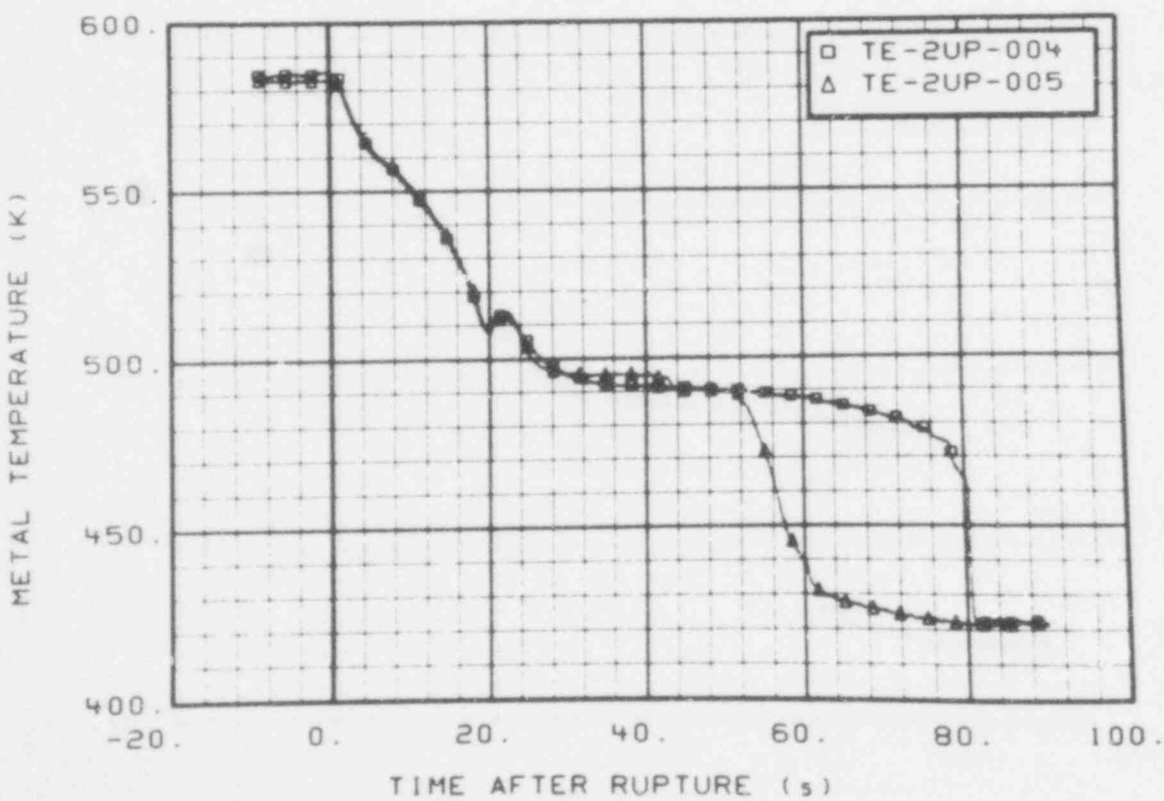


Fig. 188 Metal temperature on Fuel Assembly 2 upper core support column (TE-2UP-004 and -005) (QEUD).

563 354

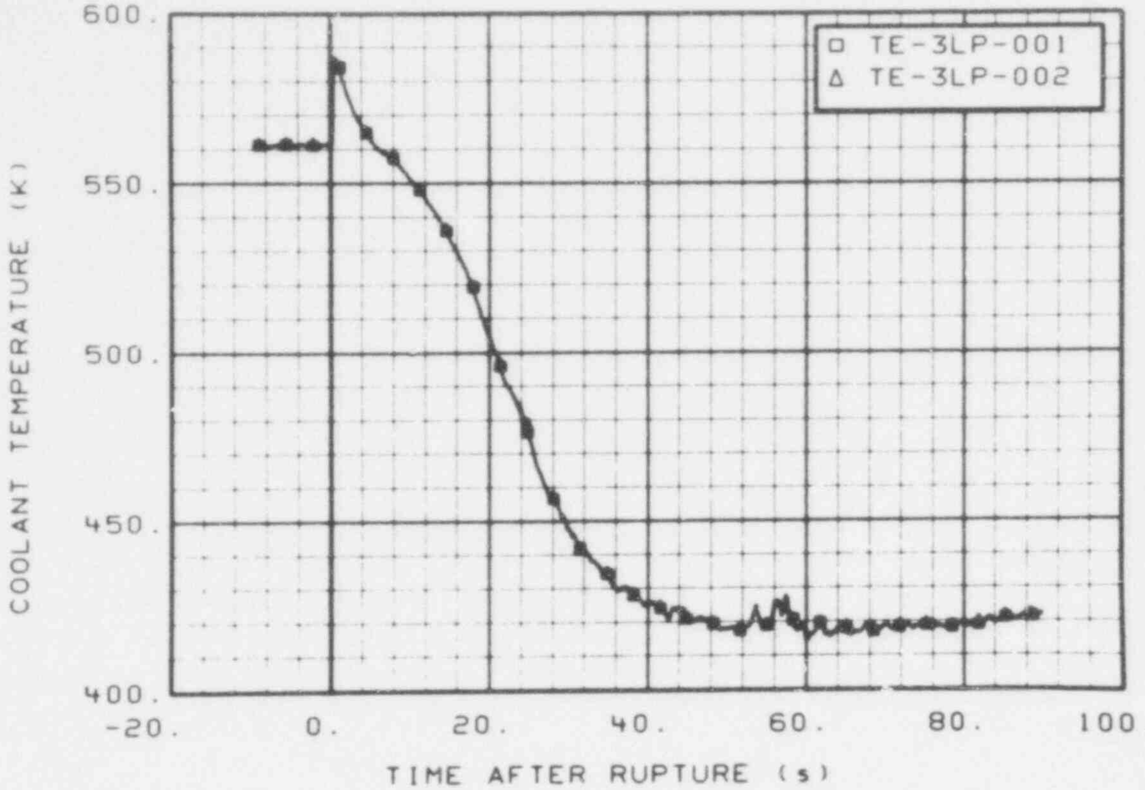


Fig. 189 Coolant temperature in reactor vessel at Fuel Assembly 3 lower end box (TE-3LP-001 and -002) (QEUD).

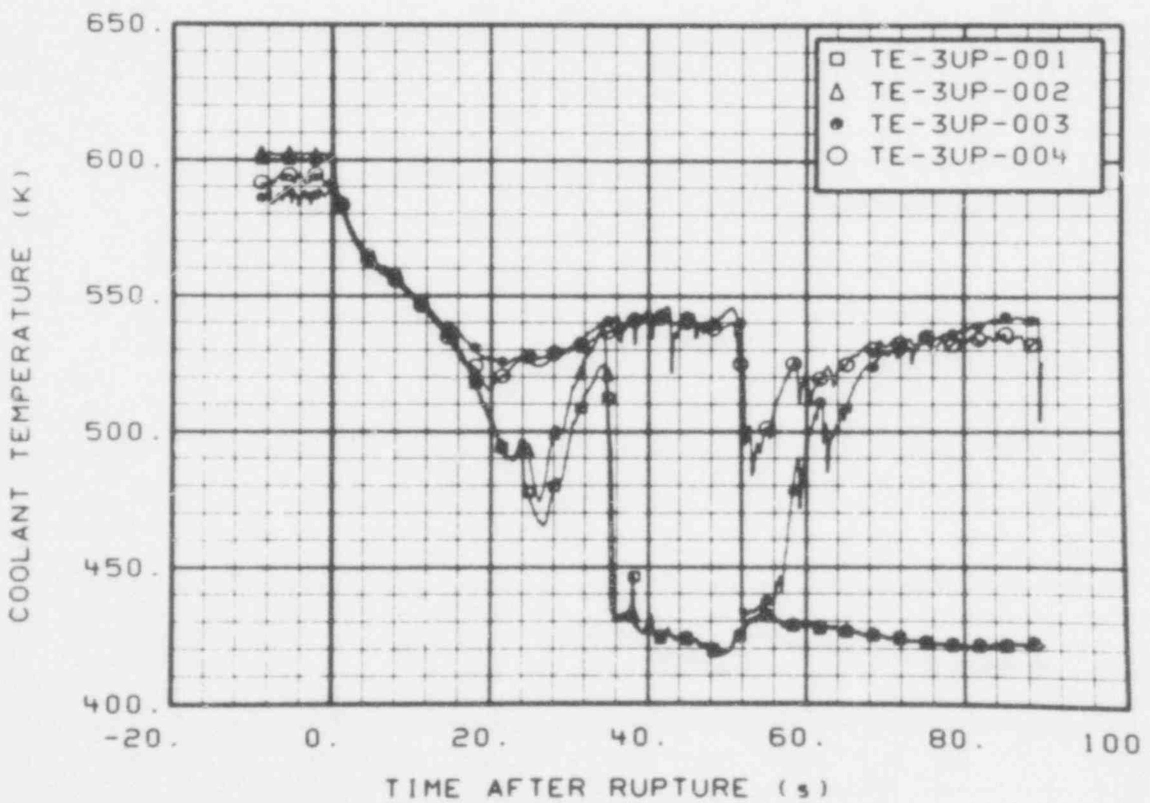


Fig. 190 Coolant temperature in reactor vessel at Fuel Assembly 3 upper end box and above outlet nozzle at support column (TE-3UP-001, -002, -003, and -004) (QEUD).

563 355

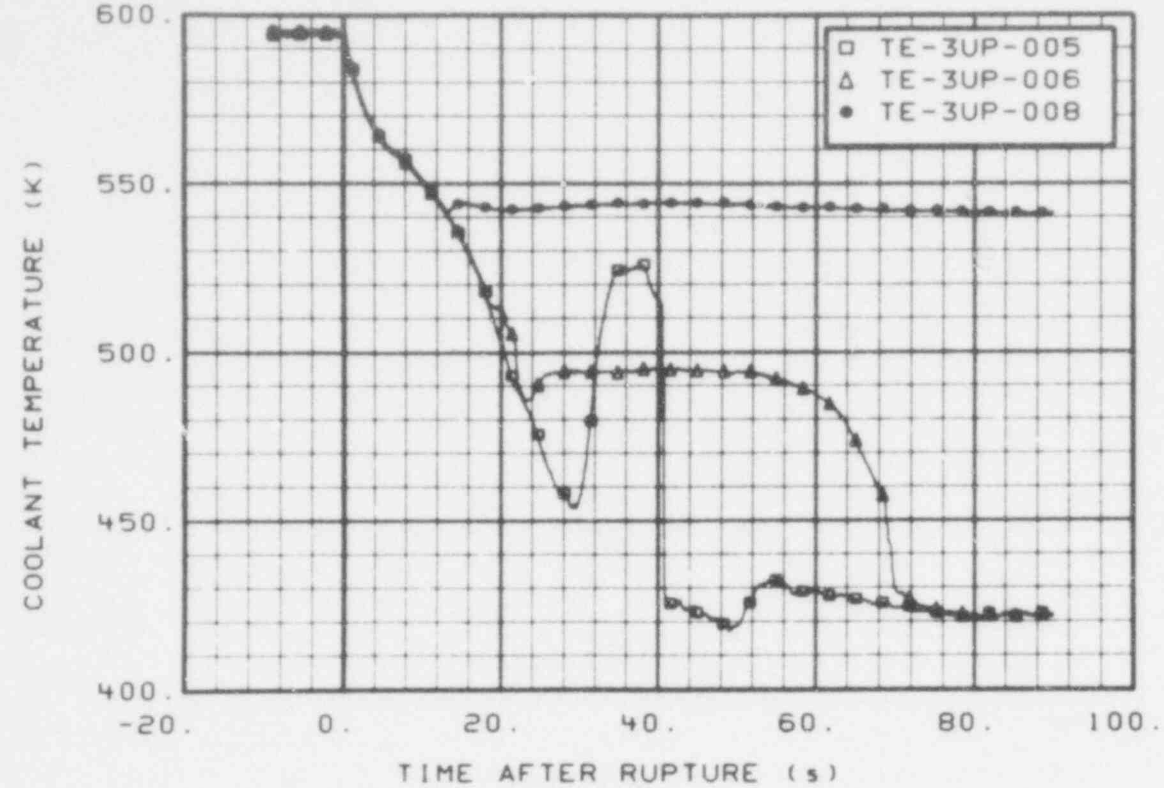


Fig. 191 Coolant temperature in reactor vessel at DTT FE-3UP-1 and at liquid level sting above Fuel Assembly 3 (TE-3UP-005, -006, and -008) (QEUD).

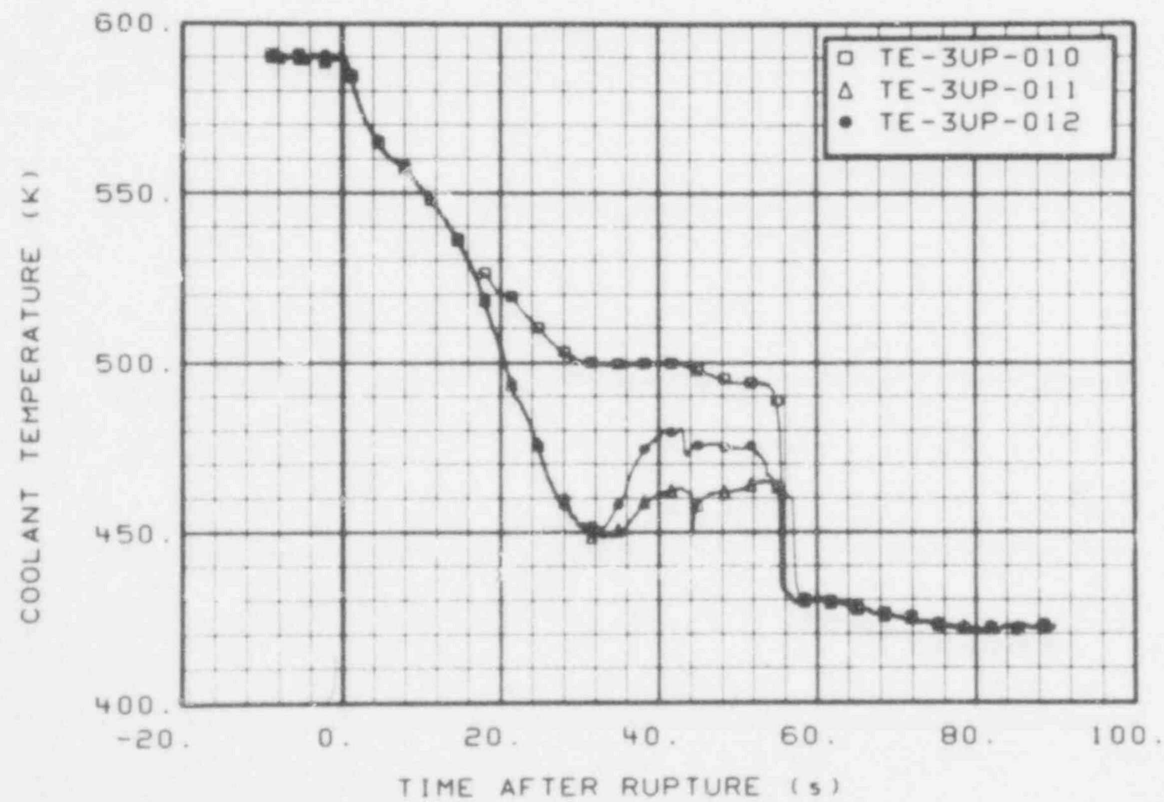


Fig. 192 Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-010, -011, and -012) (QEUD).

563 356

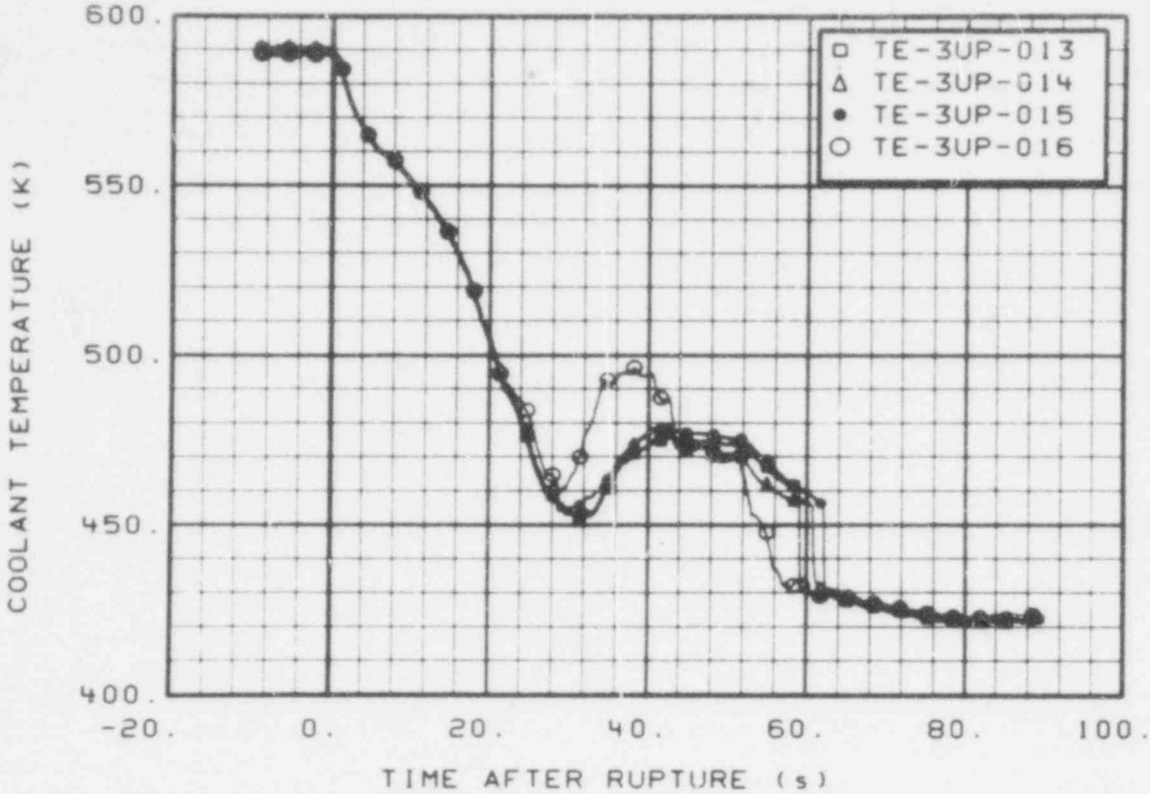


Fig. 193 Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-013, -014, -015, and -016) (QEUD).

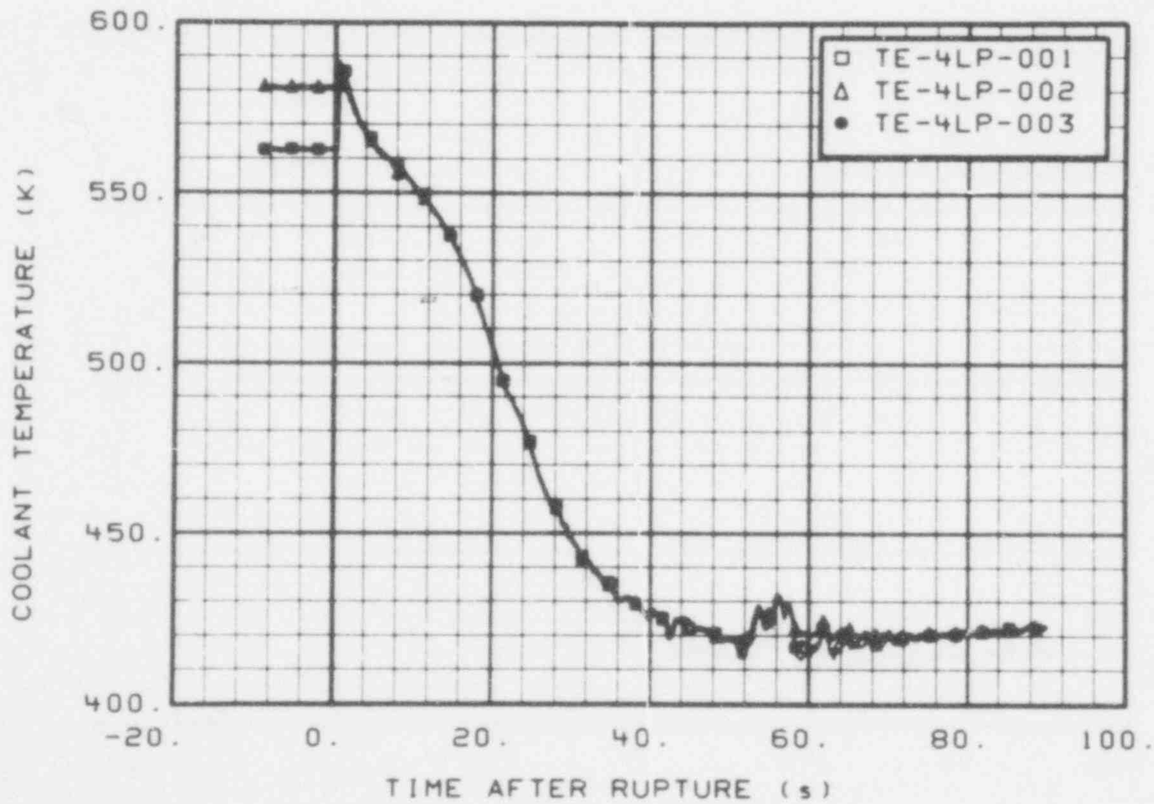


Fig. 194 Coolant temperature in reactor vessel at Fuel Assembly 4 lower end box (TE-4LP-001, -002, and -003) (QEUD).

563 357

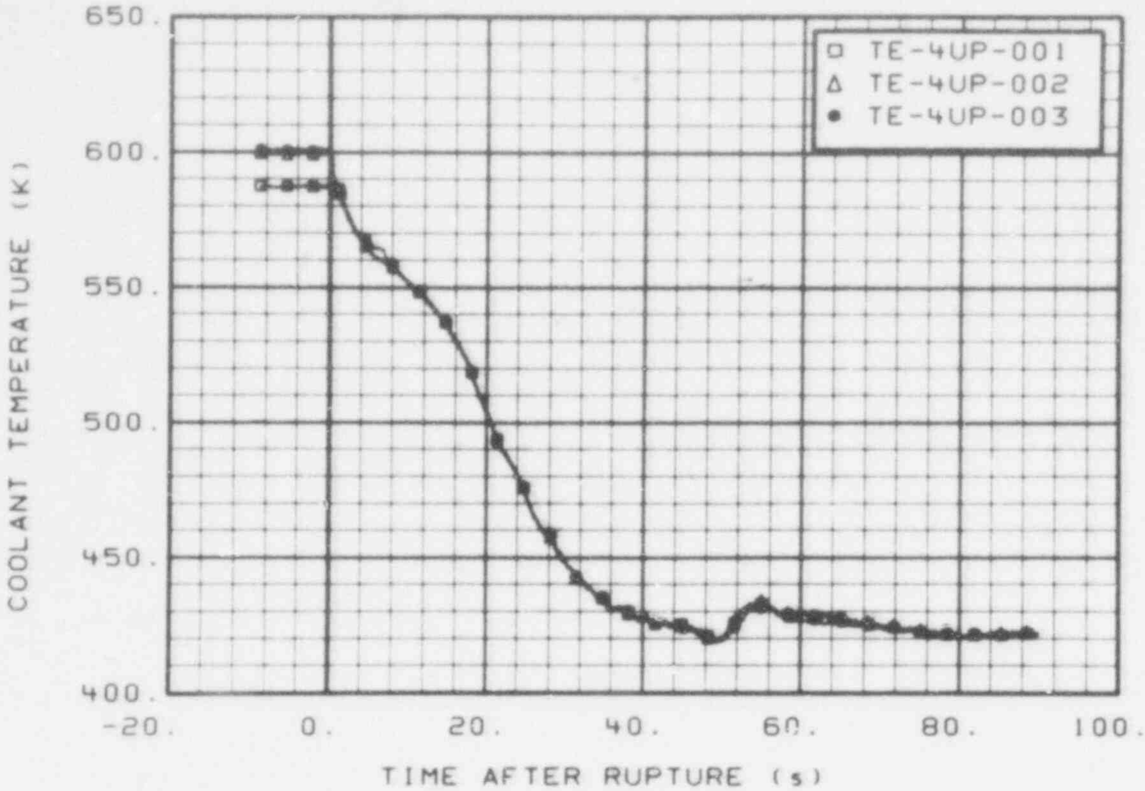


Fig. 195 Coolant temperature in reactor vessel at Fuel Assembly 4 lower end box (TE-4UP-001, -002, and -003) (QEUD).

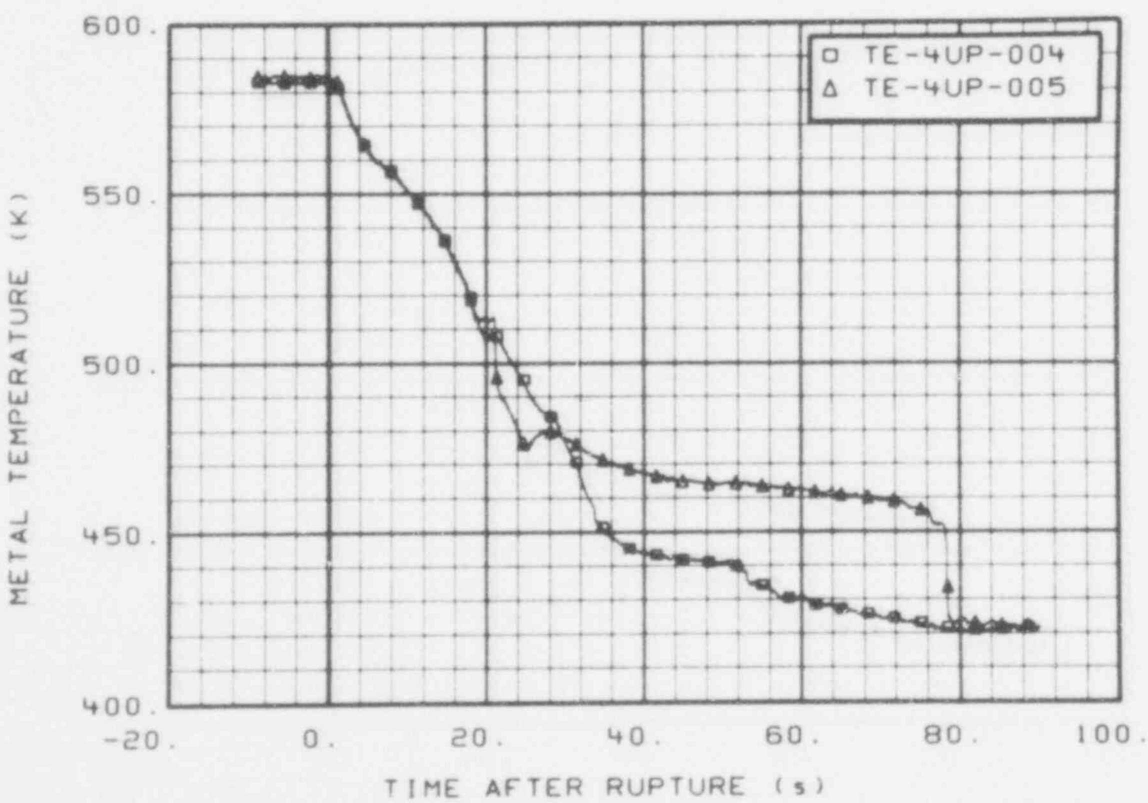


Fig. 196 Metal temperature on Fuel Assembly 4 upper core support column (TE-4UP-004 and -005) (QEUD).

563 358

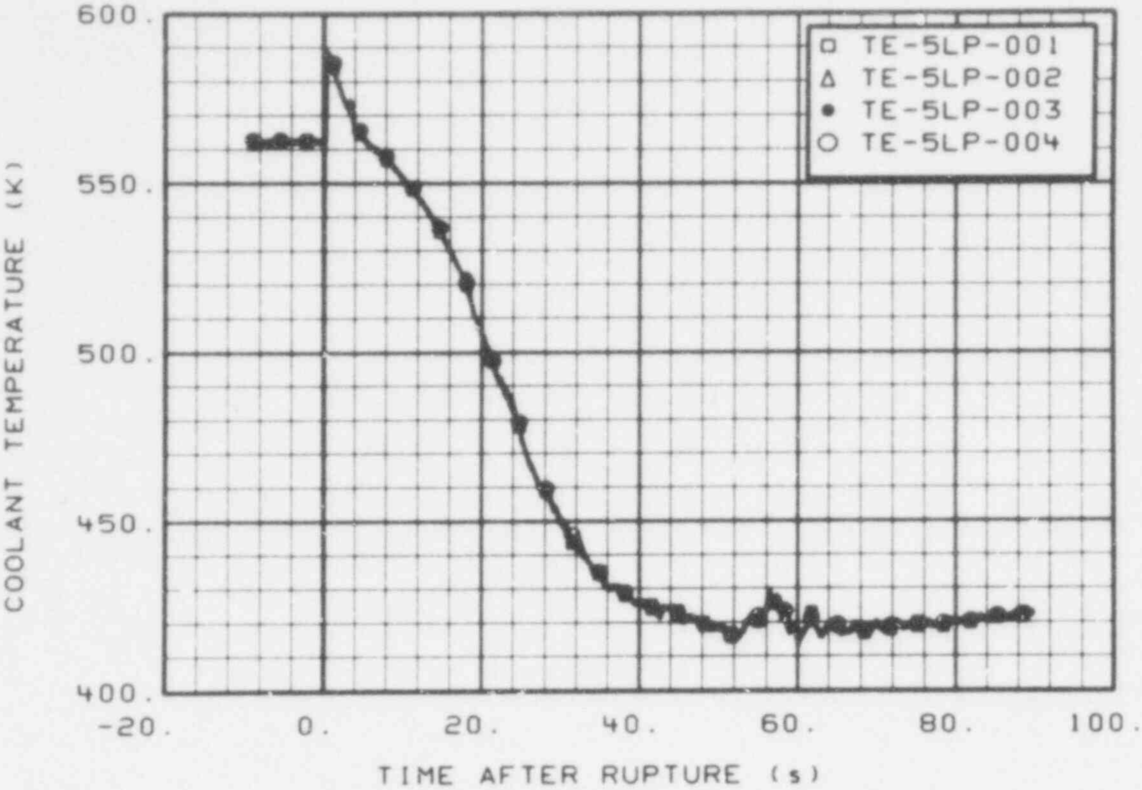


Fig. 197 Coolant temperature in reactor vessel at Fuel Assembly 5 lower end box (TE-5LP-001, -002, -003, and -004) (QEUD).

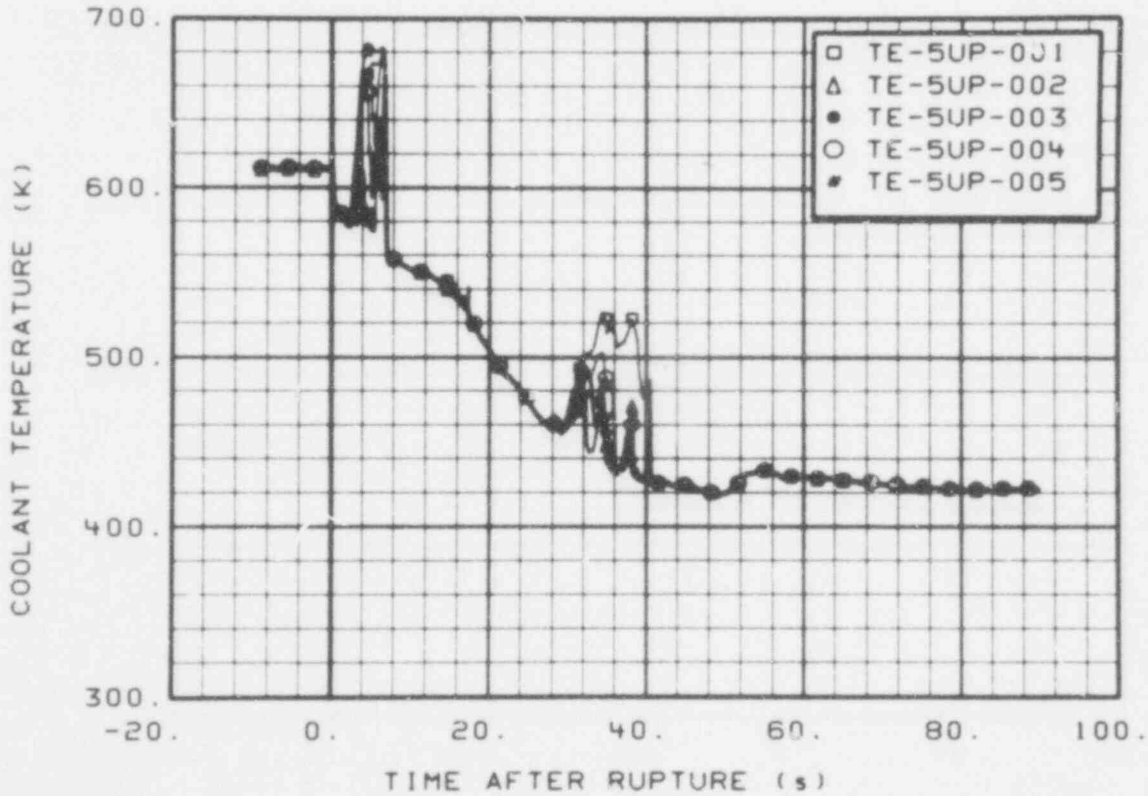


Fig. 198 Coolant temperature in reactor vessel at Fuel Assembly 5 upper end box (TE-5UP-001, -002, -003, -004, and -005) (QEUD).

563 359

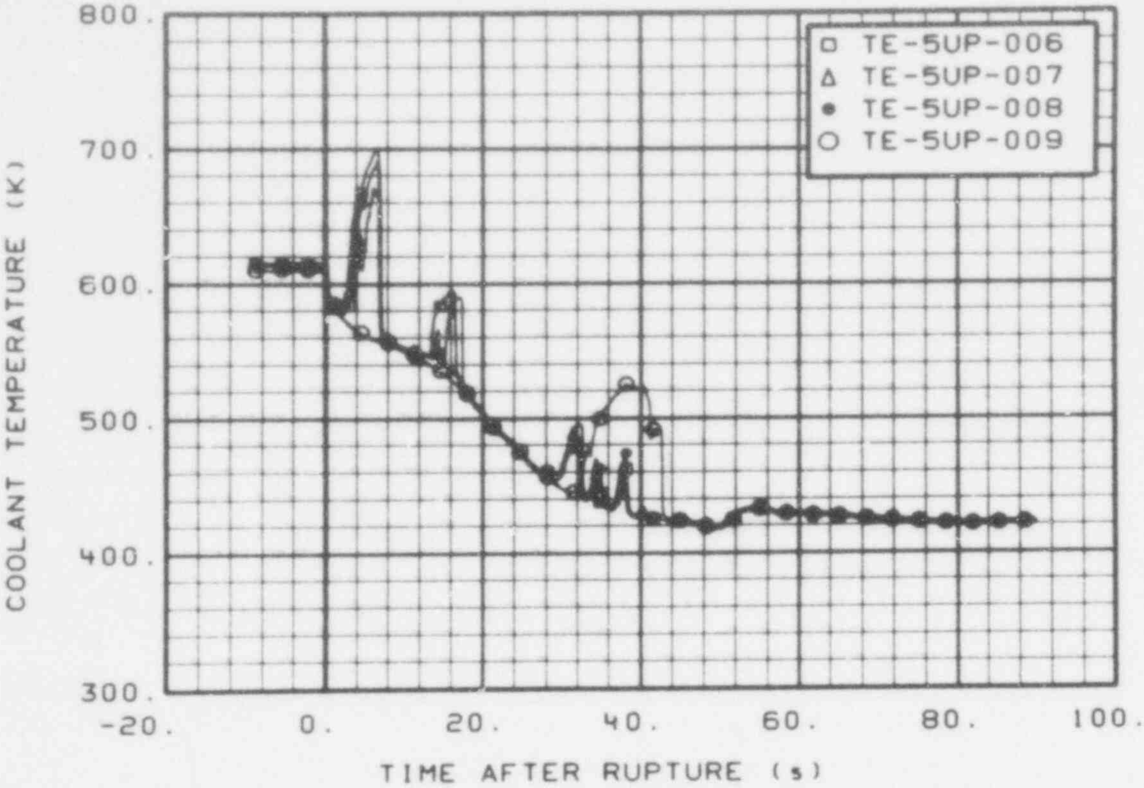


Fig. 199 Coolant te:.perature in reactor vessel at Fuel Assembly 5 upper end box and at DTT FE-5UP-001 (TE-5UP-006, -007, -008, and -009) (QEUD).

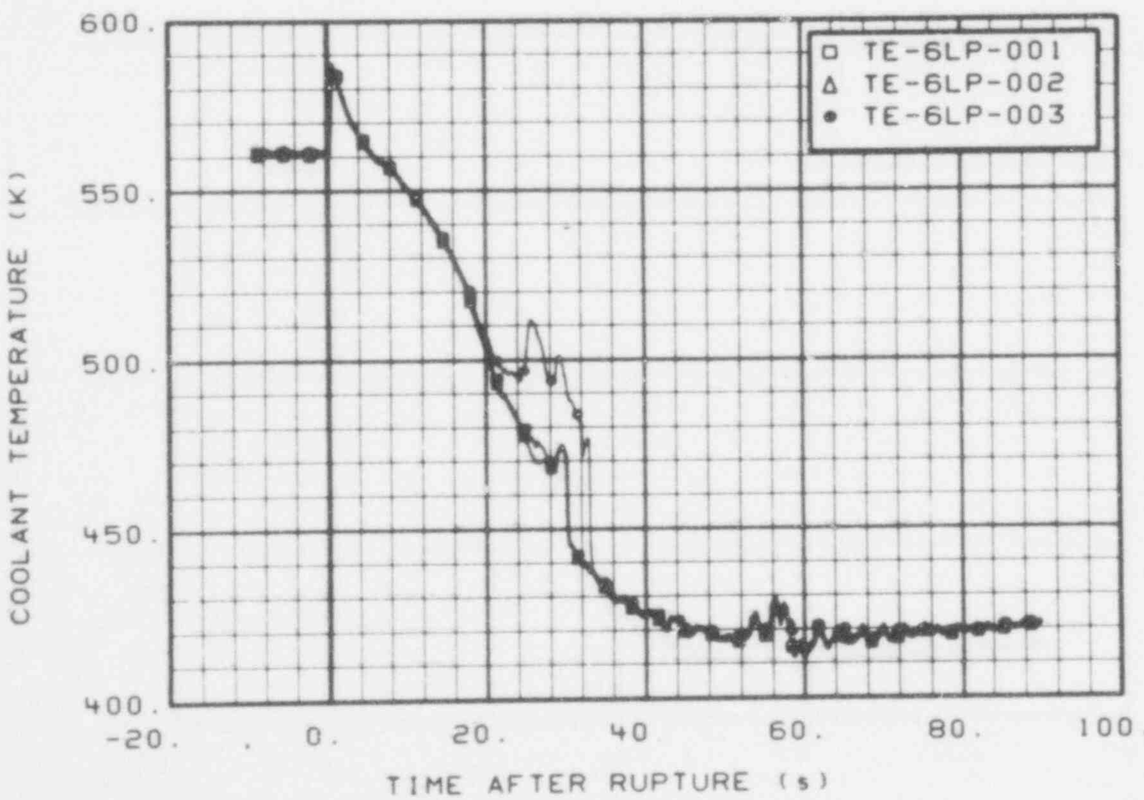
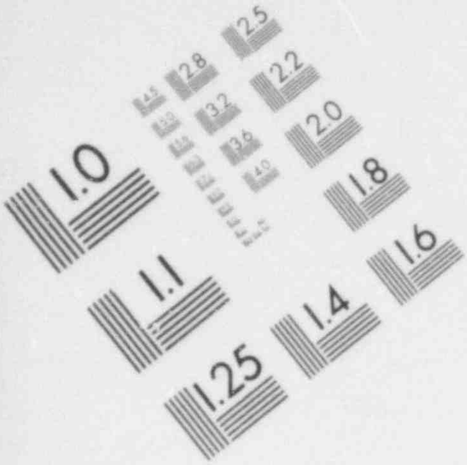


Fig. 200 Coolant temperature in reactor vessel at Fuel Assembly 6 lower end box (TE-6LP-001, -062, and -003) (QEUD).

563 360



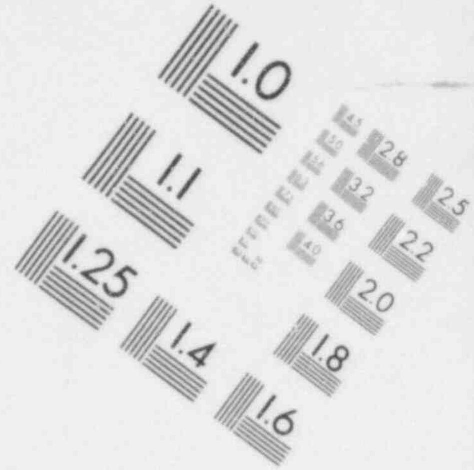
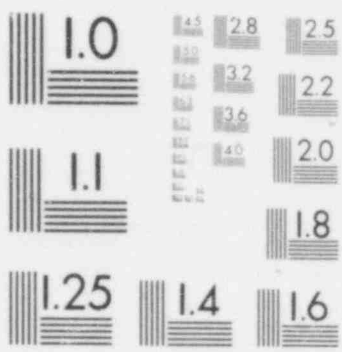
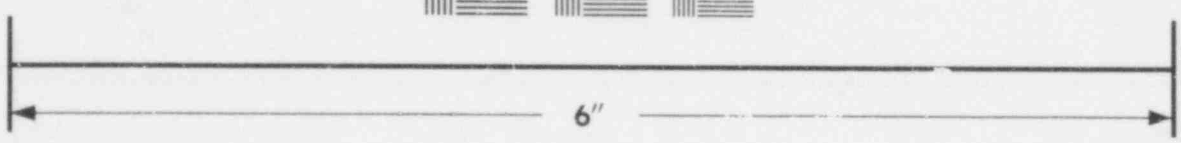
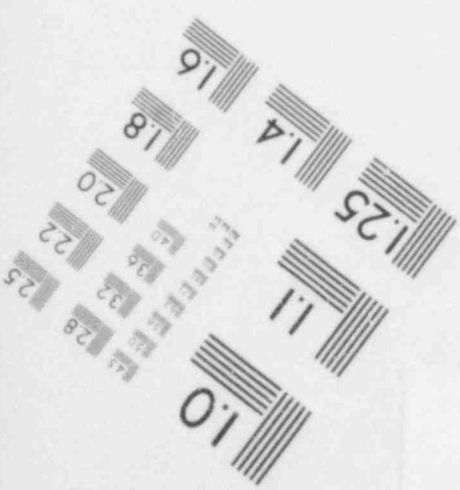


IMAGE EVALUATION TEST TARGET (MT-3)







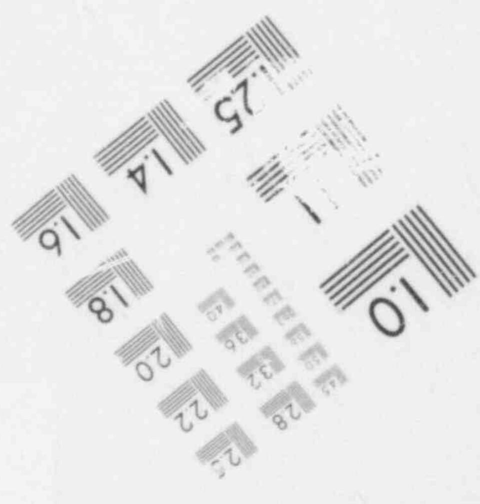
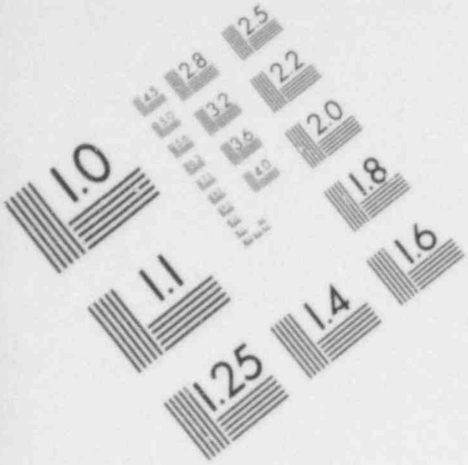


IMAGE EVALUATION TEST TARGET (MT-3)

6″



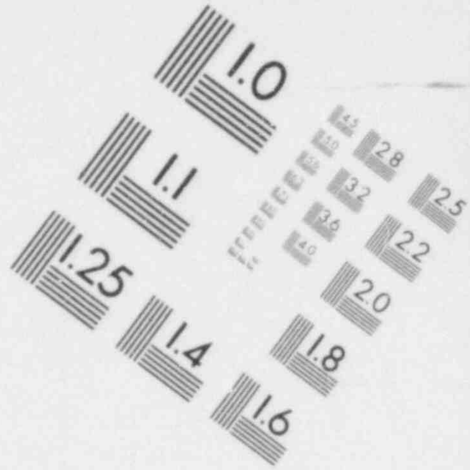
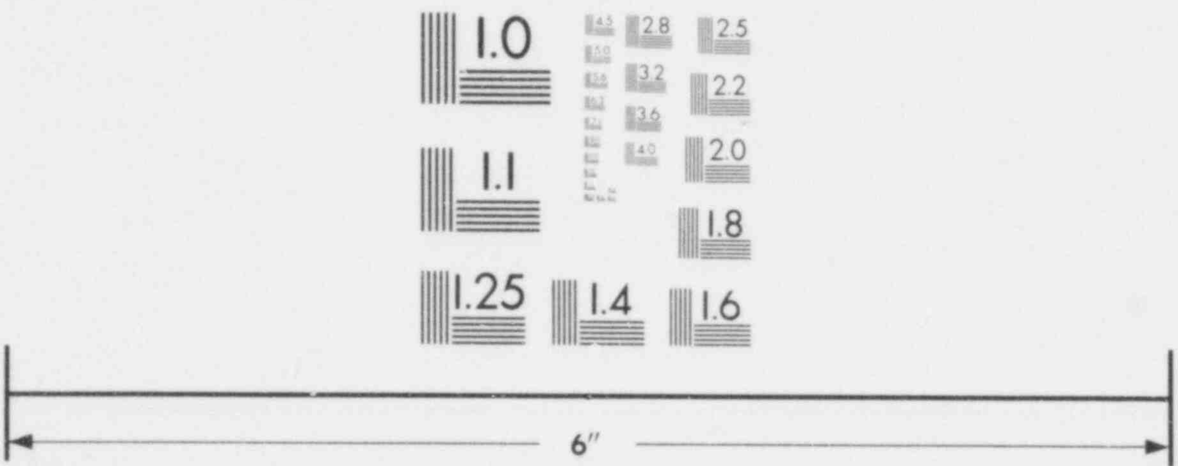
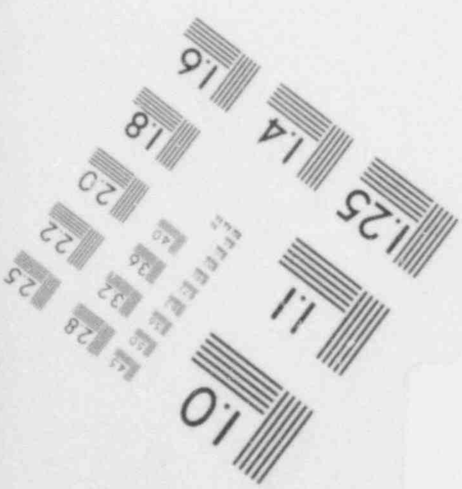
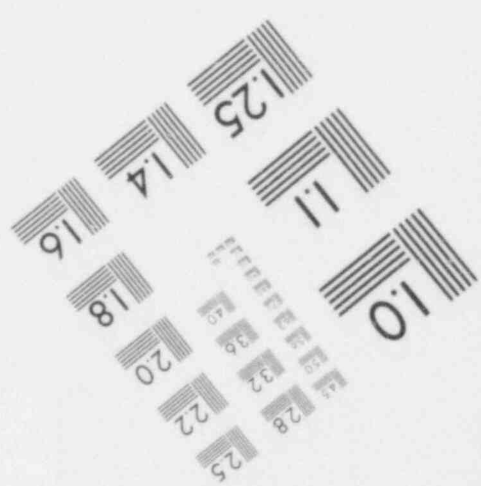
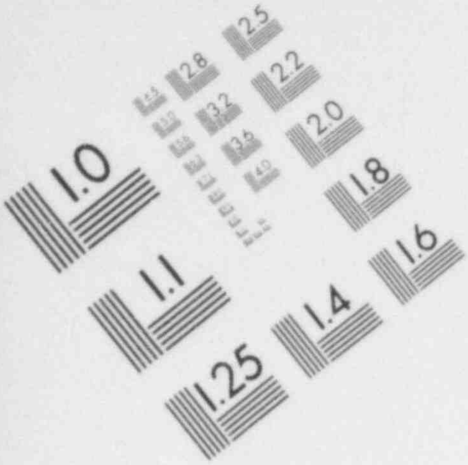


IMAGE EVALUATION TEST TARGET (MT-3)









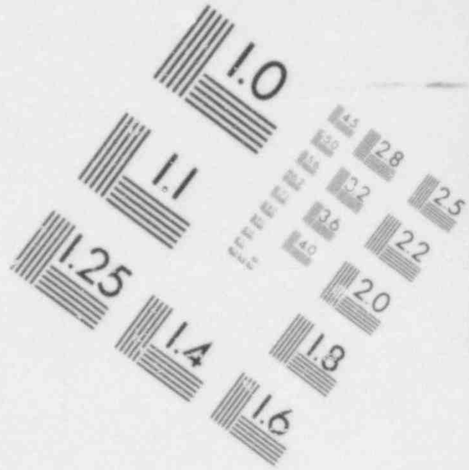
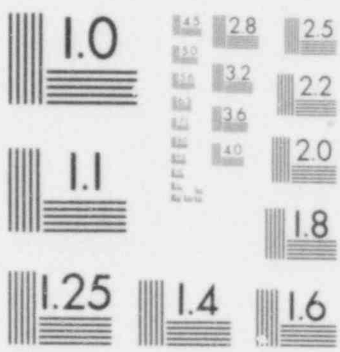


IMAGE EVALUATION
TEST TARGET (MT-3)



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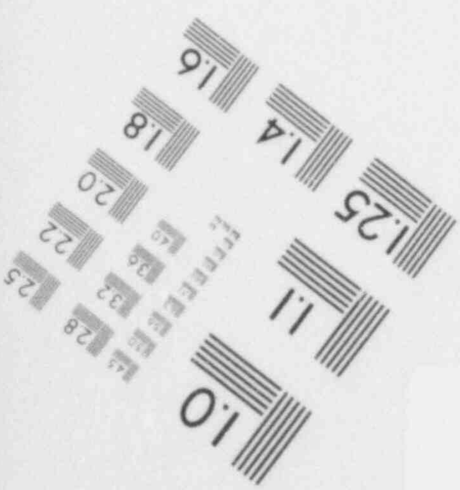

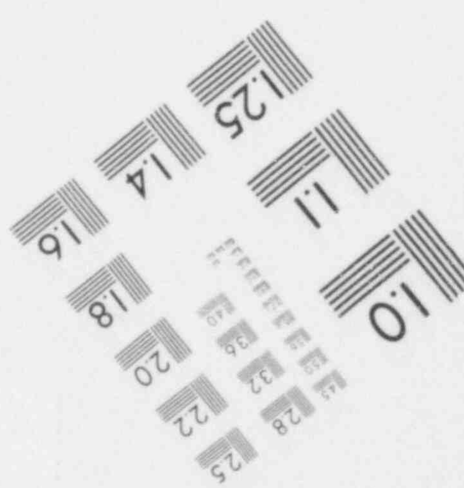

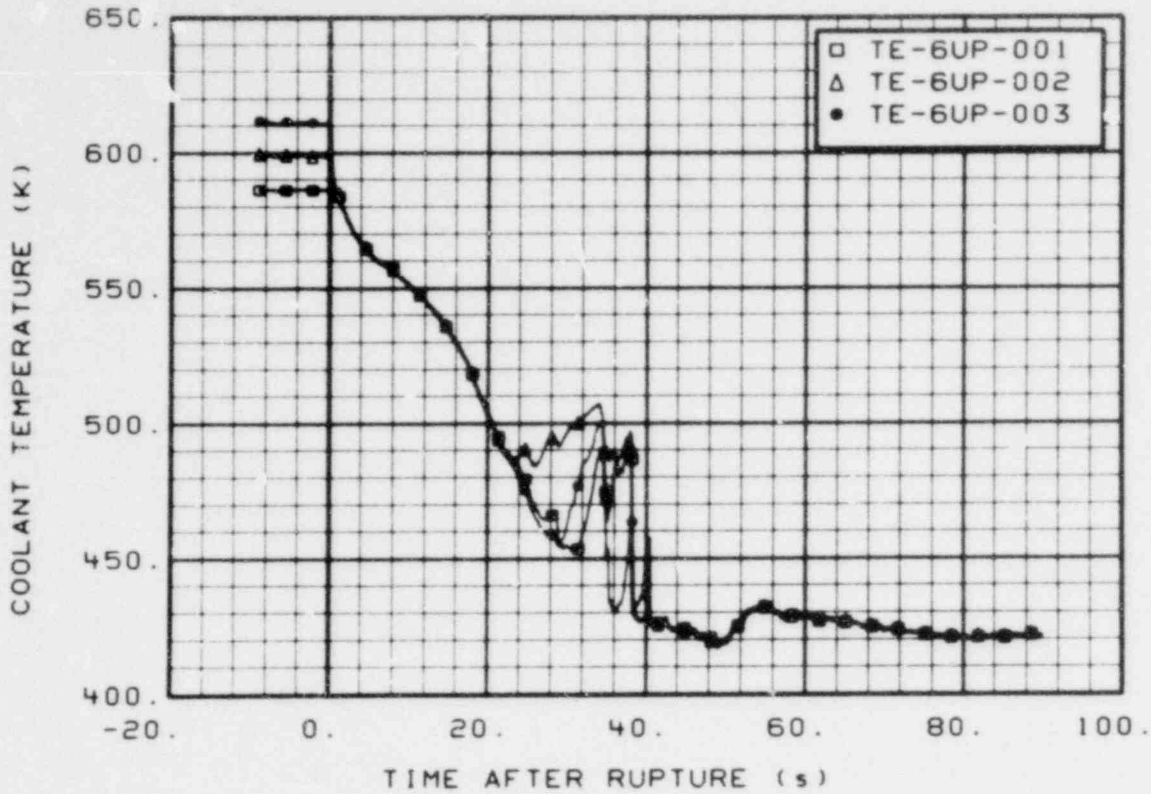

Fig. 201 Coolant temperature in reactor vessel at Fuel Assembly 6 upper end box (TE-6UP-001, -002, and -003) (QEUD).

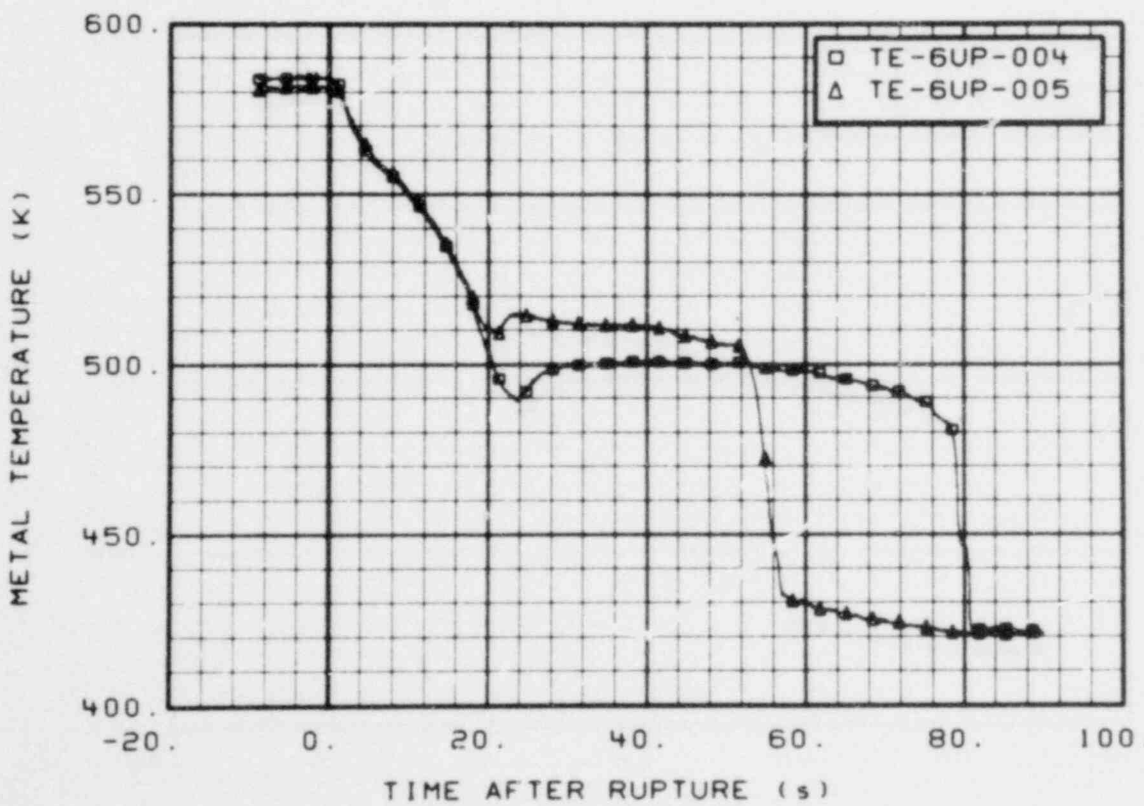

Fig. 202 Metal temperature on Fuel Assembly 6 upper core support column (TE-6UP-004 and -005) (QEUD).

564 001

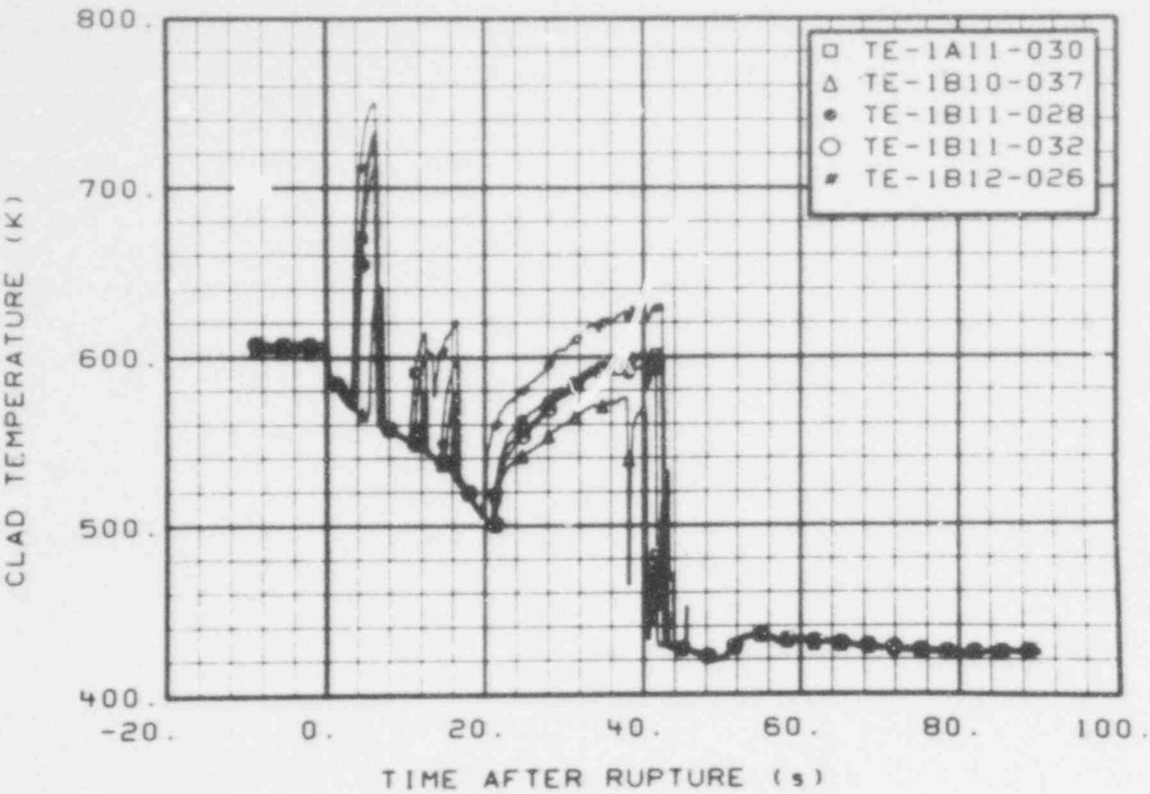

Fig. 203 Temperature of cladding on Fuel Assembly 1 Rods A11, B10, B11, and B12 (TE-1A11-030, TE-1B10-037, TE-1B11-028 and -032, and TE-1B12-026) (QEUD).

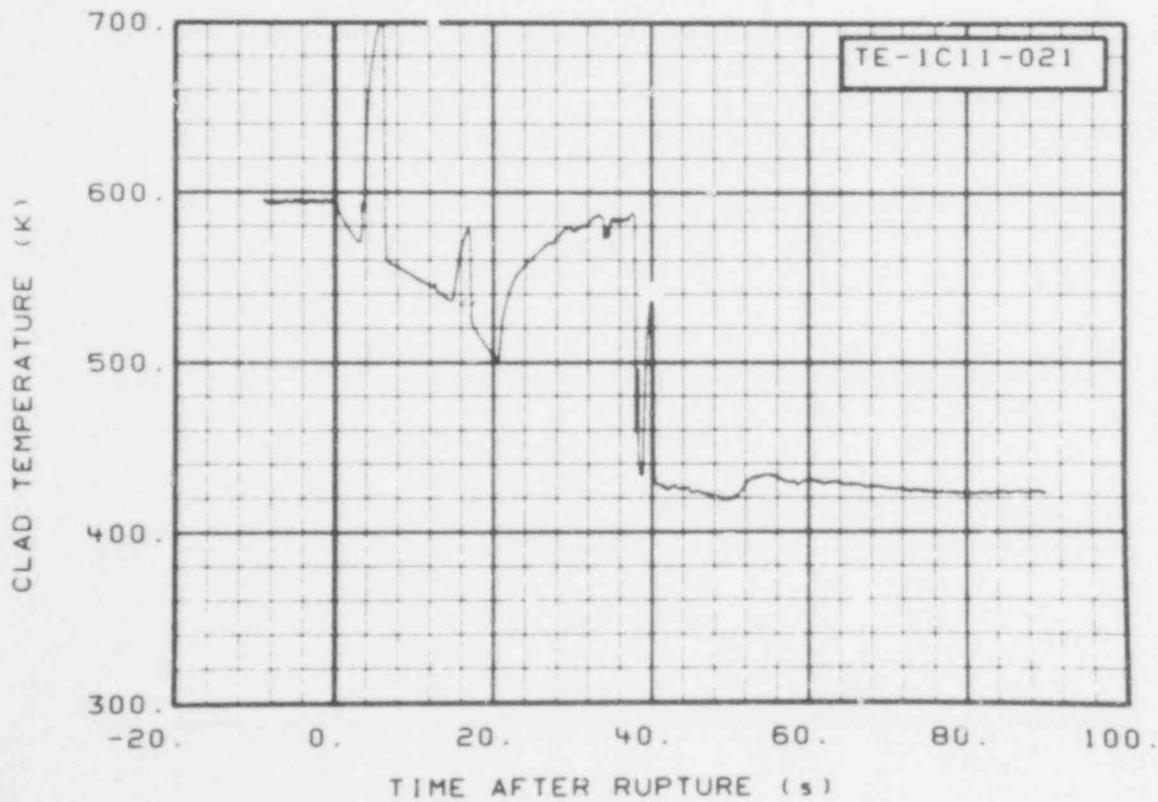

Fig. 204 Temperature of cladding on Fuel Assembly 1 Rod C11 (TE-1C11-021) (QEUD).

564 002

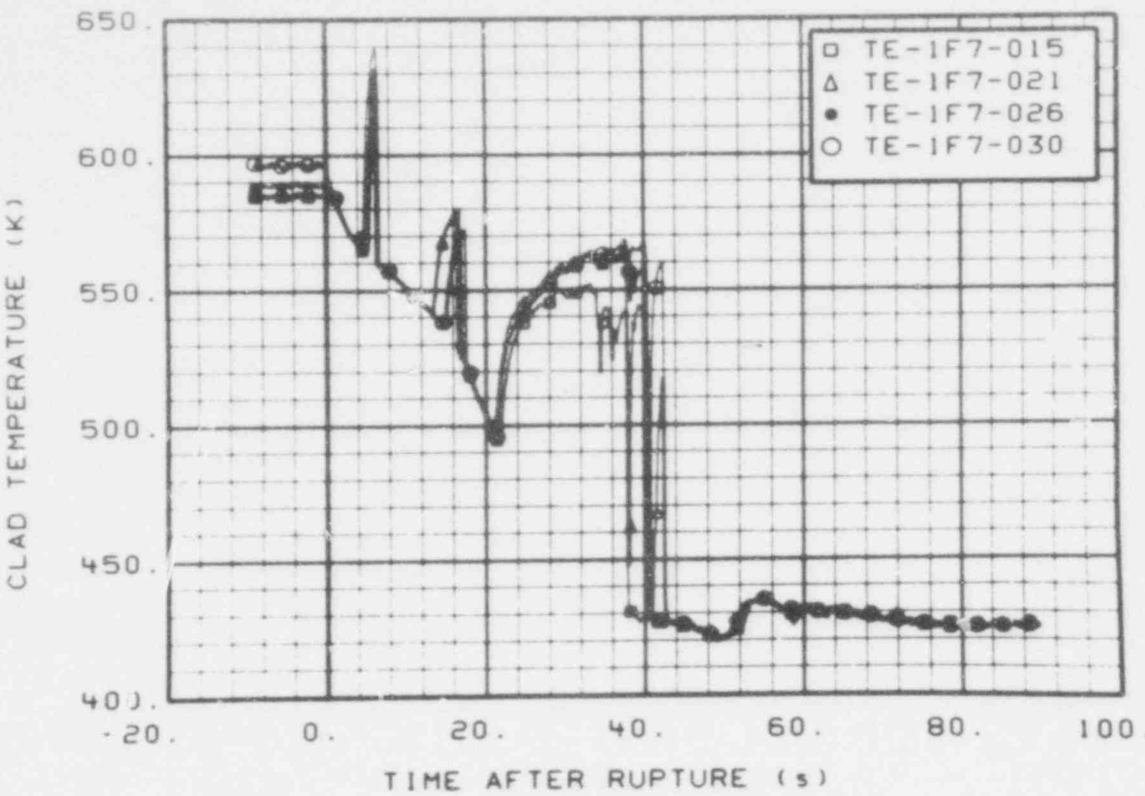

Fig. 205 Temperature of cladding on Fuel Assembly 1 Rod F7 (TE-1F7-015, -021, -026, and -030) (QEUD).

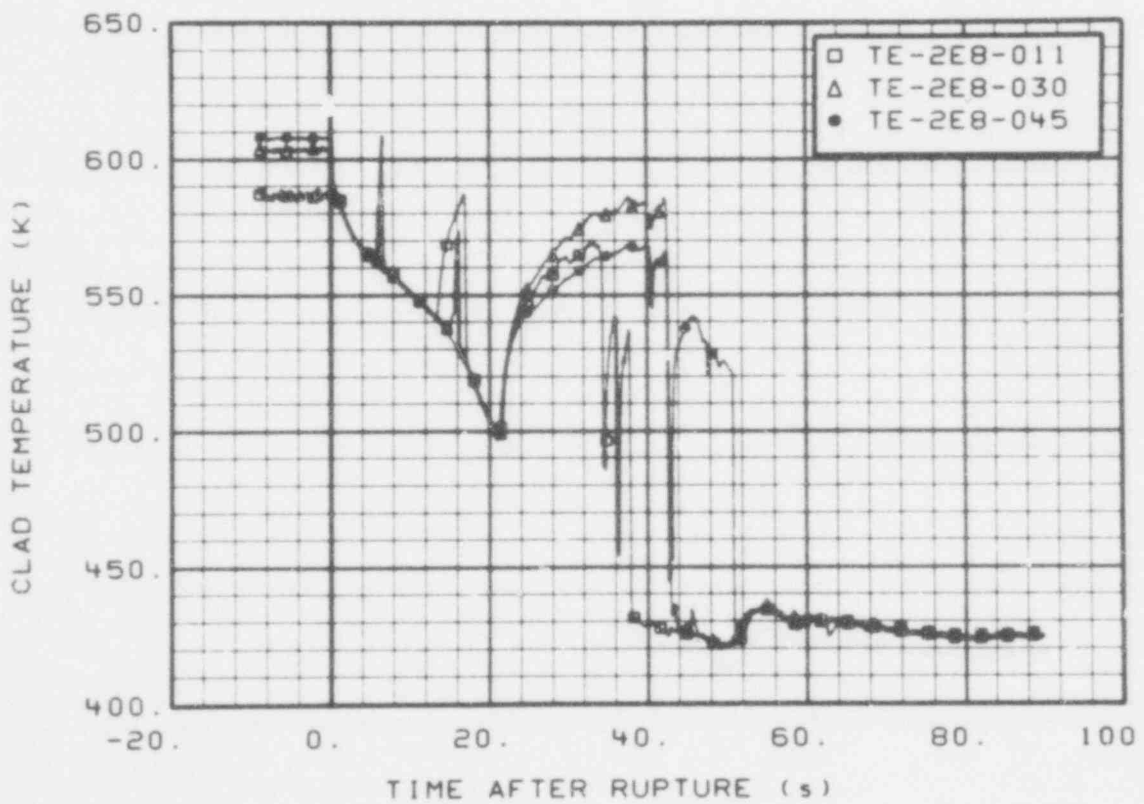

Fig. 206 Temperature of cladding on Fuel Assembly 2 Rod E8 (TE-2E8-011, -030, and -045) (QEUD).

564 003

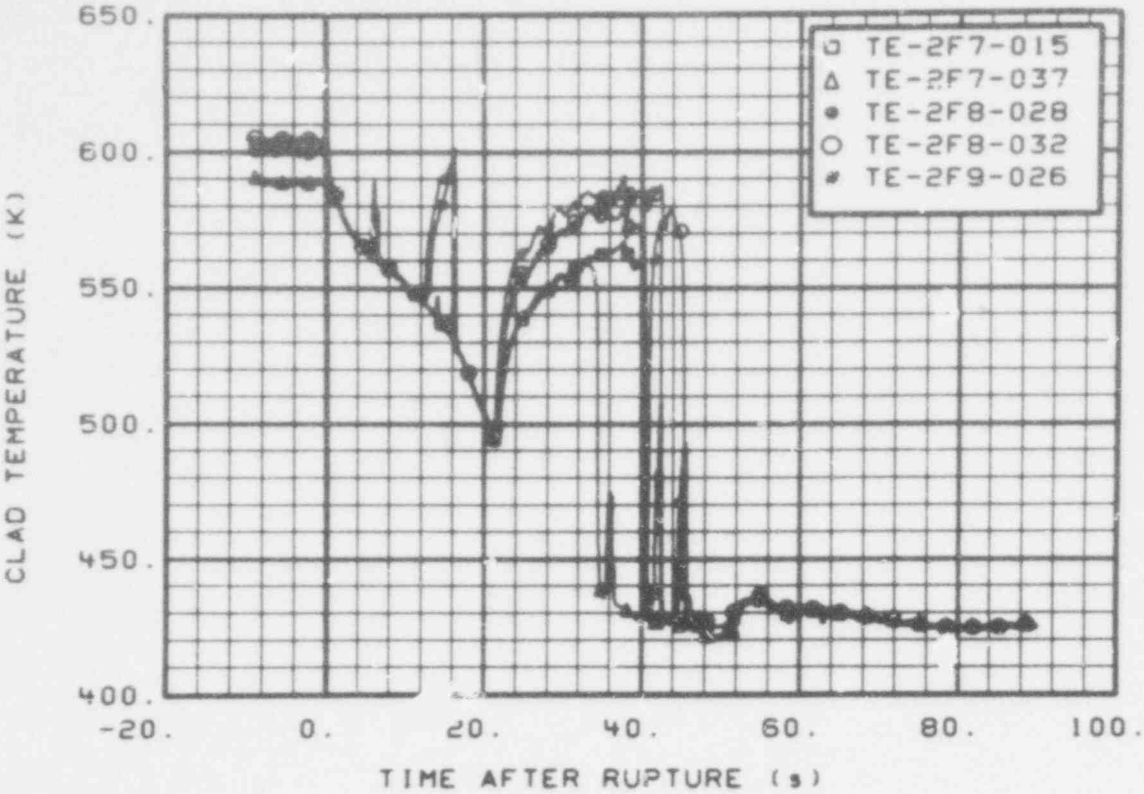

Fig. 207 Temperature of cladding on Fuel Assembly 2 Rods F7, F8, and F9 (TE-2F7-015, -037, TE-2F8-028 and -032, and TE-2F9-026) (QEUD).

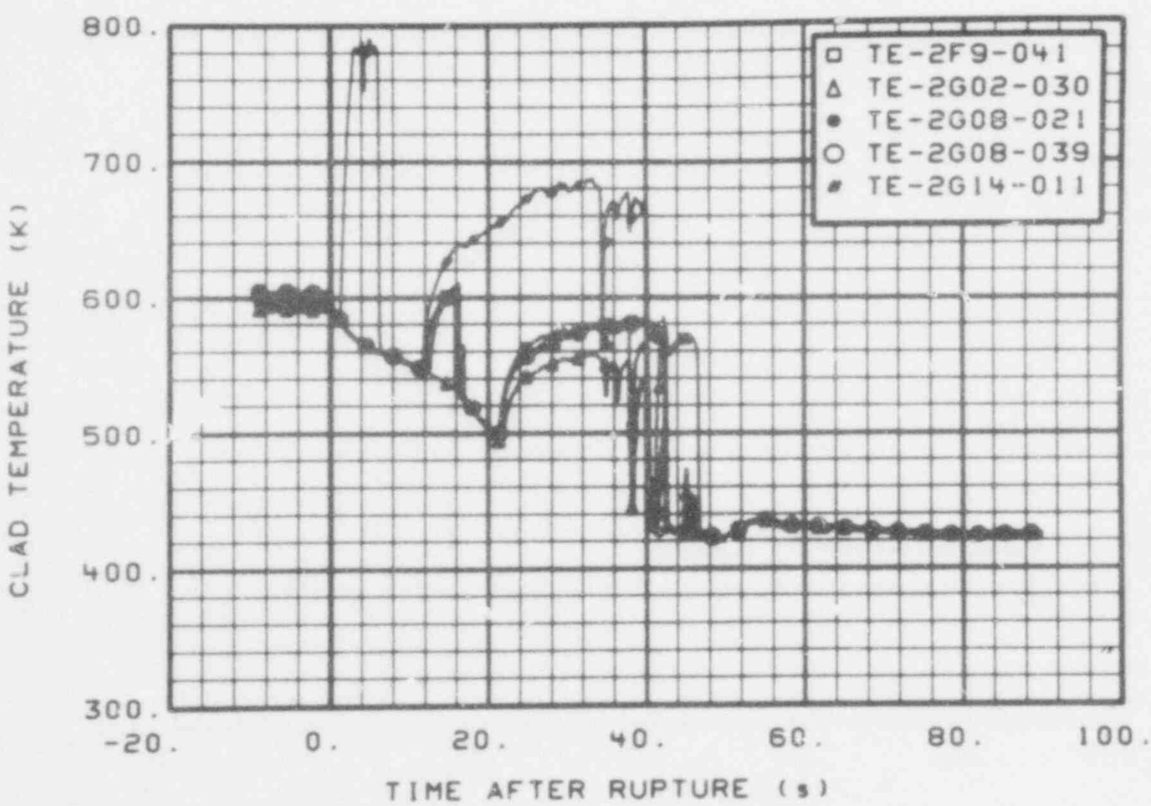

Fig. 208 Temperature of cladding on Fuel Assembly 2 Rods F9, G2, G8, and G14 (TE-2F9-041, TE-2G02-030, TE-2G08-021 and -039, and TE-2G14-011) (QEUD).

564 004

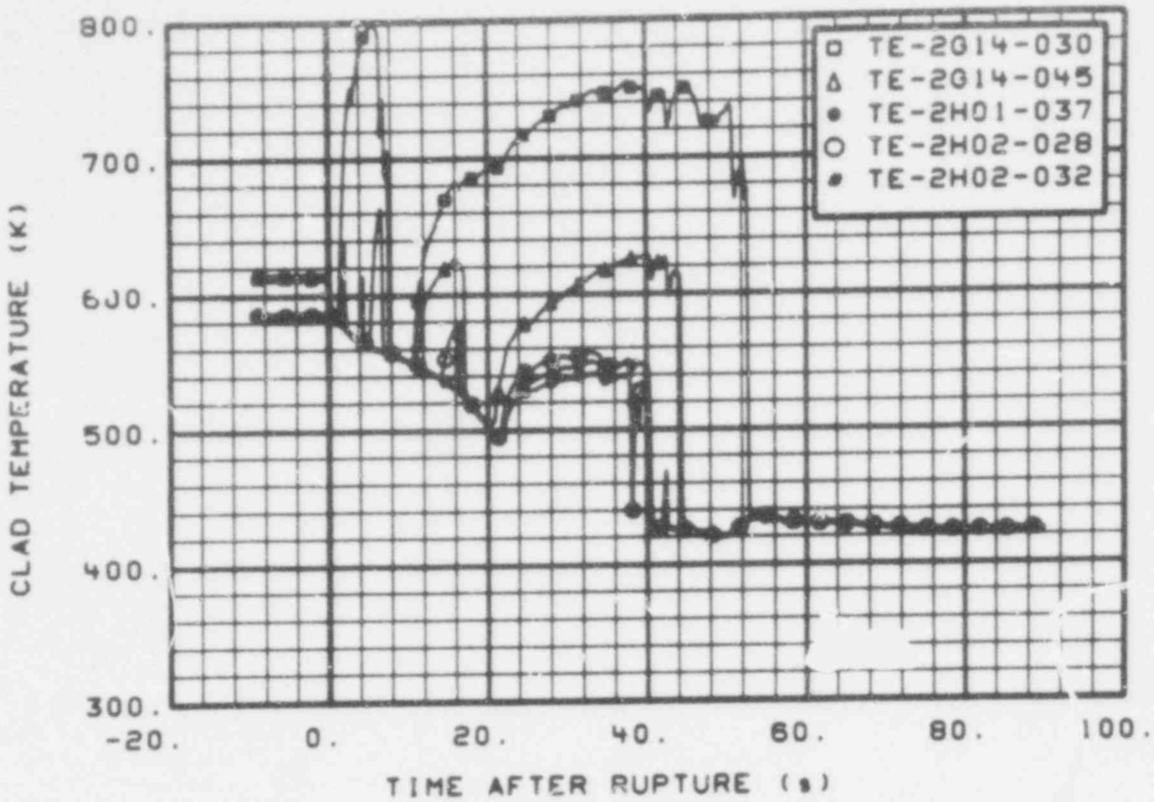

Fig. 209 Temperature of cladding on Fuel Assembly 2 Rods G14, H1, and H2 (TE-2G14-030 and -045, TE-2H01-037, TE-2H02-028 and -032) (QEUD).

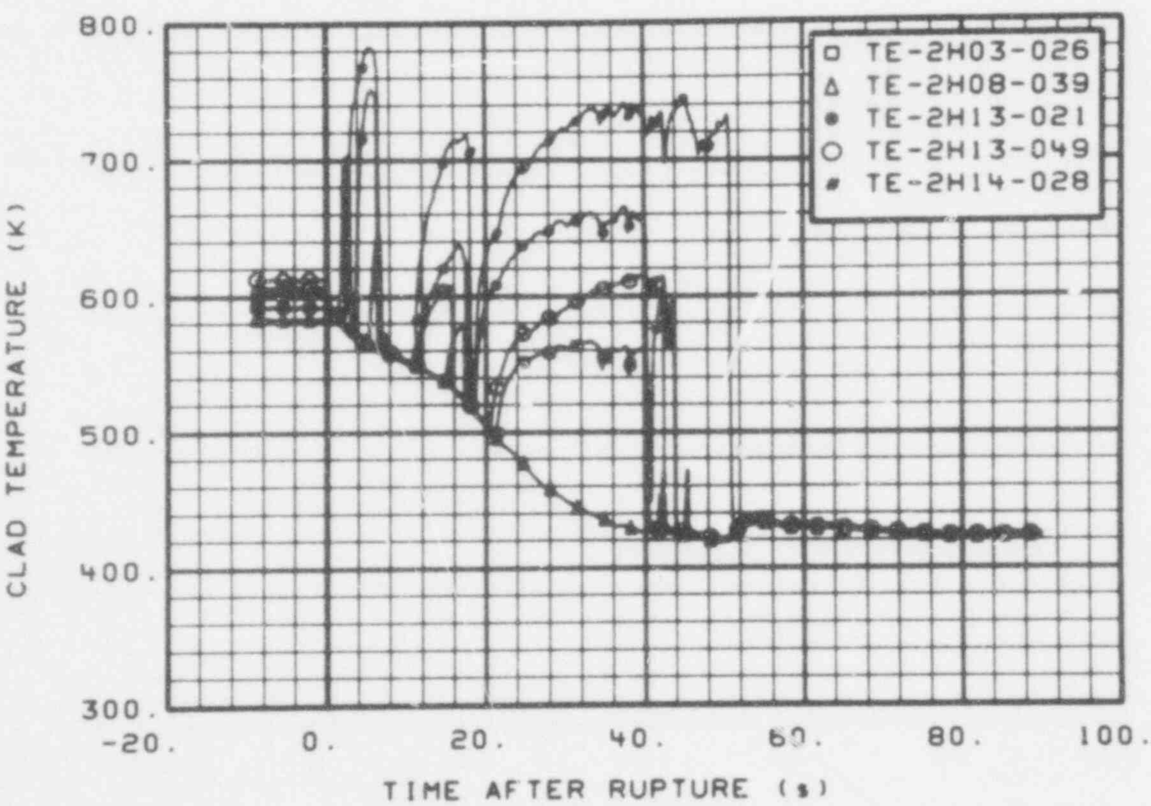

Fig. 210 Temperature of cladding on Fuel Assembly 2, Rods H3, H8, H13, and H14 (TE-2H03-026, TE-2H08-039, TE-2H13-021 and -049, TE-2H14-028) (QEUD).

564 005

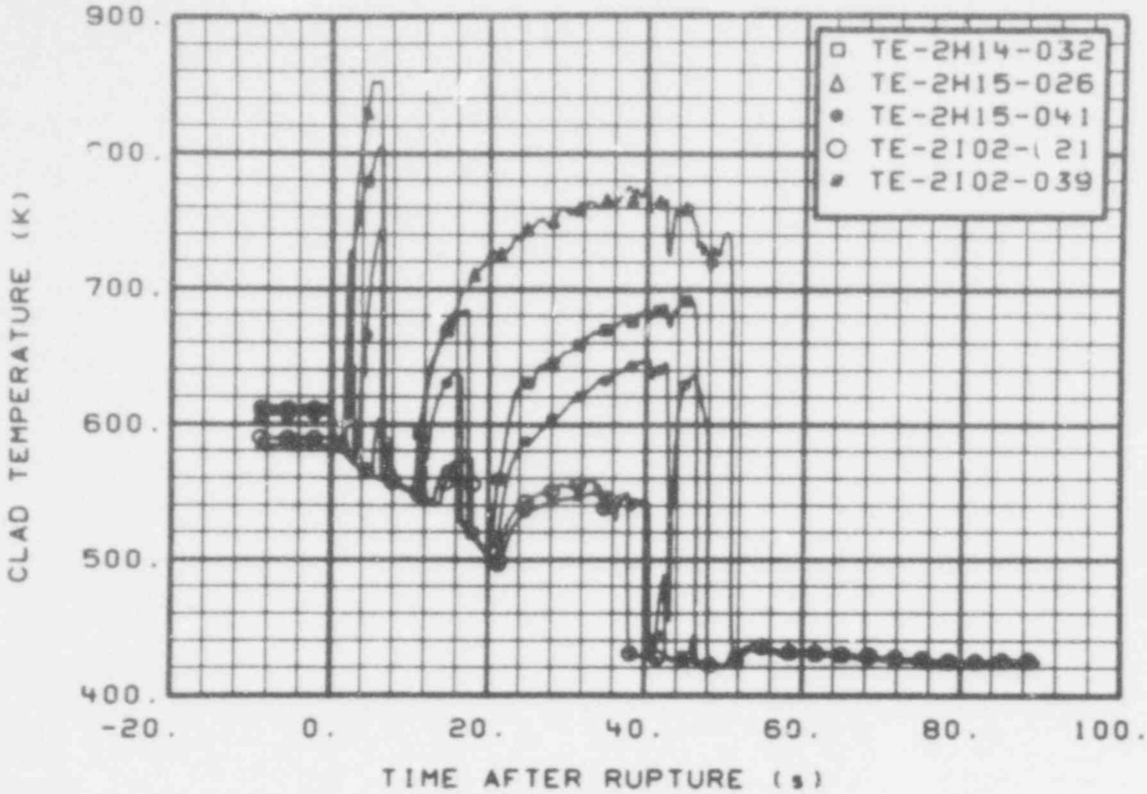

Fig. 211 Temperature of cladding on Fuel Assembly 2, Rods H14, H15, and I2 (TE-2H14-032, TE-2H15-026 and -041, TE-2I02-021 and -039) (QEUD).

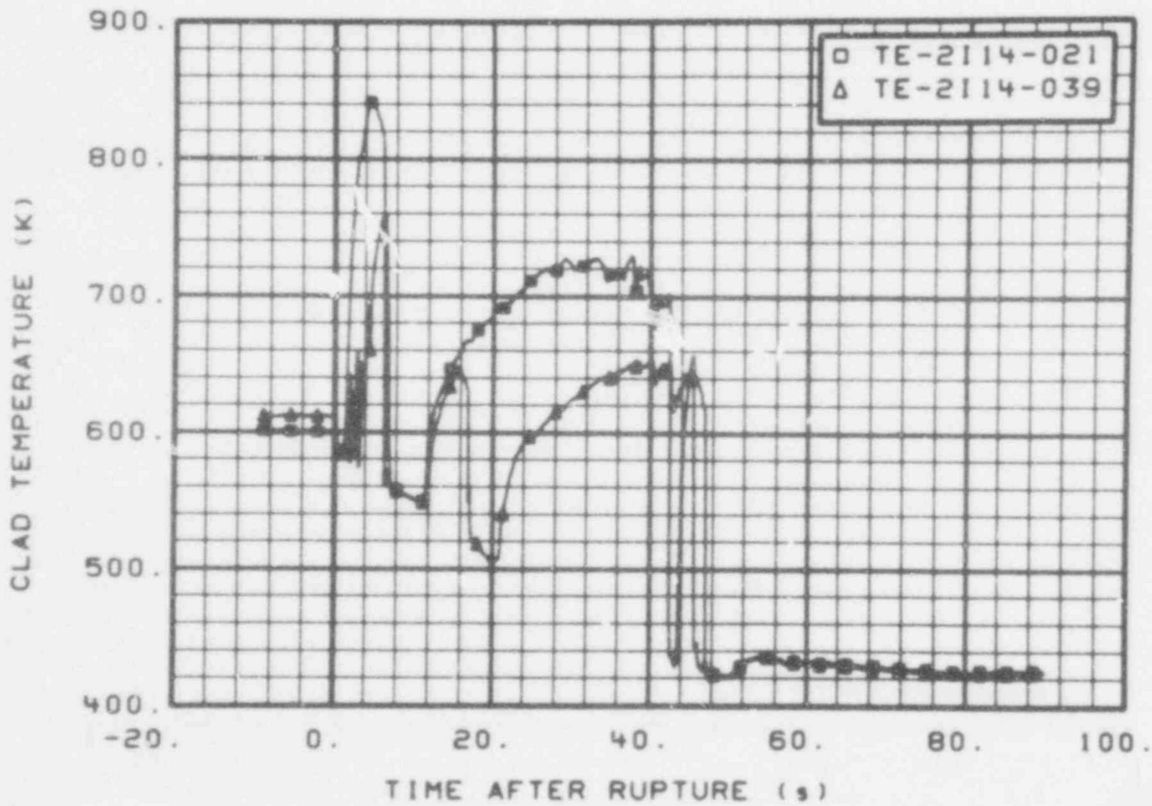

Fig. 212 Temperature of cladding on Fuel Assembly 2, Rods I14 (TE-2I14-021 and -039) (QEUD).

564 006

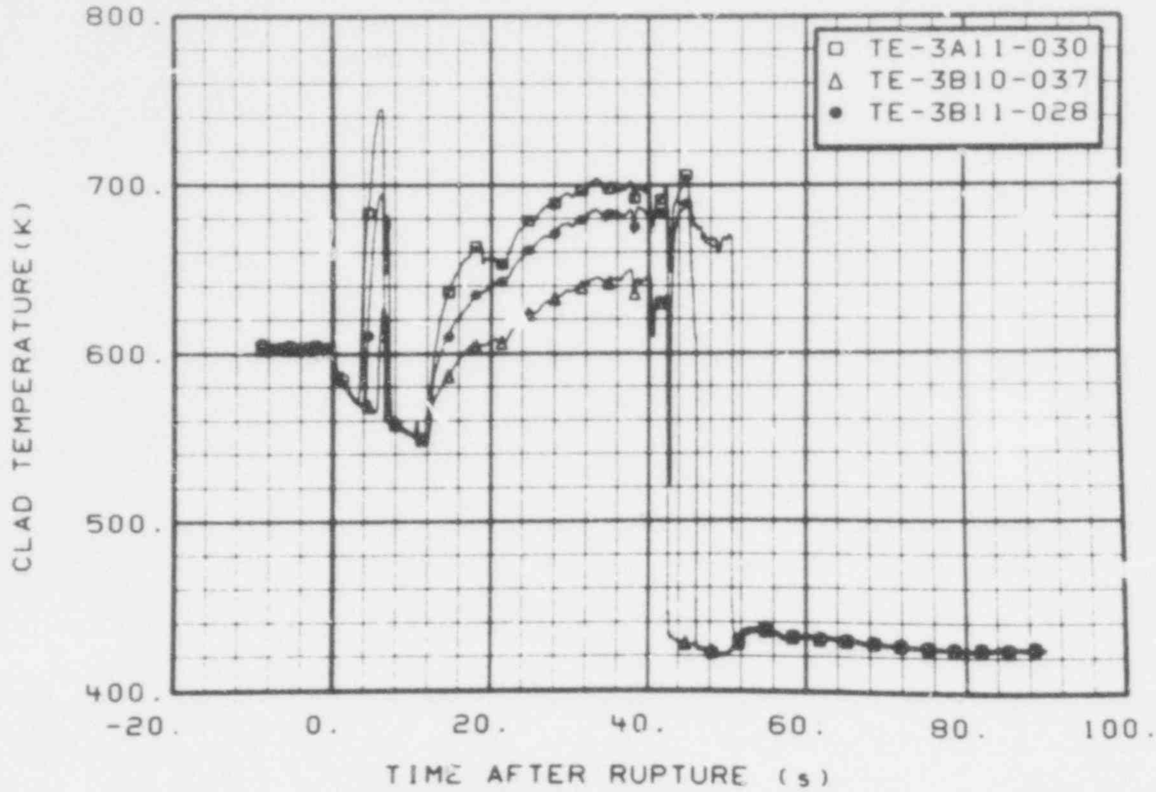

Fig. 213 Temperature of cladding on Fuel Assembly 3, Rods A11, B10, and B11 (TE-3A11-030, TE-3B10-037, and TE-3B11-028) (QEUD).

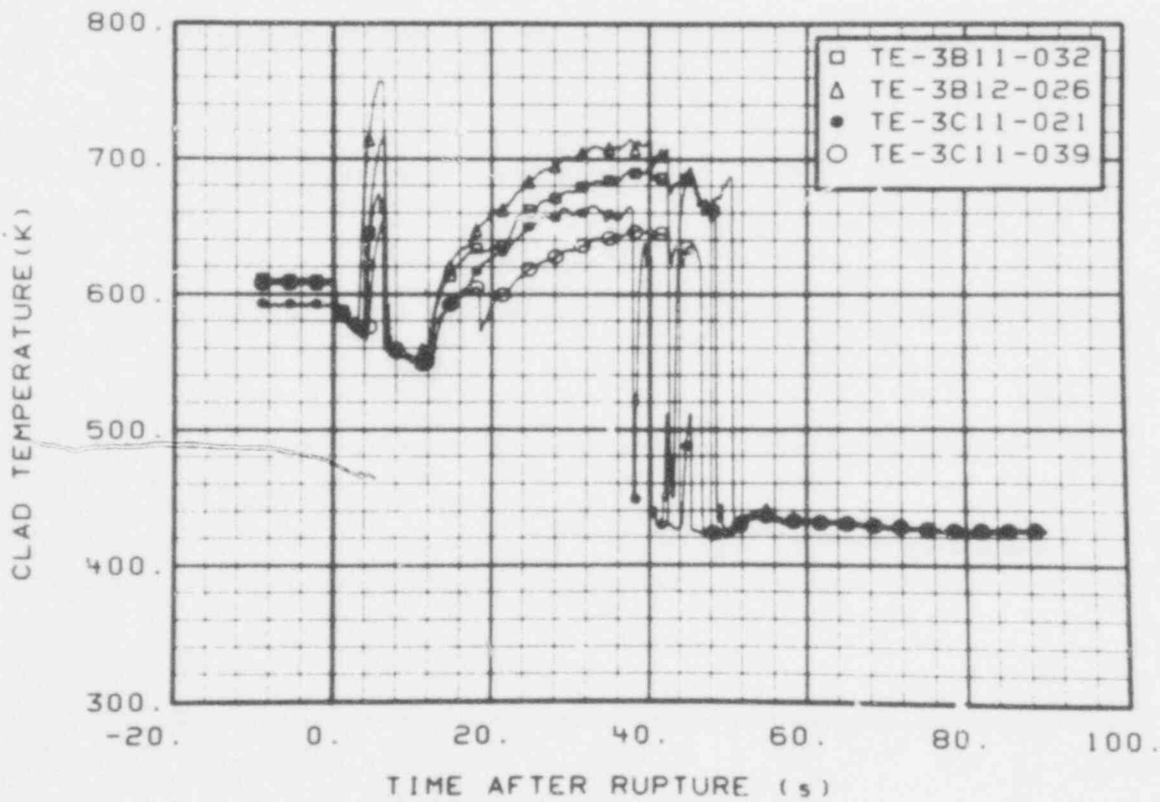

Fig. 214 Temperature of cladding on Fuel Assembly 3, Rods B11, B12, and C11 (TE-3B11-032, TE-3B12-026, and TE-3C11-021 and -039) (QEUD).

564 007

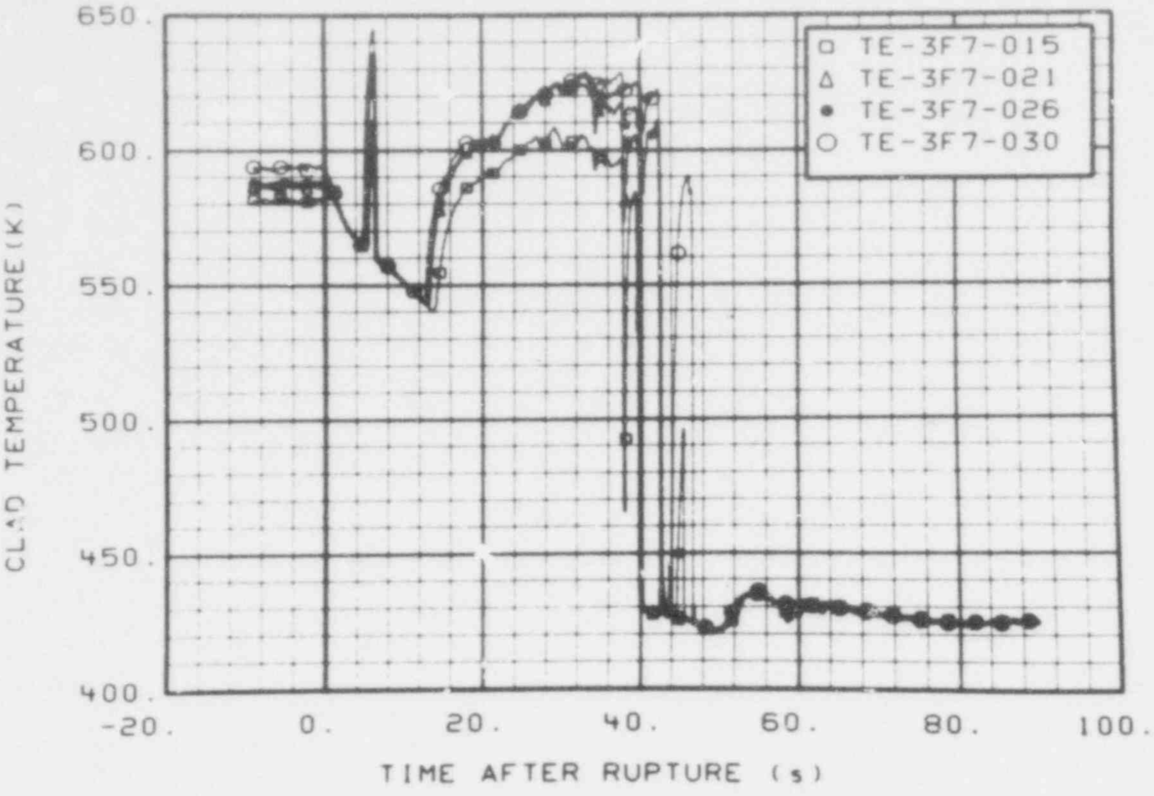

Fig. 215 Temperature of cladding on Fuel Assembly 3, Rod F7 (TE-3F7-015, -021, -026, and -030) (QEUD).

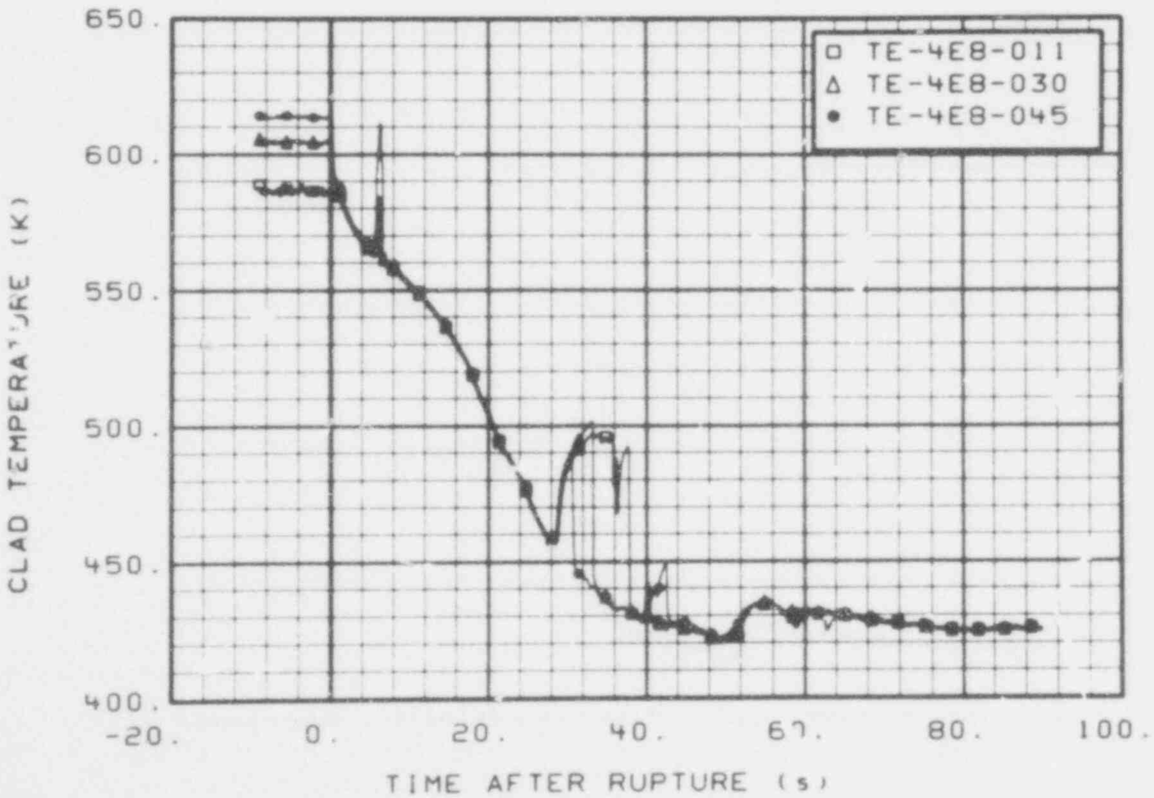

Fig. 216 Temperature of cladding on Fuel Assembly 4, Rod E8 (TE-4E8-011, -030, and -045) (QEUD).

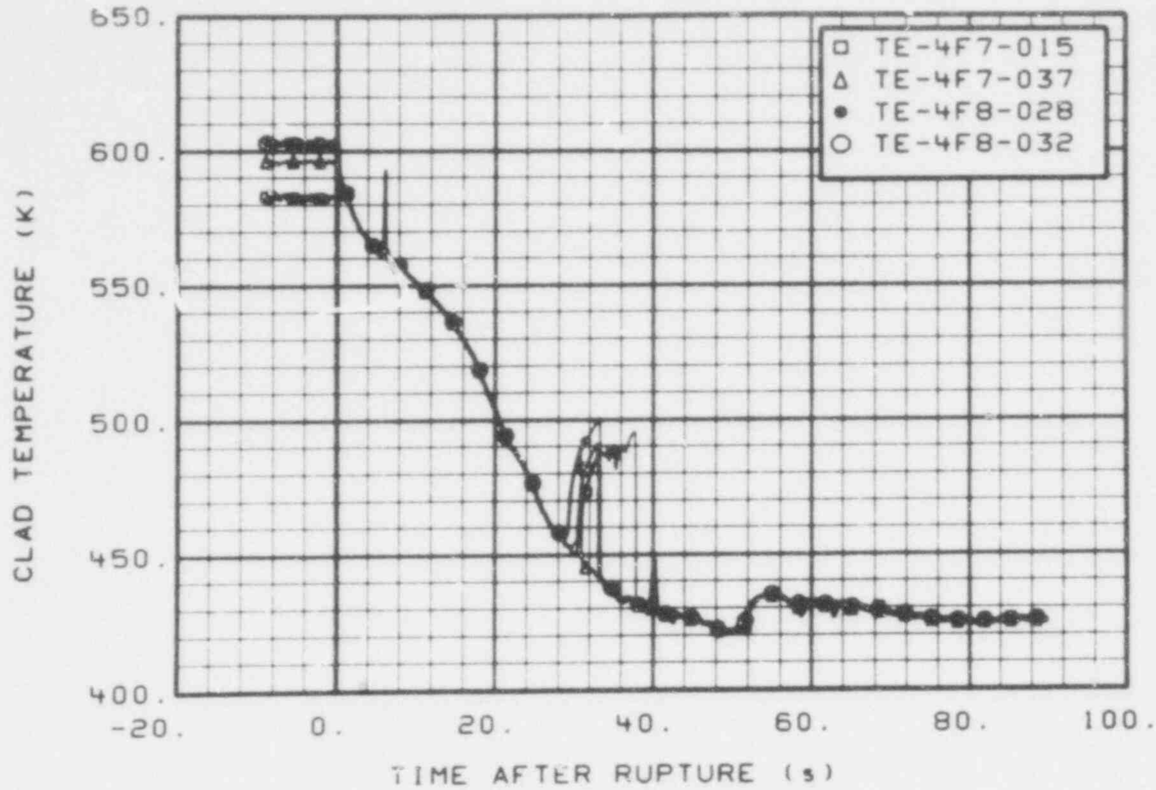

Fig. 217 Temperature of cladding on Fuel Assembly 4, Rods F7 and F8 (TE-4F7-01 ınd -037 and TE-4F8-028 and -032) (QEUD).

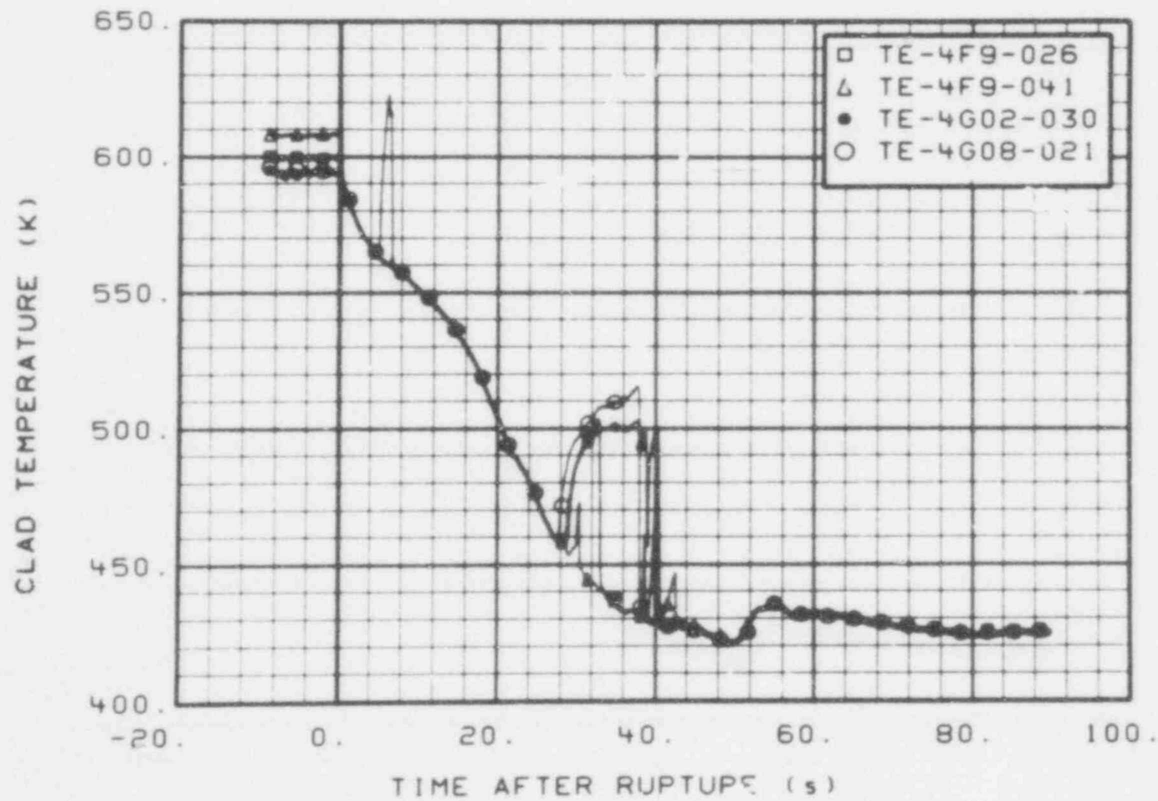

Fig. ?18 Temperature of cladding on Fuel Assembly 4, Rods F9, G2, and G8 (TE-4F9-026 and -041, TE-4G02-030, and TE-4G08-021) (QEUD).

564 009

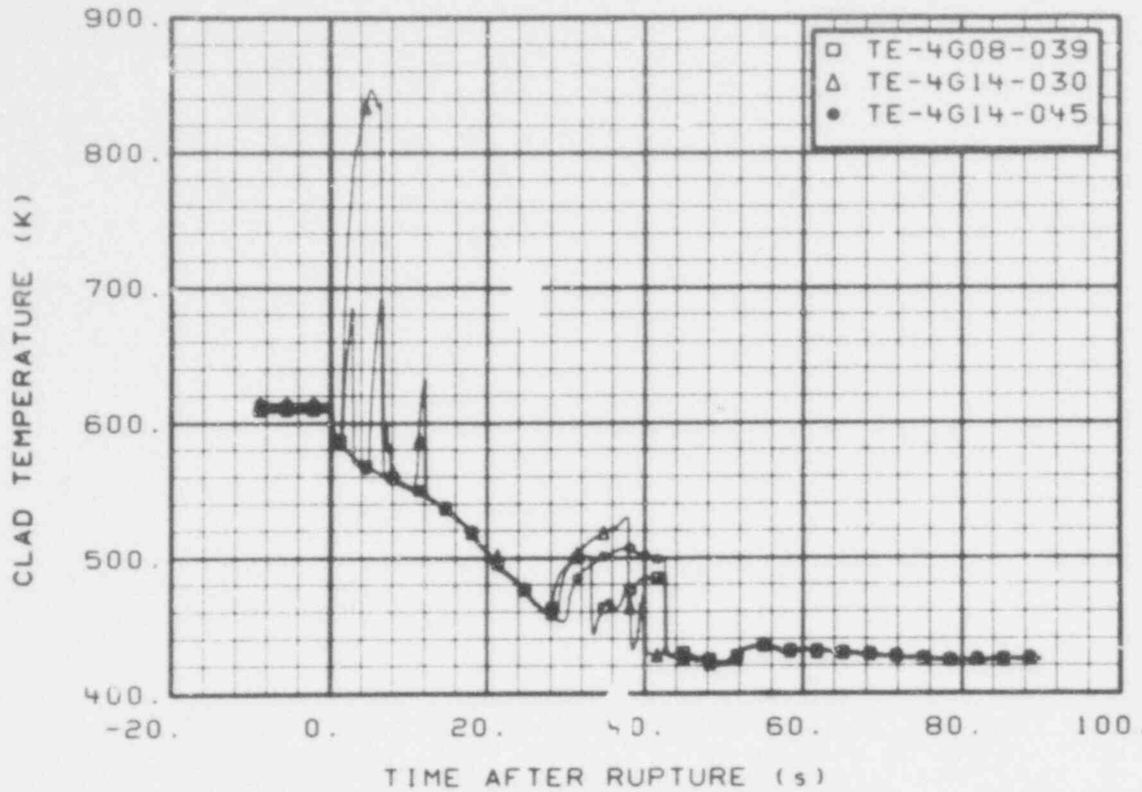

Fig. 219 Temperature of cladding on Fuel Assembly 4, Rods G8 and G14 (TE-4G8-039 and and TE-4G14-030 and -045) (QEUD).

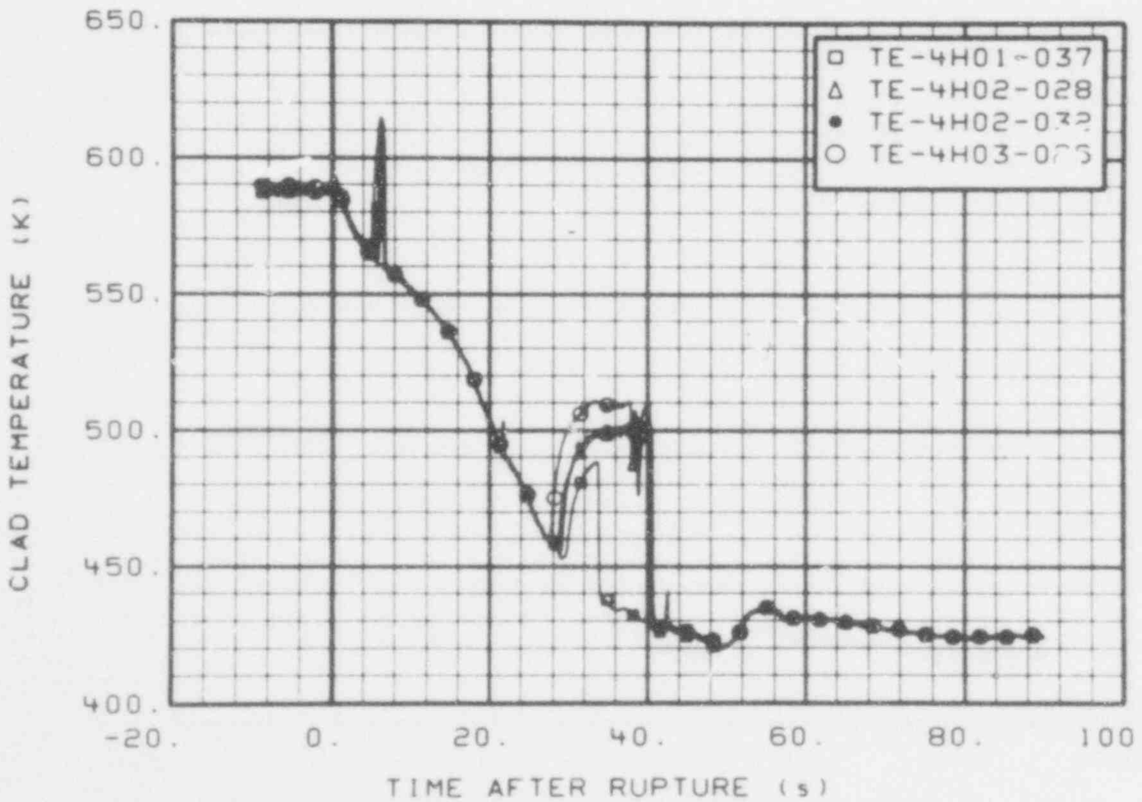

Fig. 220 Temperature of cladding on Fuel Assembly 4, Rods H1, H2, and H3 (TE-4H01-037, TE-4H02-028 and -032, and TE-4H03-026) (QEUD).

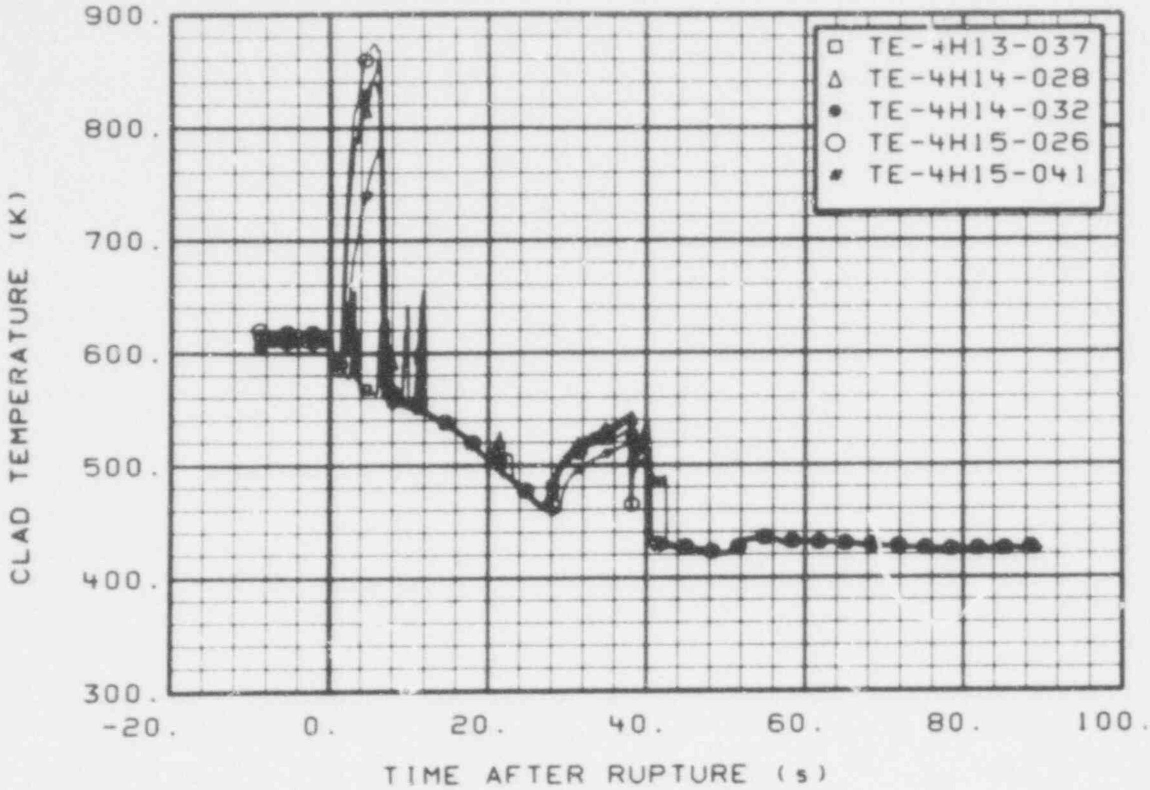

Fig. 221 Temperature of cladding on Fuel Assembly 4, Rods H13, H14, and H15 (TE-4H13-037, TE-4H14-028 and -032, and TE-4H15-026 and -041) (QEUD).

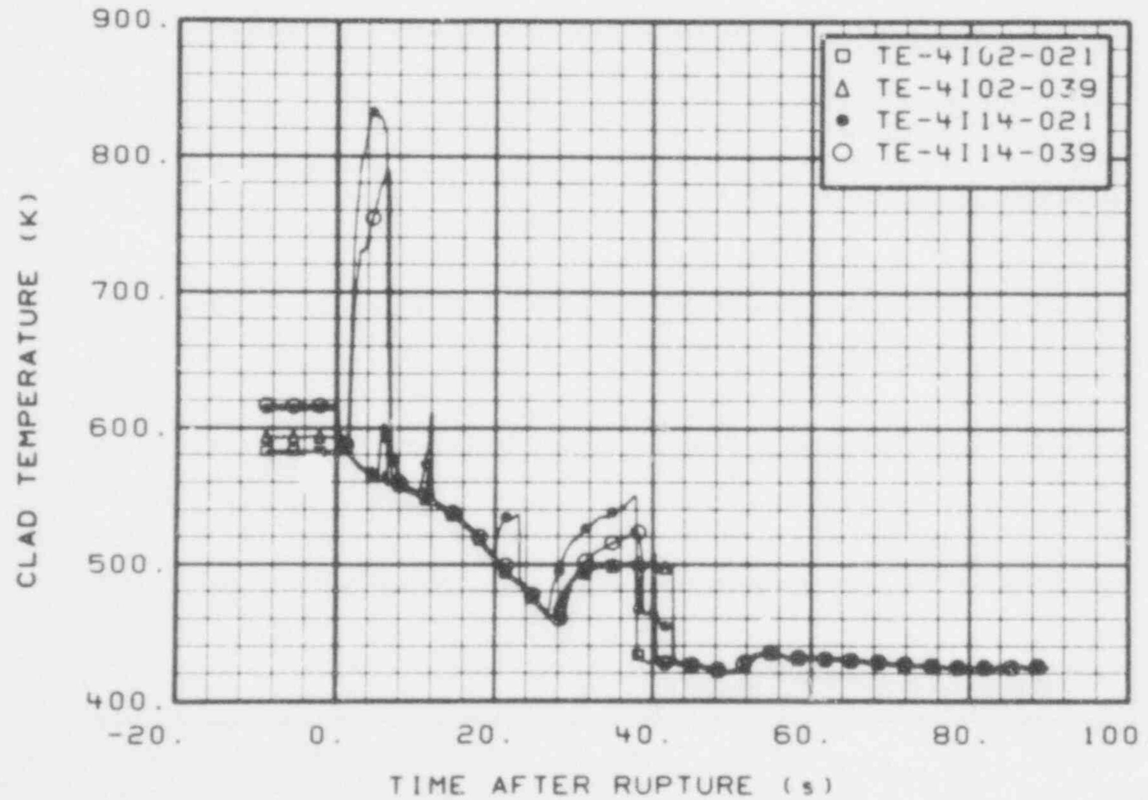

Fig. 222 Temperature of cladding on Fuel Assembly 4, Rods I2 and I14 (TE-4I02-021 and -039, and TE-4I14-021 and -039) (QEUD).

564 011

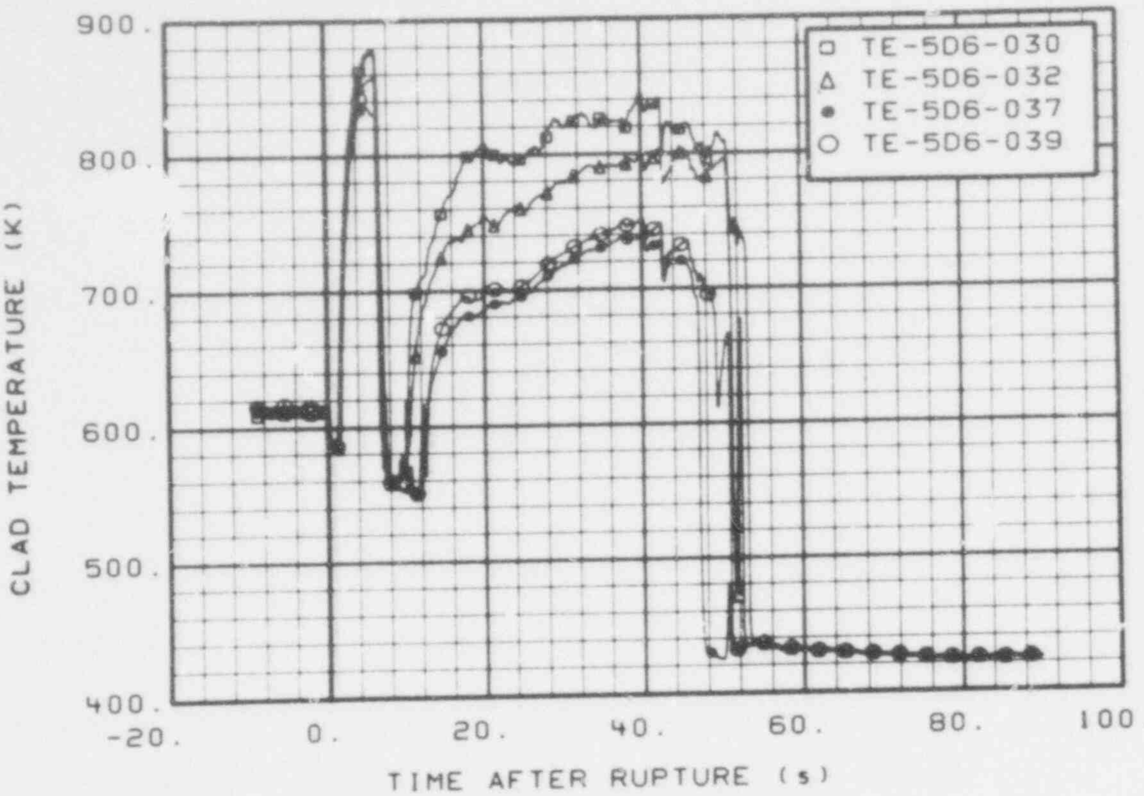

Fig. 223 Temperature of cladding on Fuel Assembly 5, Rod D6 (TE-5D6-030, -032, -037, and -039) (QEUD).

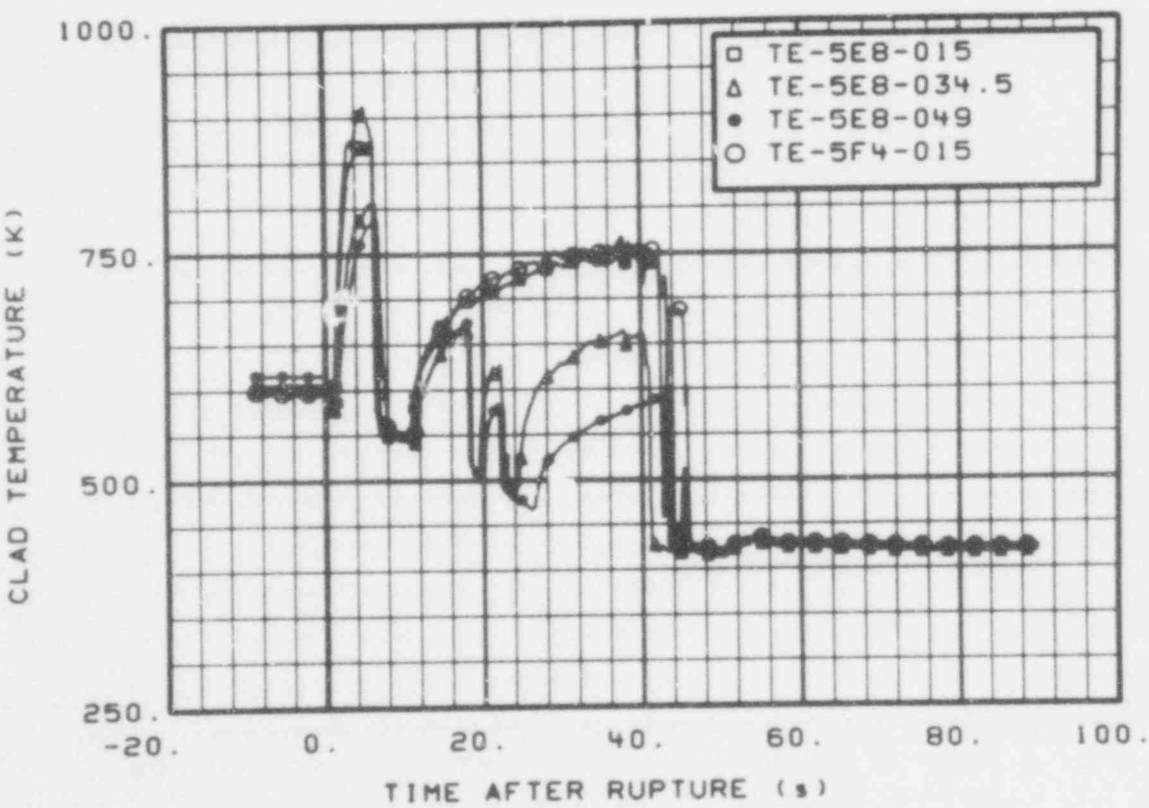

Fig. 224 Temperature of cladding on Fuel Assembly 5, Rod E8 and F4 (TE-5E8-015, 034.5, and -049 and TE-5F4-015) (QEUD).

564 012

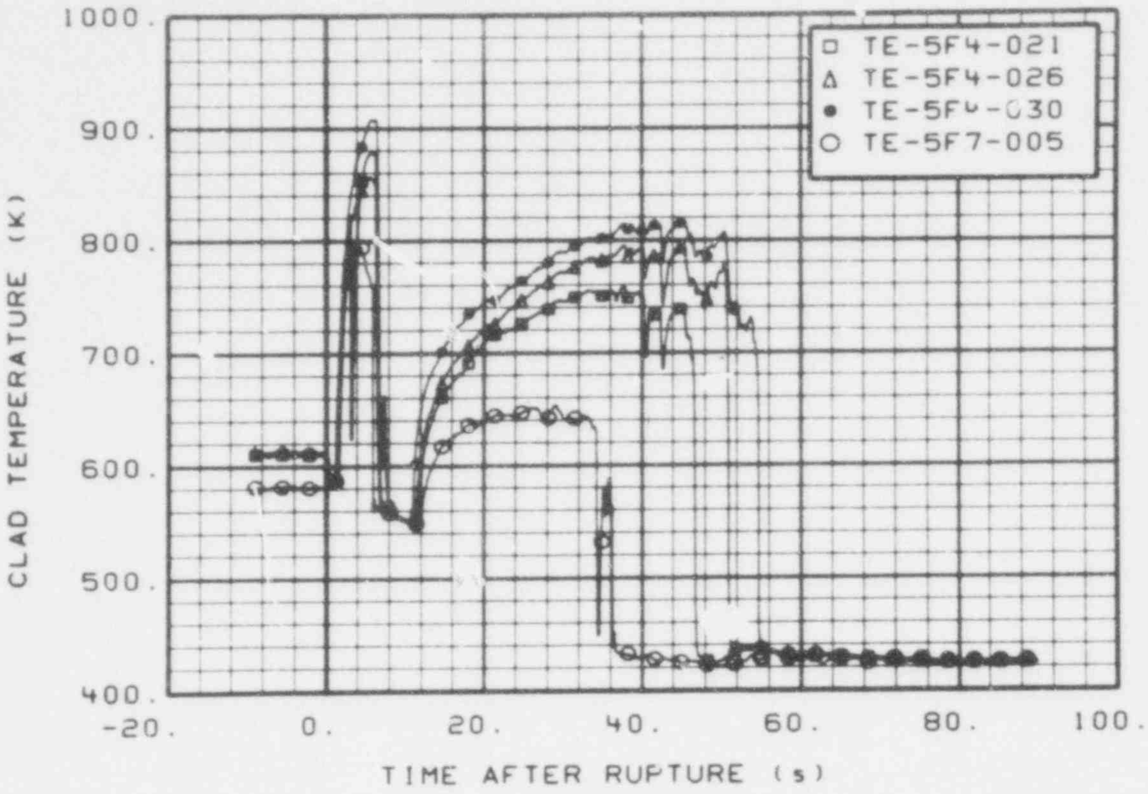

Fig. 225 Temperature of cladding on Fuel Assembly 5, Rods F4 and F7 (TE-5F4-021, -026, and -030 and TE-5F7-005 and -021) (QEUD).

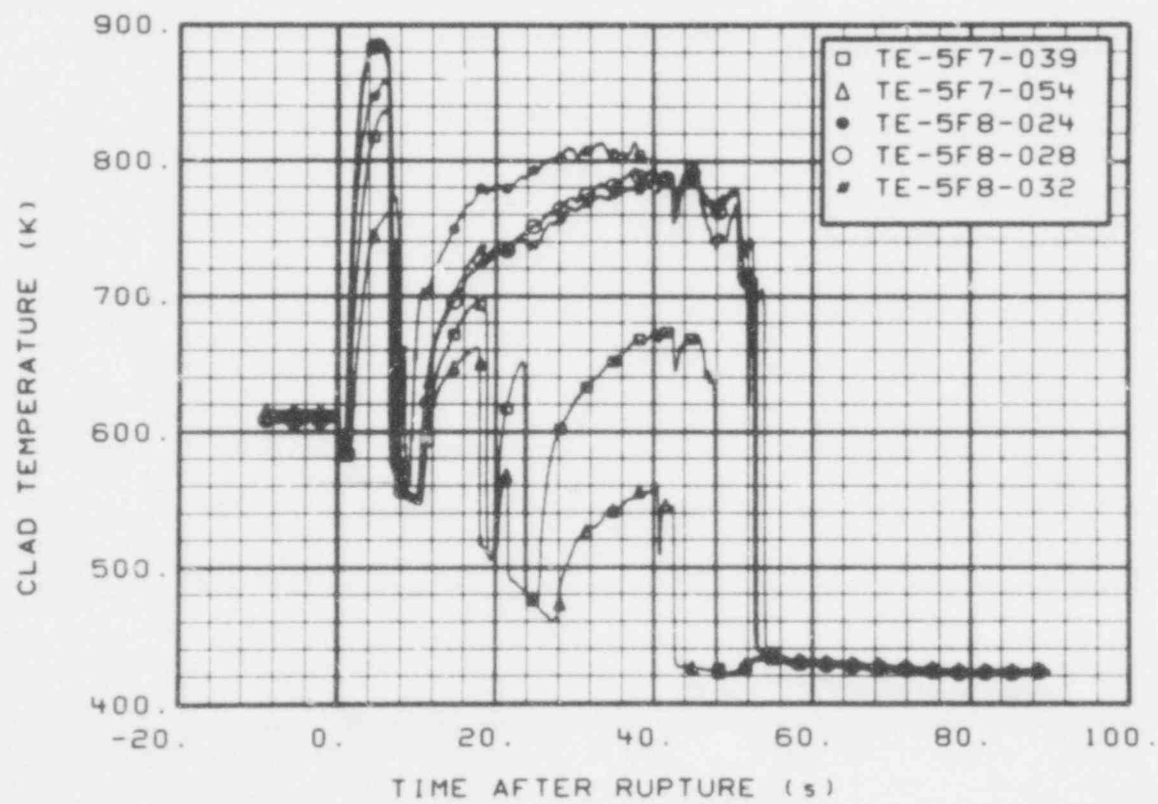

Fig. 226 Temperature of cladding on Fuel Assembly 5, Rods F7 and F8 (TE-5F7-039, -054, and TE-5F8-024, -028, and -032) (QEUD).

564 013

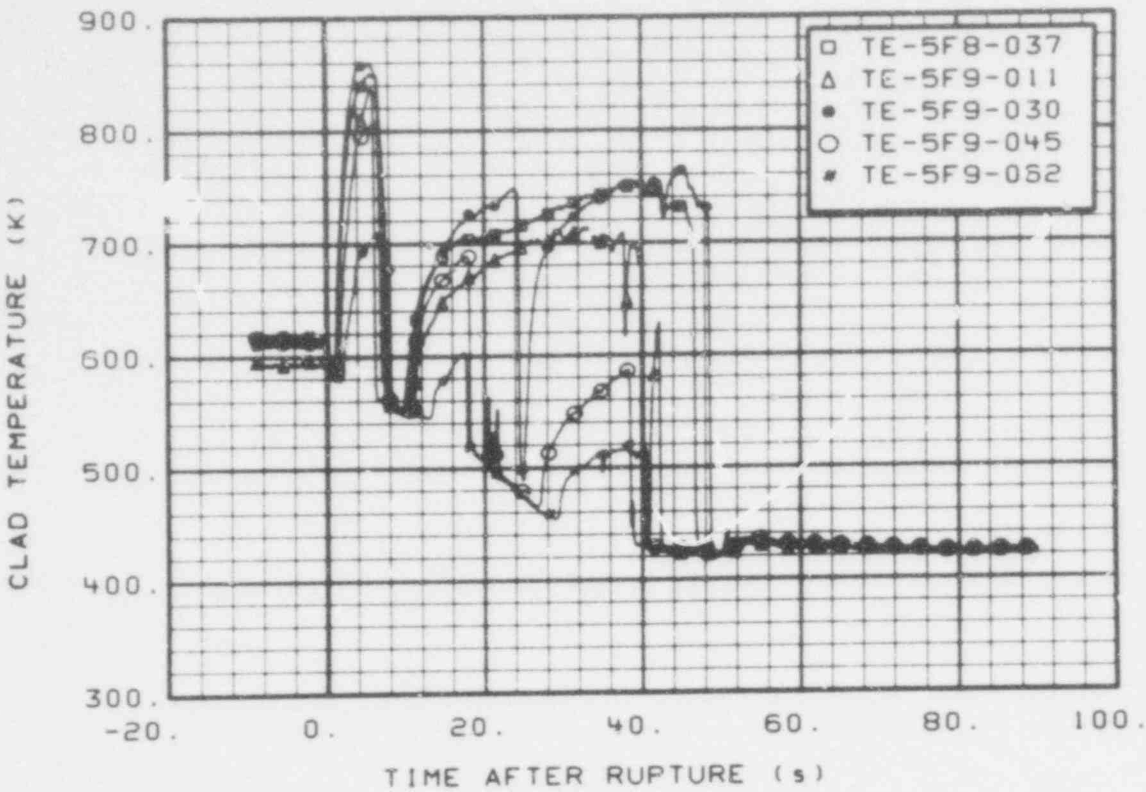

Fig. 227 Temperature of cladding on Fuel Assembly 5, Rods F8 and F9 (TE-5F8-037 and TE-5F9-011, -030, -045, and -062) (QEUD).

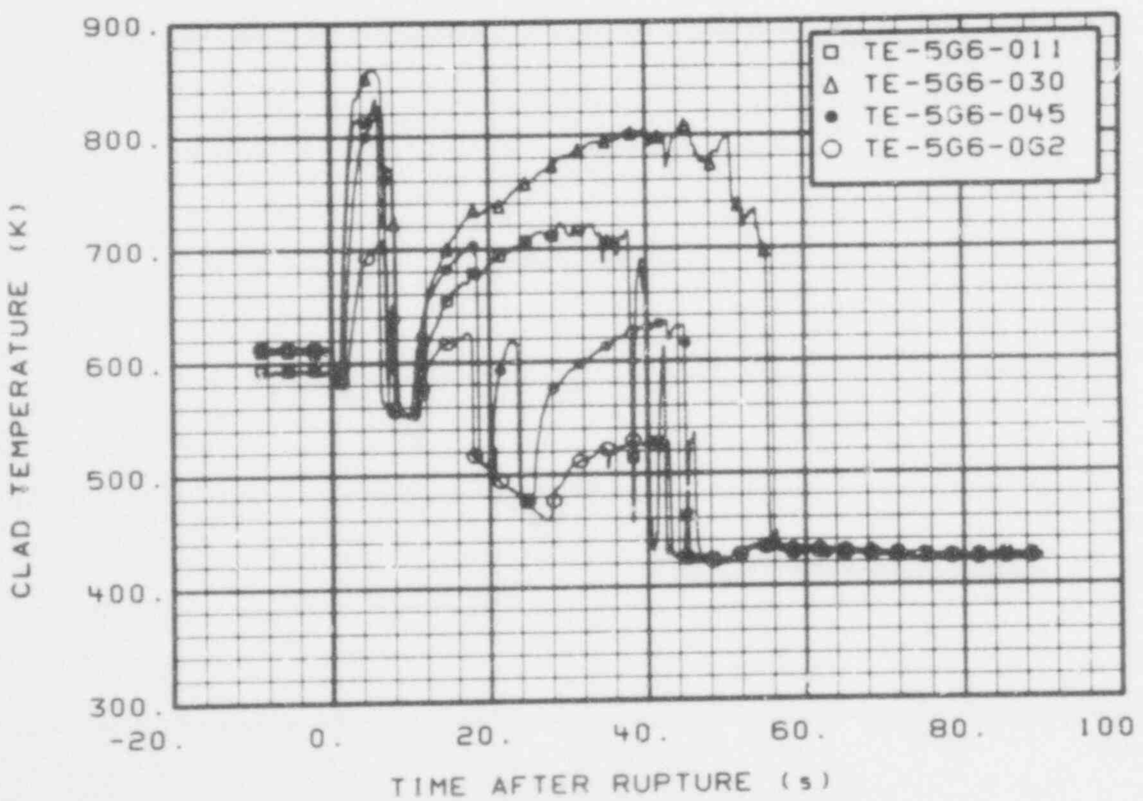

Fig. 228 Temperature of cladding on Fuel Assembly 5, Rod G6 (TE-5G6-011, -030, -045, and -062) (QEUD).

564 014

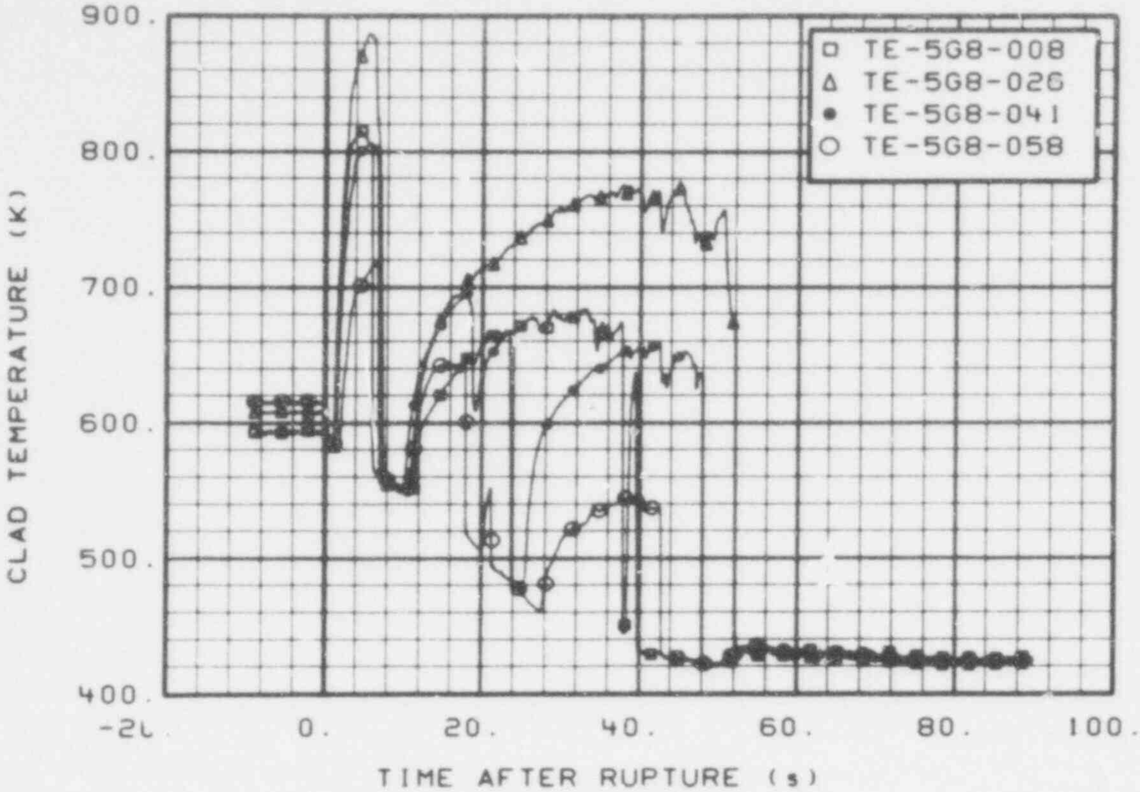

Fig. 229 Temperature of cladding on Fuel Assembly 5, Rod G8 (TE-5G8-008, -026, -041, and -058) (QEUD).

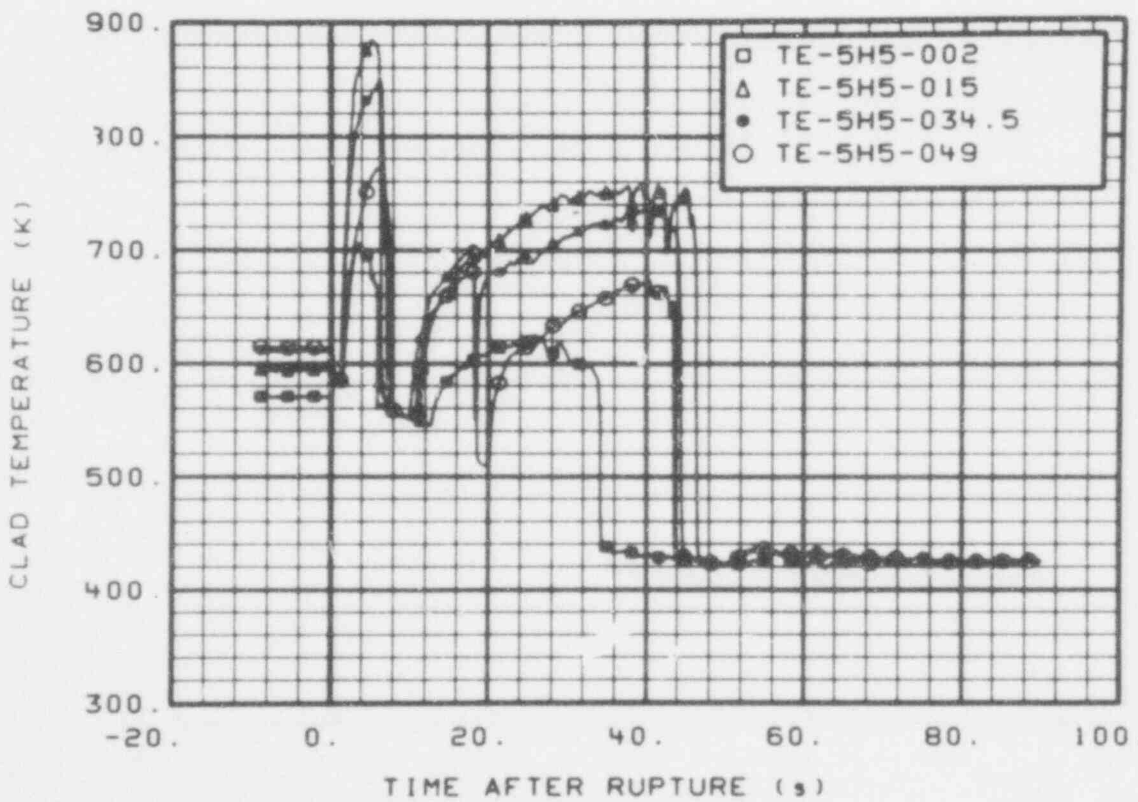

Fig. 230 Temperature of cladding on Fuel Assembly 5, Rod H5 (TE-5H5-002, -015, -034.5, and -049) (QEUD).

564 015

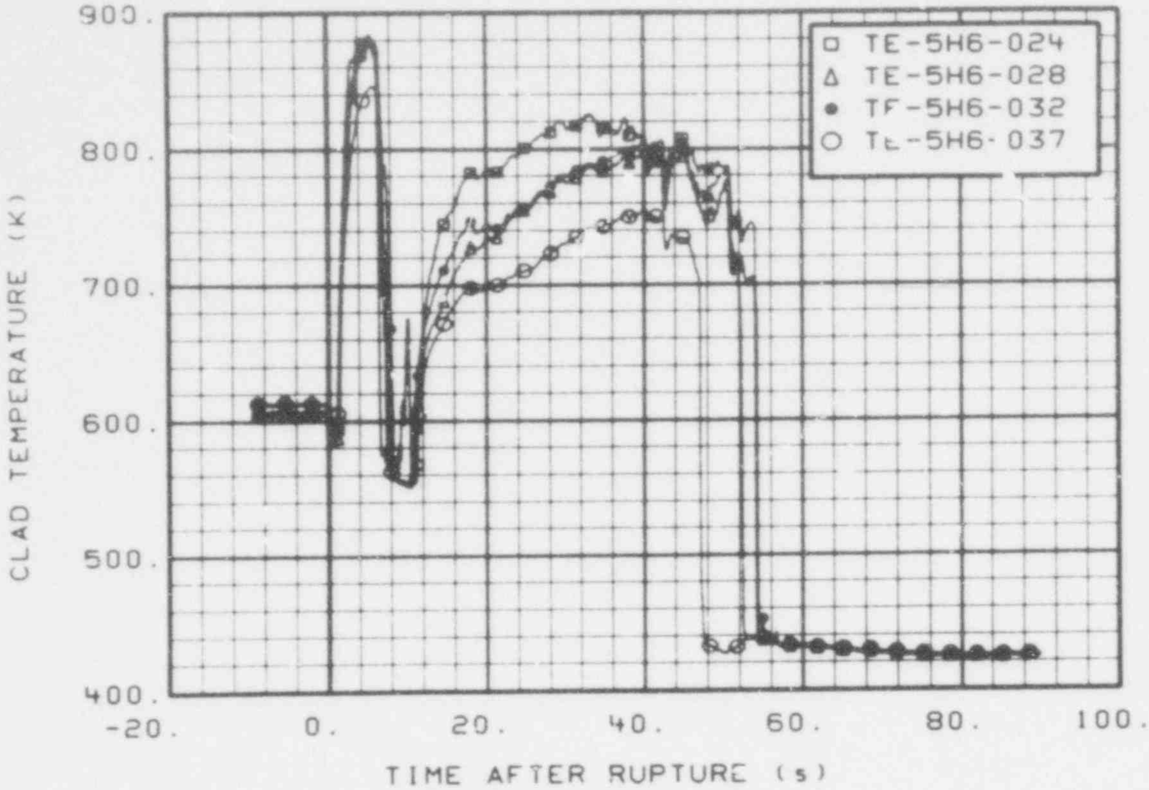

Fig. 231 Temperature of cladding on Fuel Assembly 5, Rod H6 (TE-5H6-024, -028, -032, and -037) (QEUD).

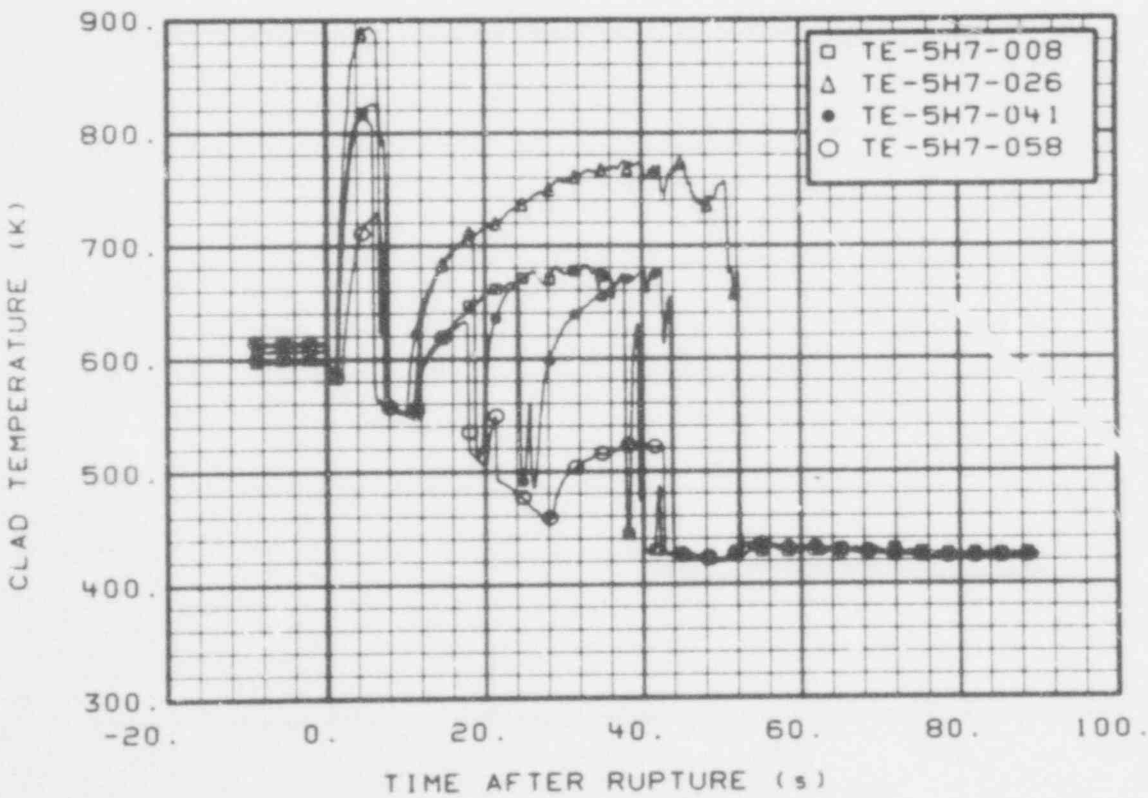

Fig. 232 Temperature of cladding on Fuel Assembly 5, Rod H7 (TE-5H7-008, -026, -041, and -058) (QEUD).

564 016

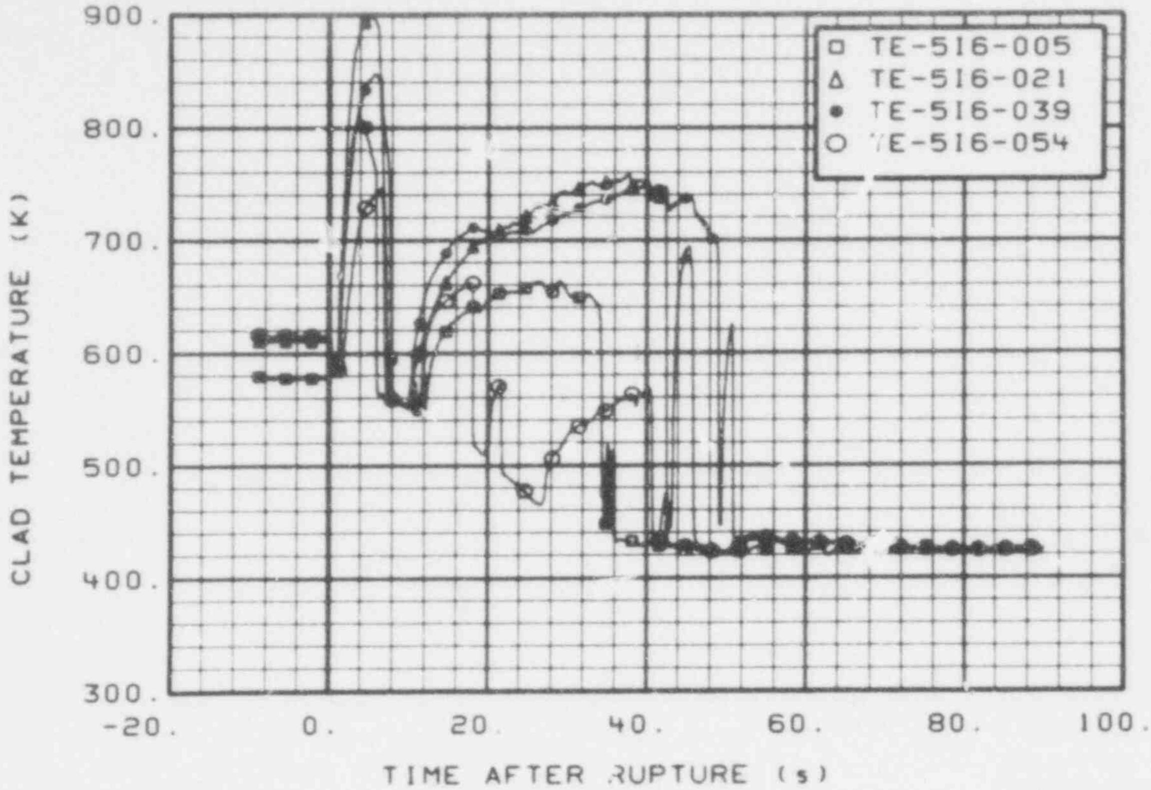

Fig. 233 Temperature of cladding on Fuel Assembly 5, Rod I6 (TE-5I6-005, -021, -039, and -054) (QEUD).

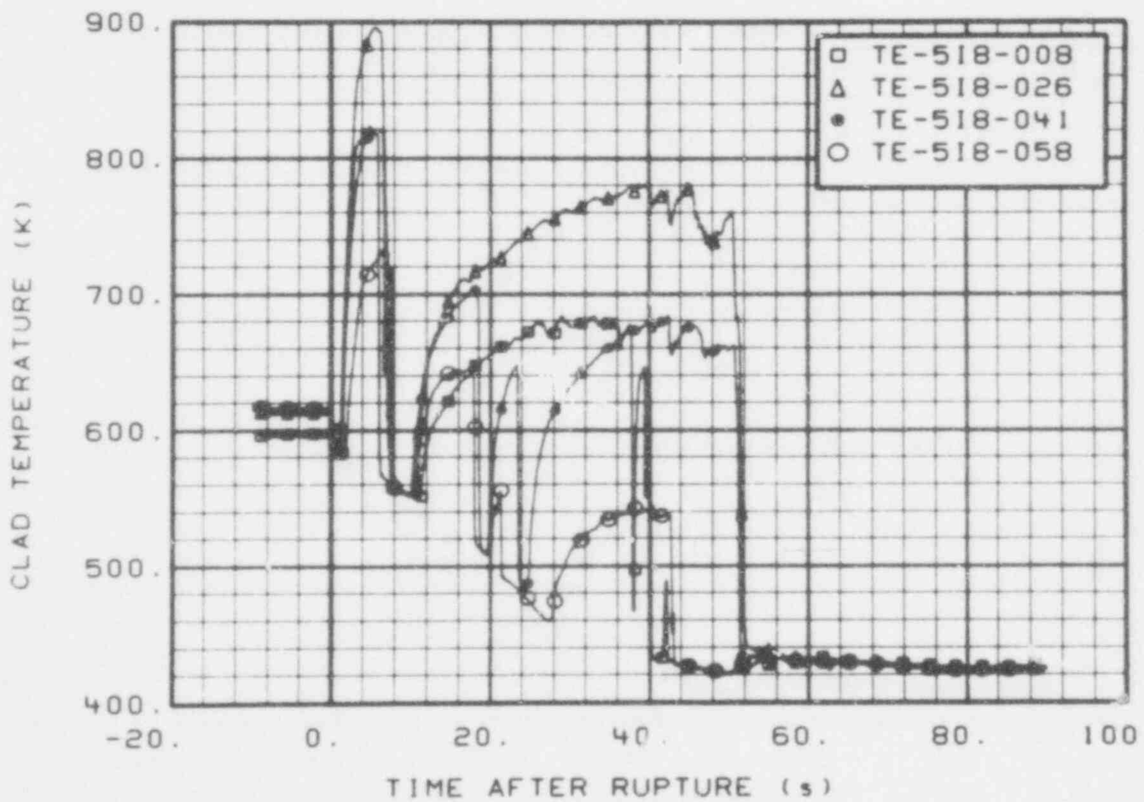

Fig. 234 Temperature of cladding on Fuel Assembly 5, Rod I8 (TE-5I8-008, -026, -041, and -058) (QEUD).

594 017

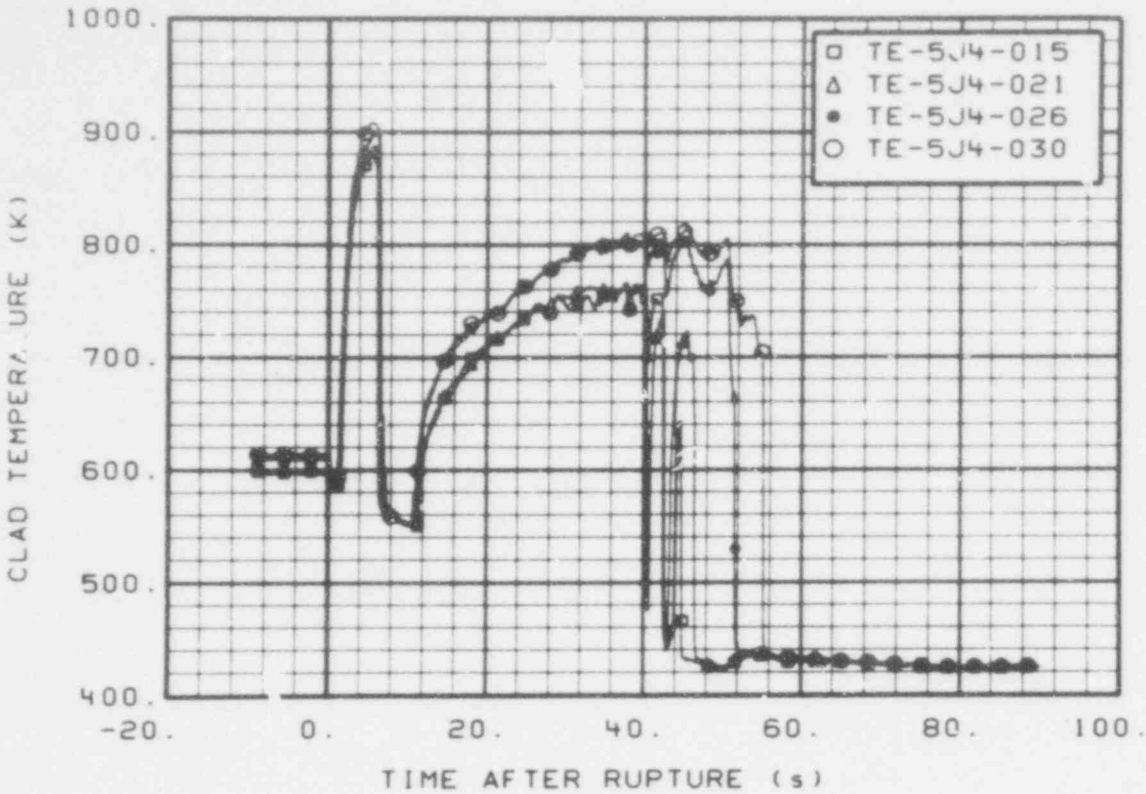

Fig. 235 Temperature of cladding on Fuel Assembly 5, Rod J4 (TE-5J4-015, -021, -026, and -030) (QEUD).

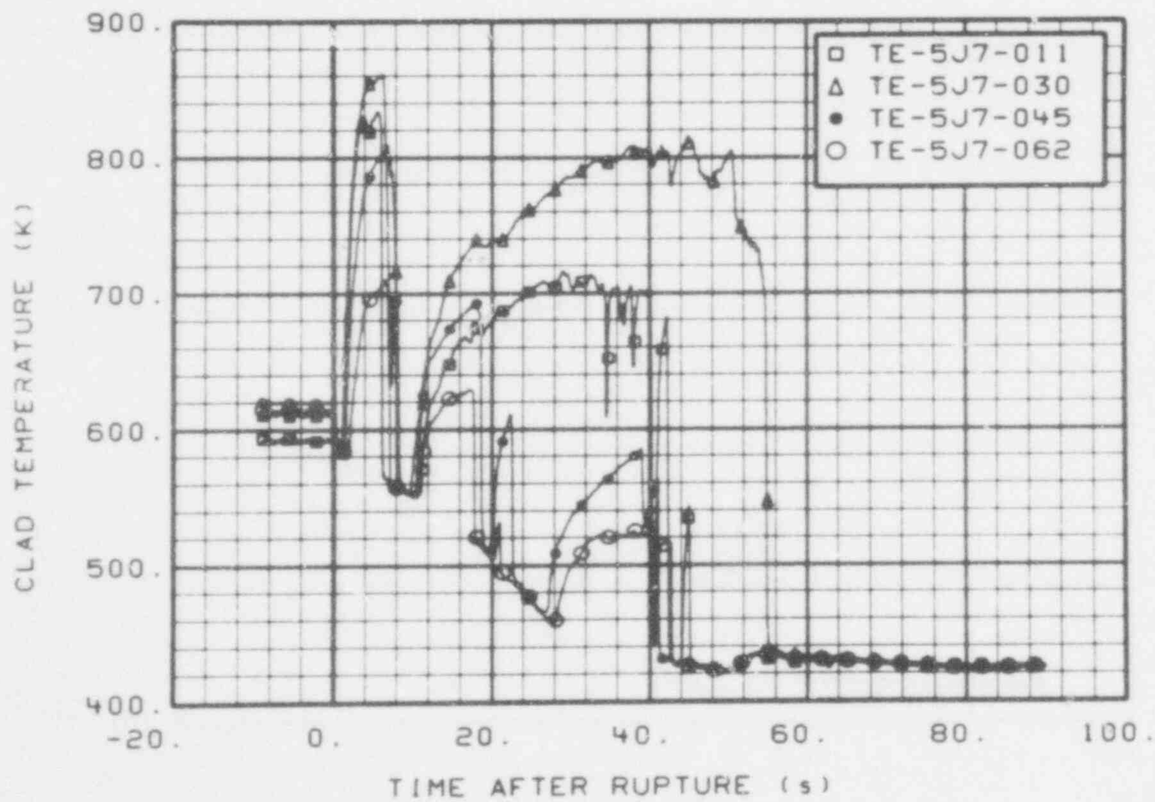

Fig. 236 Temperature of cladding on Fuel Assembly 5, Rod J7 (TE-5J7-011, -030, -045, and -062) (QEUD).

564 018

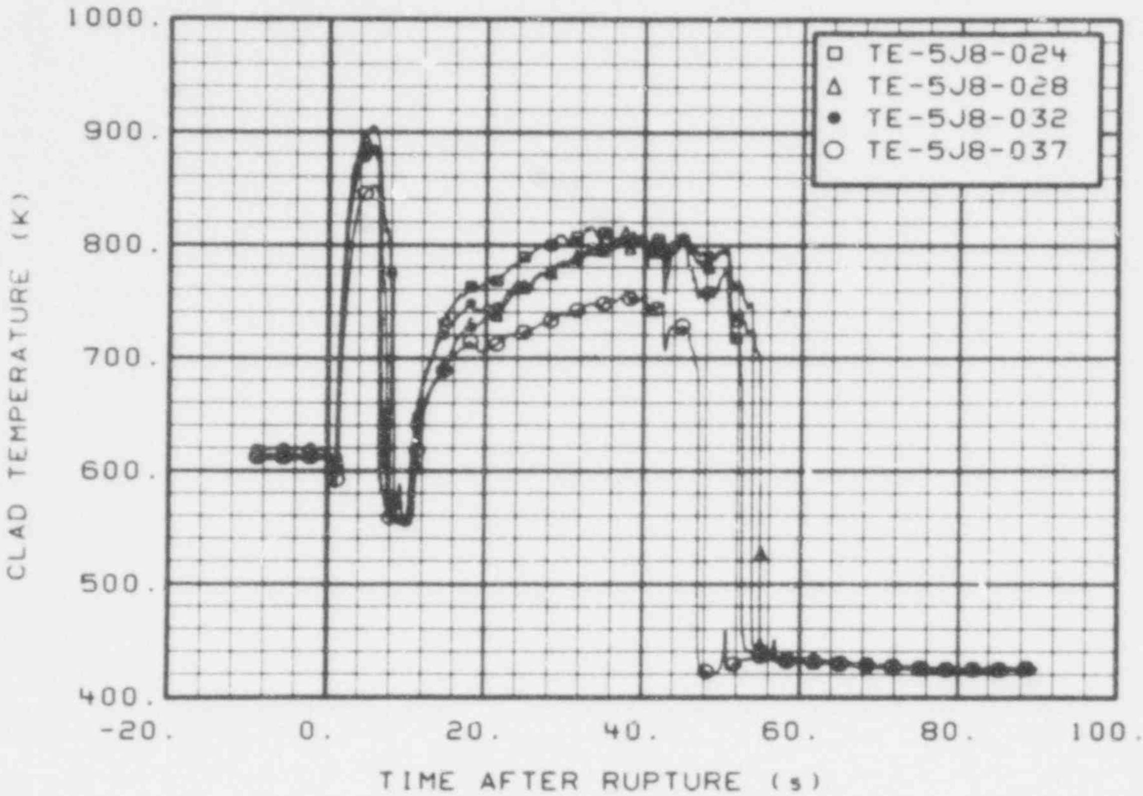

Fig. 237 Temperature of cladding on Fuel Assembly 5, Rod J8 (TE-5J8-024, -028, -032, and -037) (QEUD).

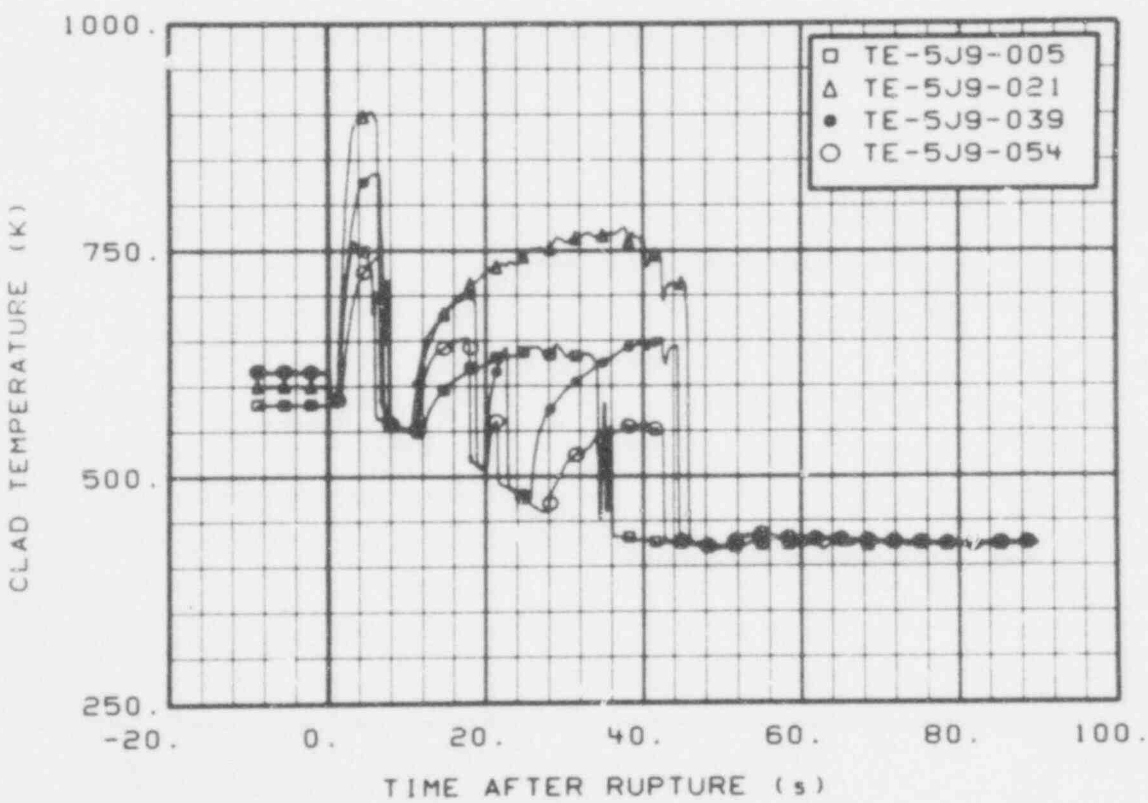

Fig. 238 Temperature of cladding on Fuel Assembly 5, Rod J9 (TE-5J9-005, -021, -039, and -054) (QEUD).

564 019

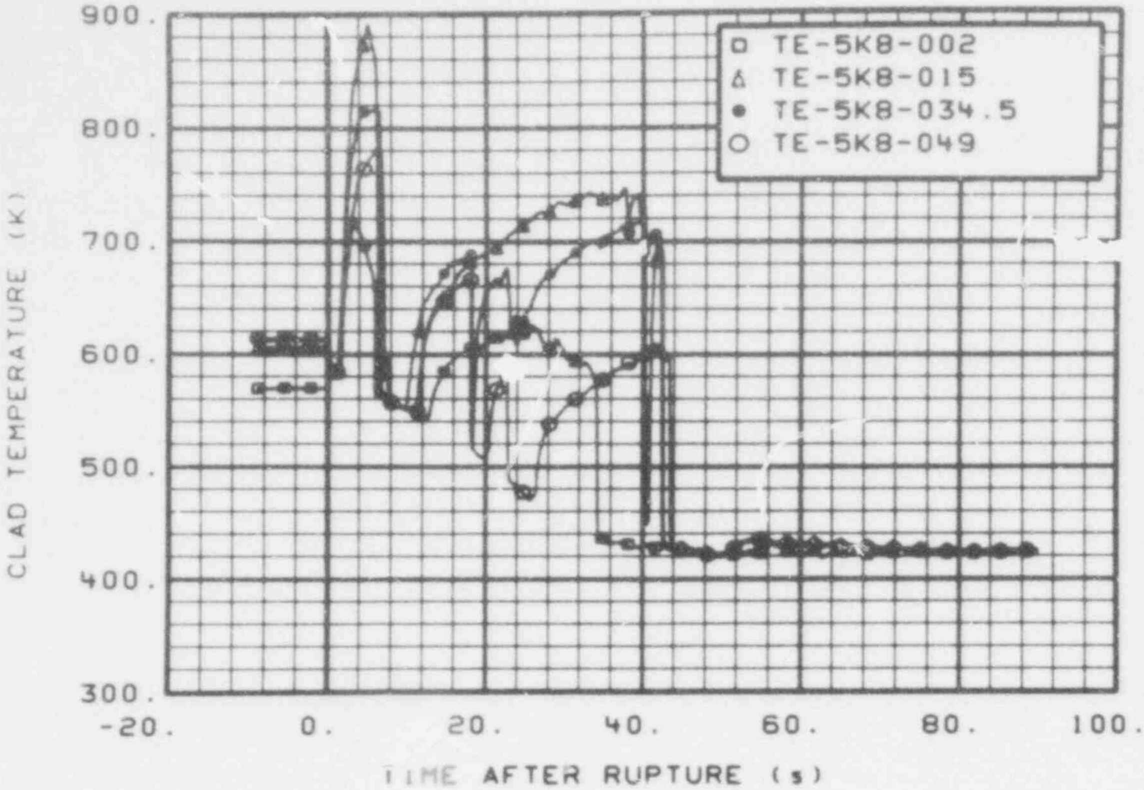

Fig. 239 Temperature of cladding on Fuel Assembly 5, Rod K8 (TE-5K8-002, -015, -034.5, and -049) (QEUD).

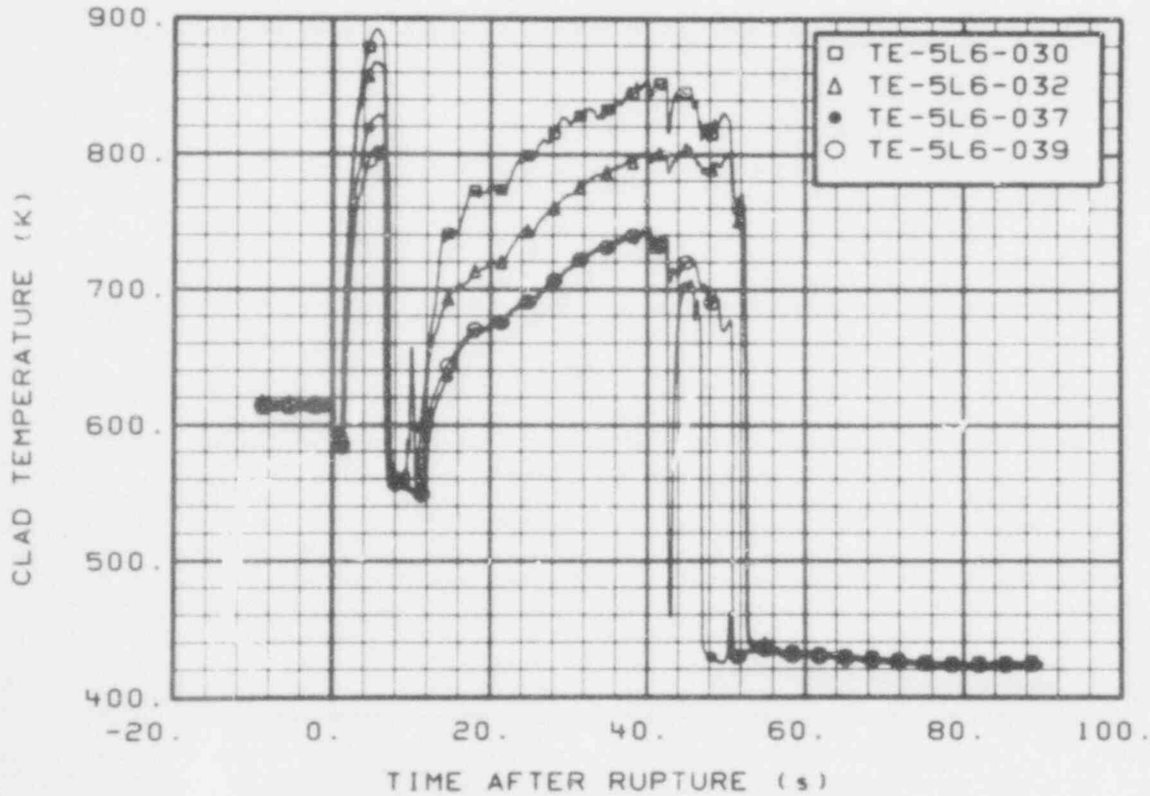

Fig. 240 Temperature of cladding on Fuel Assembly 5, Rod L6 (TE-5L6-030, -032, -037, and -039) (QEUD).

564 020

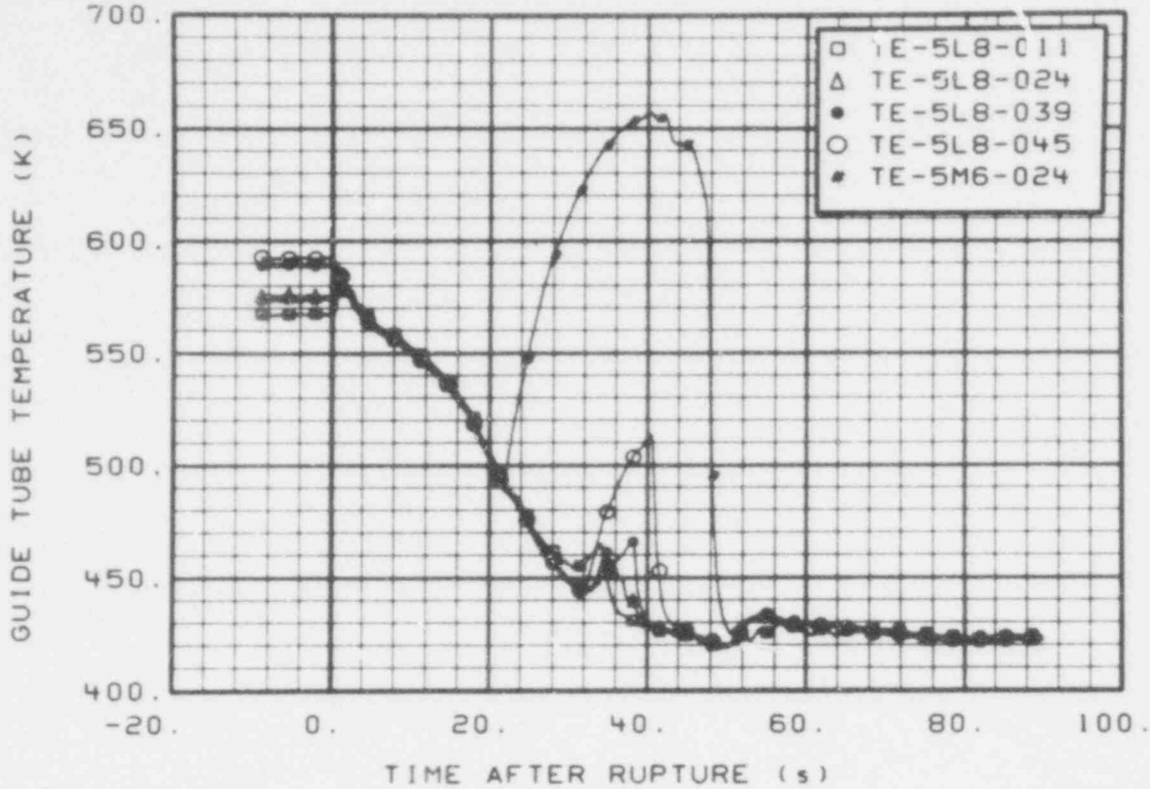

Fig. 241 Temperature on guide tubes for Assembly 5, Rods L8 and M6 (TE-5L8-011, -024, -039, and -045 and TE-5M6-024) (QEUD).

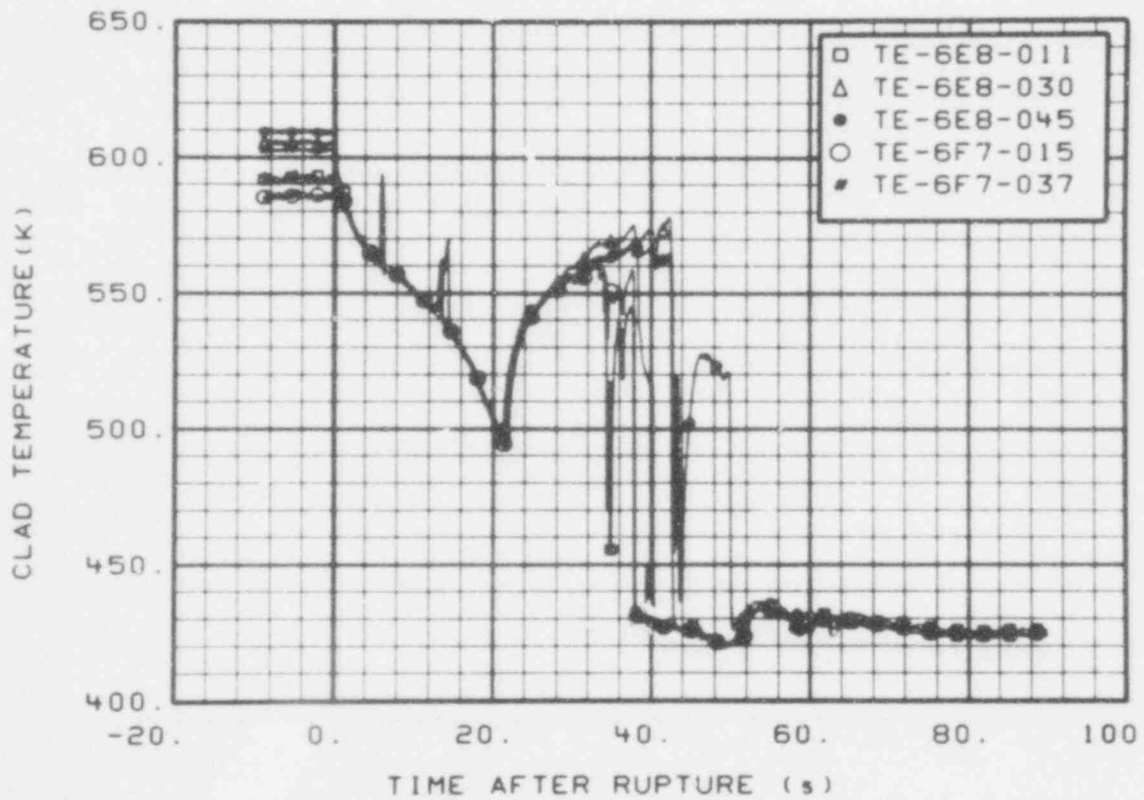

Fig. 242 Temperature of cladding on Fuel Assembly 6, Rods E8 and F7 (TE-6E8-011, -030, and -045 and TE-6F7-015 and -037) (QEUD).

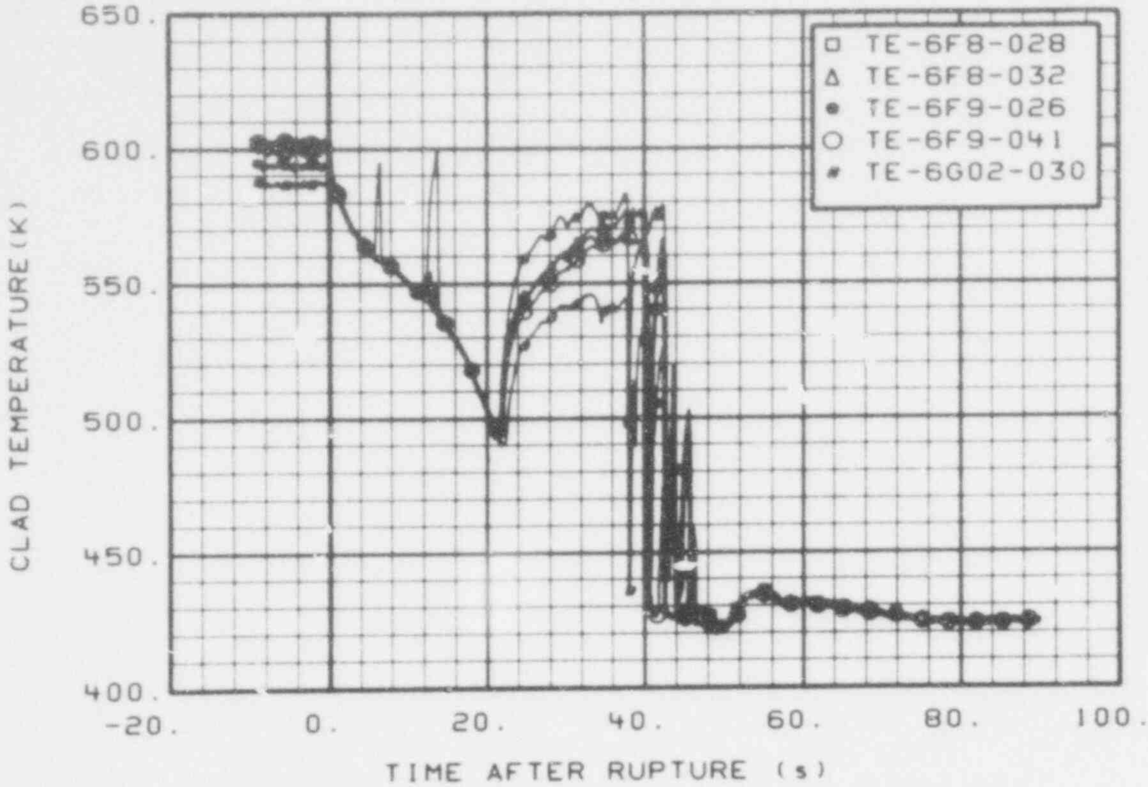

Fig. 243 Temperature of cladding on Fuel Assembly 6, Rods F8, F9, and G2 (TE-6F8-028 and -032, TE-6F9-026 and -041, and TE-6G02-030) (QEUD).

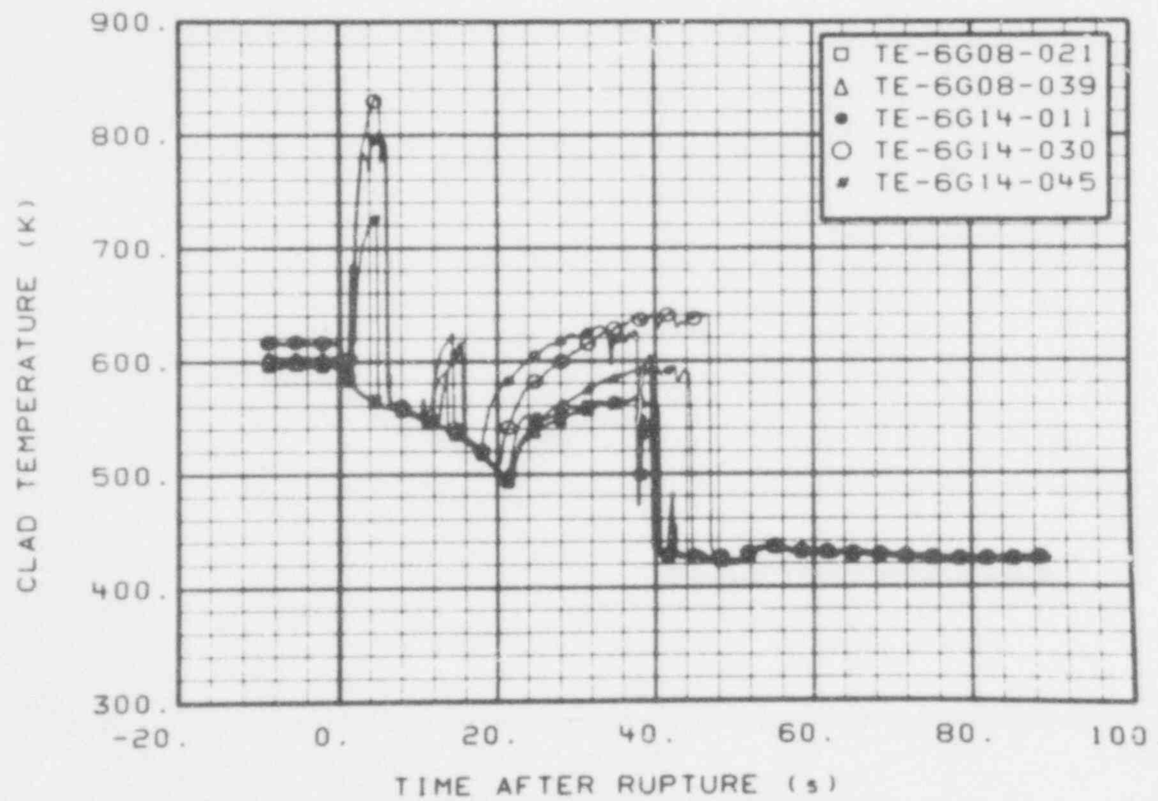

Fig. 244 Temperature of cladding on Fuel Assembly 6, Rods G8 and G14 (TE-6G08-021 and -039, and TE-6G14-011, -030, and -045) (QEUD).

564 022

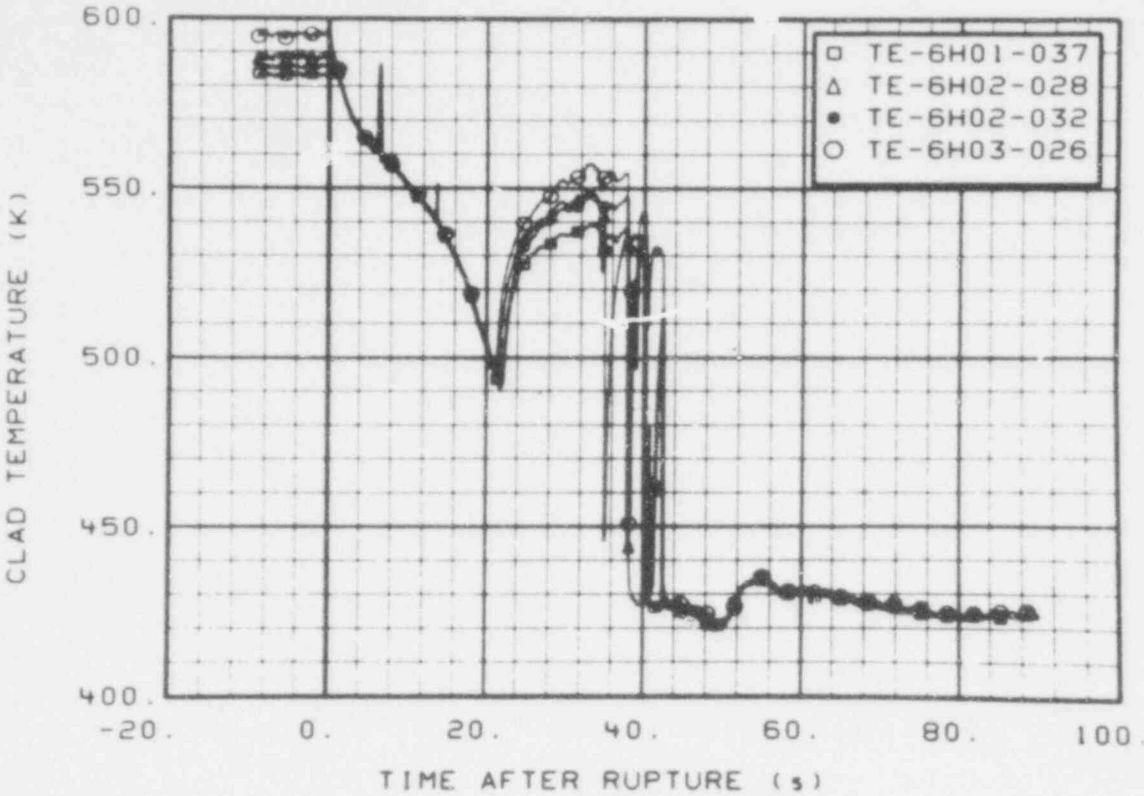

Fig. 245 Temperature of cladding on Fuel Assembly 6, Rods H01, H02, and H03 (TE-H01-037, TE-6H02-028 and -032, and TE-6H03-026) (QEUD).

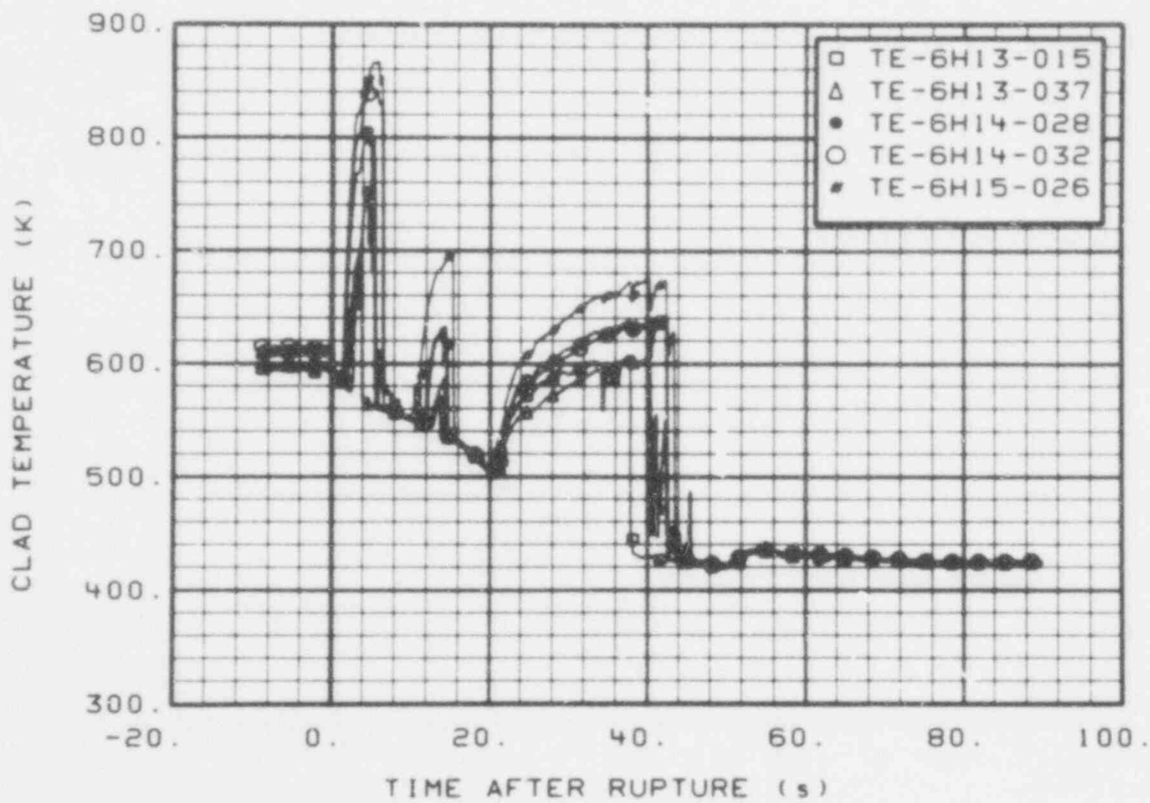

Fig. 246 Temperature of cladding on Fuel Assembly 6, Rods H13, H14 and H15 (TE-6H13-015 and -037, TE-6H14-028 and -032, and TE-6H115-026) (QEUD).

564 023

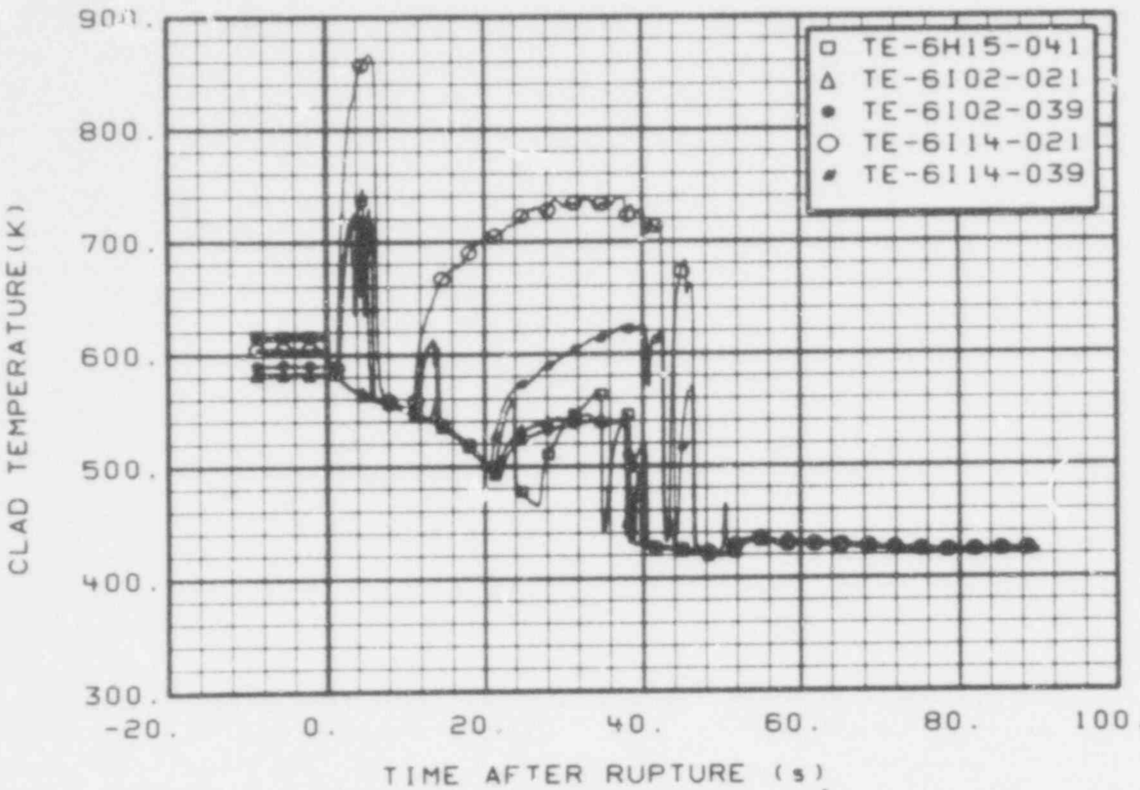

Fig. 247 Temperature of cladding on Fuel Assembly 6, Rods H15, I2 and I14 (TE-6H15-041, TE-6I02-021 an' 039, and TE-6I14-021 and -039) (QEUD).

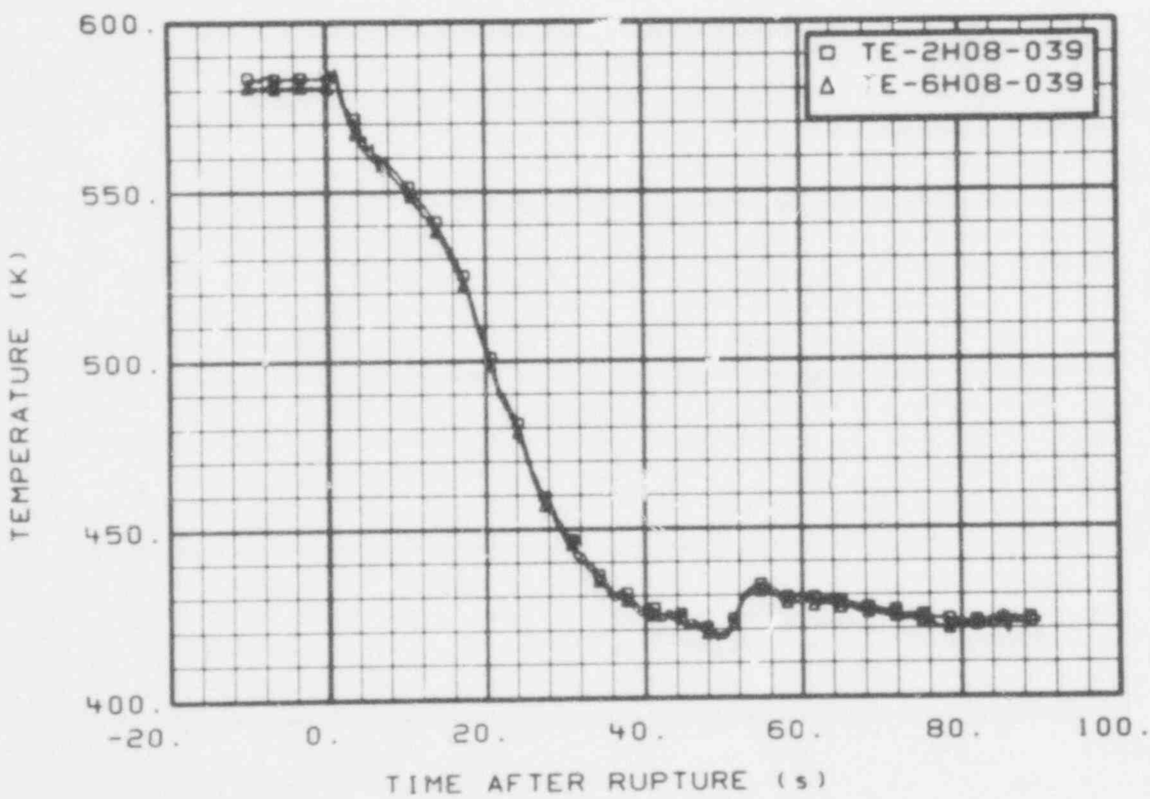

Fig. 248 Temperature on guide tubes for Fuel Assembly 2, Rod ˜ Fuel Assembly 4 Rod 8, and Fuel Assembly 6 Rod 8 (TE-2H8-039, TE-4H8-039, and TE-6H8-039) (QEUD except for TE-4H8- 39 which is: restrained, shows correct trend, however data values are low).

564 024

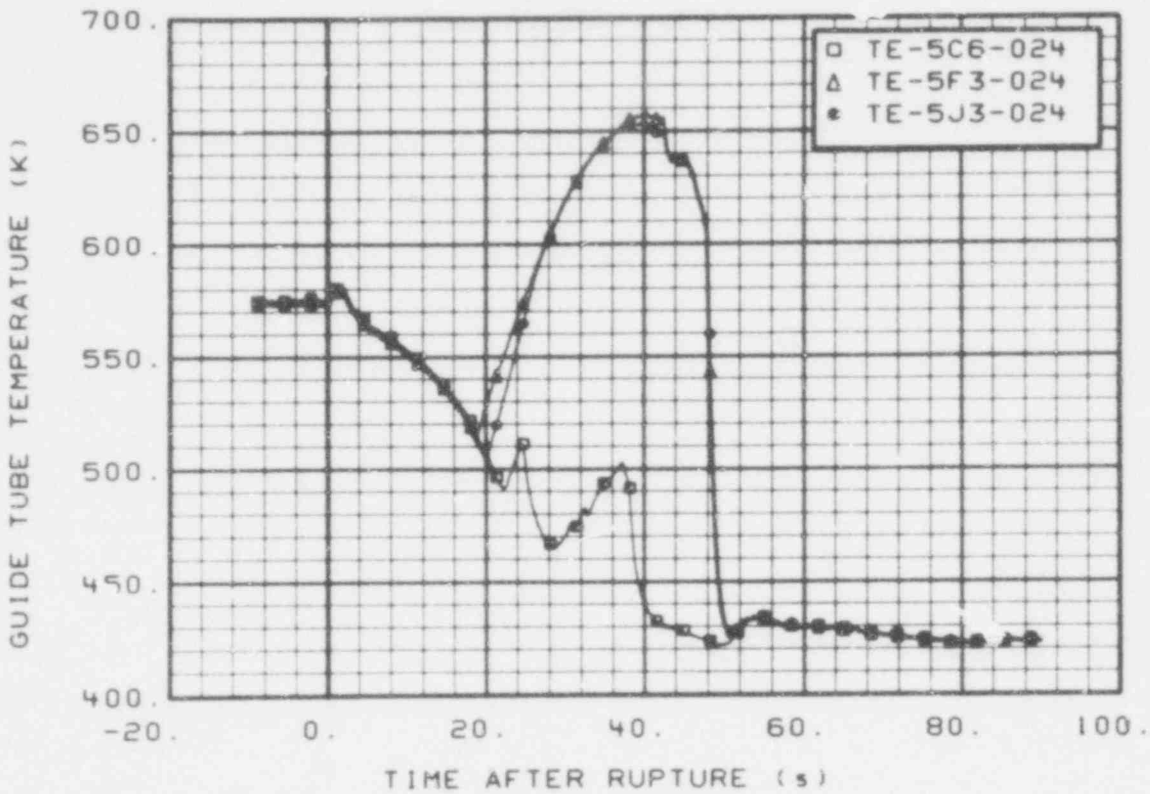

Fig. 249 Temperature on guide tubes for Fuel Assembly 5, Rods C6, F3, and J3 (TE-5C6-024, TE-5F3-024, and TE-5J3-024) (QEUD).

564 025

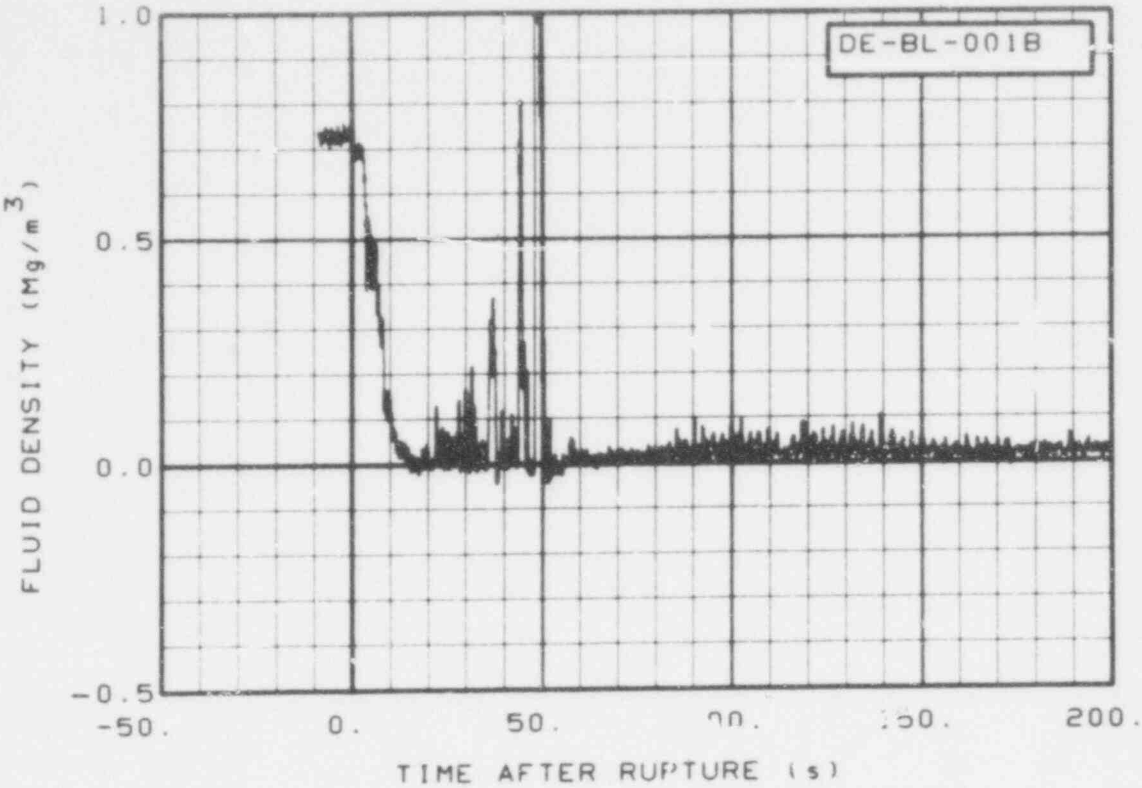

Fig. 250 Fluid density in broken loop cold leg, chordal density (DE-BL-001B) (QEUD).

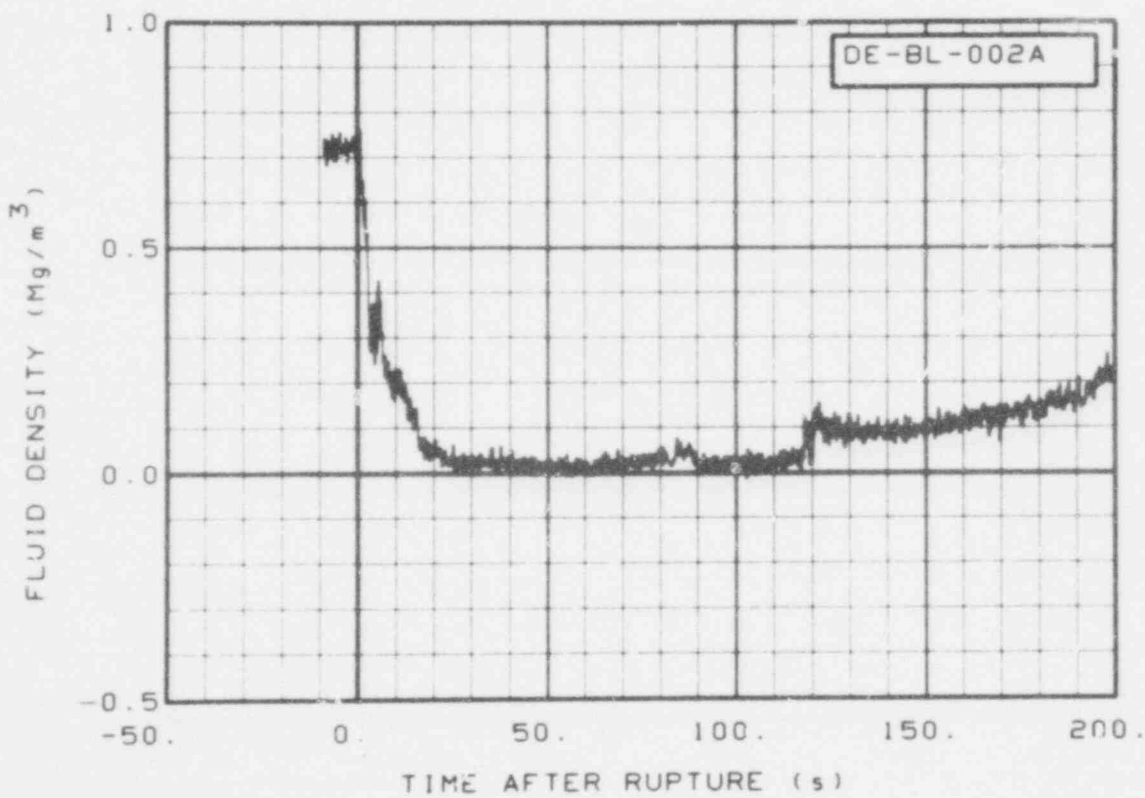

Fig. 251 Fluid density in broken loop hot leg, chordal density (DE-BL-002A) (QEUD).

564 027

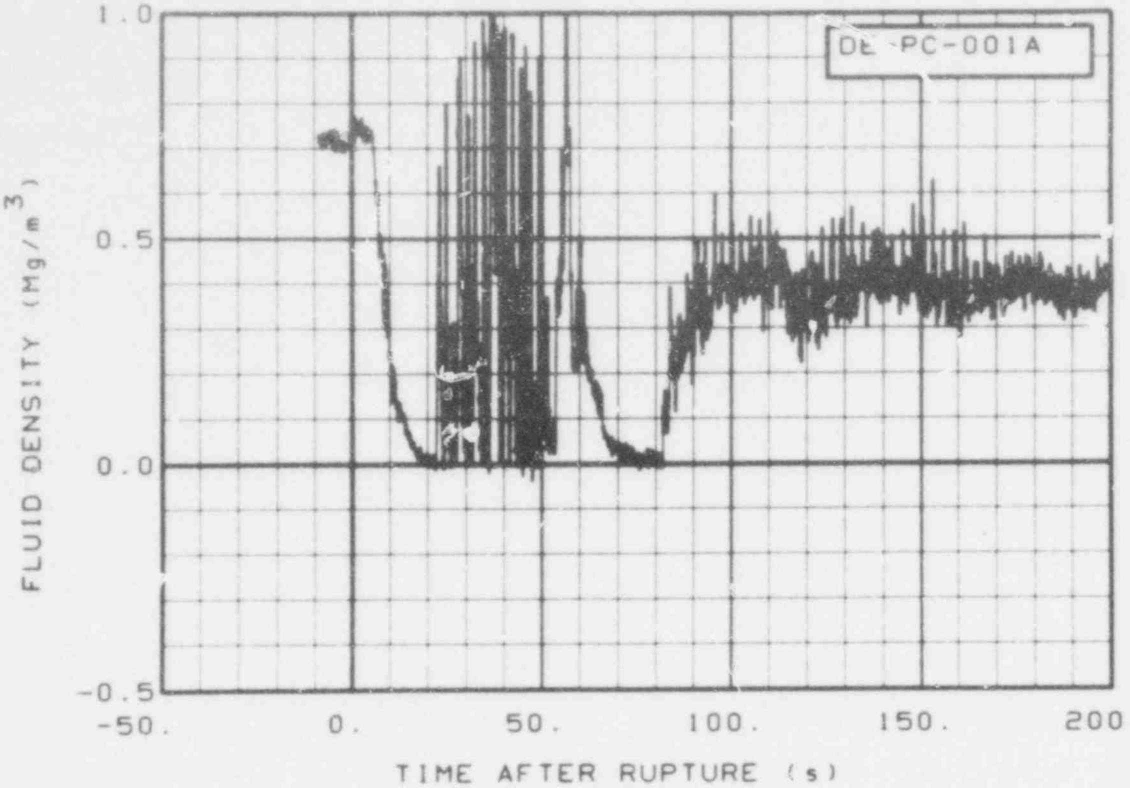

Fig. 252 Fluid density in intact loop cold leg, chordal density (DE-PC-001A) (QEUD).

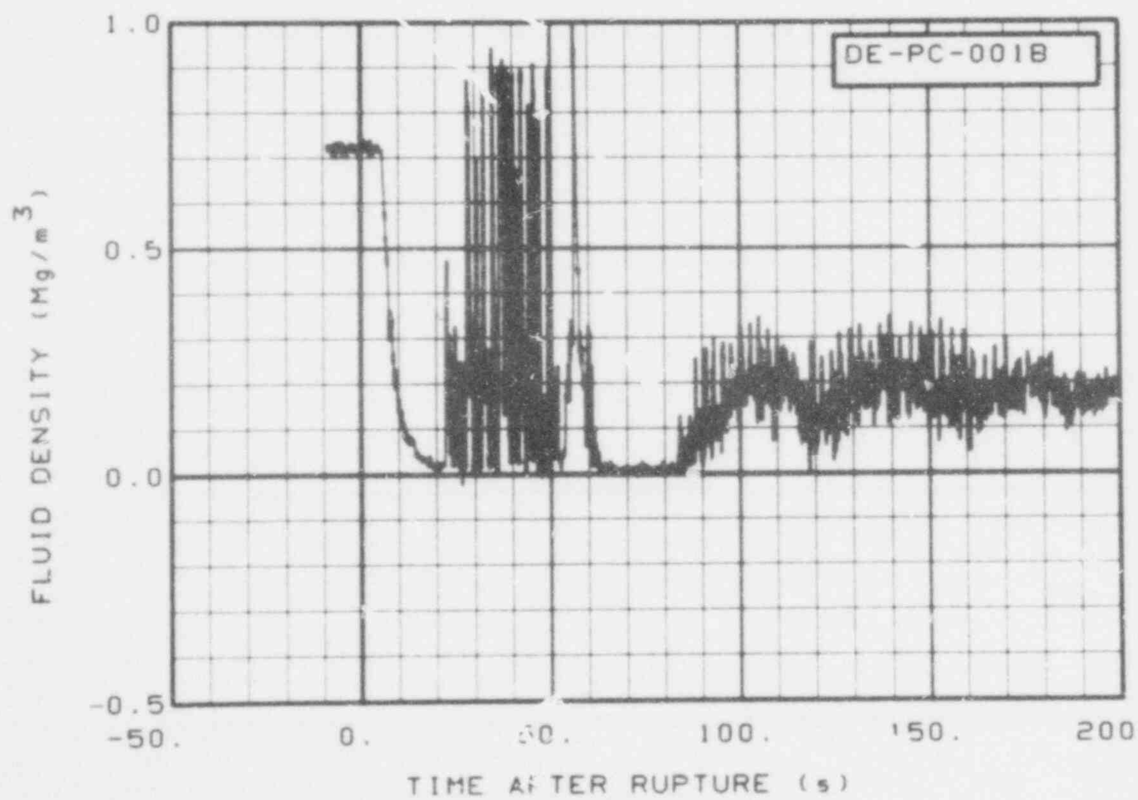

Fig. 253 Fluid density in intact loop cold leg, chordal density (DE-PC-001B) (QEUD).

564 028

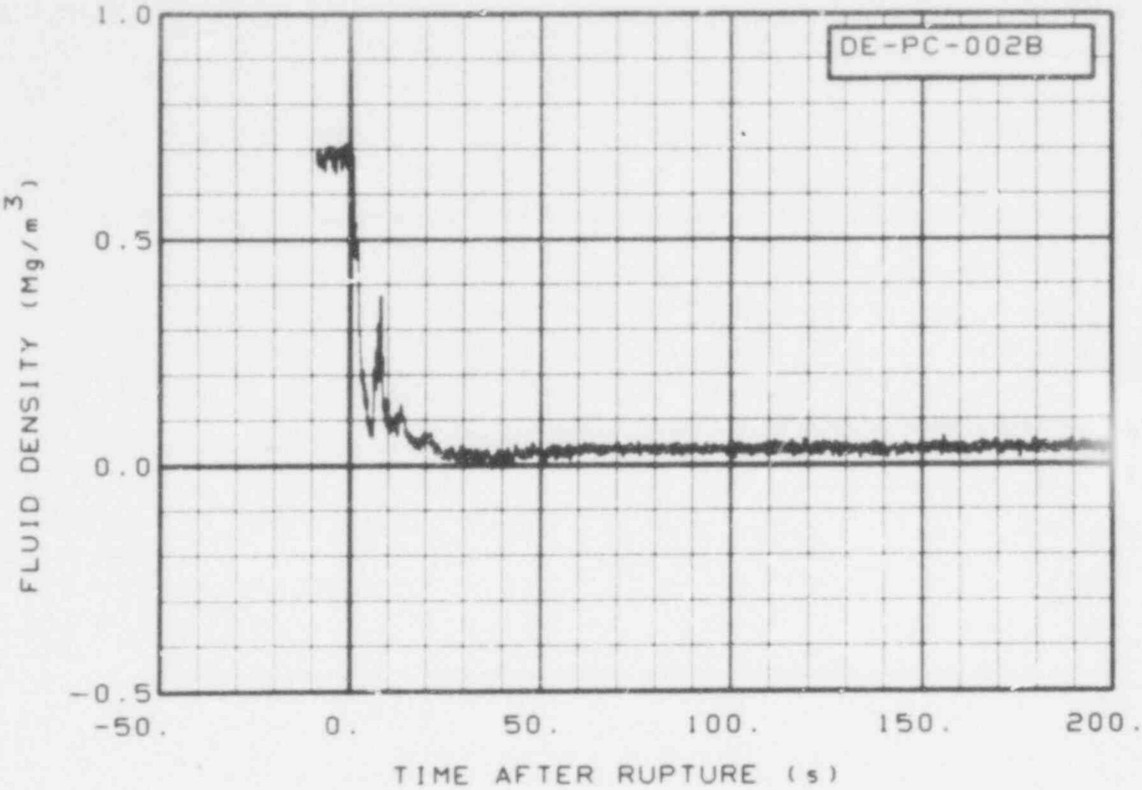

Fig. 254 Fluid density in intact loop hot leg, chordal density (DE-PC-002B) (QEUD).

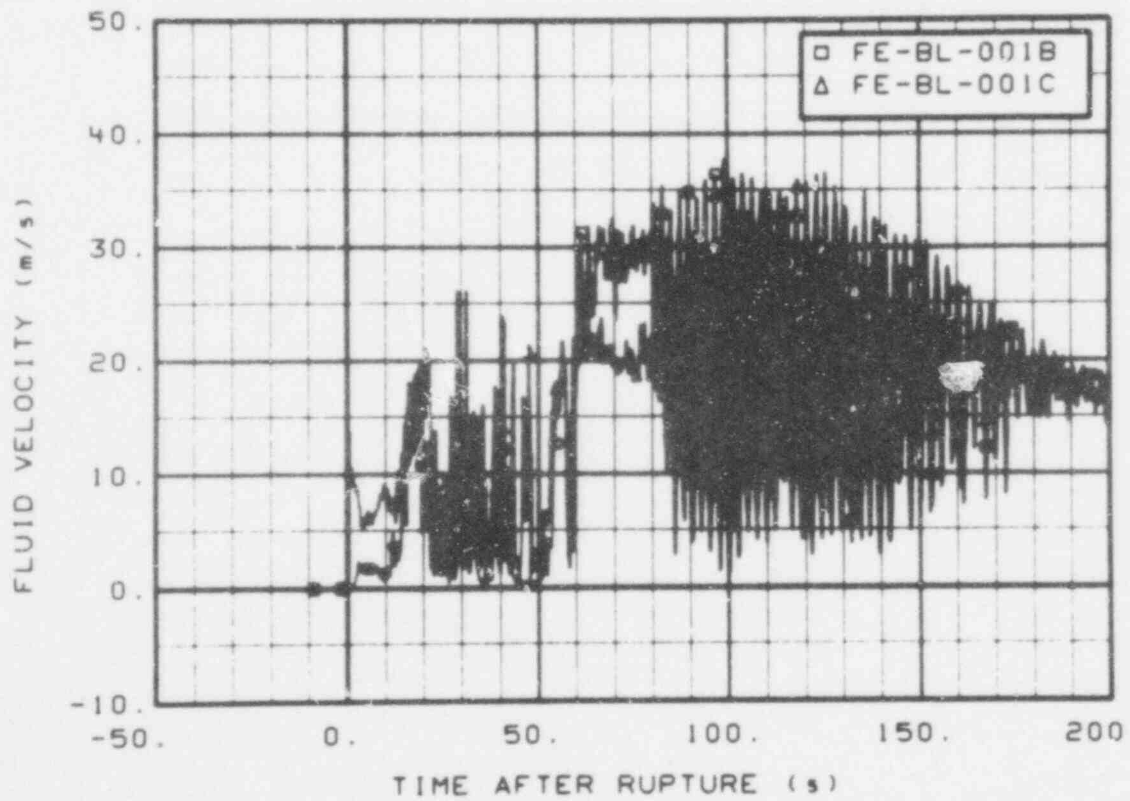

Fig. 255 Fluid velocity in broken loop cold leg at DTT flange on center and top of pipe (FE-BL-001B and FE-BL-001C) (FE-BL-001B — restrained, electronic adjustment required during T = 0 + 10 s and FE-BL-001C — QEUD).

564 029

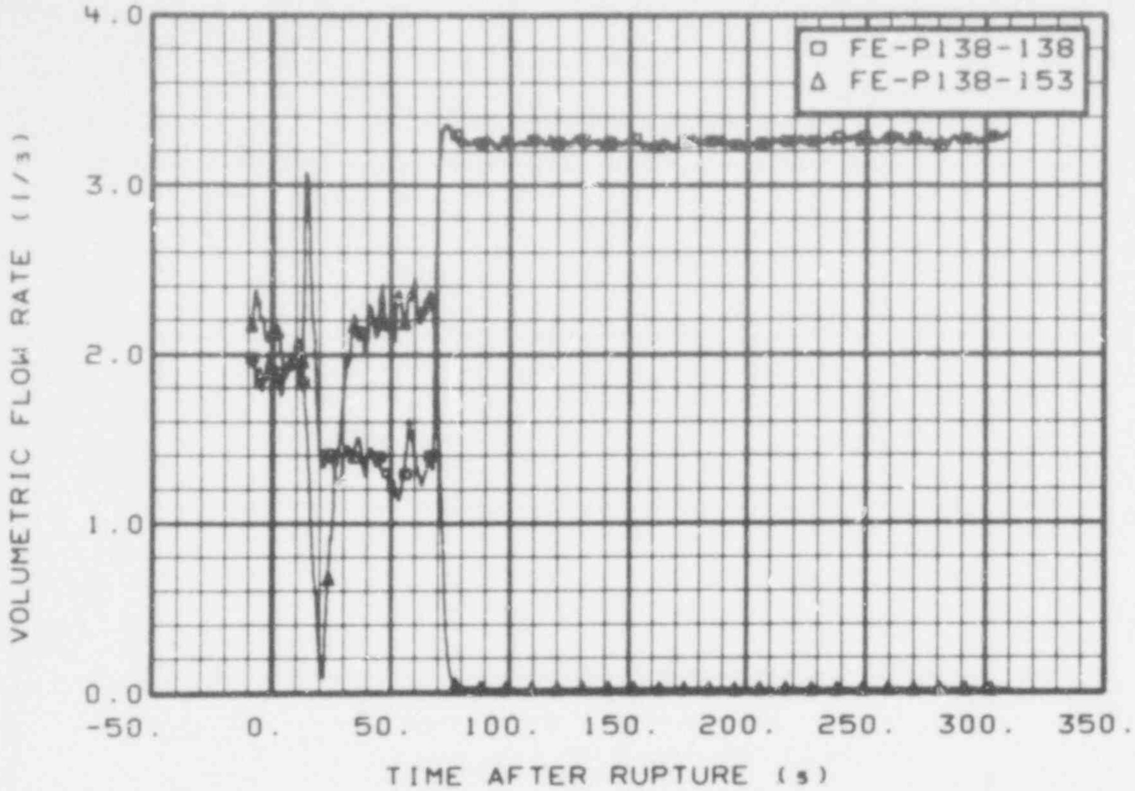

Fig. 256 Flow rate in blowdown suppression tank 3.79 l/s header and in spray pump recirculation line (FE-P138-138 and -153) (QEUD).

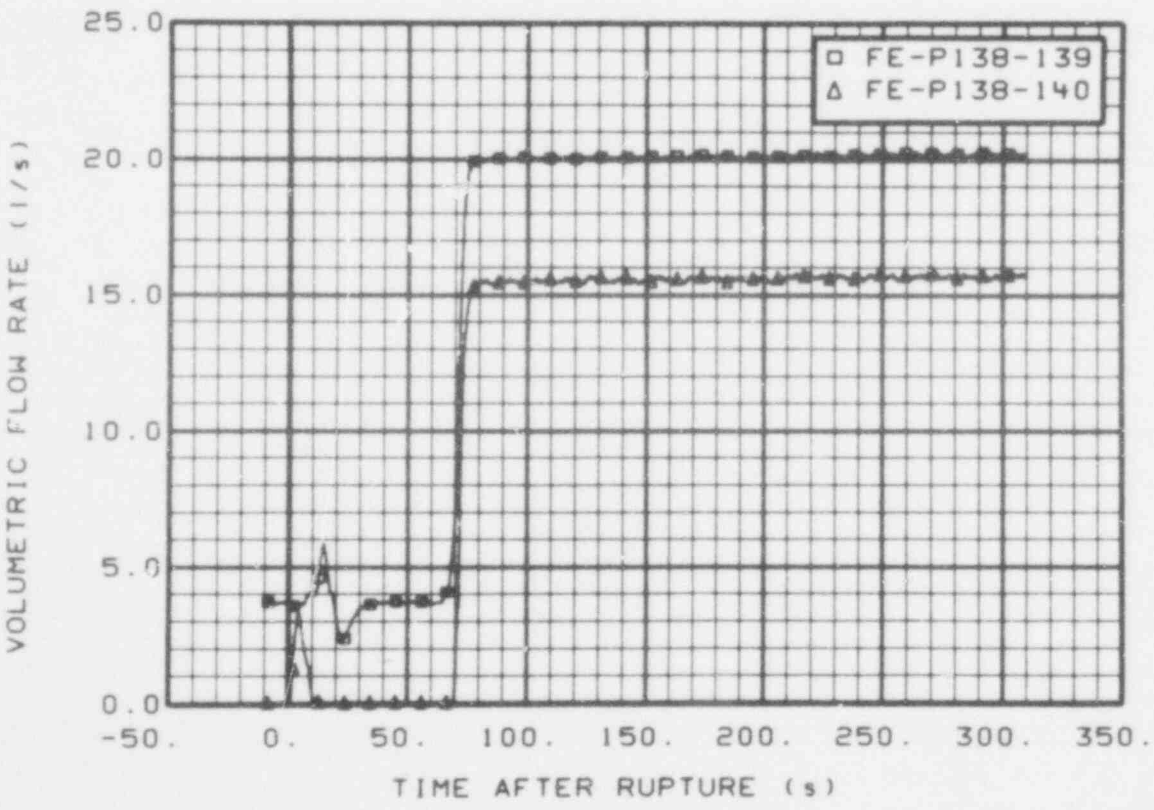

Fig. 257 Flow rate in blowdown suppression tank system pump discharge and 13.9 l/s spray header (FE-P138-139 and -140) (FE-P138-139 — QEUD and FE-P138-140 — restrained, good after T = 0 + 15 s, upstream valve closed until T = 0 + 68 s).

564 030

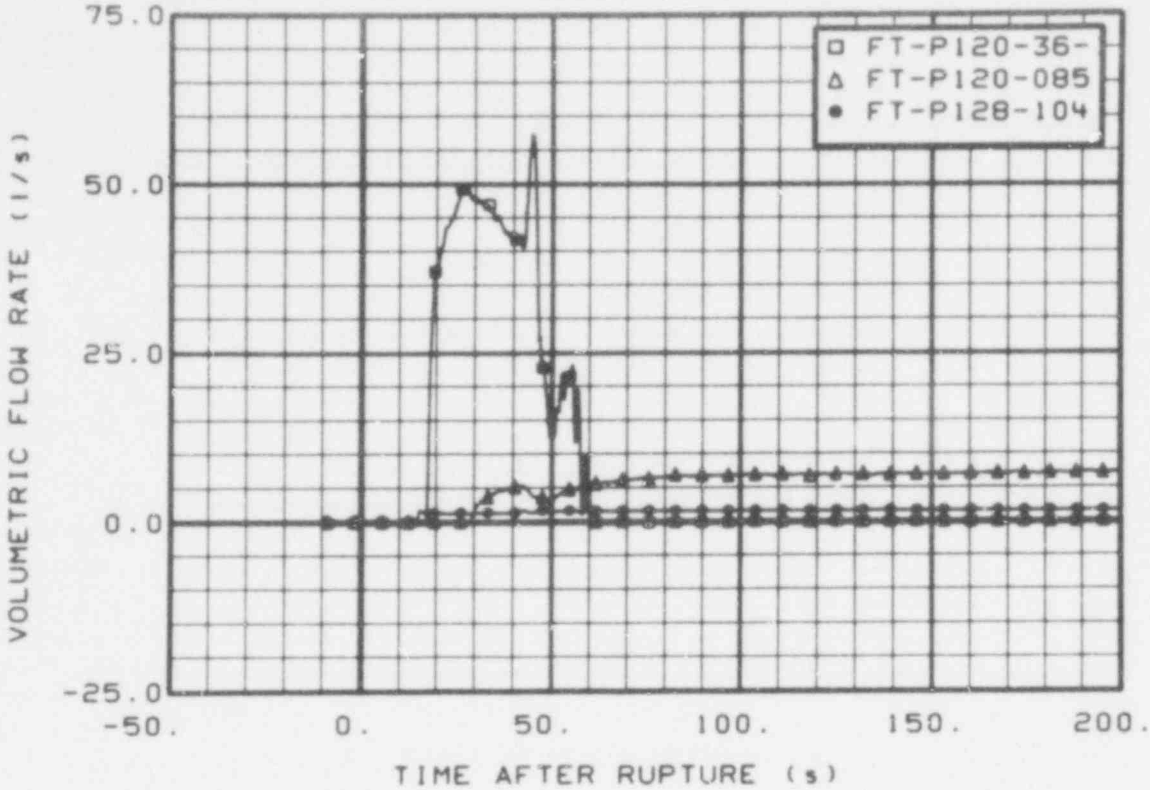

Fig. 258 Flow rate in ECC lines to intact loop cold leg (FT-P128-104, FT-P120-36-1, and FT-P120-085) (QEUD).

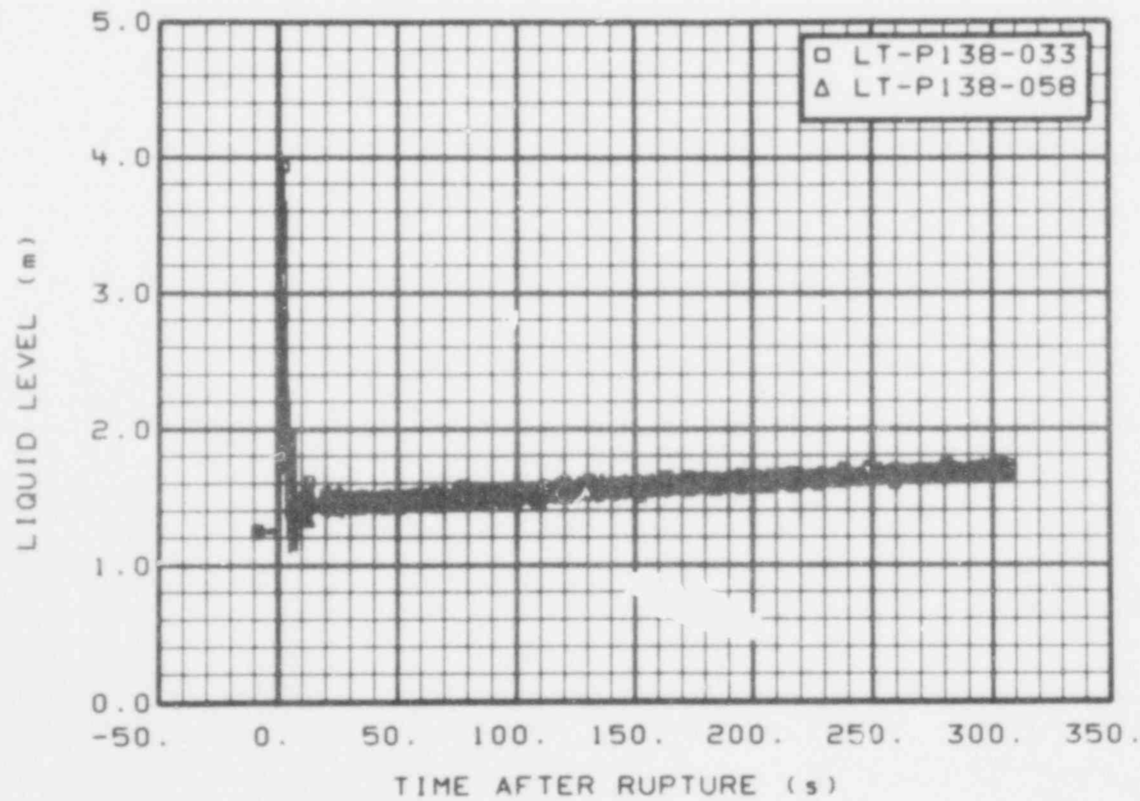

Fig. 259 Liquid level in blowdown suppression tank (LT-P138-033 and -058) [(restrained, slow response during transient, data outside uncertainty bands (mass flow)].

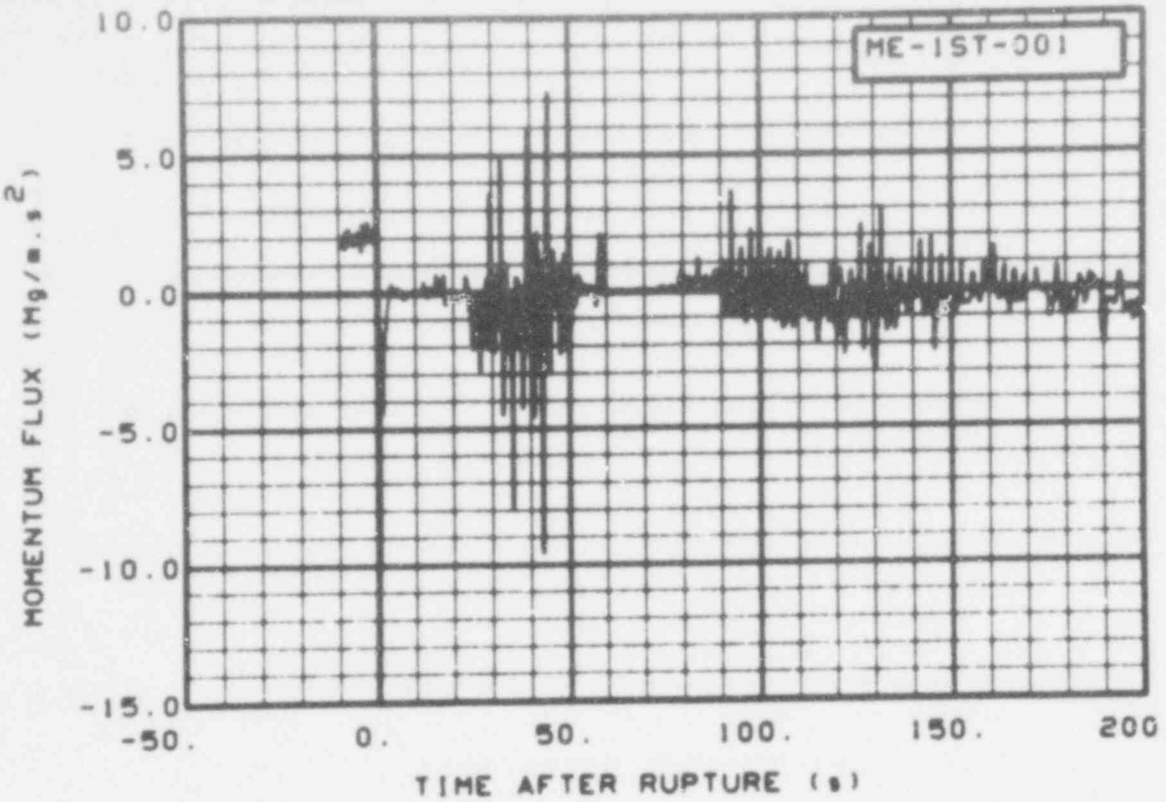

Fig. 260 Momentum flux in reactor vessel Downcomer Instrument Stalk 1, 1.13 m above reactor vessel bottom (ME-1ST-001) (restrained, may not indicate magnitude of downcomer flow).

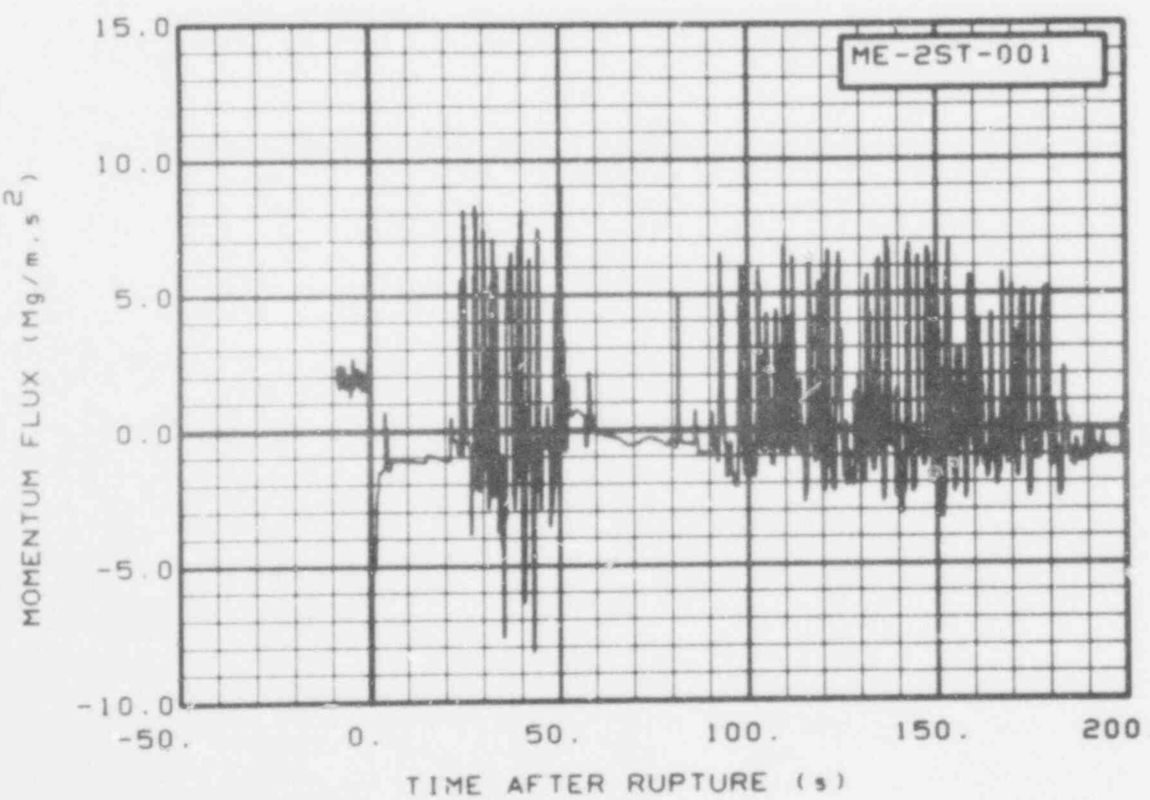

Fig. 261 Momentum flux in reactor vessel Downcomer Instrument Stalk 2, 1.13 m above reactor vessel bottom (ME-2ST-001) (restrained, may not indicate magnitude of downcomer flow).

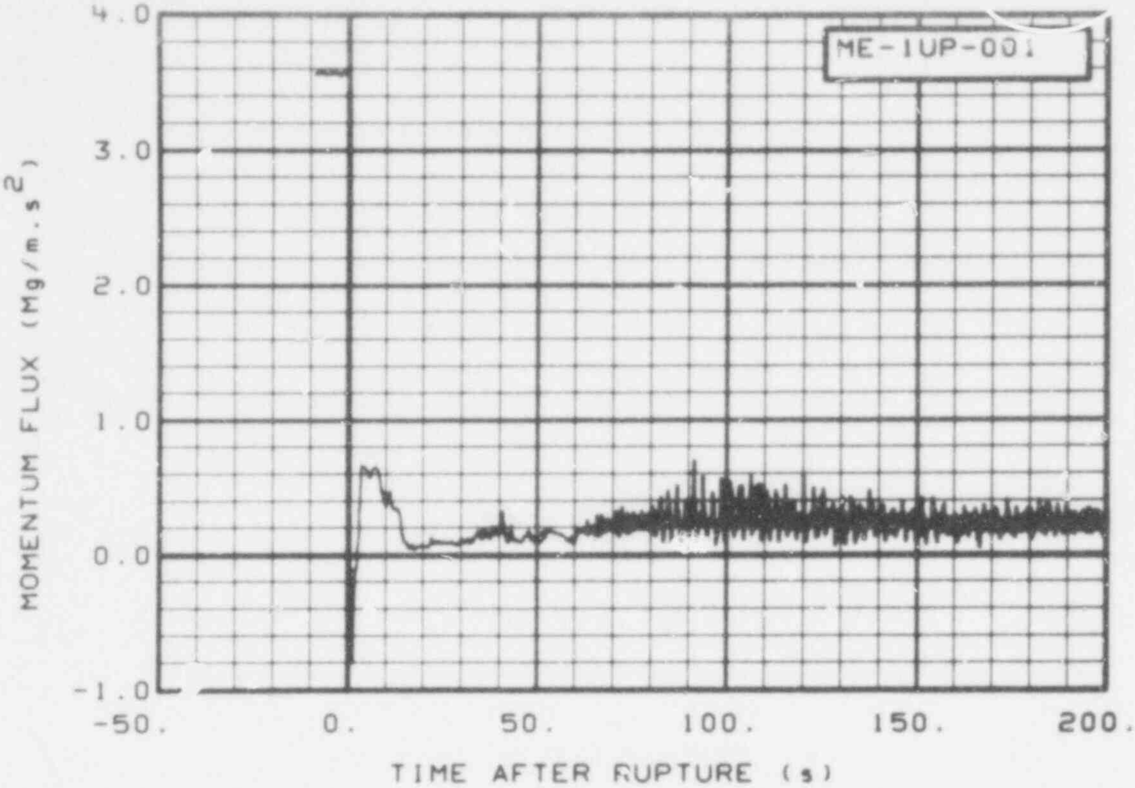

Fig. 262 Momentum flux in reactor vessel above Fuel Assembly 1 upper end box (ME-1UP-001) (restrained, questionable magnitude).

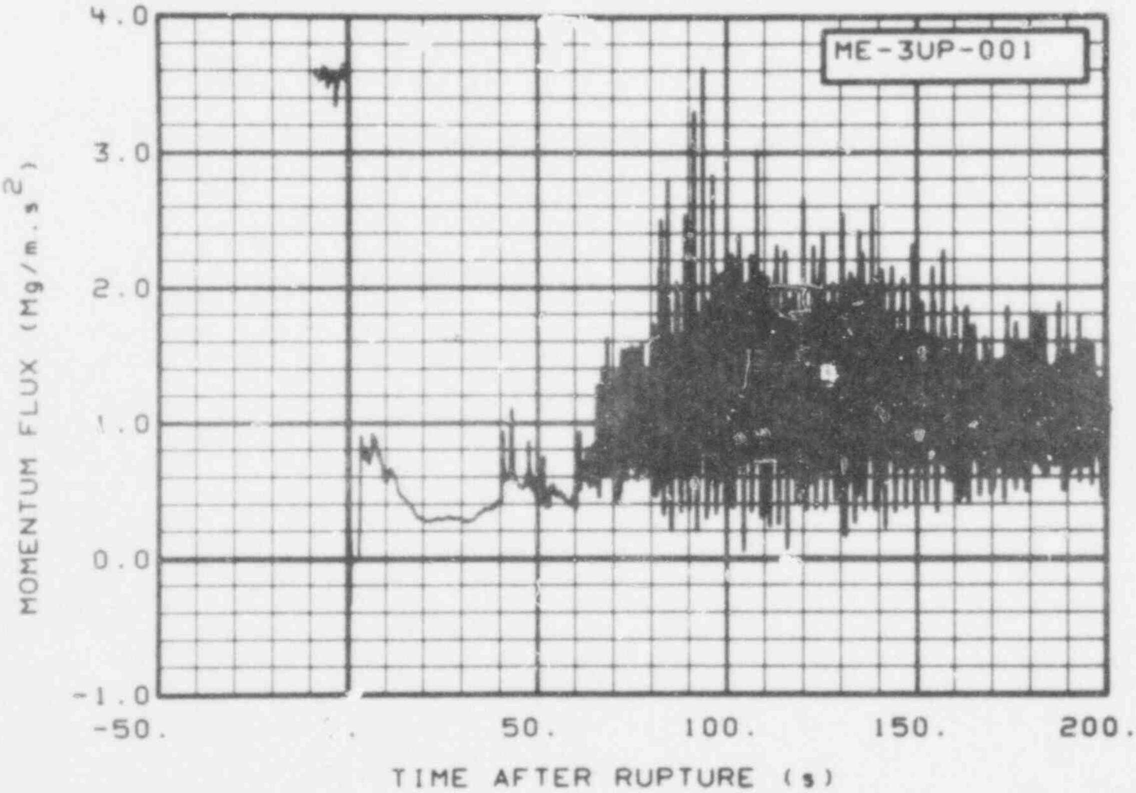

Fig. 263 Momentum flux in reactor vessel above Fuel Assembly 3 upper end box (ME-3UP-001) (restrained, questionable magnitude).

564 033

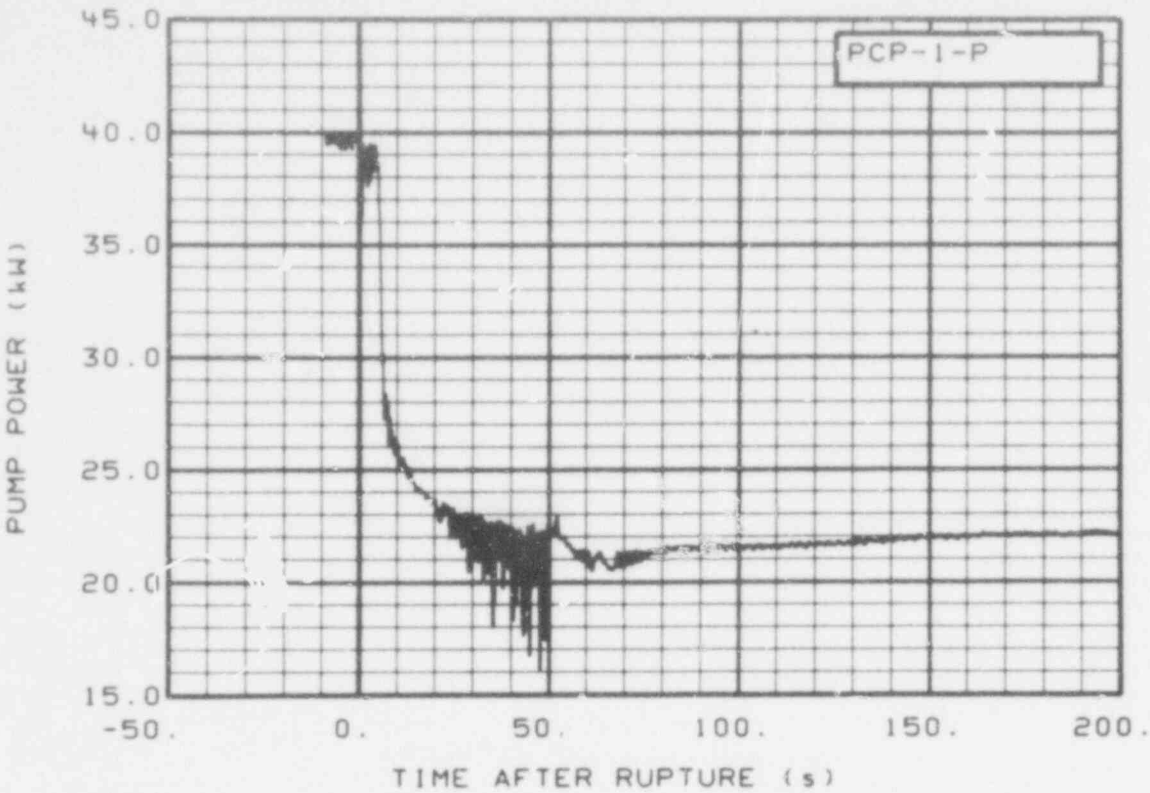

Fig. 264 Pump power for primary coolant Pump 1 (PCP-1-P) (QEUD).

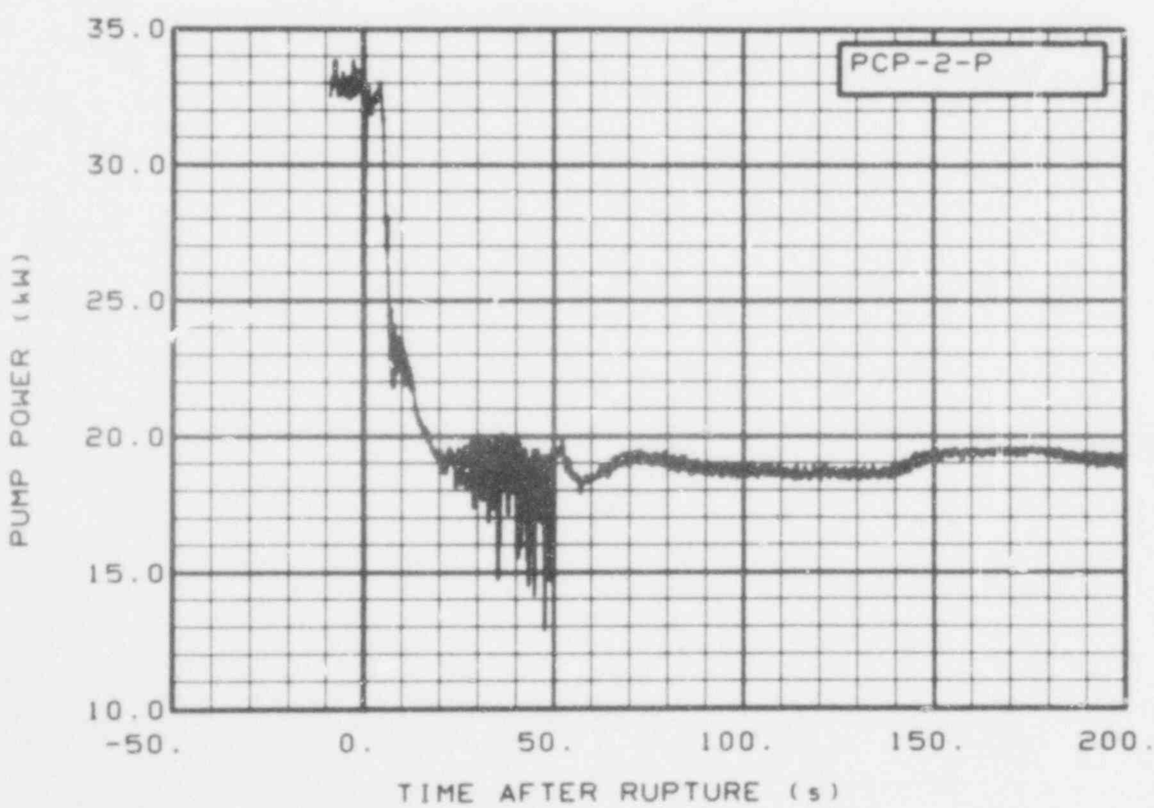

Fig. 265 Pump power for primary coolant Pump 2 (PCP-2-P) (QEUD).

564 034

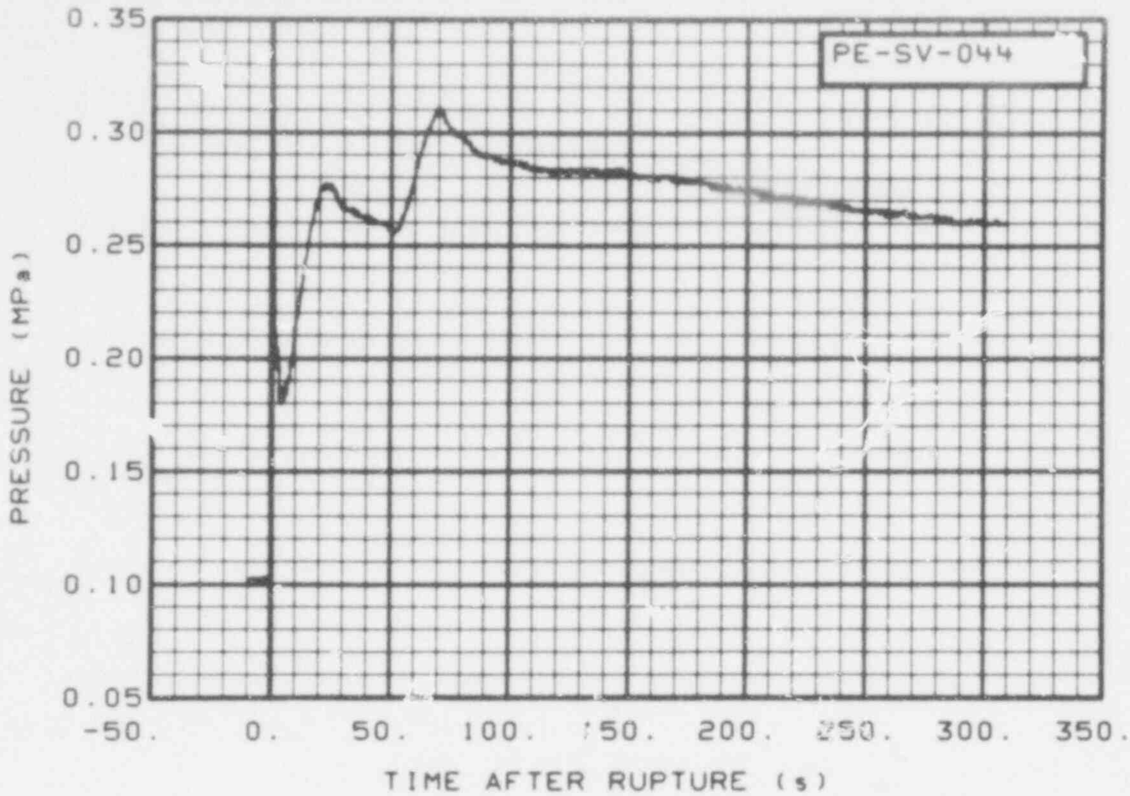

Fig. 266 Pressure in blowdown suppression tank header under Downcomer 3 (PE-SV-044) (QEUD).

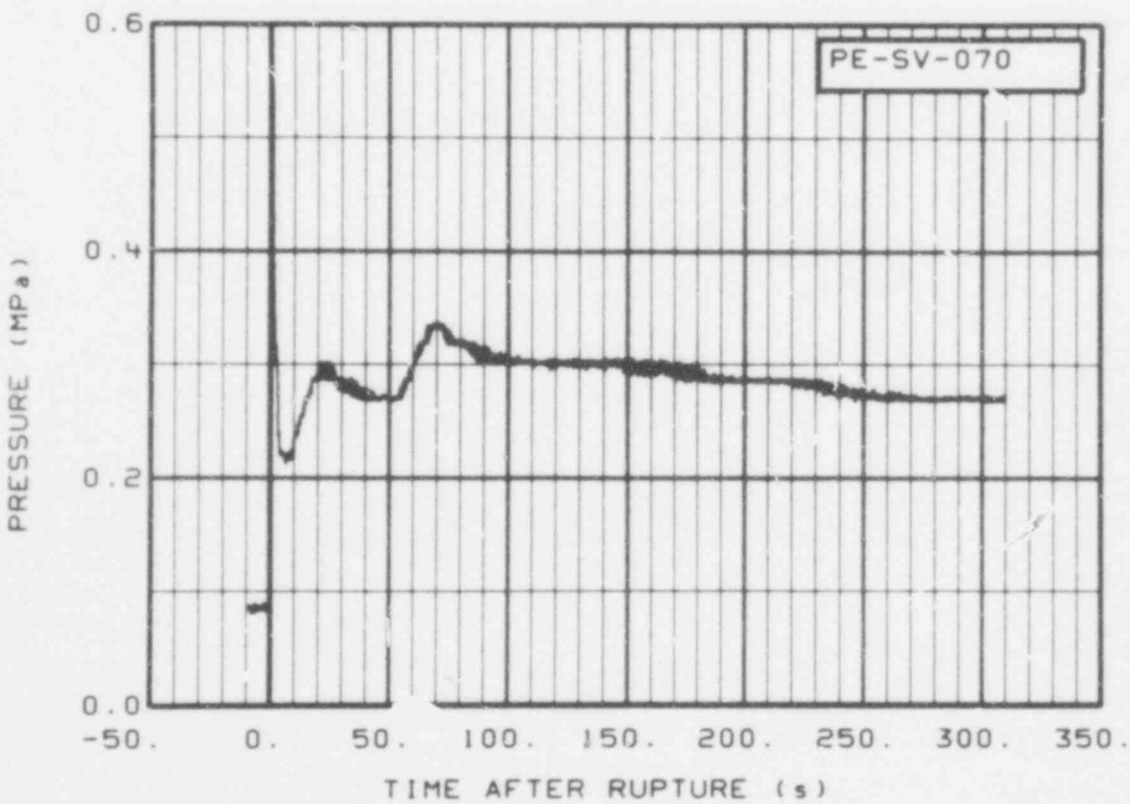

Fig. 267 Pressure in blowdown suppression tank bellows at header to test assembly (PE-SV-070) (QEUD).

564 035

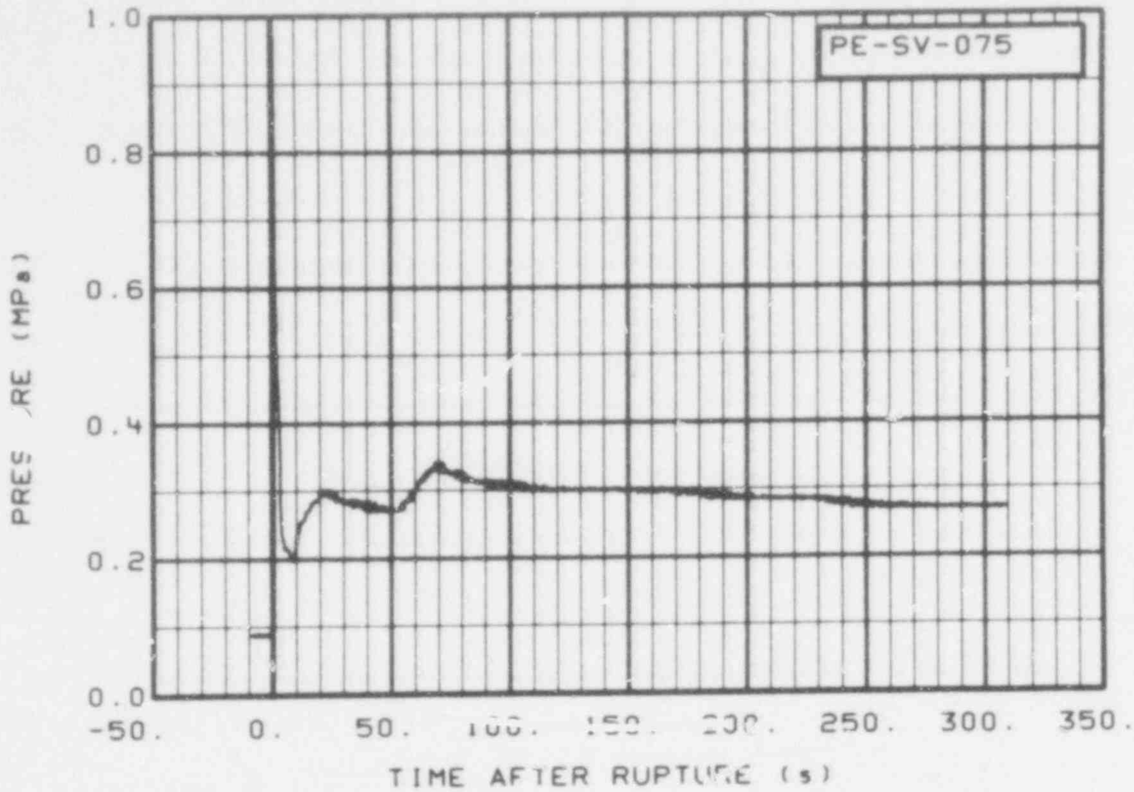

Fig. 268 Pressure in blowdown suppression tank header (PE-SV-075) (QEUD).

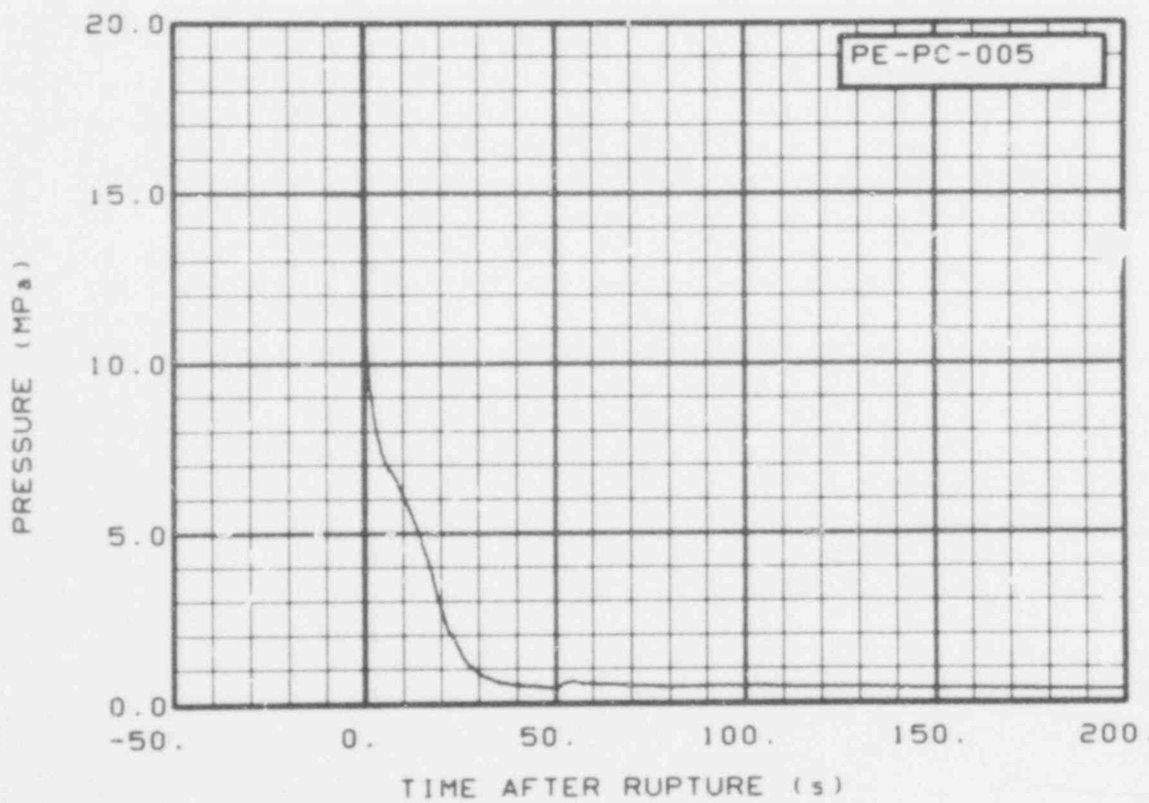

Fig. 269 Intact loop reference pressure (PE-PC-005) (QEUD).

564

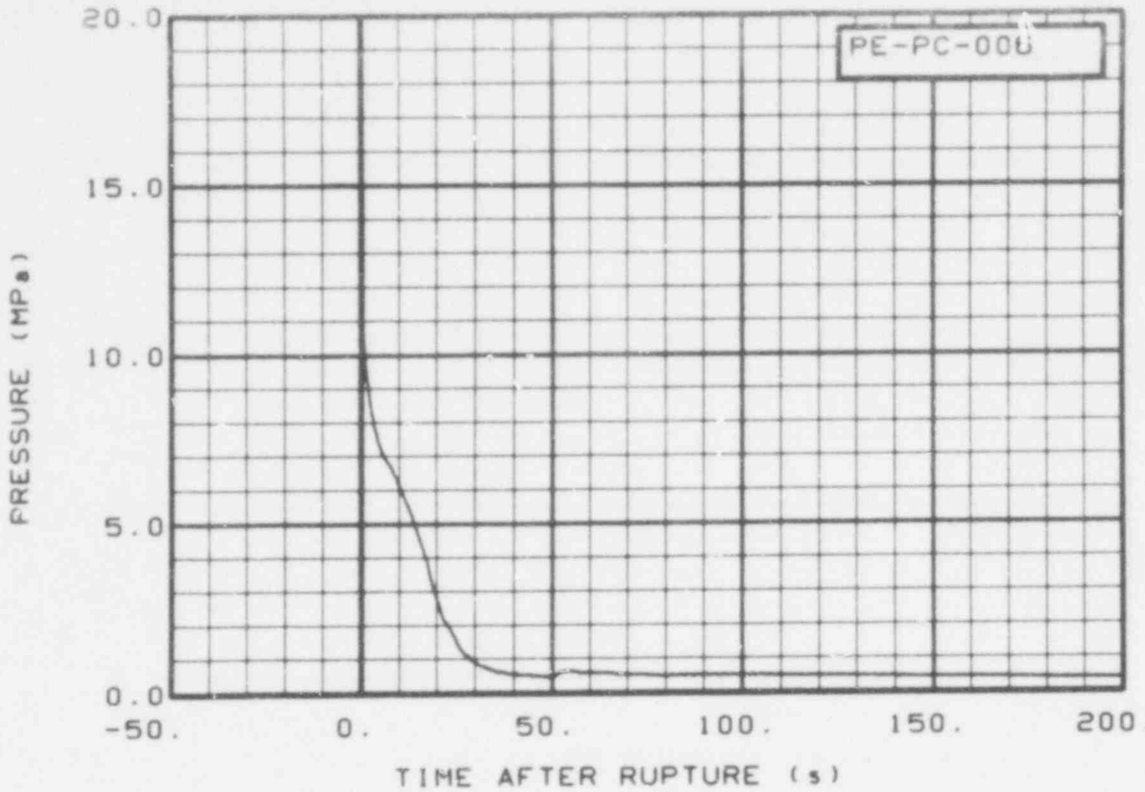

Fig. 270 Intact loop reference pressure (PE-PC-006) (QEUD).

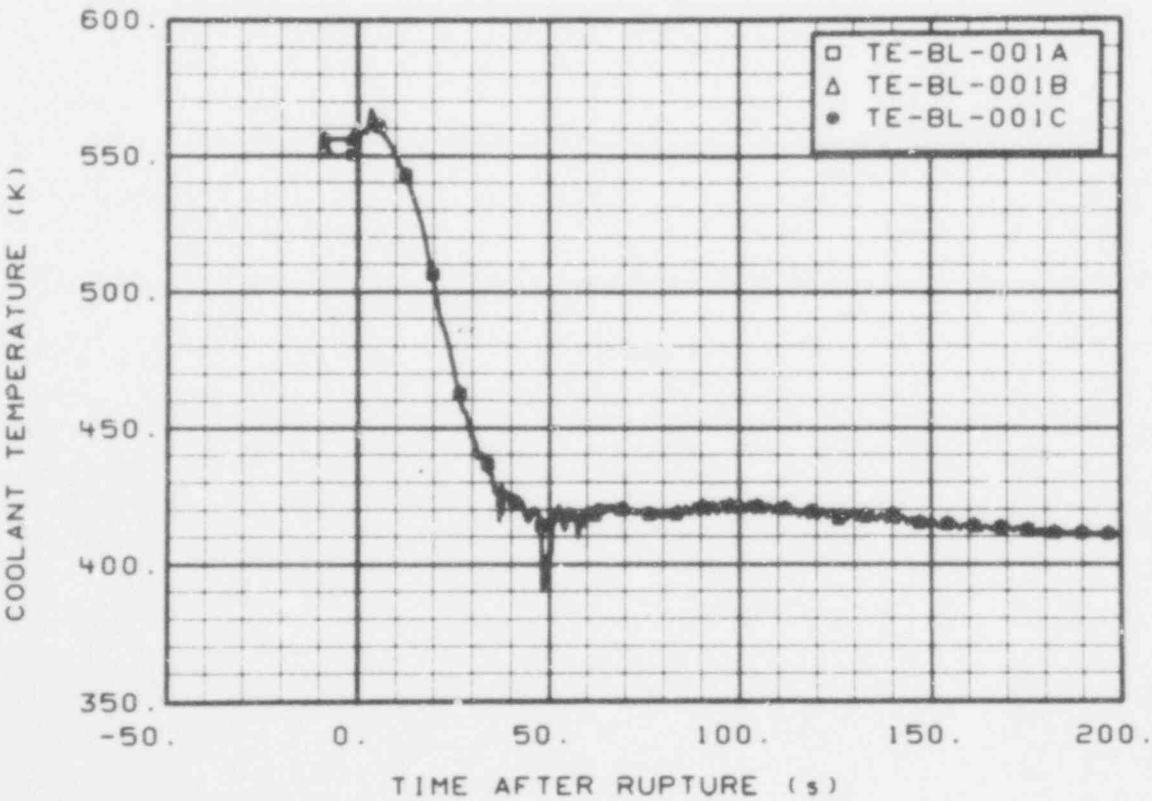

Fig. 271 Coolant temperature in broken loop cold leg (TE-BL-001A, -001B, and -001C) (QEUD).

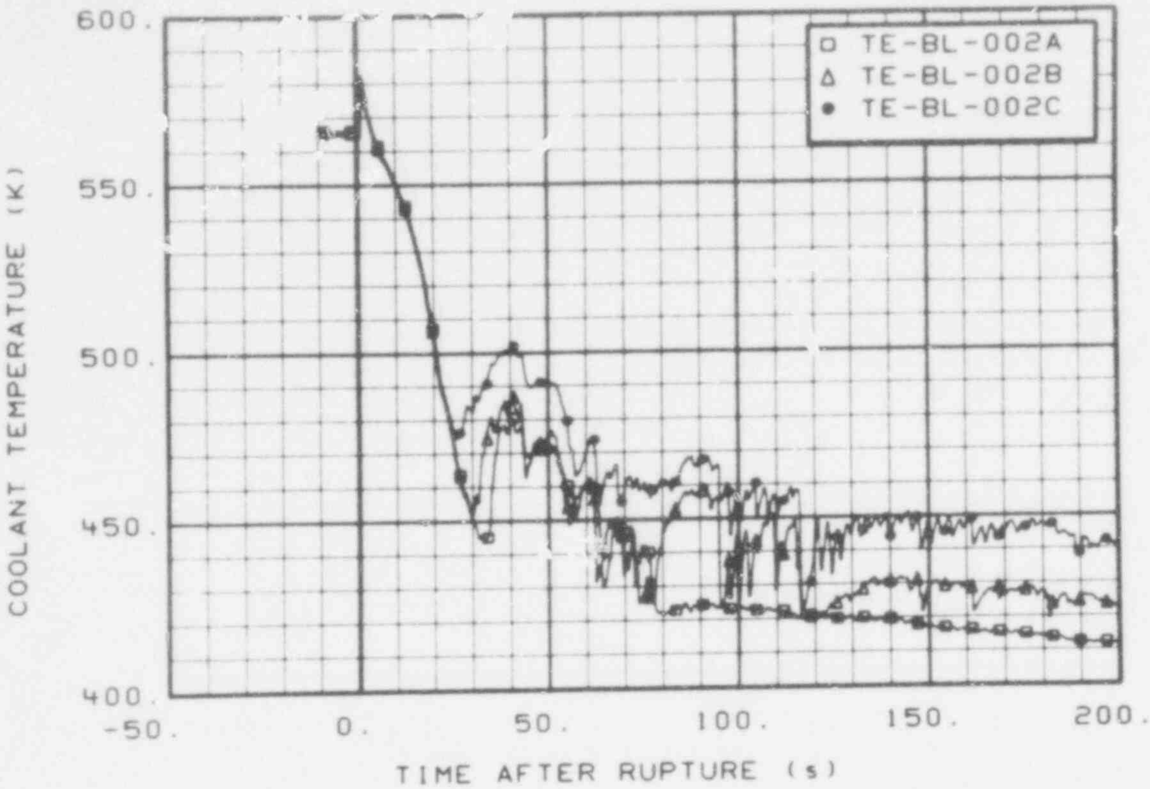

Fig. 272 Coolant temperature in broken loop hot leg (TE-BL-002A, -002B, and -002C) (QEUD).

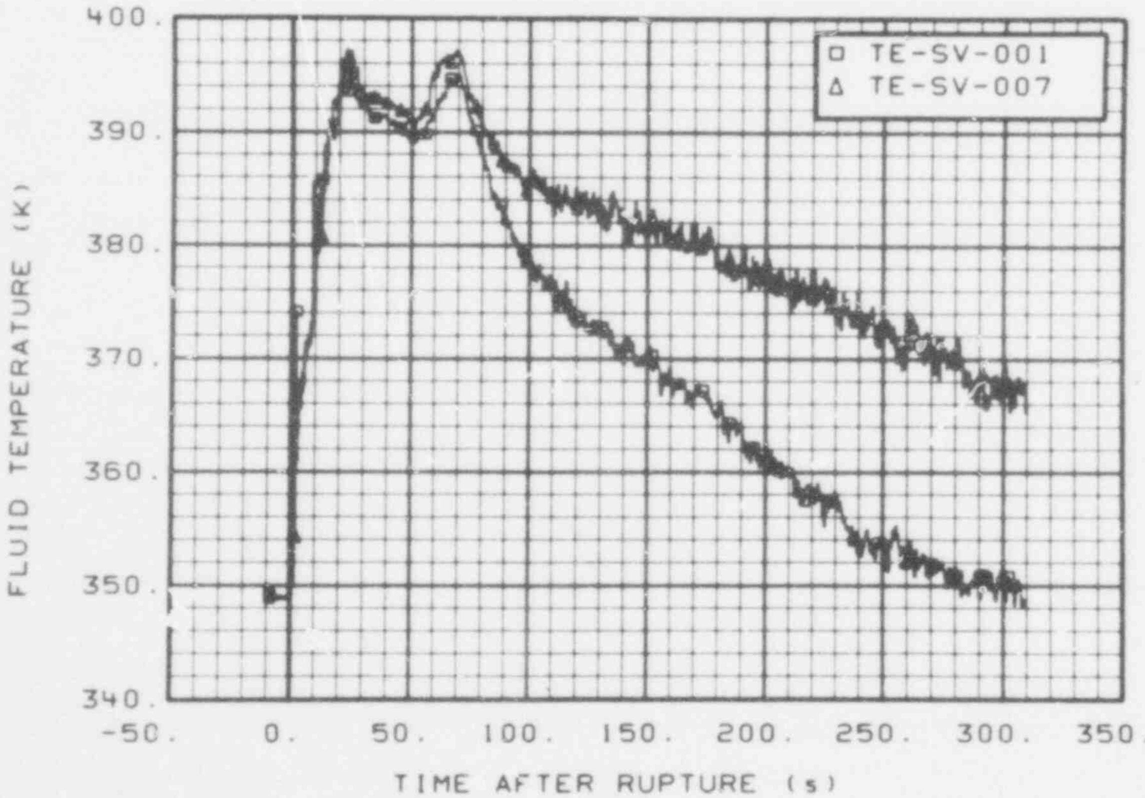

Fig. 273 Fluid temperature in blowdown suppression tank 2.723 m above tank bottom (TE-SV-001 and -007 (QEUD).

564 050

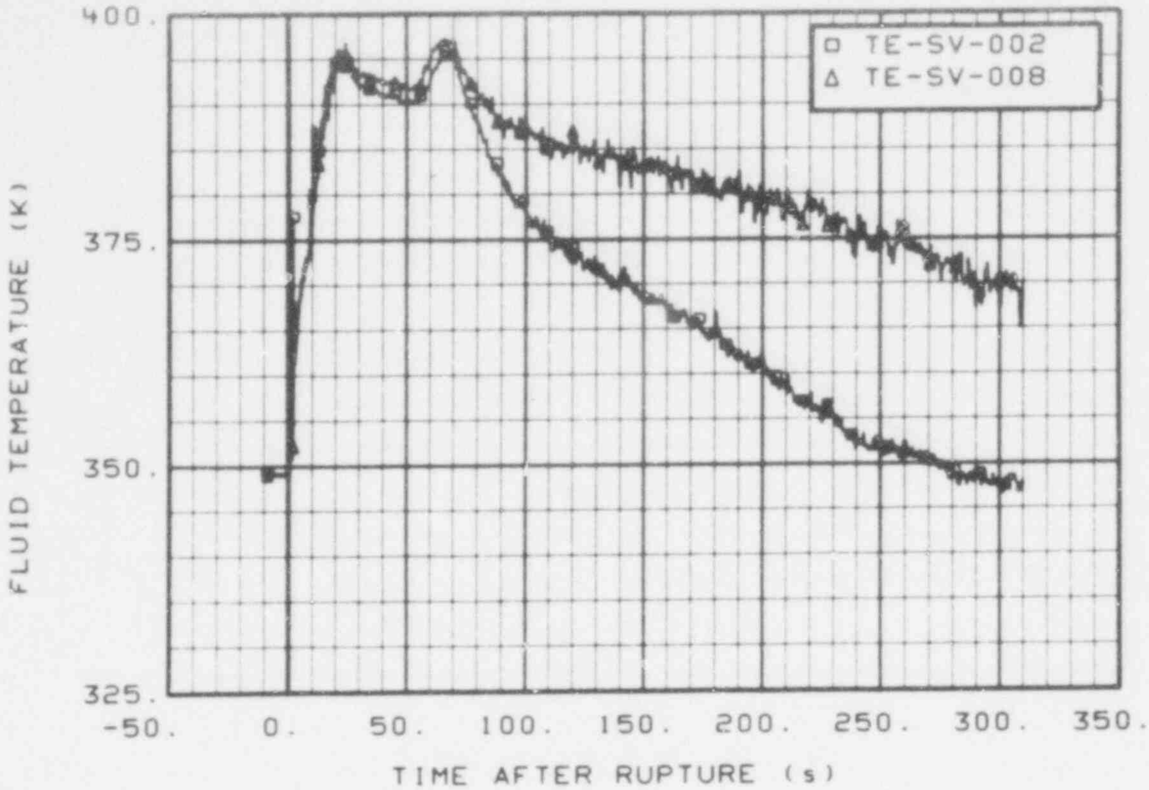

Fig. 274 Fluid temperature in blowdown suppression tank 2.362 m above tank bottom (TE-SV-002 and -008) (QEUD).

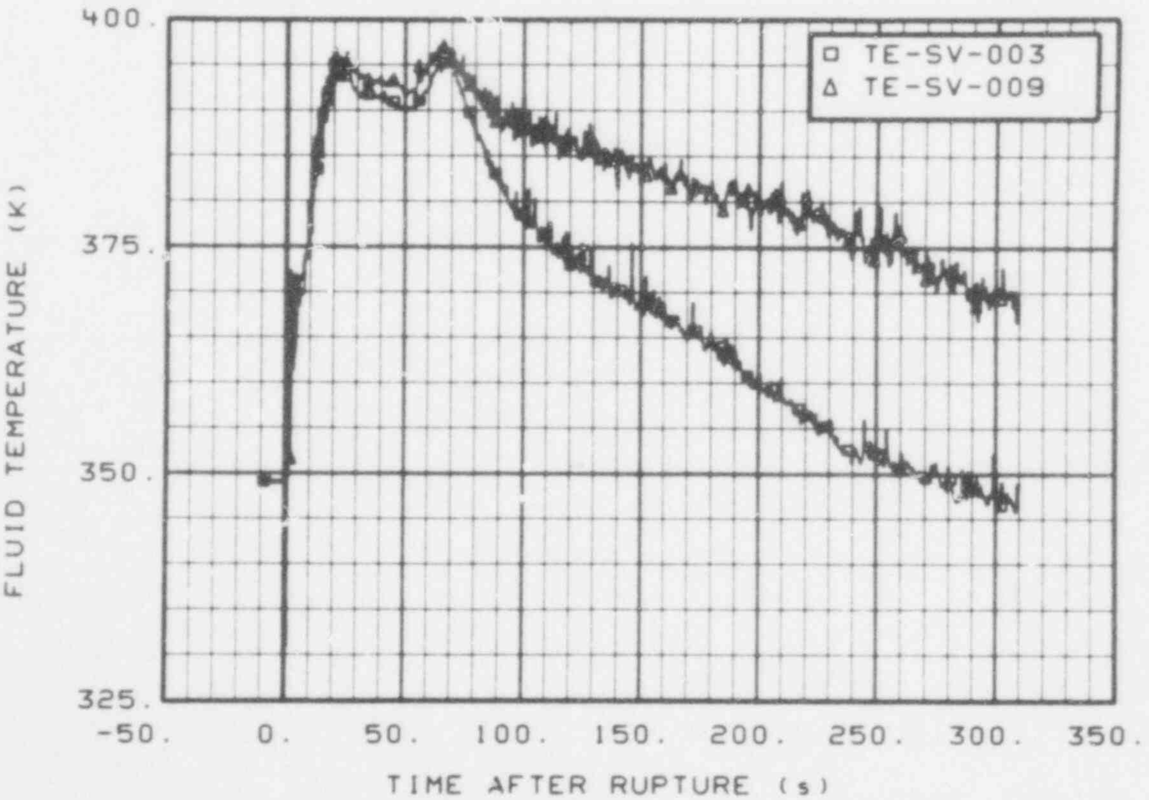

Fig. 275 Fluid temperature in blowdown suppression tank 1.897 m above tank bottom (TE-SV-003 and -009) (TE-SV-003 — QEUD; TE-SV-009 — restrained, unexplained noise spike at T = 0, data appear good otherwise).

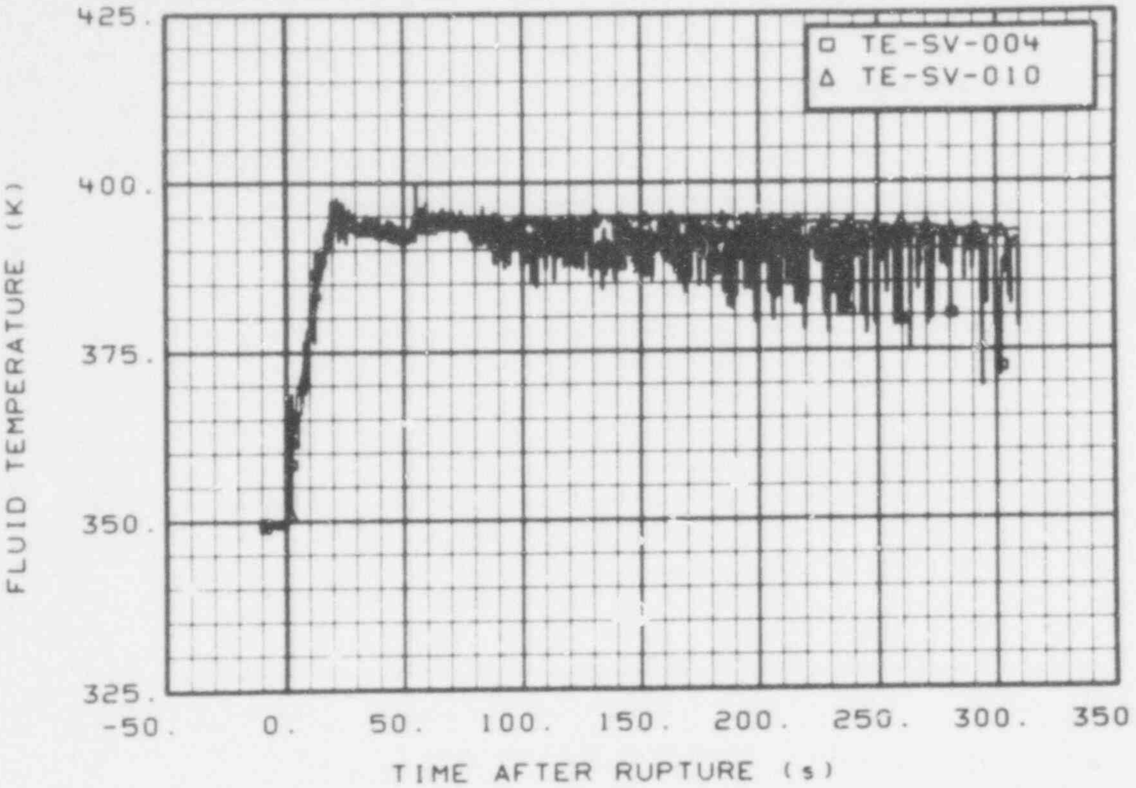

Fig. 276 Fluid temperature in blowdown suppression tank 1.453 m above tank bottom (TE-SV-004 and -010) (QEUD).

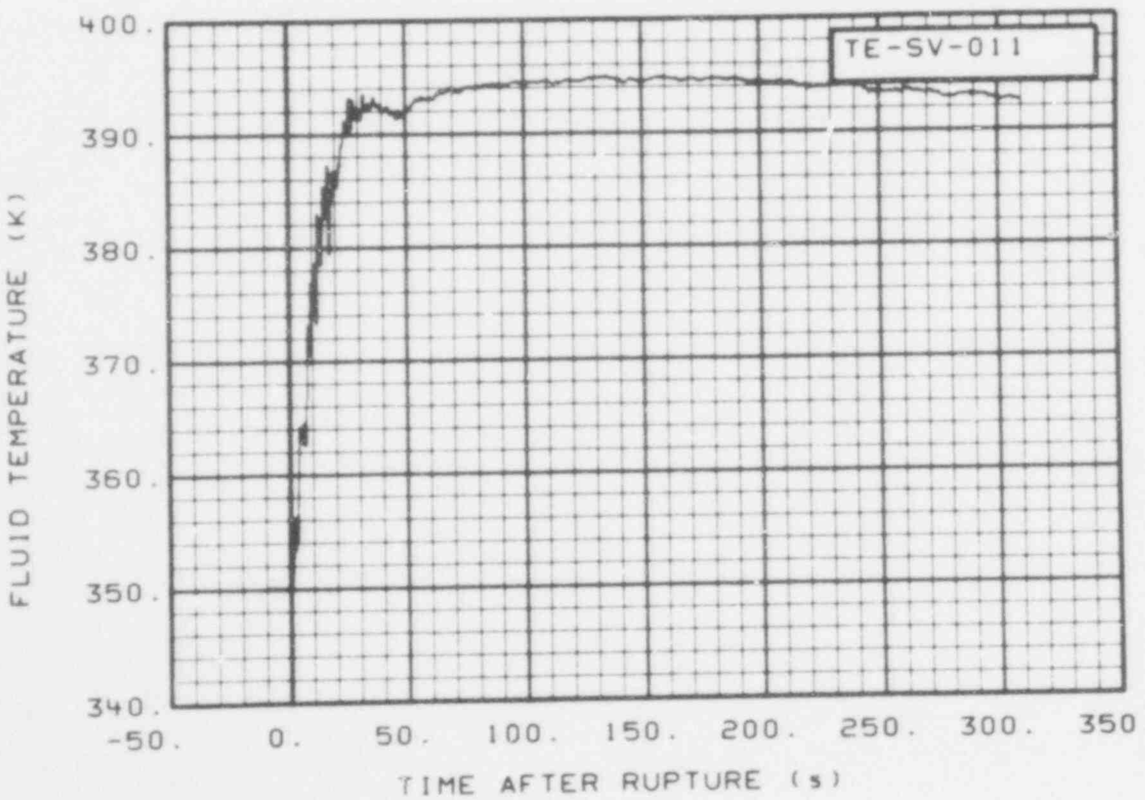

Fig. 277 Fluid temperature in blowdown suppression tank 0.991 m above tank bottom (TE-SV-011) (QEUD).

564 040

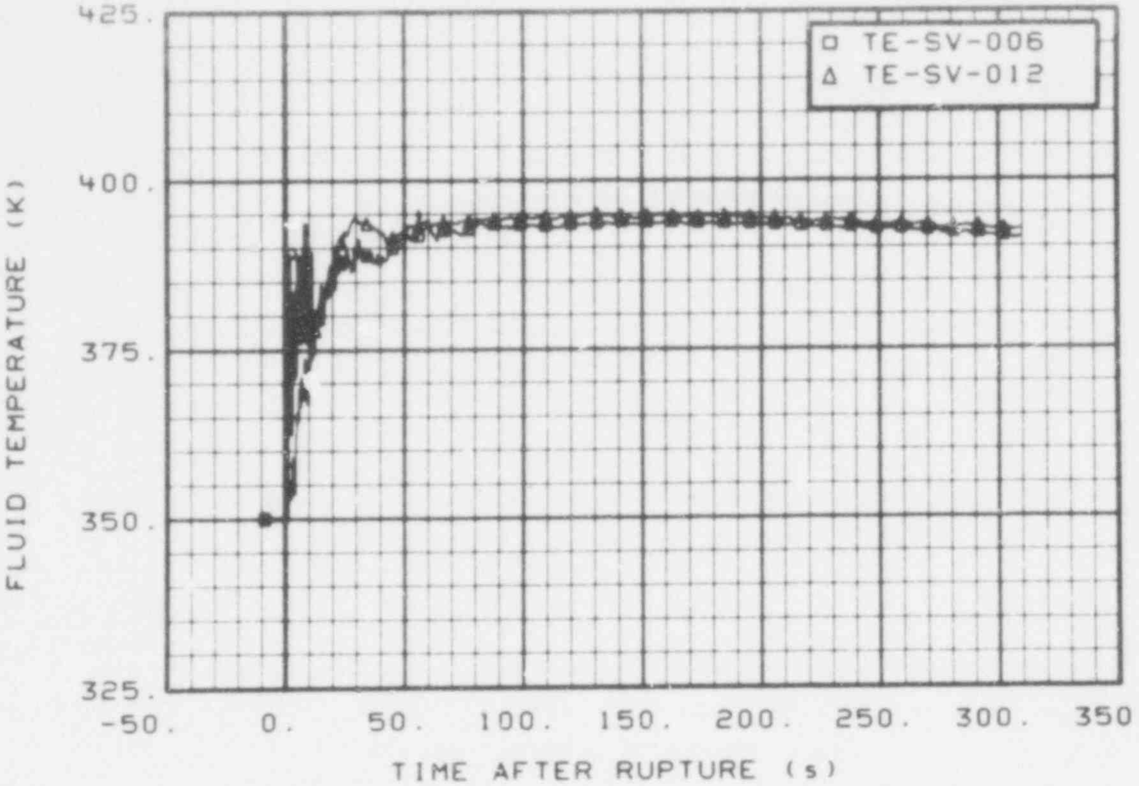

Fig. 278 Fluid temperature in blowdown suppression tank 0.373 m above tank bottom (TE-SV-006 and -012) (QEUD).

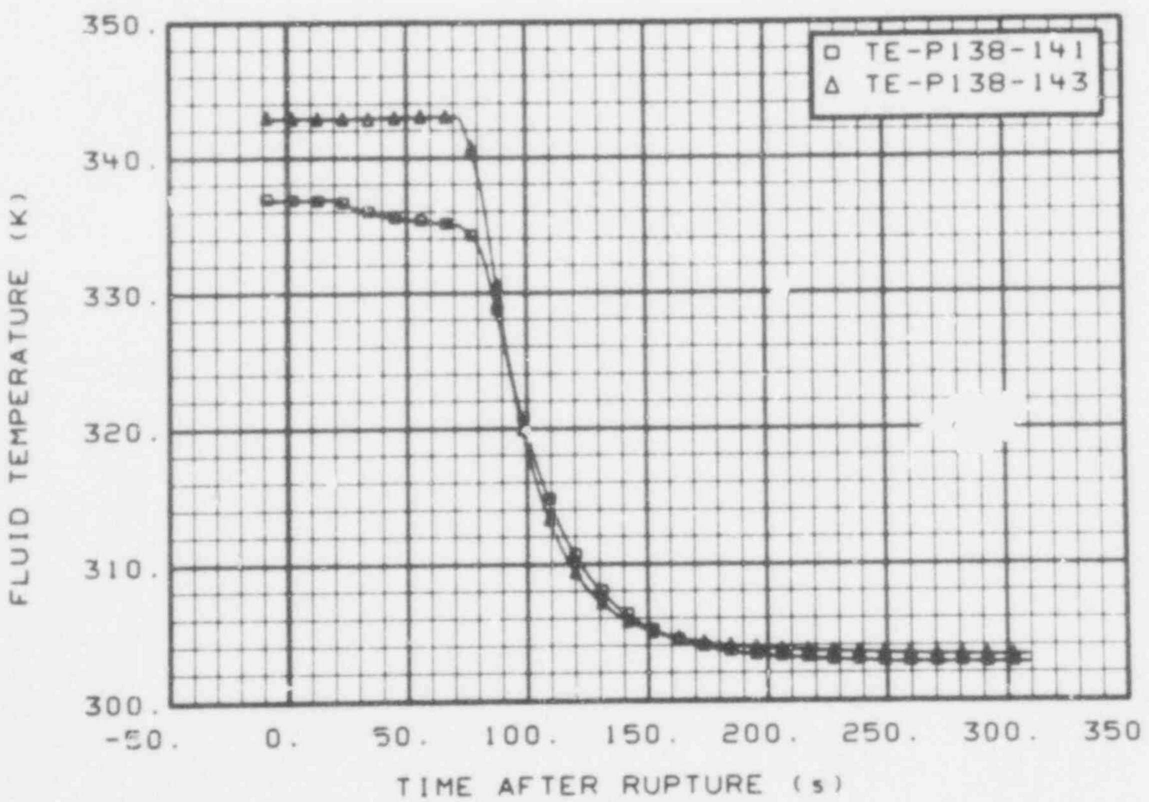

Fig. 279 Fluid temperature in blowdown suppression tank spray headers (TE-P138-141 and -143) (QEUD).

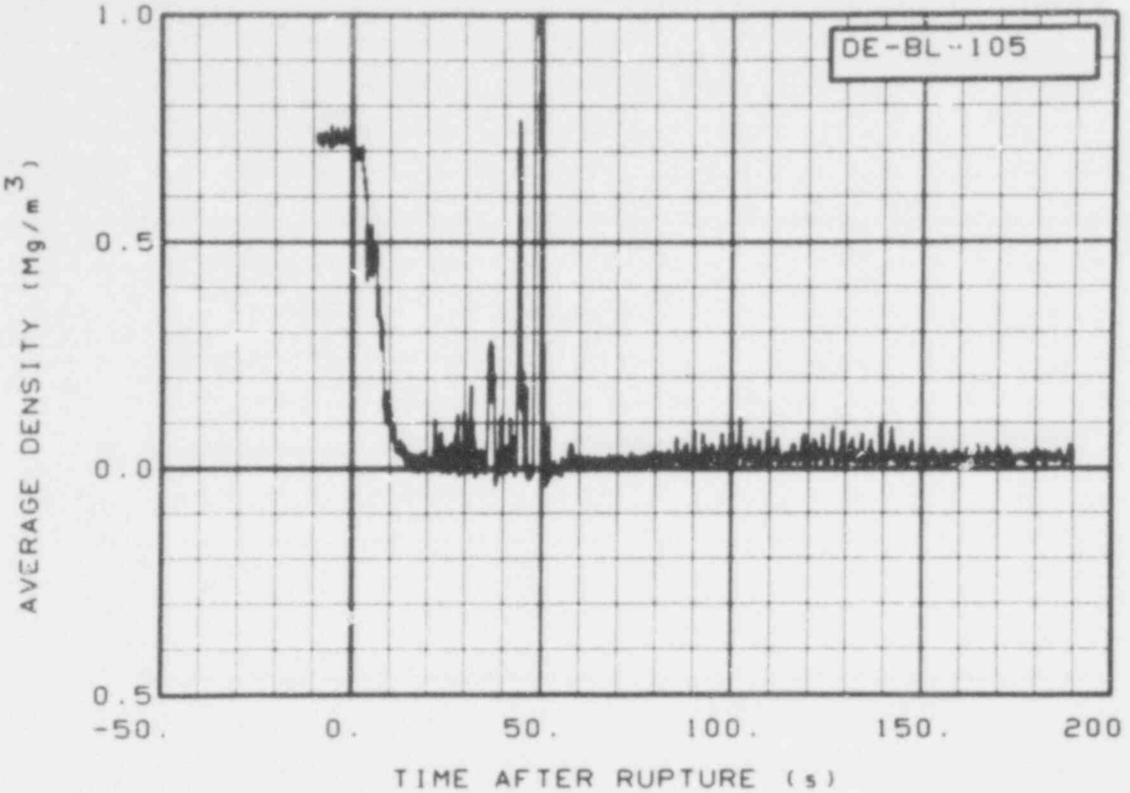

Fig. 280 Average fluid density in broken loop cold leg (DE-BL-105) (restrained, averaging calculation appears correct).

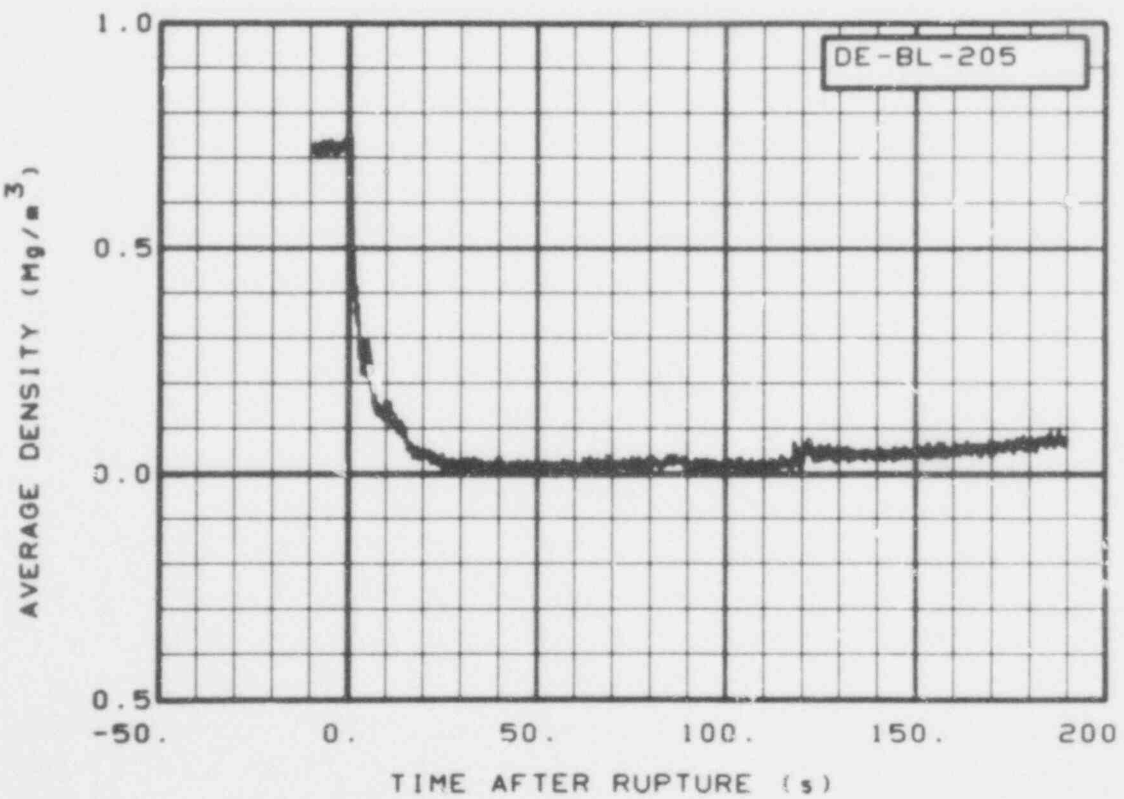

Fig. 281 Average fluid density in broken loop hot leg (DE-BL-205) (restrained, averaging calculation appears correct).

564 043

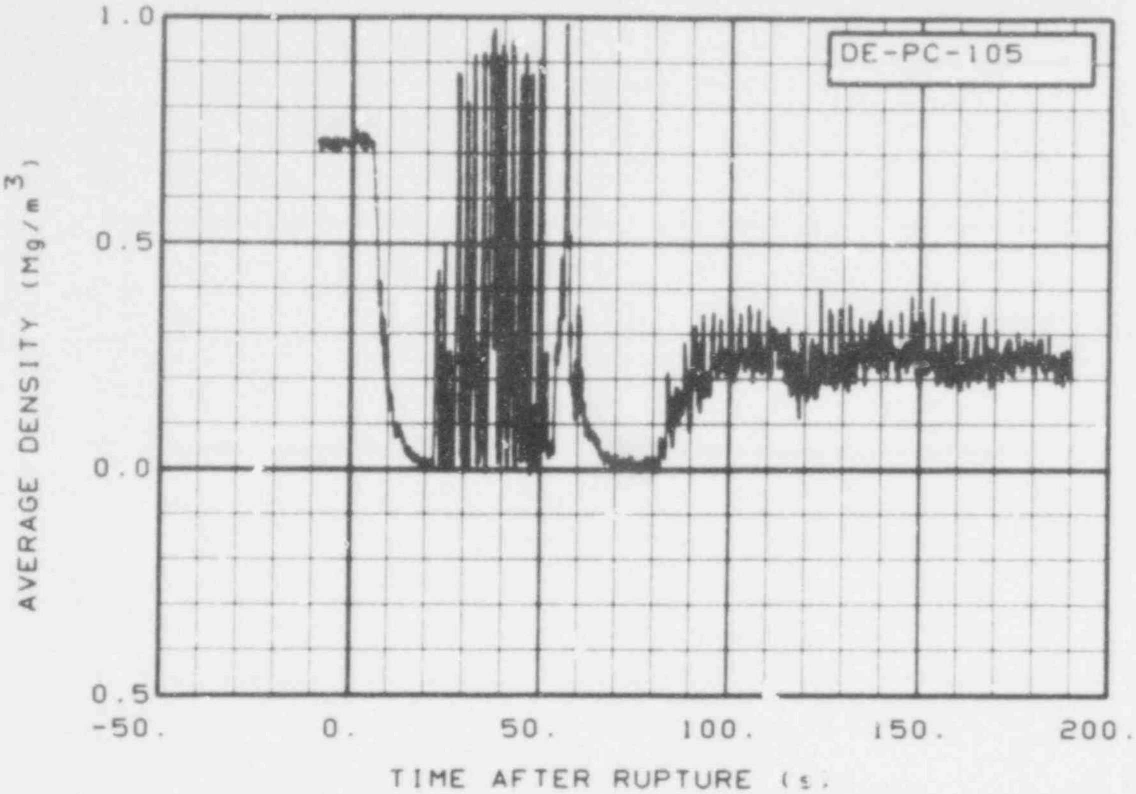

Fig. 282 Average fluid density in intact loop cold leg (DE-PL-105) (restrained, averaging calculation appears correct).

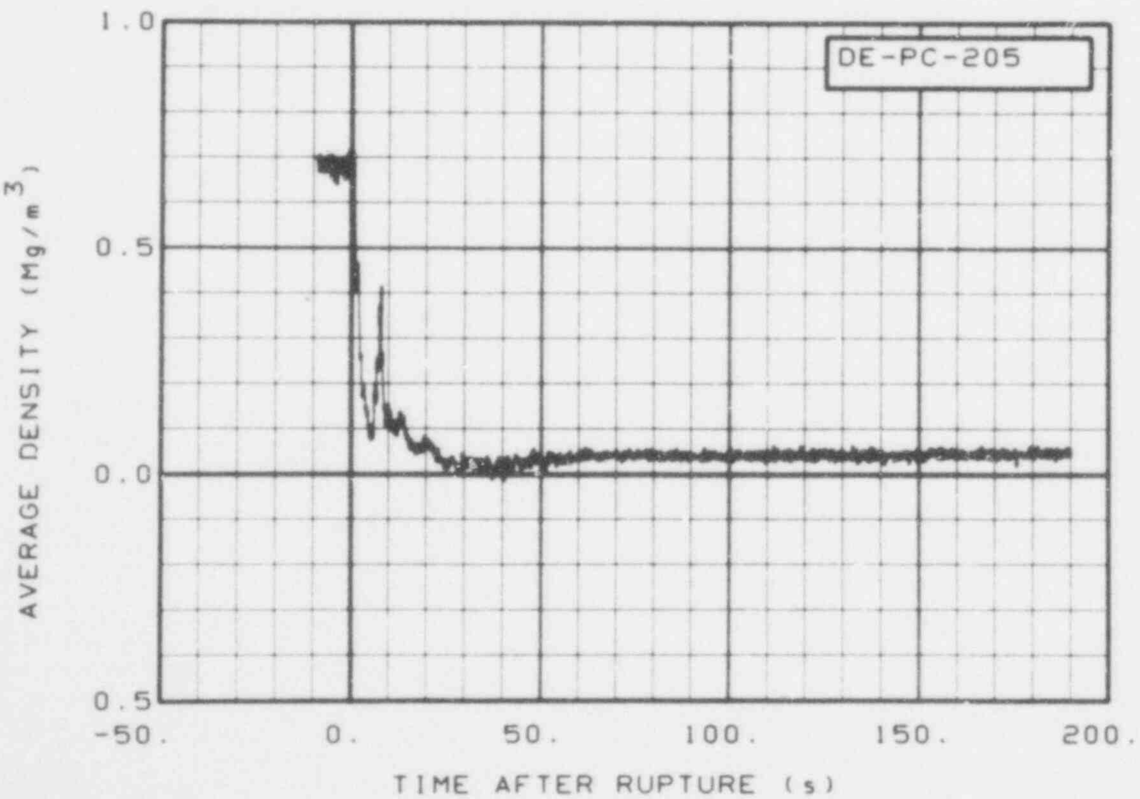

Fig. 283 Average fluid density in intact loop hot leg (DE-PL-105) (restrained, averaging calculation appears correct).

564 044

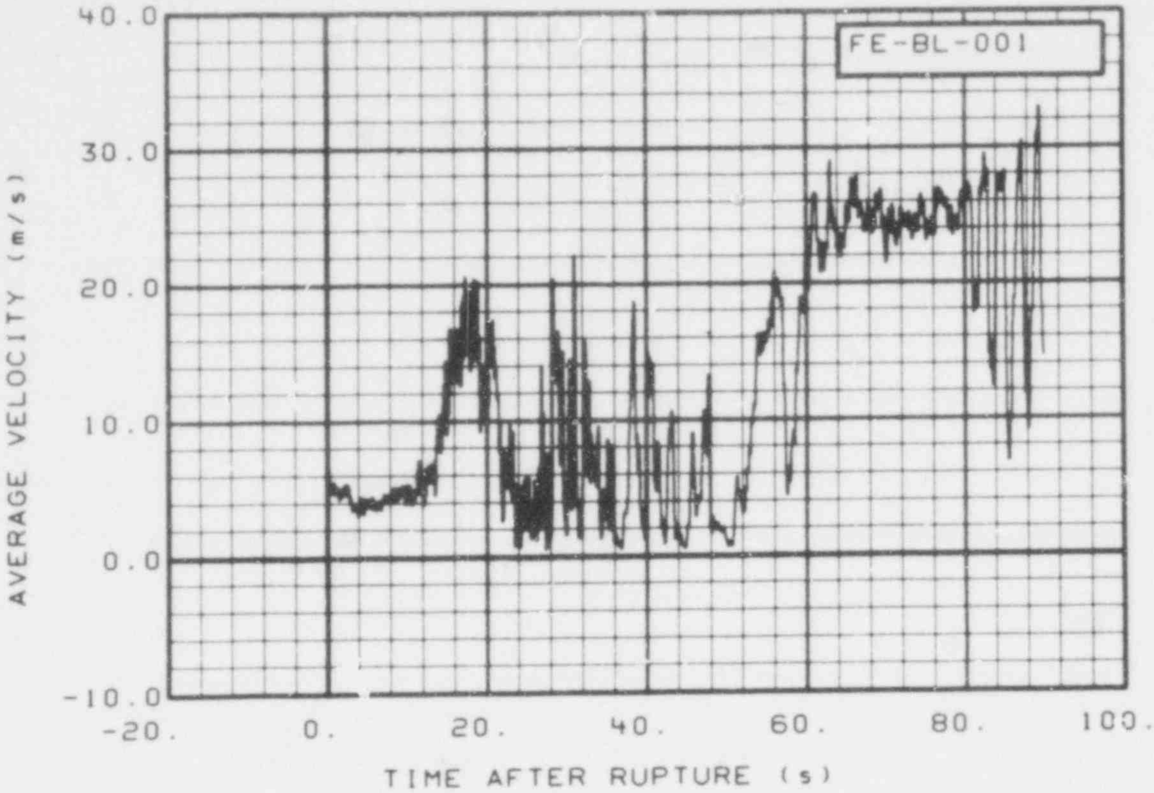

Fig. 284 Fluid velocity in broken loop hot and cold legs at DTT flanges (FE-BL-001) (restrained, averaging calculation appears correct).

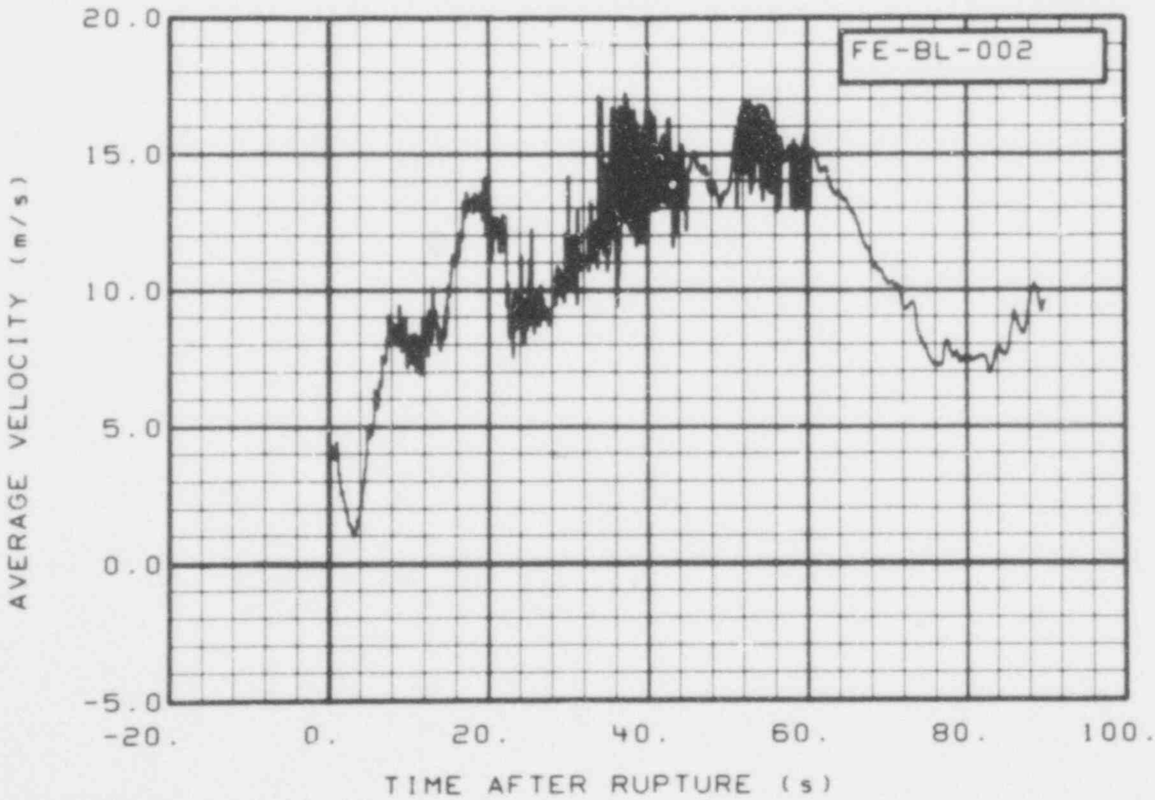

Fig. 285 Fluid velocity in broken loop hot and cold legs at DTT flanges (FE-BL-002) (restrained, averaging calculation appears correct).

564 045

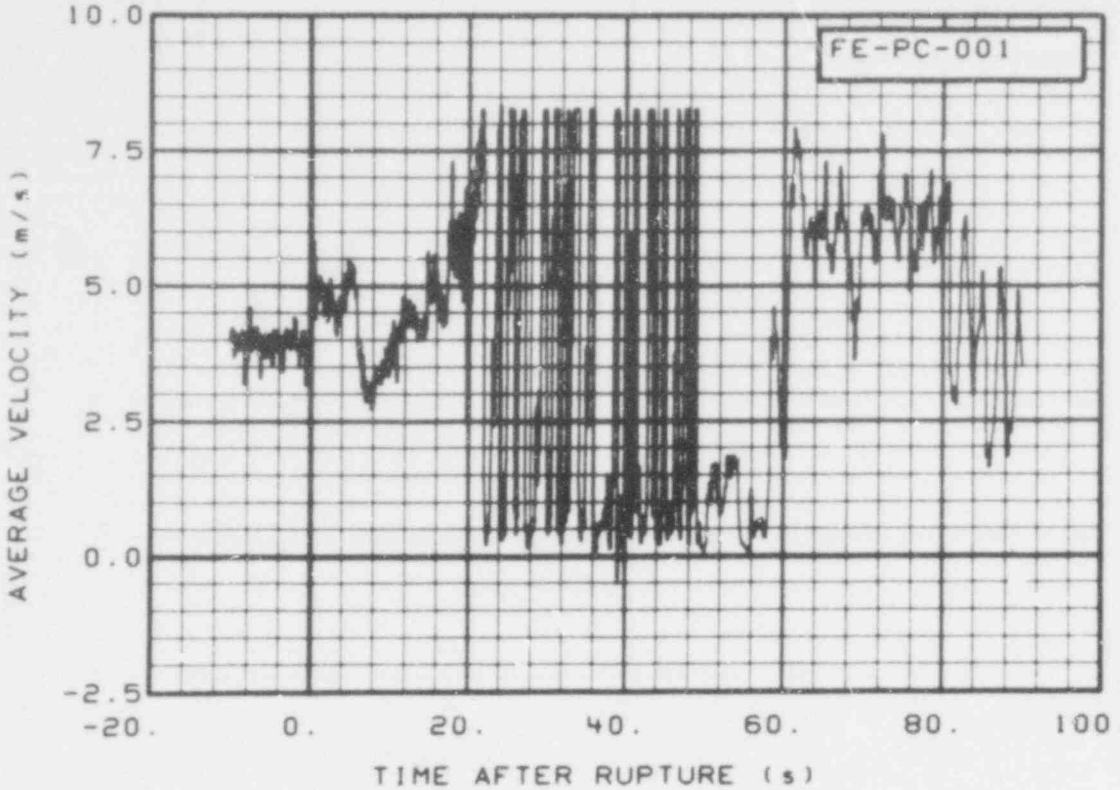

Fig. 286 Average fluid velocity in intact loop cold leg (FE-PC-001) (restrained, averaging calculation appears correct).

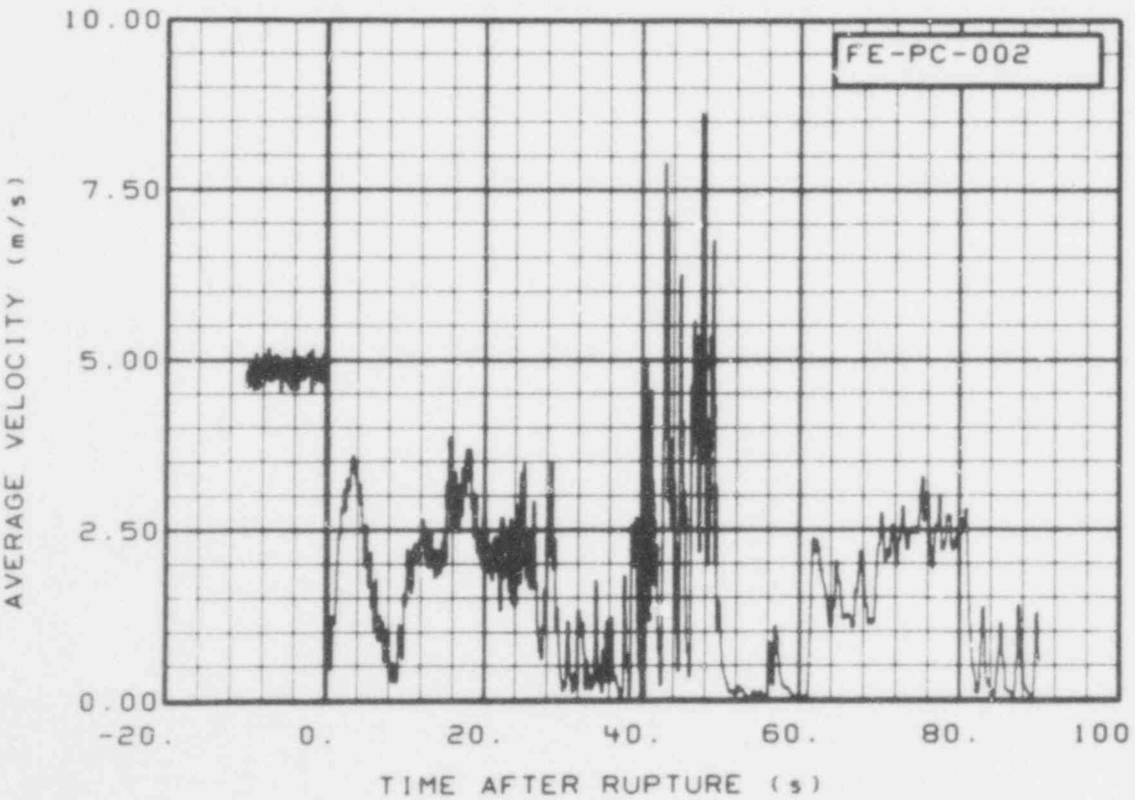

Fig. 287 Average fluid velocity in intact loop hot leg (FE-PC-002) (restrained, averaging calculation appears correct).

564 046

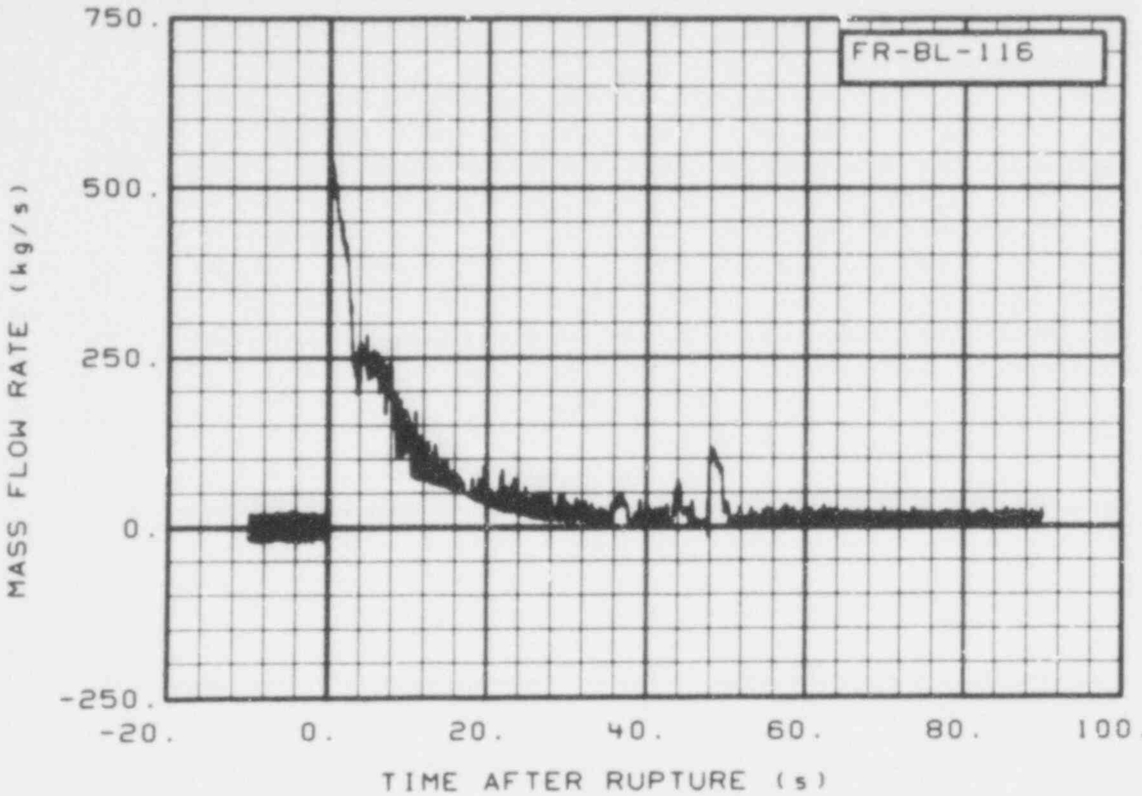

Fig. 288 Mass flow rate in broken loop cold leg calculated from PDE-BL-2 and DE-BL-1 (FR-BL-116) (restrained, compares well with other mass-flow calculations).

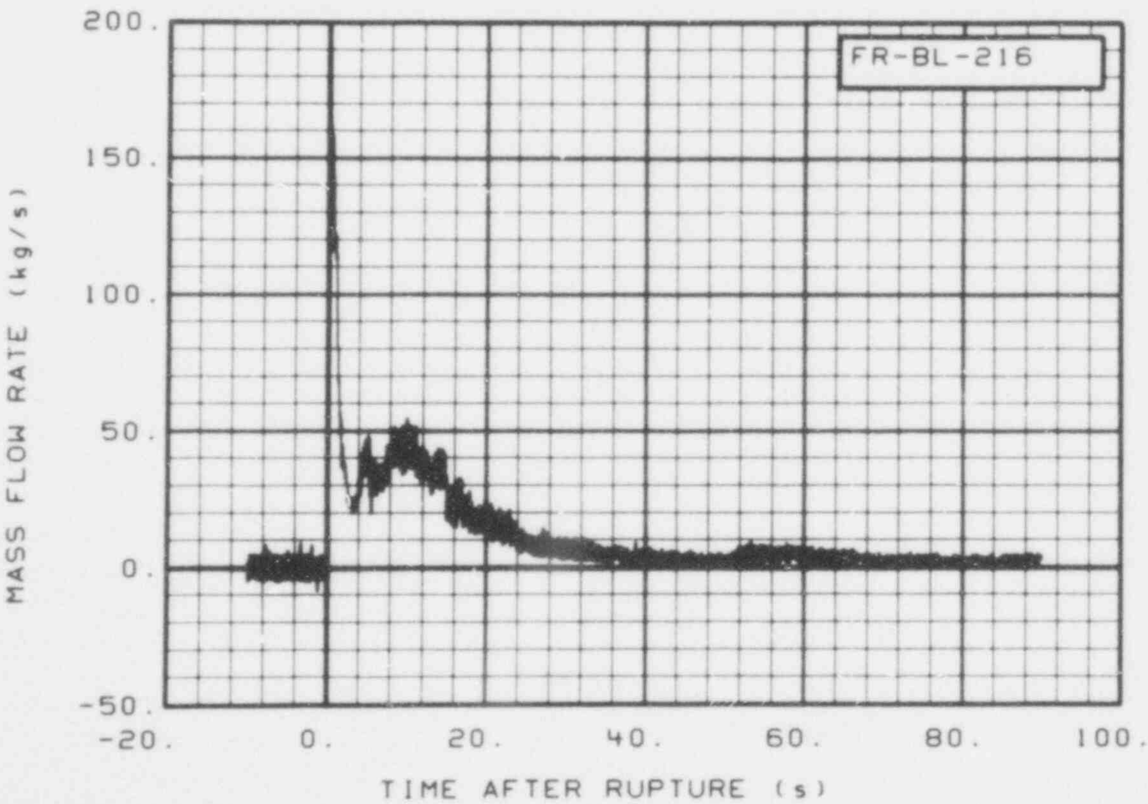

Fig. 289 Mass flow rate in broken loop hot leg calculated from PDE-BL-1 and DE-BL-2 (FR-BL-216) (restrained, compares well with other mass-flow calculations).

564 047

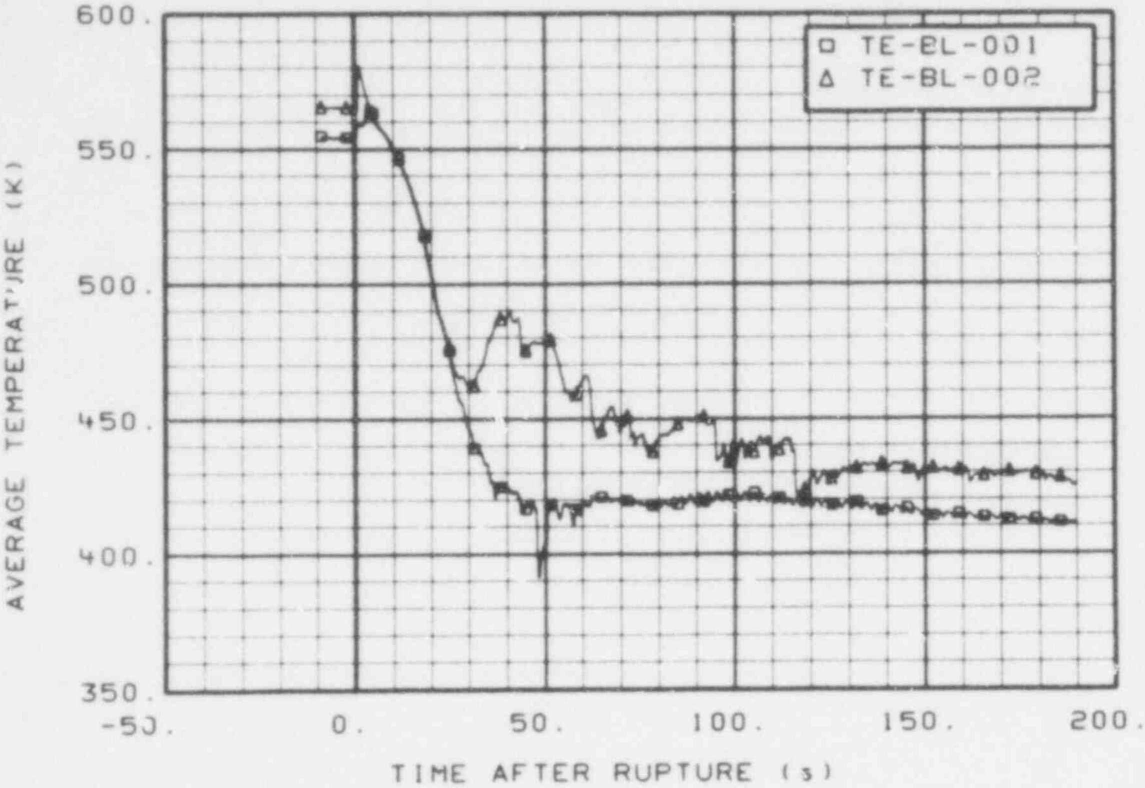

Fig. 290 Average coolant temperature in broken loop cold leg and hot leg (TE-BL-001 and TE-BL-002) (restrained, averaging calculation appears correct).

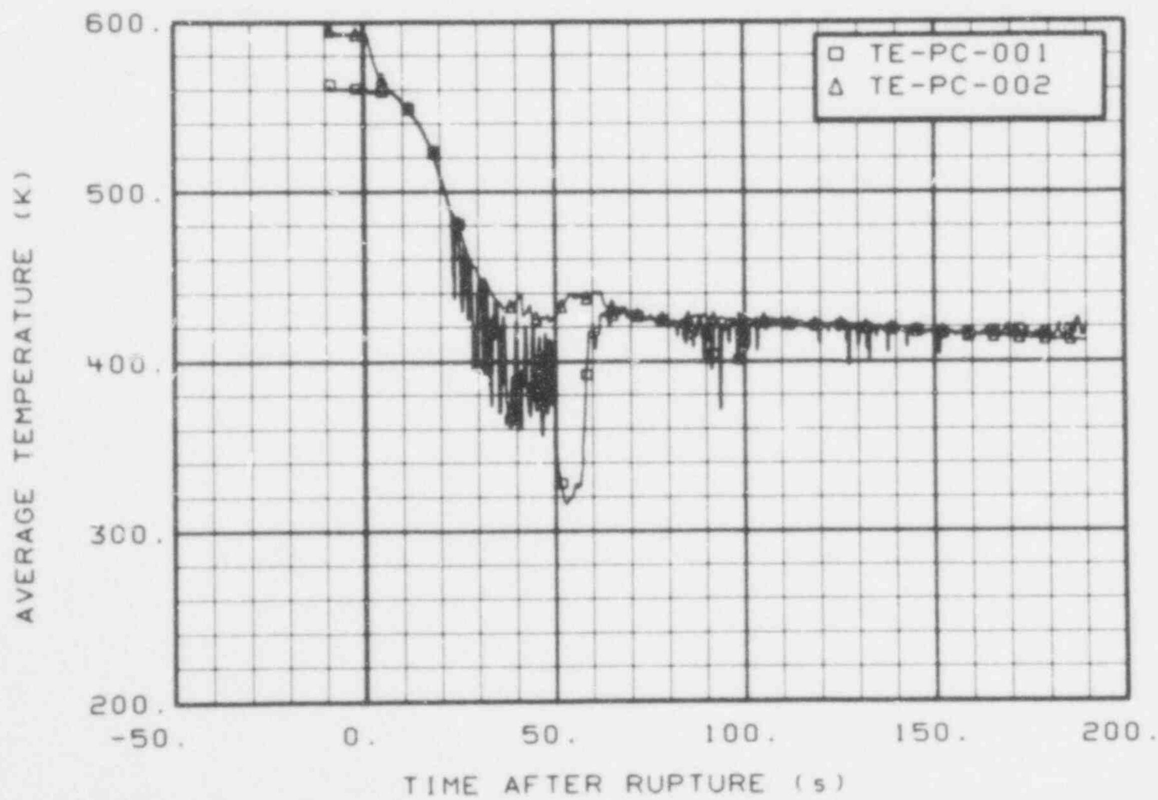

Fig. 291 Average coolant temperature in intact loop cold leg and hot leg (TE-PC-001 and TE-PC-002) (restrained, averaging calculation appears correct).

564 018

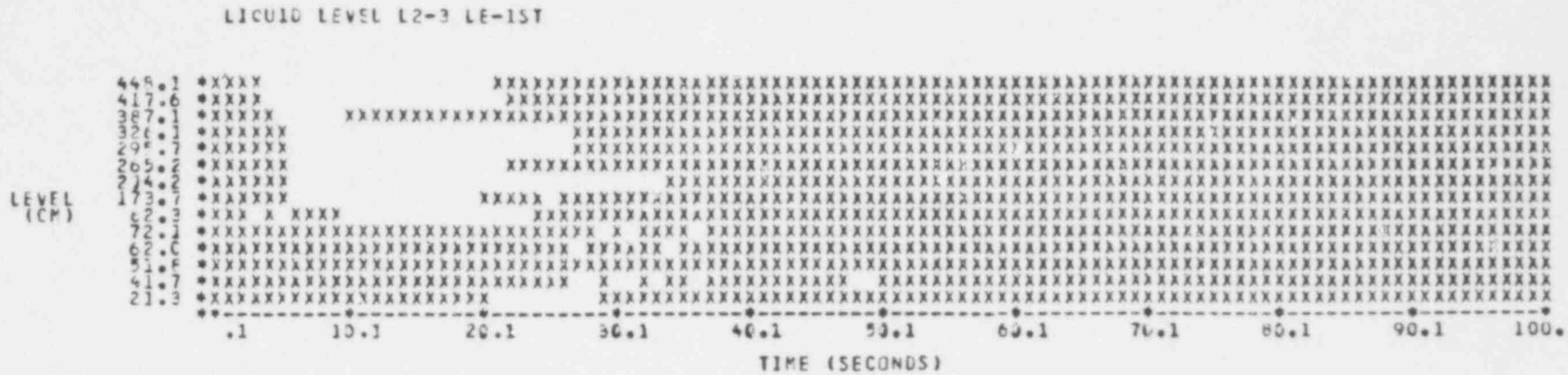

Fig. 292 Liquid level in reactor vessel Downcomer Instrument Stalk 1, bubble plot (LE-1ST) (restrained, slow response).

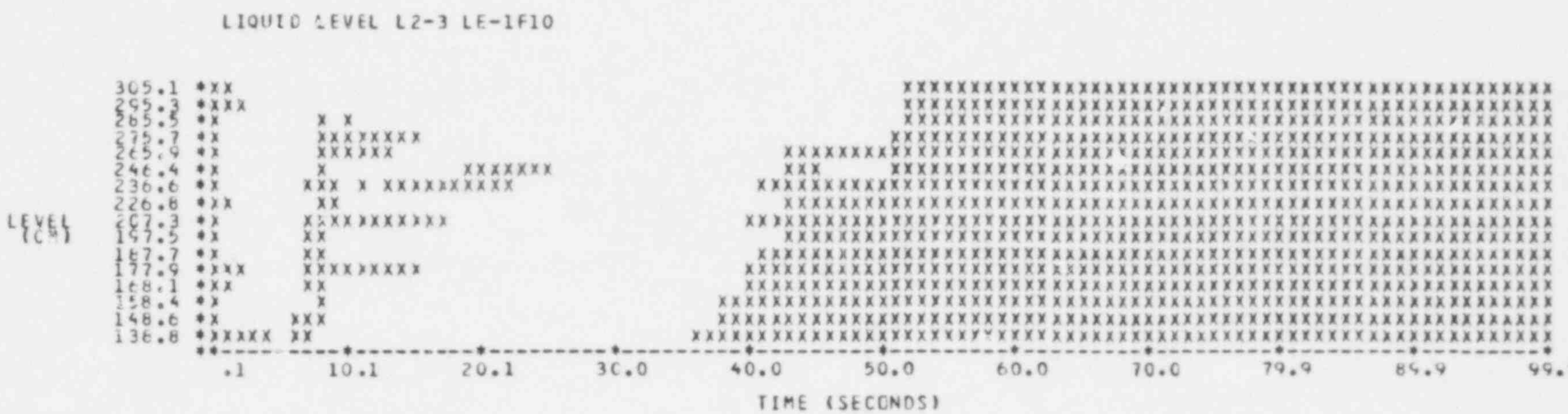

Fig. 293 Liquid level in reactor vessel core in Fuel Assembly 1, bubble plot (LE-1F10) (restrained, slow response).

564 042

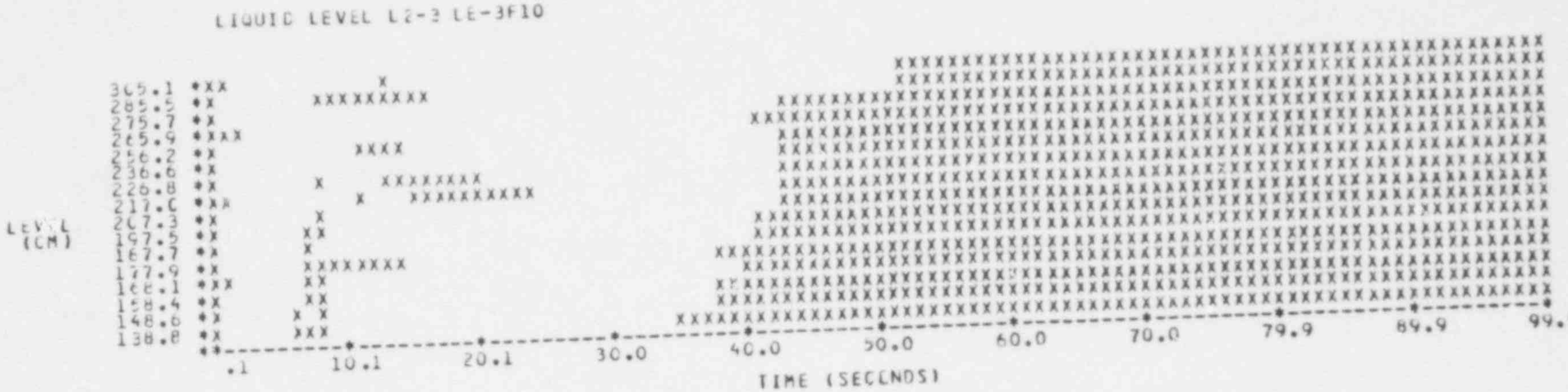

Fig. 294 Liquid level in reactor vessel core in Fuel Assembly 3, bubble plot (LE-3F10) (restrained, slow response).

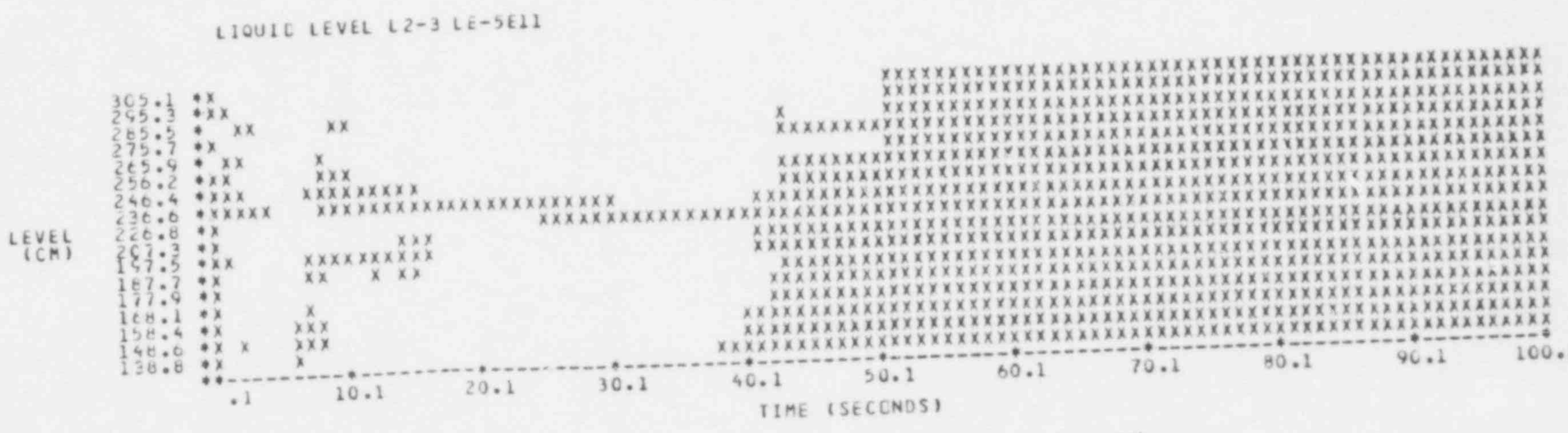

Fig. 295 Liquid level in reactor vessel core in Fuel Assembly 5, bubble plot (LE-5E11) (restrained, slow response).

564 050

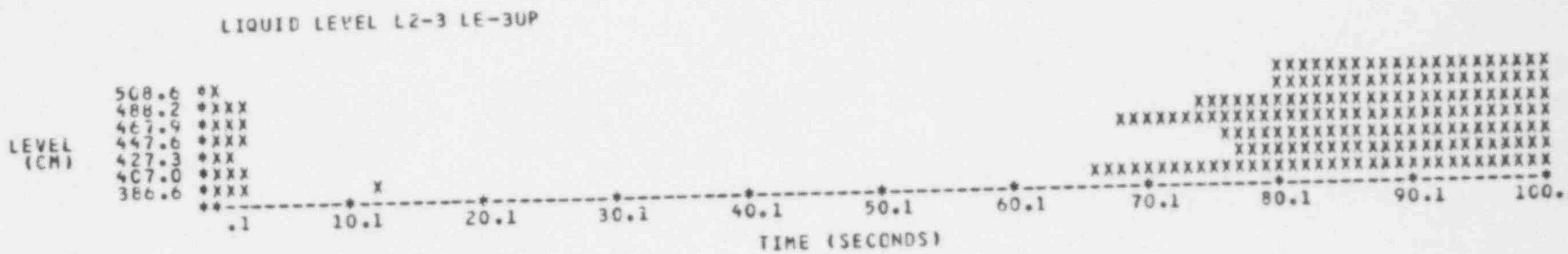

Fig. 296 Liquid level in reactor vessel core in Fuel Assembly 3, bubble plot (LE-3UP-1) (restrained, slow response).

564 051

VI. REFERENCES

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2. M. L. Russell, *LOFT Fuel Modules Design, Characterization, and Fabrication Program*, TREE-NUREG-1131 (June 1977).

3. F. S. Miyasaki, *Digital Data Acquisition Program*, ANCR-1250 (August 1975).

4. N. L. Norman, *LOFT Data Reduction*, ANCR-1251 (August 1975).

564 052

APPENDIX A

DATA CONSISTENCY CHECKS

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DATA CONSISTENCY CHECKS

The following discussion describes several techniques used to perform data consistency checks on the data presented in this report.

System temperature measurements were qualified by reviewing several data points where possible. Temperature measurement checks were performed during isothermal tests at low pump speed prior to the LOCE. Temperature distributions were reviewed just prior to blowdown initiation and during the blowdown transient.

Final temperatures were compared with pressure measurements to verify saturation conditions. When temperatures measured within the specified accuracy of the detectors, the detector output was considered reasonable and was qualified. All primary coolant system channels were reviewed in this manner. The pressurizer liquid and vapor space temperatures were checked for consistency by comparing these values with the saturation temperature for the corresponding pressurizer pressure at various points in time. Similarly, steam generator secondary side temperature was examined throughout the experiment by comparing the measured temperature with the saturation temperature for the respective secondary coolant system (SCS) pressure. Blowdown suppression tank temperature elements TE-SV-001, -006, and TE-SV-007, -012 were evaluated by comparing the pretest measurements of the thermocouples in the same horizontal stratum.

Pressure data were reviewed in a manner similar to the temperature calibrations. During the approach to Experiment L2-3 initial conditions, a series of tests at various static pressures was performed. At each point, primary system pressure measurement detectors were compared to two remote readout precision transducers. These data were used to verify that the slopes for the absolute pressure transducer responses had not changed, and to evaluate the pressure sensitivity of all other transducers. Immediately prior to blowdown, primary coolant system pressures were again compared with the pressure references (PE-PC-005 and -006) to ensure that all detectors were measuring within their specified accuracy bands. During the blowdown transient, pressure data from corresponding measurement locations were compared by overlaying the data plots. SCS pressure was qualified by comparison of saturation temperature with the measured temperature. The blowdown suppression tank pressure instruments were checked against atmospheric pressure prior to blowdown. During blowdown, comparison was made between the measured suppression pressures as further evidence for qualifying the data.

Comparison of measured temperature with the saturation temperature of the pressure measurement at the same location provided another method to verify primary coolant system data consistency. This technique, however, was valid only during the saturated blowdown transient and up until the time the measurement location voided of fluid. After voiding occurred, the measured temperatu ncreased above the corresponding saturation temperature due to radiant heating of the detector element by the structural system components and detector element stem conduction. Temperature detectors in the reactor vessel which became wetted by the emergency core cooling system injection displayed a measured temperature which decreased below the corresponding saturation temperature as the detector became immersed in the cooler fluid.

Data consistency checks for the differential pressure measurements were provided by several basic methods. The differential pressures were calibrated to read zero at zero flow at initial system conditions regardless of the elevation differences between taps. Instrument offsets were determined from flow data, static pressure tests, and temperature sensitivity data derived during the heatup. Normal operating conditions for the primary coolant system were then established and selected primary coolant system pressure drops were compared with predicted values. At various primary coolant system operating 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 instruments by plotting the square root of the differential pressure against pump speed using data from the pump frequency tests conducted prior to blowdown. The results of least squares curve fits performed on these plots were then used to confirm instrument zero offsets. Both prior to and during the blowdown transient, differential pressure measurements were compared with the differential pressure computed by subtracting appropriate absolute pressure measurements. Finally, pressure closure was calculated for three flow loops: (a) the primary coolant system intact loop, (b) the broken loop hot leg to the blowdown suppression tank and (c) the broken loop cold leg to the blowdown suppression tank.

Four system level measurements were important for Experiment L2-3: (a) Accumulator ACC-A liquid level, (b) blowdown suppression tank liquid level, (c) pressurizer coolant level, and (d) 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. Blowdown suppression tank liquid level measurements were qualified by comparing the two available measurements. The initial condition for the blowdown suppression tank level was established by taking an average of the two measurements. Similarly, pressurizer level was reviewed by redundant level measurements. The reactor vessel liquid level probes were verified by performing a pretest conductivity calibration with the vessel liquid full and under cold and hot plant conditions. During blowdown the level measurements were compared to core thermocouple data.

The primary coolant pump speed measurement was precalibrated using an oscillator to guarantee the digital to analog conversion. During heatup the zero reading was checked at every zero flow test, and during flow tests the pump speed was checked against pump frequency. Primary coolant 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 blowdown transient until the primary system motor generator set field breakers were opened at 215 s. Prior to experiment initiation, the pump speed was further checked, along with the intact loop flow rate and pump differential pressure, by reviewing the agreement with the manufacturer's pump performance curves. Pump run voltages and currents were evaluated prior to the initiation of blowdown by calculating the pump electrical horsepower input, the pump water power, and finally the combined pump efficiency. These calculated efficiencies were then compared to previously recorded efficiencies determined during pump requalification tests.

To evaluate the primary coolant system average fluid densities, calculations were performed by using the gamma densitometers. The densitometers were checked for normal operation by recording and examining data tapes approximately one 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. Calibration constants were obtained from all-liquid readings a few seconds before the LOCE and and all-steam conditions late in the LOCE. The fluid densities for the all-liquid and all-steam conditions were determined from steam tables using temperature and pressure measurements.

Several techniques were employed to verify the validity of the measured data from the turbine flowmeters, the drag discs, and the intact loop mass flow rate venturi flowmeter. The intact loop venturi flowmeter data were examined by performing least squares curve fits for the computed venturi flowmeter mass flows plotted against the corrected average pump speed using the variable frequency single-phase test data obtained prior to blowdown initiation. The intercept coefficients from the least squares curve fits were used to correct the observed offset. These corrected venturi flowmeter mass flow rates were then used to calculate average velocities and momentum fluxes in the intact loop and the reactor vessel which were subsequently compared with the output of the turbine flowmeters and drag discs. As an independent check, the turbine flowmeter and drag-disc data were used to calculate fluid density. These values were then compared to the known single-phase density prior to blowdown. This analysis was performed on all the turbine flowmeters and drag discs in the intact loop and the reactor vessel with the exceptions of those instruments that failed.

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For the turbine flowmeter and drag discs in the intact loop, a check was performed at each pump frequency step. These were steady state flow tests performed at 20, 30, 40, 50, and 60 Hz. The data from each turbine flowmeter and drag disc were compared with velocity and momentum flux calculated from the intact loop venturi mass flow rate as described above. Average velocity was calculated from the point measurements of the three turbines in each rake and average momentum flux from the drag discs and compared to the values calculated from mass flow. Reactor vessel and downcomer drag discs were compared with values calculated from venturi mass flow, assuming the full flow area. Slope coefficients were calculated and the effects of temperature on the calibration coefficients was determined.

Additional calibrations were performed on specified turbine flowmeters and drag discs to convert the point measurements to average measurements. In the intact loop, the flow rates calculated using the turbine flowmeters and their associated areas were normalized with the intact loop venturi during steady state (initial) conditions to determine the calibration factors for the turbine flowmeters. These calibration factors were squared and applied to the drag discs. Similar calibration factors were developed for the broken loop drag discs using the results of accumulator blowdown tests (where the accumulator flow was directed through the broken loop).

System fluid velocities were evaluated during the blowdown transient by using two independent methods. Velocities were measured directly by the turbine flowmeters. Data consistency checks were performed by comparing the turbine flowmeter velocities for representative system locations with the respective calculated fluid velocities. To provide reliable data for these velocity checks, the gamma densitometers, the drag discs, and the turbine flowmeters were calibrated prior to test initiation.

As a redundant approach to verify the validity of Experiment L2-3 data, selected instrument variables were overlaid with plots from various sources including the Semiscale counterpart Test S-06-3[A-1] and the LOFT nuclear Experiment L2-2[A-2]. Variables of interest in these comparisons included broken and intact loop average densities, pressures, temperatures, fluid velocities, and computed mass flow rates per system volume. The differential pressure measurements across selected primary coolant system components were also examined.

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