Babcock & Wilcox

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December 13, 1979

Dr. D. F. Ross, Jr.
Director, Bulletins and Orders Task Force
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: LOFT L3-1 Pre-test Prediction

Reference: Letter from J. H. Taylor to D. F. Ross, same subject, November 20, 1979

Dear Dr. Ross:

The attached is B&W's pre-test prediction of LOFT test L3-1. The model used for this analysis is consistent with the model and outstanding concerns presented to Mr. Paul Norian during his visit to B&W's offices on November 20, 1979.

If you have questions concerning this submittal, please contact me or Henry Bailey (Ext. 2678) of my staff.

Very truly yours,

James H. Taylor
Manager, Licensing

JHT:dsf

Attach.

cc: R. B. Borsum (B&W)

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B&W's BEST ESTIMATE PREDICTION OF THE LOFT L3-1 NUCLEAR SMALL BREAK TEST USING THE CRAFT2 COMPUTER CODE

December, 1979

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Reviewed by: R. C. Jones Jr.

R. C. Jones, Jr.

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1. INTRODUCTION

This report documents B&W's best estimate blind prediction for the Loss-of Fluid-Test (LOFT) L3-1 small break Standard Problem with a nuclear core.[1] The LOFT facility[2] and L3-1 test were modeled using the CRAFT2, Version 9.3, computer code.[3] The computer code and the model with Bernoulli-Moody Discharge Model with discharge coefficient (C_D) of 0.6 for all phases are identical to those as presented to Nuclear Regulatory Commission (NRC) prior to the test.[4] However, a second case, which utilized a C_D of 0.9 for steam flow, was also run and is considered to be B&W's best estimate blind prediction. Within the predicted transient, the switch from C_D of 0.6 to C_D of 0.9 was made after the leak flow was observed to have stabilized to a pure steam discharge. Prior to that point in the transient, the C_D of 0.6 was utilized. The model change is consistent with the outstanding concerns identified in reference 4. The model, the results with each discharge coefficient, and a brief system description are presented herein.

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2. LOFT L3-1 SYSTEM SUMMARY

The LOFT L3-1 system and initial conditions are as presented in references 1 and 2. The primary side of the LOFT facility is comprised of a reactor vessel with a 5.5 feet, 50 MW(t) nuclear core, and a single intact loop containing a pressurizer, an inverted U-tube steam generator, and two primary coolant pumps in-parallel. In addition, a dead-ended broken loop hot leg contains a simulated pump and a simulated steam generator. Further, a 0.002214 ft^2 orifice upstream of a quick-opening blowdown valve (QOBV) in the broken loop cold leg is used to simulate the small break. The QOBV discharges to a pressure suppression tank. The total primary system volume is 272 ft^3.

The emergency core cooling system (ECCS) consists of a high pressure injection system (HPIS), a low pressure injection system (LPIS), and an accumulator (i.e., core flood tank). All the ECCS are aligned to inject borated water into the intact loop cold leg piping downstream of the primary coolant pumps.

2.1. Initial Conditions

The initial condition for the L3-1 test are as follows:

- Flowrate - 3.8 x 10^6 lbm/hr (10,000 gpm)
- Pressure, upper plenum - 2177.96 psia
- Pressure, secondary - 750 psia*
- ΔP, across pumps - 67.56 psid
- T_{ave}, primary - 560°F
- Temperature, core inlet - 542.48°F
- Temperature, core outlet - 577.71°F
- Temperature, secondary - 510°F*
- Power level - 50 MW(t)
- Power history - 40 Effective Full Power Hours, minimum

1629 006

*These values were obtained per a telephone conversation between D. Jarrell of EG&G/LOFT and C. Motloch on 10/12/79.

2.2. Initiating Sequence of Events

The sequence of events leading up to the initiation of the test begins with scramming the reactor. When the rod bottom lights are observed to be on, the following actions are taken concurrently:

1. The QOBV is opened, thus initiating the break. This valve has an opening time of from 10 to 50 milliseconds, but in this prediction it was assumed to open instantaneously.
2. The primary coolant pumps are tripped. Their coastdown is controlled by the flywheel action of the motor generator sets down to 750 rpm, after which they coastdown on their own inertia.
3. The steam generator main feedwater is shut off.
4. The steam flow control valve is placed into its automatic mode. The initial response in the automatic mode will be to begin shutting the steam valve at a rate of 5% of the full open position per second.

1629 007

3. COMPUTER CODES

3.1. CRAFT2, Version 9.3 With LOFT Pump Model

The CRAFT2[3] computer program was developed to study the transient behavior of a Nuclear Steam Supply System undergoing a loss-of-coolant accident (LOCA). The program solves the conservation equations for mass and energy, the continuity equation, and the equation of state for water. This program is based upon the CRAFT1 program and is similar to the FLASH programs and the RELAP3 program.

The CRAFT2 program permits the user to select the nodal representation that results in the best finite differencing of the fluid system to be analyzed. The program then solves the conservation equations for each node and the momentum equation for each flow path between nodes. The Nuclear Steam Supply System is simulated in a node-flow path representation. Components with different thermal-hydraulic characteristics must be simulated as different nodes.

CRAFT2 contains flexible models of all major Nuclear Steam Supply System components. Various options as well as user input parameters enable the program to model the reactor core, reactor coolant pumps, steam generators, and connecting piping in any configuration and operating mode desired.

Version 9.3 of CRAFT2 was utilized because it contains a pump model which was developed specifically for modeling the LOFT pumps. Version 9.3 is essentially the same as the B&W ECCS Evaluation Model currently in use. User input for this prediction was selected to yield a best-estimate analysis.

1629 008

3.2. TAFY3[5], Version 20

The code determines the fuel and cladding temperature distribution within a cylindrical fuel rod. The fuel-cladding gas conductivity, heat transfer coefficient, and the internal pressure are also determined.

TAFY3 uses a series of analytical and empirical-analytical steady-state calculational models to obtain solution to heat diffusion equations in one dimension (radial).

TAFY3 is currently a production code at Babcock & Wilcox.

TAFY3 was utilized to calculate the average fuel pellet temperature of the LOFT L3-1 nuclear core. This information was input into the CRAFT2 LOFT model.

4. CRAFT2 LOFT L3-1 MODEL

4.1. Nodal Arrangement

The LOFT major components are shown in Figure 4.1. A noding diagram of the CRAFT2 LOFT L3-1 computer model is shown in Figure 4.2 and is described in Table 1. The model has 18 nodes and 36 flow paths. Except for across the pump, dual paths are used throughout the model to allow for counter-current flow. The secondary side of the steam generator is connected to the suppression tank (i.e., containment node) to simulate the steam flow to the LOFT air-cooled condenser. Consequently, to minimize unrealistic increases in suppression tank back pressure, the volume of that node was increased by a factor of one hundred.

4.2. Bubble Rise Model

The Wilson Bubble Rise Velocity model is used in all of the primary system nodes. A multiplier of 2.38 is used in the core node and 2.0 in the remainder of the vessel nodes. This approach is consistent with the B&W ECCS Evaluation Model. The secondary side of the SG has a steam separator, hence, a large bubble rise velocity is utilized to obtain complete phase separation.

4.3. Discharge Model (Bernoulli-Moody Discharge Model)

Leak flow area = 0.00214 ft^2

Leak flow paths = 32 & 33

Maximum quality to use Bernoulli = 0.0

Maximum quality for linear interpolation between Bernoulli and Moody = 0.1%

1629 010

The Bernoulli-Moody Discharge Model was utilized for this analysis with the above values. Two cases were run with different discharge coefficients, i.e., $C_D = 0.6$ and $C_D = 0.9$.

In the first case, a C_D of 0.6 was maintained constant throughout all phases of the blowdown transient, i.e., the subcooled, the two-phase and the pure steam phase. This represents the "locked-in" model as presented to the NRC.[4]

In the second case, the switch from $C_D = 0.6$ to $C_D = 0.9$ occurs within the transient only after the leak flow was observed to have stabilized to pure steam. The C_D of 0.9 was then maintained constant throughout the remainder of the transient. However, as in the first case, during the subcooled and two-phase blowdown portion of the transient, a C_D of 0.6 was utilized. This second case represents B&W's best estimate prediction.

The decision to use a steam C_D of 0.9 for the best estimate case is based on two factors. B&W's evaluation of the transient blowdown test of the LOFT 0.6374-inch diameter flow nozzle, which was performed at the Transient Flow Calibration Facility at Wyle Laboratories,[7] indicates that, within test accuracy, a C_D within the range of 0.4 to 1.0 would be appropriate. Also, based on studies done at B&W, it was concluded that a C_D of 0.9 for Moody Steam Flow correlates well with a Homogeneous Equilibrium Model (HEM). It is also expected that, in general, the HEM predicts steam phase blowdown reasonably well. The transient results for both cases are presented in Section 5. The Wyle nozzle-blowdown test information was not received early enough for B&W to properly assess it prior to the NRC's visit to Lynchburg on November 20, 1979. It should be noted that, as reported in reference 4, B&W was in the process of evaluating the discharge model at the time of the NRC's visit.

1629 011

4.4. Steam Generator

The steam generator primary side is represented by two nodes and the secondary side with one node. The initial pressure drop across the steam generator primary side was calculated using the Low Resistance Orifice Curve[2], Figure 92, per telephone communication with D. Jarrell of EG&G/LOFT. The steam path from the secondary side of the steam generator, path 36, is open at the time of the reactor trip and starts closing at a rate of 5% of the full open position per second. An effective steady-state flow area was calculated based on the Moody cr' l flow model. The effective flow area was changed, as a function of secondary side pressure, consistent with the given steam flow control valve response characteristics.

4.5. Pump Model

The CRAFT2 pump input was modified to model the specified LOFT pump characteristics. The two parallel pumps and associated piping were combined into a single equivalent pump node. Pump performance characteristics for each pump were assumed to be identical.

4.6. ECCS Model

The ECCS is comprised of one accumulator (core flood tank), one high pressure injection system, and one low pressure injection system. The injection point is the intact loop cold leg piping downstream of the primary coolant pumps. The ECCS actuation and performance characteristics are consistent with the specified initial conditions for this experiment.

1629 012

4.7. Core Model

The core is modeled as a single node with axial and radial peaking factors of 1.0. An initial average fuel pellet temperature of 1835°F, based on an average linear heat rate of 6.993 kW/ft, was calculated using the TAFY3, Version 20, computer code[5]. The CRAFT2 point kinetics model was not utilized. Instead, the core heat generation was based on the given 40 Effective Full Power Hour LOFT decay heat curve[6].

4.8. Primary Metal

The transfer of the stored energy in the metal adjacent to the water in the control volumes was modeled using the CRAFT2 Primary Metal Option. In reference 1, the primary system heat loss to ambient was estimated to be 248 ± 20 kW. During the saturated blowdown phase of the transient, this is equivalent to approximately 15% of the total LOFT system heat generation (i.e., decay heat plus primary metal heat flow). No credit for this heat loss to ambient was taken in the CRAFT2 model. The relative location of the heat slabs is depicted in Figure 1 and the heat slab description is given in Table 2.

1629 013

5. DISCUSSION OF RESULTS

As discussed in section 4.3 of this report, two sets of results are presented. On set represents the model "locked-in" by the NRC and has a discharge model with C_D = 0.6 for Moody steam flow. The second set of results utilizes a C_D = 0.9 for Moody steam flow. The transition to steam flow is predicted to occur approximately 375.0 seconds into the transient, and it was at this time in the transient that the value of C_D for Moody steam flow was altered. As requested in reference 1, plots are presented with a 0 to 100 seconds and a 0 to 1500 seconds time scale. Since the value of C_D was altered at 375.0 transient seconds, the 0 to 100 seconds plots are applicable to both cases mentioned above. The Code Predicted Sequence of Events for LOFT Test L3-1 are given in Table 3.

5.1. System Pressure Response

The pressure behavior in the upper plenum, Figures 5.1, 5.2, and 5.3, is typical of the pressure response for the reactor vessel, the intact and the broken loop piping. The pressure decays rapidly from an initial pressure of appoximately 2178 psia to a saturation pressure of approximatley 1200 psia in about 32 seconds after the break. The pressure then decays slowly during the saturated period of blowdown. As expected, and as shown in Figures 5.3 and 5.2, respectively, the rate of depressurization is higher for the discharge model with C_D = 0.9 as compared to a C_D of 0.6.

5.2. Mixture Level in Reactor Vessel

The mixture level in the reactor vessel is shown in Figures 5.6 and 5.7 for C_D = 0.6 and C_D = 0.9, respectively. As can be seen from Figure 5.7 (B&W best-estimate), the lowest mixture height is predicted to be ~3 ft above the core. F e, the core is predicted not to uncover during the transient.

Consequently, the fuel is predicted to remain well cooled and the fuel temperature is predicted not to rise appreciably.

5.3. ECCS Response

The accumulator and the HPIS flow rates for the B&W best-estimate are shown in Figures 5.4 and 5.5, respectively. The HPIS initiation is predicted to occur 5.0 seconds after the break while the accumulator initiation, based on $C_D = 0.9$, is predicted to occur 850.0 seconds after the break. It is also predicted that, within the first 1500 seconds, the system will not depressurize sufficiently to actuate the LPIS injection.

The sudden cold water injection from the accumulator is predicted to cause local pressure suppression and flow oscillations. The accumulator cycles on and off as a function of the pressure in the intact loop cold leg, node 12. The downcomer liquid level is predicted to increase while the reactor vessel liquid level is predicted to decrease during the periods when the accumulator injection is on. This is shown in Figures 5.7 and 5.8, respectively.

5.4. Leak Flow Path Response

The transient leak flow out the broken loop cold leg orifice for the B&W best estimate case is shown in Figure 5.9. As expected, during the subcooled portion of the blowdown, the leak flow follows the system depressurization curve, Figure 5.3. At 225 seconds into the transient, the leak node becomes saturated and a two-phase mixture is expelled out the break. This continues until 390 seconds into the transient at which time the mixture level in the system has dropped sufficiently to allow a pure steam discharge out the orifice. At 375 seconds, the C_D was changed to 0.9 and remained constant for the remainder of the prediction. The steam discharge continues until the accumulators begin cycling on and off during which time a two-phase mixture is emitted from the break.

1629 015

REFERENCES

[1] Information for L3-1 Standar r. ' Kaufman, N.C., Kau-203-79, dated September 28, 1979.

[2] LOFT System and Test Description (5.5 ft Nuclear Core 1 LOCES), NUREG/CR-0274, TREE-1208, Reeder, D.L., dated July 1978.

[3] CRAFT2, Fortran Program f r Digital Simulation of a Multi-Node Reactor Plant During a Loss-of-Coolant, BAW-10092, Rev. 2, Babcock and Wilcox, April 1975.

[4] Savani, N.K., "Preliminary CRAFT2 Model of LOFT L3-1 Experiment," November 20, 1979.

[5] TAFY-Fuel Pin Temperature and Gas Pressure Analysis, BAW-10044, Babcock and Wilcox, April 1972.

[6] Memo from G.D. McPherson (NRC) to J.H. Taylor (B&W), "LOFT Decay Heat for 40 Hour Operation," October 19, 1979.

[7] "Small Break Nozzle Information for L3-1 Standard Problem," Kau-228-79, October 29, 1979.

1629 016

Table 1. Node Description

Node No.	Description
1	Downcomer annulus
2	Downcomer
3	Lower plenum
4	Core
5	Upper plenum & upper head
6	Pressurizer
7	Hot leg, intact loop
8	Steam generator, front half of primary side, intact loop
9	Steam generator, back half of primary side, intact loop
10	Steam generator outlet, cold leg piping, intact loop
11	Pump suction, intact loop
12	Pump discharge, intact loop
13	Hot leg plus half simulated SG, broken loop
14	Half simulated SG plus half pump, broken loop
15	Half pump plus piping, broken loop
16	Leak node
17	Suppression tank
18	Secondary side, intact loop

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Table 2. Heat Slab Description

Slab No.	Associated node No.	Description
1	1	Reactor vessel from top of downcomer annulus to top of distributor annulus plus two RV stubs
2	1	Reactor vessel filler from top of downcomer annulus to top of distributor annulus
3	1	Core barrel from top of downcomer annulus to top of distributor annulus
4	2	Reactor vessel from top to bottom of downcomer annulus
5	2	Reactor vessel filler from top to bottom of downcomer annulus
6	2	Core barrel from top to bottom of downcomer annulus
7	3	Reactor vessel below bottom of downcomer
8	3	Bottom portion of reactor vessel filler below bottom of downcomer annulus
9	3	Lower core support structure and lower core end boxes
10	4	Skirt and filler within active core height
11	5	Upper core support structure plus upper core end boxes
12	5	Skirt of core filler above active core to top of core barrel plus two RV stubs
13	7	Intact loop hot leg from RV stub to steam generator
14	8	Steam generator inlet plenum plus 1/2 of tube sheet plus 1/2 of plenum partition
15	8	1/2 of primary side of steam generator tubes
16	9	1/2 of primary side of steam generator tubes
17	9	Steam generator outlet plenum plus 1/2 of tube sheet plus 1/2 of plenum partition
18	18	Steam generator tubes, secondary side
19	18	Steam generator shroud, secondary side
20	18	Steam generator shell
21	18	Top of tube sheet exposed to secondary water
22	10	Steam generator outlet piping
23	11	Pump suction piping
24	12	Intact cold leg piping
25	6	Surge line
26	6	Pressurizer

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Table 2. (Cont'd)

Slab No.	Associated node No.	Description
27	13	Broken loop hot leg plus 1/2 steam generator simulator plus hot leg side of bypass system
28	14	1/2 pump simulator plus 1/2 steam generator simulator
29	15	1/2 simulated pump plus remainder of broken loop hot leg
30	16	Broken loop cold leg including cold leg side of bypass system

1629 019

Table 3. Code Predicted Sequence of Events for LOFT Test L3-1

	Event	Time, second
1.	T_0 (Experiment initiation)	0.0
2.	HPIS initiation	5.0
3.	Pumps reach 12.5 Hz	17.0
4.	Pressurizer empty	~24.0
5.	Maximum average clad temperature	28.0 (573°F)
6.	Saturation pressure reached in outlet plenum	32.0
7.	Auxiliary feedwater starts	60.0
8.	Saturation pressure reached in pump inlet	74.0
9.	Loop seal cleared	210.0
10.	Break transition to steam flow	@ 225.0 sec, two-phase flow @ 390.0 sec, steam flow
11.	Accumulator initiation	*850.0 (1230.0)
12.	LPIS initiation	**NA
13.	Accumulator empty	NA
14.	First indication of DNB	NA
15.	First return to nucleate boiling	NA
16.	Core uncovery time	NA
17.	Core completely recovered	***See below

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*The accumulator initiates at 850.0 seconds with $C_D = 0.9$, and at 1230.0 seconds with $C_D = 0.6$.

**The events that were predicted not to occur by the code are indicated by "NA."

***Core remains covered through the transient; the minimum level in the RV was approximately 3.0' above core.

1629 020

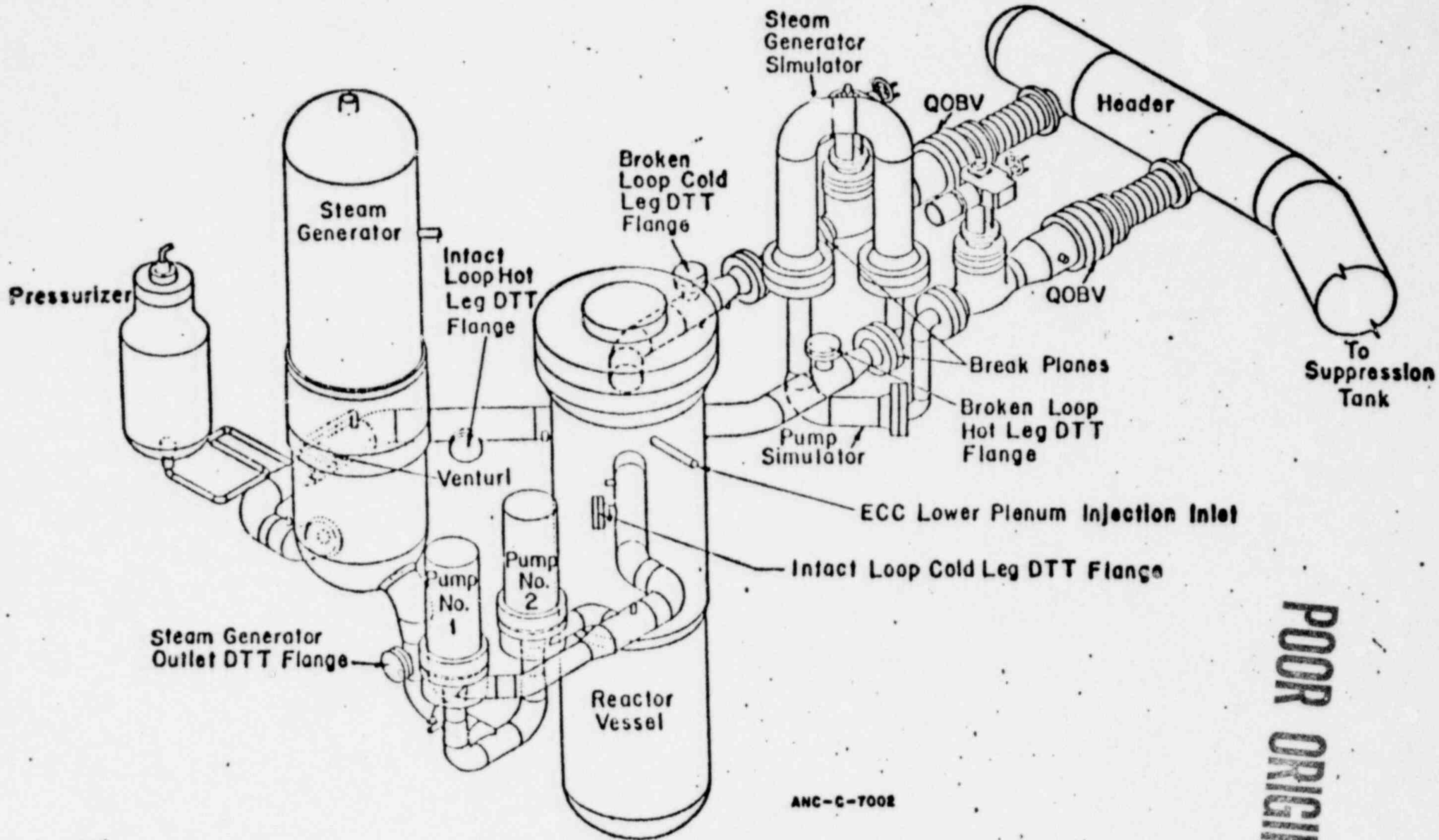
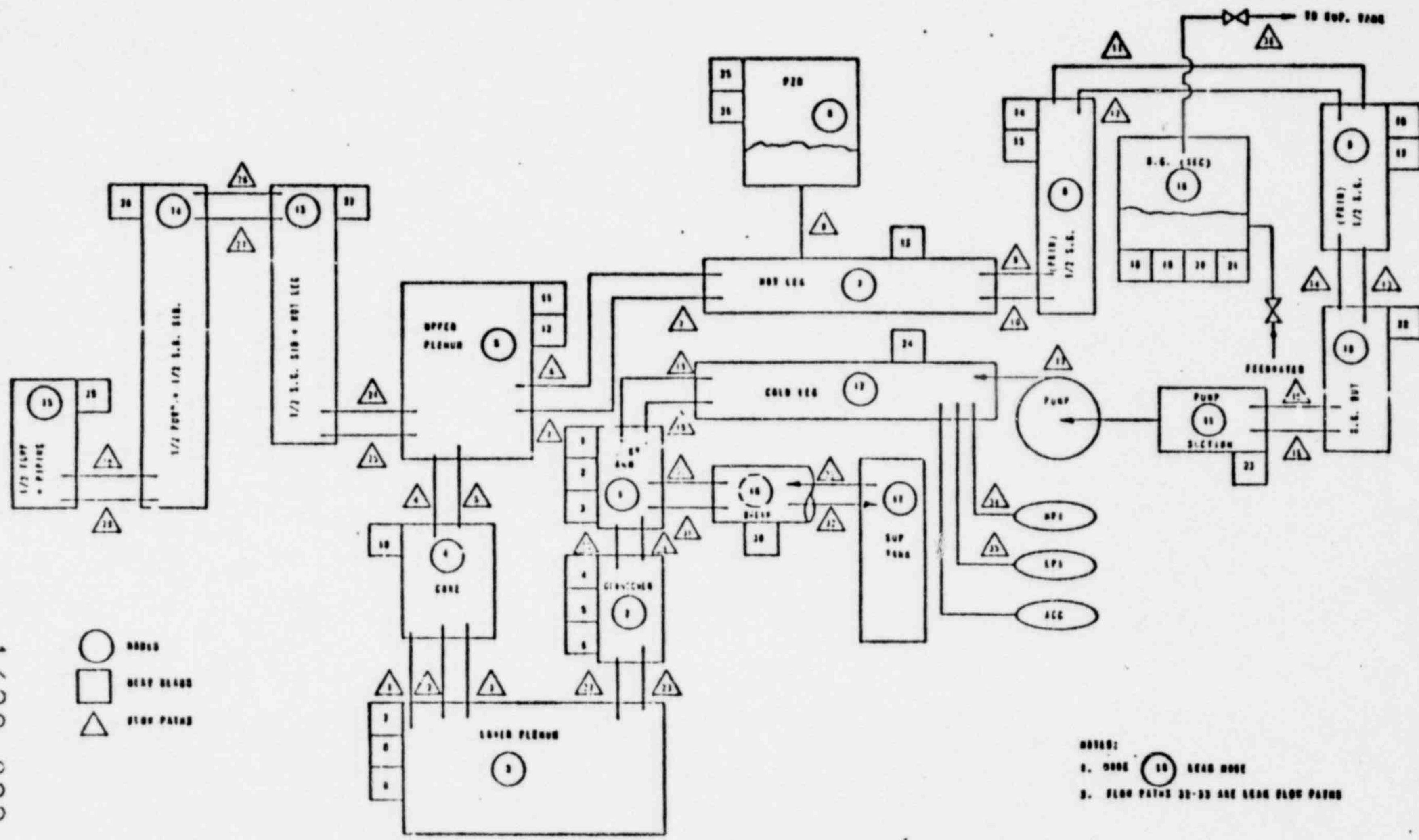


Fig. 4.1, LOFT MAJOR COMPONENTS

POOR ORIGINAL

1629 021

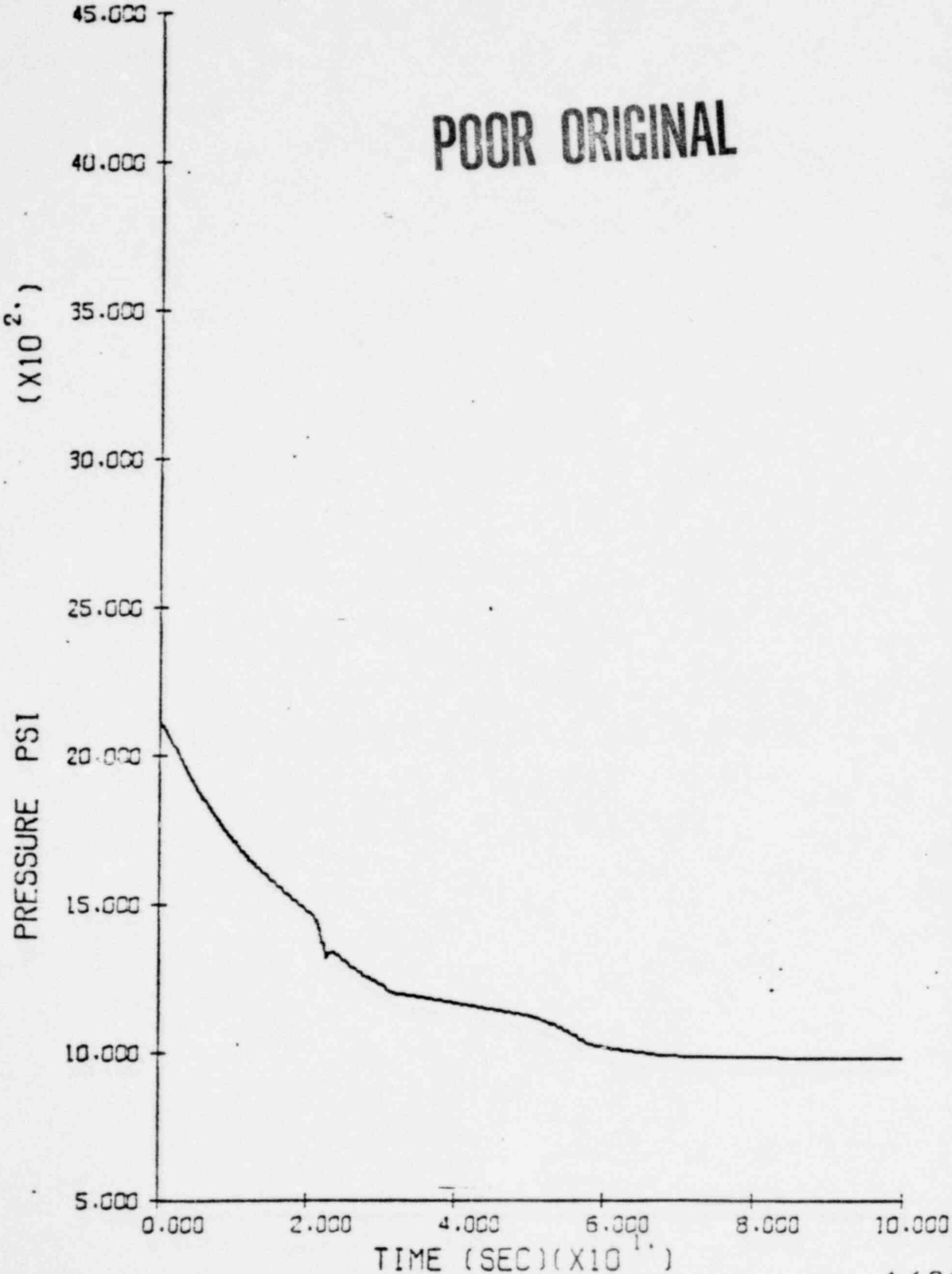
Figure 4.2 LOFT L3-1 Noding Diagram



POOR ORIGINAL

1629 022

Figure 5.1 - Pressure, Upper Plenum (0 to 100 sec.)



_31S2EE LOFT L3-1 STD PRBLM 1629 023

NODE 5

Figure 5.2 - Pressure, Upper Plenum (C_D = 0.6)

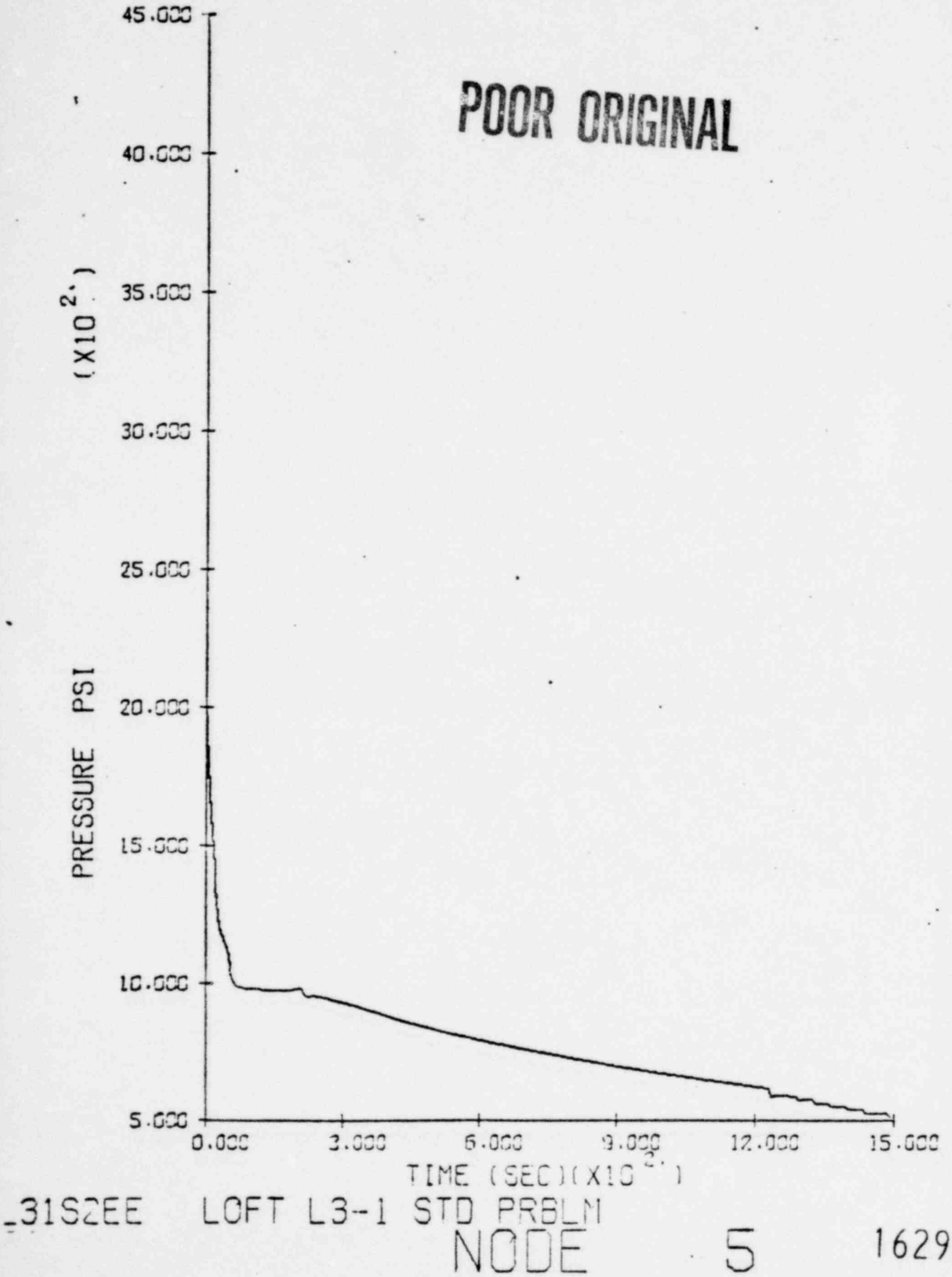


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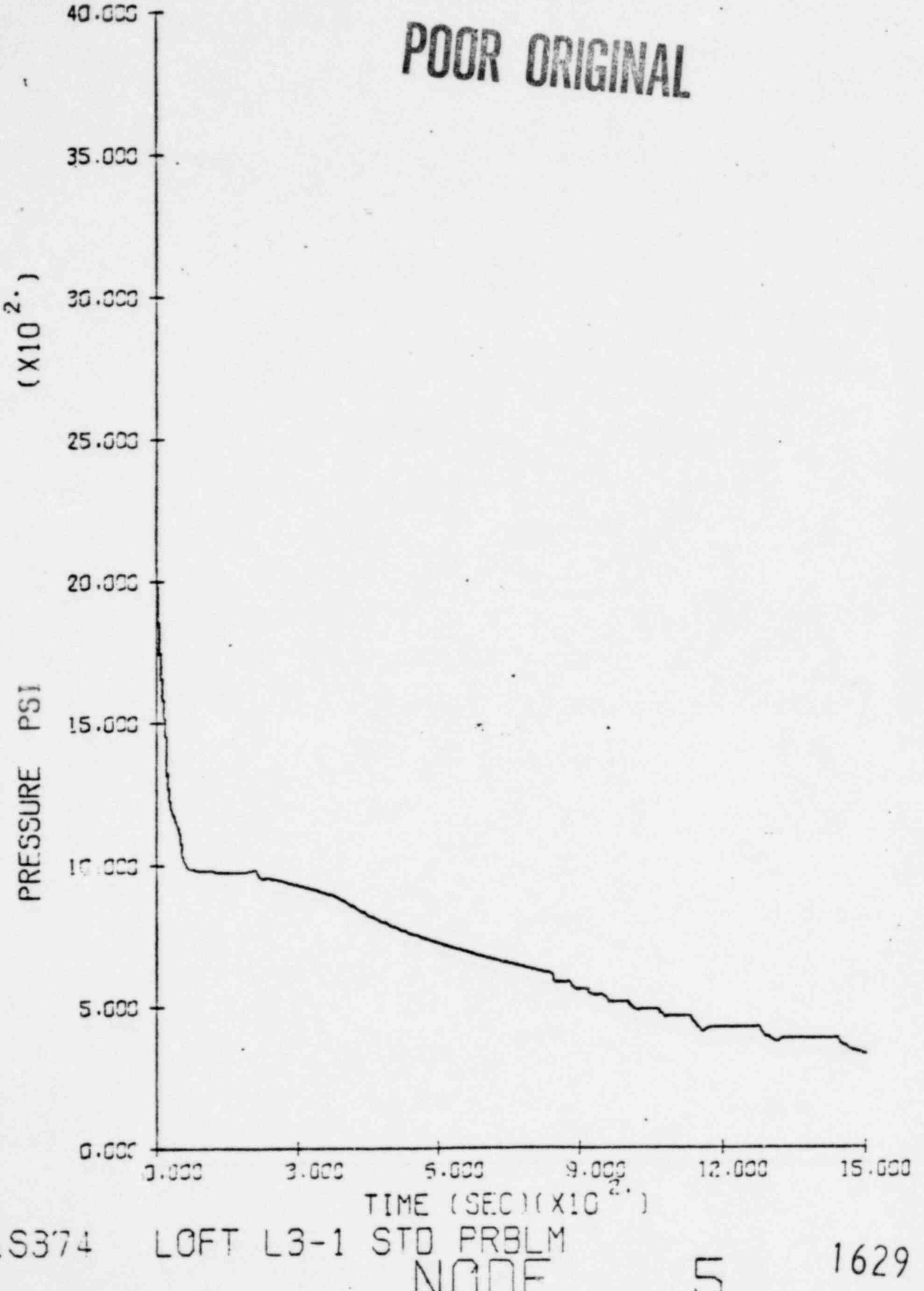
Figure 5.3 - Pressure, Upper Plenum (C_D = 0.9)

POOR ORIGINAL



1629 025

Figure 5.4 - Flow Rate, Accumulator (C_D = 0.9)

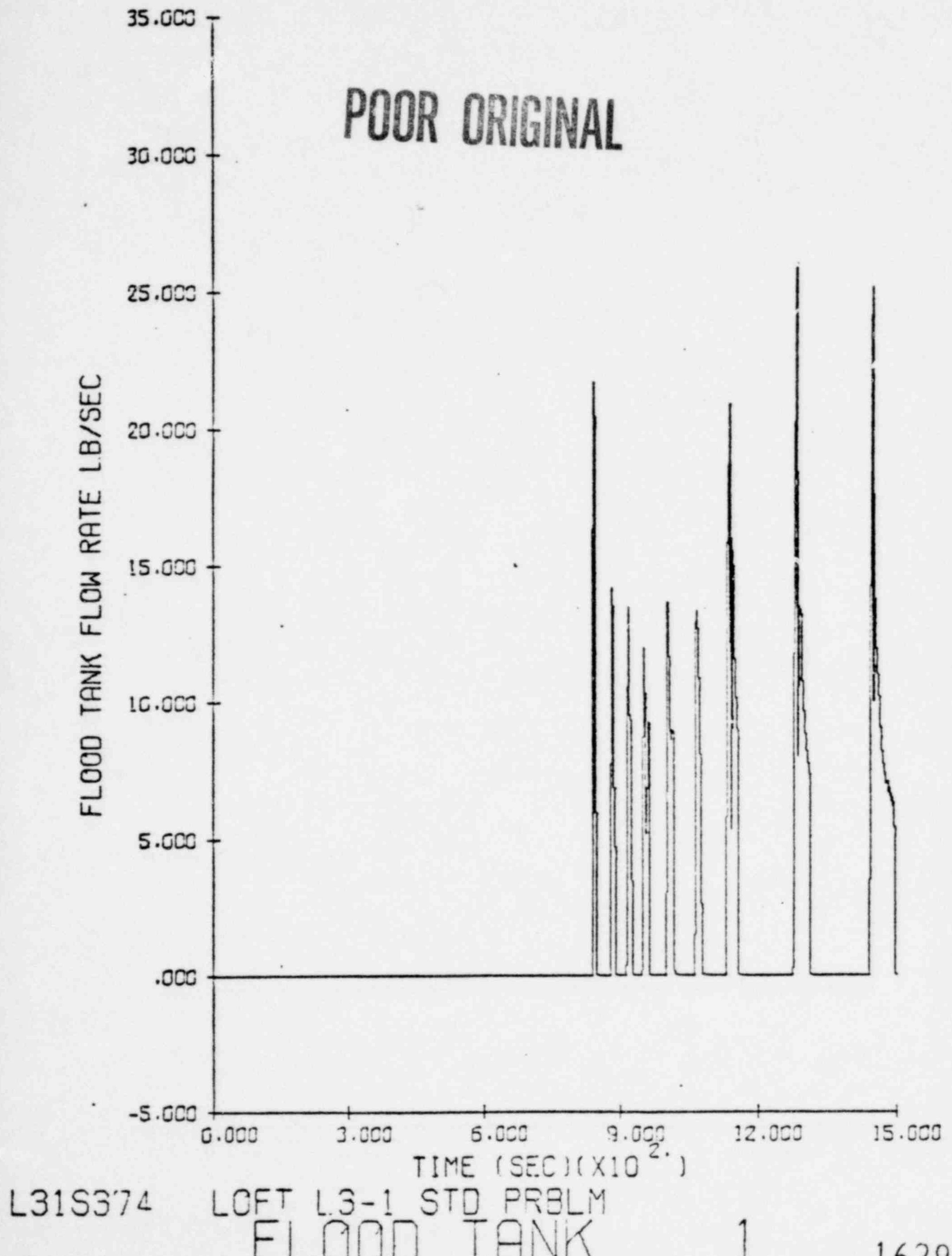


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Figure 5.5 - Flow Rate, HPIS (C_D = 0.9)

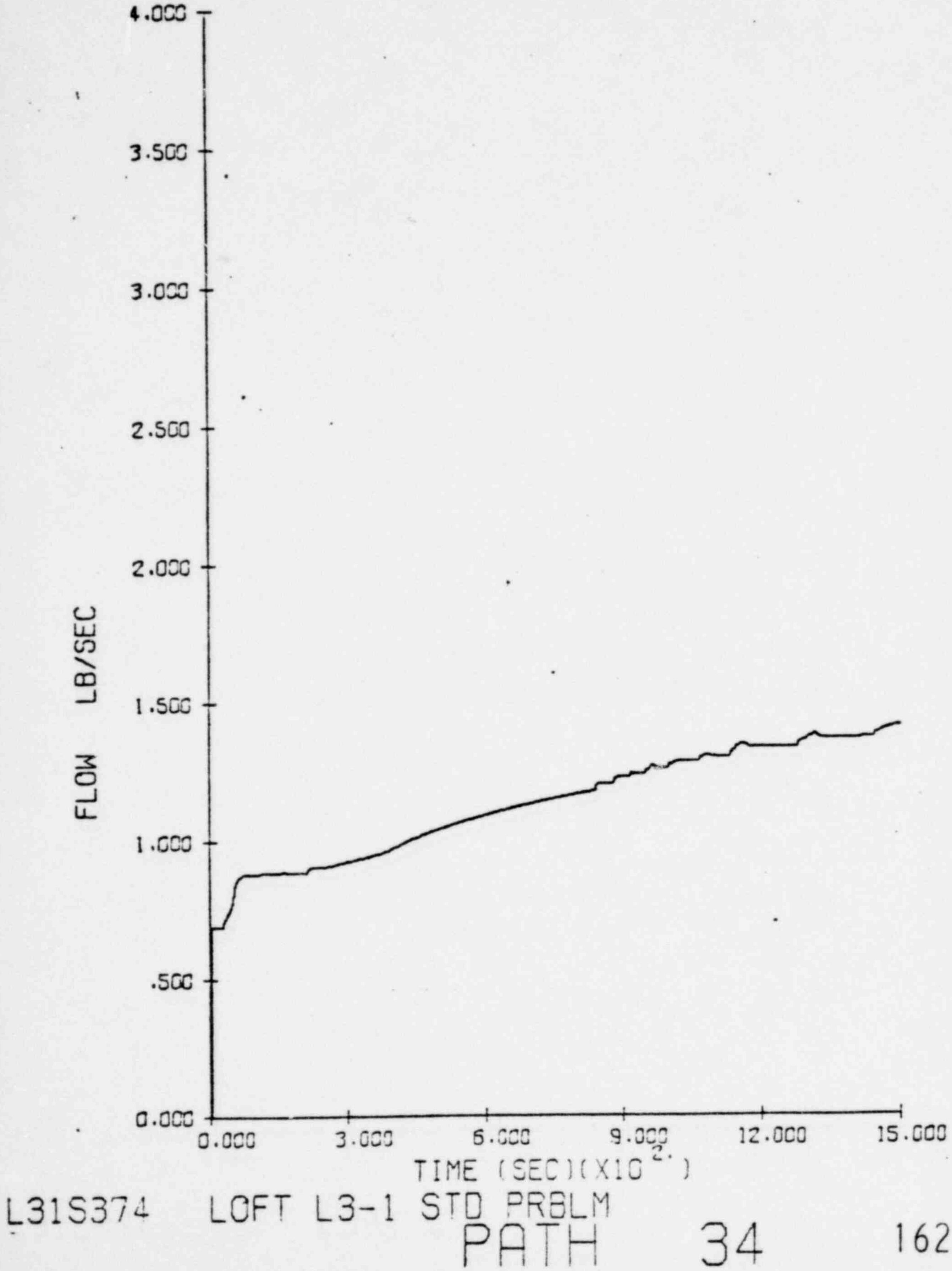

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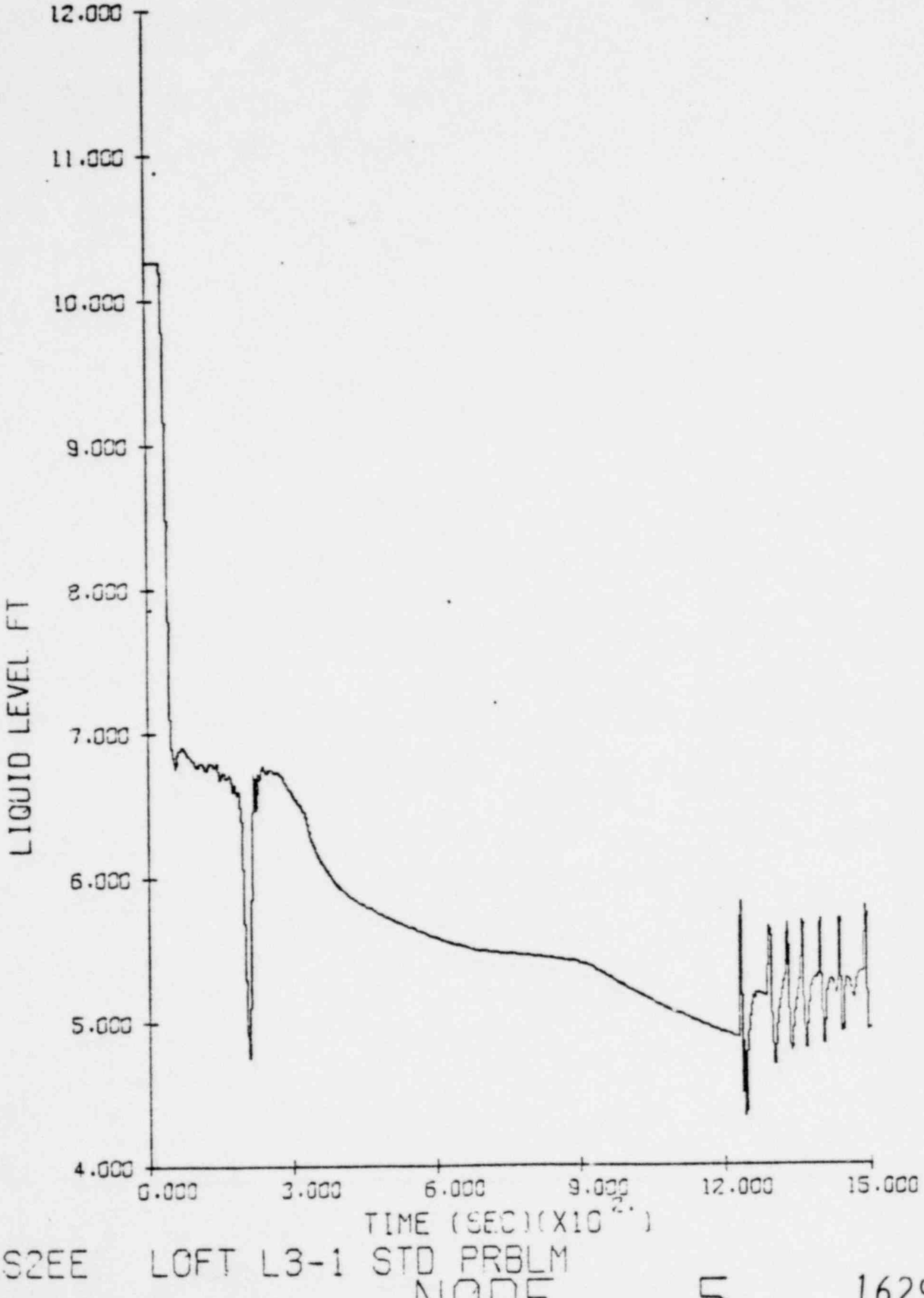
Figure 5.6 - Mixture Level, Reactor Vessel (C_D = 0.6)
(NOTE: The top of the core is at 0.0 ft elevation)



1629 028

Figure 5.7 - Mixture Level, Reactor Vessel (C_D = 0.9)

(__NOTE__: The top of the core is at 0.0 ft elevation)

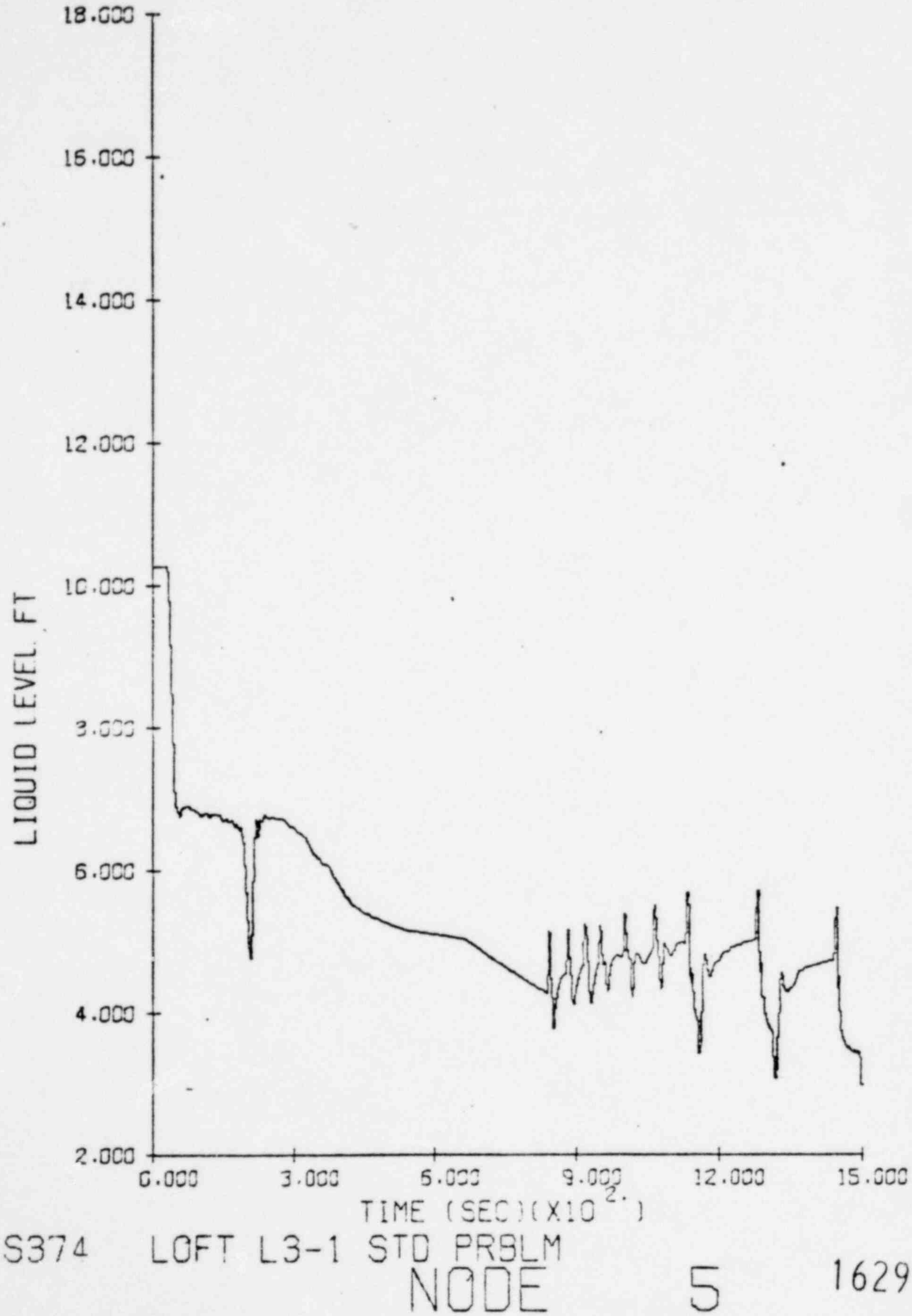


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Figure 5.8 - Mixture Level, Downcomer (C_D = 0.9)

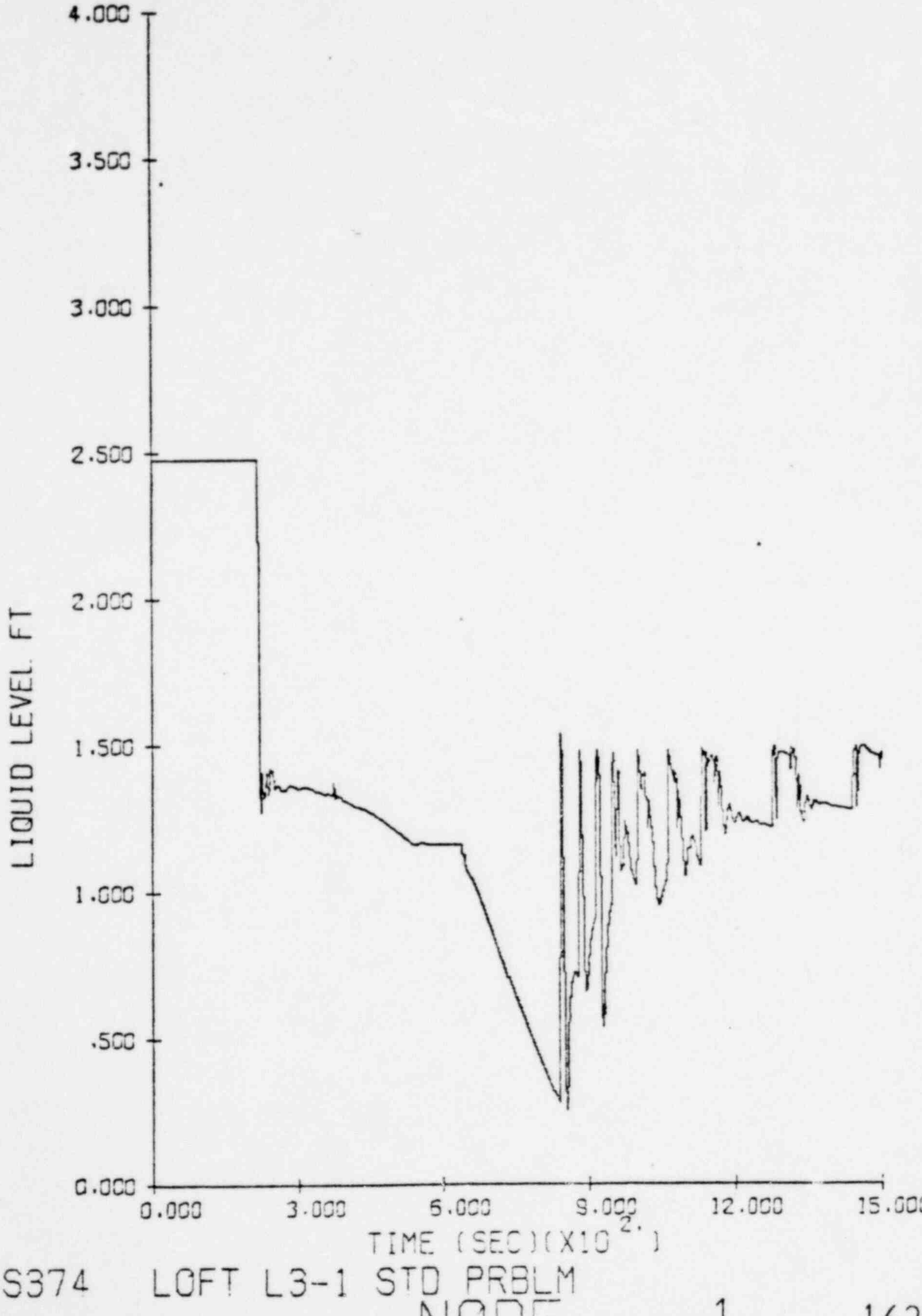

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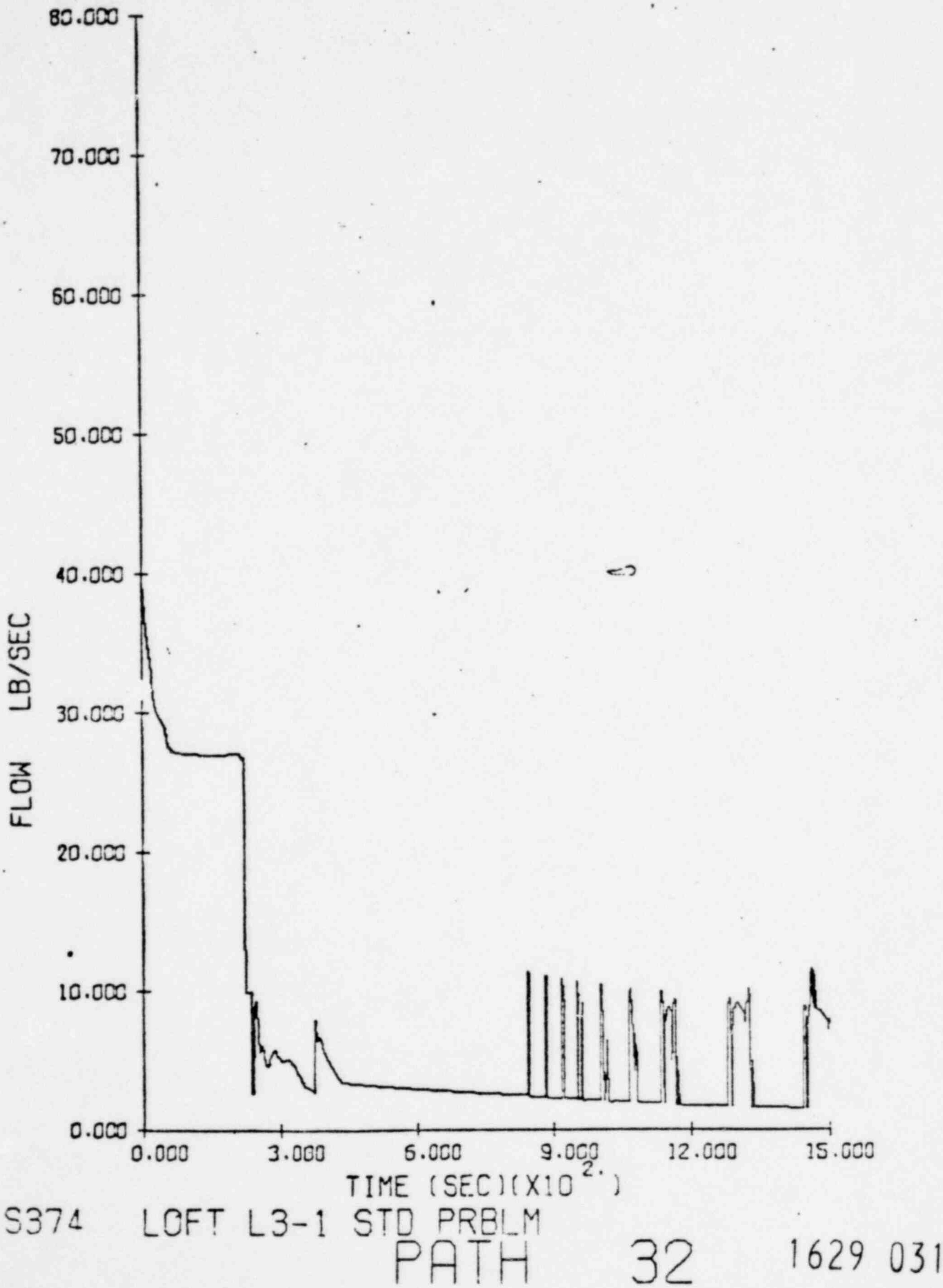
Figure 5.9 - Flow Rate, Break Flow, Path 32 (C_D = 0.9)



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7. ATTACHMENT

This section includes all the plots requested by NRC to evaluate the B&W's prediction. These plots are shown on Figures 2 through 166. The comparison parameters for the CRAFT2 analysis and LOFT experiement are described in Table 4. The input listing of CRAFT2 computer run is shown in Table 5.

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LIST OF FIGURES

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

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LIST OF FIGURES (Cont'd)

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LIST OF FIGURES (Cont'd)

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LIST OF FIGURES (Cont'd)

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Table 4. Parameters for Test Data Comparison

Pressure	Instrument	CRAFT2	Figure No.
Pressurizer (vapor space)	PE - PC - 4	Node 6	2-4
Broken loop hot leg, near break	PE - BL - 2	Node 13	5-7
Broken loop cold leg, near break	PE - BL - 1	Node 16	8-10
Upper plenum (upper end box)	PE - 1UP - 1	Node 5	11-13
Accumulator, intact loop	PT - P120 - 43	Flood Tank	14-16
Steam generator secondary	PT - P4 - 10A	Node 18	17-19
Density			
Intact loop cold leg	DE - PC - 1	Node 12	20-22
Intact loop hot leg	DE - PC - 2	Node 7	23-25
Broken loop cold leg	DE - BL - 1	Node 16	26-28
Broken loop hot leg	DE - BL - 2	Node 13	29-31
Pump suction	DE - PC - 3	Node 11	32-34
Differential pressure			
Across core	No measurement	Node 3/Node 5	35-37
Across intact loop pump	PdE - PC - 1	Node 11/Node 12	38-40
Pump suction leg	No measurement	Node 10/Node 11	41-43
Intact hot leg to top of vessel	No measurement	Node 7/Node 5	44-46
Fluid Temperatures			
Upstream of break, cold leg	TE - BL - 1	Node 16	47-49
Upper plenum	TE - 1UP - 1	Node 5	50-52
Pressurizer (liquid)	TE - P139 - 20	Node 6	53-55
Lower plenum	TE - 1LP - 1	Node 3	56-58

Table 4. (Cont'd)

Flow Rates	Instrument	CRAFT2	Figure No.
Core inlet	No measurement	Paths 1, 2, & 3	59-67
Core outlet	No measurement	Paths 4 & 5	68-73
Break flow	TTE - BL - 1[a]	Paths 32 & 33	74-79
Cold leg, intact loop	FE - PC - 1[b]	Paths 18 & 19	80-85
Hot leg, intact loop	PNE - PC - 2[c]	Paths 9 & 10	86-91
Accumulator, intact loop	FT - P120 - 36 - 1	Flood tank	92-94
LPIS	FT - P120 - 85	Path 35	95-97
HPIS	FT - P128 - 104	Path 34	98-100
Pressurizer surge line	Pde - PC - 8[b]	Path 8	101-103
Metal Temperatures			
Average rod	No measurement	Core Paths 1 & 2	104-109
Hot rod	No measurement	Not given	
Clad average temperature	No measurement	Core Paths 1 & 2	110-115
Peak clad temperature	No measurement	Not given	
Mass Inventories			
Primary system liquid mass inventory	No measurement	Not given	
Vessel inventory (collapsed liquid volume)	No measurement	Nodes 1-5	116-130
Integrated mass leaving system through break junction	No measurement	Integrated flow to containment	131-133
Energy released to containment	No measurement	Integrated energy to containment	134-136
Qualities, Heat Transfer Coefficients			
Quality, core average	No measurement	Core Paths 1 & 2	137-142
Quality, leak path	No measurement	Leak Path 32	143-145
Heat transfer coefficients, core	No measurement	Core Paths 1 & 2	146-151

1629 041

Table 4. (Cont'd)

Water Level	Instrument	CRAFT2	Figure No.
Vessel	LE - 3F10	Node 5	152-154
Downcomer	LE - 1ST or 2ST	Node 1	155-157
Pressurizer	LE - P139 - 6, 7, 8	Node 6	158-160
Pump Performance			
Pump speed	RPE - PC - 1 & 2	Pump speed	161-163
Pump head		Pump head	164-166

Table 5. Input Listing of CRAFT2 Computer Model for LOFT Test L3-1

POOR ORIGINAL

```
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
LIST09W  KIBLER BG           11/19/79  17.24.39. CYBER  C

L31S1,T7777,STMFZ.            SAVANI NK
CHARGE.AH001A19,SAVANI NK,394,P,CRAFT2.
T TLE(LOFT PRETEST PREDICTION OF L3-1,CALC. 32-1106463-00)
D.SPOSE(OUTPUT,*PR)
REQUEST,TAPE7,A4,*PF.
REQUEST,TAPE10,*PF.
REQUEST,TAPE77,*PF.
STAGE(TAPE,VSN=10792,PE)
LABEL(TAPE,R,L=PUMPMODEL)
COPYBF(TAPE,CRAFT2)
RETURN(TAPE)
STAGE(RTAPE,PE,POST,VSN=12101)
LABEL(RTAPE,W,L=L31NK,T=999)
STAGE(PTAPE,PE,POST,VSN=07199)
LABEL(PTAPE,W,L=L31NK,T=999)
STAGE(OTAPE,PE,POST,VSN=08748)
LABEL(OTAPE,W,L=L31NK,T=999)
REWIND(CRAFT2)
COPYBF(CRAFT2,TAPE77)
EXIT(C)
CRAFT2(FL=500000)
EXIT(U)
REWIND(TAPE77)
COPYBF(TAPE77,RTAPE,2)          (RESTART TAPE)
RETURN(RTAPE)
PURGE(TAPE77)
RETURN(TAPE77)
EXIT(U)
R WIND(TAPE7)
COPYBF(TAPE7,PTAPE)         (PLOT TAPE)
RETURN(PTAPE)
PURGE(TAPE7)
RETURN(TAPE7)
EXIT(U)
REWIND(TAPE10)
COPYCF(TAPE10,OUTPUT,100)
REWIND(OUTPUT)
COPYBF(OUTPUT,PAPER,100)
DISPOSE(PAPER,*PR)
REWIND(TAPE10)
COPYBF(TAPE10,OTAPE,100)
RETURN(OTAPE)
PURGE(TAPE10)
        1MOTLOCH   L31BASECAS                    0OFR        LOFT L3-1 BASE CASE
       * LOFT L3-1 BASE CASE
       * BASE CASE
       * TRANSIENT
       * PLOT PACKAGE
       * PUMP HEAD SET TO 332.0 FT.
       * INPUT CA
       * AUXILIARY FEED WATER MODELED USING CARD SERIES 7211
       * 1/3 2/3 STEAM GENERATOR SPLIT
       * CORRECTED BUBBLE RISE INPUT
       * FUEL AVERAGE TEMPERATURE READJUSTED
       * STEAM FLOW CONTROL VALVE MODELED WITH CARD SERIES 4951
       * 40 HOUR OPERATION DECAY HEAT CURVE
       * ONB TURNED OFF
       * LPI INITIATES AT 144.7 PSIA
       90, 4
       *
       * RESTART INFORMATION
       *
```

1629 043

Table 5. (Cont'd)

POOR ORIGINAL

```
101,  2.0
1001,     20.0,    0.0,    0.0
1004, 5.00, 5.00, 5.00
*
* PLOT INFORMATION
*
```

*	ID	X	MIN	MAX	SCALE	Y	MIN	MAX	LENGTH	X4	X5
* NODES											
1501,	1105,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1502,	1106,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1503,	1107,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1504,	1112,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1505,	1113,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1506,	1116,	1,	0.0,	0.0,	10.0,	1,	-0.0,	0.0,	10.0,	00,	00
1507,	1118,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1508,	1201,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1509,	1202,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1510,	1203,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1511,	1204,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1512,	1205,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1513,	1206,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1514,	1208,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1515,	1209,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1516,	1210,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1517,	1218,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1518,	1308,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1519,	1309,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1520,	1408,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1521,	1409,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1522,	1603,	1,	0.0	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1523,	1604,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1524,	1605,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1525,	1606,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1526,	1608,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1527,	1609,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1528,	1616,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1529,	1618,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1530,	1801,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	3,	5
1531,	1802,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	11,	12
1532,	1803,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	10,	11
1533,	1804,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	7,	5
* FLOW PATHS											
1534,	2101,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1535,	2102,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1536,	2103,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1537,	2104,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1538,	2105,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1539,	2109,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1540,	2110,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1541,	2117,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1542,	2118,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1543,	2119,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1544,	2124,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1545,	2125,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1546,	2132,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1547,	2133,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1548,	2134,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1549,	2135,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1550,	2401,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1551,	2402,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1552,	2409,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00
1553,	2411,	1,	0.0,	0.0,	10.0,	1,	0.0,	0.0,	10.0,	00,	00

Table 5. (Cont'd)

POOR ORIGINAL

```
1554, 2413, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1555, 2617, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1556, 2717, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
* CORE PATHS
*
1557, 3101, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1558, 3102, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1559, 3201, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1560, 3202, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1561, 3301, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1562, 3302, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1563, 3501, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1564, 3502, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1565, 3601, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1566, 3602, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1567, 3801, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1568, 3802, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
*
* STEAM GENERATOR
*
1569, 4101, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1570, 4301, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1571, 4401, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1572, 4501, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1573, 4701, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
*
* FLOOD TANKS
*
1574, 5101, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1575, 5201, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1576, 5301, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
15 7, 5801, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
*
* MISC
*
1578, 5401, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1579, 5501, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1580, 5601, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1581, 7104, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1582, 7107, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1583, 7111, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1584, 7112, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1585, 7113, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1586, 7116, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1587, 7201, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1588, 7202, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1589, 7203, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1590, 7204, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1591, 7205, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1592, 7206, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1593, 7208, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1594, 7209, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1595, 7210, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1596, 7211, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1597, 7218, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1598, 2108, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1599, 2432, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
1600, 1211, 1, 0.0, 0.0, 10.0, 1, 0.0, 0.0, 10.0, 00, 00
*
* PLOT SELECTION INFORMATION
*
1601, 1105, 1604, 2132, 5601, 7204, 2717
*
1701, 100
*
* TIME INFORMATION
```

Table 5. (Cont'd)

POOR ORIGINAL

```
*
2001,0.0001,10.,20.,0.0005,100.,18.,0.001,500.,8.
*
* CONTROL VOLUMES
*
3001, 2.427, 2.477, 20.661, 22.000, 20.611,2198.77,538.03,0.0
3002, 1.451,12.574,  8.087, 20.561,  8.037,2193.88,538.03,0.0
3003, 6.113, 4.109,  9.694,  7.987,  5.635,2197.07,538.03,0.0
3004, 1.988, 5.543, 15.278,  9.794,  9.744,2189.42,582.92,0.0
3005, 3.284,10.256, 22.000, 15.378, 15.328,2178.56,582.92,0.0
3006, 6.040, 5.702, 26.298, 26.298, 26.248,2168.30,  0.0 ,3.71
3007,11.650, 0.932, 22.000, 22.000, 21.534,2170.70,582.92,0.0
3008, 2.482,10.909, 32.393, 22.000, 21.534,2159.25,560.43,0.0
3009, 2.430,10.532, 22.498, 32.393, 21.911,2148.25,538.03,0.0
3010, 0.882, 5.021, 13.257, 22.498, 17.791,2135.46,538.03,0.0
3011, 2.327, 4.675, 22.000, 18.257, 17.791,2134.31,538.03,0.0
3012,16.191, 0.932, 22.0  , 22.0  , 21.534,2199.66,538.03,0.0
3013, 1.983,11.109, 32.041, 22.0  , 21.534,2176.24,538.03,0.0
3014, 0.773,15.088, 18.021, 32.041, 17.555,2176.24,538.03,0.0
3015, 0.560, 4.860, 22.0  , 18.021, 17.563,2179.60,538.03,0.0
3016, 4.120, 2.920, 22.0  , 22.0  , 21.534,2198.33,538.03,0.0
3017,23710.,15.600, 22.0  , 11.49 ,  8.490,  30.00,  0.0 ,4.17
3018,14.630,13.860, 44.01 , 34.23 , 25.62 , 750.00,  0.0 ,10.5
*
* PRIMARY METAL HEAT TRANSFER COEFFICIENTS
*
3510,  1.4,  .00055
*
* PRIMARY METAL TIME STEPS
3511,  0.1,  15.0,  .001,  1.+6
*
* PRIMARY METAL PROPERTIES
*
*       VOL   H.T.AREA   THICK     CLAD T      BULK K   CLAD K   RHO CP   T-INC
3521,   1.,     47.18,   0.51,     0.01042,    24.00,   10.99,   53.30,   0.0
3522,   1.,     61.09,   0.842,    0.842,      10.99,   10.99,   62.90,   0.0
3523,   1.,     21.40,   0.125,    0.125,      10.99,   10.99,   62.90,   0.0
3524,   2.,    189.94,   0.399,    0.01042,    24.00,   10.99,   53.30,   0.0
3525,   2.,    310.09,   0.842,    0.842,      10.99,   10.99,   62.90,   0.0
3526,   2.,    108.63,   0.125,    0.125,      10.99,   10.99,   62.90,   0.0
3527,   3.,     24.36,   0.325,    0.01042,    24.00,   10.99,   53.30,   0.0
3528,   3.,     28.34,   0.842,    0.842,      10.99,   10.99,   62.90,   0.0
3529,   3.,     64.00,   0.0449,   0.0449,     10.99,   10.99,   62.90,   0.0
3530,   4.,     35.02,   0.254,    0.254,      10.99,   10.99,   62.90,   0.0
3531,   5.,    973.0,    0.010,    0.010,      10.99,   10.99,   62.90,   0.0
3532,   5.,     64.10,   0.254,    0.254,      10.99,   10.99,   62.90,   0.0
3533,   7.,     50.09,   0.140,    0.140,      10.99,   10.99,   64.11,   0.0
3534,   8.,     29.673,  0.267,    0.0208,     24.00,   10.8,    53.30,   0.0
3535,   8.,   1449.8,    0.00204,0.00204,      10.8,    10.8,    55.16,   0.0
3536,   9.,   1449.8,    0.00204,0.00204,      10.8,    10.8,    55.16,   0.0
3537,   9.,     29.673,  0.267,    0.0208,     24.0,    10.8,    53.30,   0.0
3538,  18.,   3610.0,    0.00204,0.00204,      10.8,    10.8,    55.16,   0.0
3539,  18.,    312.21,   0.0625,   0.0625,     24.0,    24.0,    53.30,   0.0
3540,  18.,    268.03,   0.18,     0.18,       24.0,    24.0,    53.30,   0.0
3541,  18.,     12.07,   0.479,    0.0208,     24.0,    10.8,    53.30,   0.0
3542,  10.,     18.51,   0.135,    0.135,      10.99,   10.99,   64.11,   0.0
3543,  11.,     34.66,   0.125,    0.125,      10.99,   10.99,   64.11,   0.0
3544,  12.,     49.52,   0.129,    0.129,      10.99,   10.99,   64.11,   0.0
3545,   6.,     11.01,   0.0293,   0.0293,     10.99,   10.99,   64.11,   0.0
3546,   6.,     65.95,   0.2711,   0.0208,     24.0,    10.99,   53.30,   0.0
3547,  13.,    127.82,   0.098,    0.098,      10.99,   10.99,   64.11,   0.0
3548,  14.,     88.17,   0.093,    0.093,      10.99,   10.99,   64.11,   0.0
3549,  15.,     13.67,   0.046,    0.046,      10.99,   10.99,   64.11,   0.0
3550,  16.,     54.96,   0.092,    0.092,      10.99,   10.99,   64.11,   0.0
*
* CONTAINMENT NODE
```

Table 5. (Cont'd)

POOR ORIGINAL

```
*
3801,17,32,33
*
* WILSON MULTIPLIER TABLE
*
3890,    2.0,    0.0,    2.0,   1.+6
3891,    2.0,    0.0,    2.0,   1.+6
3892,    2.0,    0.0,    2.0,   1.+6
3893,    2.38,   0.0,    2.38,  1.+6
3894,    2.0,    0.0,    2.0,   1.+6
*
* BUBBLE RISE VELOCITY
*
3901, 1,-887.0, 2,-887.0, 3,-887.0, 4,-887.0, 5,-887.0, 6,-888.0
3902, 7,-888.0, 8,-888.0, 9,-888.0,10,-888.0,11,-888.0,12,-888.0
3903,13,-888.0,14,-888.0,15,-888.0,16,-888.0,17,-888.0,18,1000.0
*
* HYDRAULIC DIAMETER FOR WILSON MODEL
*
3905, 1,0.292, 2,0.167, 3,0.035, 4,0.0402, 5,1.307, 6,2.783, 7,0.932
3906, 8,0.034, 9,0.034,10,0.932,11,0.9320,12,0.932,13,0.932,14,0.058
3907,15,0.338,16,0.932,17,1.938,18,4.316
*
* REGULAR FLOW PATHS
*
4001, 1, 3, 4,501.39, 6.884,0.828, 0.0 ,-1.44-4,0.,0.100,0.0,0.0402
4002, 1, 3, 4,501.39, 6.884,0.828, 0.0 ,-1.44-4,0.,0.100,0.0,0.0402
4003, 8, 3, 4, 52.78,228.11,0.025, 0.0 ,-1.30-2,0.,0.1  ,0.0,0.178
4004, 8, 4, 5,527.78, 7.062,1.340, 0.0 ,-1.02-4,0.,0.1  ,0.0,1.306
4005, 8, 4, 5,527.78, 7.062,1.340, 0.0 ,-1.02-4,0.,0.1  ,0.0,1.306
4006, 8, 5, 7,527.78,23.10 ,0.361, 0.0 ,-6.86-4,0.,0.466,0.0,0.932
4007, 8, 5, 7,527.78,23.10 ,0.361, 0.0 ,-6.86-4,0.,0.466,0.0,0.932
4008, 5, 6, 7,  0.0 ,1384.2,0.018, 7.6 ,-2.28-4,0.,0.1  ,1.0-8,.141,.99
4009, 8, 7, 8,527.78,37.540,0.451, 0.0 ,7.625-4,0.,0.1  ,0.0,0.0335
4010, 8, 7, 8,527.78,37.540,0.451, 0.0 ,7.625-4,0.,0.1  ,0.0,0.0335
4011, 8, 8, 9,527.78, 8.521,0.314, 0.0 ,  0.0  ,0.,0.479,0.0,0.0335
4012, 8, 8, 9,527.78, 8.521,0.314, 0.0 ,  0.0  ,0.,0.479,0.0,0.0335
4013, 8, 9,10,527.78,12.528,0.746, 0.0 ,-7.63-4,0.,0.100,0.0,0.0335
4014, 8, 9,10,527.78,12.528,0.746, 0.0 ,-7.63-4,0.,0.1  ,0.0,0.0335
4015, 8,10,11,527.78,18.922,0.341, 0.0 ,  0.0  ,0.,0.466,0.0,0.932
4016, 8,10,11,527.78,18.922,0.341, 0.0 ,  0.0  ,0.,0.466,0.0,0.932
4017, 2,11,12,1055.6, 8.874,1.075, 0.0 ,  0.0  ,0.,0.708,0.0,0.932
4018, 8,12, 1,527.78,36.546,0.366, 0.0 ,8.699-4,0.,0.466,0.0,0.932
4019, 8,12, 1,527.78,36.546,0.366, 0.0 ,8.699-4,0.,0.466,0.0,0.932
4020, 8, 1, 2,527.78,10.241,0.704, 0.0 ,1.295-4,0.,0.1  ,0.0,0.292
4021, 8, 1, 2,527.78,10.241,0.704, 0.0 ,1.295-4,0.,0.1  ,0.0,0.292
4022, 8, 2, 3,527.78,10.055,0.890, 0.0 ,1.772-4,0.,0.1  ,0.0,0.167
4023, 8, 2, 3,527.78,10.055,0.890, 0.0 ,1.772-4,0.,0.1  ,0.0,0.167
4024, 8,13, 5, 0.0  ,52.568,0.180,1.003,6.856-4,0.,0.466,1.0-8,.479
4025, 8,13, 5, 0.0  ,52.568,0.180,1.003,6.856-4,0.,0.466,1.0-8,.479
4026, 8,14,13, 0.0  ,106.75,0.208,12.56,-5.92-4,0.,0.602,1.0-8,.515
4027, 8,14,13, 0.0  ,106.75,0.208,12.56,-5.92-4,0.,0.602,1.0-8,.515
4028, 8,15,14, 0.0  ,112.37,0.067, 4.56,0.05290,0.,0.458,1.0-8,.292
4029, 8,15,14, 0.0  ,112.37,0.067, 4.56,0.05290,0.,0.458,1.0-8,.292
4030, 8, 1,16, 0.0  , 16.31,0.396, 5.67,-8.70-4,0.,0.466,1.0-8,.710
4031, 8, 1,16, 0.0  , 16.31,0.396, 5.67,-8.70-4,0.,0.466,1.0-8,.710
*
* LEAK FLOW PATHS
*
4232, 7,16,17,0.0,0.0010,0.002214,0.60,-1.0,0.053
4233, 7,17,16,0.0,0.0010,0.002214,0.60,-1.0,0.053
*
* FILL SYSTEM
*
4434,6,1,12,0,1.0,43.09,0.0
4435,6,2,12,0,1.0,43.09,0.0
```

Table 5. (Cont'd)

POOR ORIGINAL

```
4036, 10, 18, 17, 58.5, 100.0, .038487,2.4359,0.0,0.0,0.1,1.-8,0.22,1.0
*
* INTEGRATED FLOW PATH MASS
*
4601,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20
4602, 21, 22, 23, 24, 26, 28, 30, 31, 32, 33
4810, 36
*
* FLOW PATH ELEVATION MODIFICATIONS
*
*      PATH  UP.ELEV  DN.ELEV
4901,   1,    9.584,    9.804
4902,   2,    9.684,    9.904
4903,   3,    9.684,    9.904
4904,   4,   15.168,   15.388
4905,   5,   15.268,   15.488
4906,   6,   22.232,   22.232
4907,   7,   21.768,   21.768
4908,   9,   22.232,   22.232
4909,  10,   21.768,   21.768
4910,  11,   31.964,   31.964
4911,  12,   31.006,   31.006
4912,  13,   22.873,   22.653
4913,  14,   22.973,   22.753
4914,  15,   18.490,   18.490
4915,  16,   18.025,   18.025
4916,  18,   22.232,   22.232
4917,  19,   21.768,   21.768
4918,  20,   20.671,   20.451
4919,  21,   20.771,   20.551
4920,  22,    8.097,    7.877
4921,  23,    8.197,    7.977
4922,  24,   22.232,   22.232
4923,  25,   21.768,   21.768
4924,  26,   32.341,   32.341
4925,  27,   31.740,   31.740
4926,  28,   18.106,   18.106
4927,  29,   17.936,   17.936
4928,  30,   22.232,   22.232
4929,  31,   21.768,   21.768
4930,   8,   26.298,   22.416
*
* STEAM FLOW CONTROL CONTROL VALVE
*
4951,    0.038487,  0.0,    0.0,  15.0,0.0,1.+6
*
* CORE PARAMETERS
*
5001,0.0402,5.5,7500.,3000.0,10.,3,2.15969+5,394.96,1.,-9.8-5,1.,1.,
+    1.,1.,0.0,0.0,0
5002,0.0402,5.5,7500.,3000.0,10.,3,2.15969+5,394.96,1.,-9.8-5,1.,1.,
+    1.,1.,0.0,0.0,0
*
* FUEL PIN,GAP AND CLADDING PROPERTIES
*
5101,0.0152, 0.0 , 0.0,1835.0,0.0003125,-1.,-1.,0.00203,0.0,0.0,0.0,
+    0.0,0.0,1,55.0
5102,0.0152, 0.0 , 0.0,1835.0,0.0003125,-1.,-1.,0.00203,0.0,0.0,0.0,
+    0.0,0.0,2,55.0
*
* FUEL PIN FUEL DENSITY
*
5500,636.92
*
* POISSON RATIO AND PIN PLENUM VOLUMES
*
```

Table 5. (Cont'd)

POOR ORIGINAL

```
5505,0.35,0.0,1.56-4,1.,0.2,0.0153,2
*
* UPPER AND LOWER PATHS FOR EACH CHANNEL
*
5510,1,1,1,2,2,2
*
* METAL-WATER REACTION CONSTANTS
*
5901,91.22,140.5,6.5,2.0,1.-5,1500.,45500.0,33.3,0.0
*
* DNB PARAMETERS
*
5921, 6.0+9, 1000.0, 1000.0, 2.75, 0.0
*
* SCRAM PARAMETERS
*
6001,  3.71,  0.0,  3000.0,  0.0,  0.0,  5,  6
*
* HEAT GENERATION VS TIME TABLE ... 40 HOUR OPERATION
*
6011, 1.0,           0.0,  0.059060,     1.0,  0.057404,     1.5
6012, 0.055963,      2.0,  0.051666,     4.0,  0.048779,     6.0
6013, 0.048640,      8.0,  0.044956,    10.0,  0.041393,    15.0
6014, 0.039756,     20.0,  0.034757,    40.0,  0.031888,    60.0
6015, 0.029900,     80.0,  0.023412,   100.0,  0.025868,   150.0
6016, 0.024201,    200.0,  0.020577,   400.0,  0.018552,   600.0
6017, 0.017087,    800.0,  0.015932,  1000.0,  0.013811,  1500.0
6018, 0.012315,   2000.0,  0.008993,  4000.0
* NORMALIZED HEAT TRANSFER COEFFICIENT VS TIME TABLE
*
7021,1.,0.0,1.,10000.0
7031,1.,0.0,1.,10000.0
*
* STEAM GENERATOR HEAT TRANSFER MODEL (OPTION 2)
*
7100,1,1
*
* STEAM GENERATOR
*
7101,9,  18,  15796.3,  31592.6,  40.13,  40.13,  58.5,  0.1
*
* STEAM GENERATOR LOGIC PARAMETERS
*
7201,1.+6,1.+6,60.0
*
* MAIN FEEDWATER COASTDOWN
*
*
7211,  0.0, 0.0,  0.0, 59.99,  1.11, 60.0,  1.11, 1500.0
* AUXILIARY FEEDWATER VS PRESSURE TABLE
*
7231,0.0,0.0,0.0,1.+6
*
* RELIEF VALVE ACTUATION PRESSURE VS TIME TABLE
*
7251,3000.0,0.0,3000.0,10000.0
*
* RELIEF VALVE CHARACTERISTICS
*
7271,0.0,0.0,0.0,10000.0
*
* SAFETY VALVE CHARACTERISTICS
*
7291,0.0,0.0,0.0,0.0
*
* PUMP CHARACTERISTICS
```

1629 049

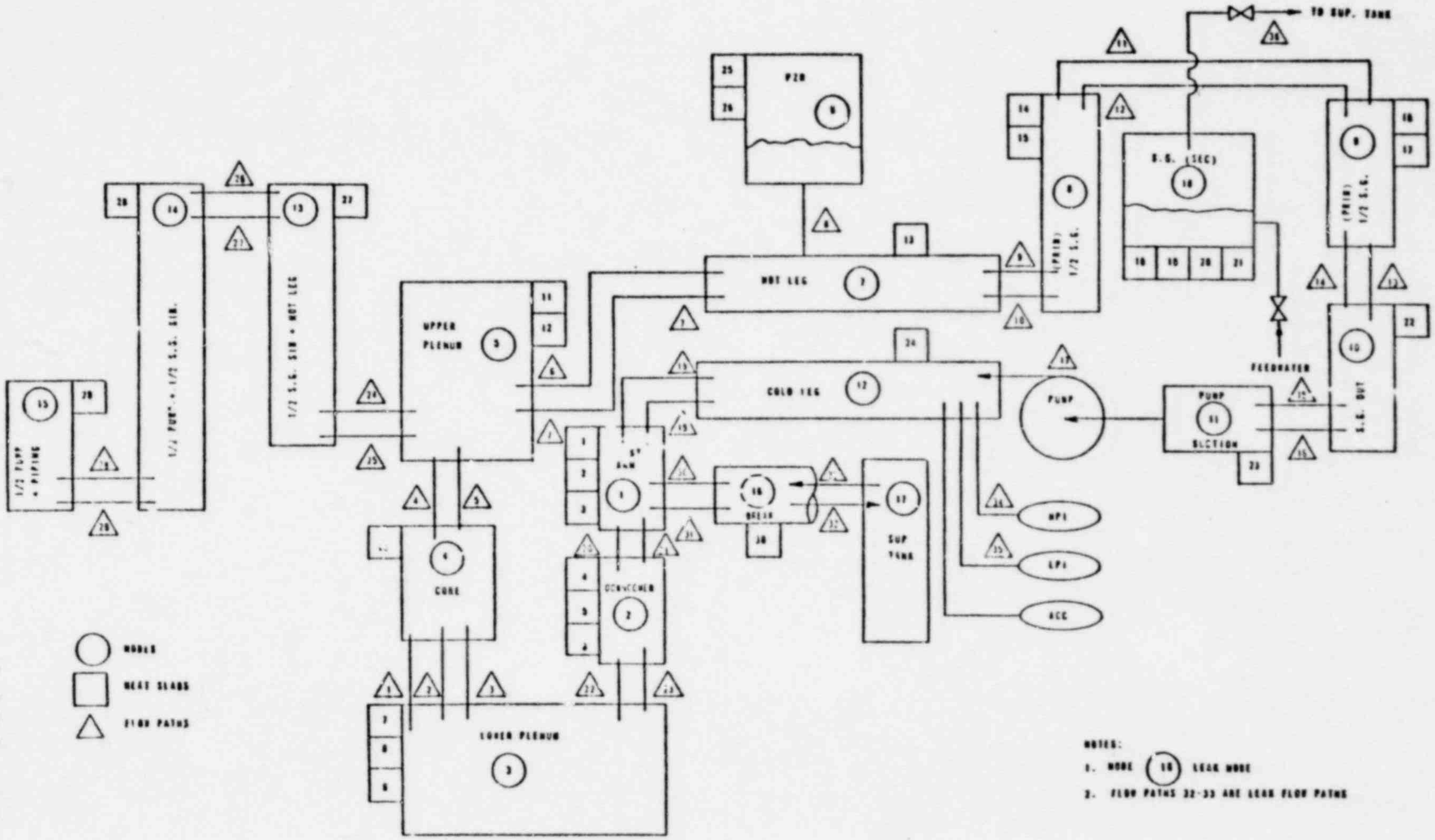
Table 5. (Cont'd)

POOR ORIGINAL

```
*
8001,1, 2.42, 2.03, 1.82, 1.61, 1.48, 1.40, 1.35, 1.30, 1.21, 1.11, 1.00
8002,2, 1.00, 0.70, 0.47, 0.33, 0.28, 0.24, 0.13,-0.05,-0.30,-0.60,-1.00
8003,3,-1.00,-0.98,-0.94,-0.88,-0.79,-0.68,-0.51,-0.28, 0.0 , 0.40, 1.00
8004,4, 1.00, 0.85, 0.83, 0.85, 0.89, 0.93, 1.21, 1.29, 1.52, 1.92, 2.42
8005,5, 1.98, 1.40, 1.04, 0.80, 0.67, 0.60, 0.63, 0.73, 0.83, 0.91, 1.00
8006,6, 0.33, 0.21, 0.07,-0.26,-0.36,-0.47,-0.70,-0.92,-0.95,-0.98,-1.00
8007,7,-1.00,-0.98,-0.95,-0.92,-0.88,-0.68,-0.47,-0.26, 0.30, 0.63, 1.00
8008,8, 0.33, 0.53, 0.73, 0.93, 1.08, 1.25, 1.39, 1.52, 1.66, 1.81, 1.98
*
* PUMP ELECTRIC TORQUE VS ACTUAL PUMP SPEED
*
8016,350.8,0.0,350.8,3062.5
*
* PUMP SHUTDOWN PARAMETERS
*
8021,0.0, 1.-8, 0.0, 750.0, 0.0, 0.0, 0.0
*
* PUMP PARAMETERS
*
8031,17,332.0,455.59,3530.0,10000.0,0.788,3062.5
*
* PUMP MOTOR CONSTANTS
*
8041,0.003,14.455,152.994,0.0,0.0,972.694,386.971,-1777.01,
+    0.0,0.0,34.0,1.0
*
* FILL SYSTEM ACTUATION PARAMETERS
*
10001,0.0,1910.7,6,7
*
* FILL SYSTEM TIME DELAYS
*
10011,1.+6,0.0,1.+6
10012,1.+6,0.0,1.+6
*
* FILL FLOW VS BACK PRESSURE TABLE
*
10021,12.0,0.0,12.0,14.7, 5.0,1214.7, 5.0,3000.0
10026,110.5,0.0,110.5,14.7,68.0,144.7,0.0,145.0,0.0,3000.0
*
* FLOOD TANKS
*
10060,12,62.23,4741.93,59.62,42.8,615.0,2.5,125.1,13.06,560.6
10061,24.174,22.0,22.0,13.57,527.4,24.8,0.0645,0,0.0
*
```

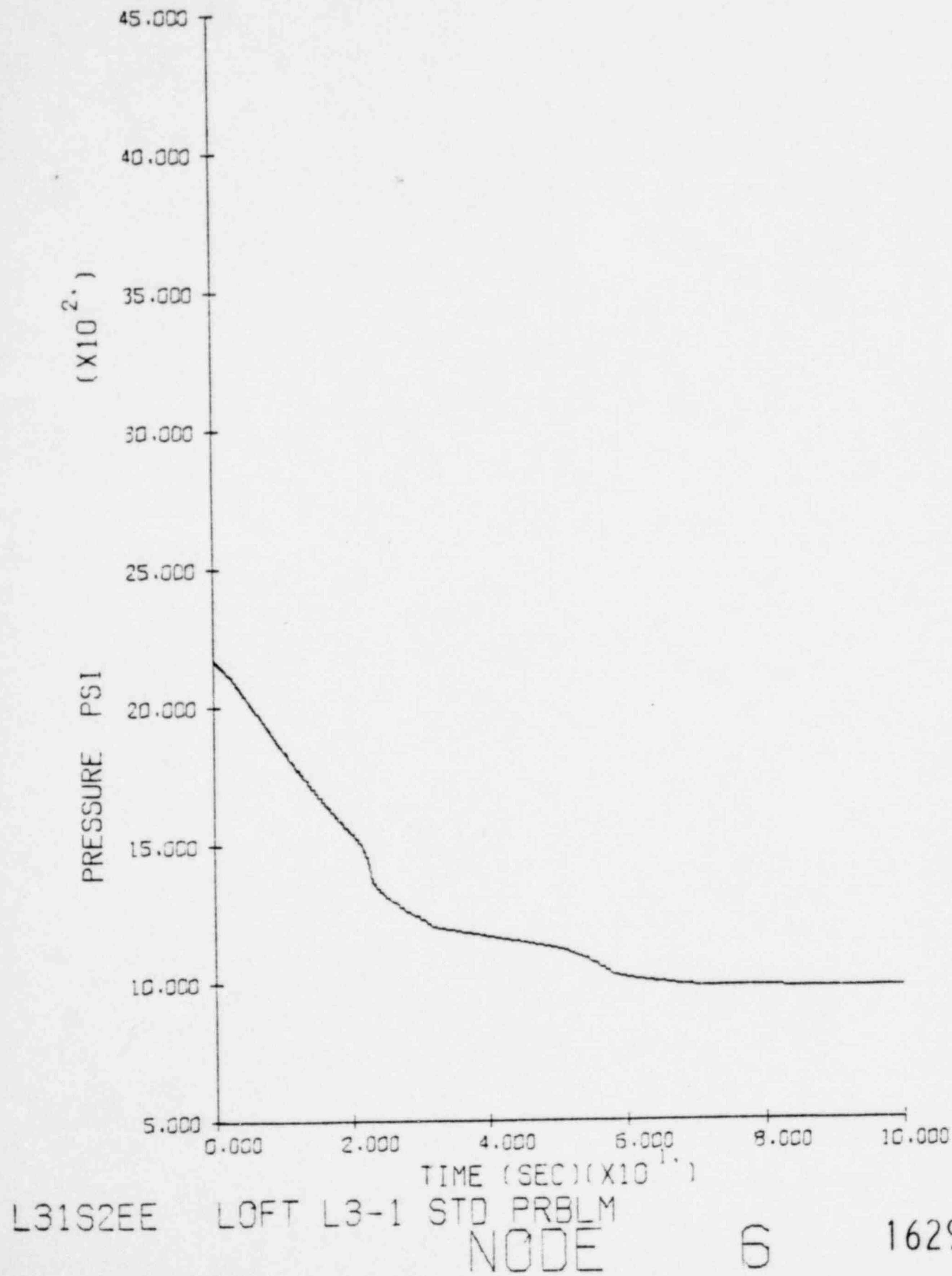
1629 050

Figure 1. LOFT L3-1 Diagram



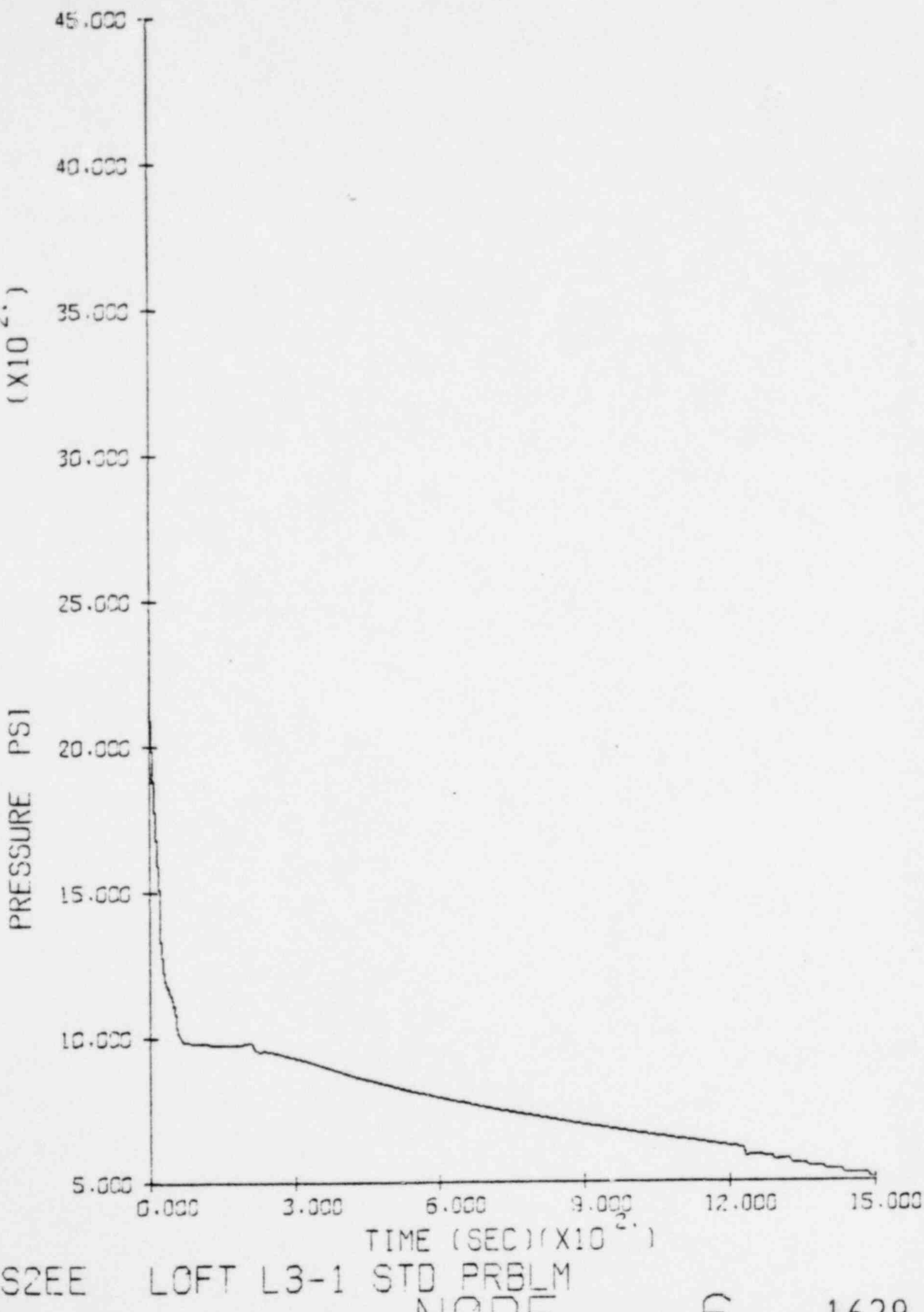
1629 051

Figure 2 - Pressure, Pressurizer (0 to 100 sec.)



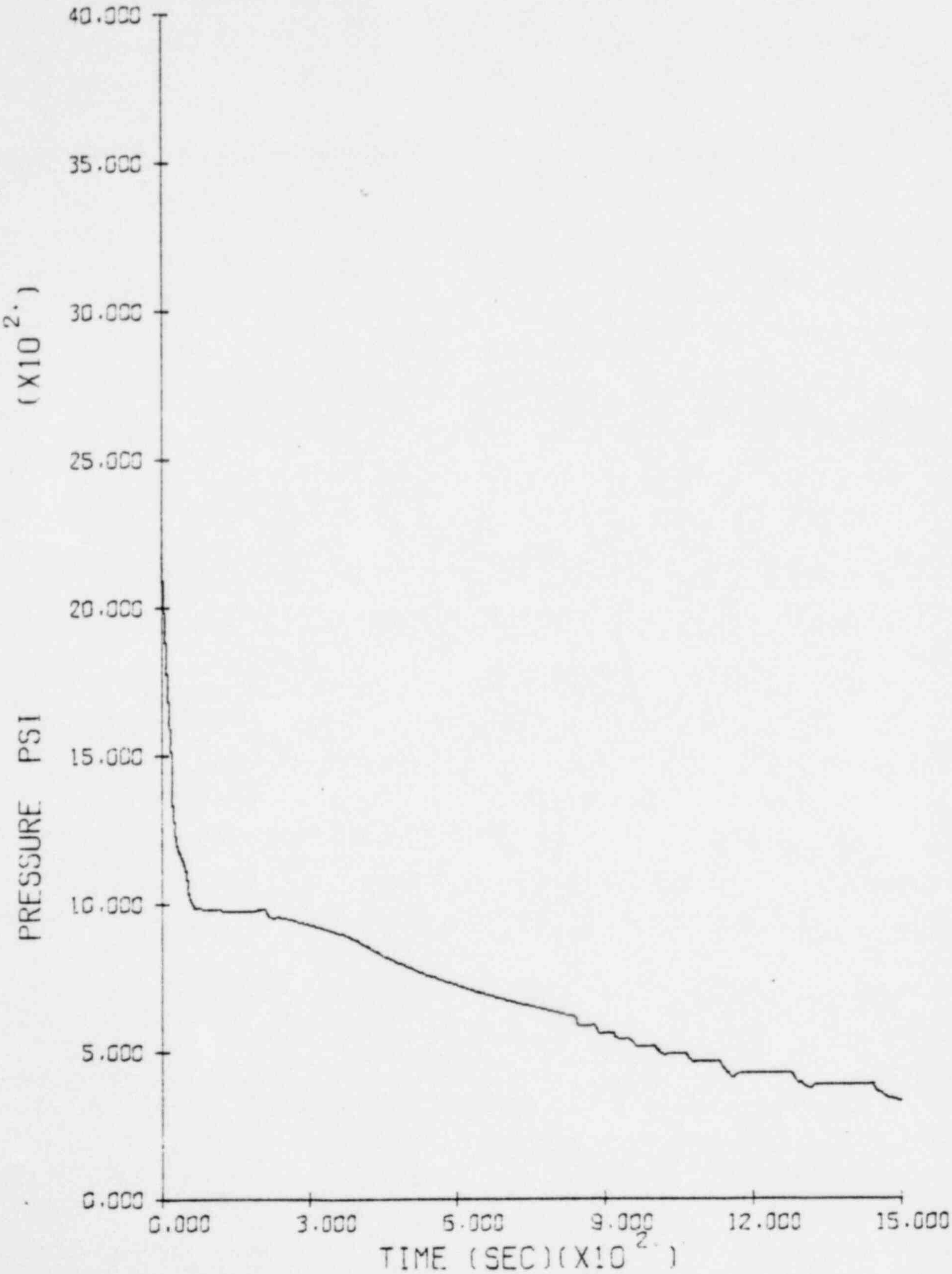
1629 052

Figure 3 - Pressure, Pressurizer (C_D = 0.6)



1629 053

Figure 4 - Pressure, Pressurizer (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM

NODE 6

1629 054

Figure 5 - Pressure, Broken Loop Hot Leg Near Break (0 to 100 sec.)

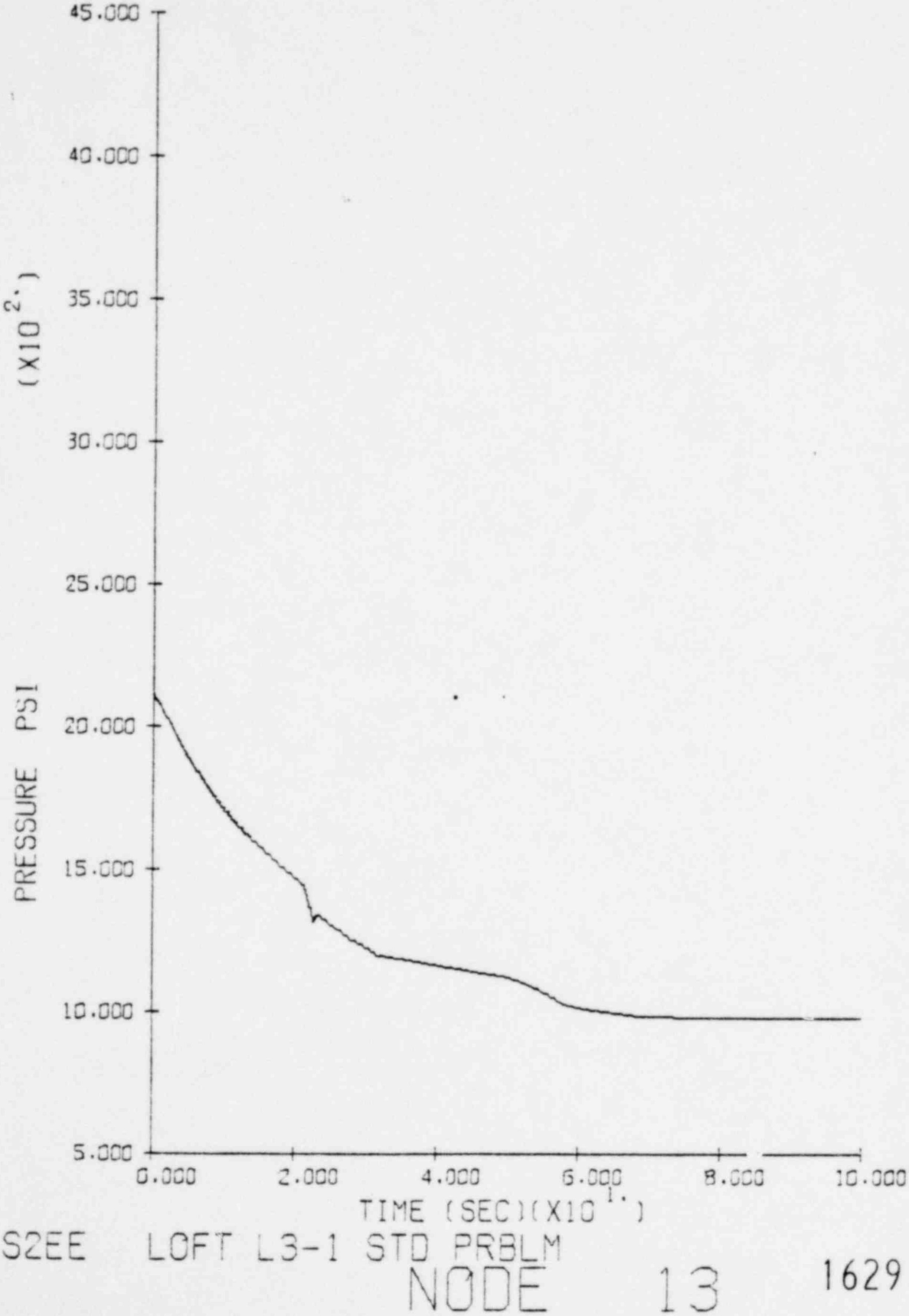


Figure 6 - Pressure, Broken Loop Hot Leg Near Break ($C_D = 0.6$)

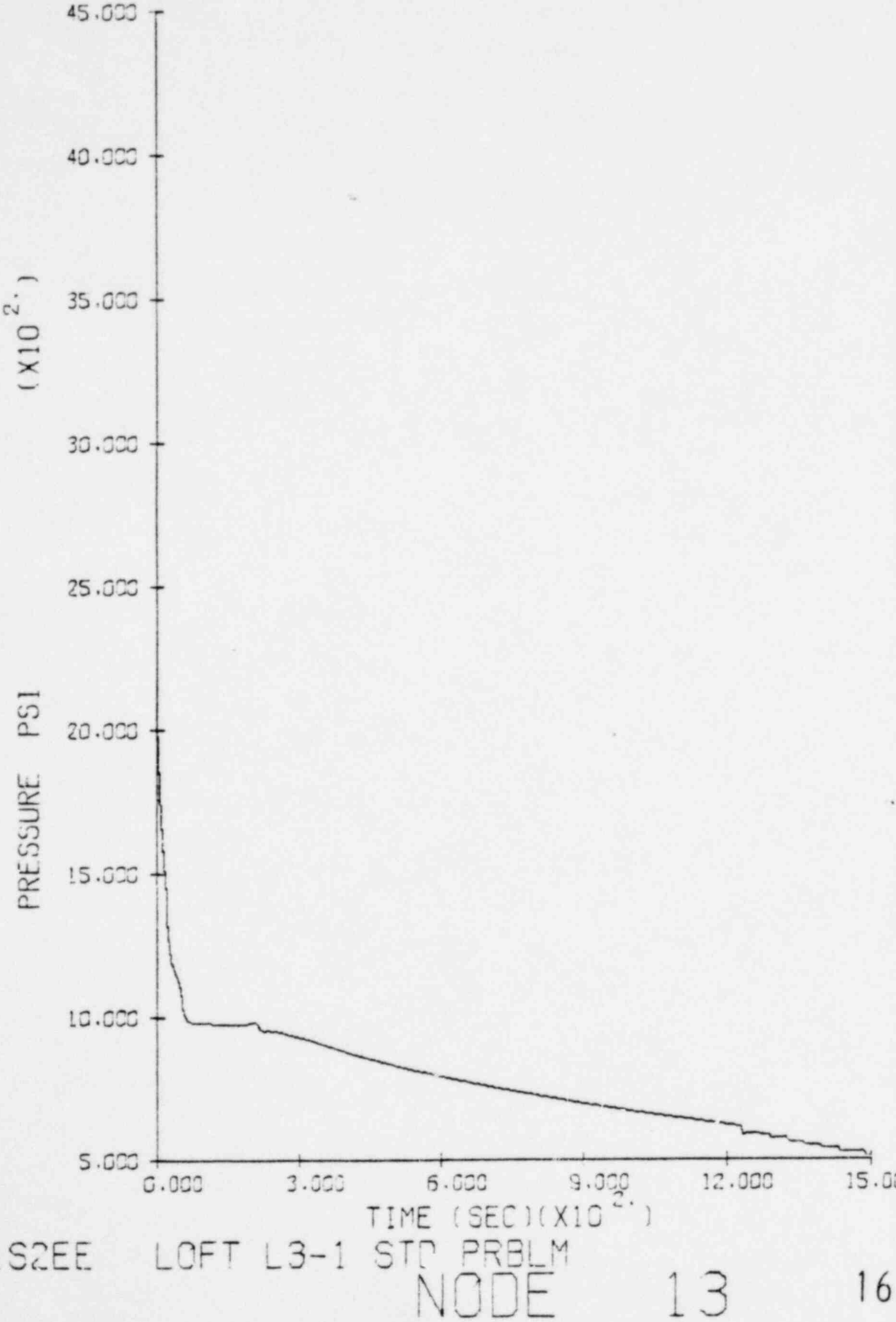
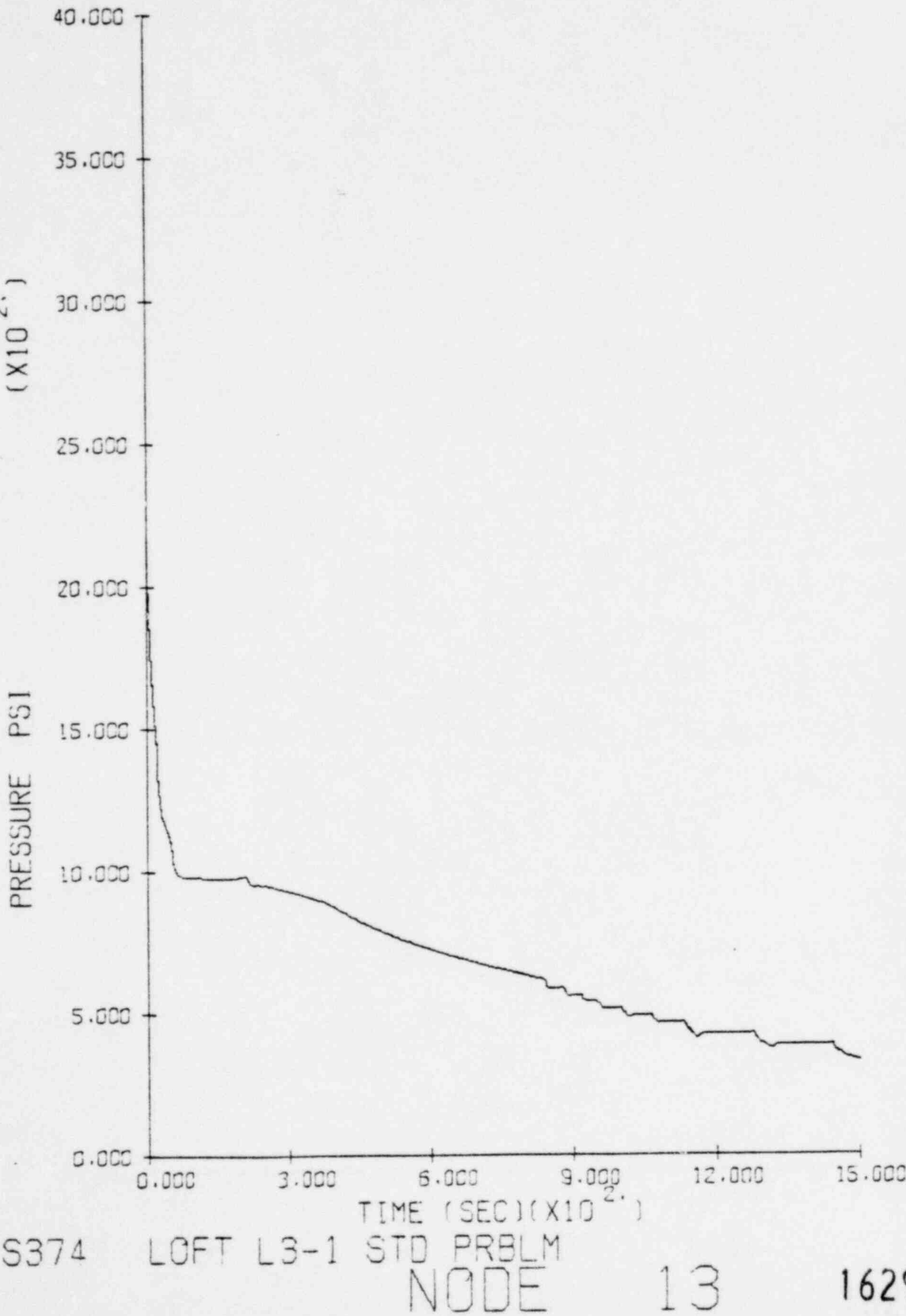
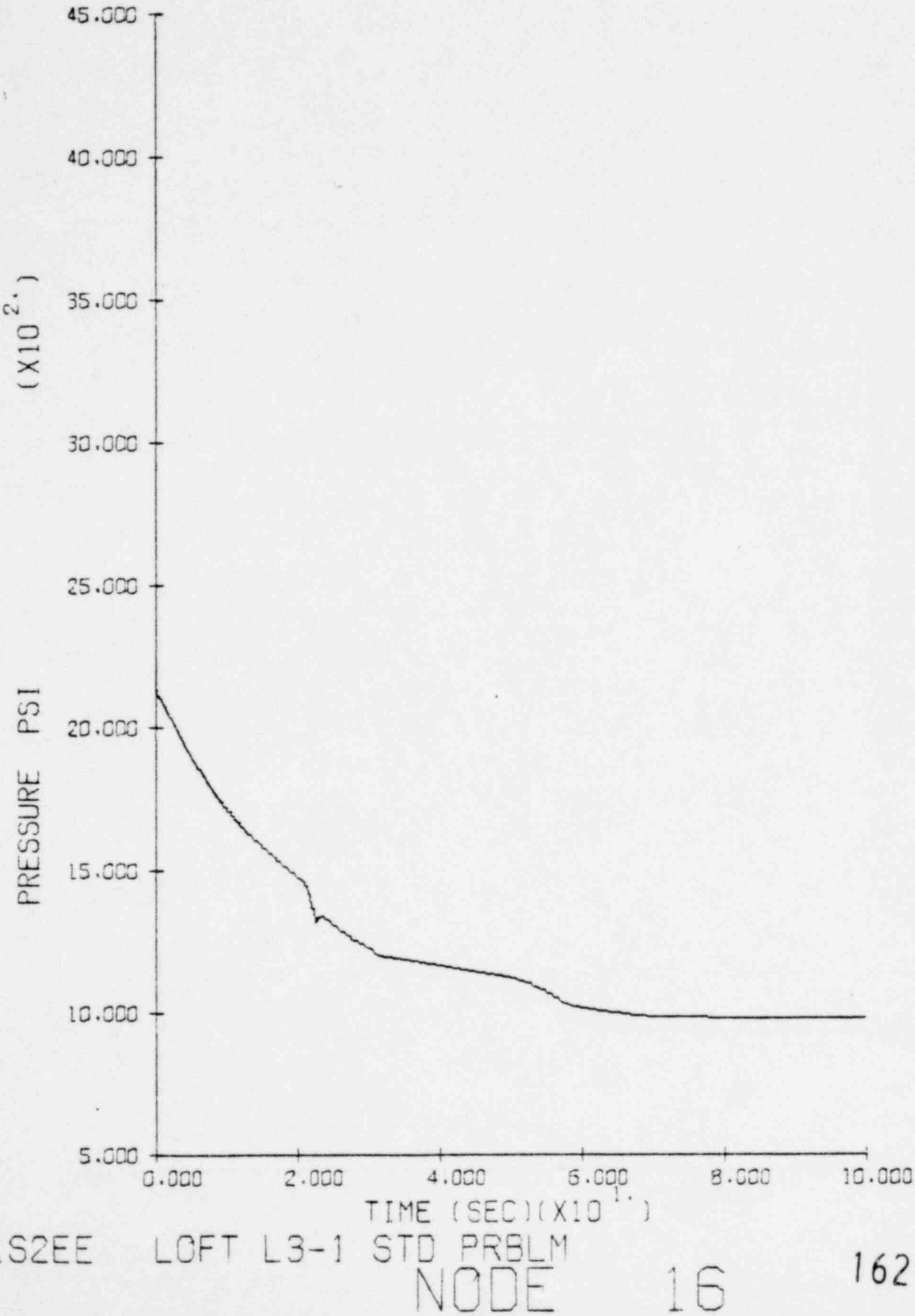


Figure 7 - Pressure, Broken Loop Hot Leg Near Break (C_D = 0.9)



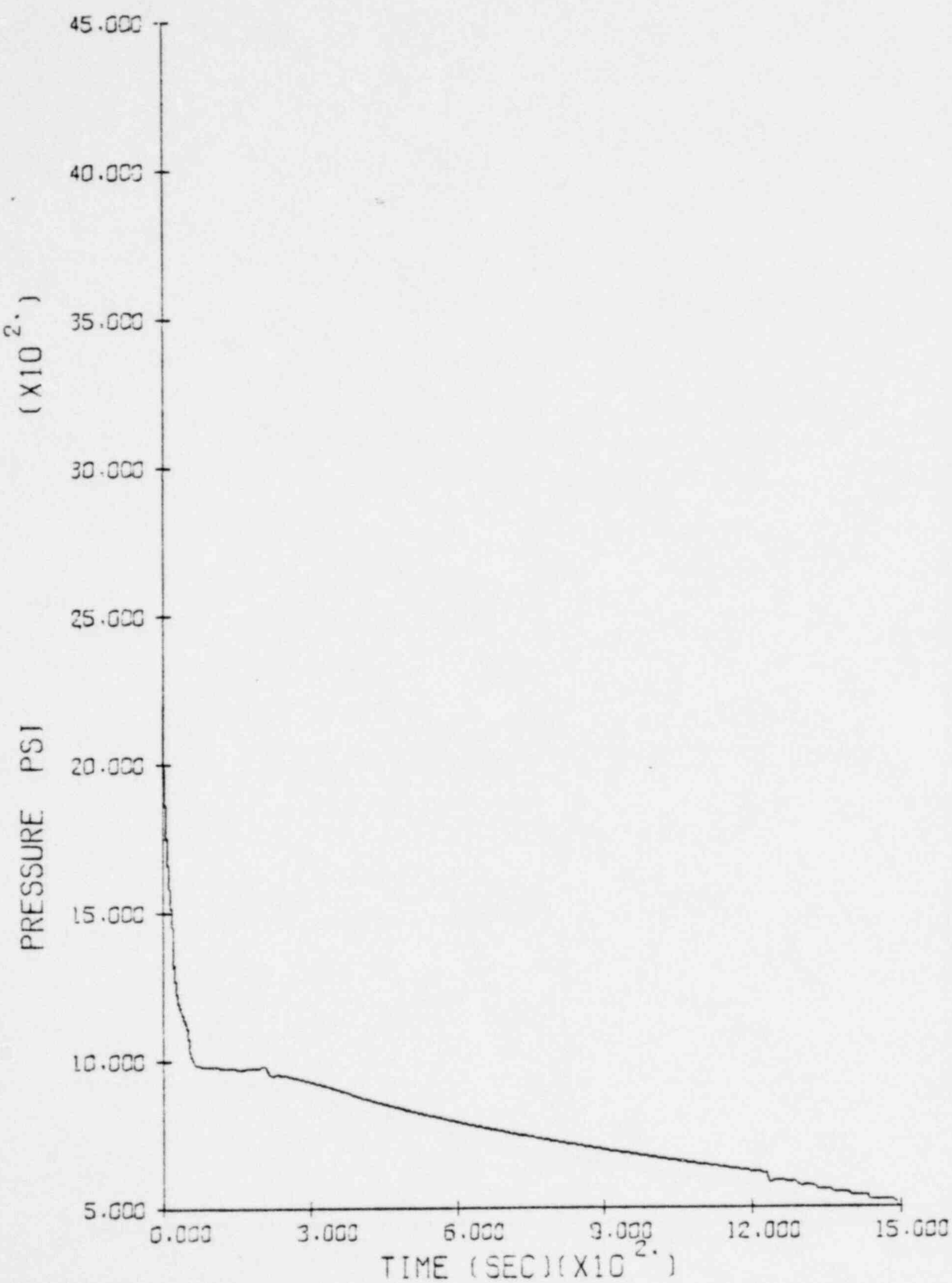
1629 057

Figure 8 - Pressure, Broken Loop Cold Leg Near Break (0 to 100 sec.)



1629 058

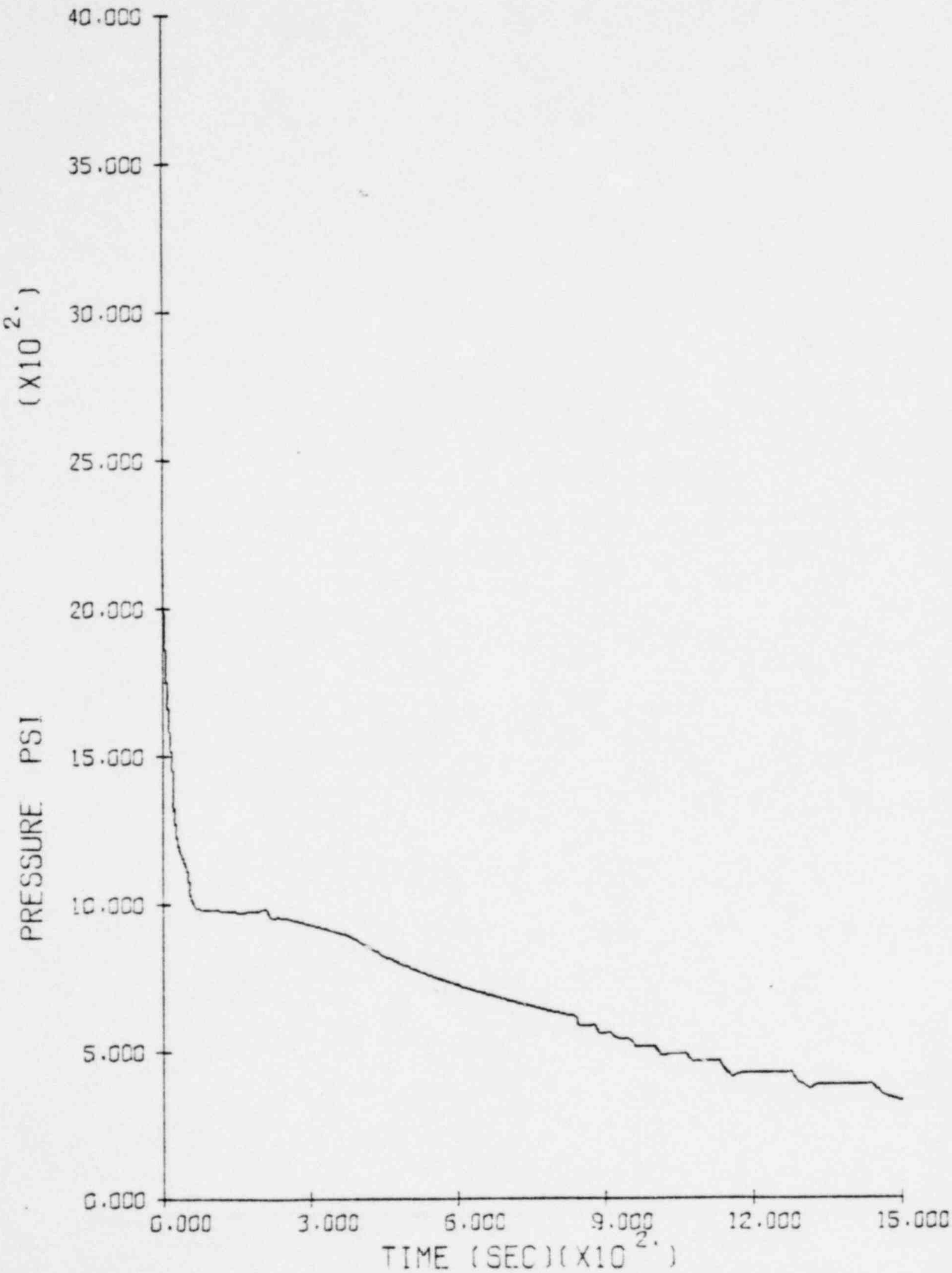
Figure 9 - Pressure, Broken Loop Cold Leg Near Break (C_D = 0.6)



L31S2EE LOFT L3-1 STD PRBLM

NODE 16

Figure 10 - Pressure, Broken Loop Cold Leg Near Break (C_D = 0.9)

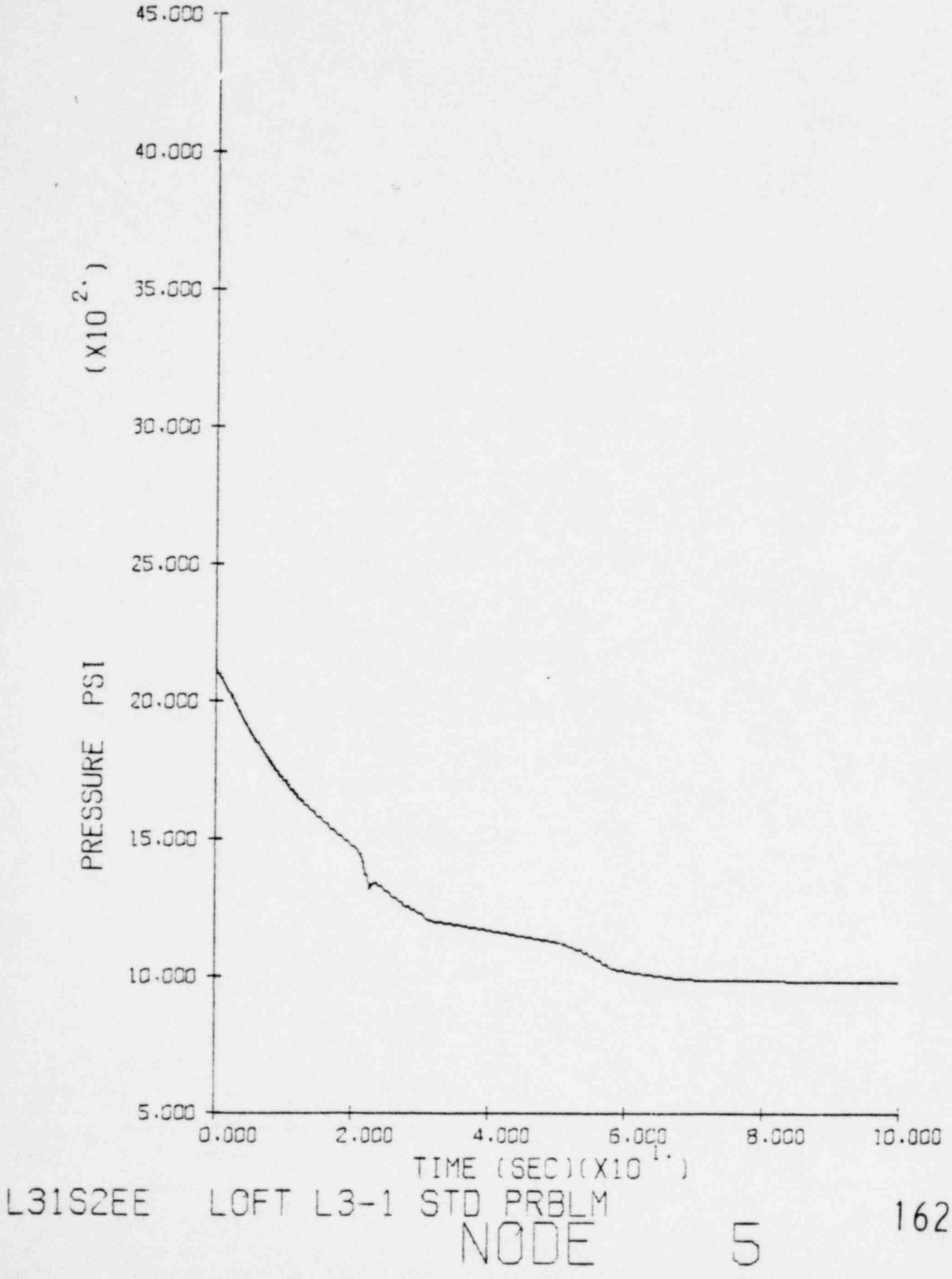


L31S374 LOFT L3-1 STD PRBLM

NODE 16

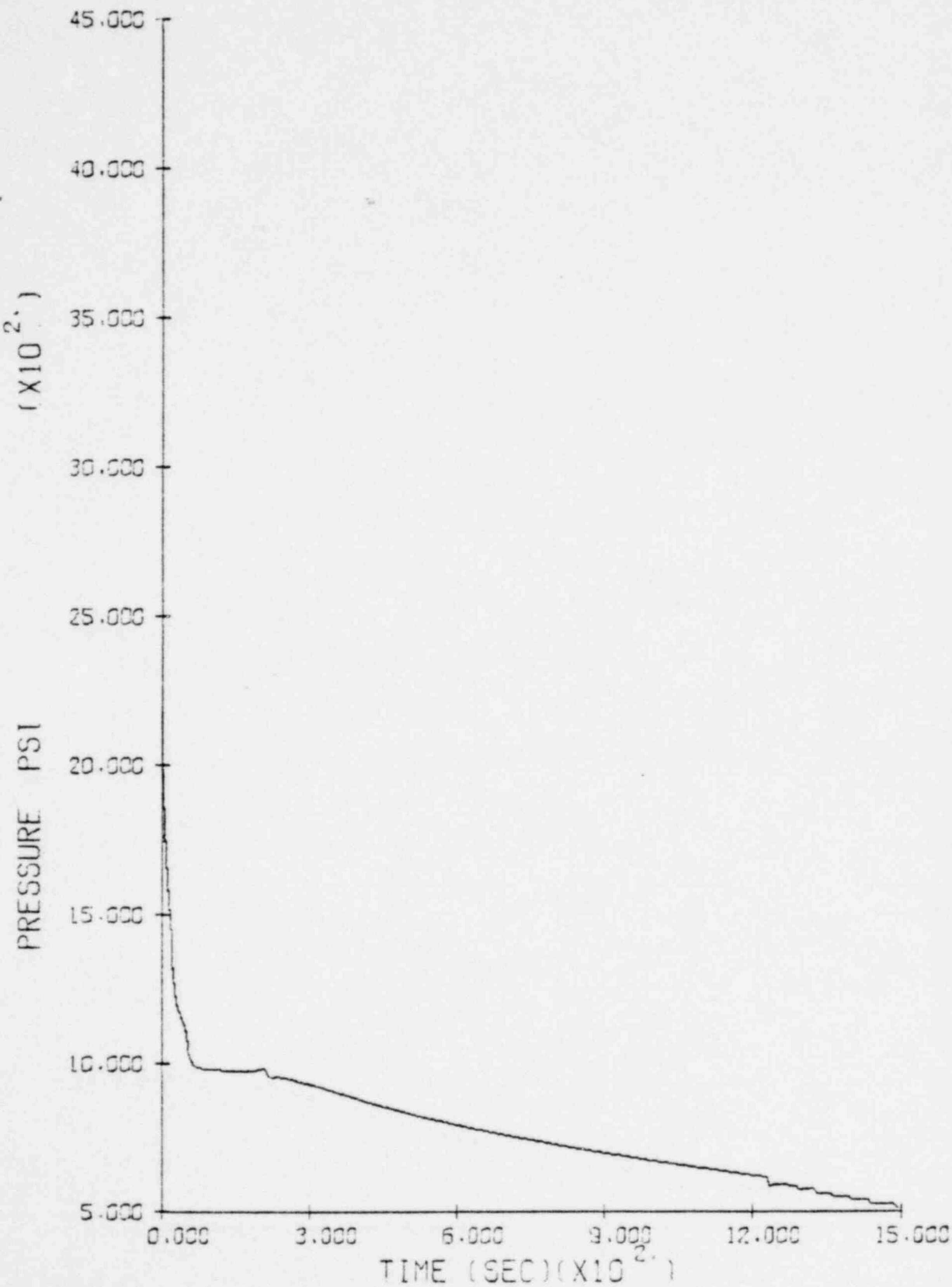
1629 0..

Figure 11 - Pressure, Upper Plenum (0 to 100 sec.)



1629 0·1

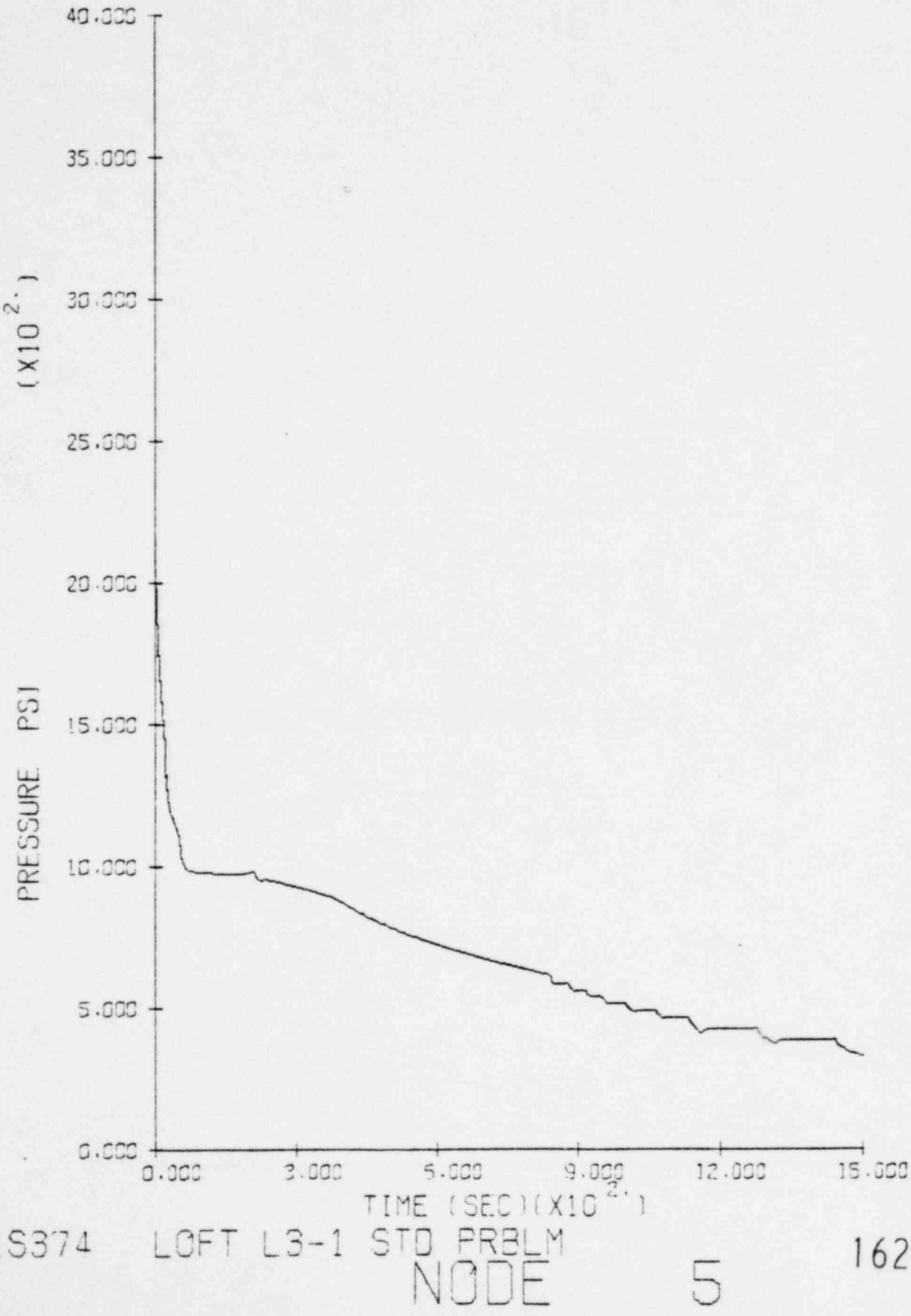
Figure 12 - Pressure, Upper Plenum (C_D = 0.6)



L31S2EE LOFT L3-1 STD PRBLM

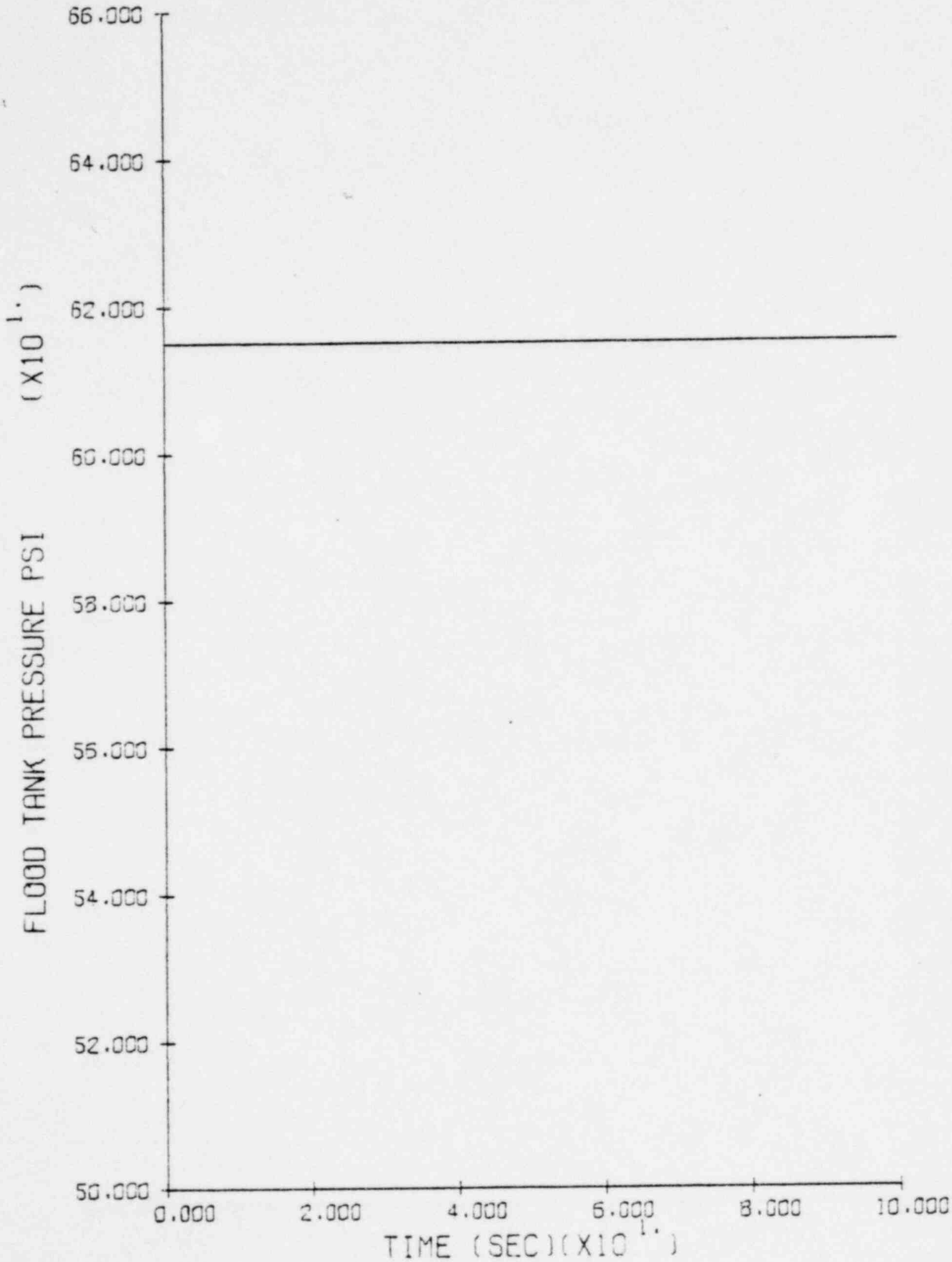
NODE 5

Figure 13 - Pressure, Upper Plenum (C_D = 0.9)



1629 063

Figure 14 - Pressure, Accumulator, Intact Loop (0 to 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

FLOOD TANK 1

Figure 15 - Pressure, Accumulator, Intact Loop (C_D = 0.6)

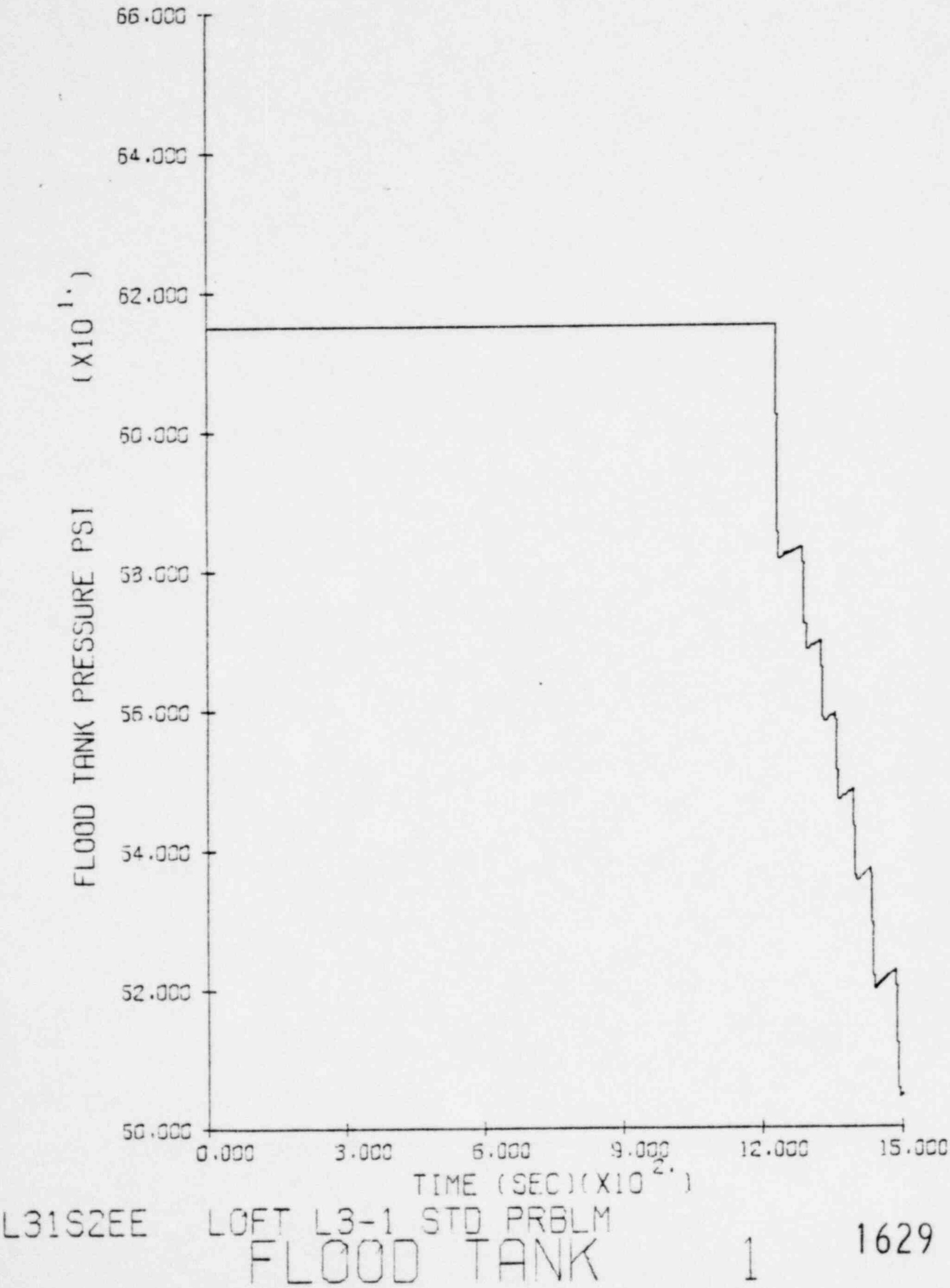
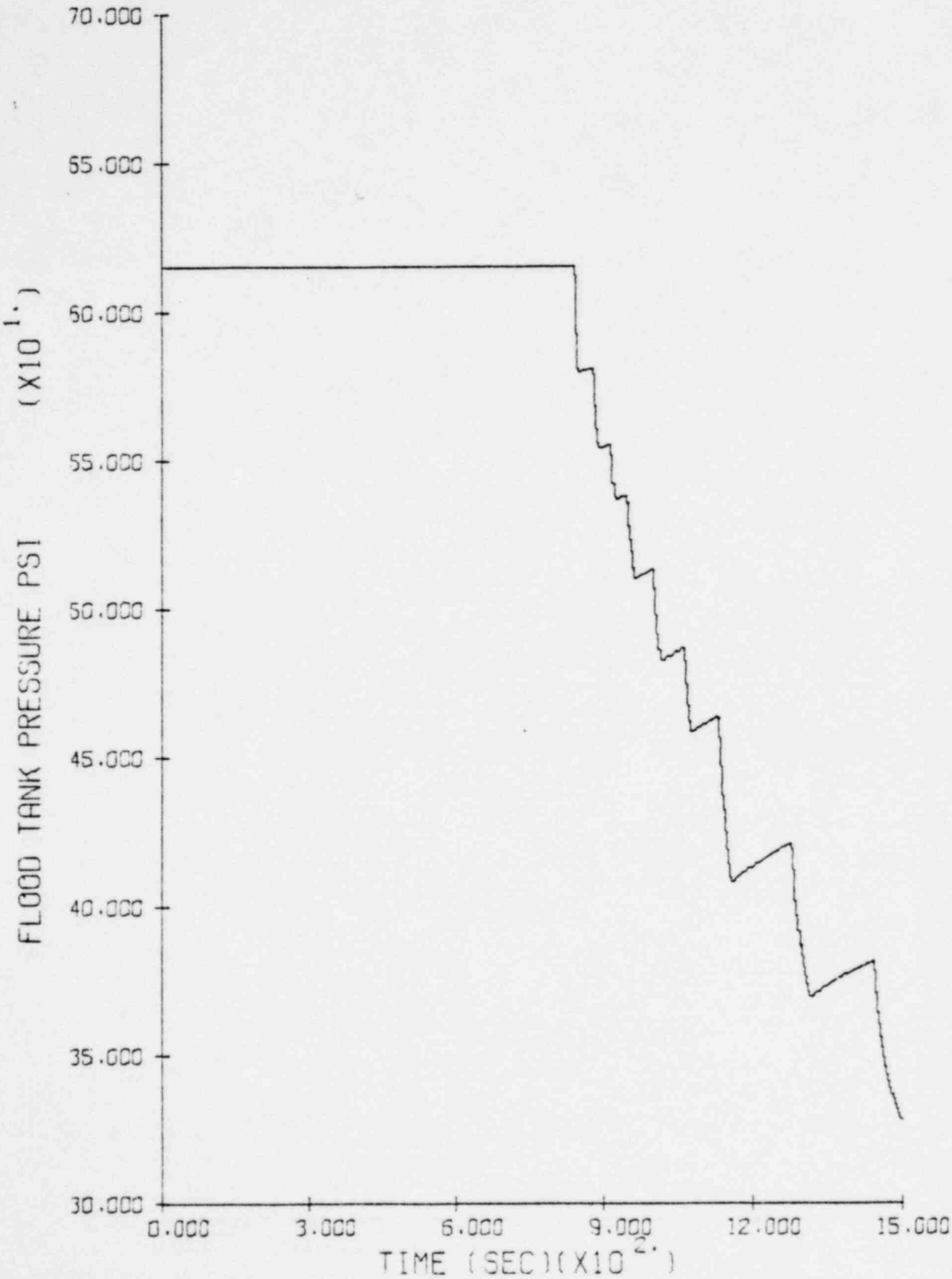


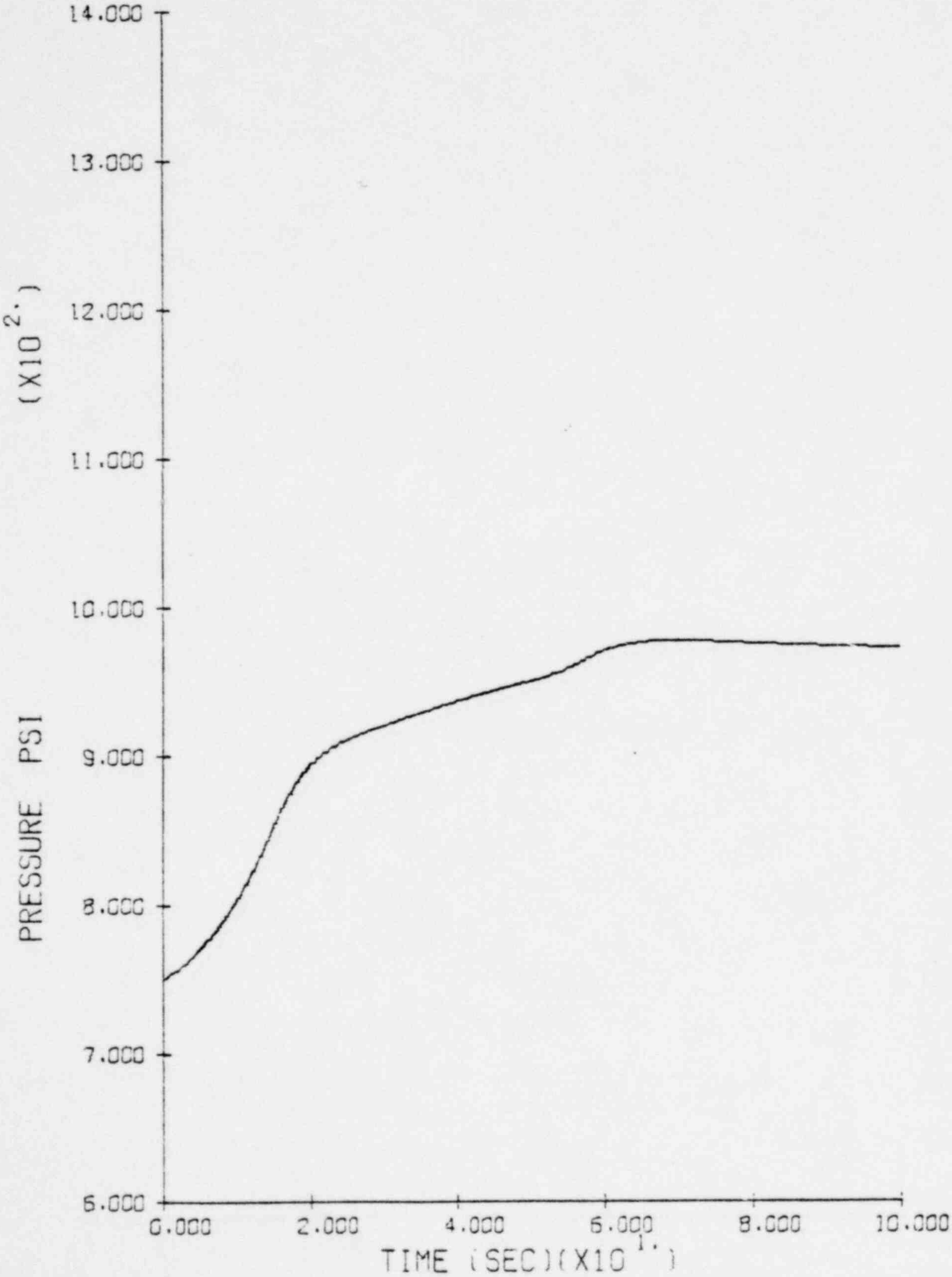
Figure 16 - Pressure, Accumulator, Intact Loop (0 to 0.9)



L31S374 LOFT L3-1 STD PRBLM

FLOOD TANK 1

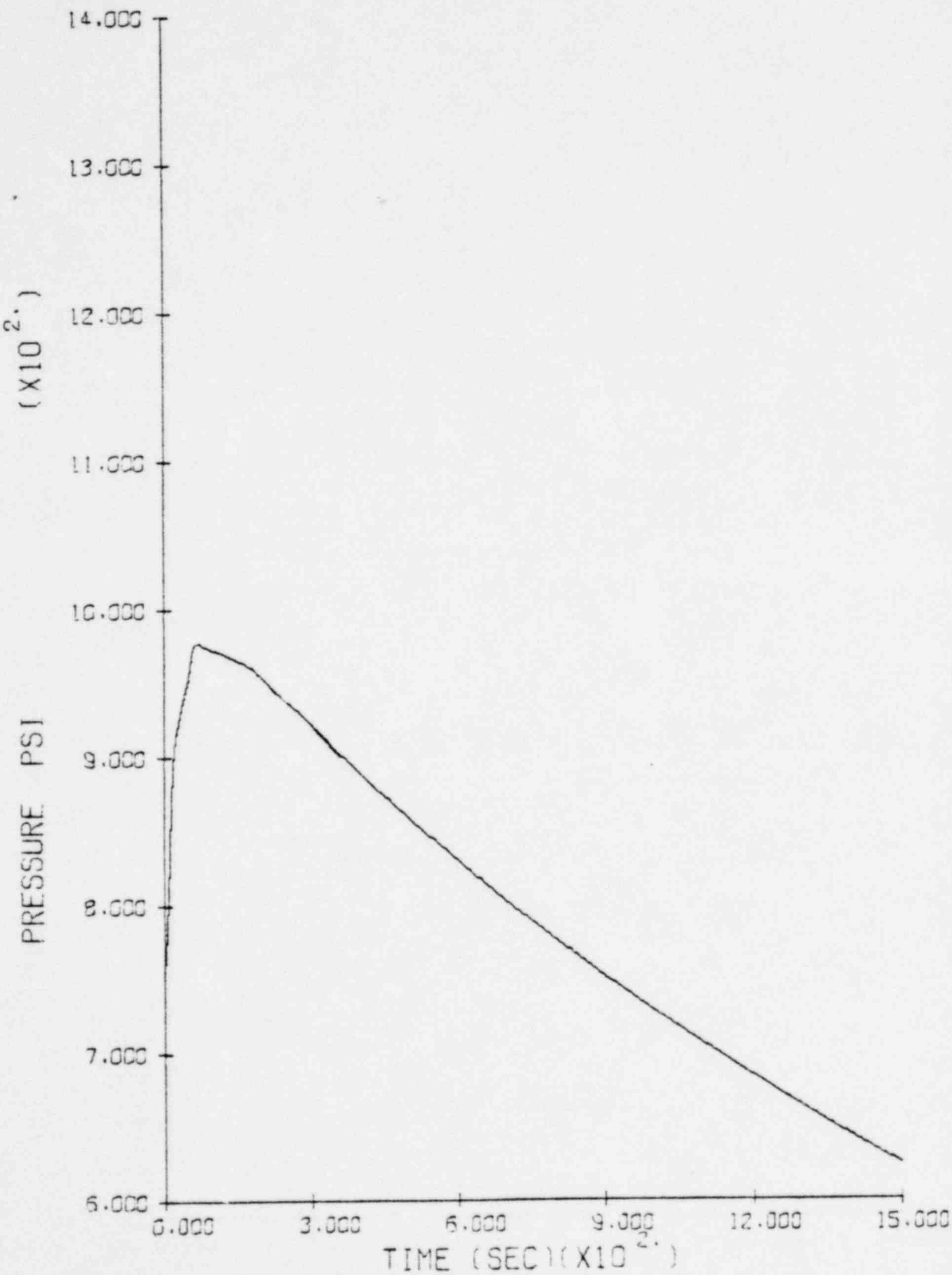
Figure 17 - Pressure, Steam Generator Secondary (0 to 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

NODE 18

Figure 18 - Pressure, Steam Generator Secondary (C_D = 0.6)

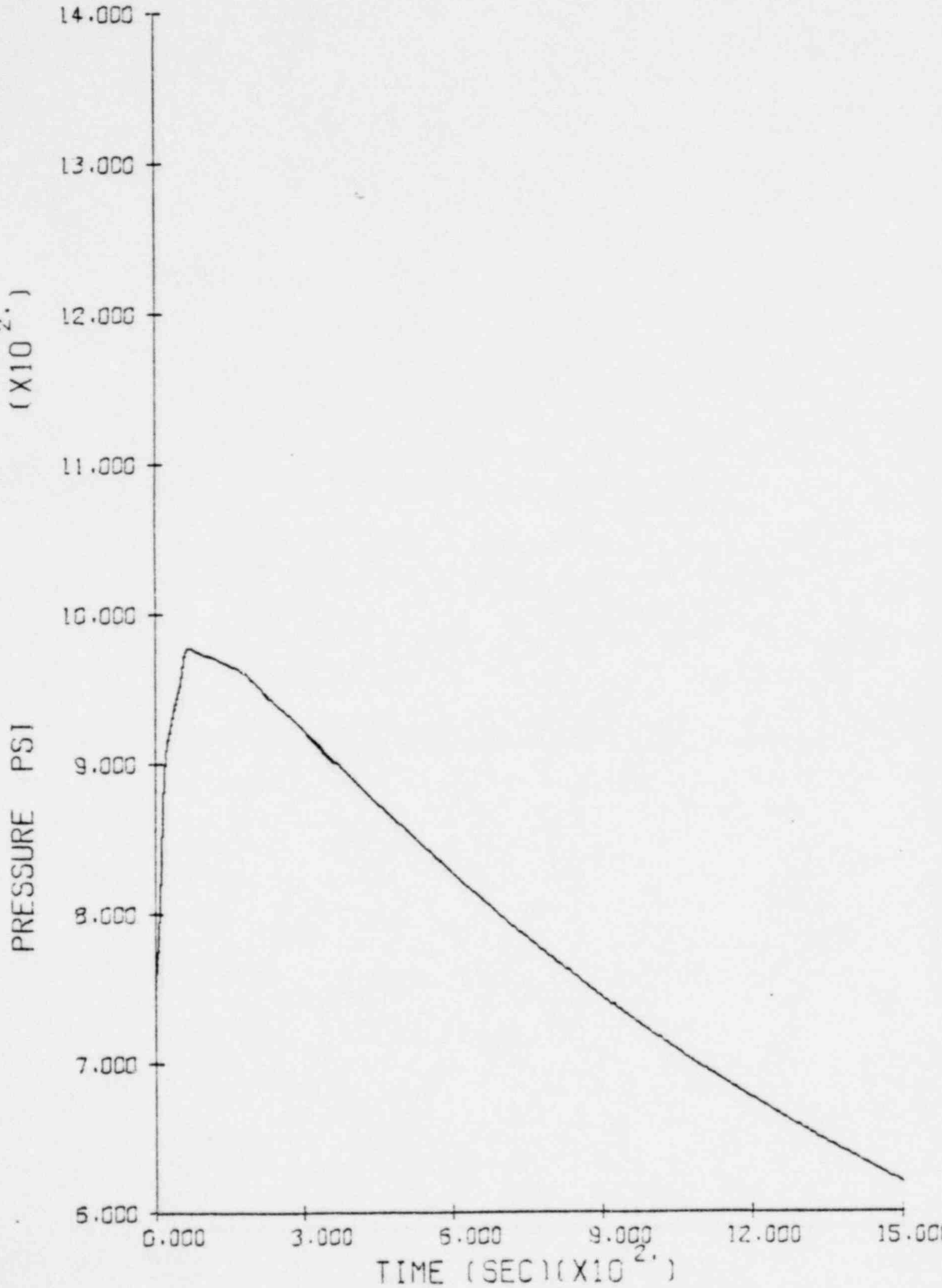


L31S2EE LOFT L3-1 STD PRBLM

NODE 18

1629 068

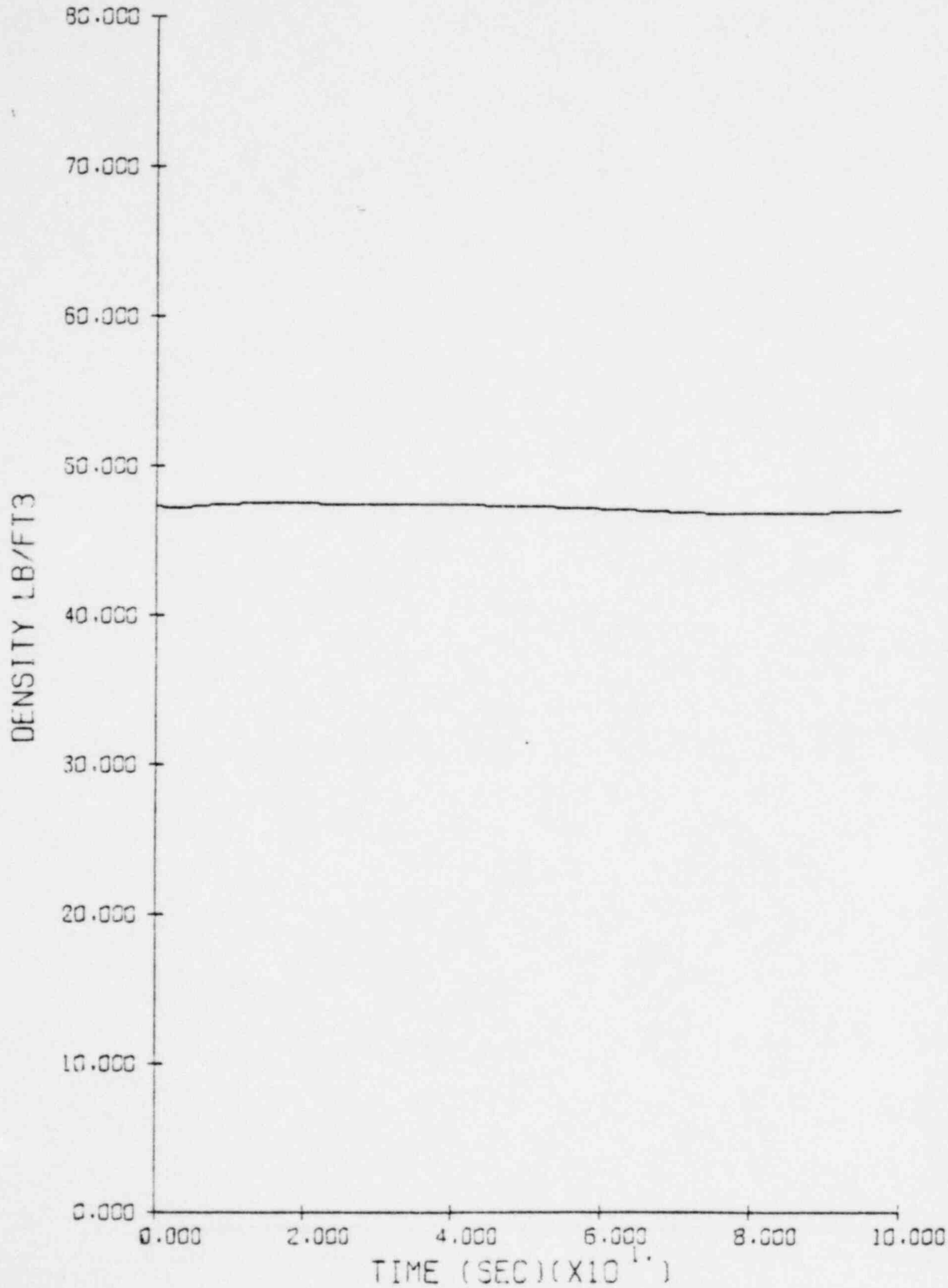
Figure 19 - Pressure, Steam Generator Secondary (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM

NODE 18

Figure 20 - Density, Intact Loop Cold Leg (0 to 100 sec.)

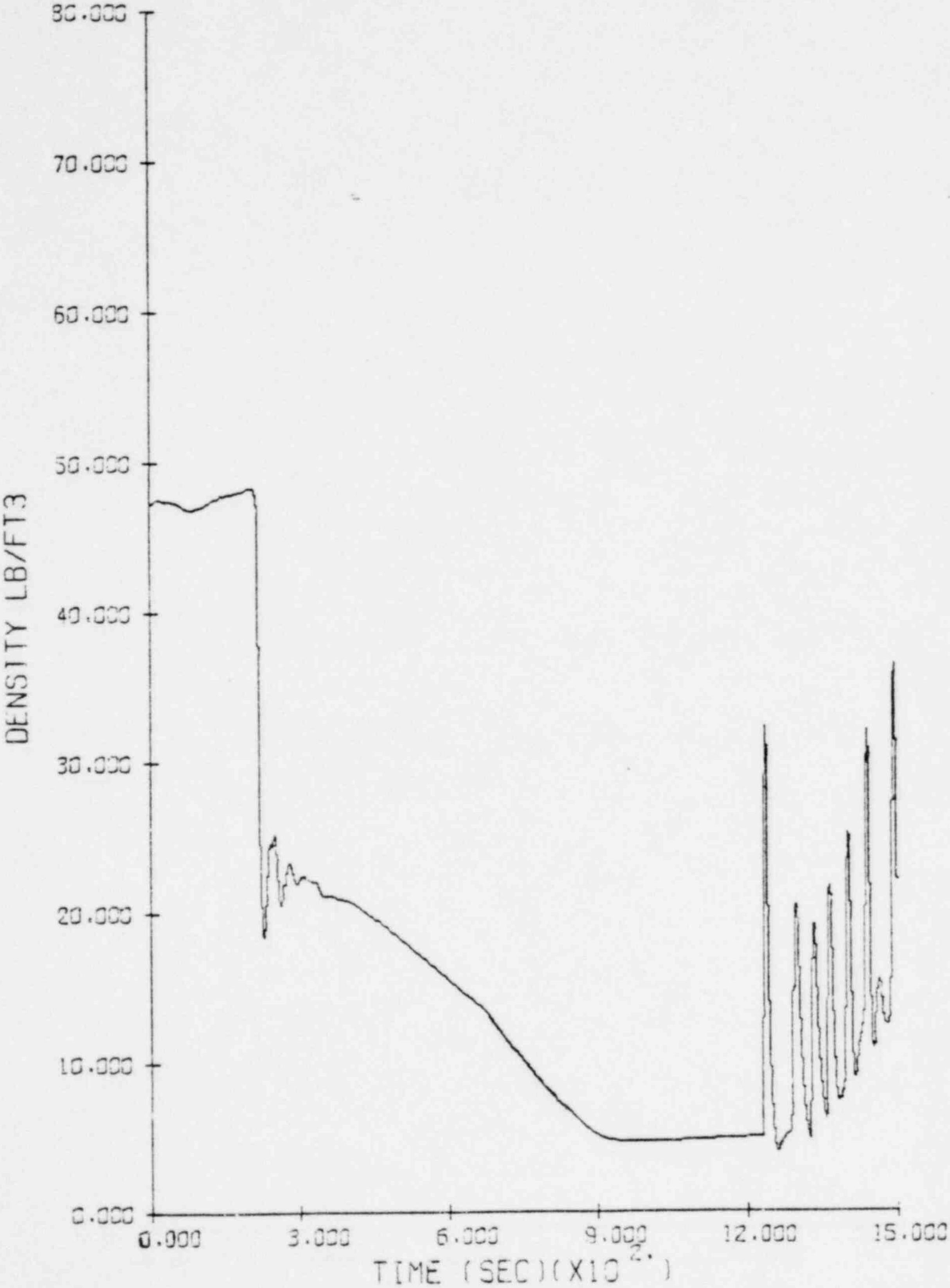


L31S2EE LOFT L3-1 STD PRBLM

NODE 12

1629 070

Figure 21 - Density, Intact Loop Cold Leg (C_D = 0.6)

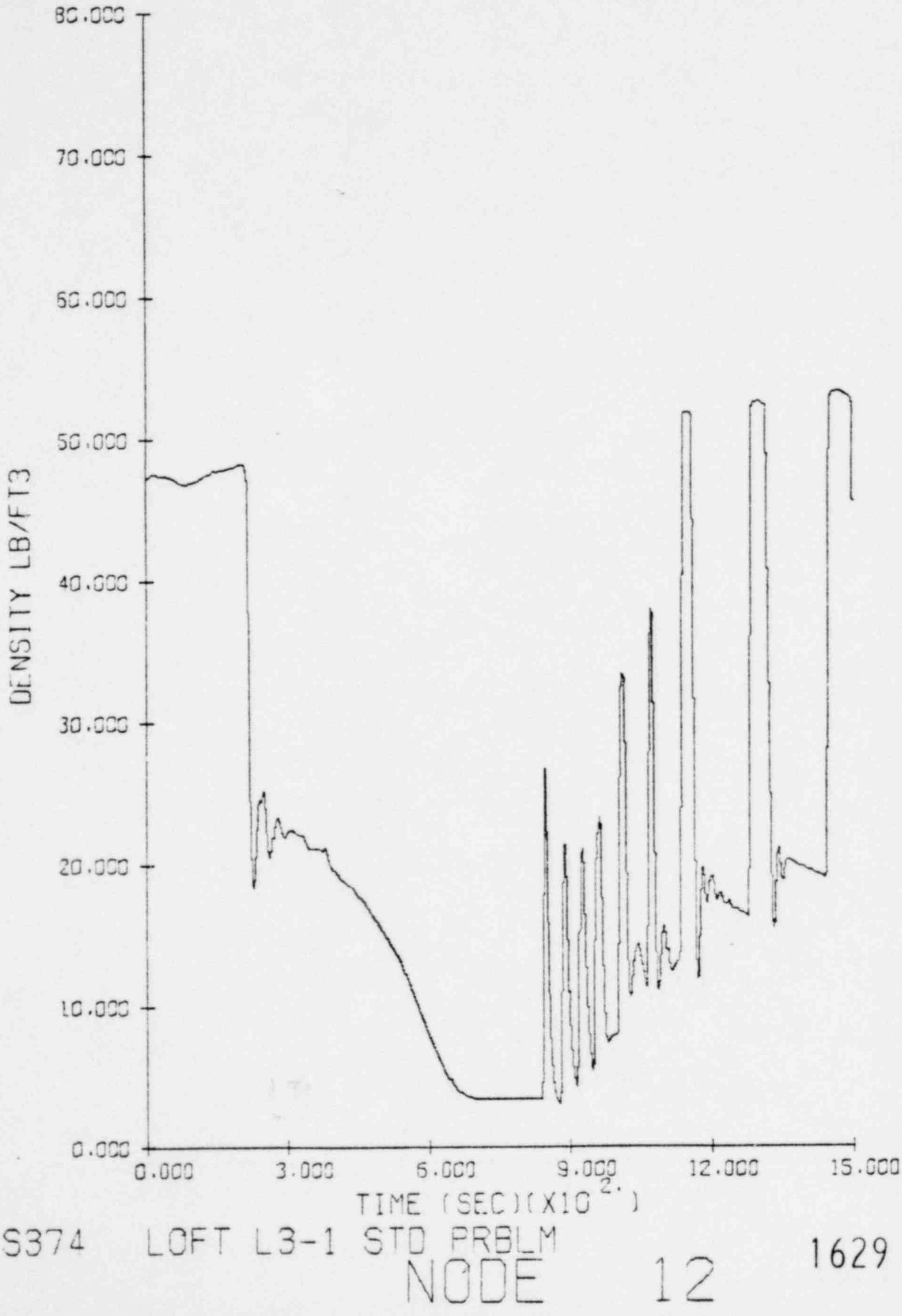


L31S2EE LOFT L3-1 STD PRBLM

NODE 12

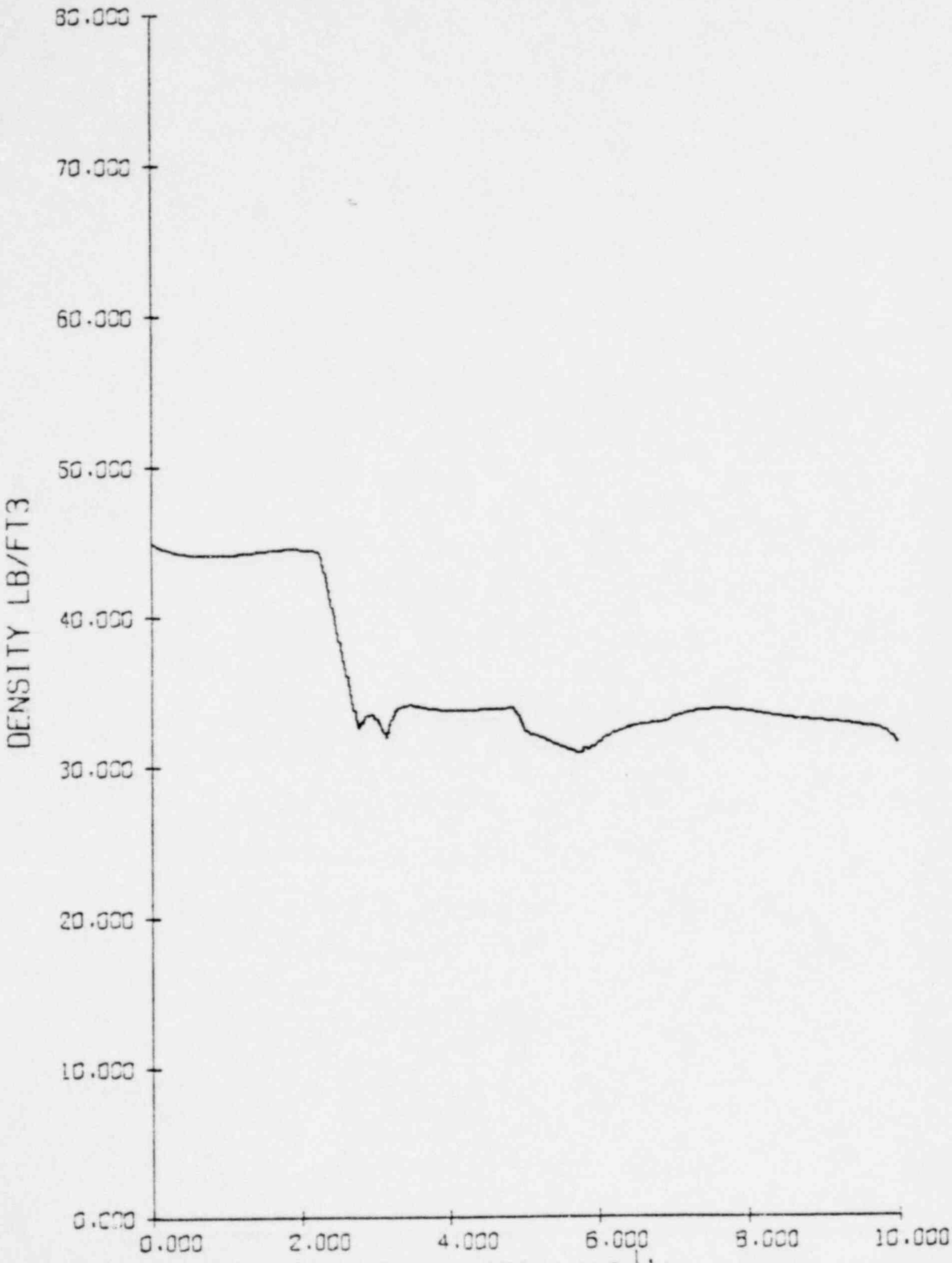
1629 071

Figure 22 - Density, Intact Loop Cold Leg (C_D = 0.9)



1629 072

Figure 23 - Density, Intact Loop Hot Leg (0 to 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

NODE 7

Figure 24 - Density, Intact Loop Hot Leg (C_D = 0.6)

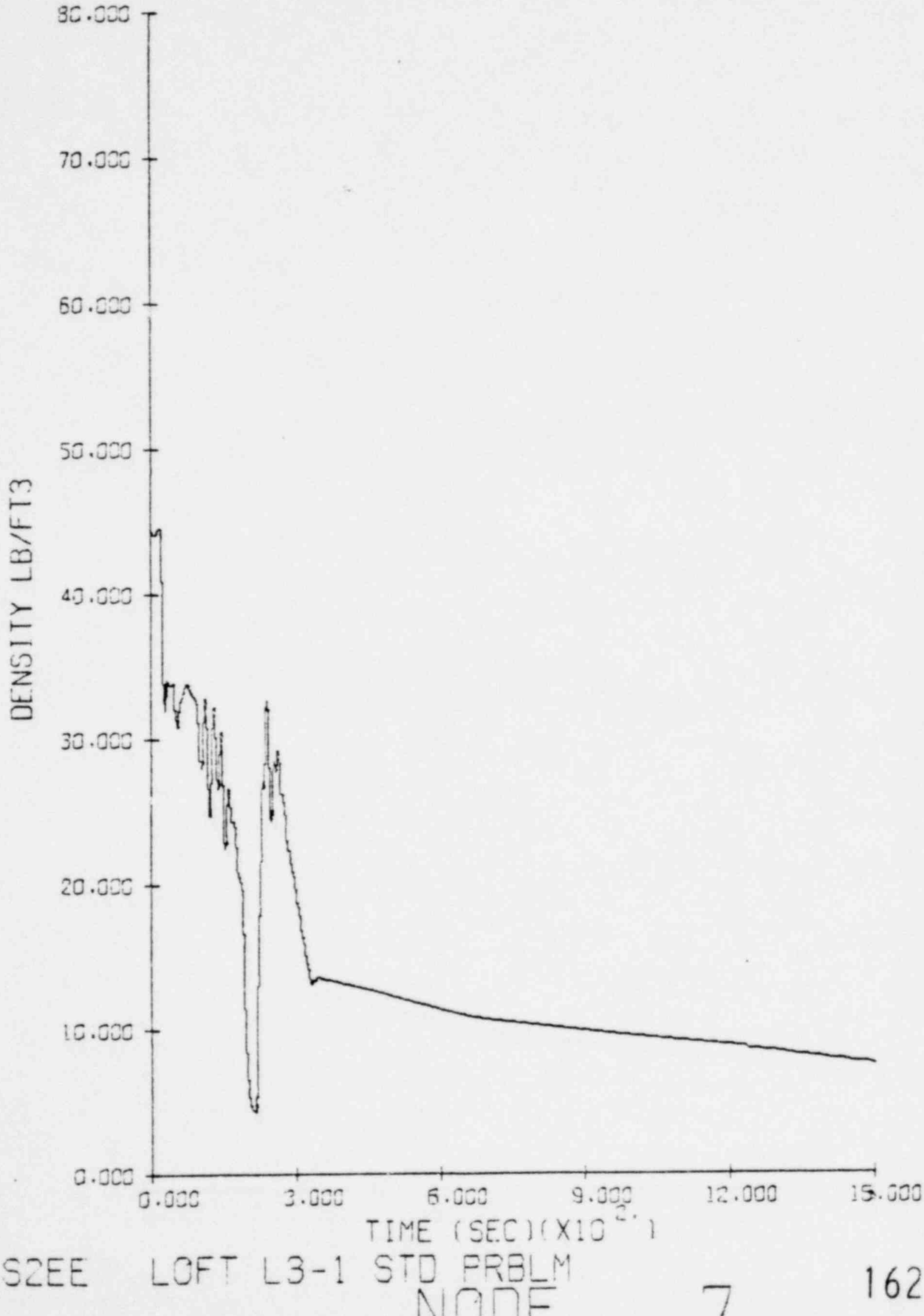
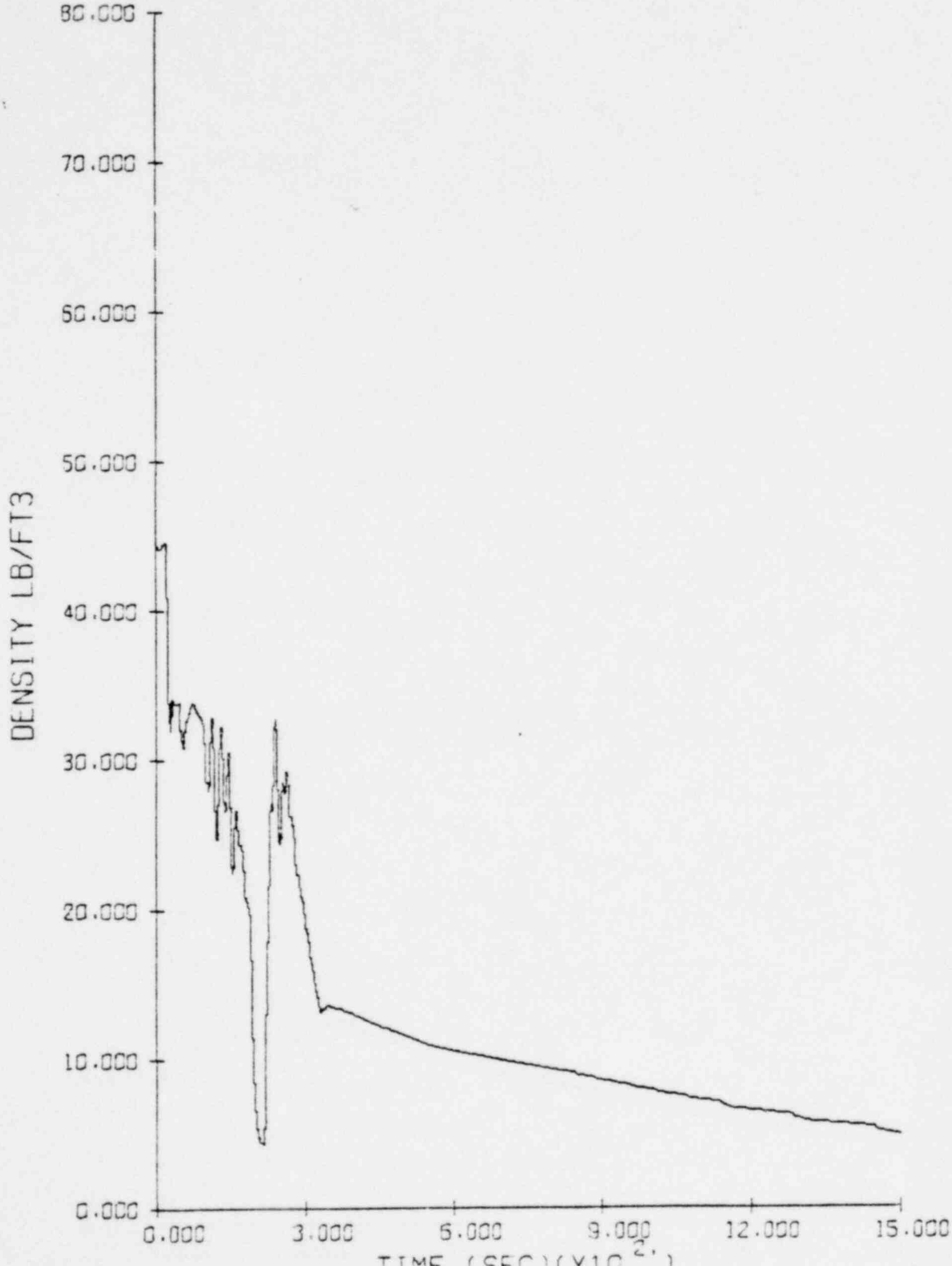


Figure 25 - Density, Intact Loop Hot Leg ($C_D = 0.9$)



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NODE 7

Figure 26 - Density, Broken Loop Cold Leg (0 to 100 sec.)

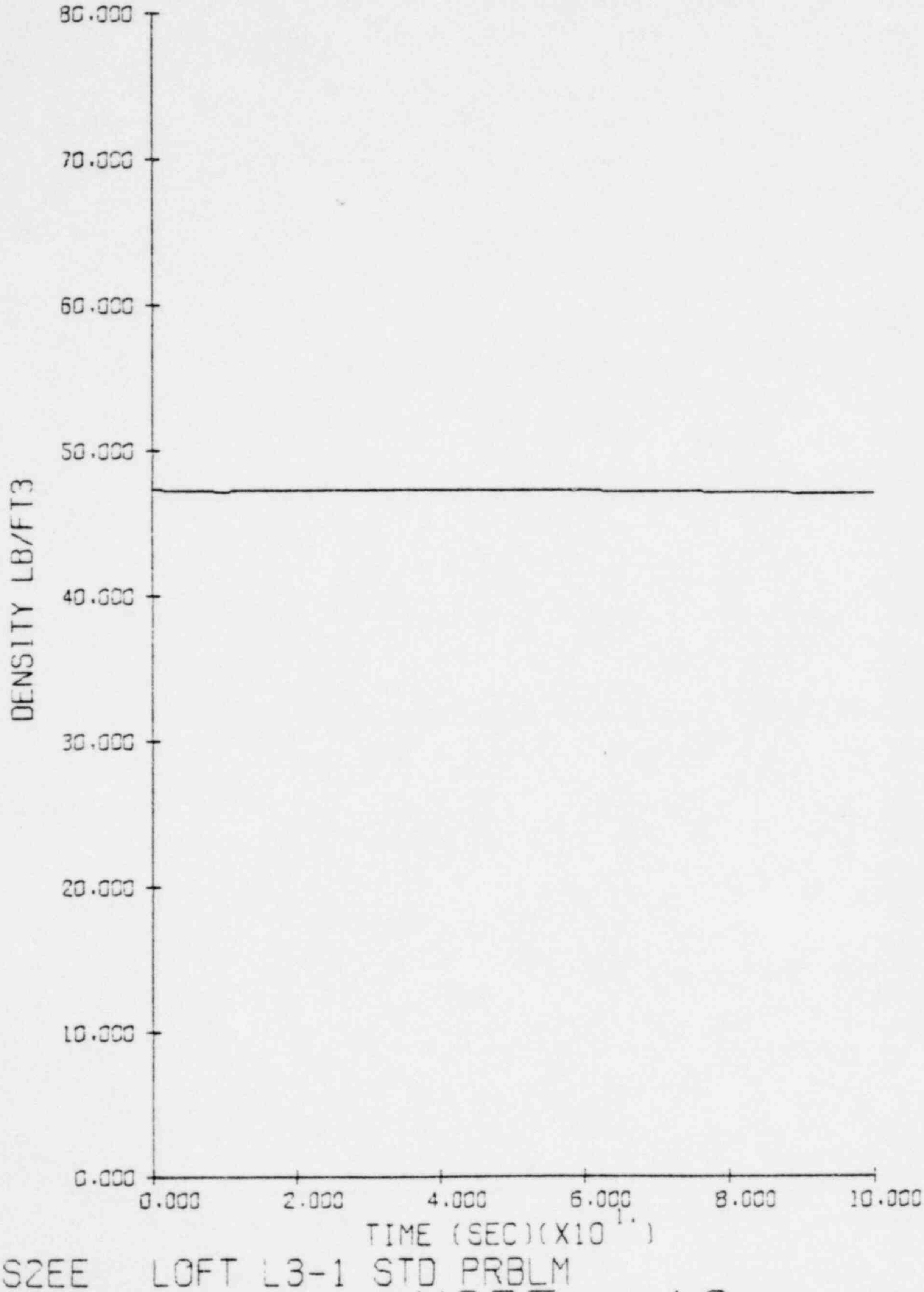
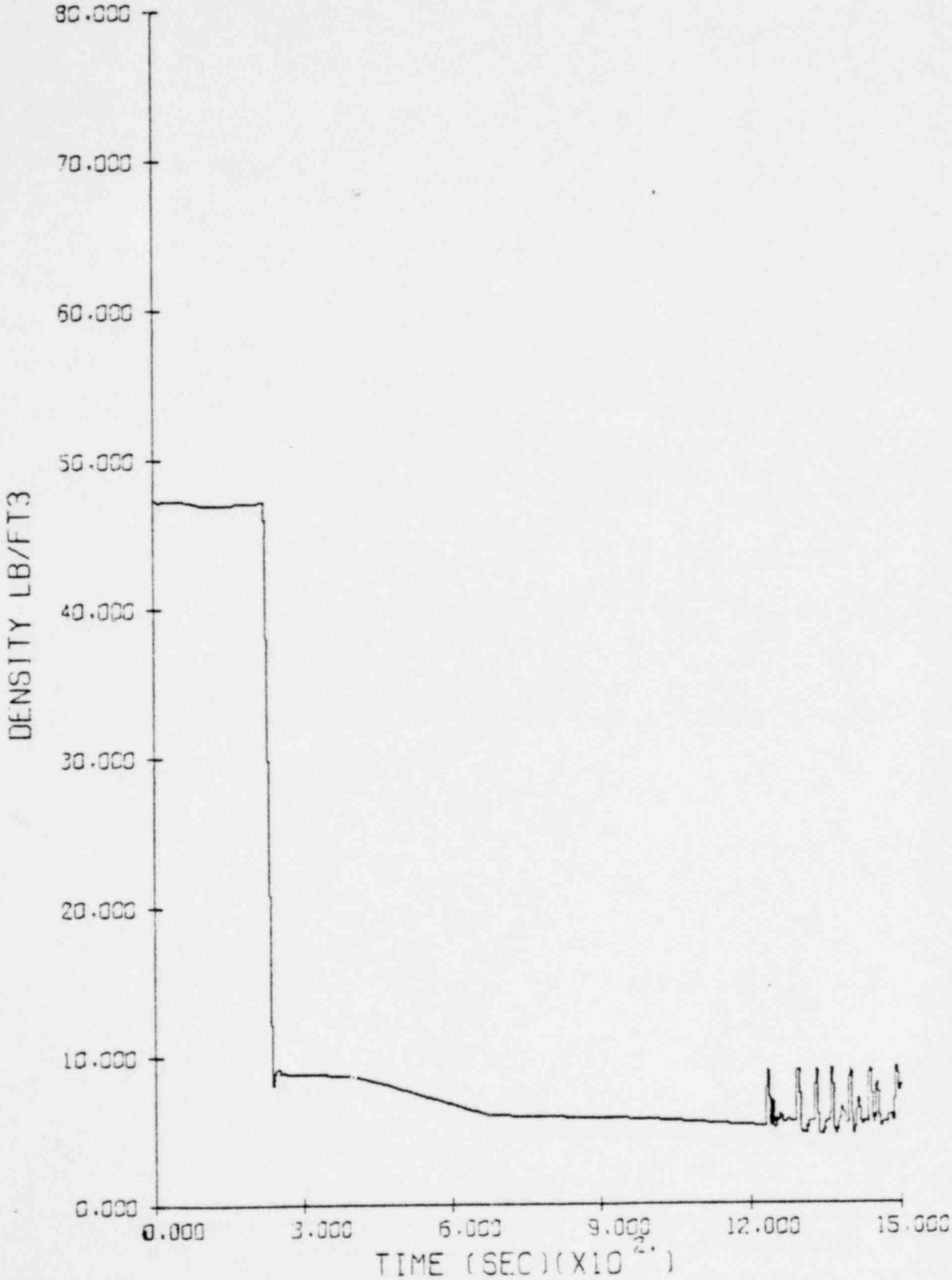


Figure 27 - Density, Broken Loop Cold Leg (C_D = 0.6)



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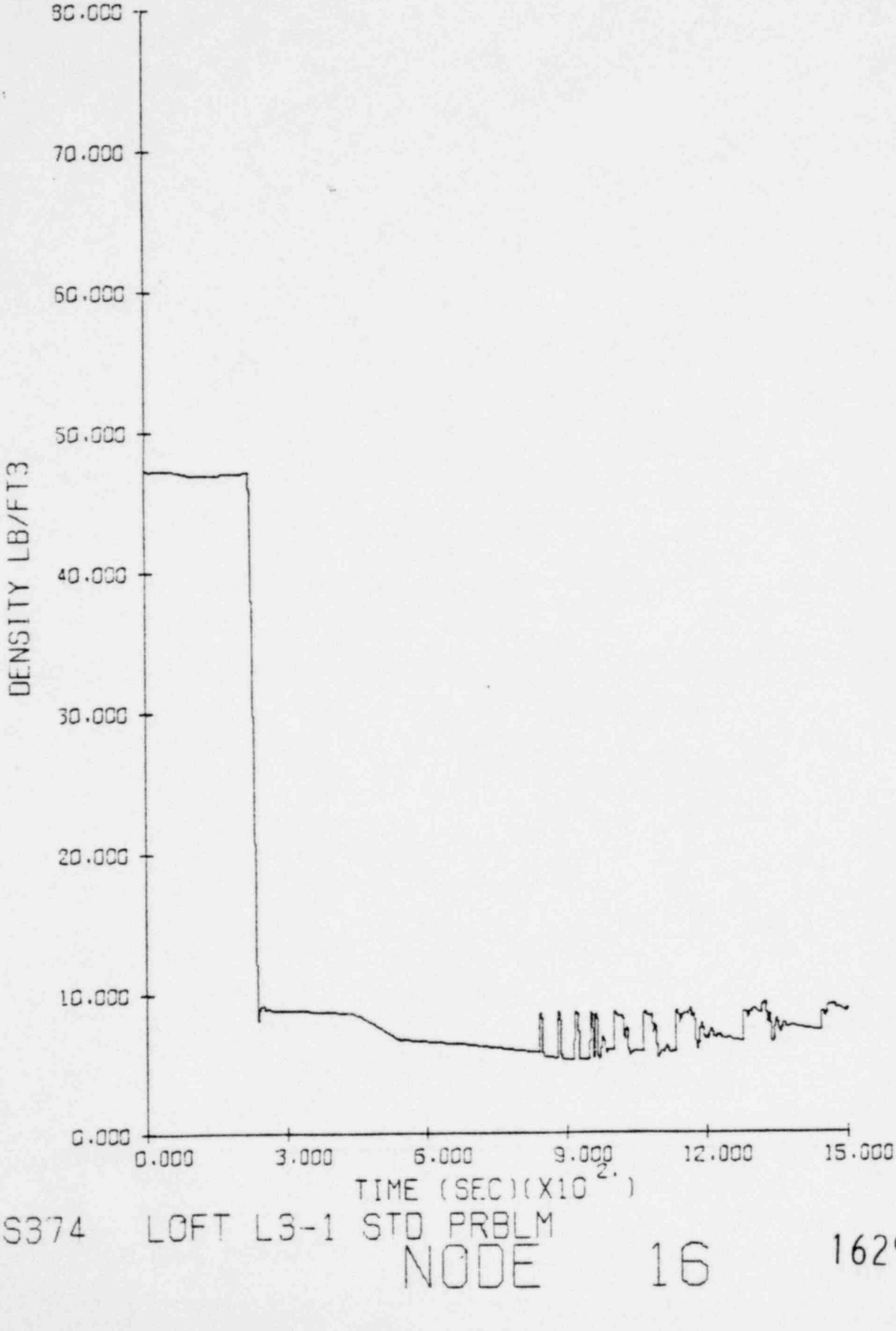
NODE 16

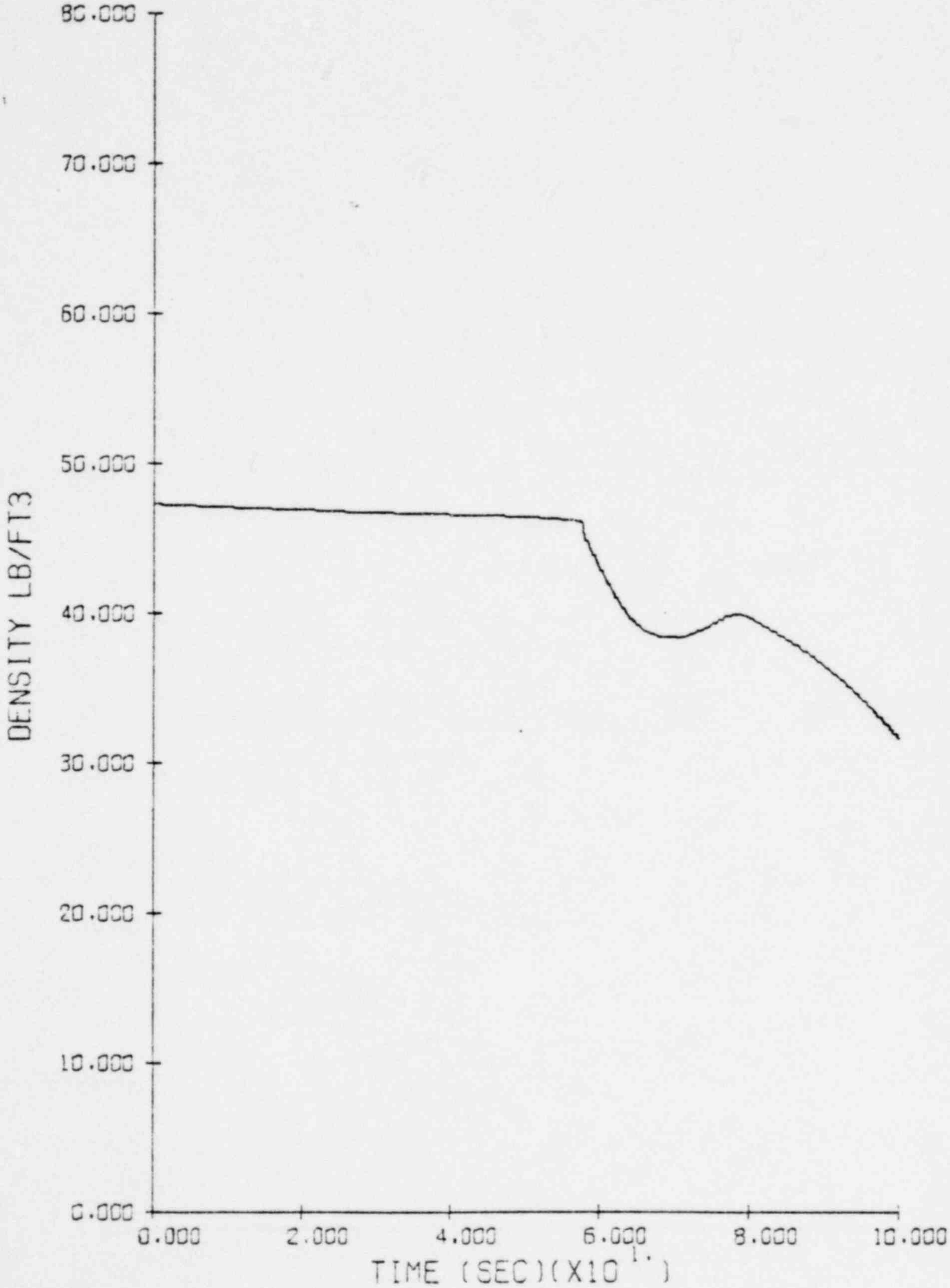
1629 077

Figure 28 - Density, Broken Loop Cold Leg ($C_D = 0.9$)



1629 078

Figure 29 - Density, Broken Loop Hot Leg (0 to 100 sec.)



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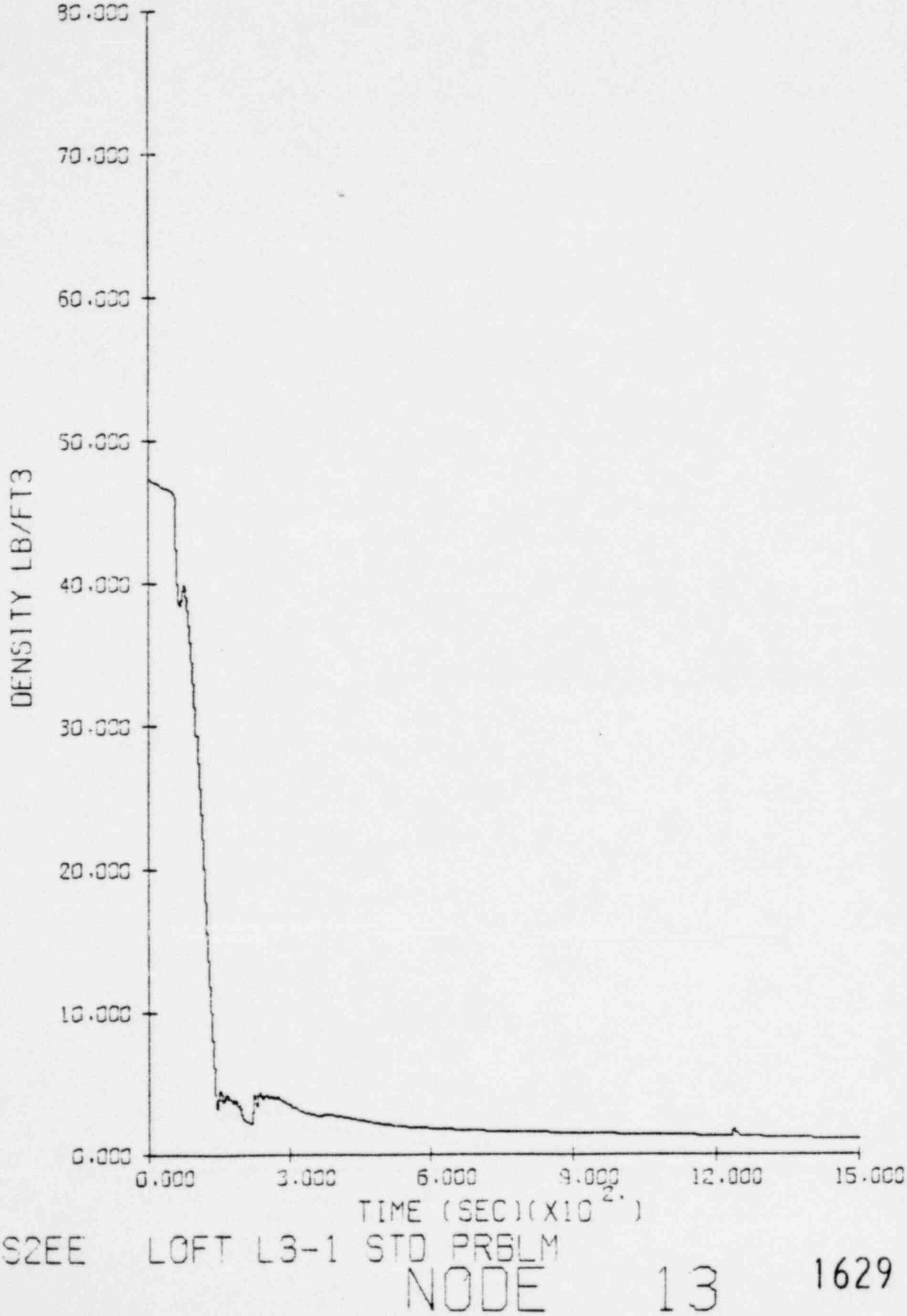
NODE 13

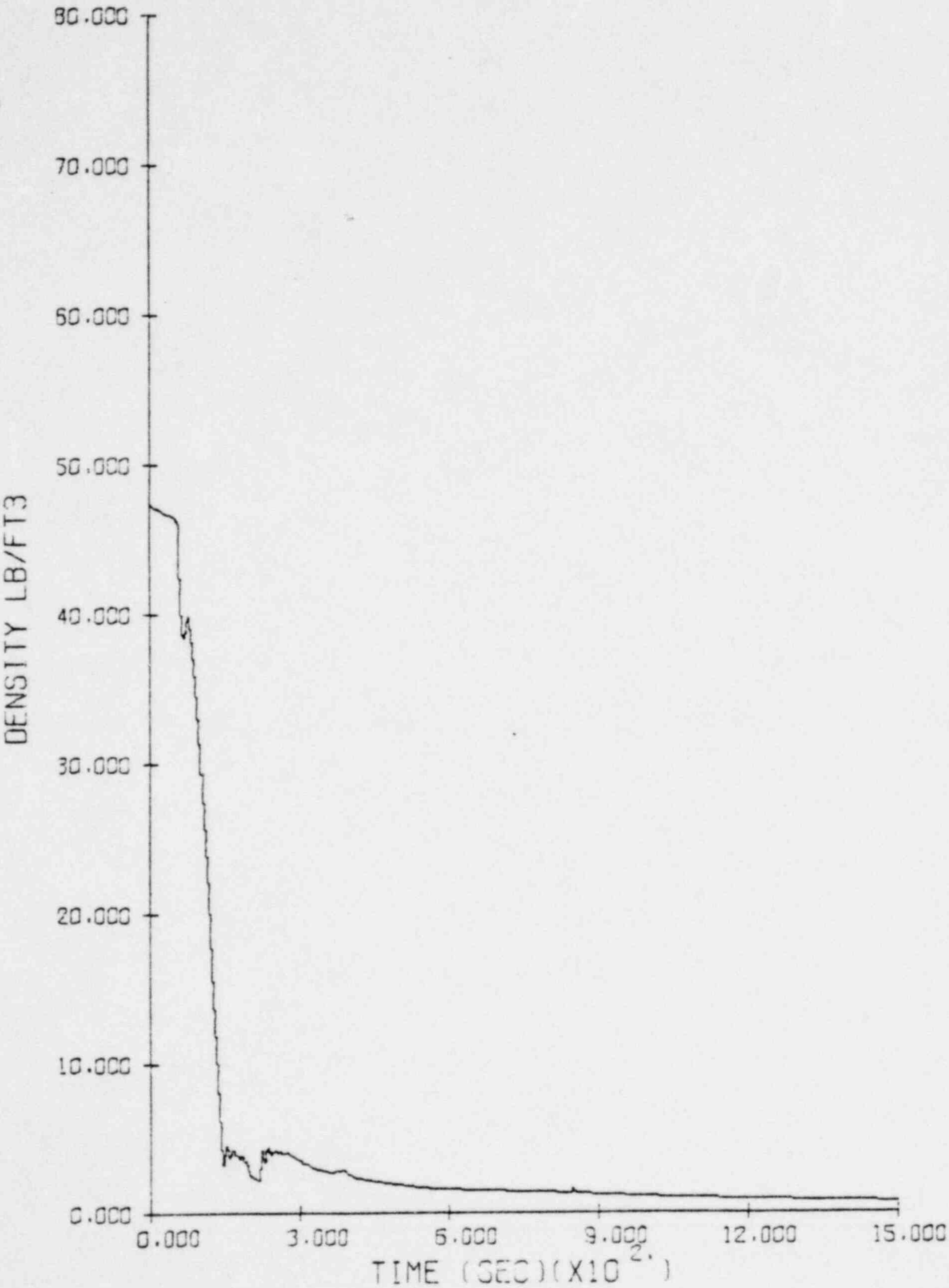
1629 079

Figure 30 - Density, Broken Loop Hot Leg (C_D = 0.6)



1629 080

Figure 31 - Density, Broken Loop Hot Leg (C_D = 0.9)



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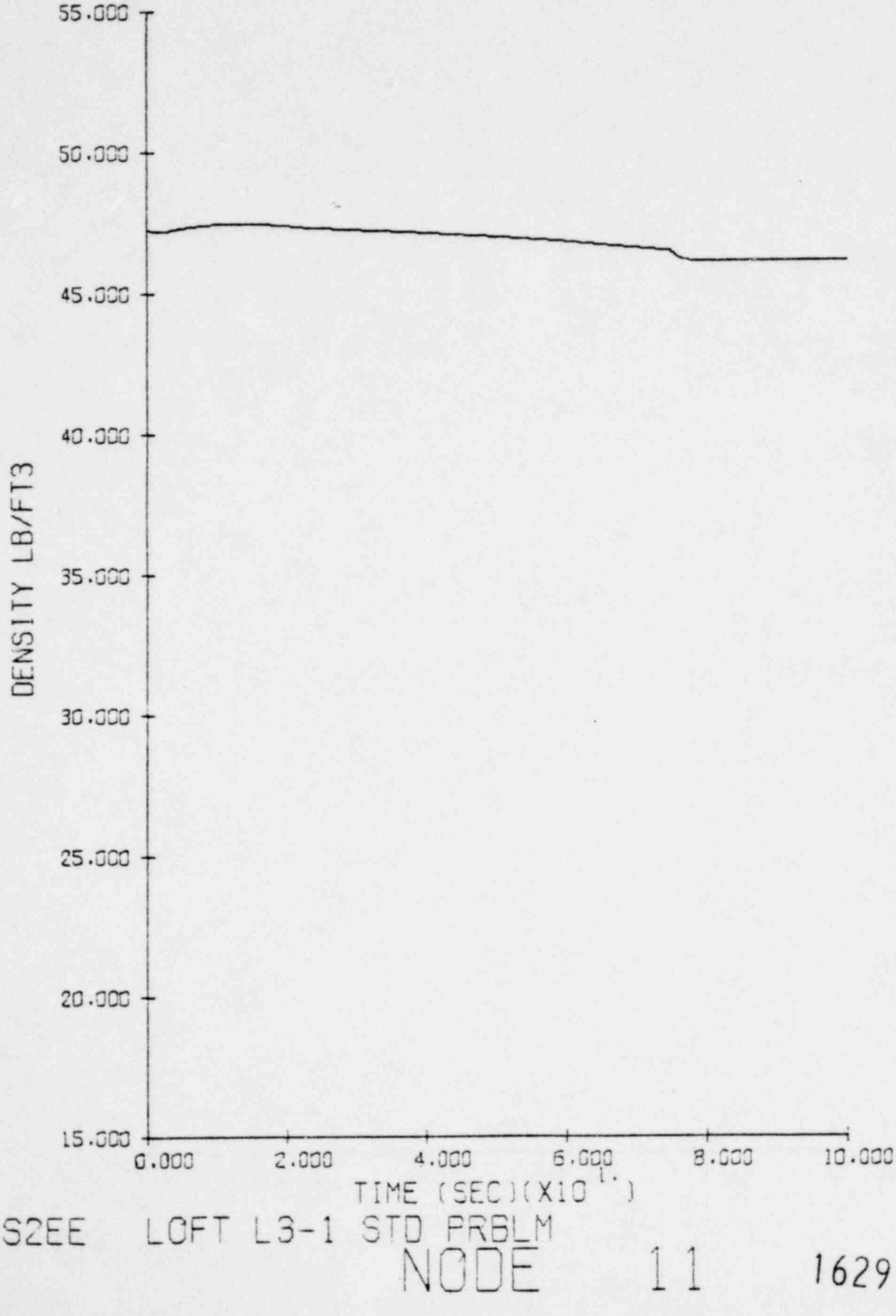
NODE 13

1629 081

Figure 32 - Density, Pump Suction (0 to 100 sec.)



1629 082

Figure 33 - Density, Pump Suction (C_D = 0.6)

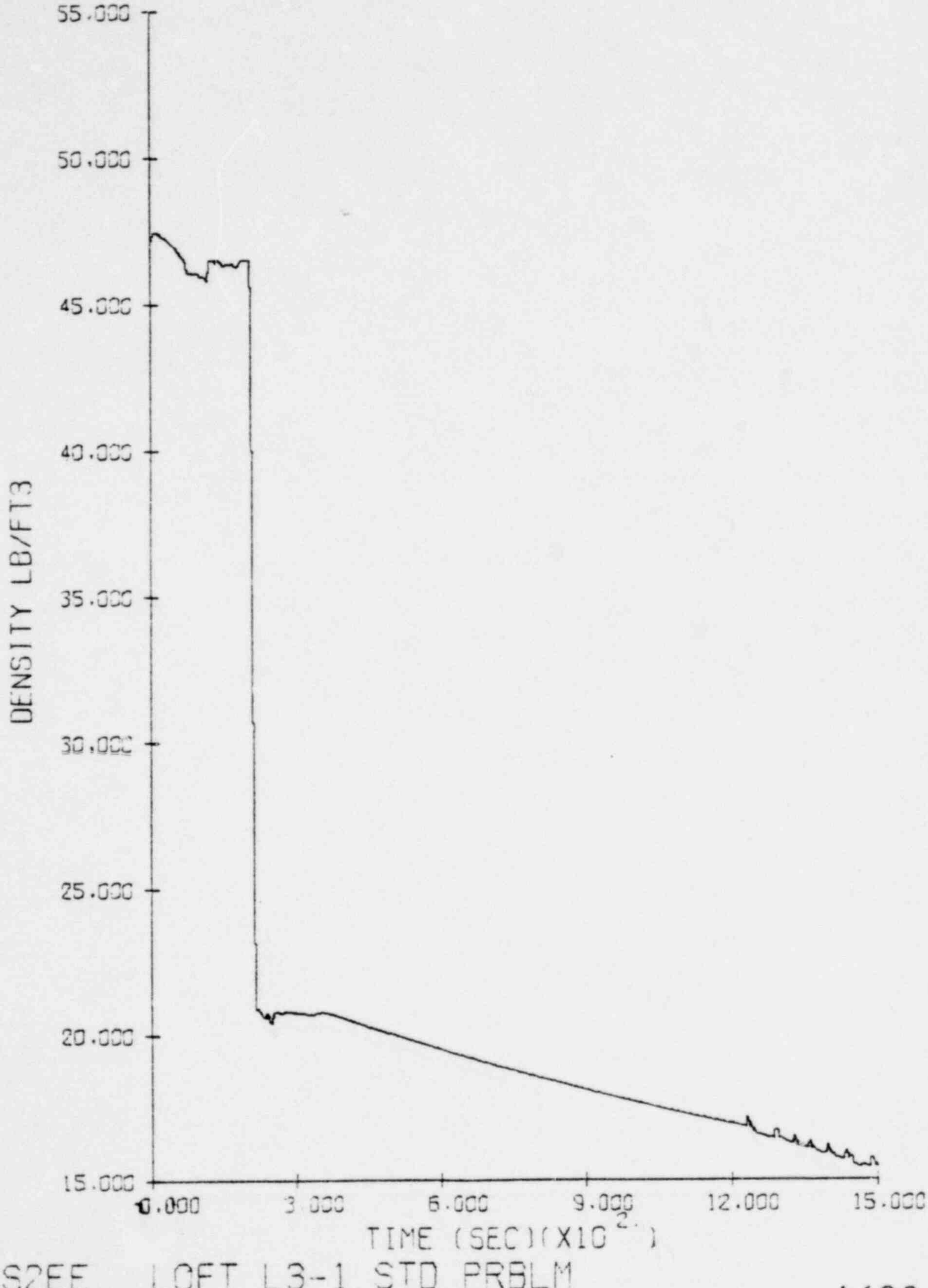
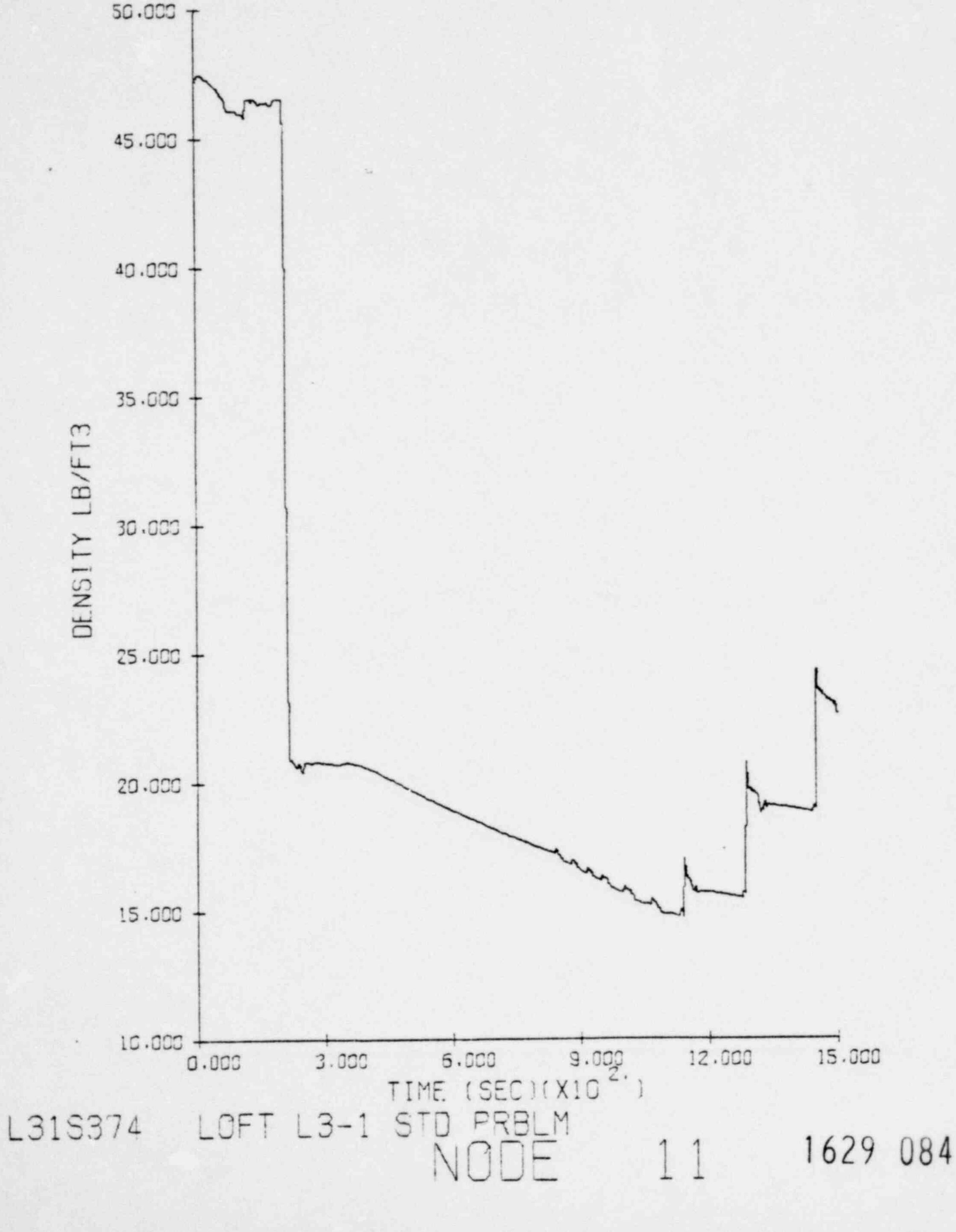


Figure 34 - Density, Pump Suction (C_D = 0.9)



1629 084

Figure 35 - Differential Pressure, Across Core (0 to 100 sec.)

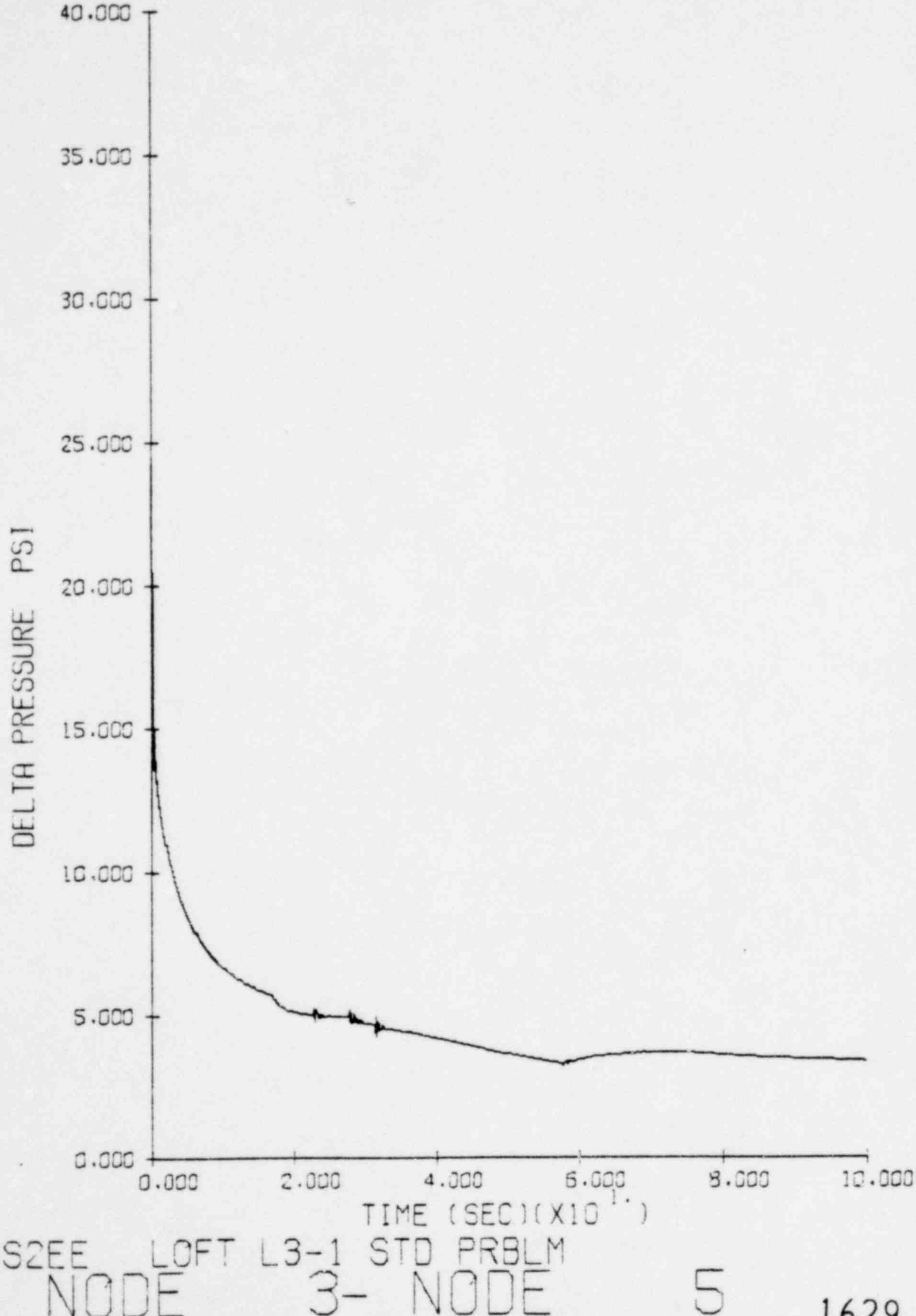
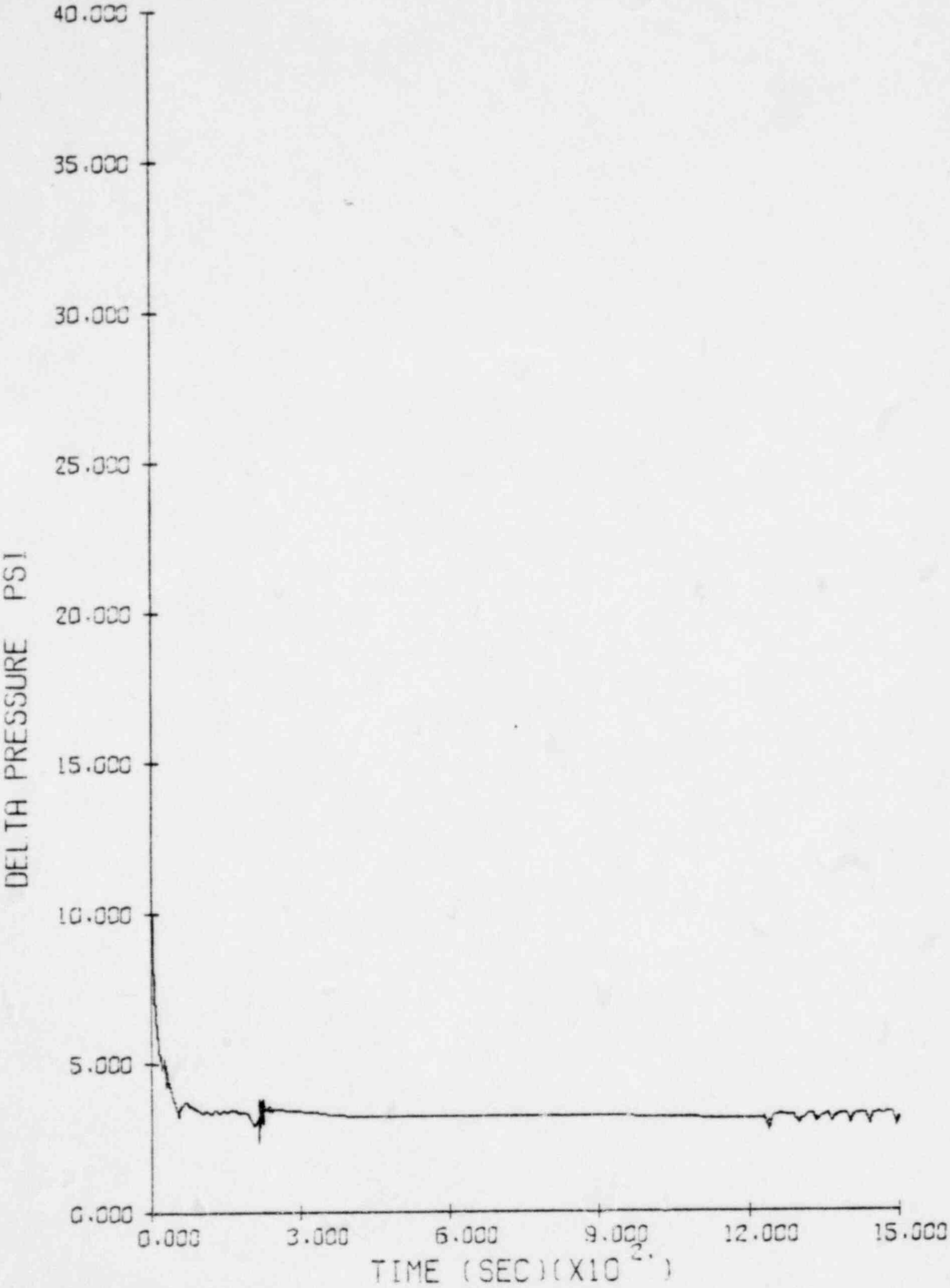


Figure 36 - Differential Pressure, Across Core (C_D = 0.6)



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NODE 3- NODE 5

1629 086

Figure 37 - Differential Pressure, Across Core (C_D = 0.9)

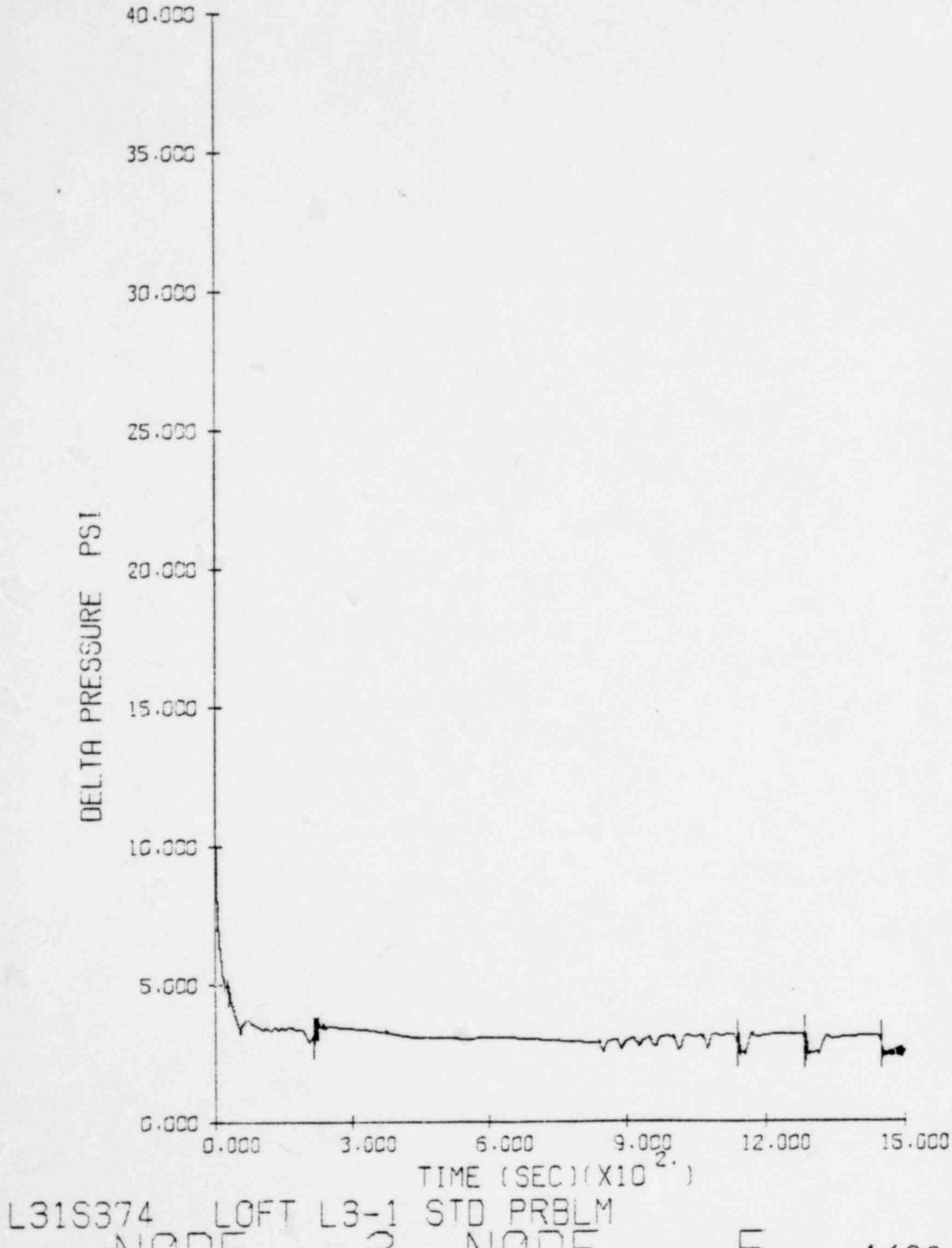
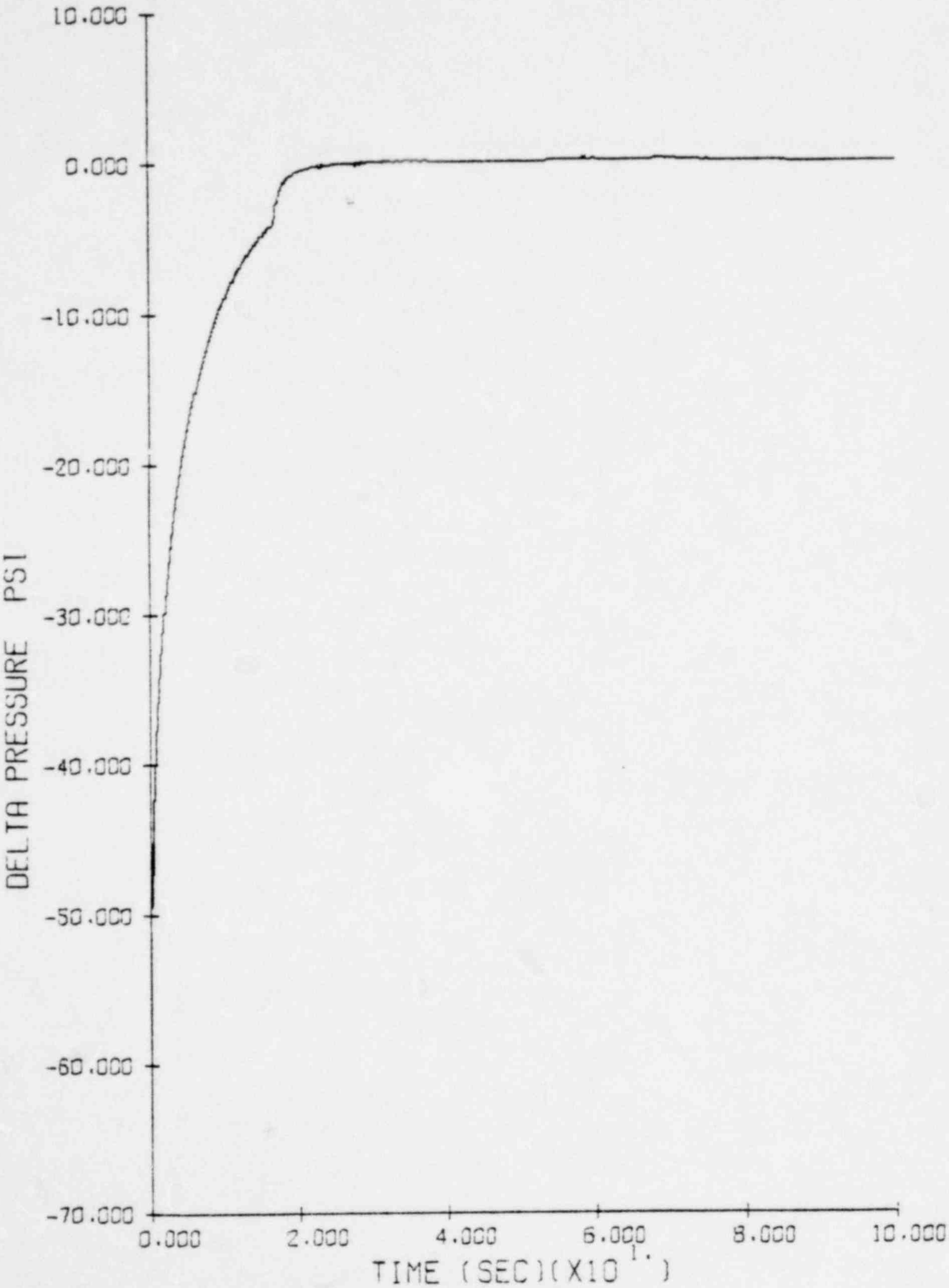


Figure 38 - Differential Pressure, Across Intact Loop Pump (0 to 100 sec.)



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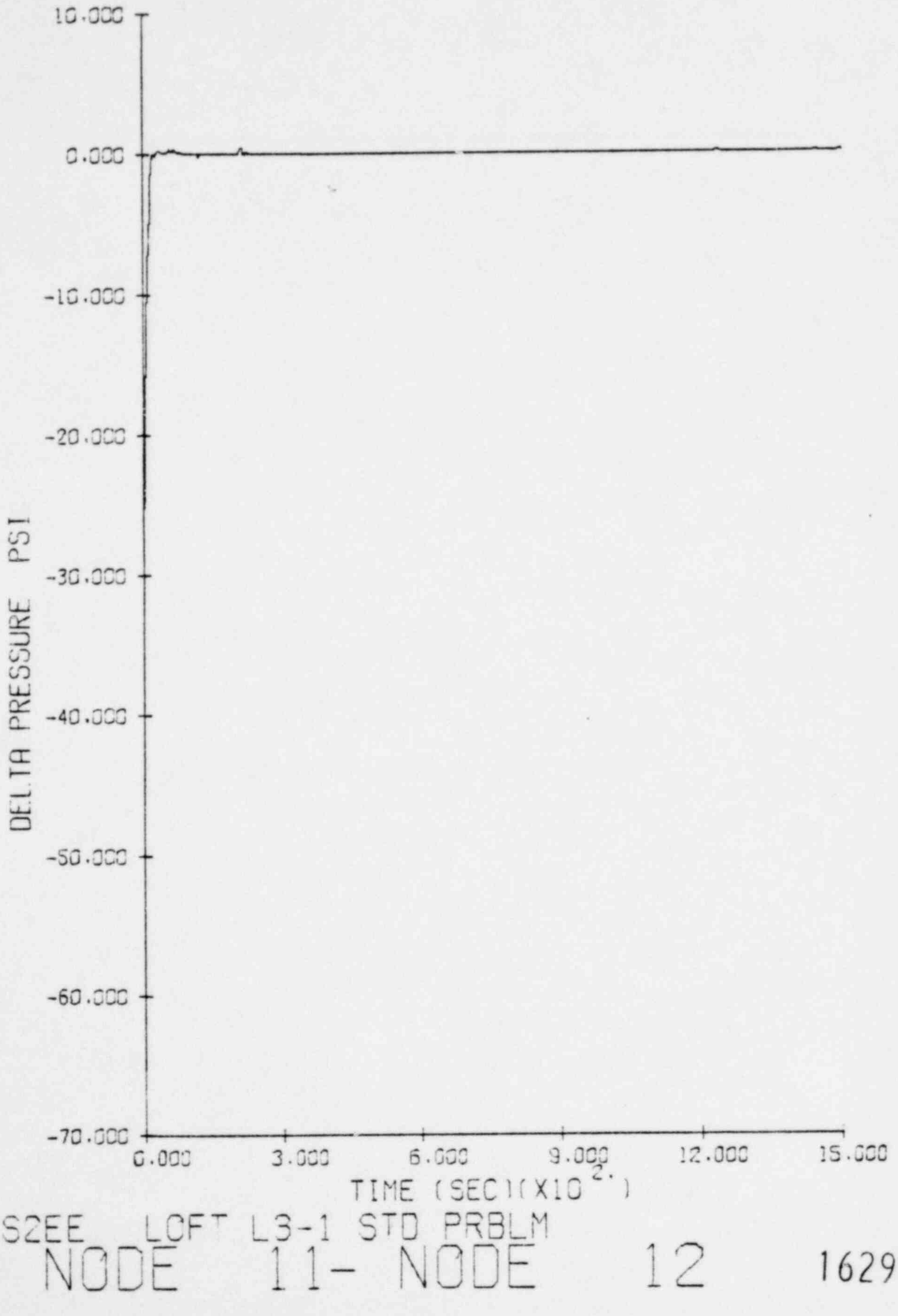
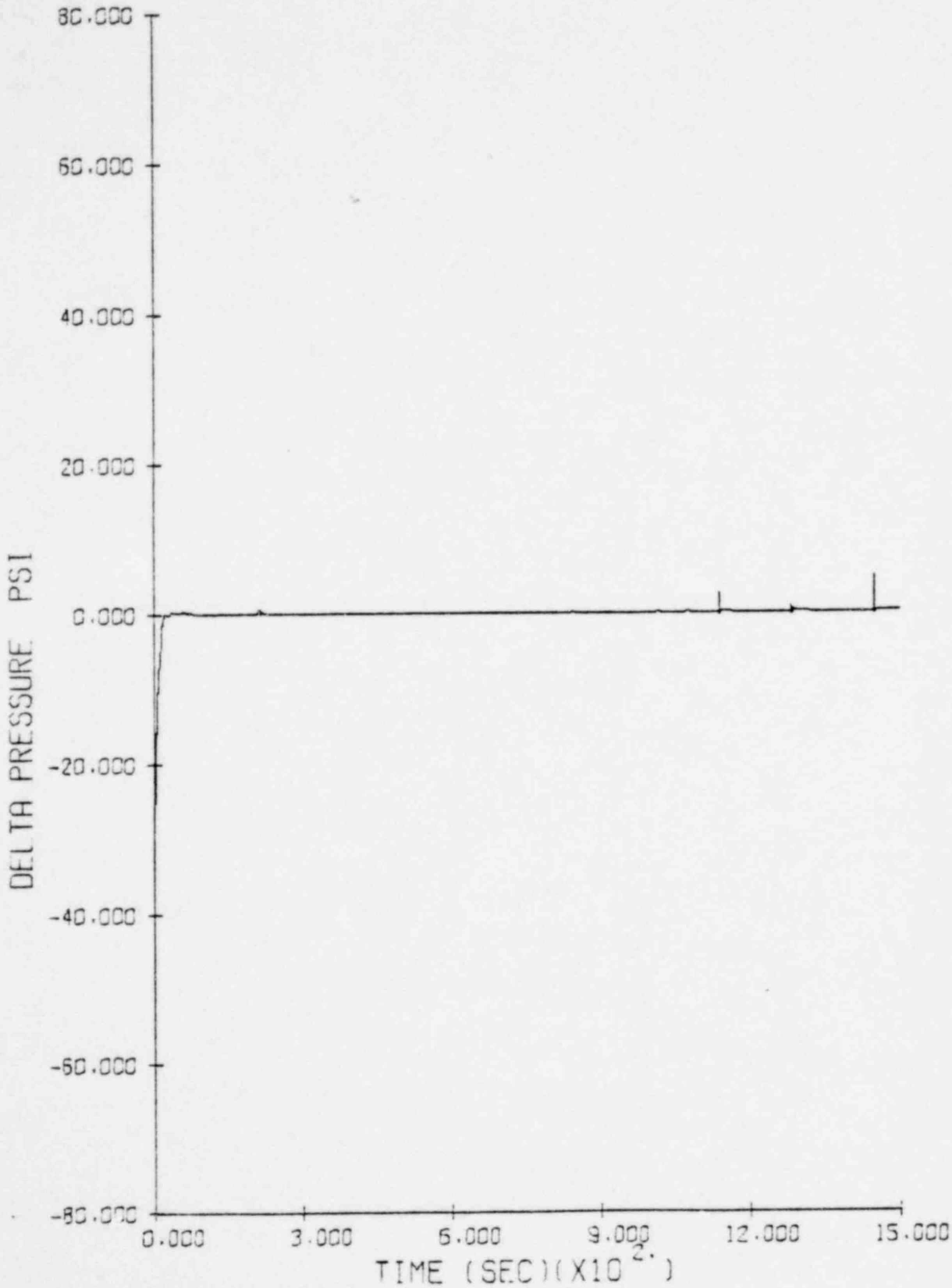
NODE 11- NODE 12

Figure 39 - Differential Pressure, Across Intact Loop Pump ($C_D = 0.9$)



1629 089

Figure 40 - Differential Pressure, Across Intact Loop Pump (C_D = 0.9)



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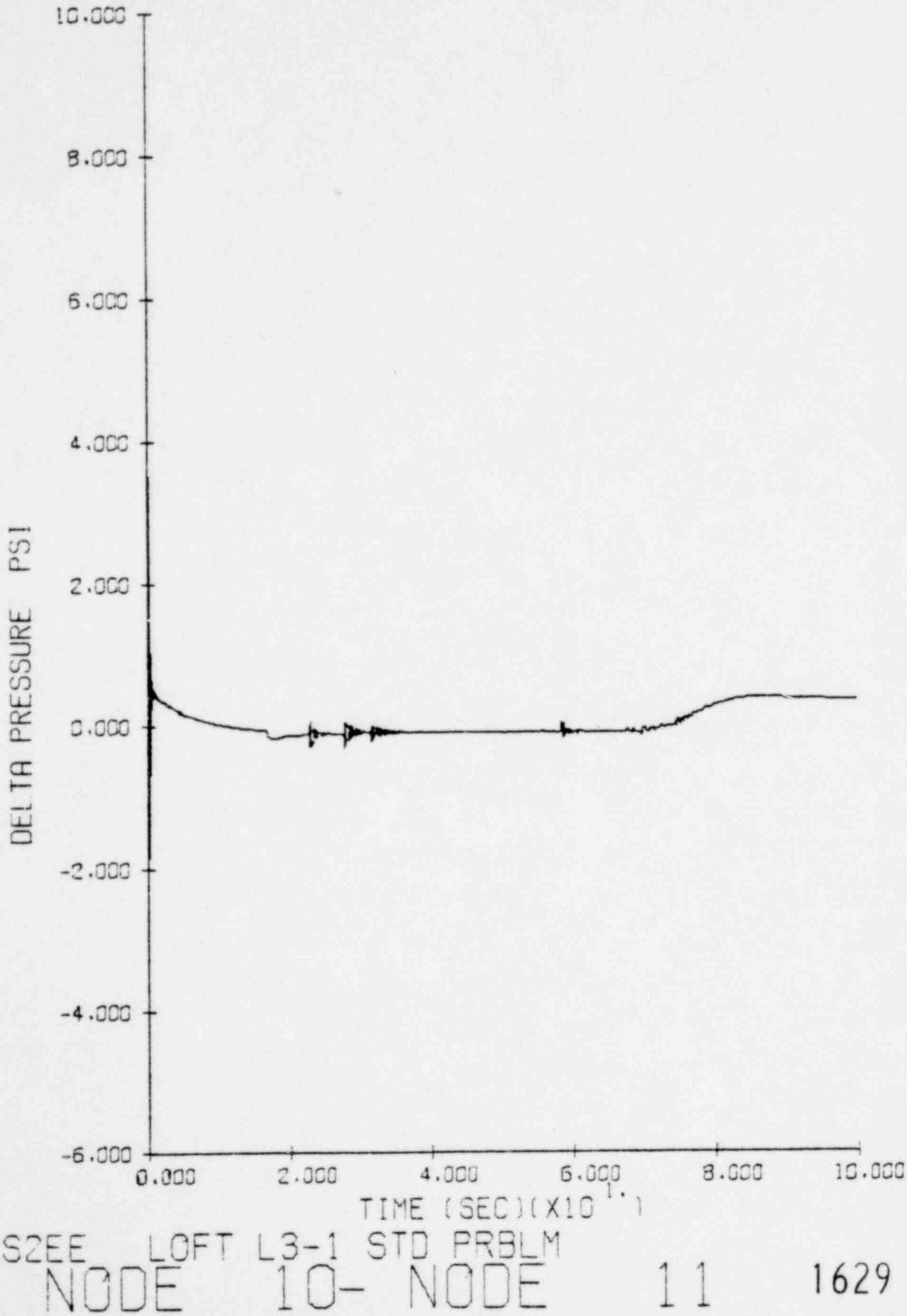
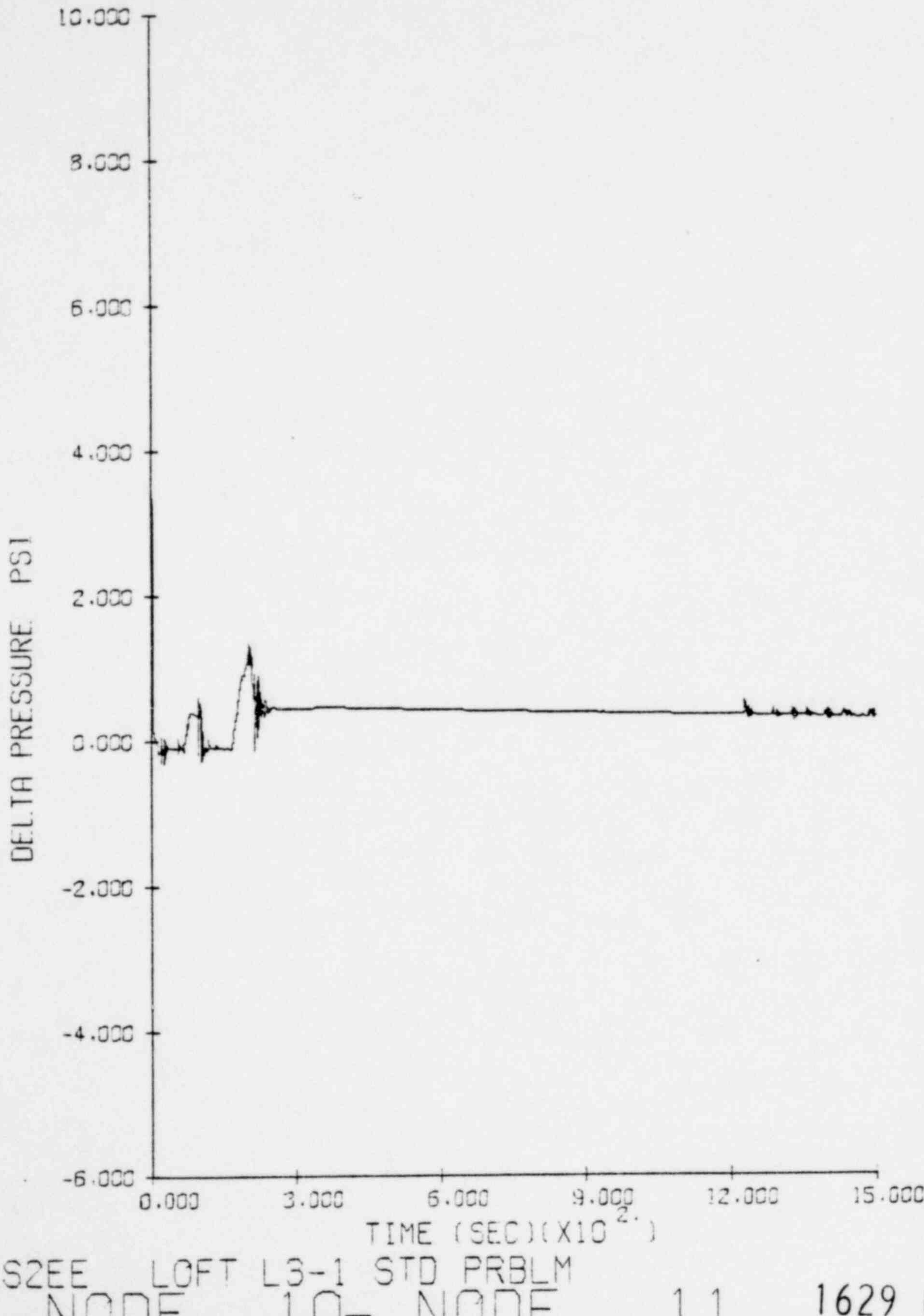
NODE 11- NODE 12

Figure 41 - Differential Pressure, Pump Suction Leg (0 to 100 sec.)



1629 091

Figure 42 - Differential Pressure, Pump Suction Leg (C_D = 0.6)



1629 092

Figure 43 - Differential Pressure, Pump Suction Leg (C_D = 0.9)

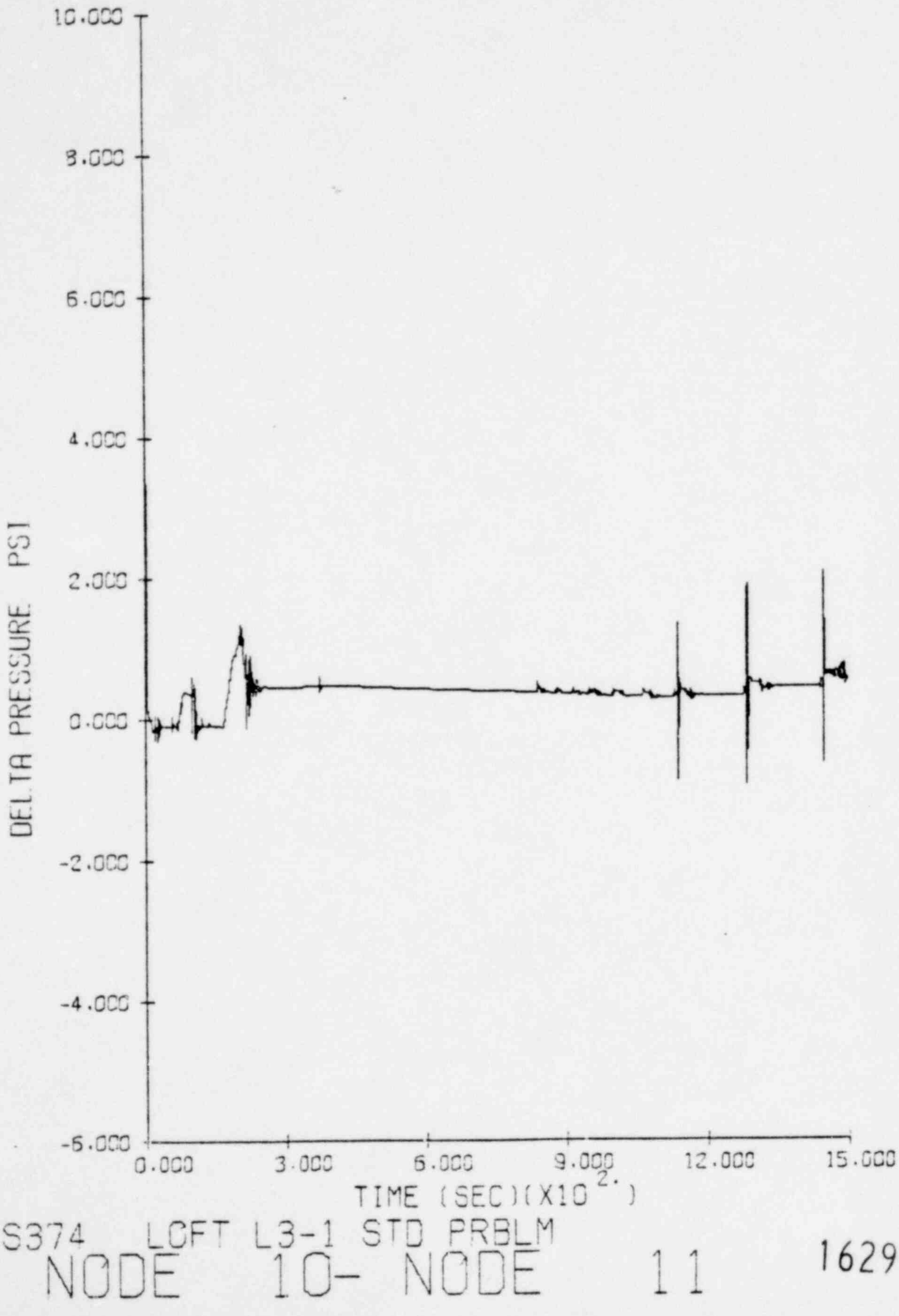


Figure 44 - Differential Pressure, Intact Hot Leg to Top of Vessel (0 to 100 sec.)

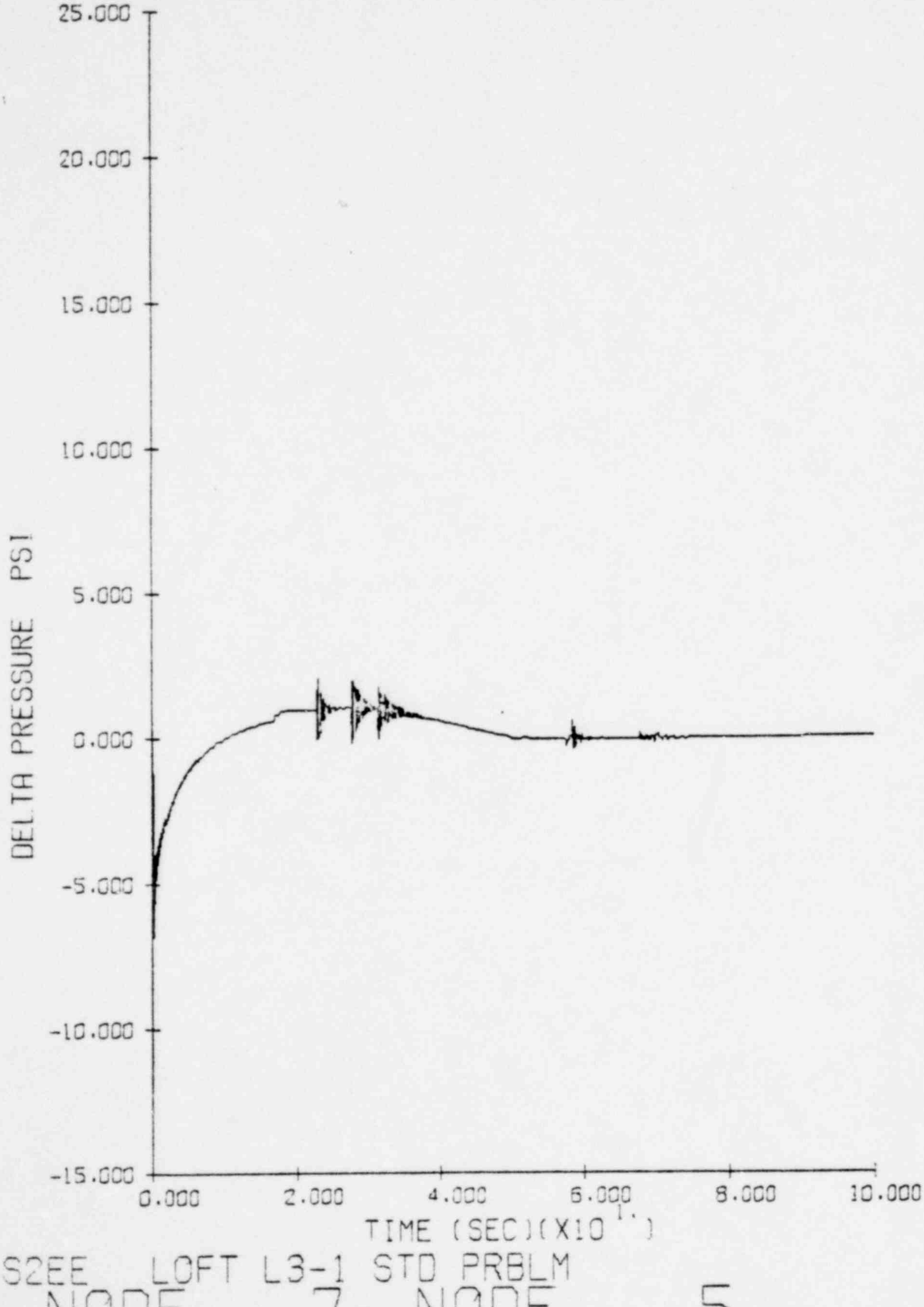


Figure 45 - Differential Pressure, Intact Hot Leg to Top of Vessel (C_D = 0.6)

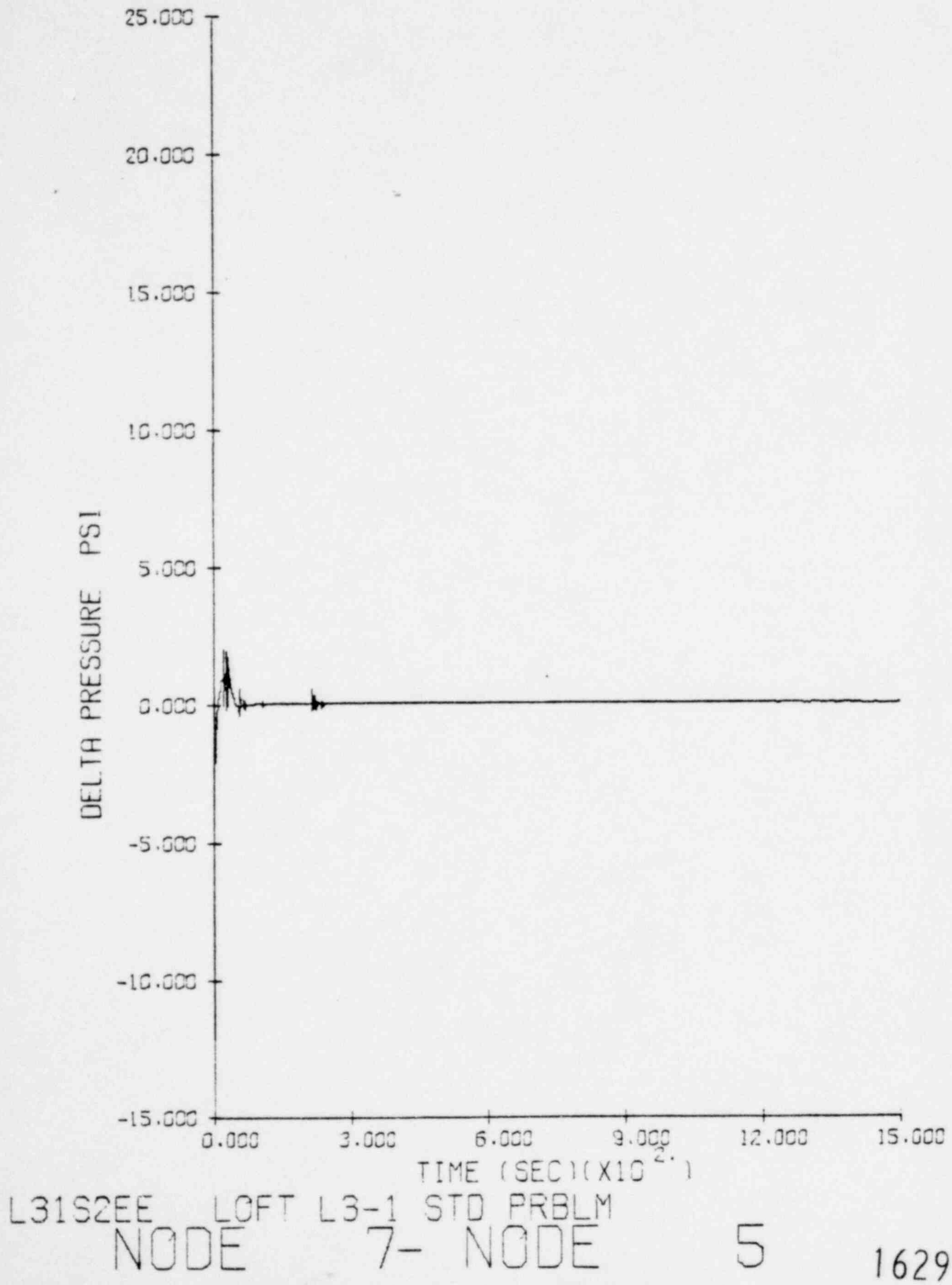
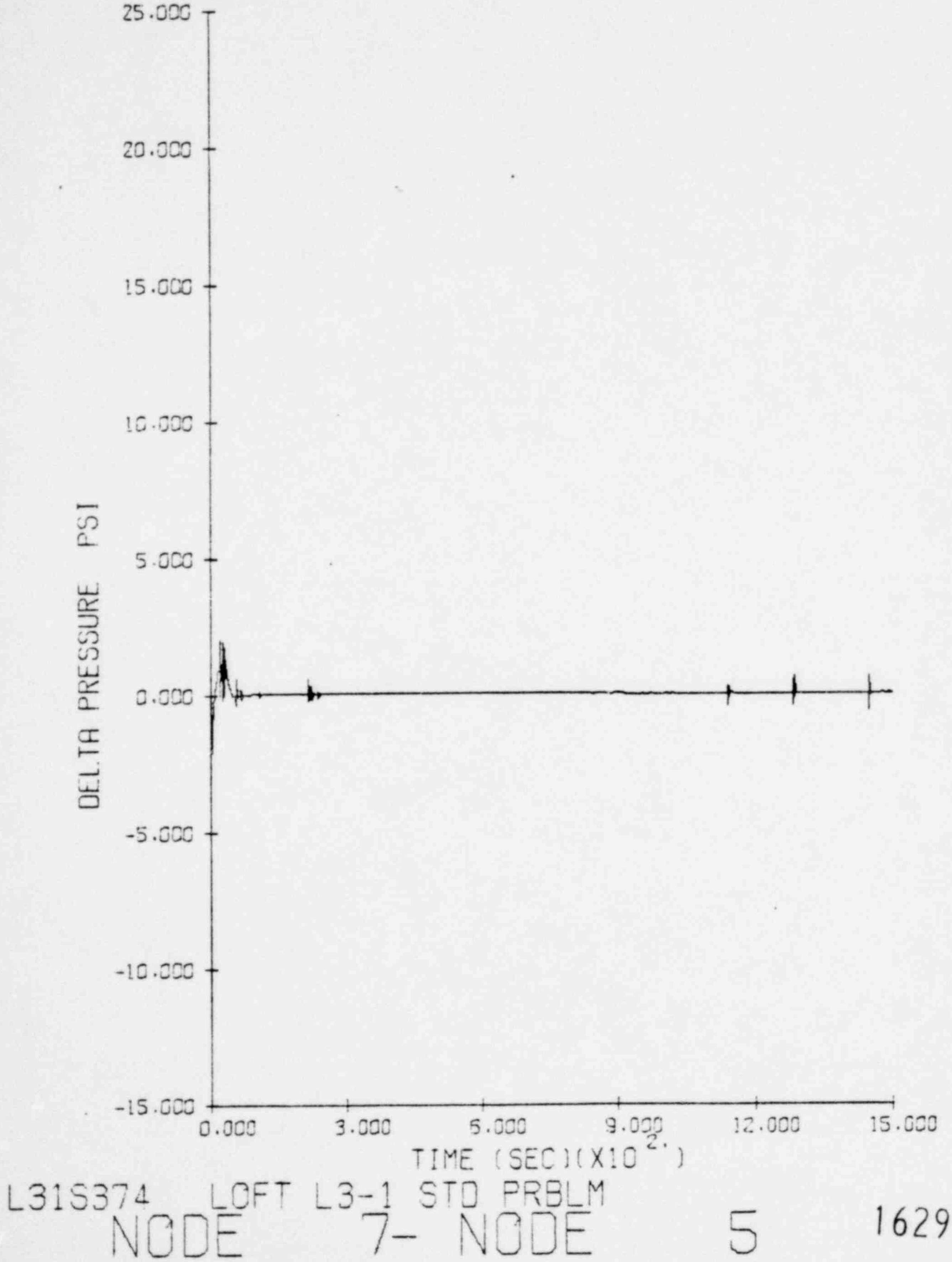


Figure 46 - Differential Pressure, Intact Hot Leg to Top of Vessel (C_D = 0.9)



1629 096

Figure 47 - Fluid Temperature, Cold Leg, Upstream of Break (0 to 100 sec.)

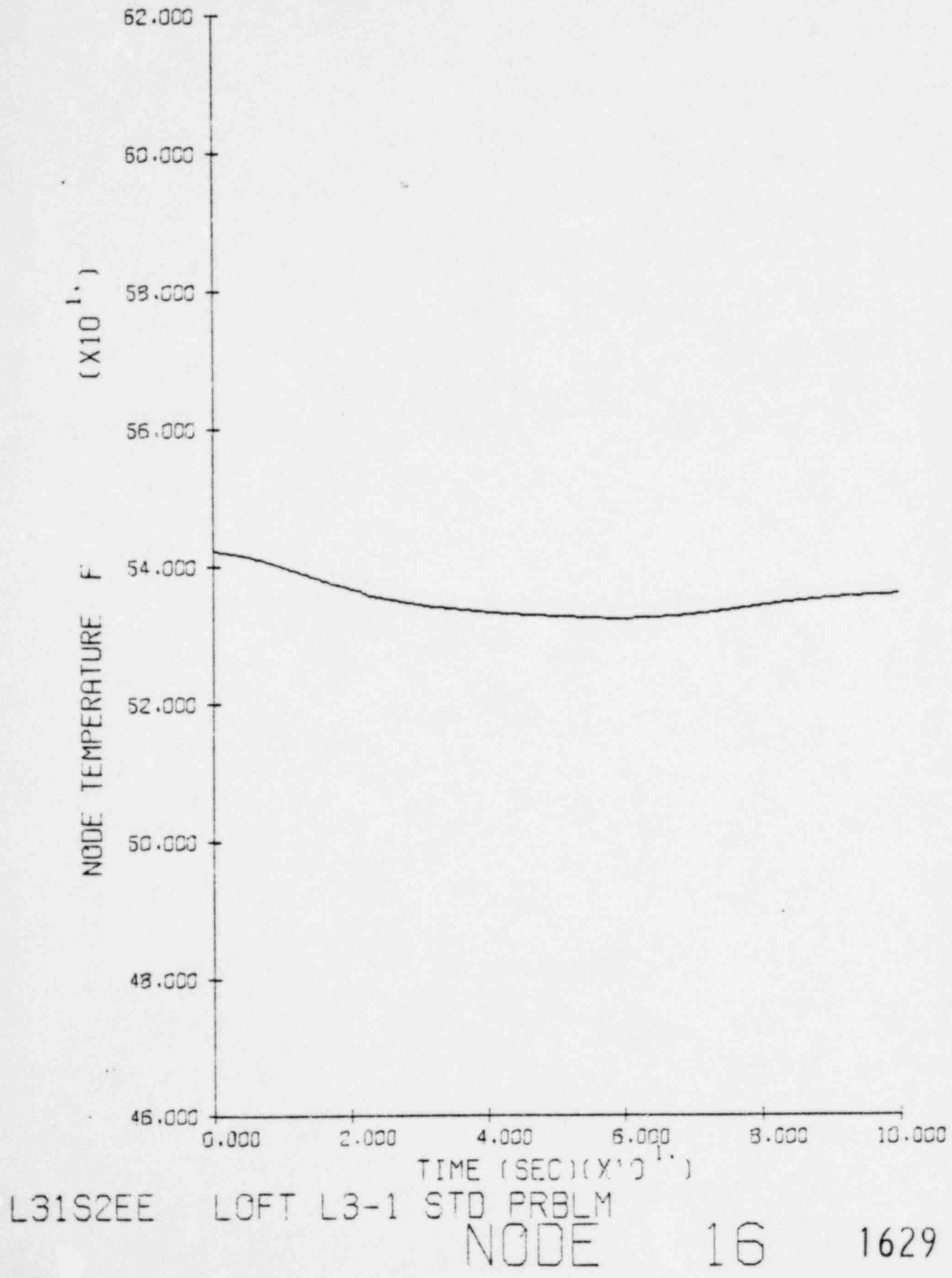


Figure 48 - Fluid Temperature, Cold Leg, Upstream of Break (C_D = 0.6)

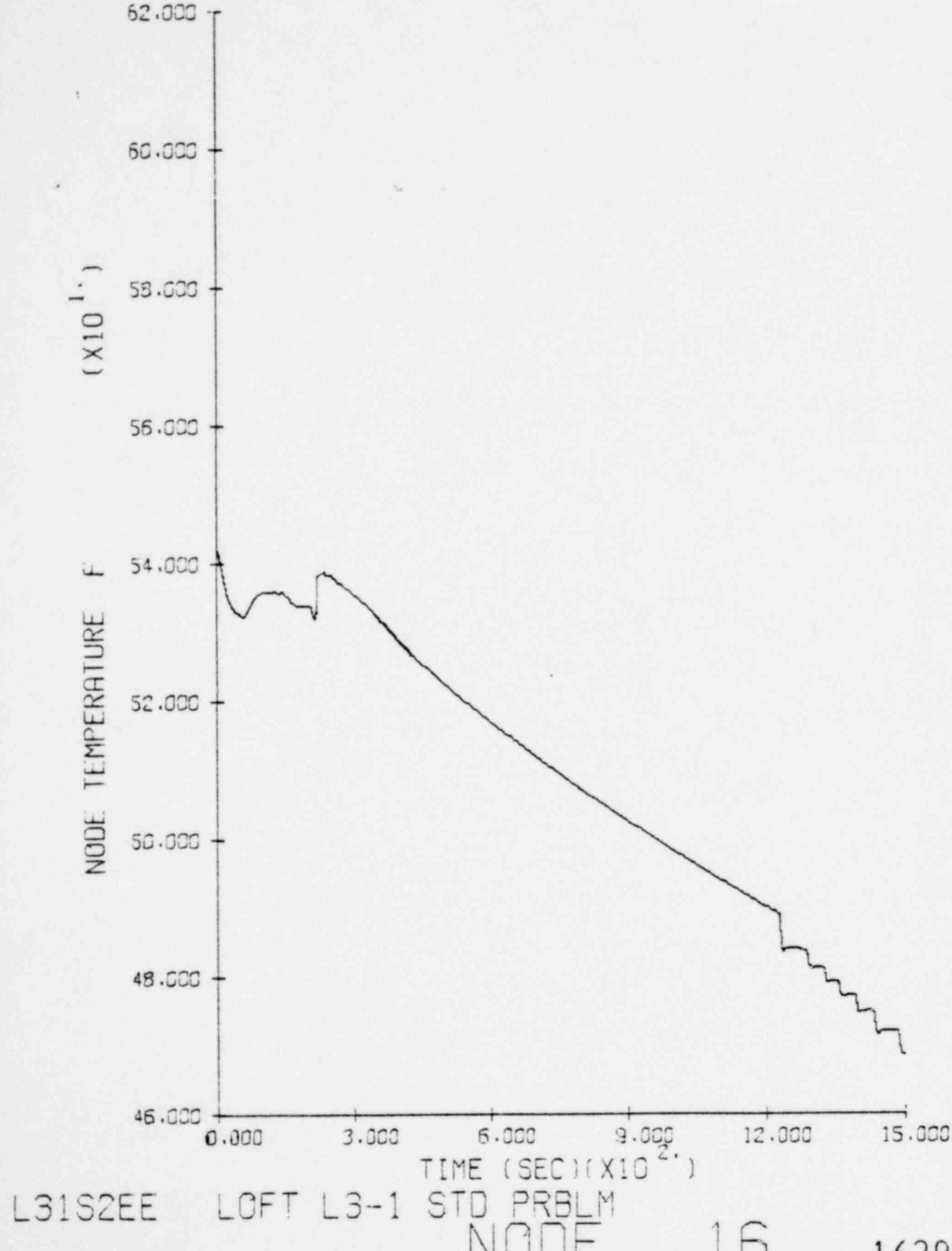
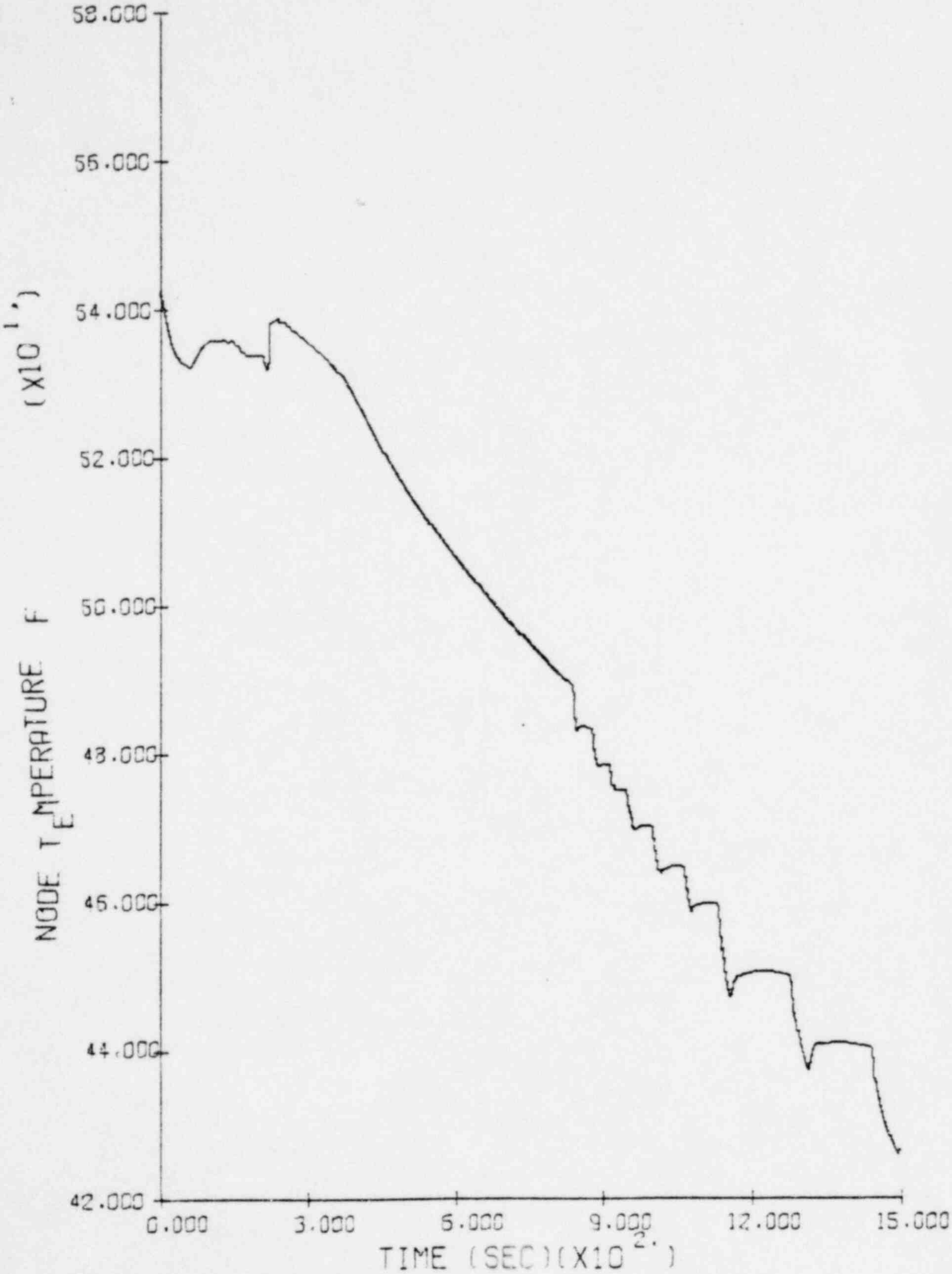


Figure 49 - Fluid Temperature, Cold Leg, Upstream of Break (C_D = 0.9)



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NODE 16

Figure 50 - Fluid Temperature, Upper Plenum (0 to 100 sec.)

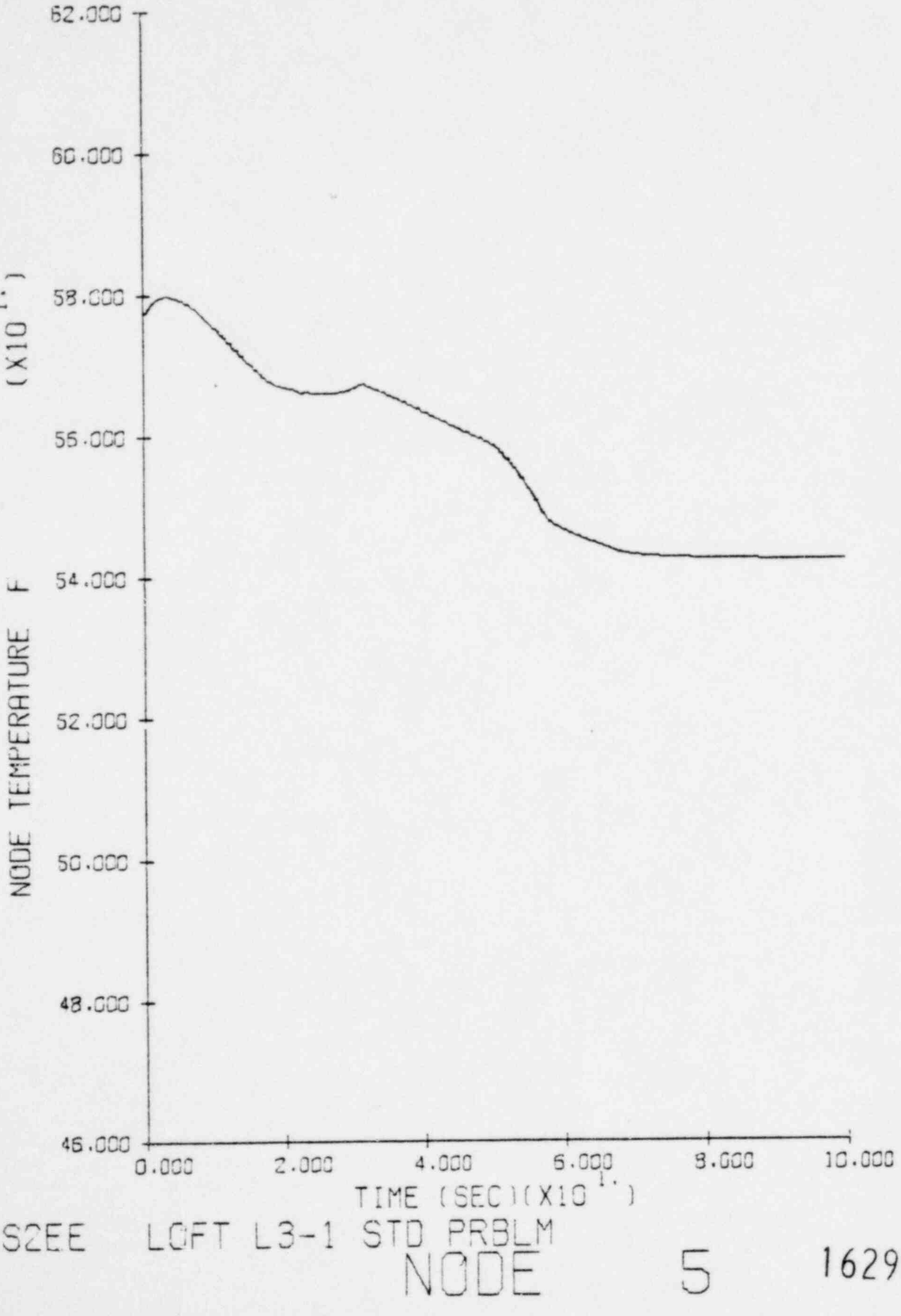


Figure 51 - Fluid Temperature, Upper Plenum (C_D = 0.6)

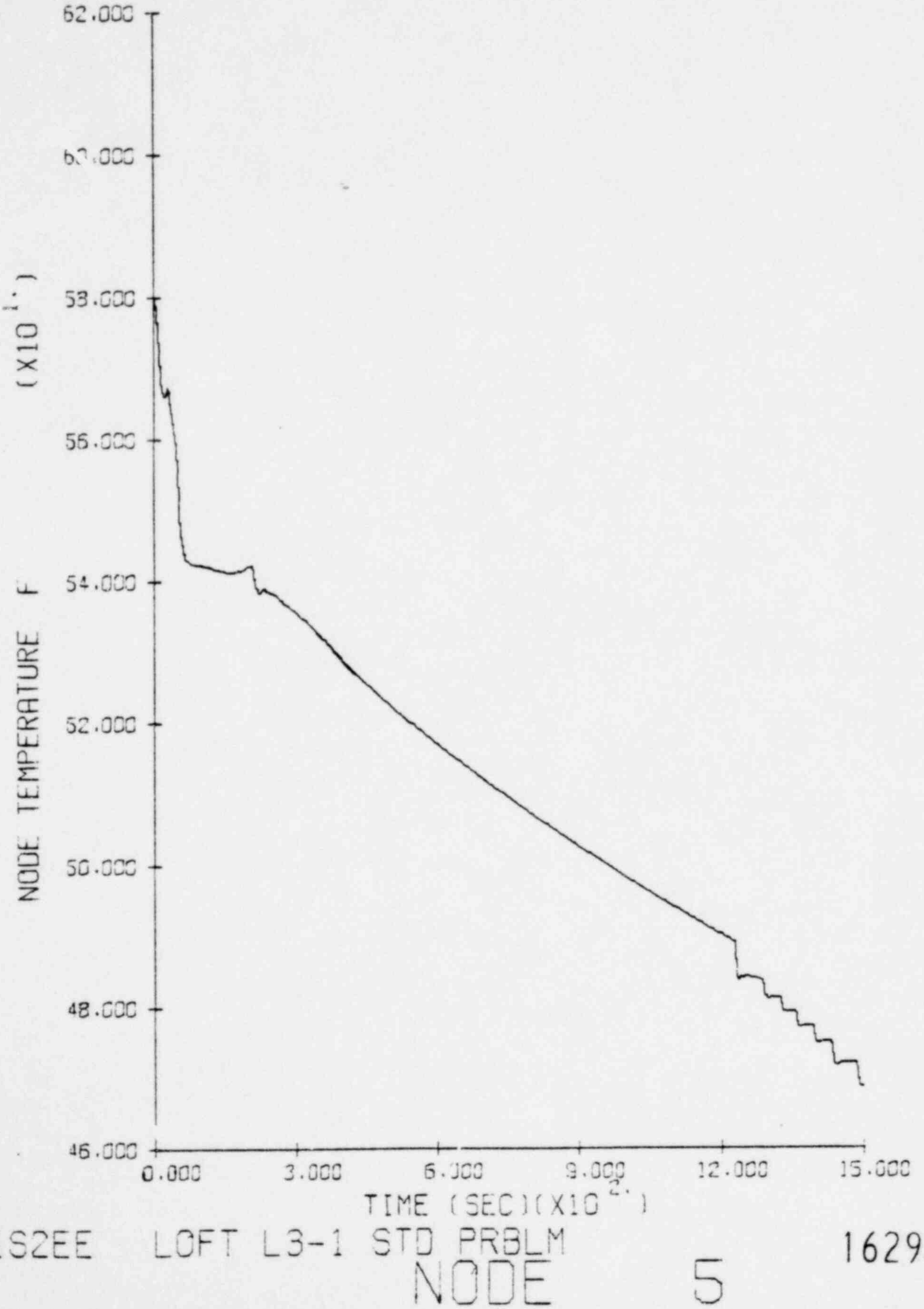
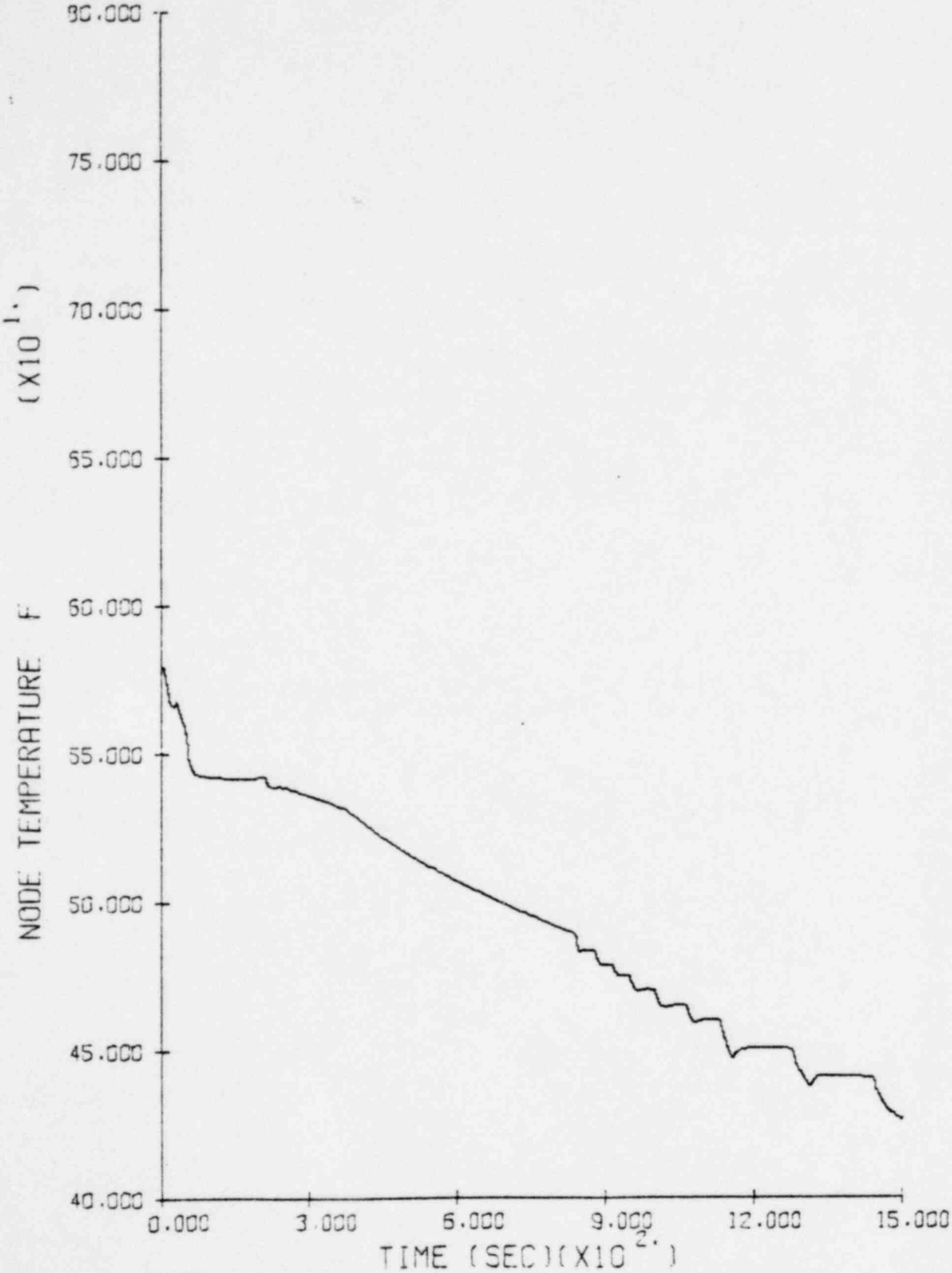


Figure 52 - Fluid Temperature, Upper Plenum (C_D = 0.9)



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NODE 5

Figure 53 - Fluid Temperature, Pressurizer (0 to 100 sec.)

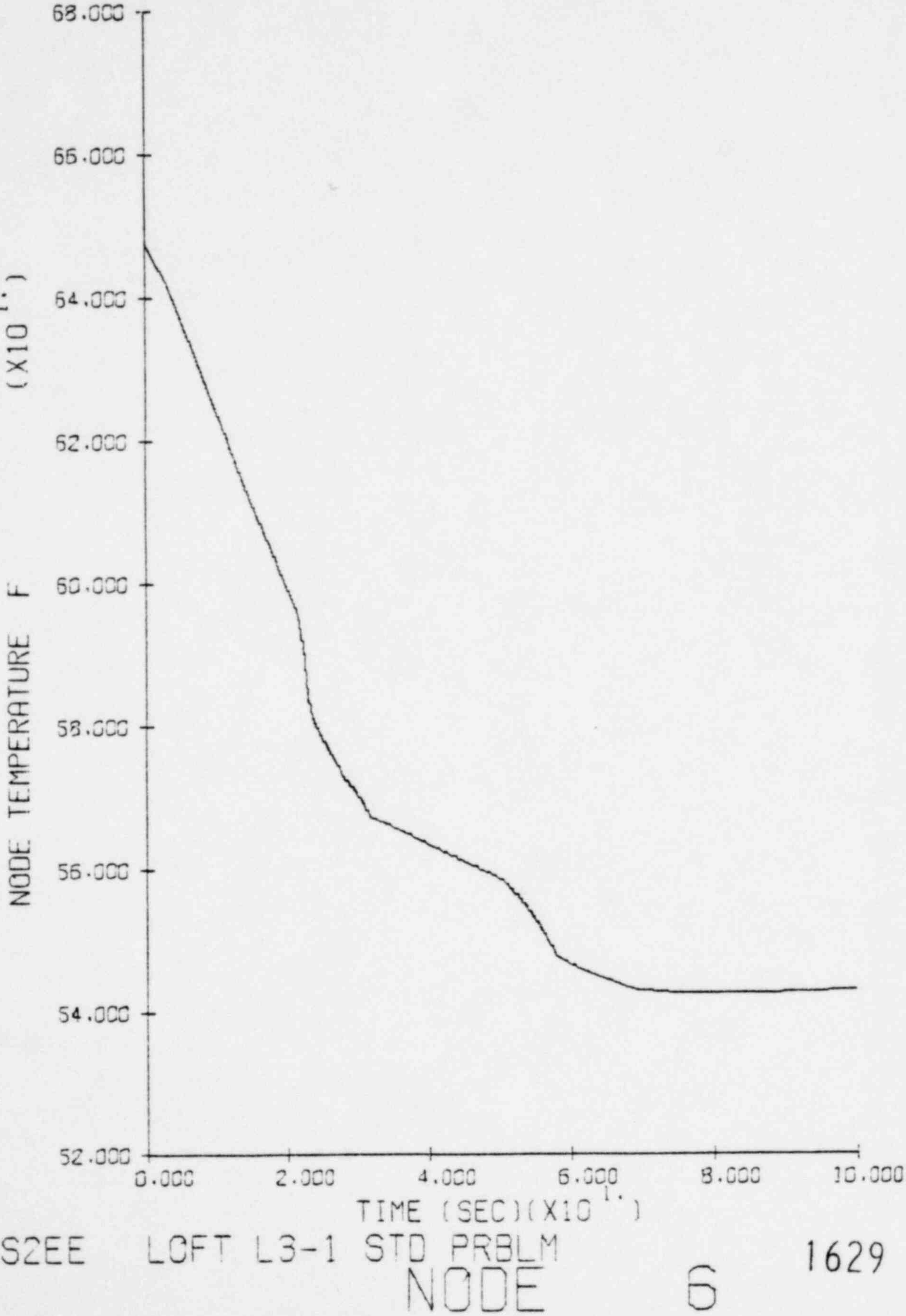

Figure 54 - Fluid Temperature, Pressurizer (C_D = 0.6)

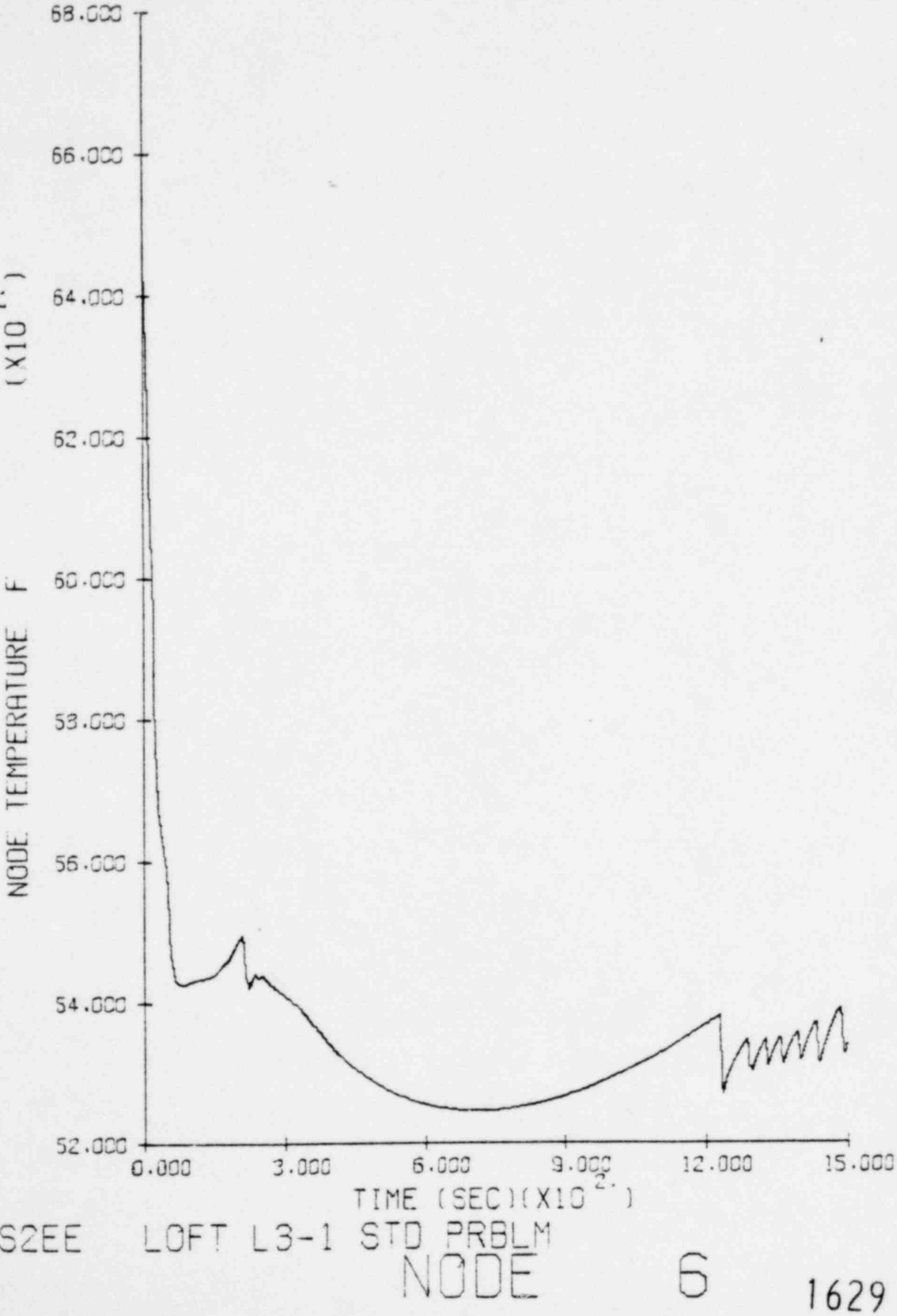

Figure 55 - Fluid Temperature, Pressurizer (C_D = 0.9)

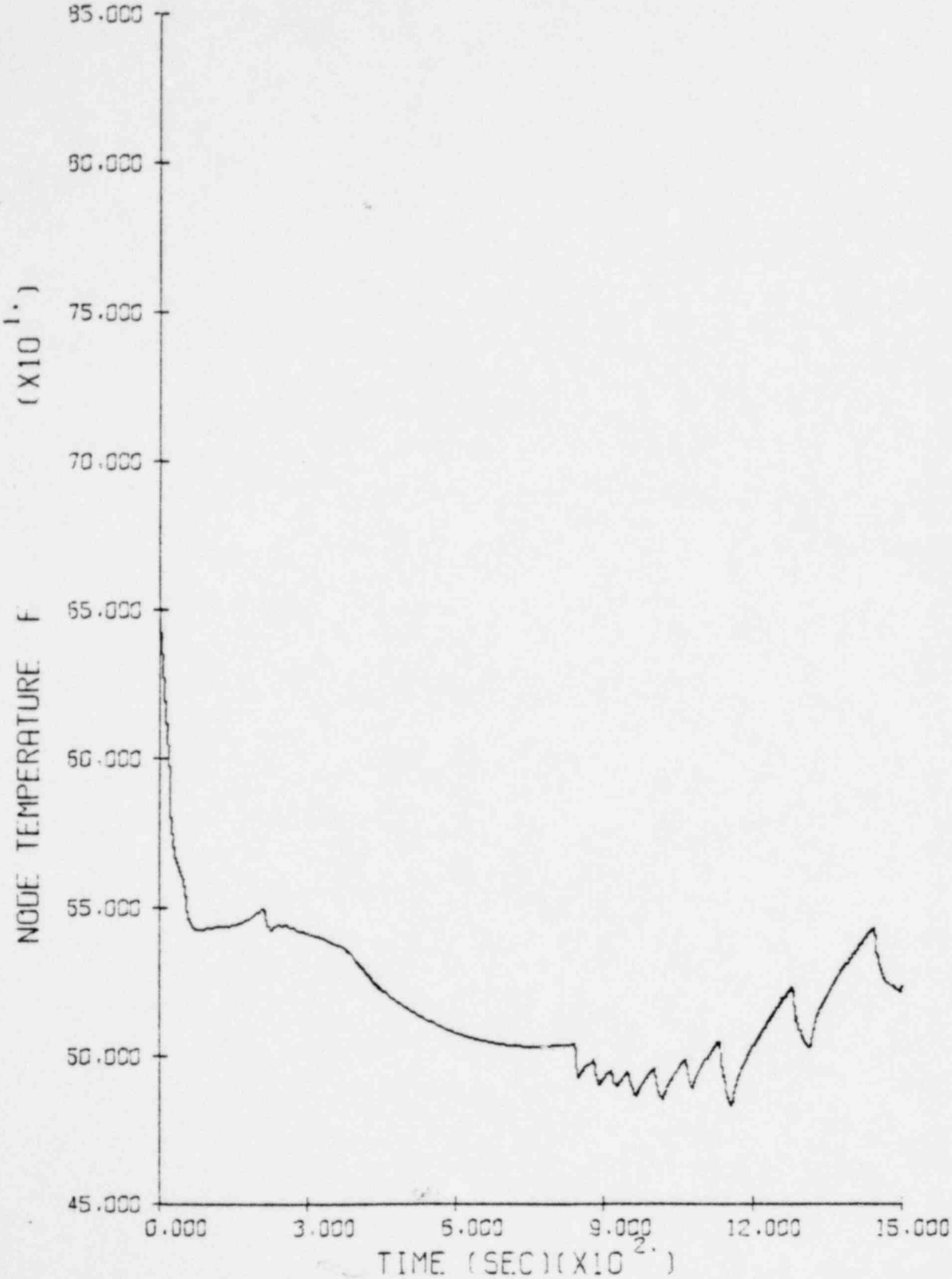

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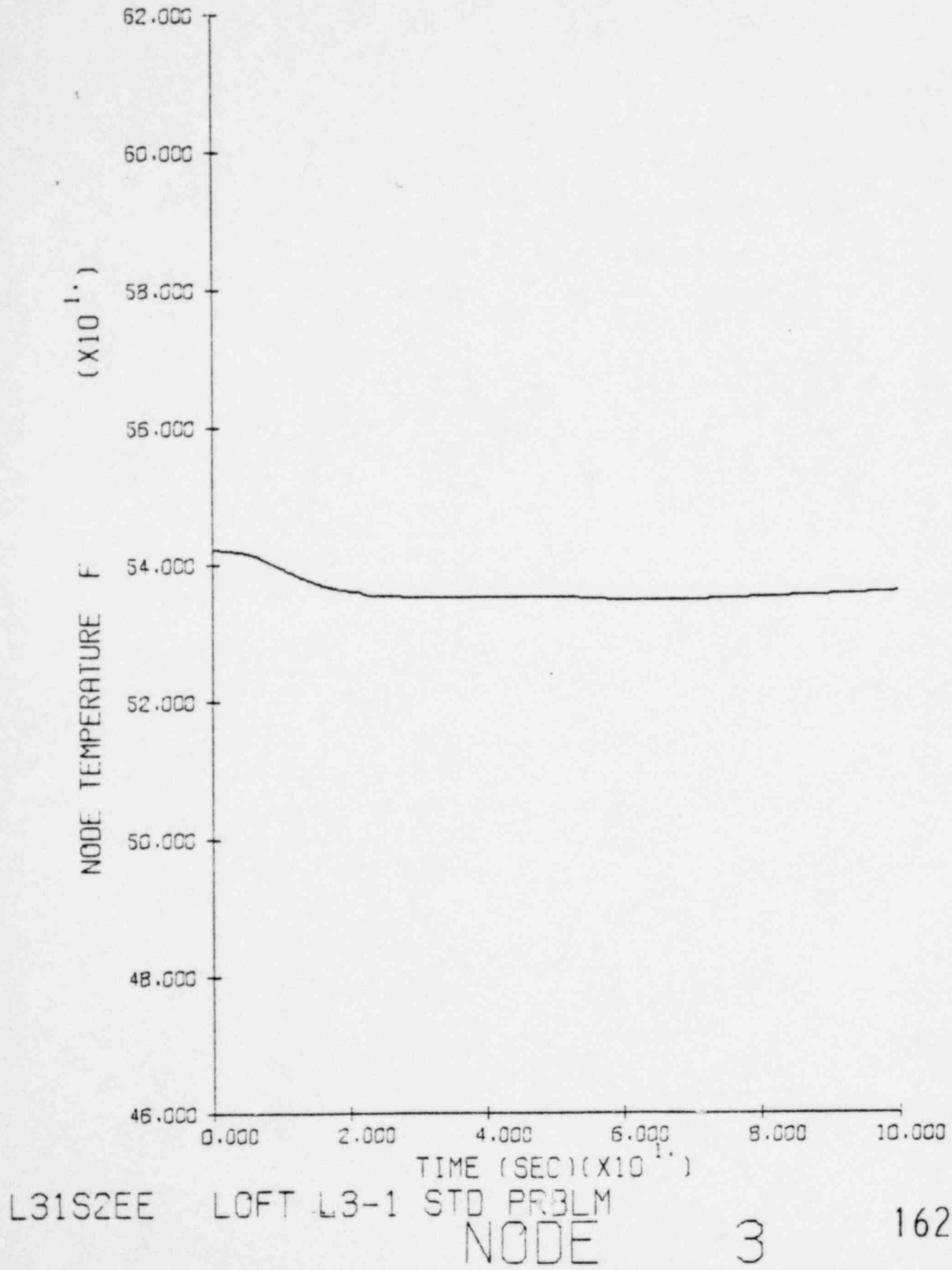
Figure 56 - Fluid Temperature, Lower Plenum (0 to 100 sec.)



1629 106

Figure 57 - Fluid Temperature, Lower Plenum (C_D = 0.6)

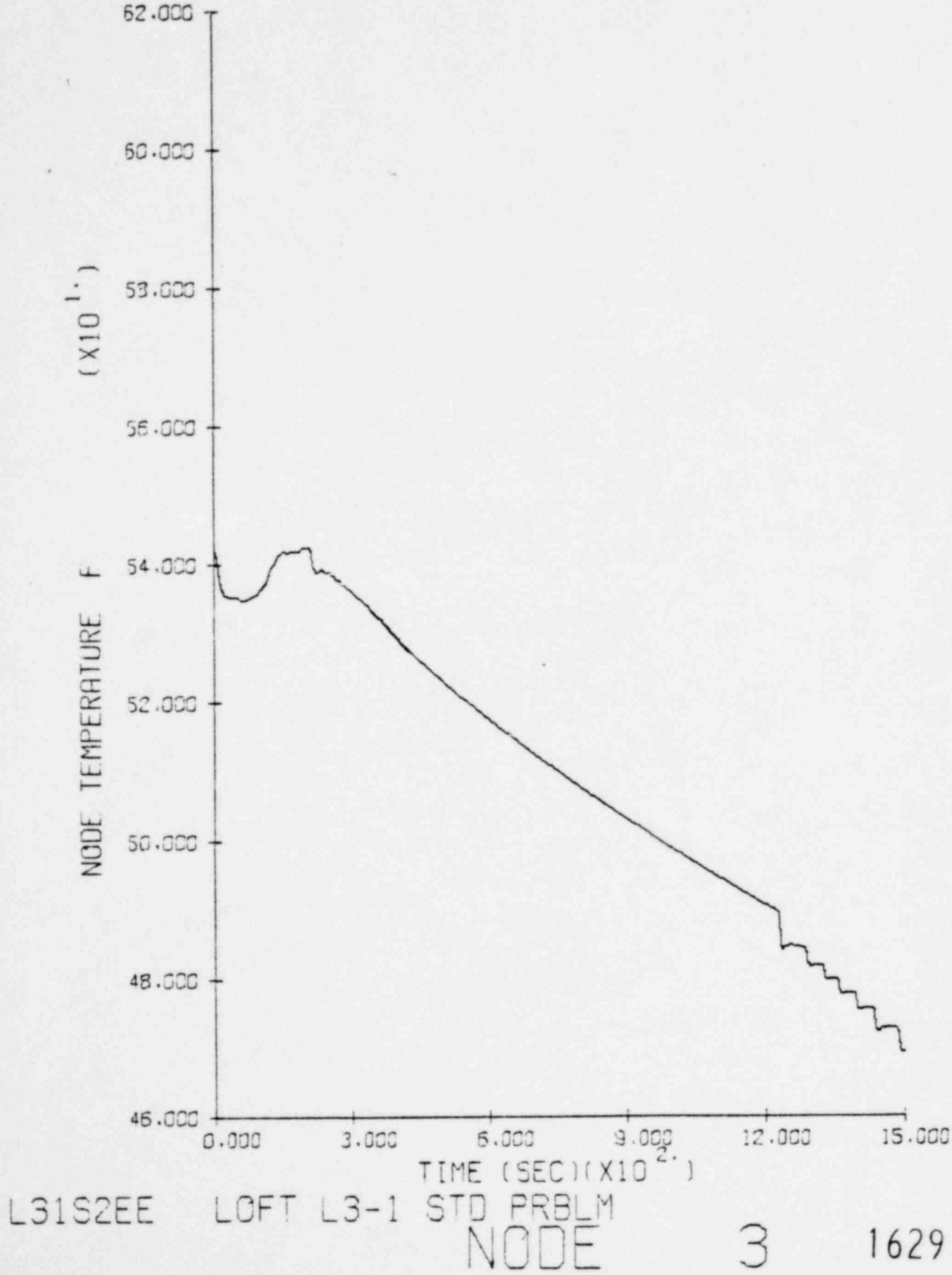


Figure 58 - Fluid Temperature, Lower Plenum (C_D = 0.9)

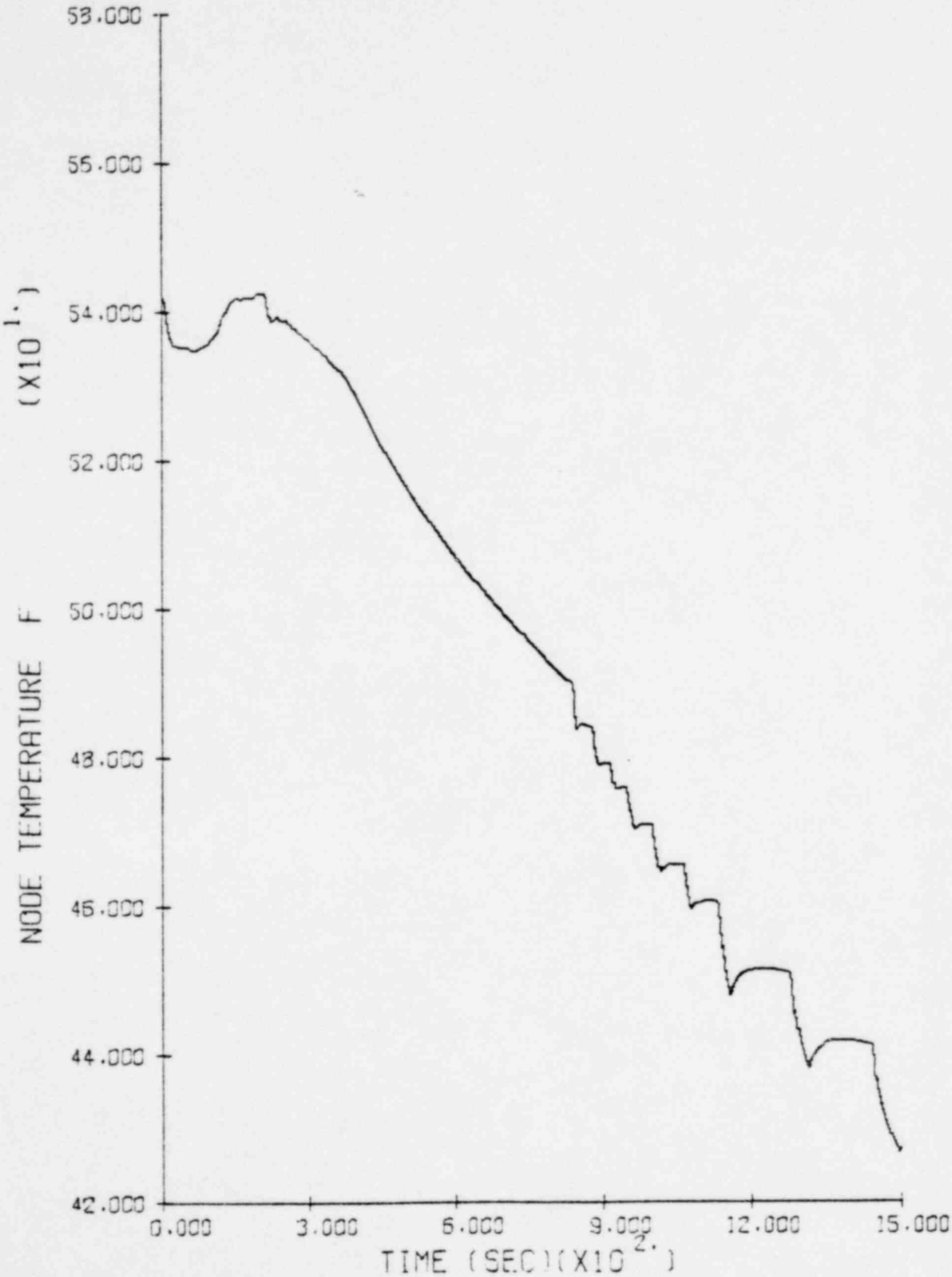


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Figure 59 - Flow Rate, Core Inlet, Path 1 (0 to 100 sec.)

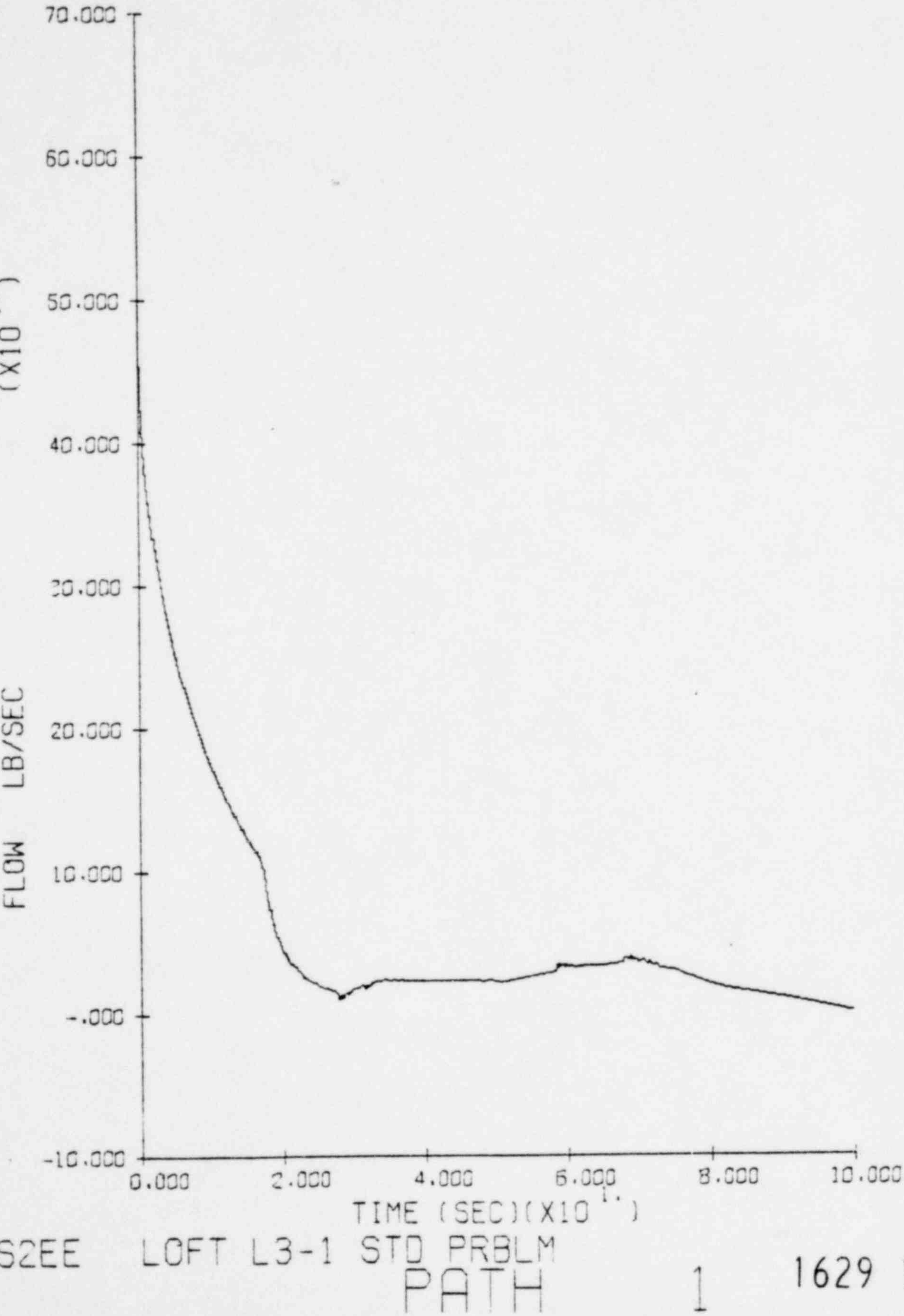
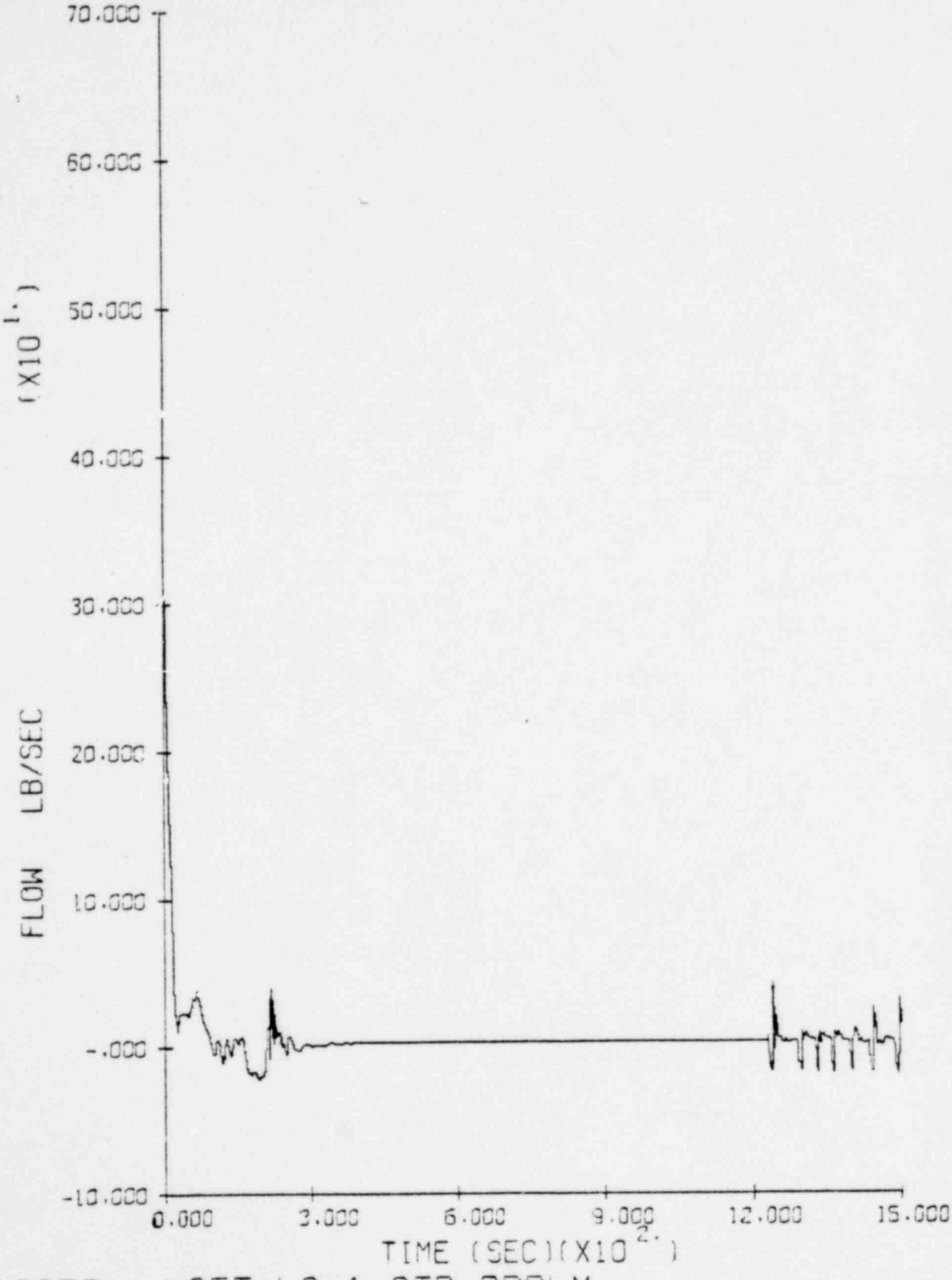


Figure 60 - Flow Rate, Core Inlet, Path 1 (C_D = 0.6)



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PATH 1

Figure 61 - Flow Rate, Core Inlet, Path 1 (C_D = 0.9)

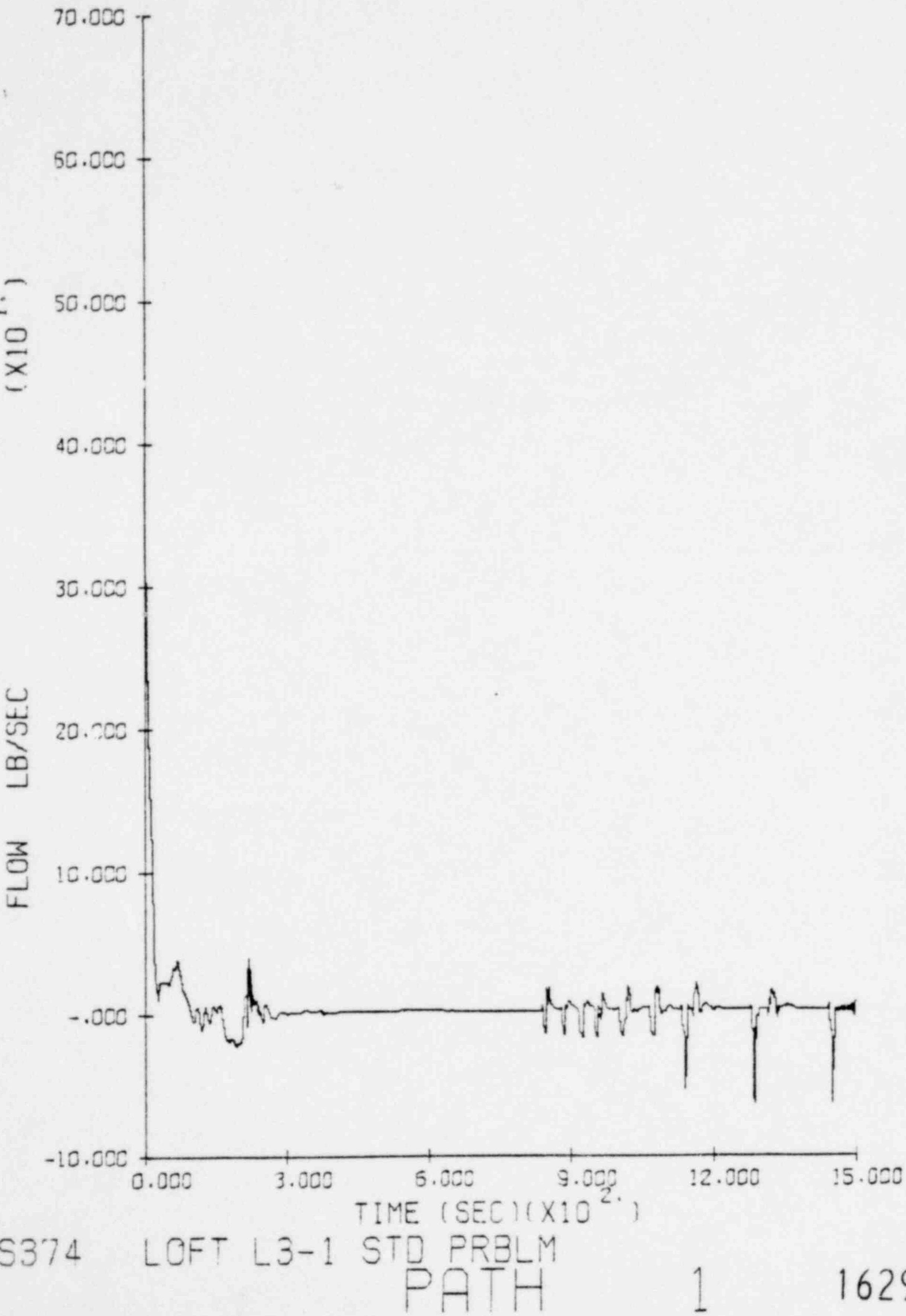
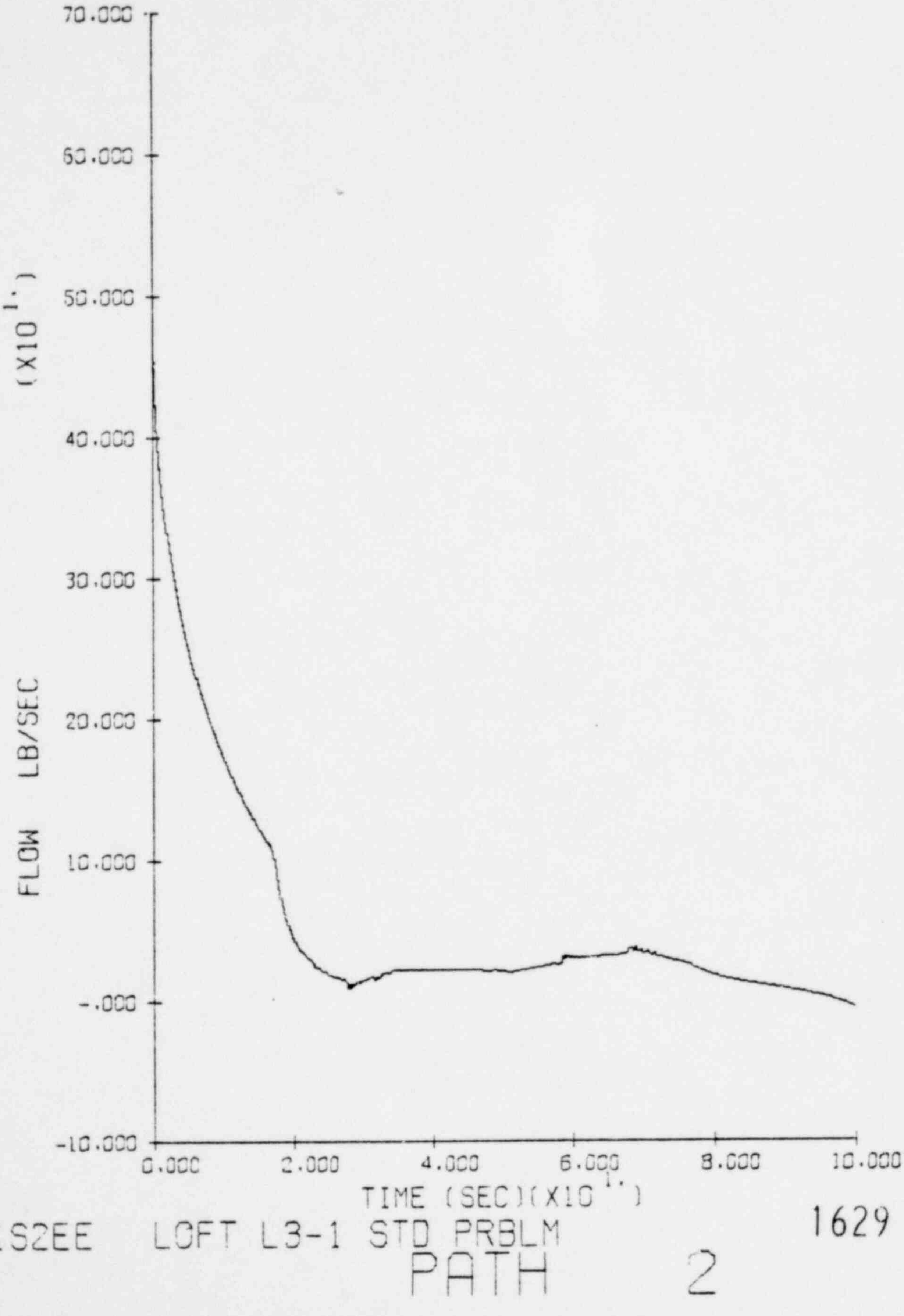


Figure 62 - Flow Rate, Core Inlet, Path 2 (0 to 100 sec.)



1629 112

Figure 63 - Flow Rate, Core Inlet, Path 2 (C_D = 0.6)

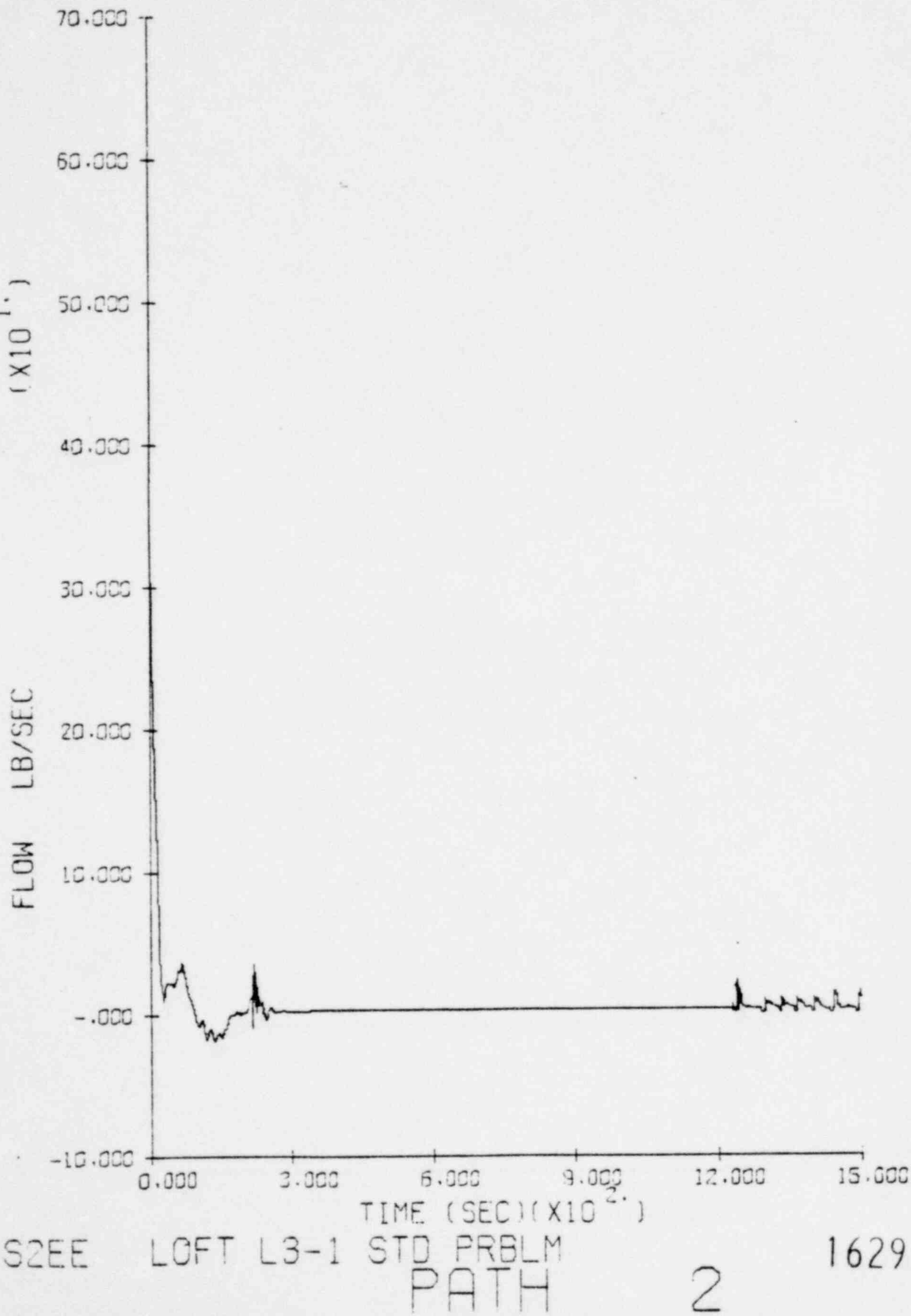


Figure 64 - Flow Rate, Core Inlet, Path 2 (C_D = 0.9)

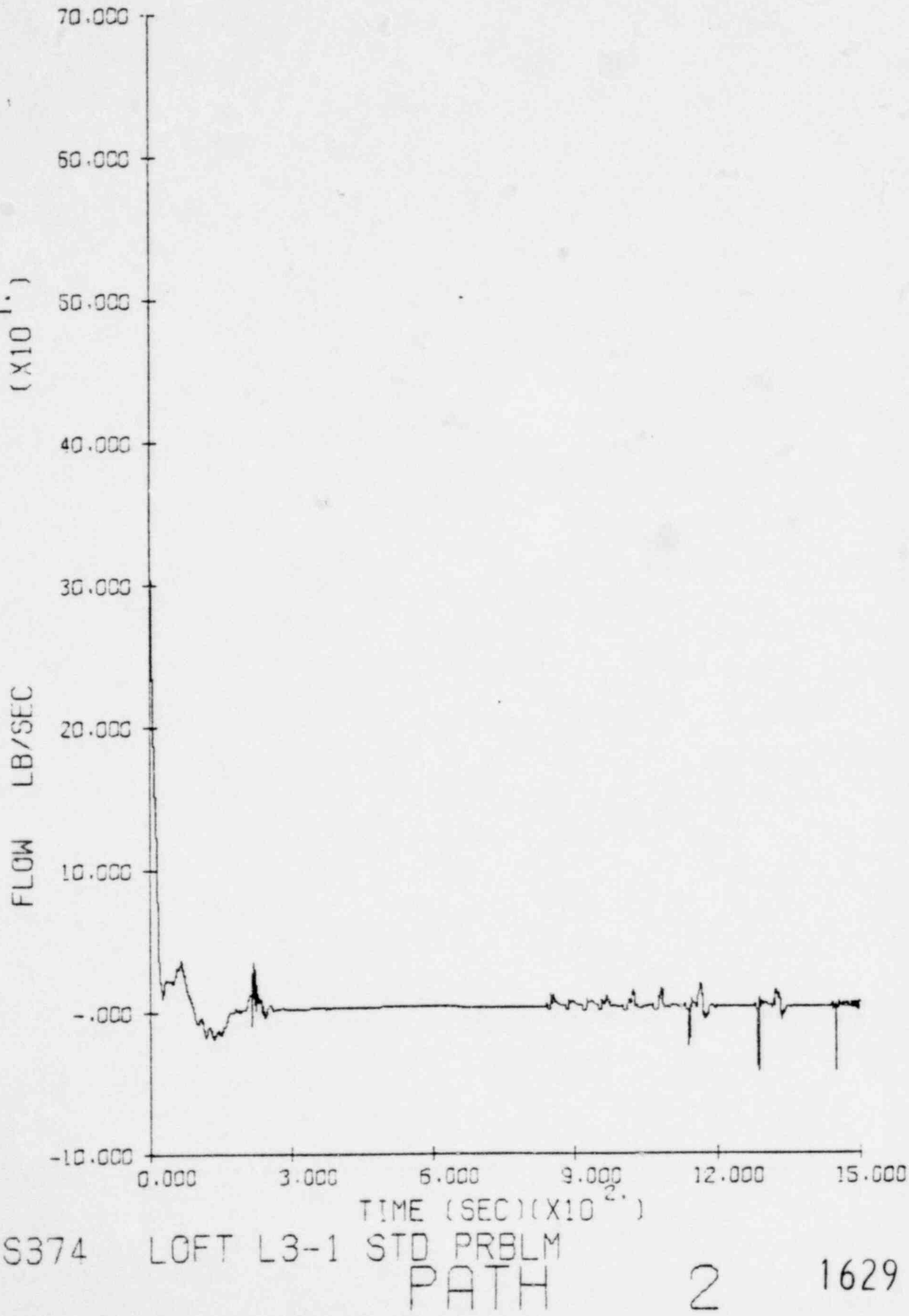


Figure 65 - Flow Rate, Core Inlet, Path 3 (0 to 100 sec.)

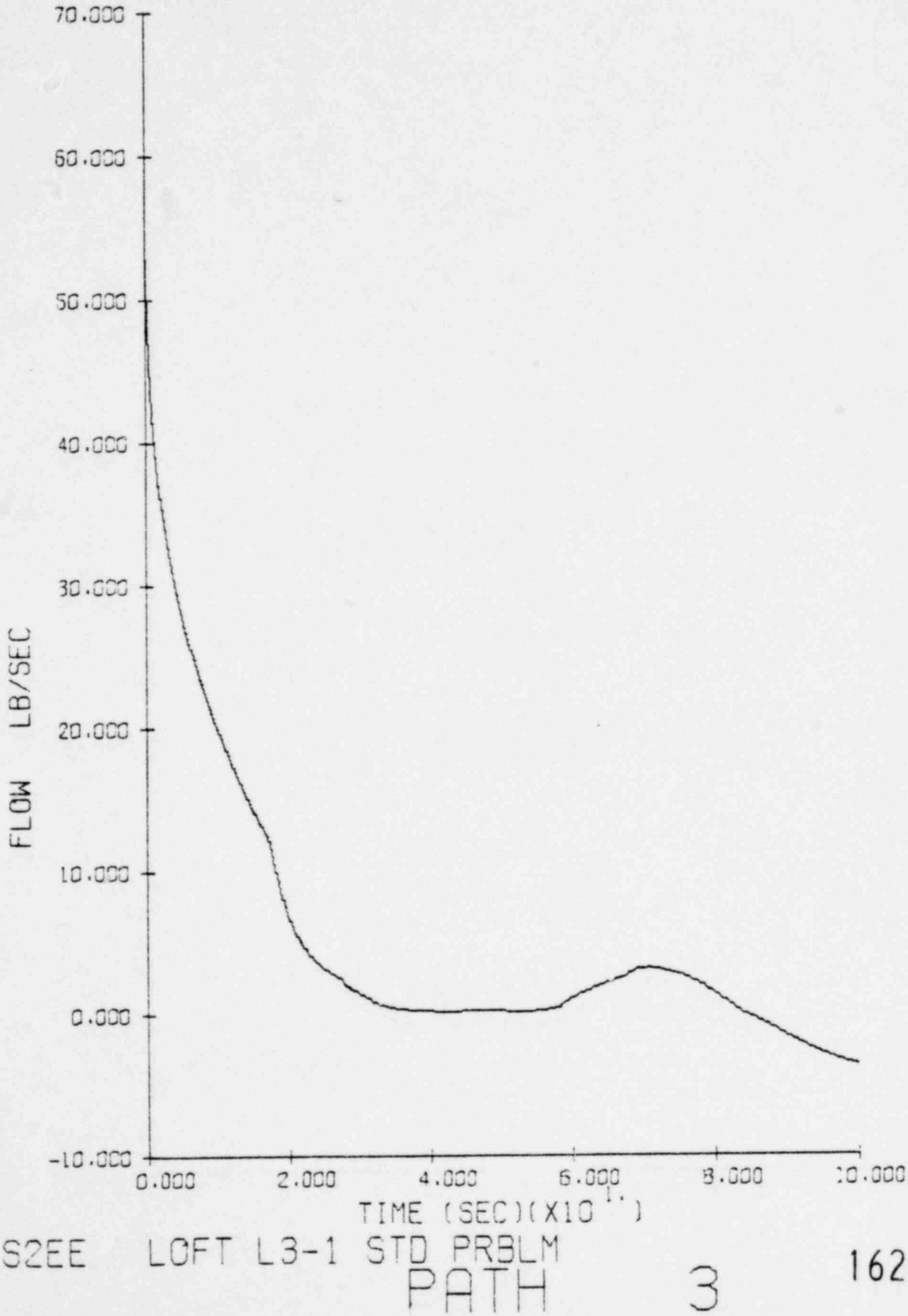


Figure 66 - Flow Rate, Core Inlet, Path 3 (C_D = 0.6)

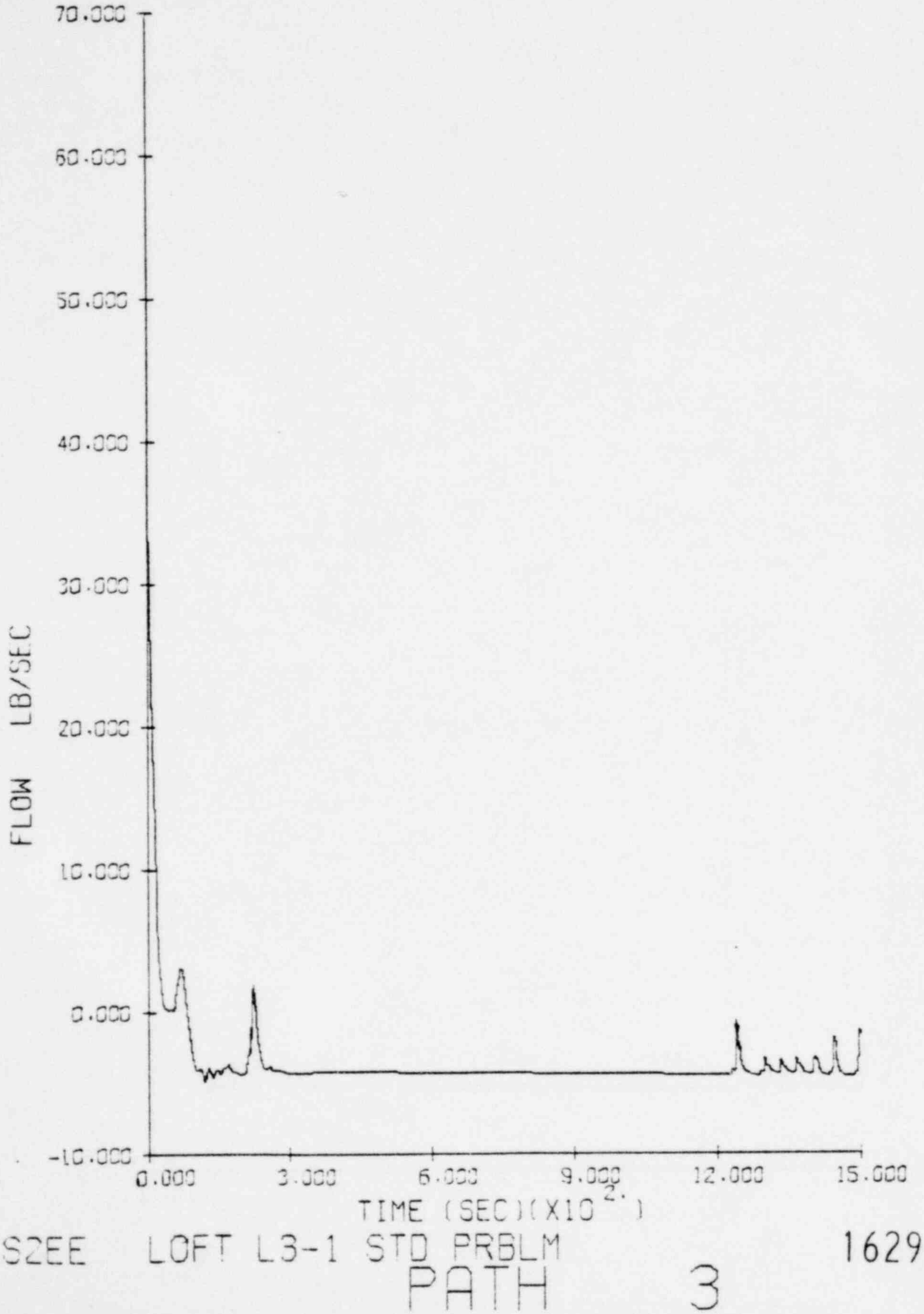
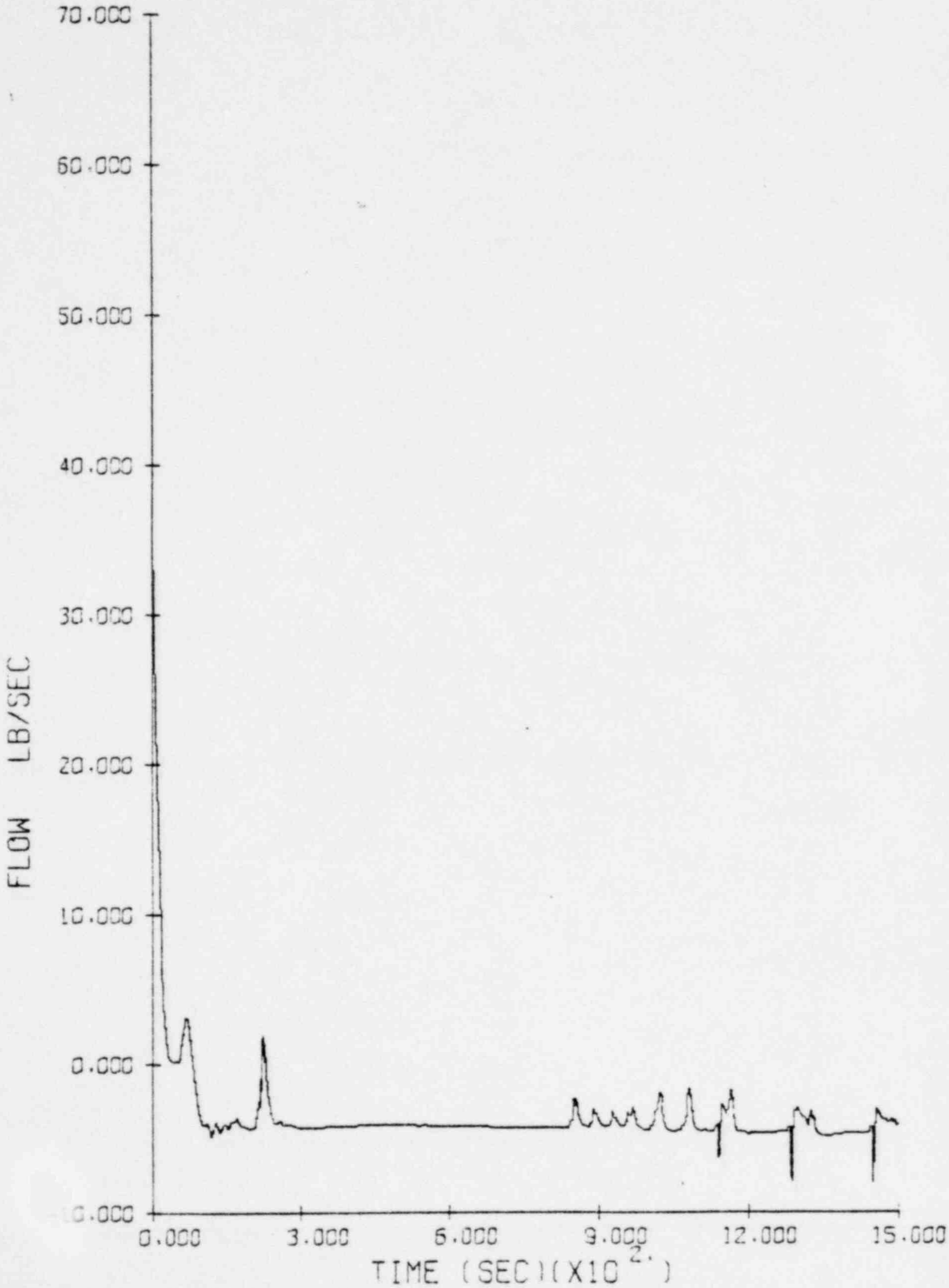


Figure 67 - Flow Rate, Core Inlet, Path 3 (C_D = 0.9)



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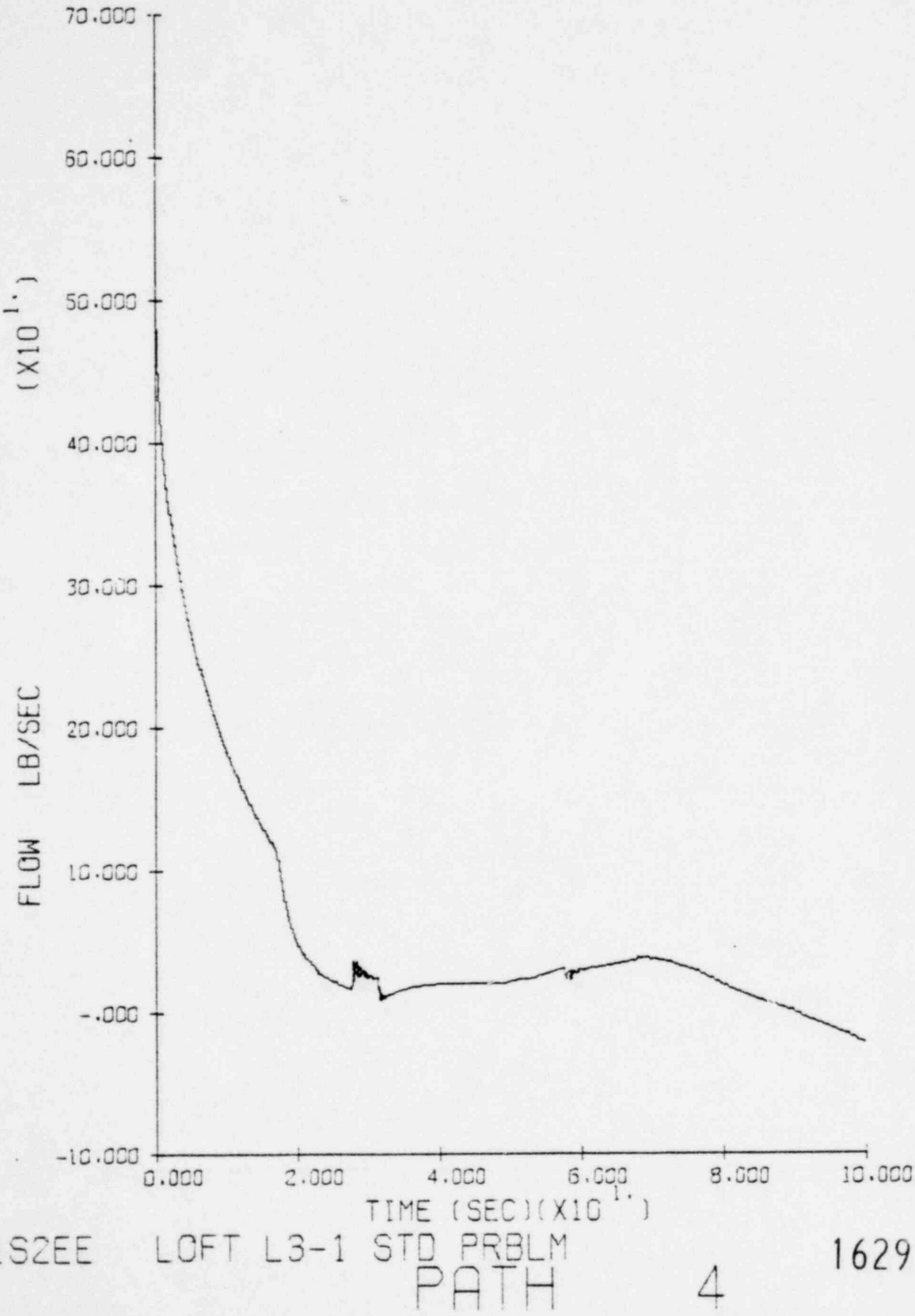
PATH 3

Figure 68 - Flow Rate, Core Outlet, Path 4 (0 to 100 sec.)



1629 118

Figure 69 - Flow Rate, Core Outlet, Path 4 (C_D = 0.6)

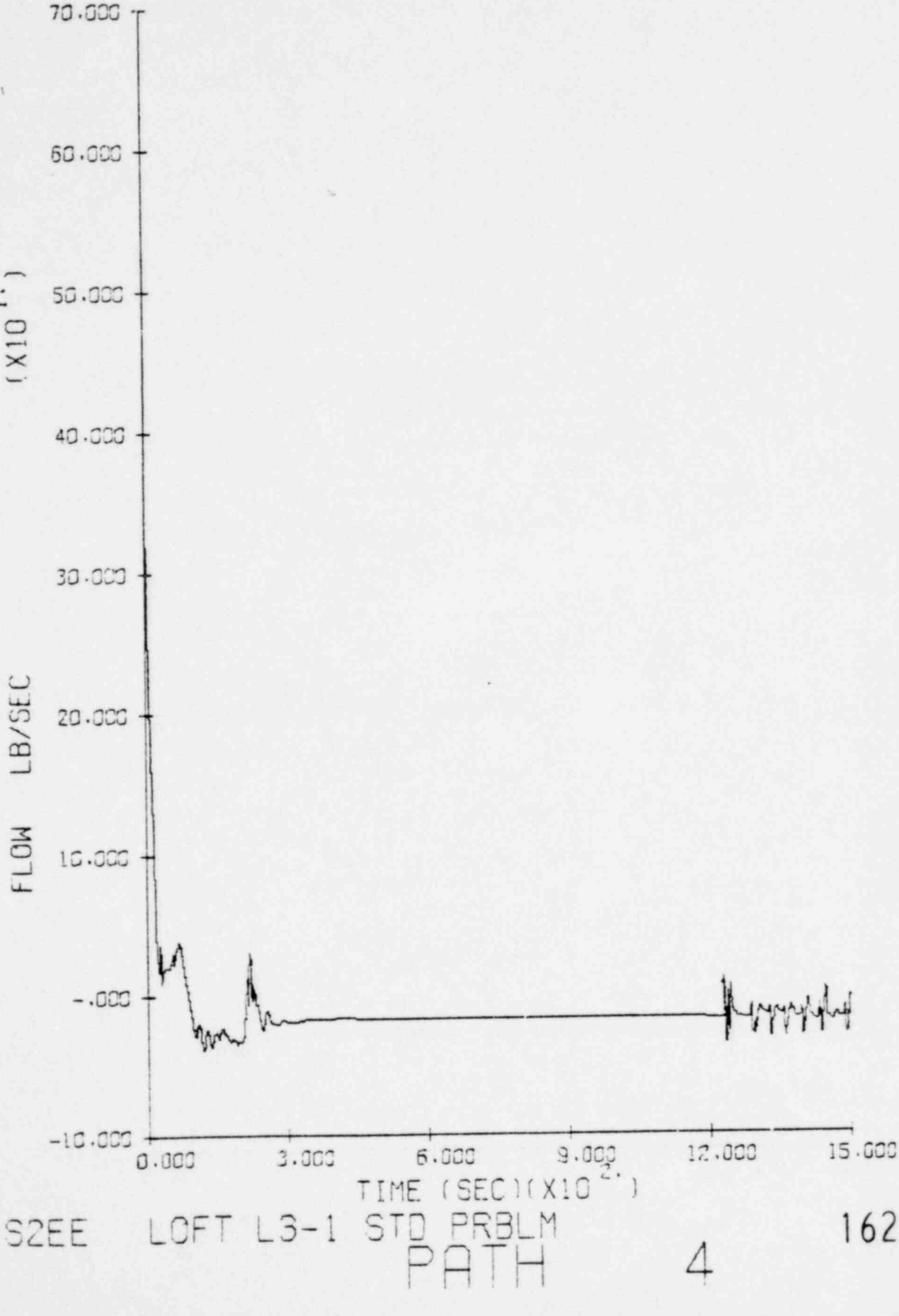


Figure 70 - Flow Rate, Core Outlet, Path 4 (C_D = 0.9)

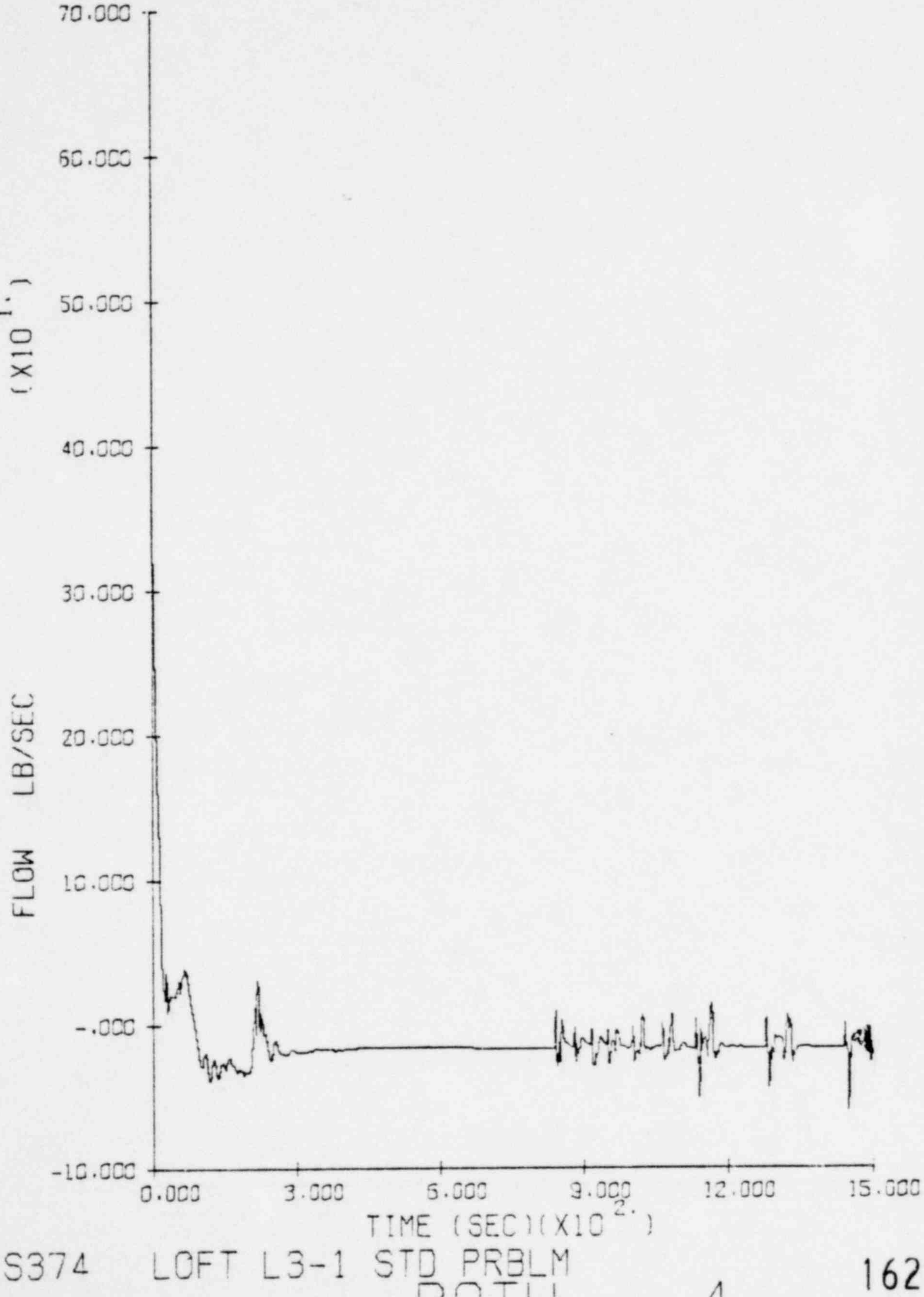


Figure 71 - Flow Rate, Core Outlet, Path 5 (0 to 100 sec.)

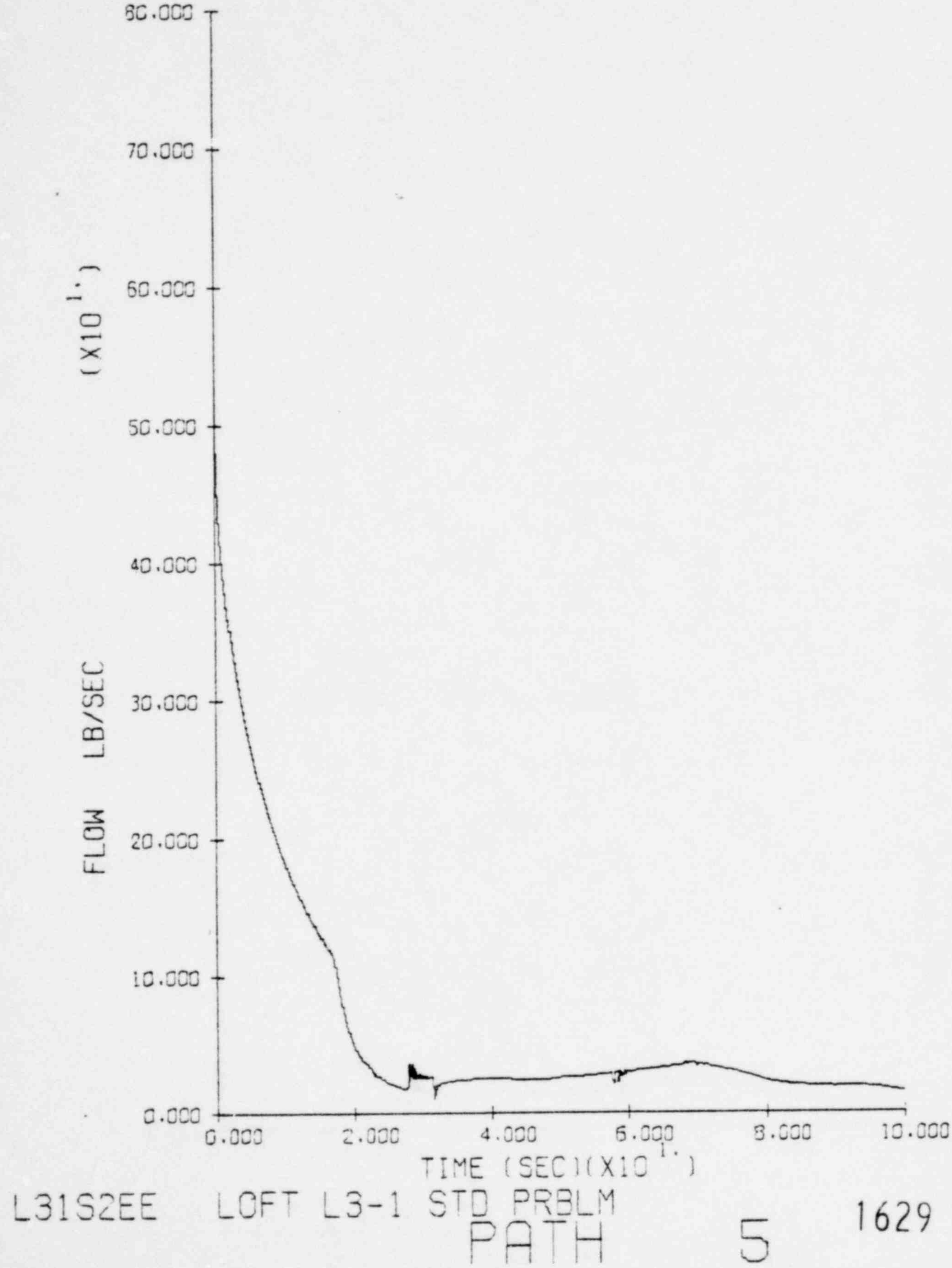


Figure 72 - Flow Rate, Core Outlet, Path 5 (C_D = 0.6)

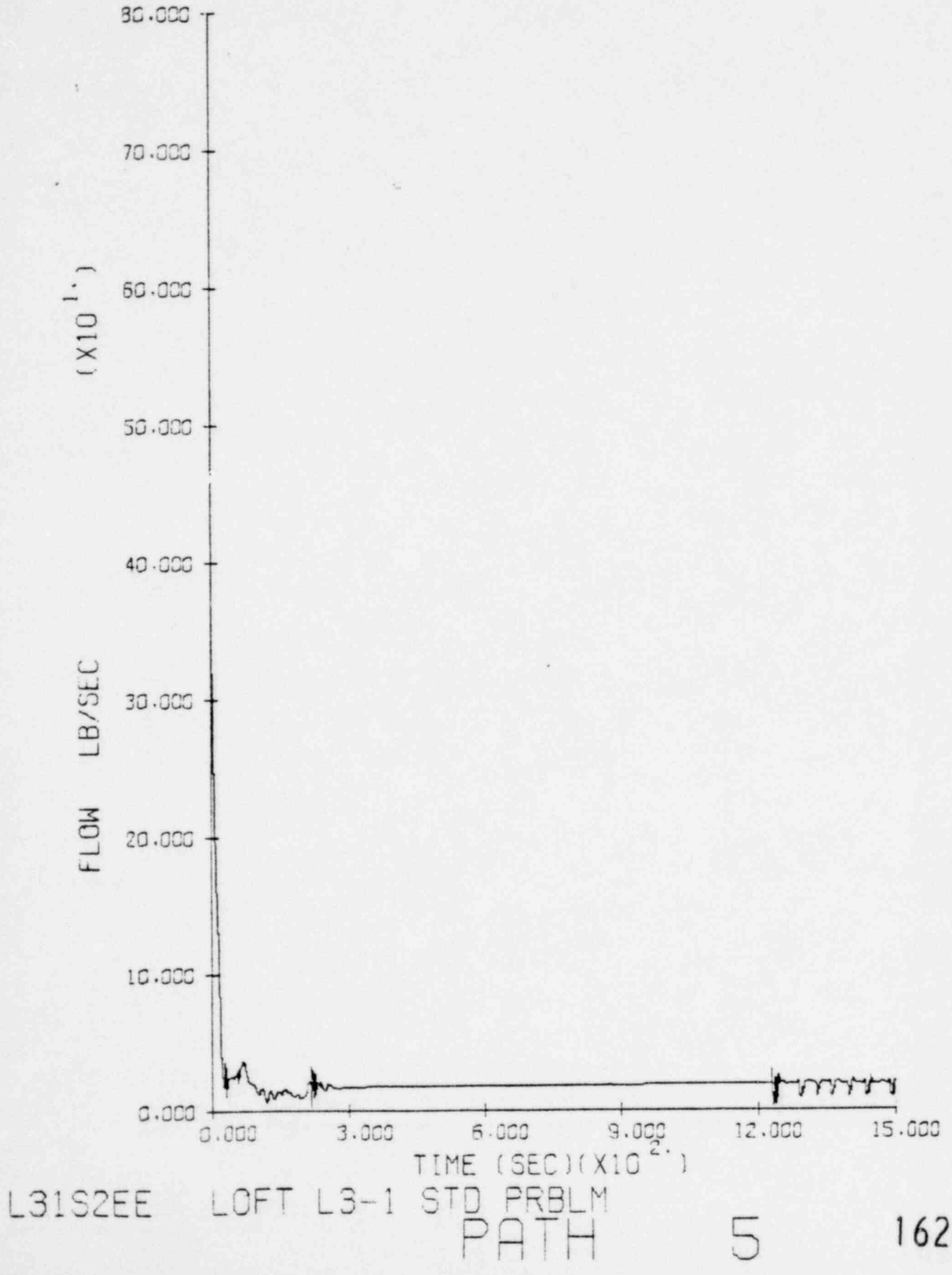
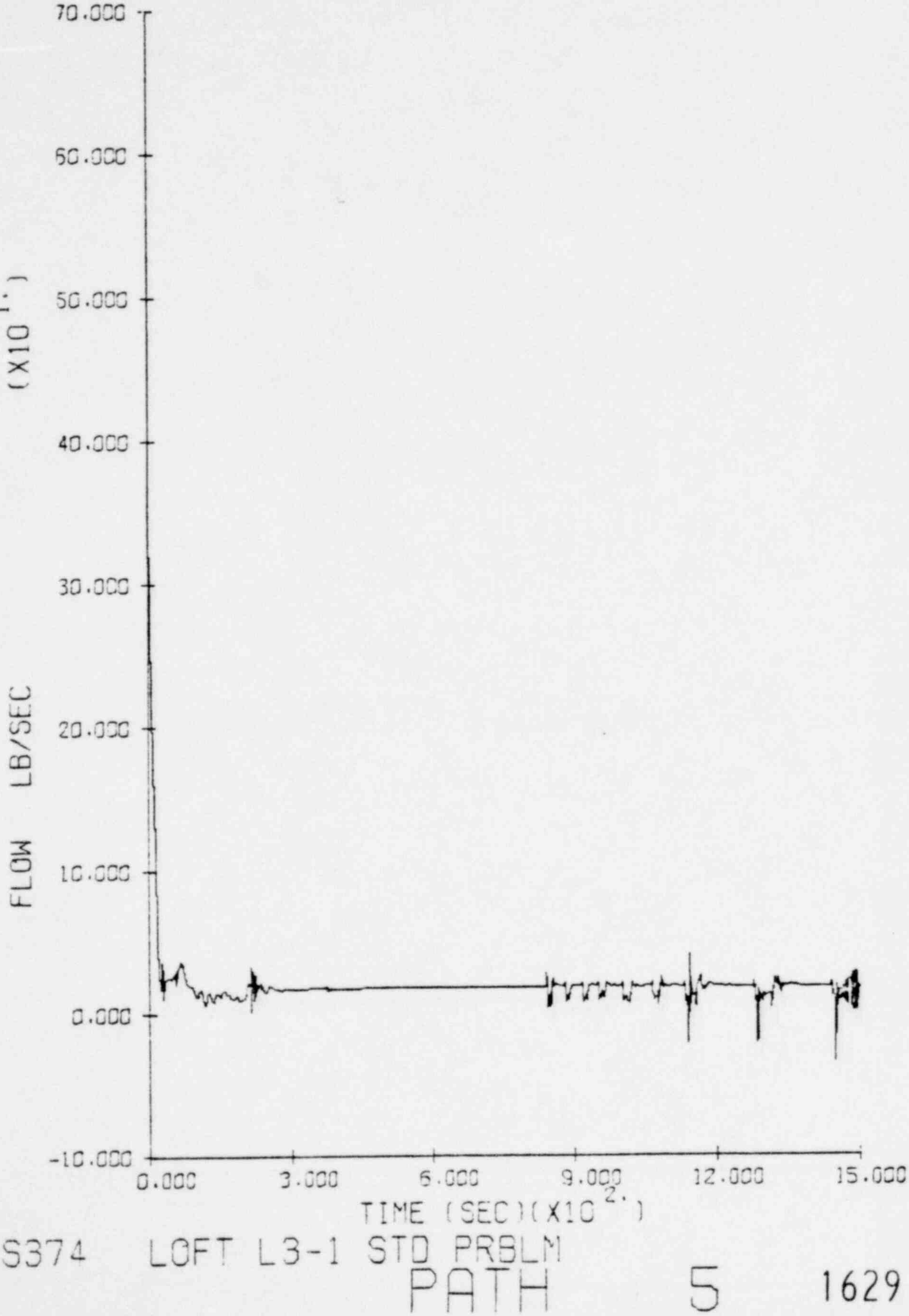
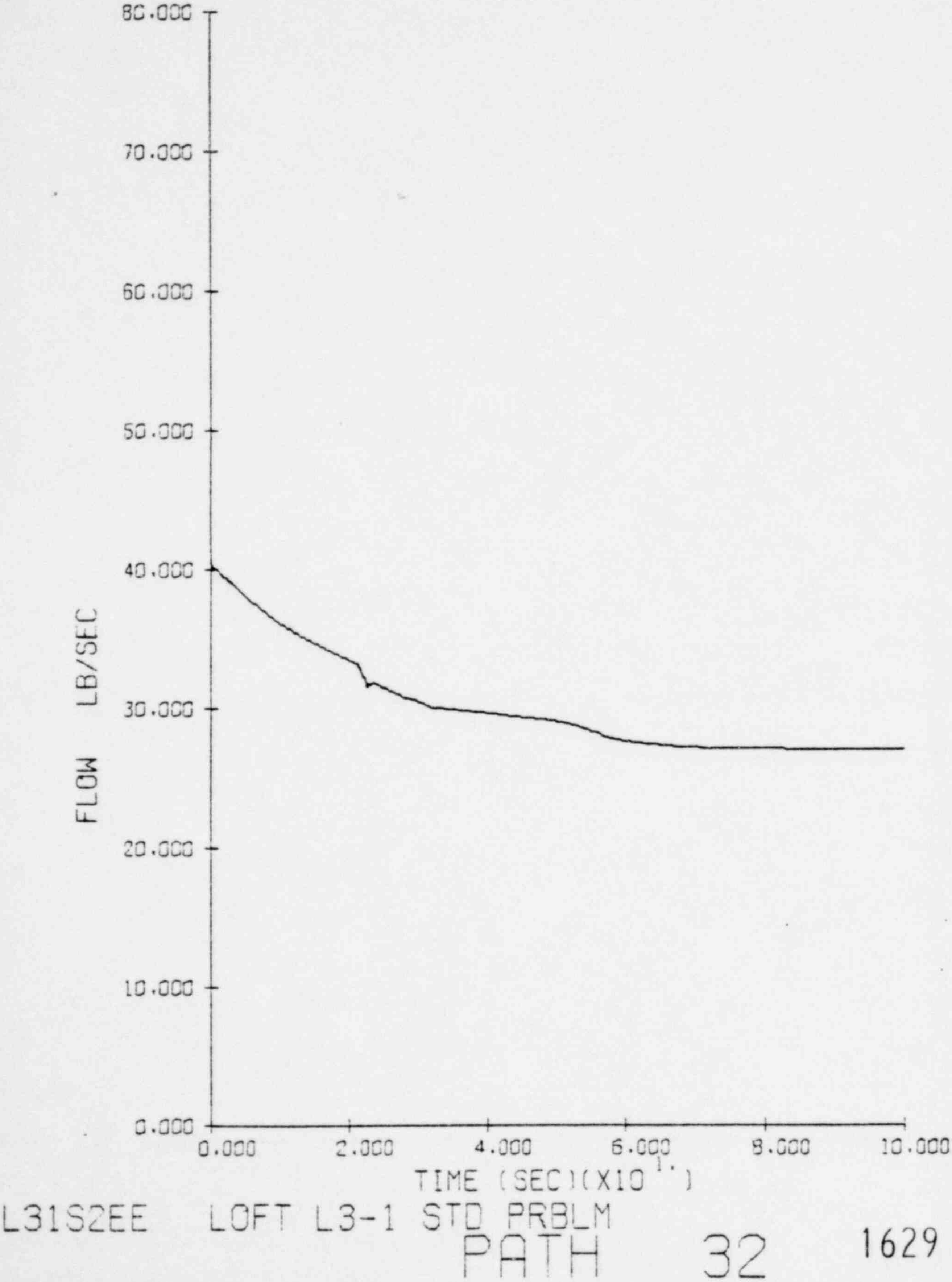


Figure 73 - Flow Rate, Core Outlet, Path 5 (C_D = 0.9)



1629 123

Figure 74 - Flow Rate, Break Flow, Path 32 (0 to 100 sec.)



1629 124

Figure 75 - Flow Rate, Break Flow, Path 32 (C_D = 0.6)

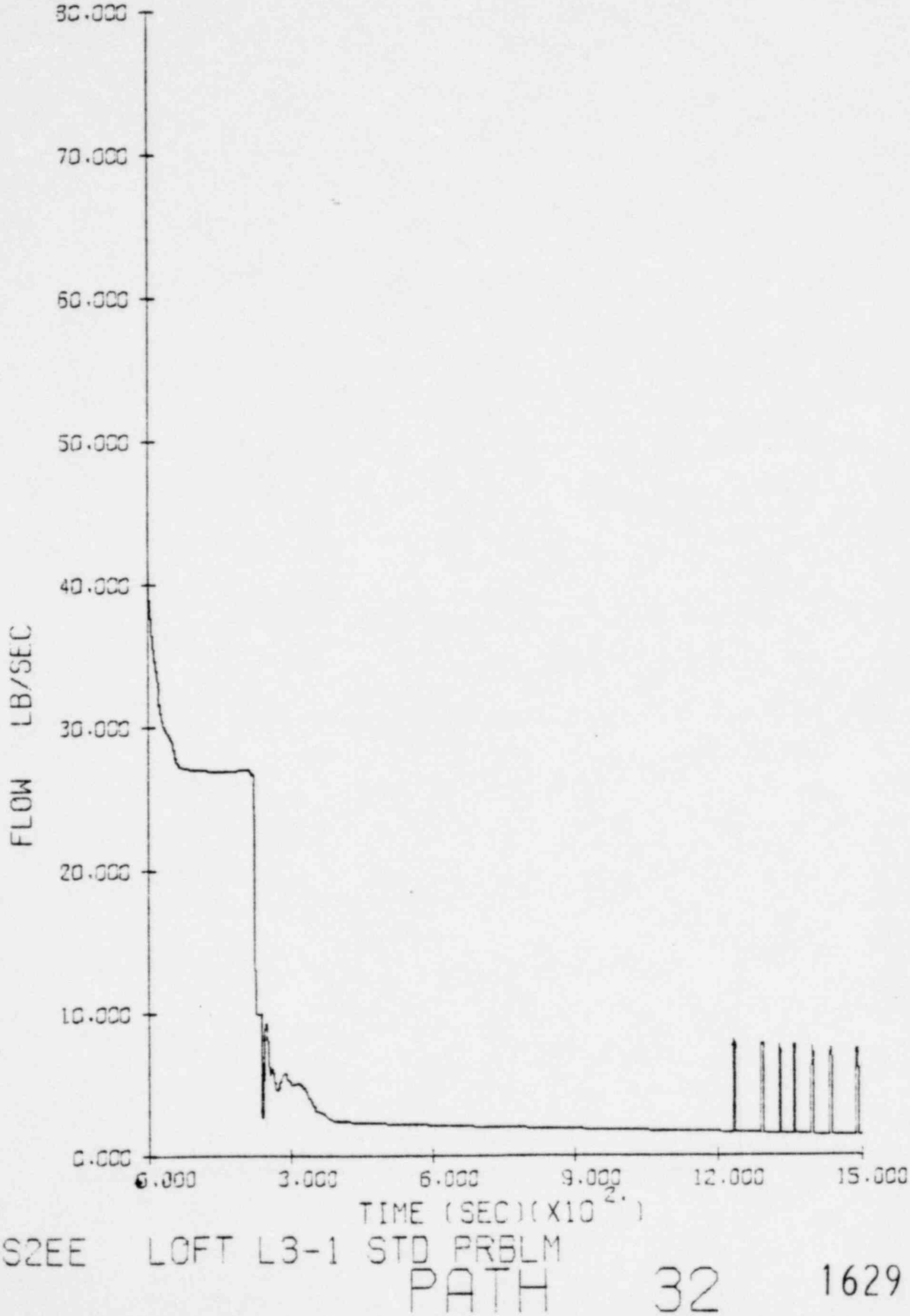
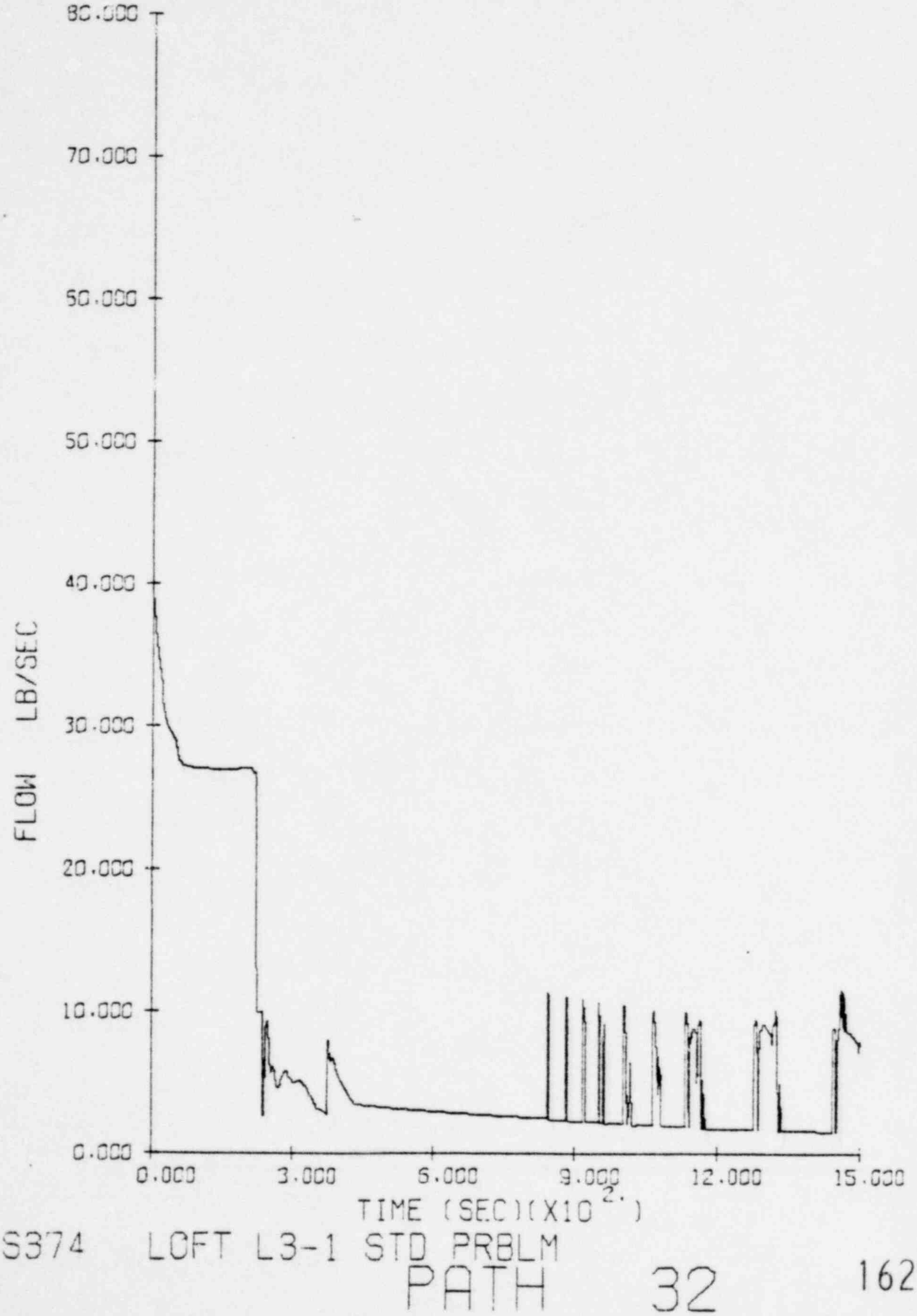


Figure 76 - Flow Rate, Break Flow, Path 32 (C_D = 0.9)



1629 126

Figure 77 - Flow Rate, Break Flow, Path 33 (0 to 100 sec.)

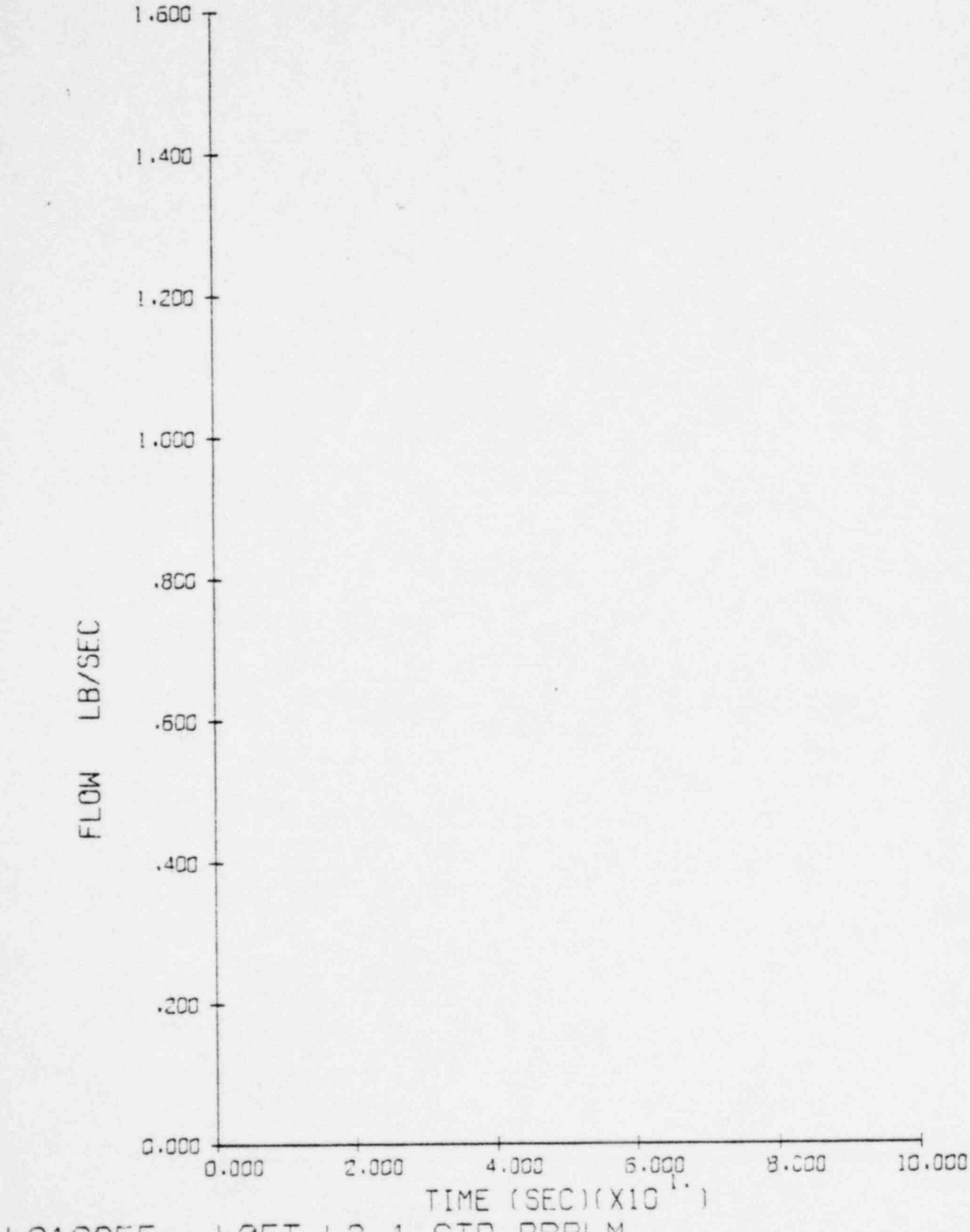


Figure 78 - Flow Rate, Break Flow, Path 33 (C_D = 0.6)

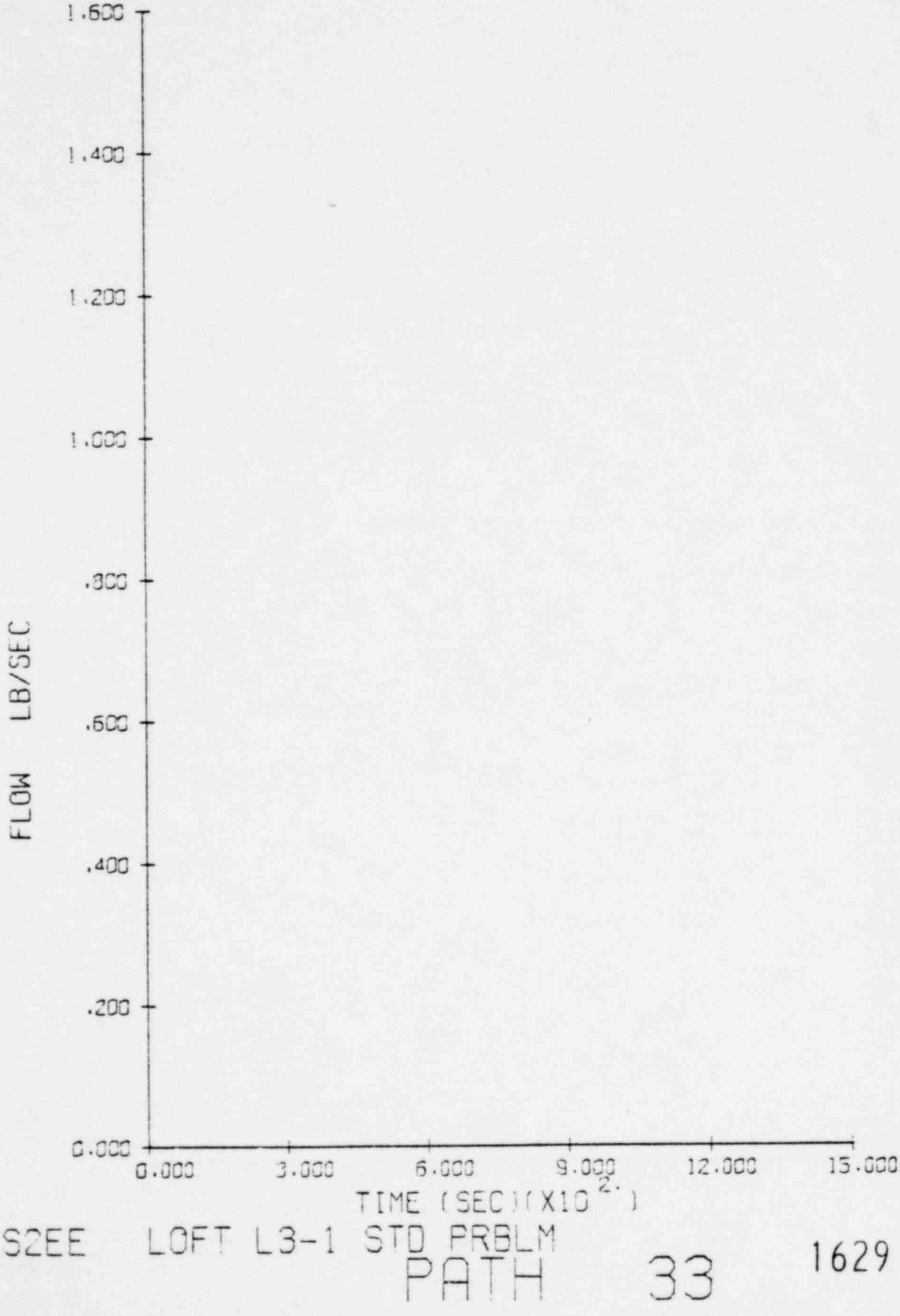


Figure 79 - Flow Rate, Break Flow, Path 33 (C_D = 0.9)

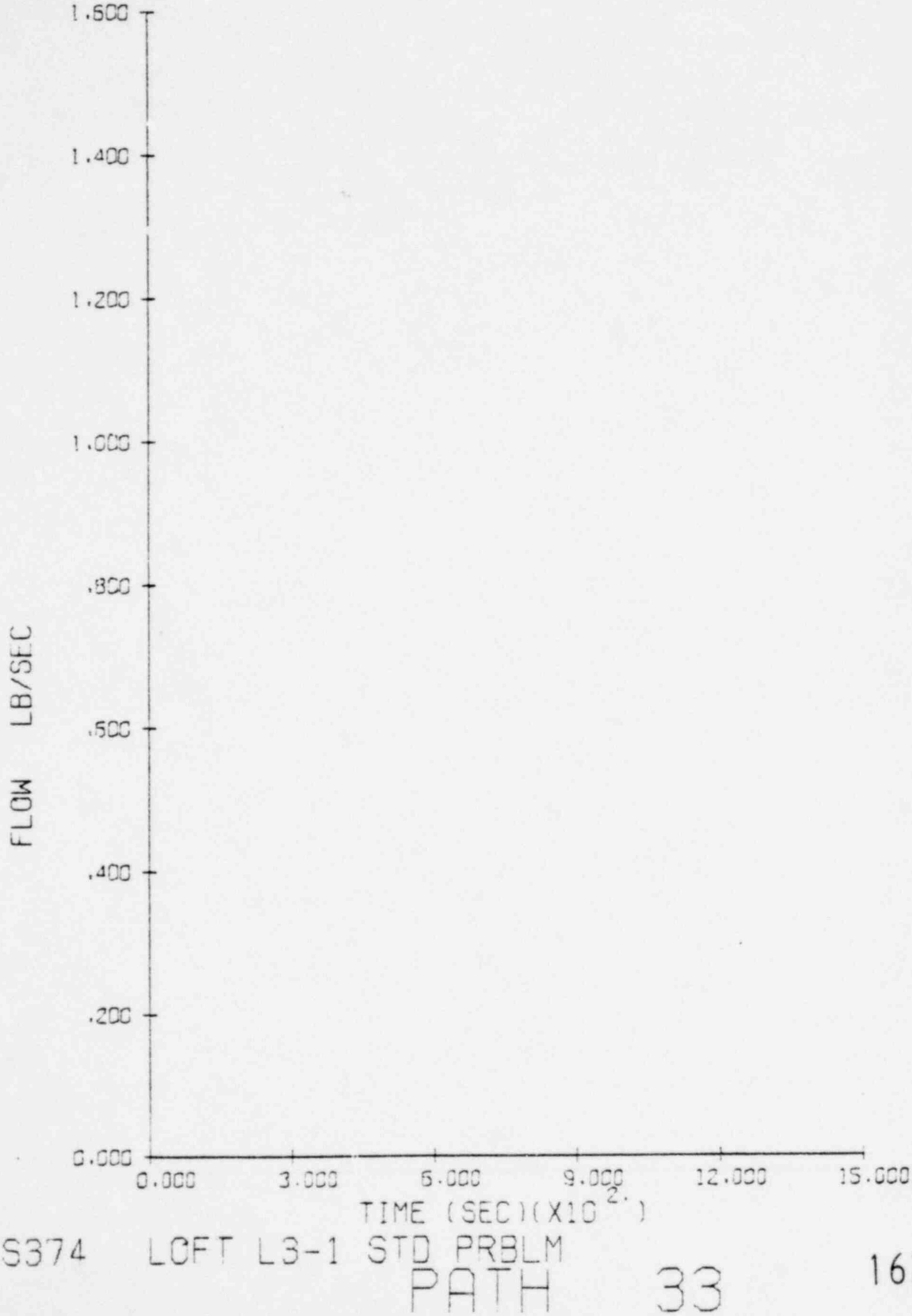


Figure 80 - Flow Rate, Cold Leg, Path 18 (0 to 100 sec.)

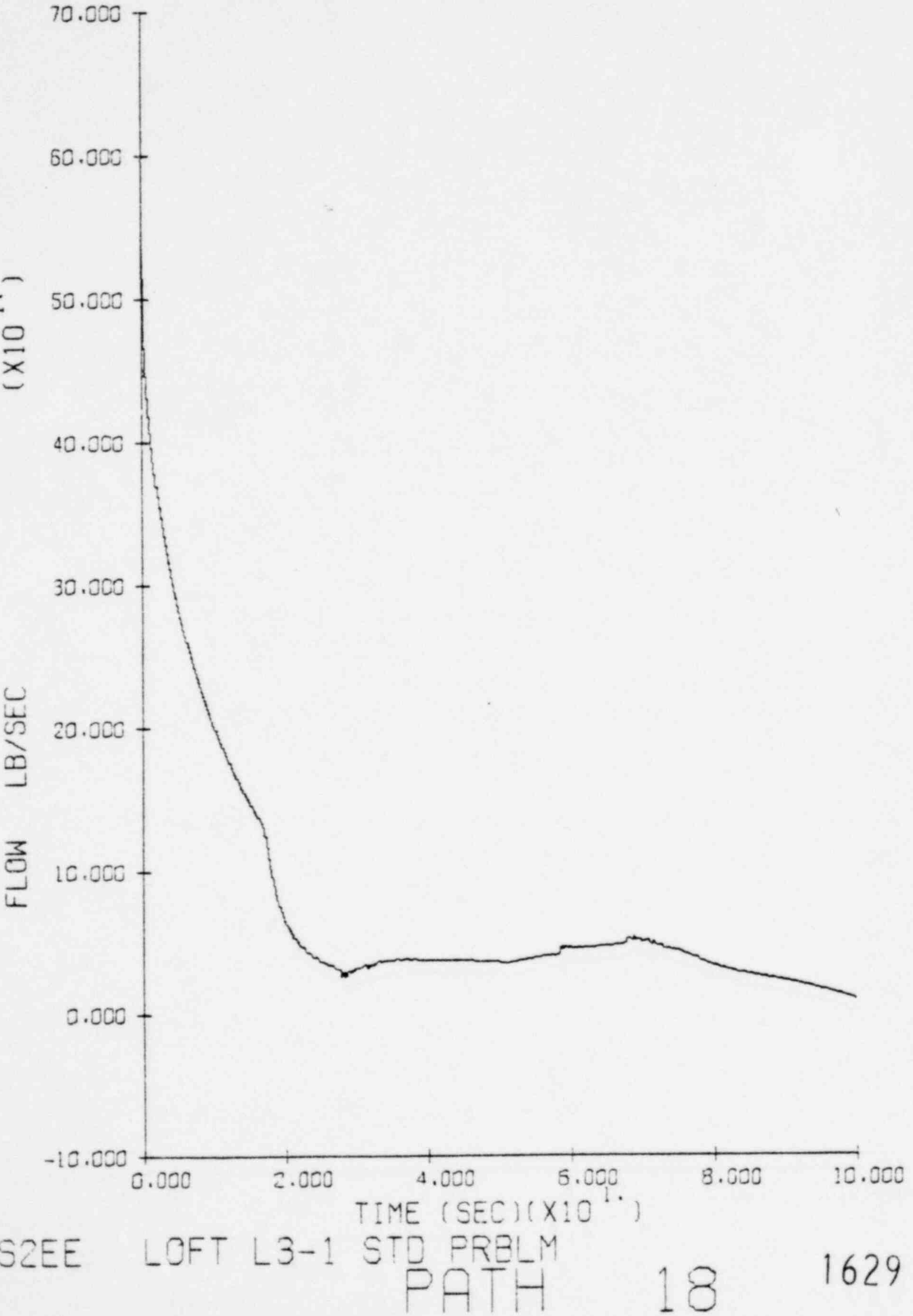


Figure 81 - Flow Rate, Cold Leg, Path 18 (C_D = 0.6)

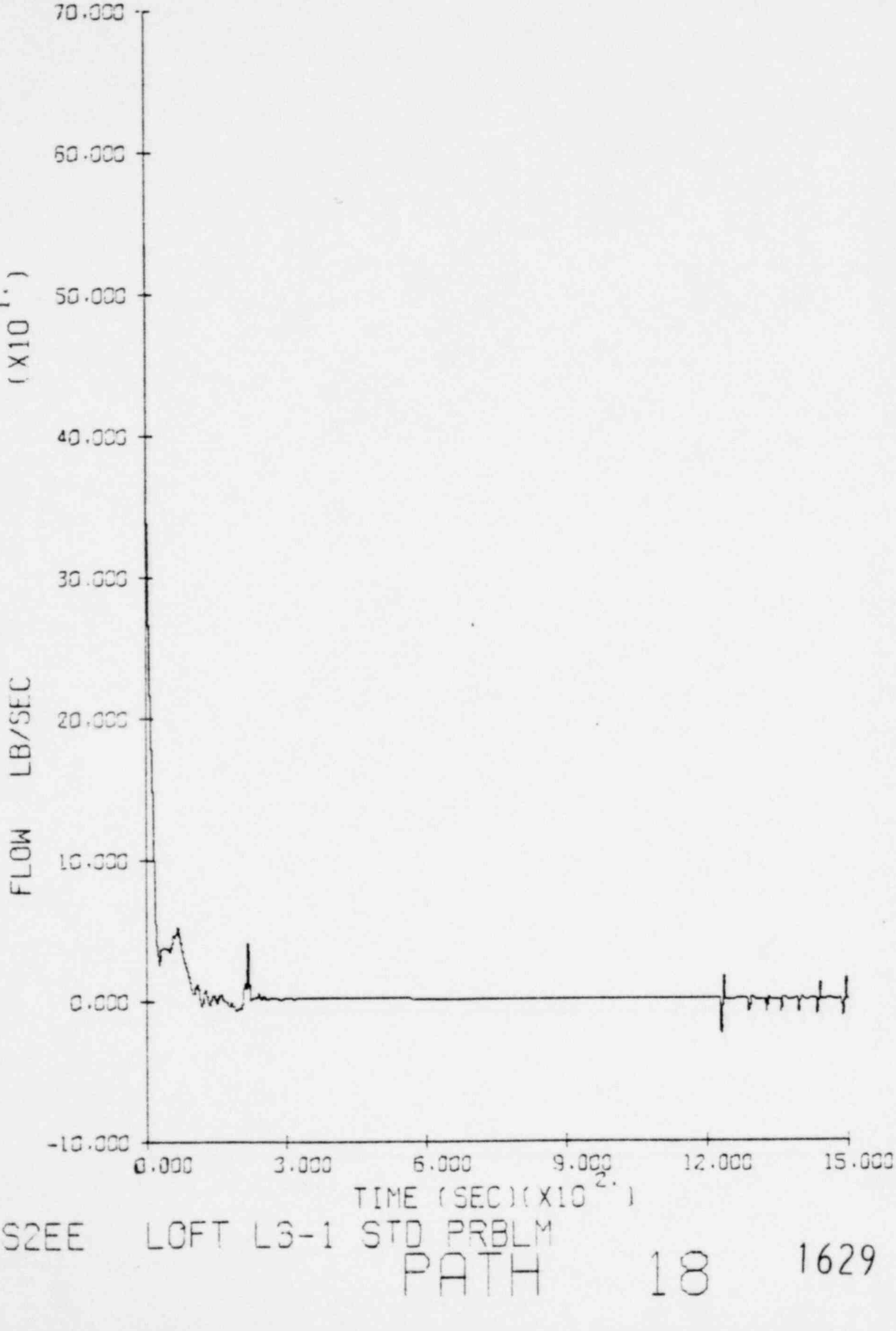


Figure 82 - Flow Rate, Cold Leg, Path 18 (C_D = 0.9)

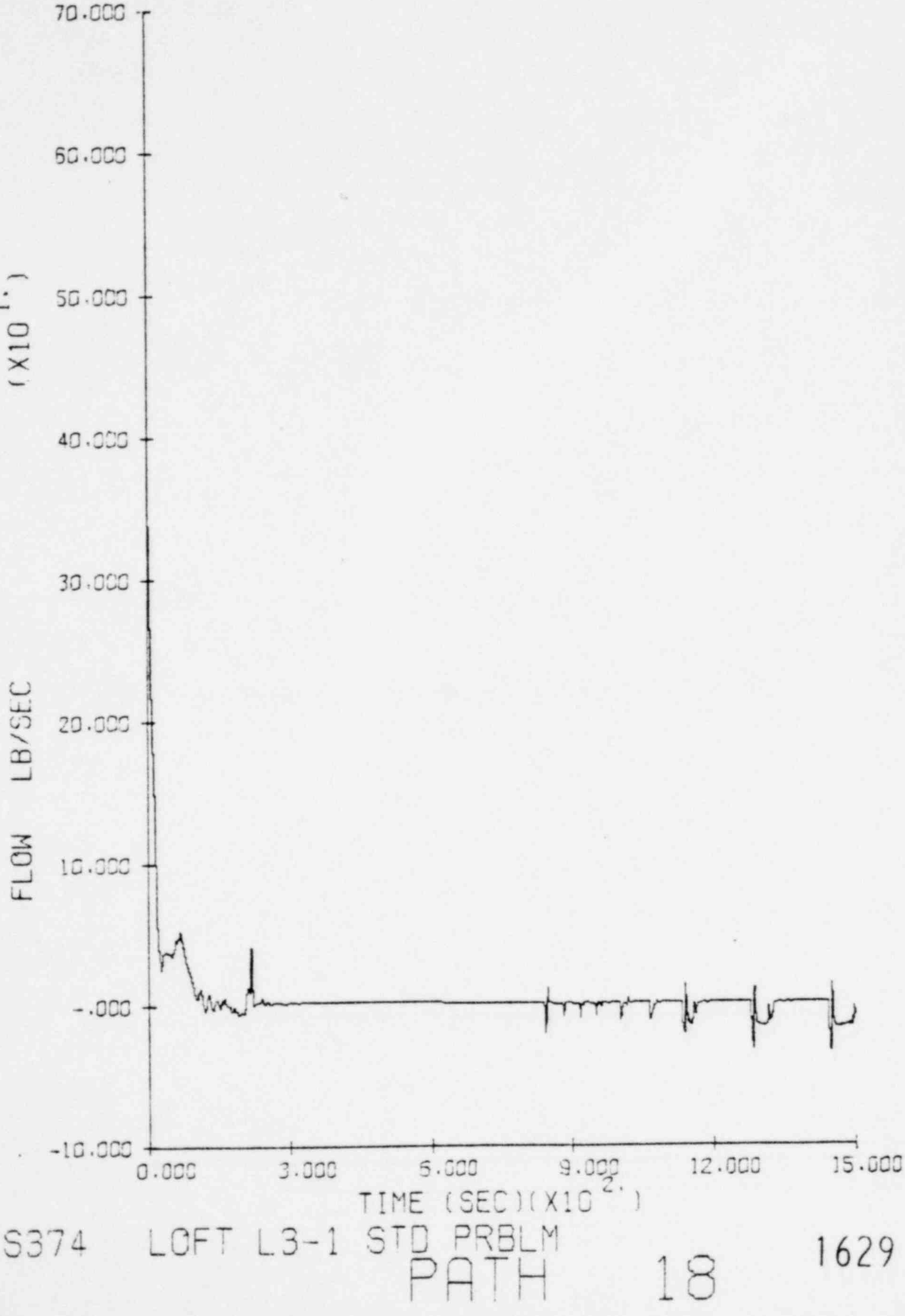


Figure 83 - Flow Rate, Cold Leg, Path 19 (0 to 100 sec.)

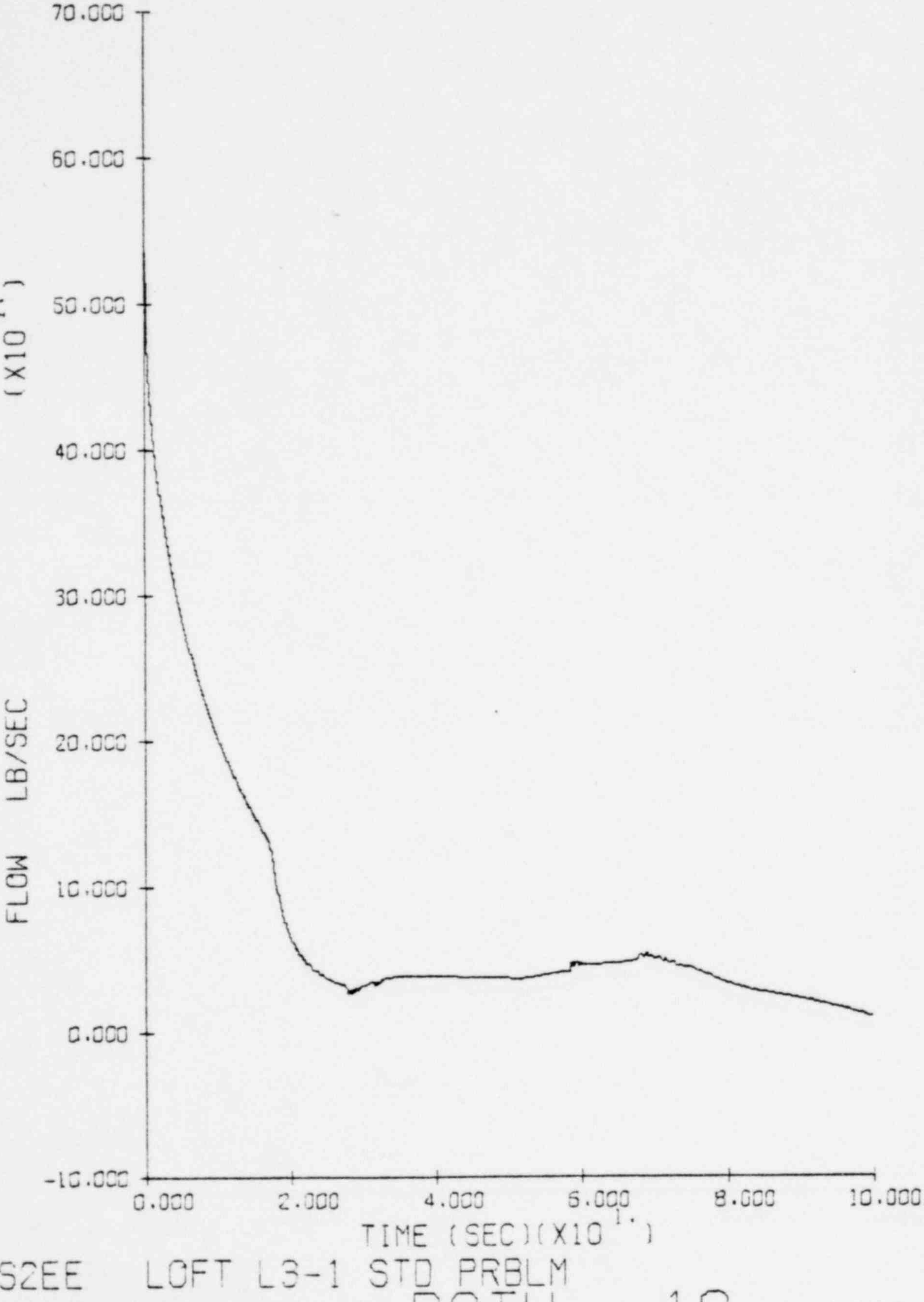
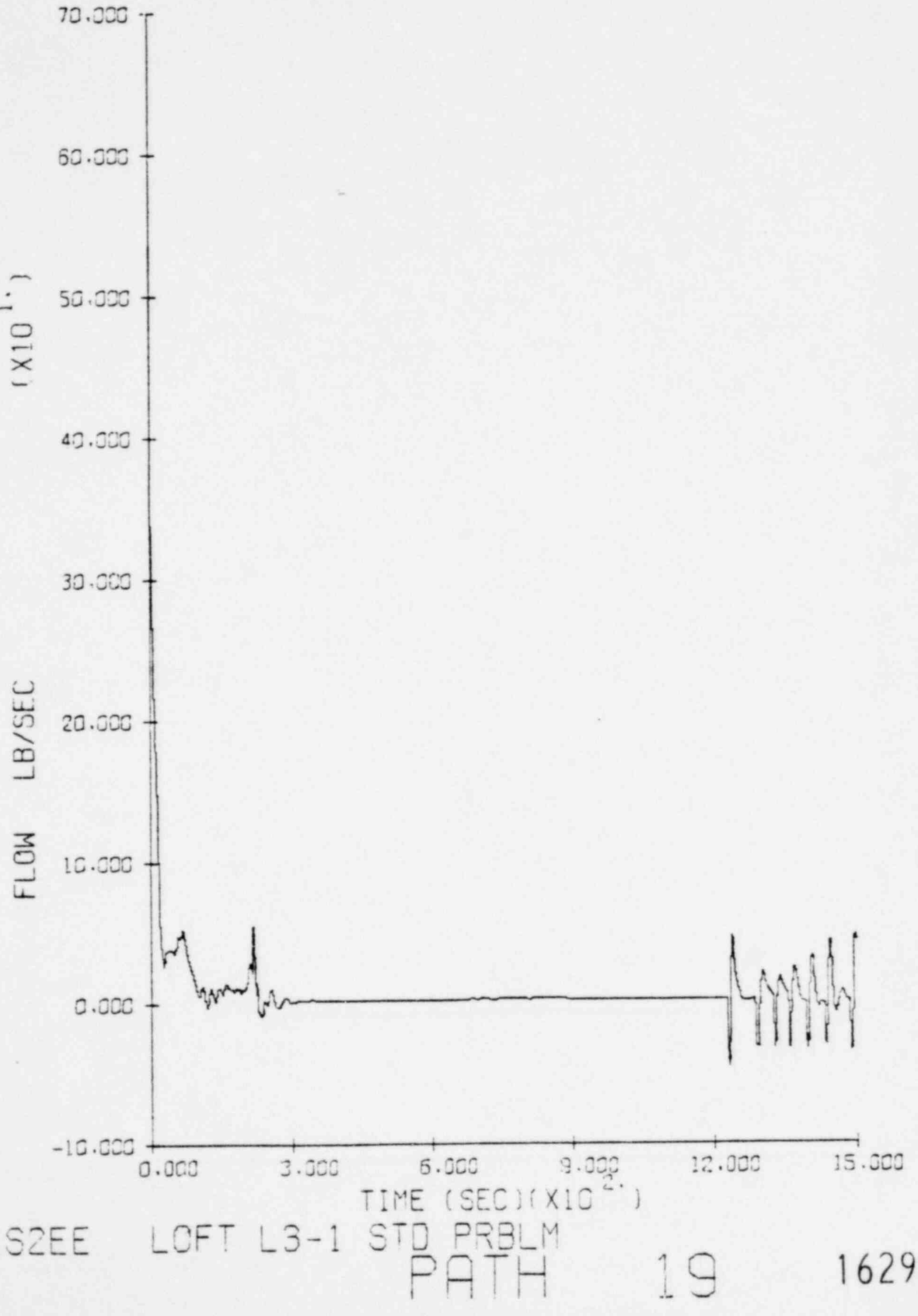


Figure 84 - Flow Rate, Cold Leg, Path 19 (C_D = 0.6)



1629 134

Figure 85 - Flow Rate, Cold Leg, Path 19 (C_D = 0.9)

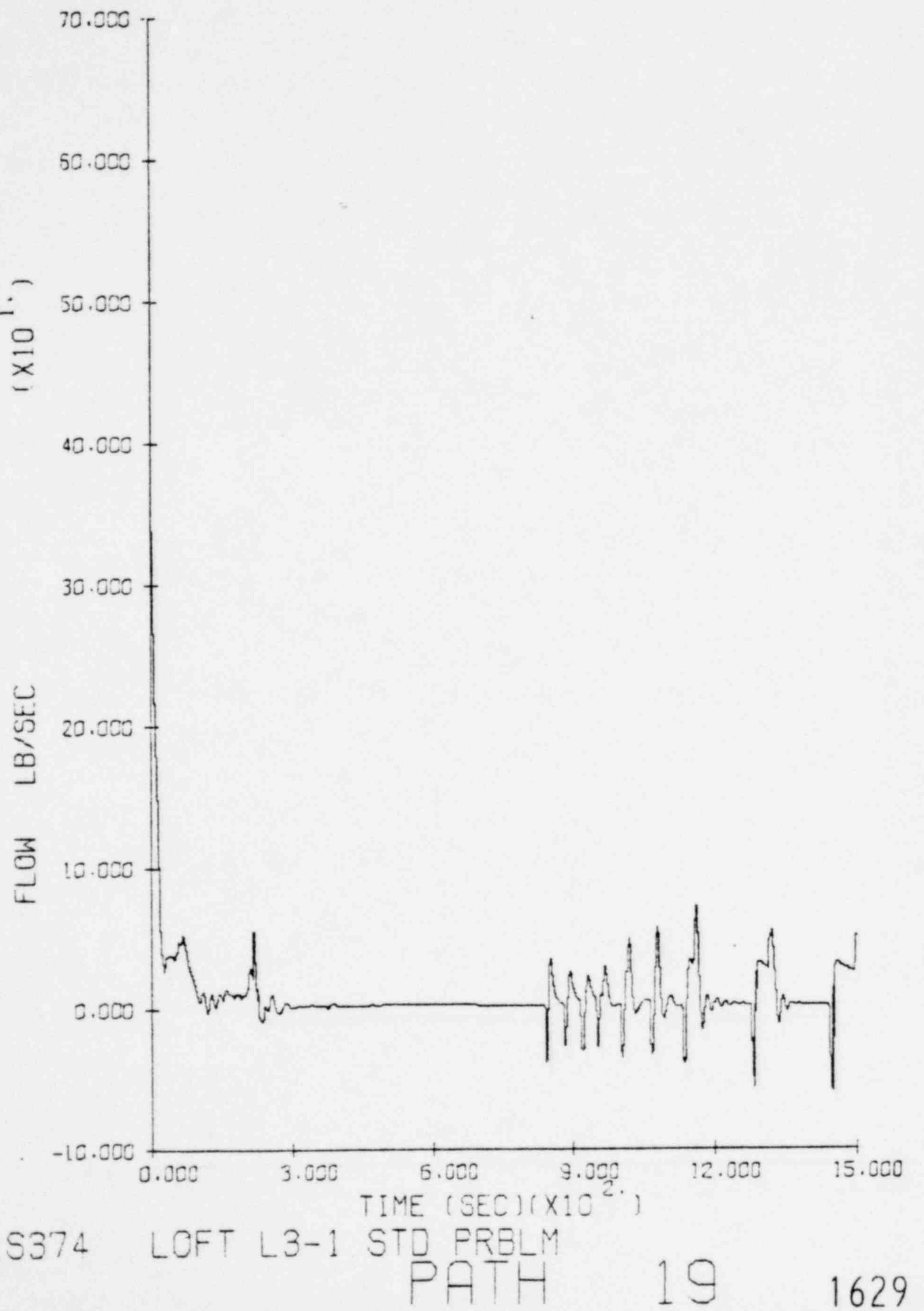


Figure 86 - Flow Rate, Hot Leg, Path 9 (0 to 100 sec.)

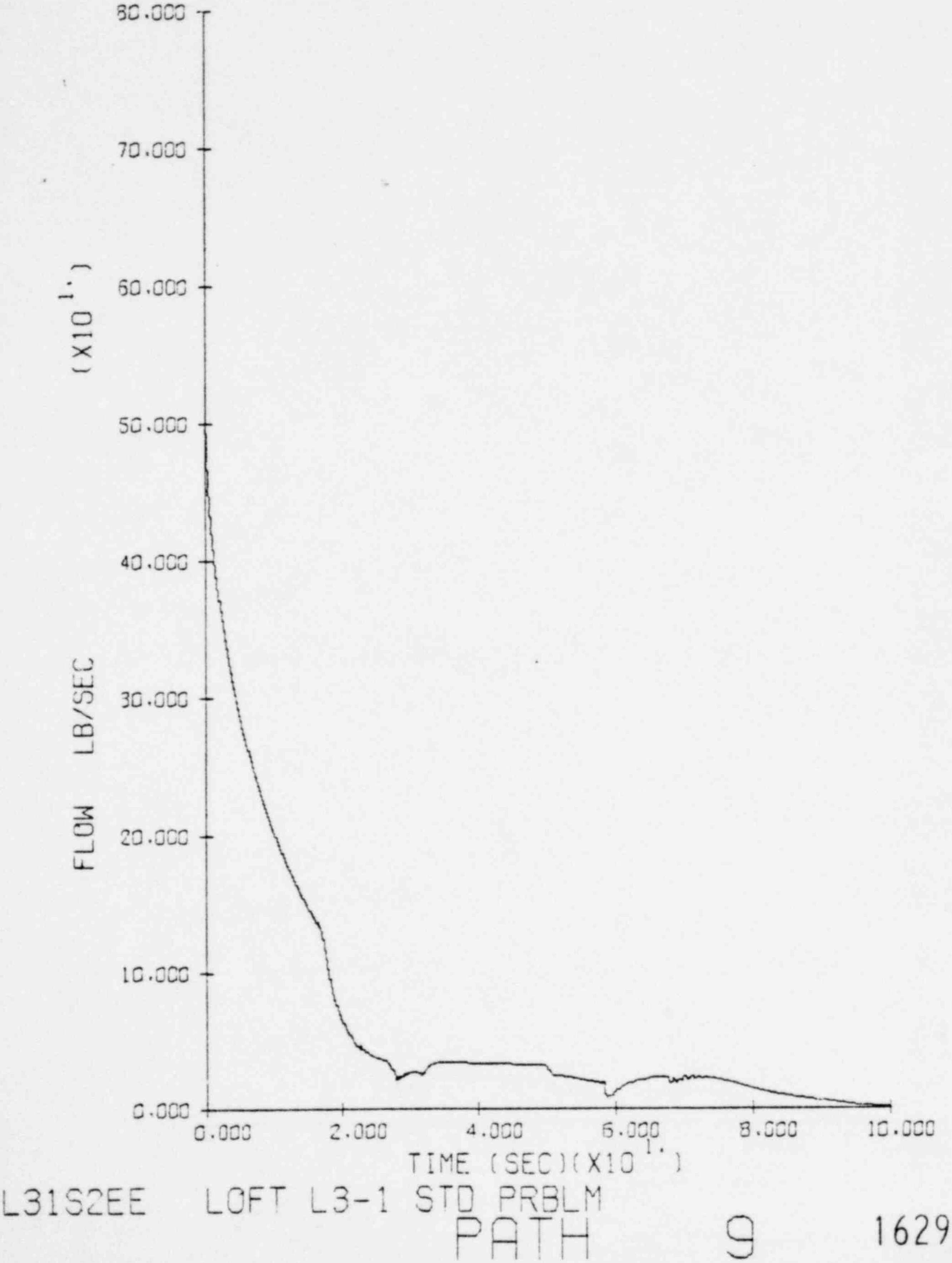


Figure 87 - Flow Rate, Hot Leg, Path 9 (C_D = 0.6)

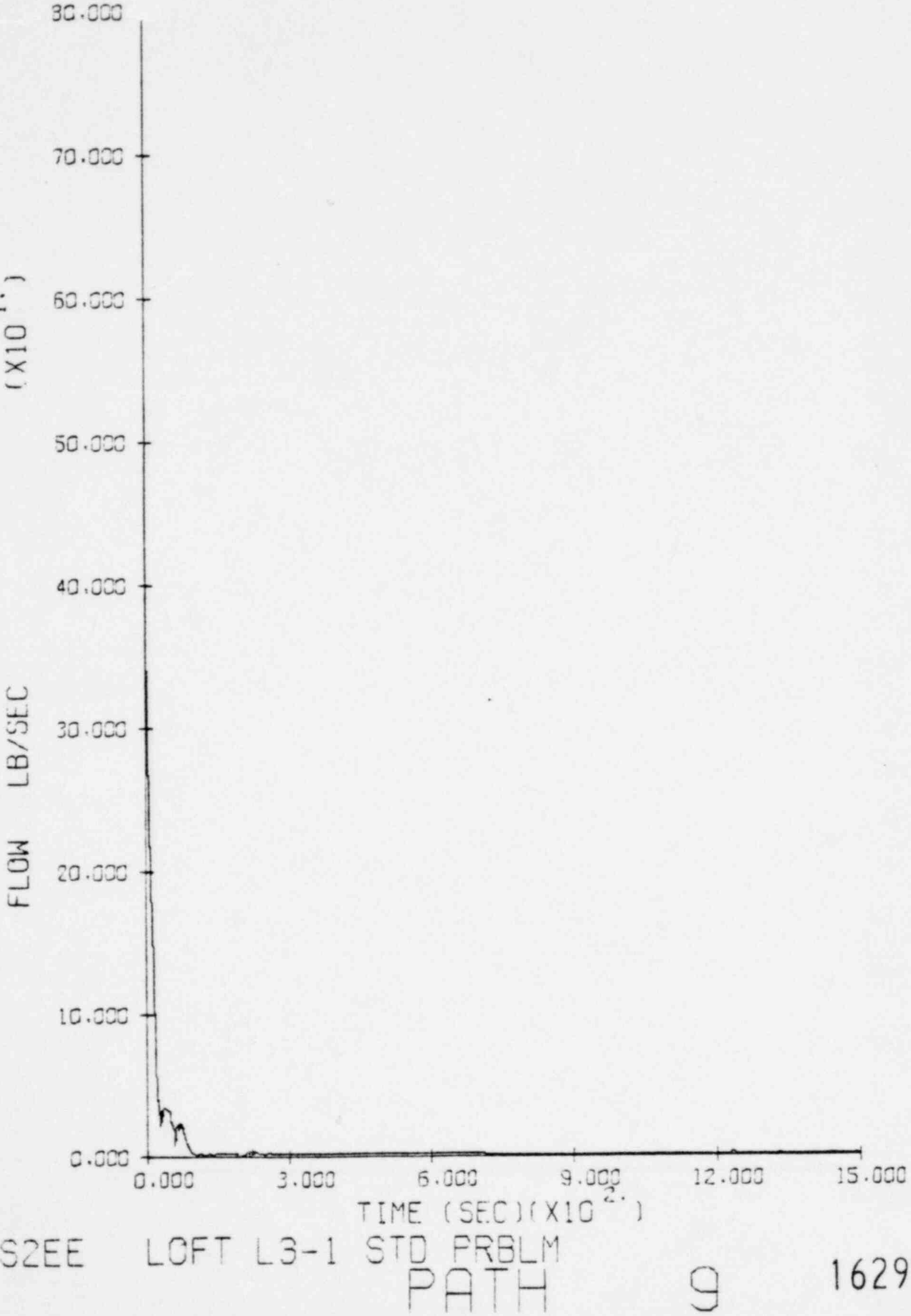


Figure 88 - Flow Rate, Hot Leg, Path 9 (C_D = 0.9)

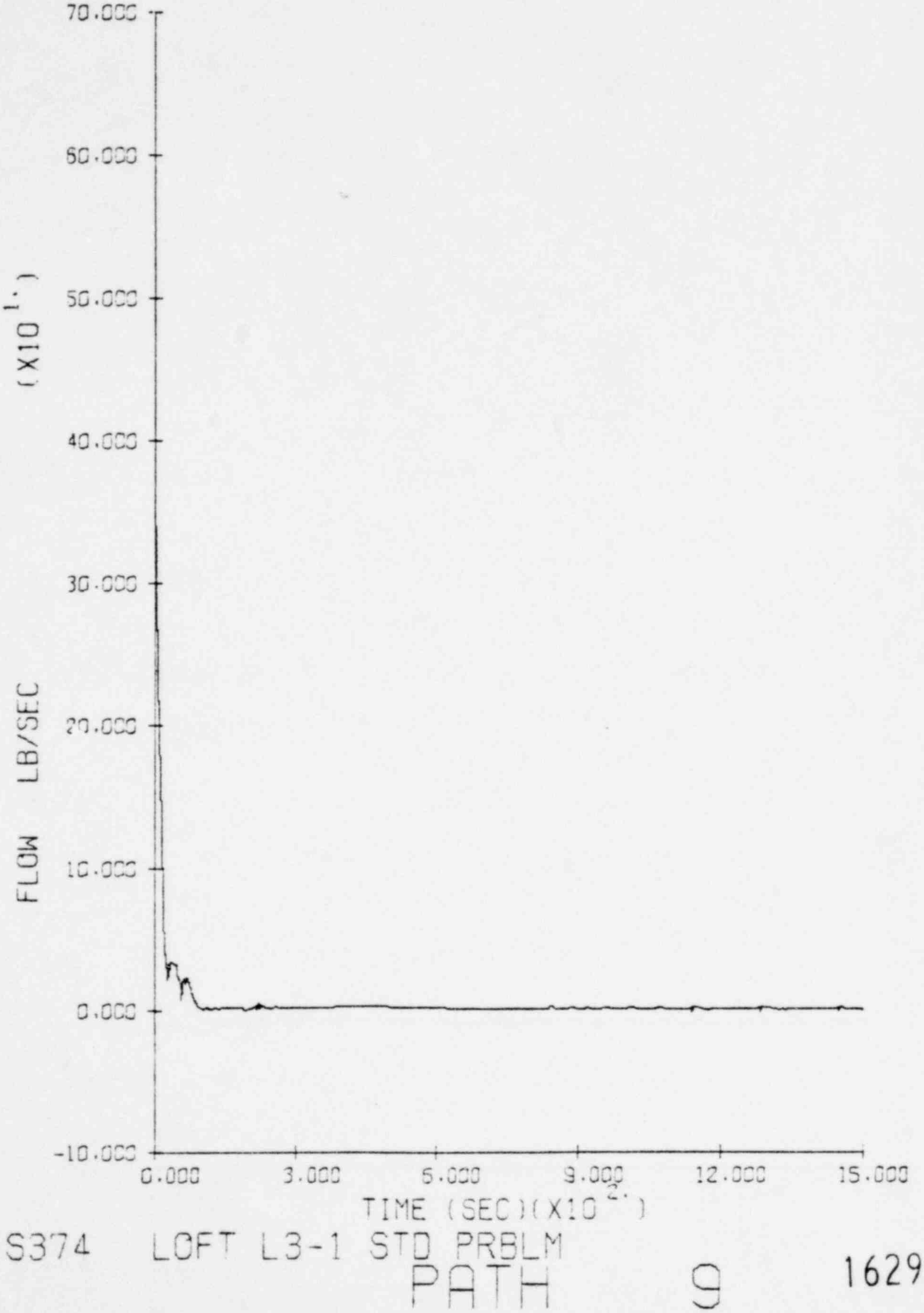


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Figure 89 - Flow Rate, Hot Leg, Path 10 (0 to 100 sec.)

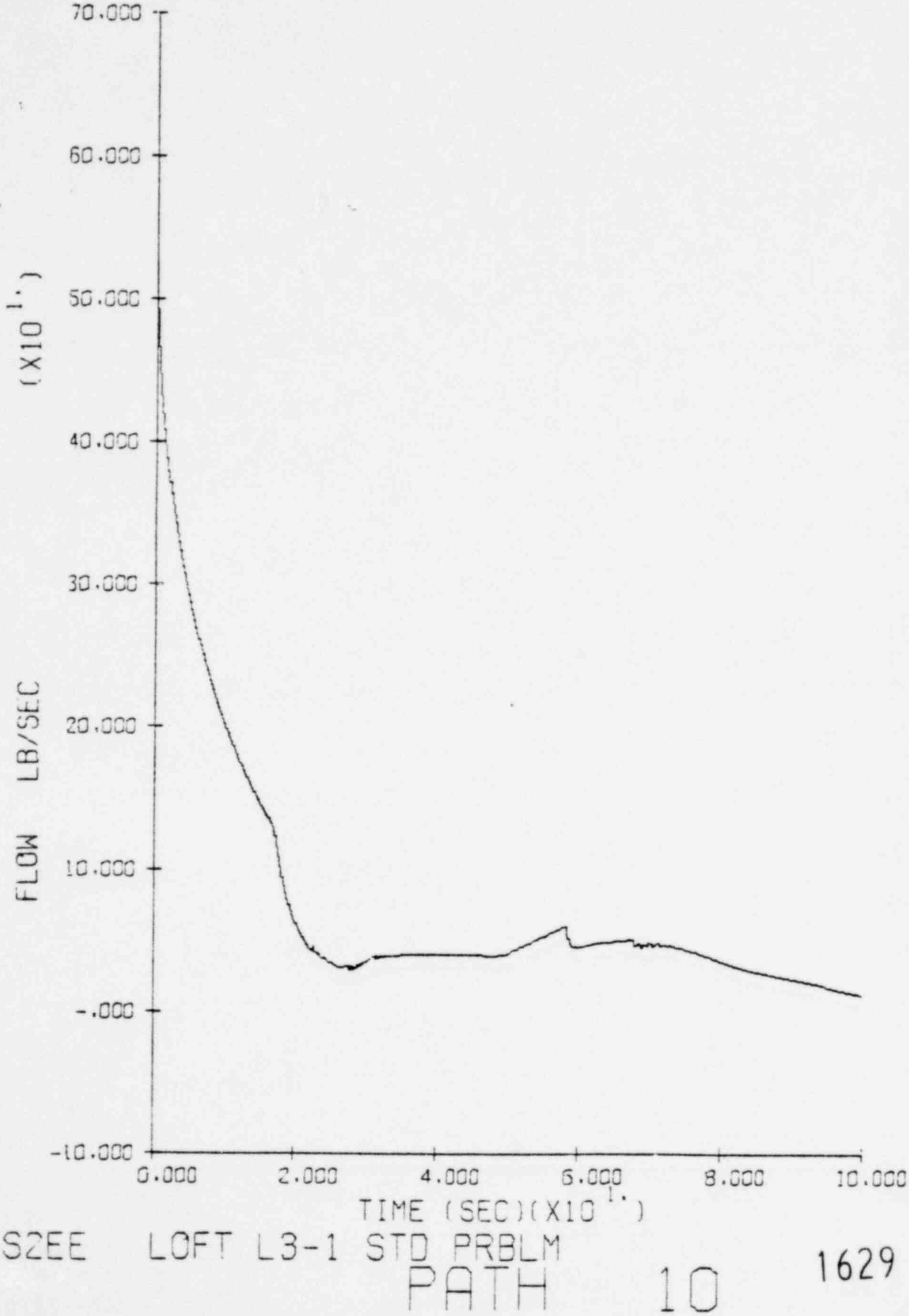


Figure 90 - Flow Rate, Hot Leg, Path 10 (C_D = 0.6)

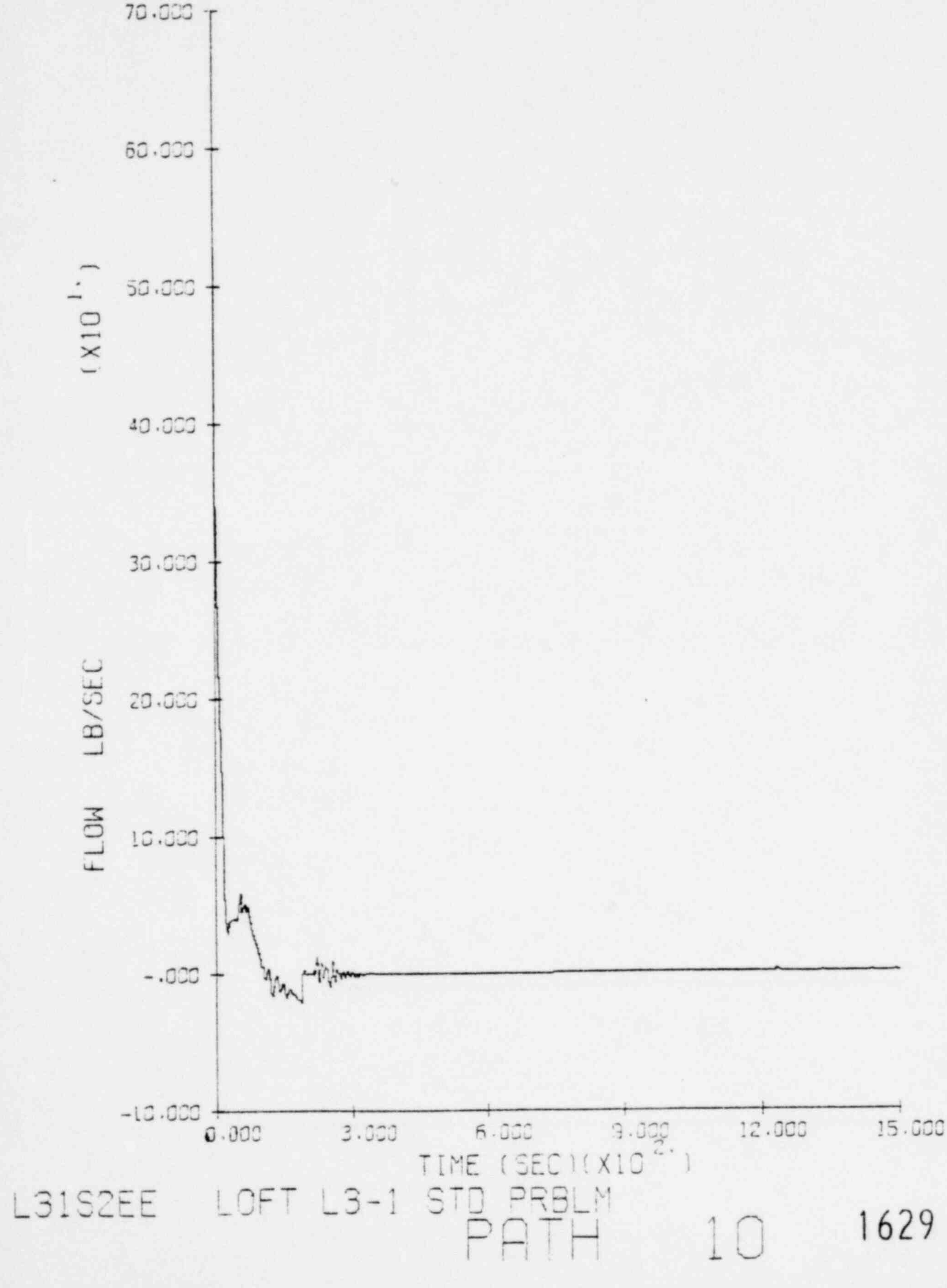


Figure 91 - Flow Rate, Hot Leg, Path 10 (C_D = 0.9)

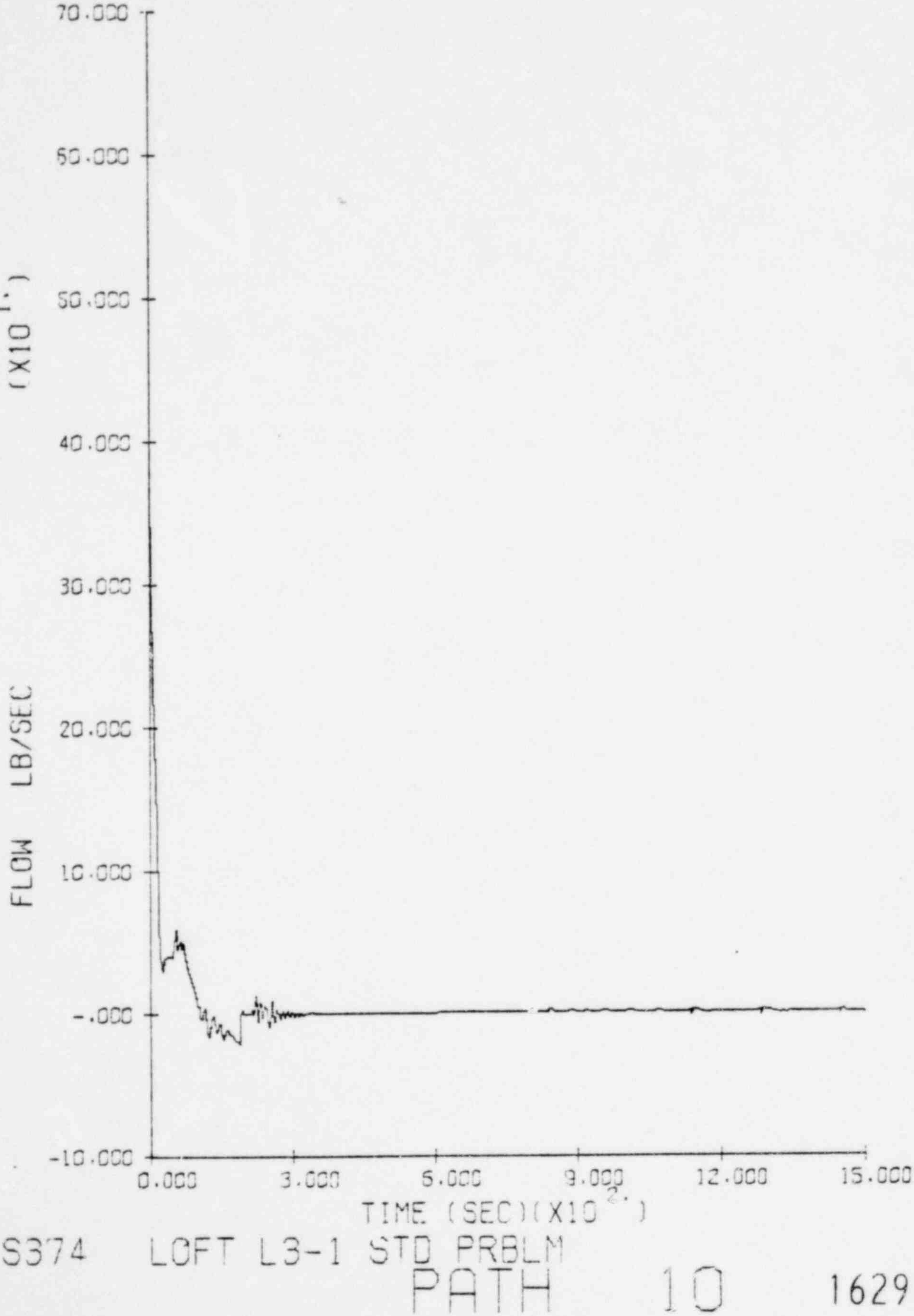
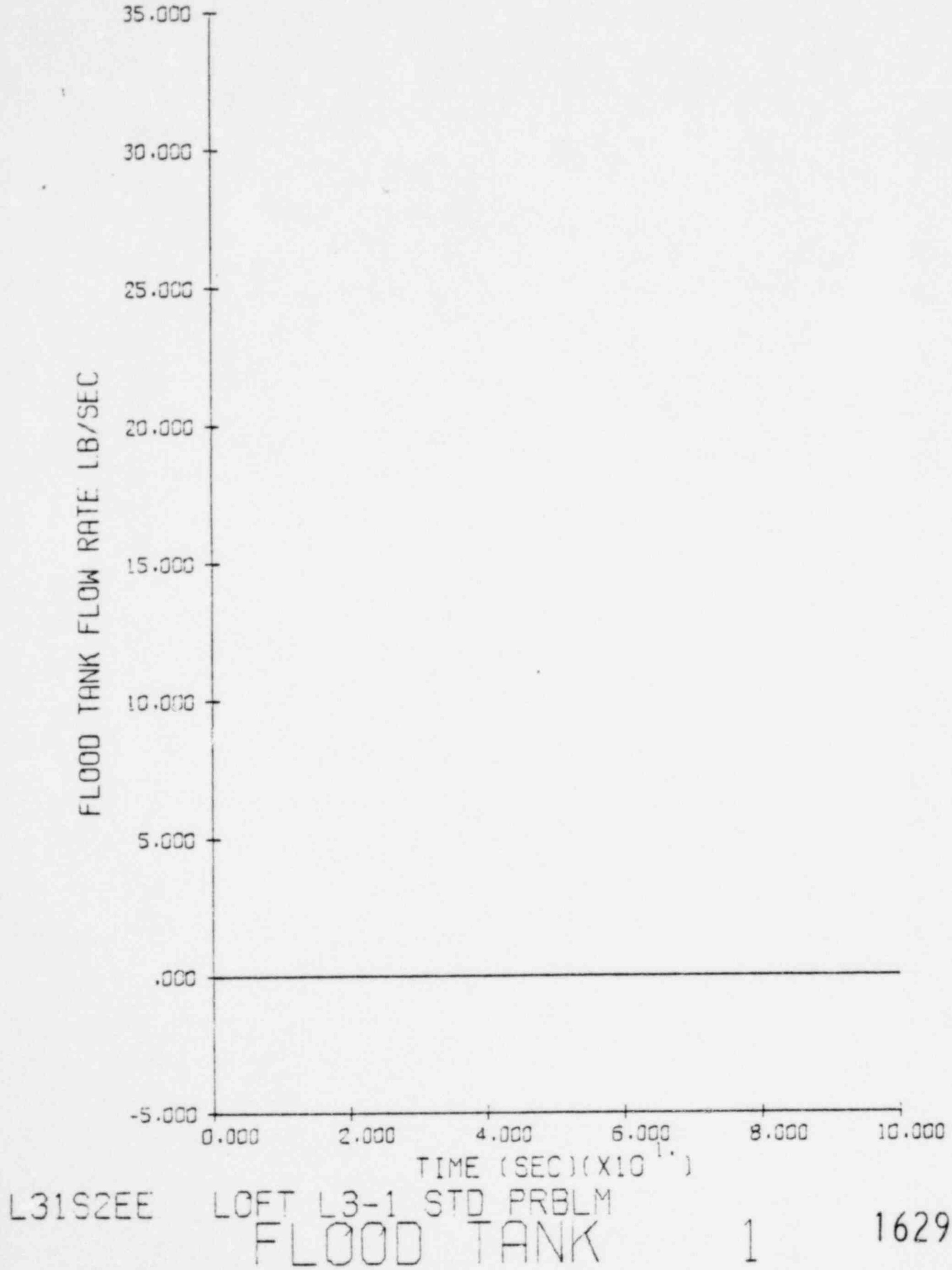
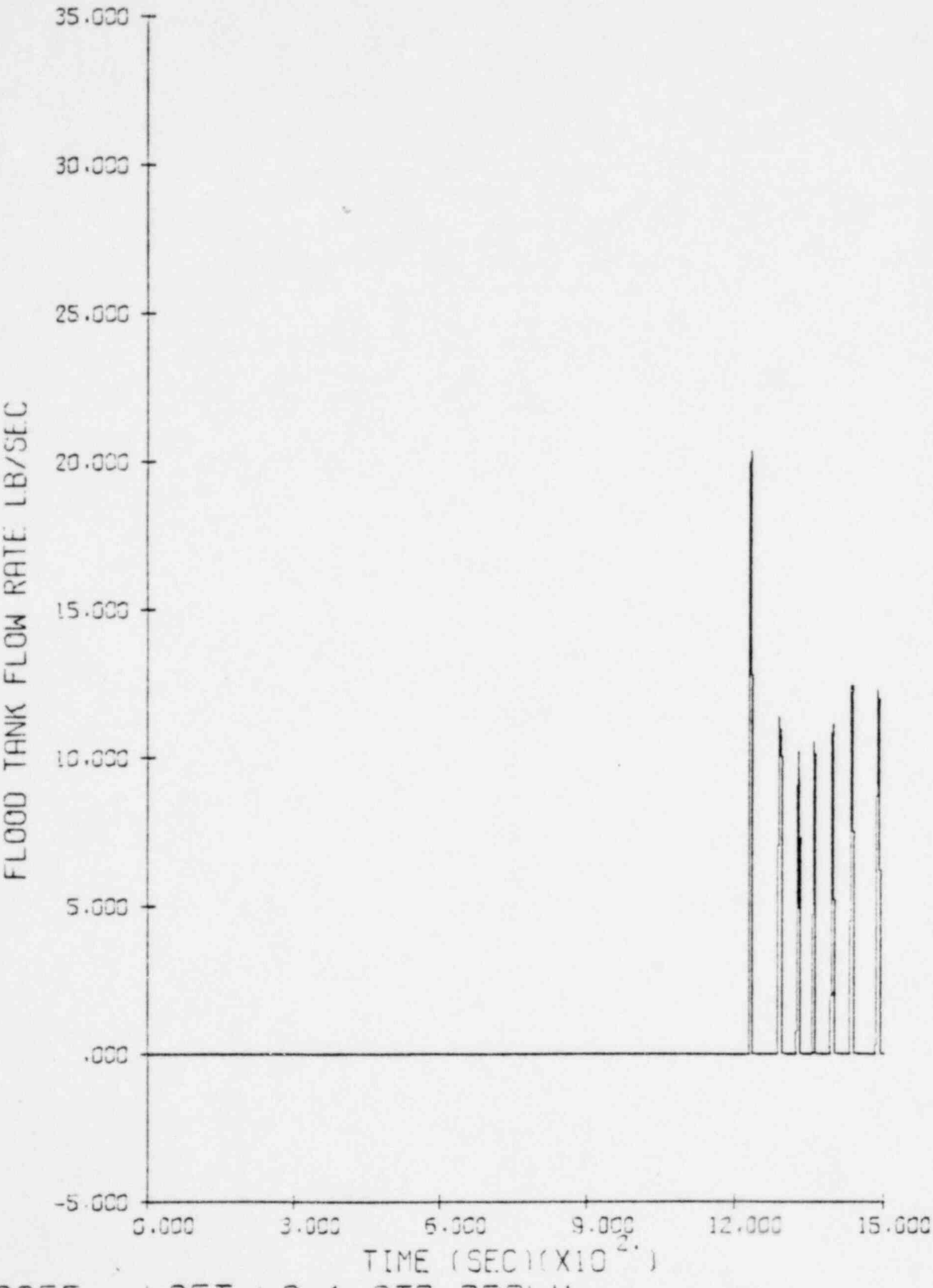


Figure 92 - Flow Rate, Accumulator (0 to 100 sec.)



1629 142

Figure 93 - Flow Rate, Accumulator (C_D = 0.6)



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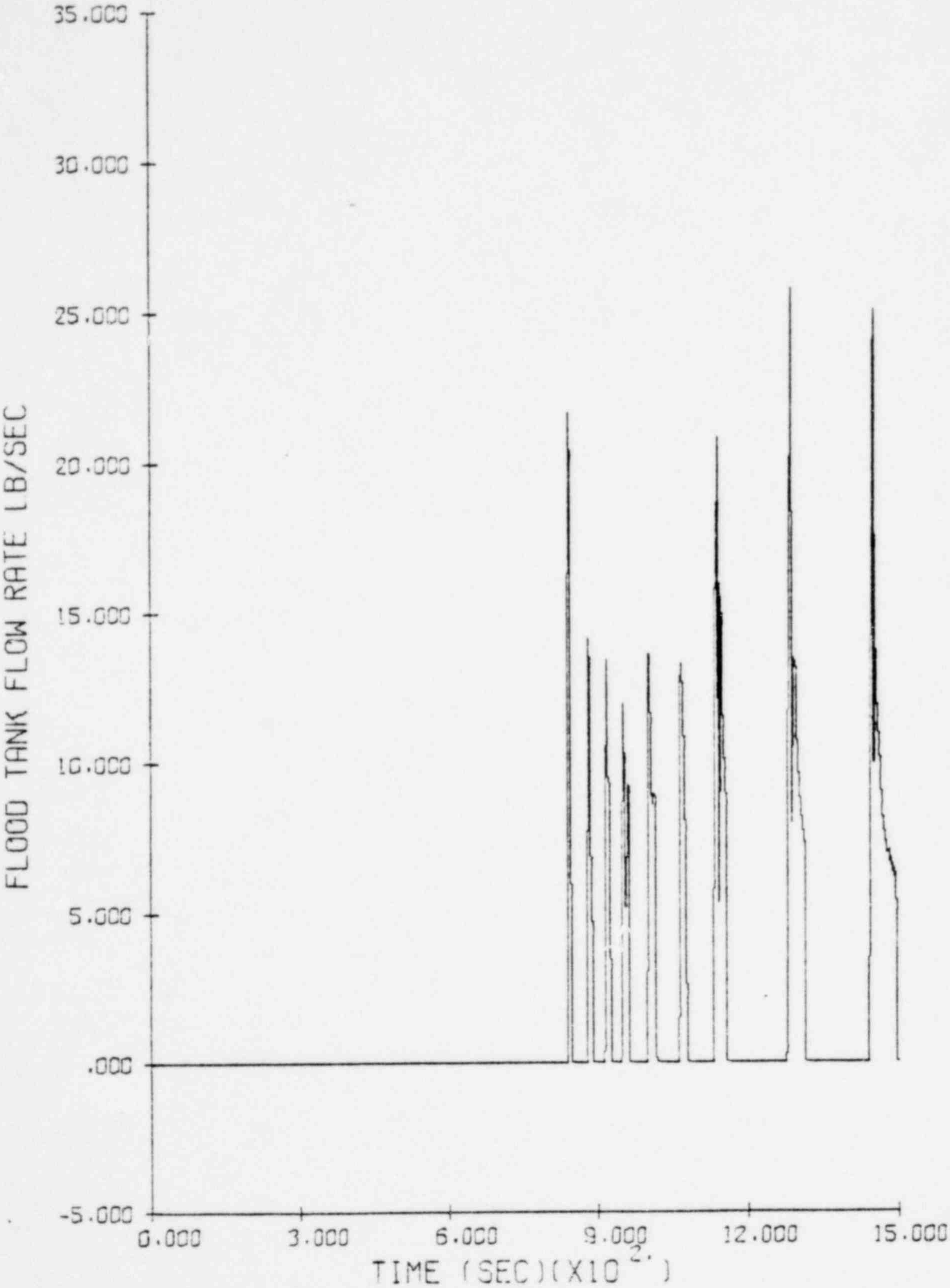
FLOOD TANK 1

Figure 94 - Flow Rate, Accumulator (C_D = 0.9)



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FLOOD TANK 1

Figure 95 - Flow Rate, LPIS (0 to 100 sec.)

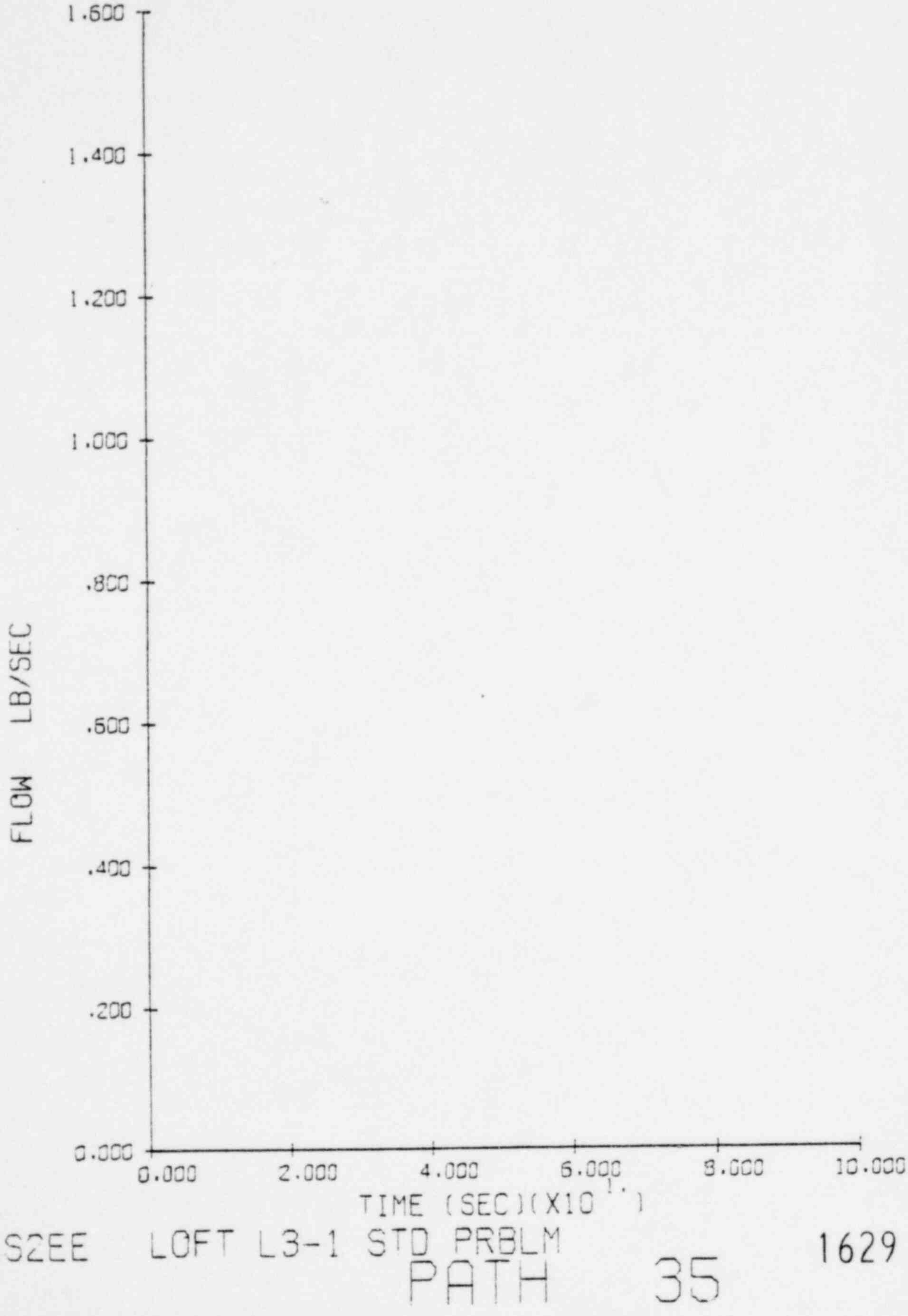


Figure 96 - Flow Rate, LPIS (C_D = 0.6)

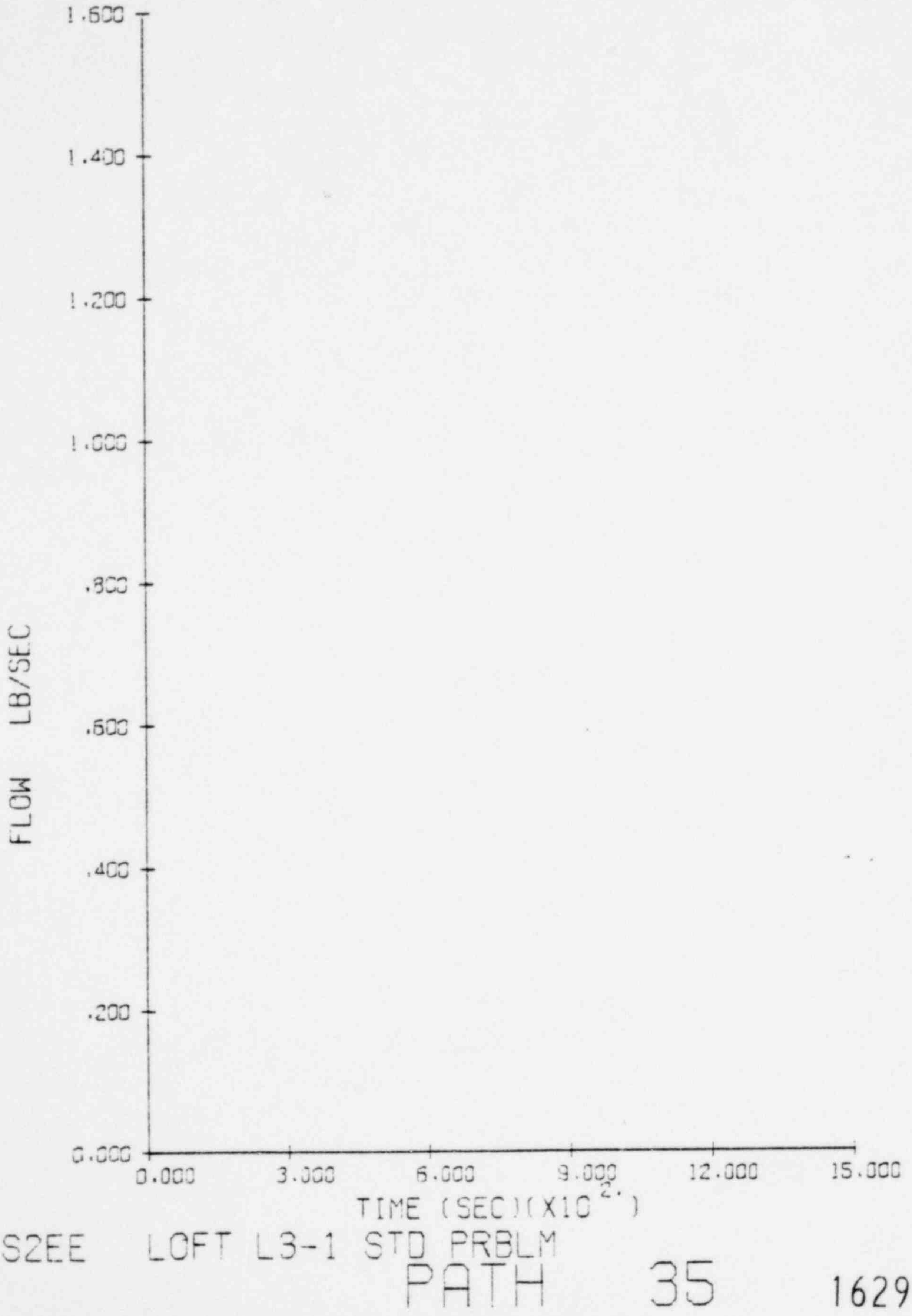


Figure 97 - Flow Rate, LPIS (C_D = 0.9)

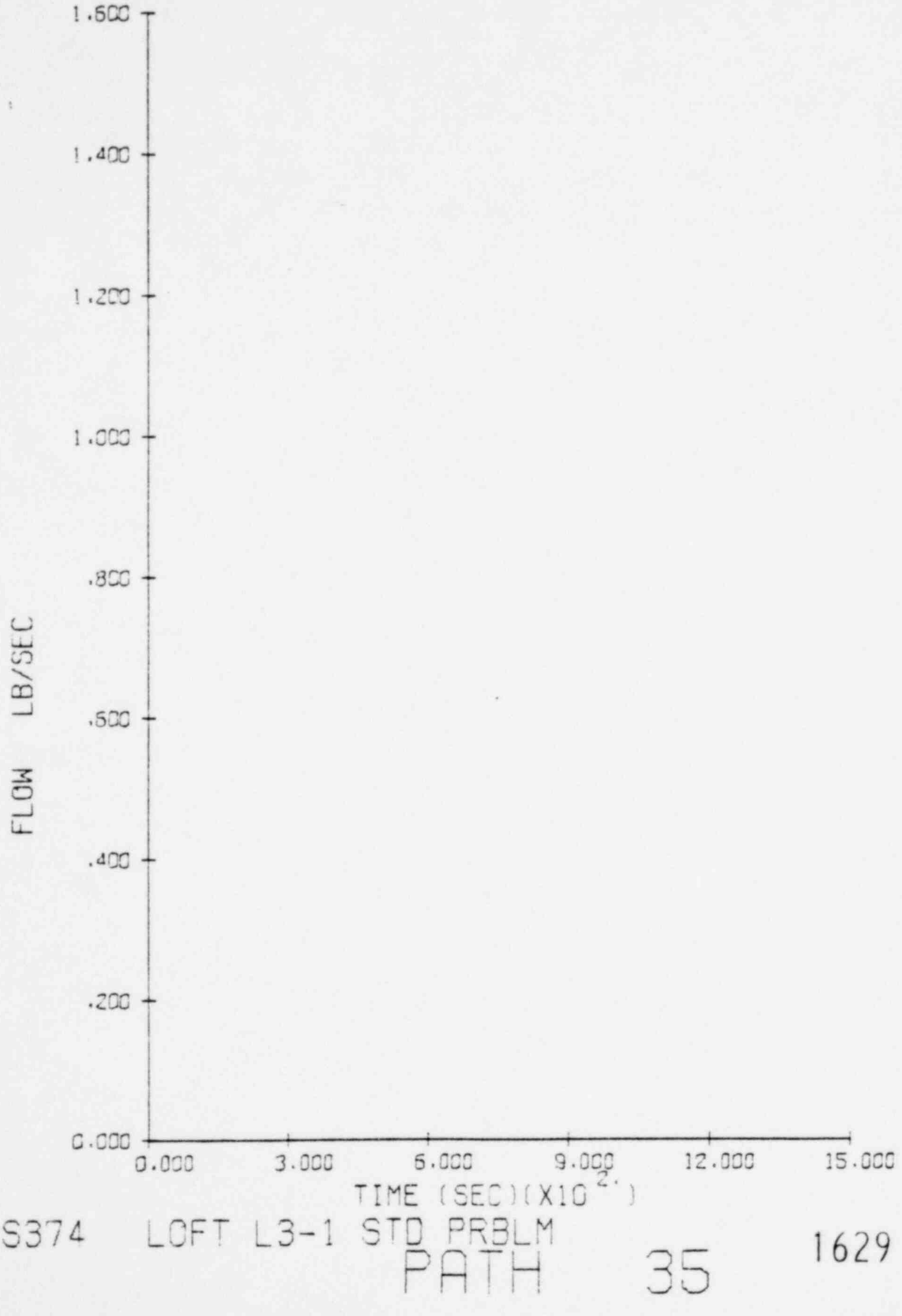
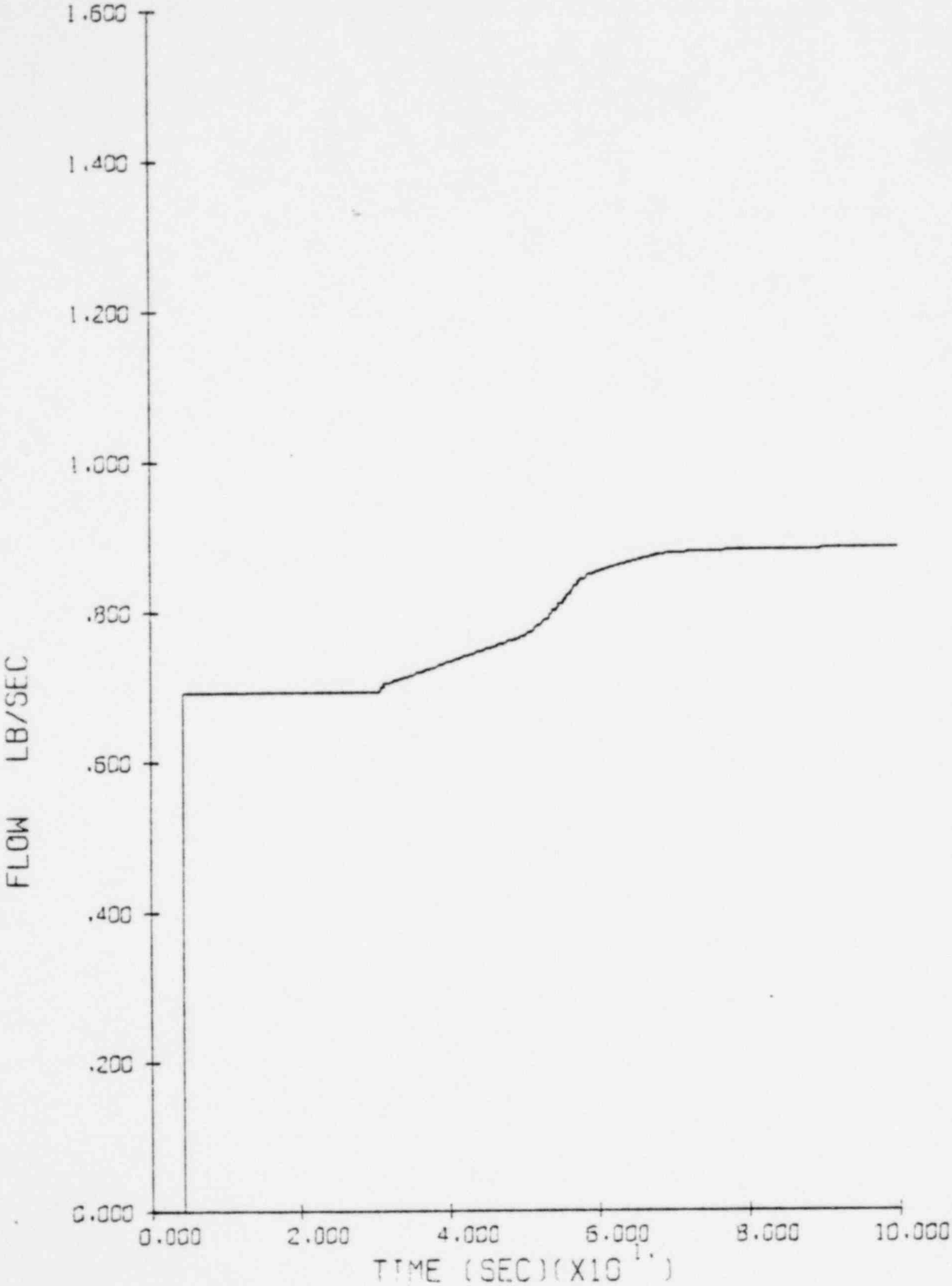


Figure 98 - Flow Rate, HPIS (0 to 100 sec.)



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PATH 34

Figure 99 - Flow Rate, HPIS (C_D = 0.6)

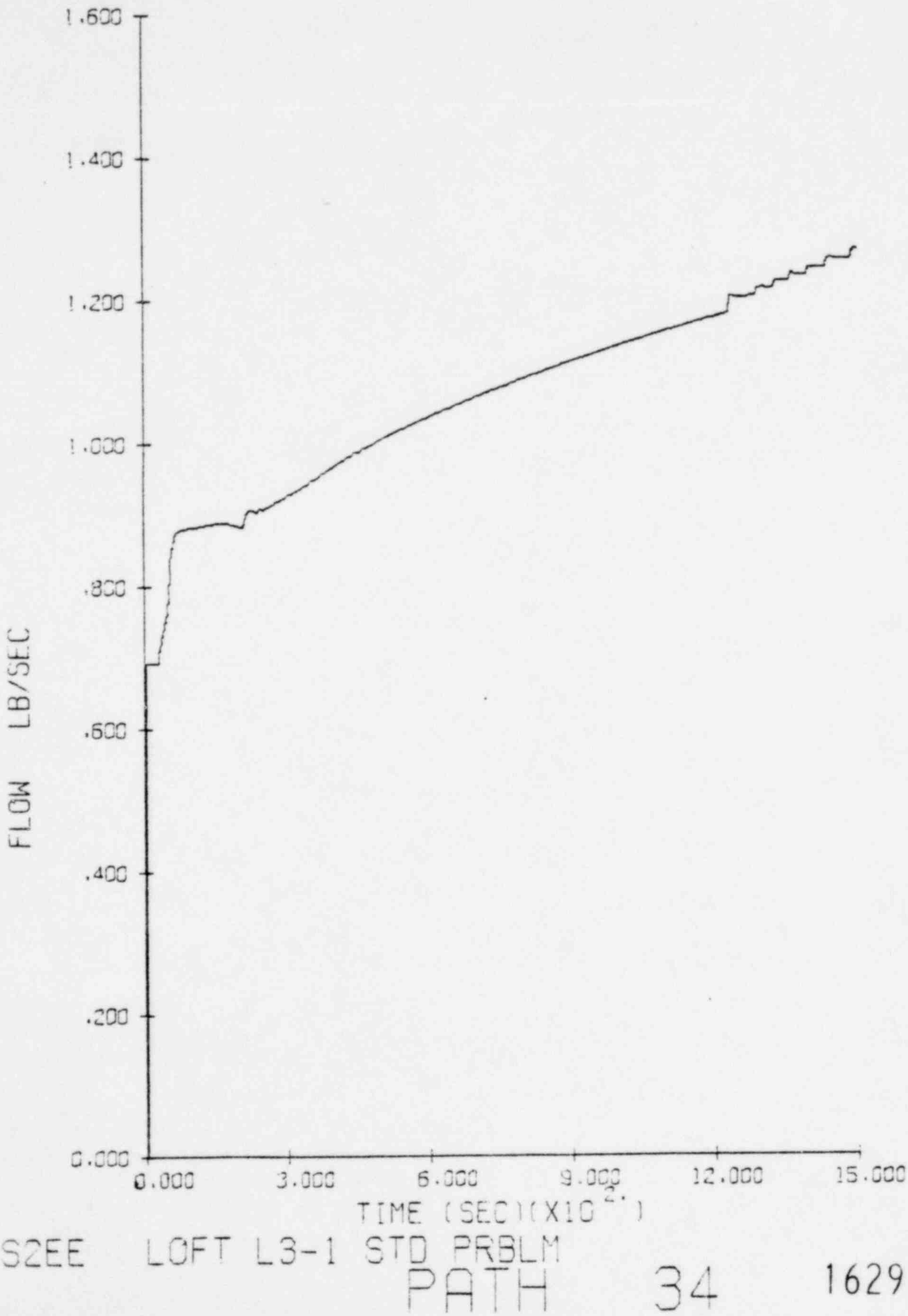
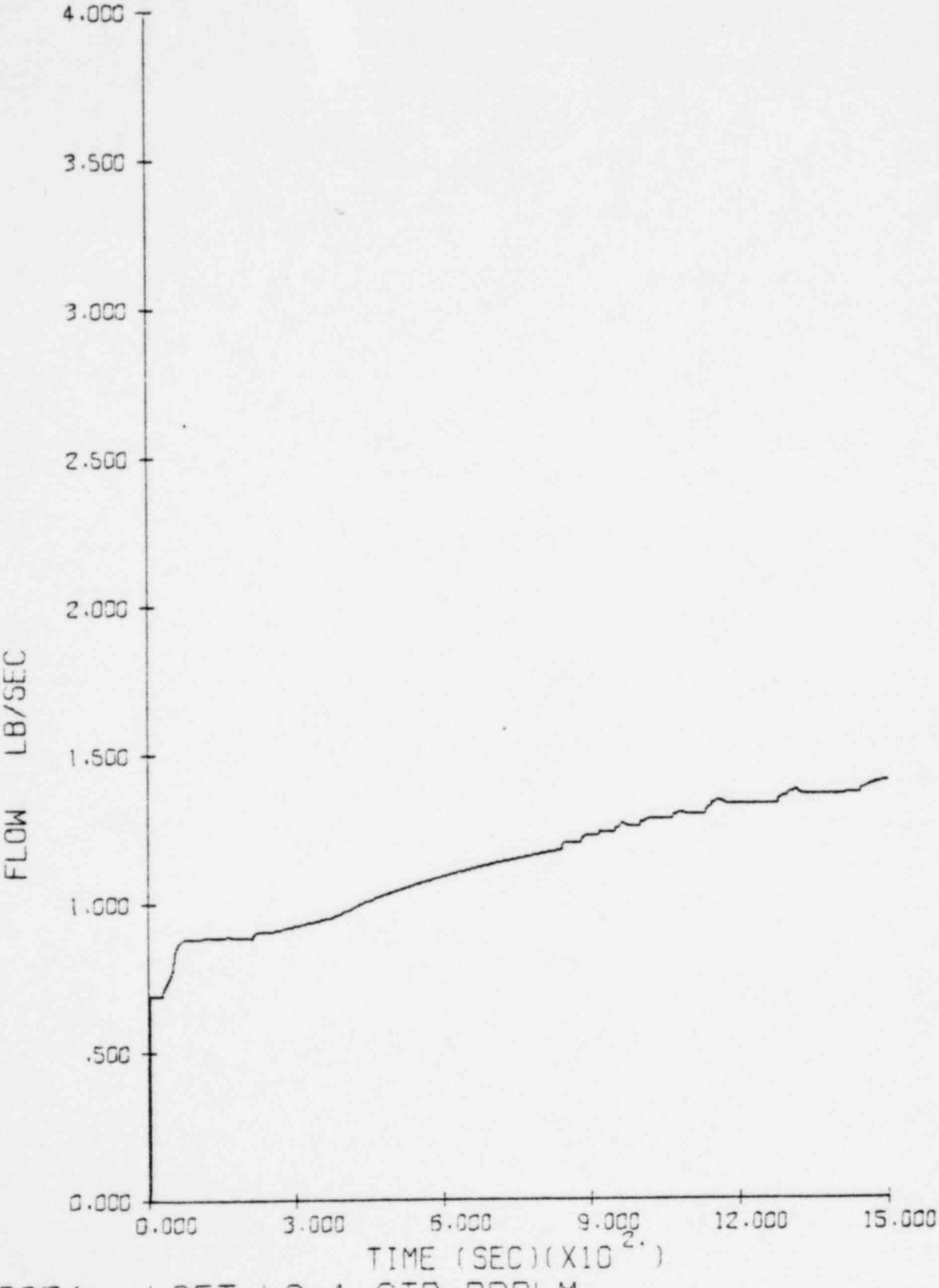


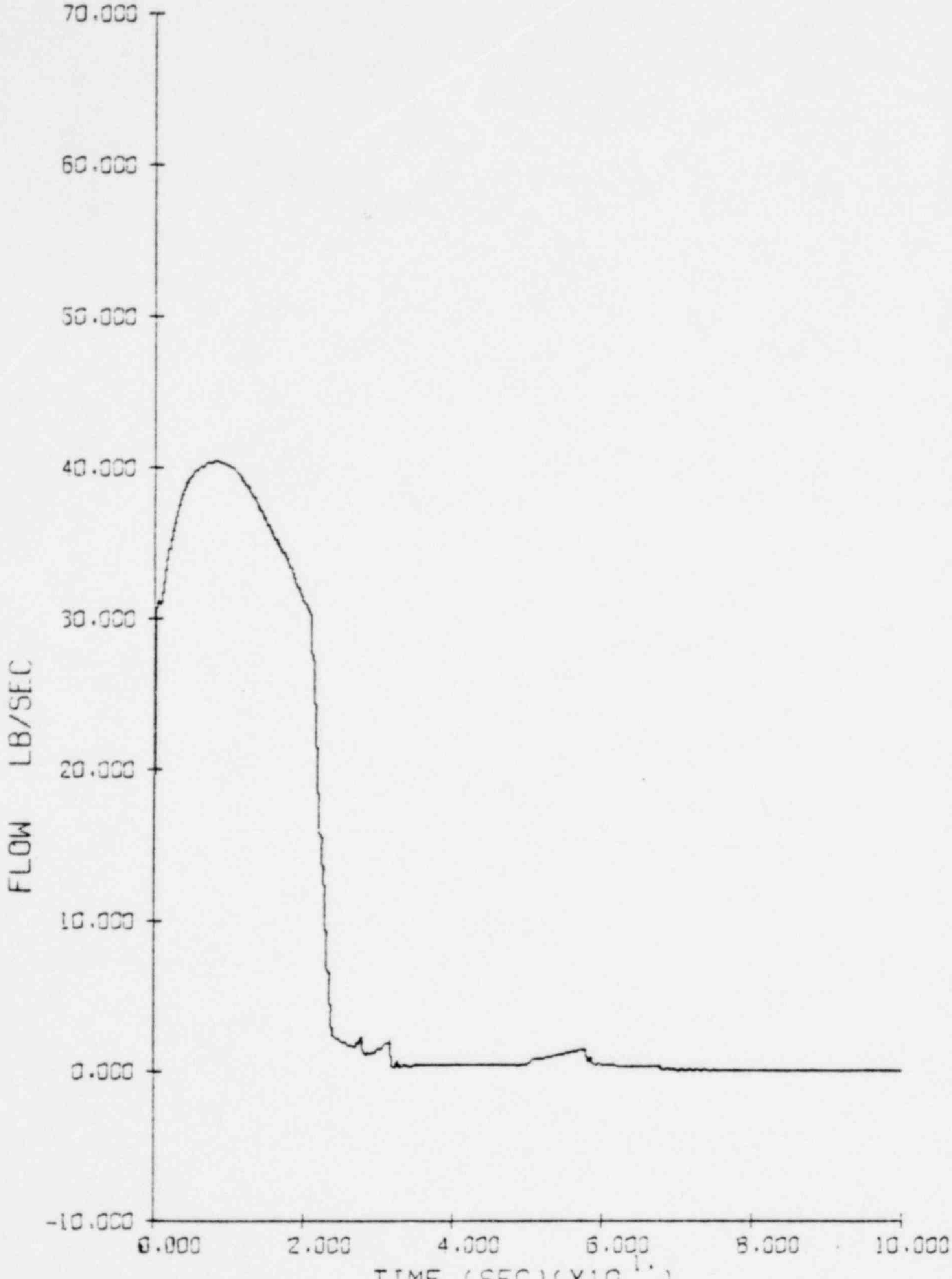
Figure 100 - Flow Rate, HPIS (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM

PATH 34

Figure 101 - Flow Rate, Pressurizer Surge Line (0 to 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

PATH 8

Figure 102 - Flow Rate, Pressurizer Surge Line (C_D = 0.6)

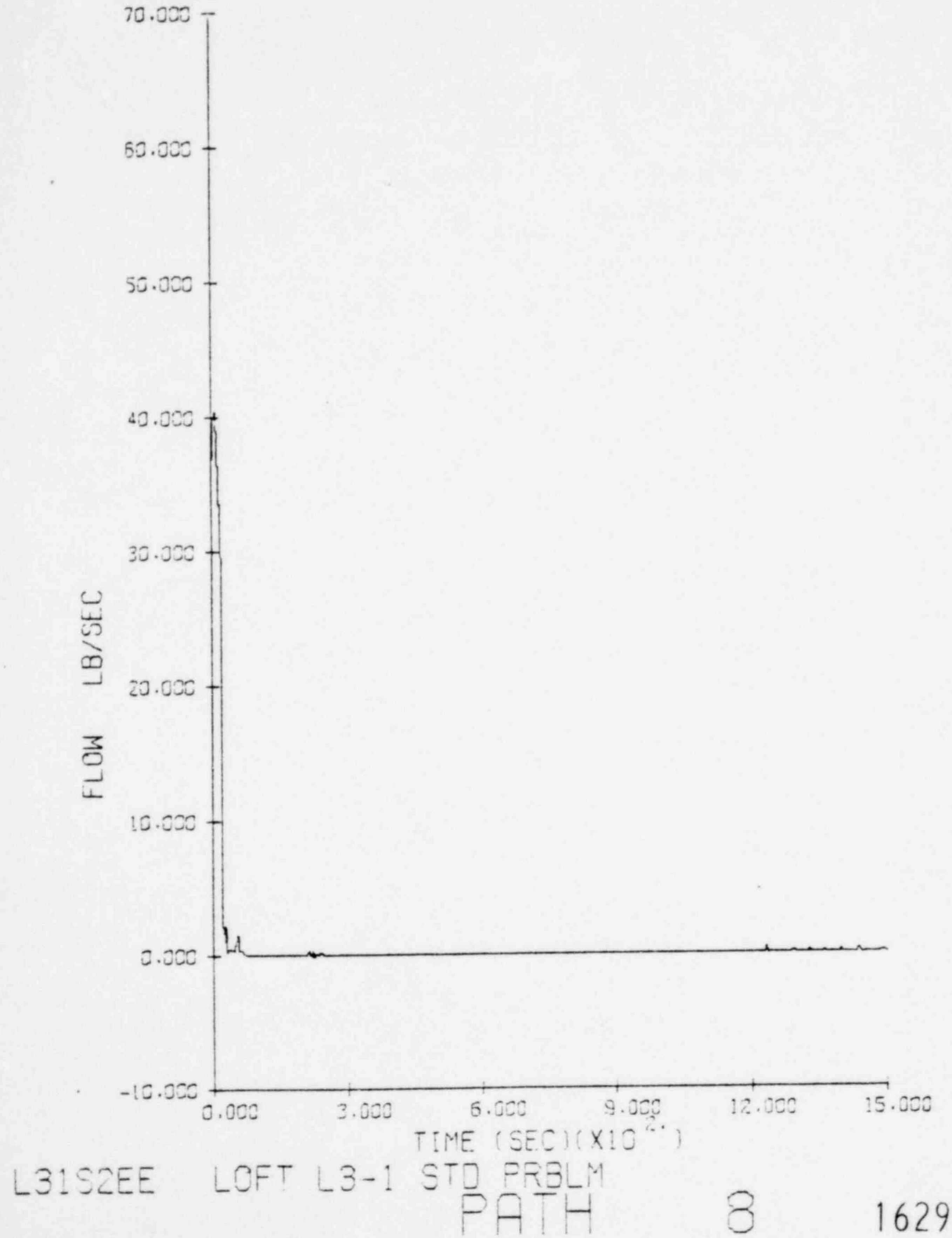


Figure 103 - Flow Rate, Pressurizer Surge Line (C_D = 0.9)

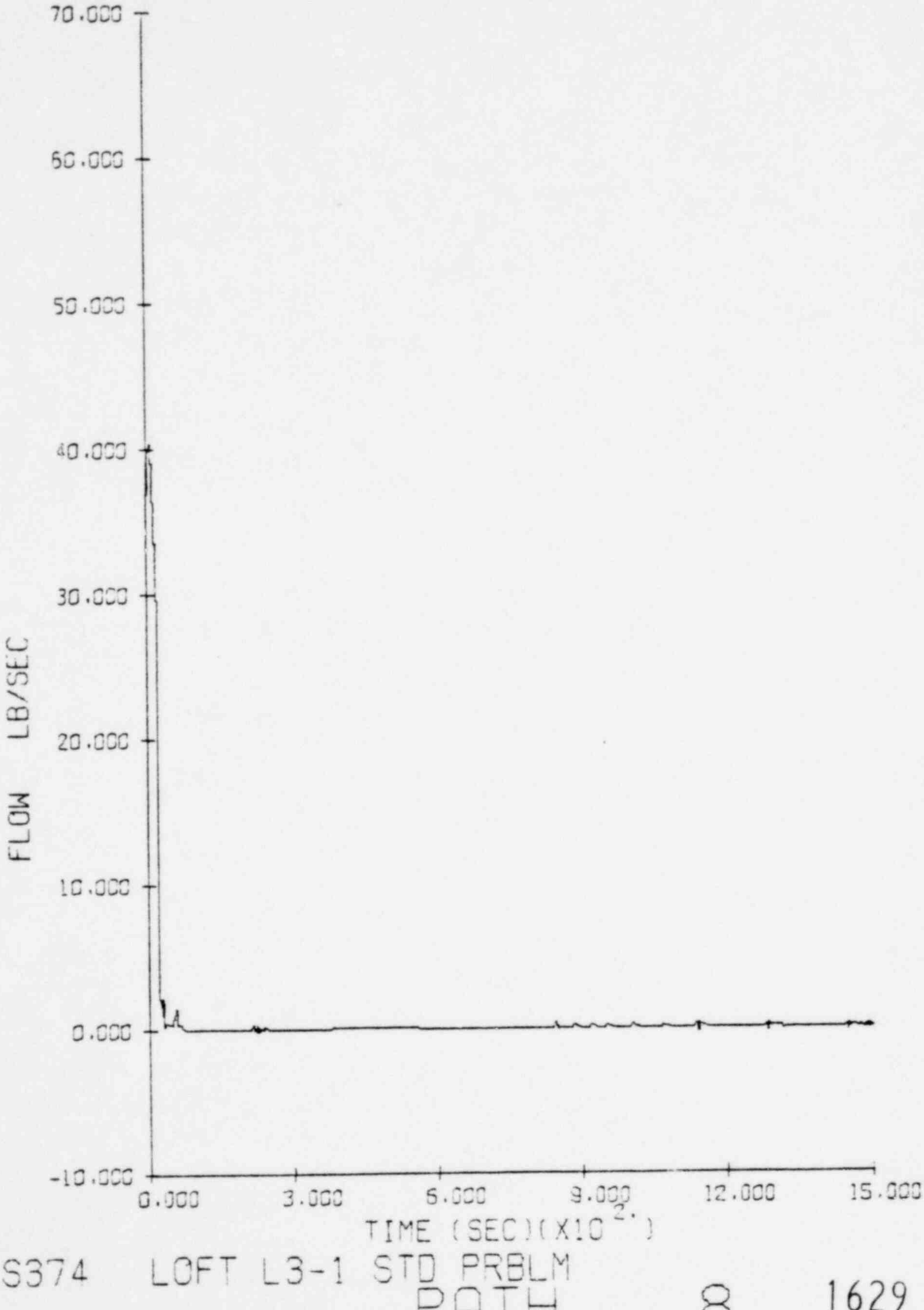


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Figure 104 - Temperature, Average Fuel Rod, Core Path 1 (0 to 100 sec.)

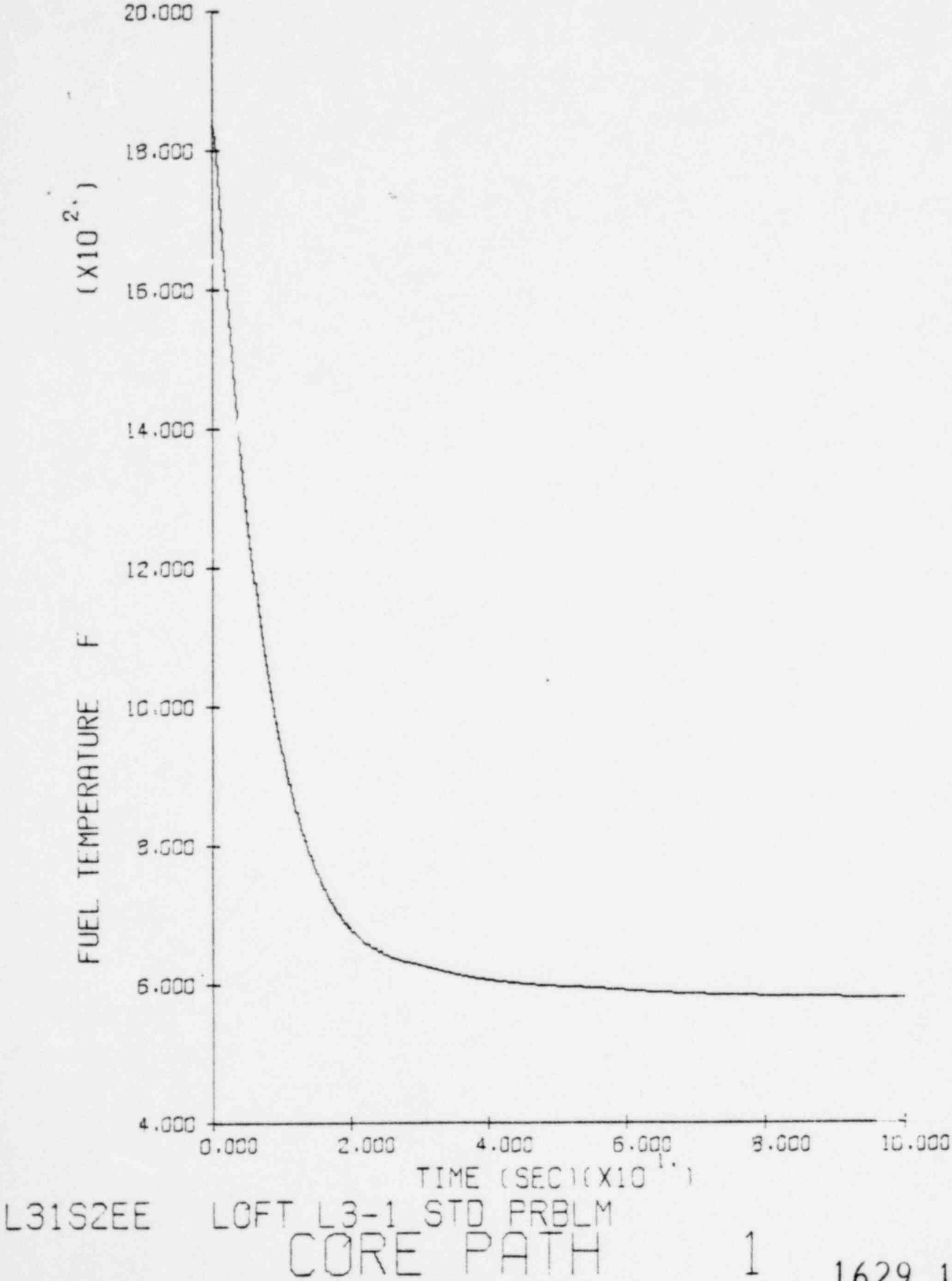


Figure 105 - Temperature, Average Fuel Rod, Core Path 1 (C_D = 0.6)

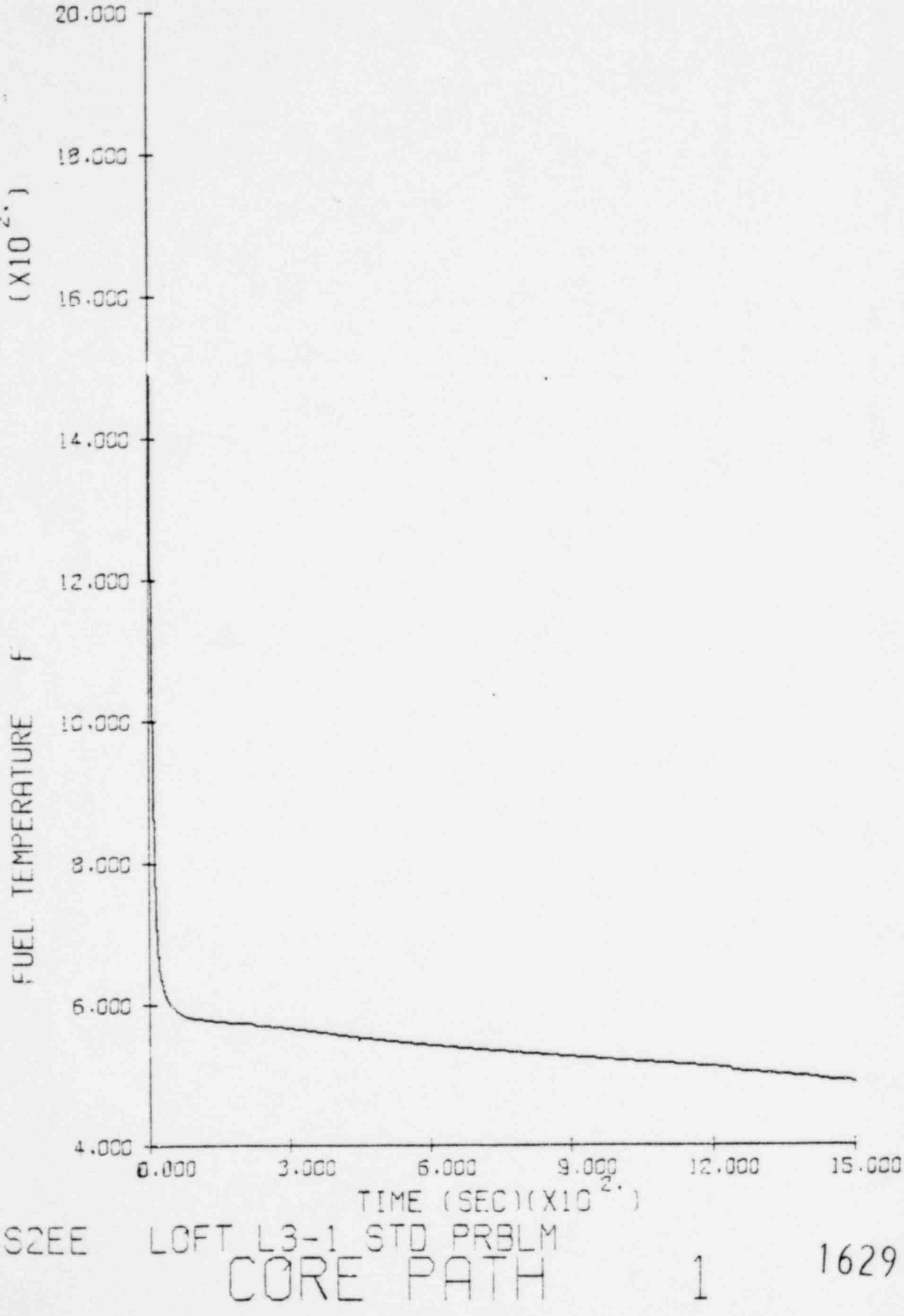
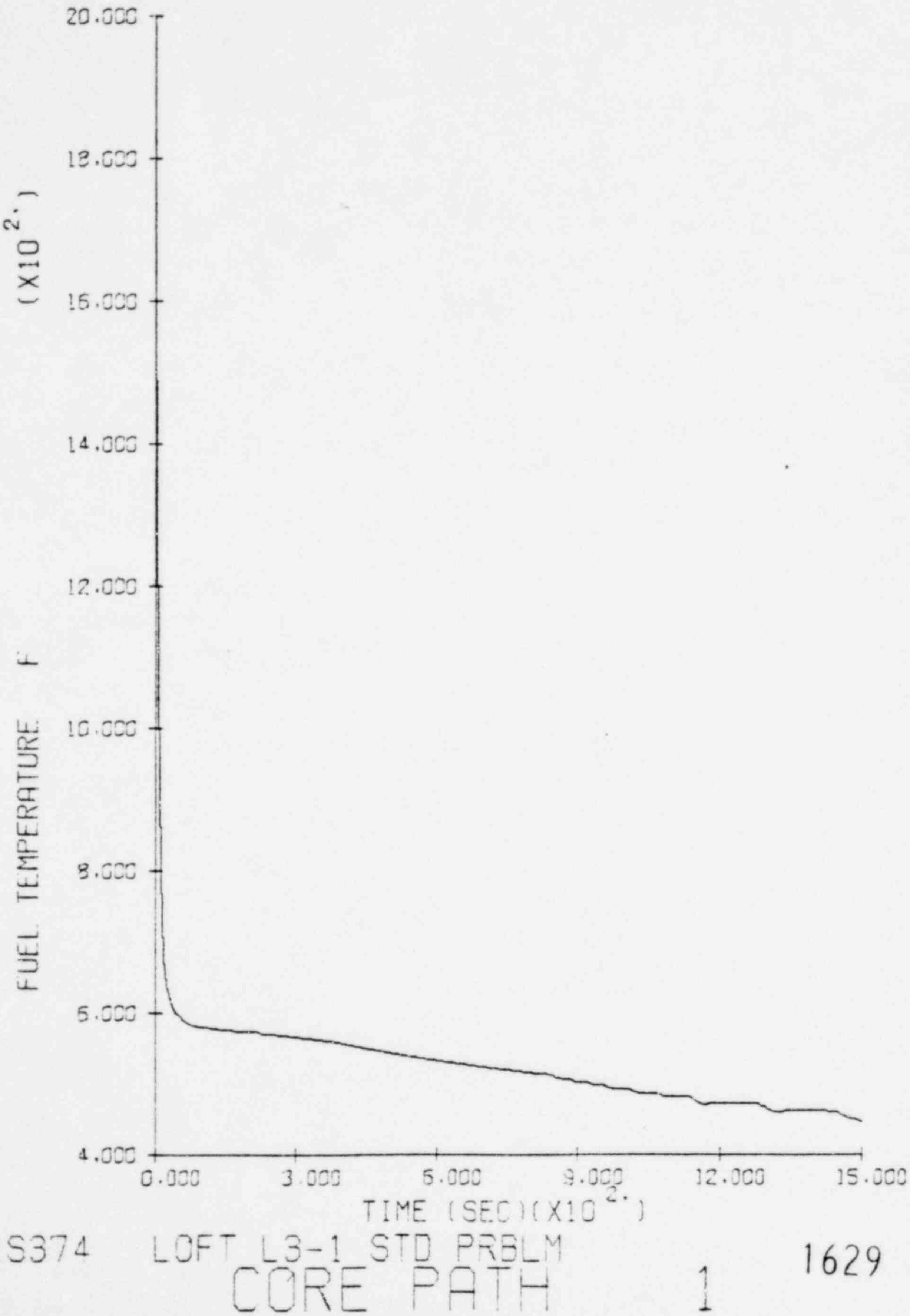


Figure 106 - Temperature, Average Fuel Rod, Core Path 1 (C_D = 0.9)



1629 156

Figure 107 - Temperature, Average Fuel Rod, Core Path 2 (0 to 100 sec.)

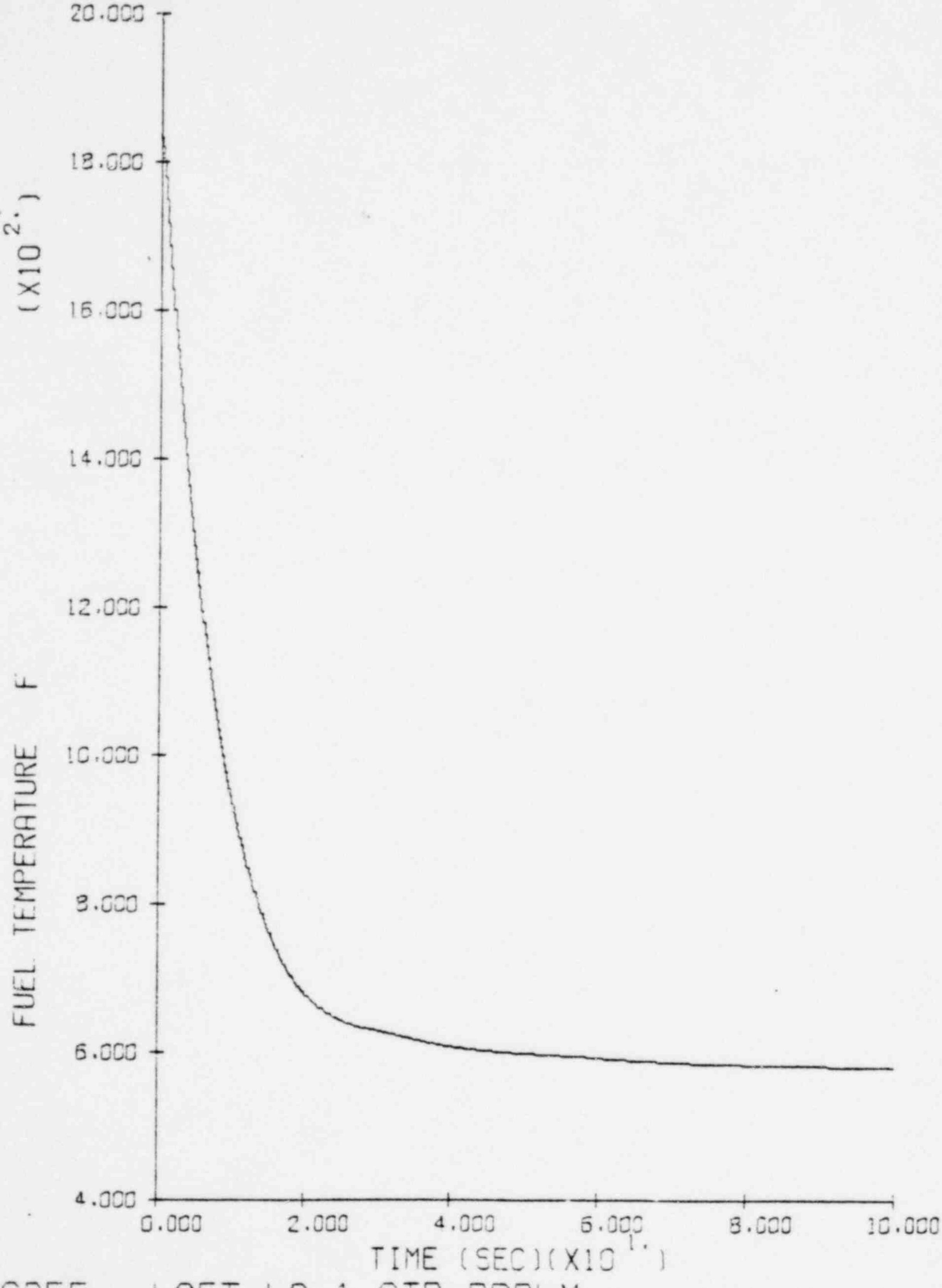


Figure 108 - Temperature, Average Fuel Rod, Core Path 2 (C_D = 0.6)

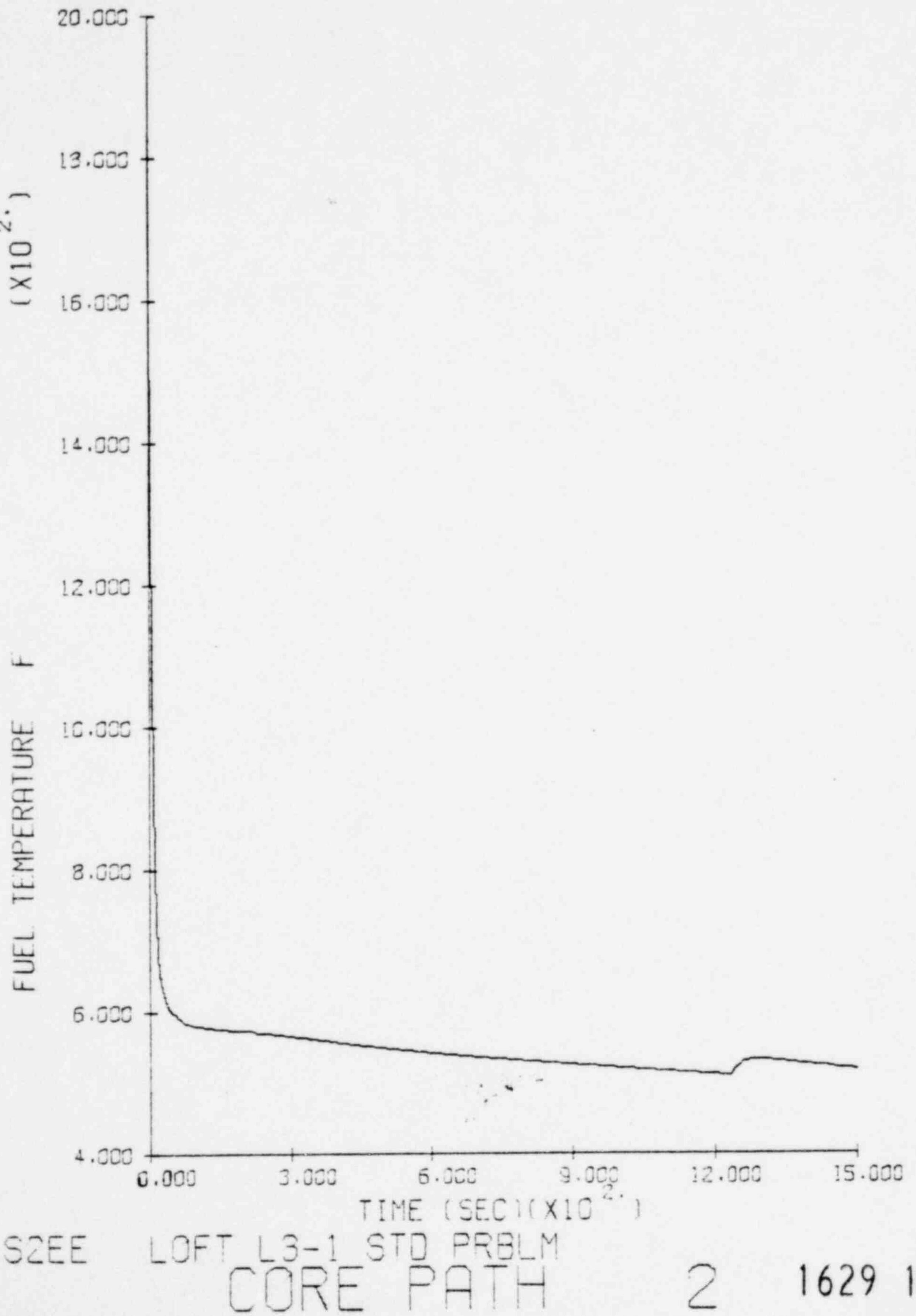
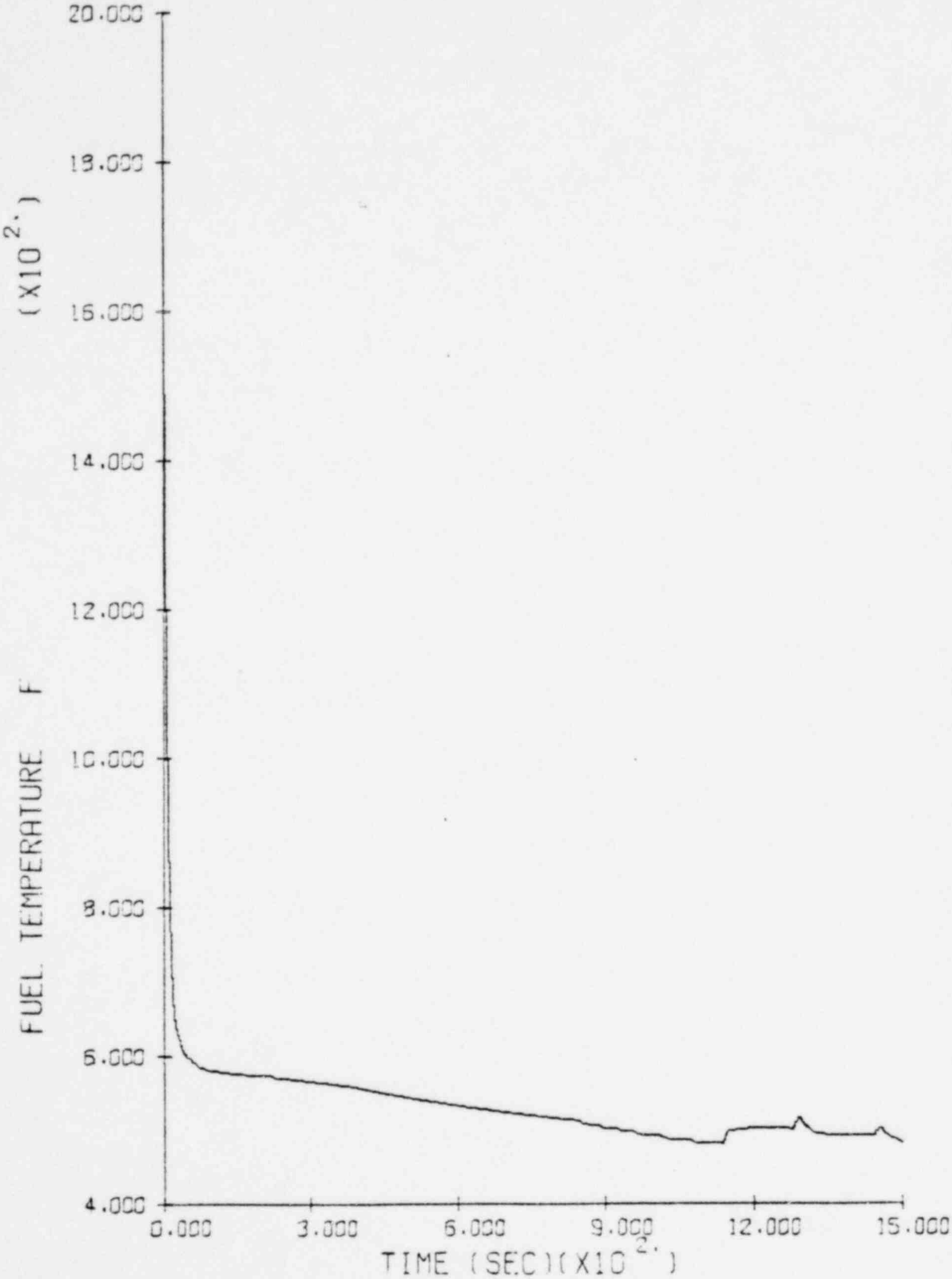


Figure 109 - Temperature, Average Fuel Rod, Core Path 2 (C_D= 0.9)



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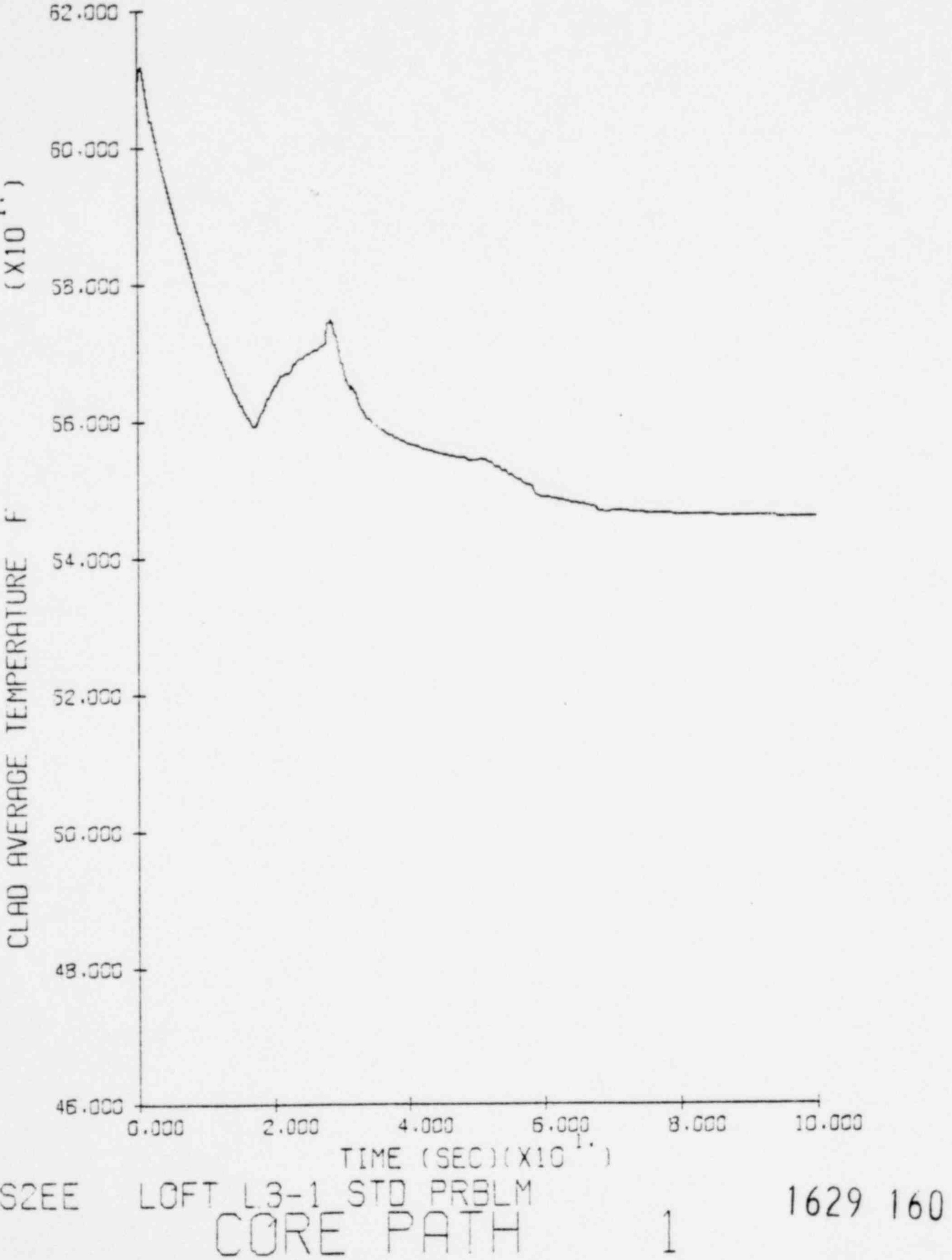
CORE PATH 2

Figure 110 - Temperature, Average Clad, Core Path 1 (0 to 100 sec.)



1629 160

Figure 111 - Temperature, Average Clad, Core Path 1 (C_D = 0.6)

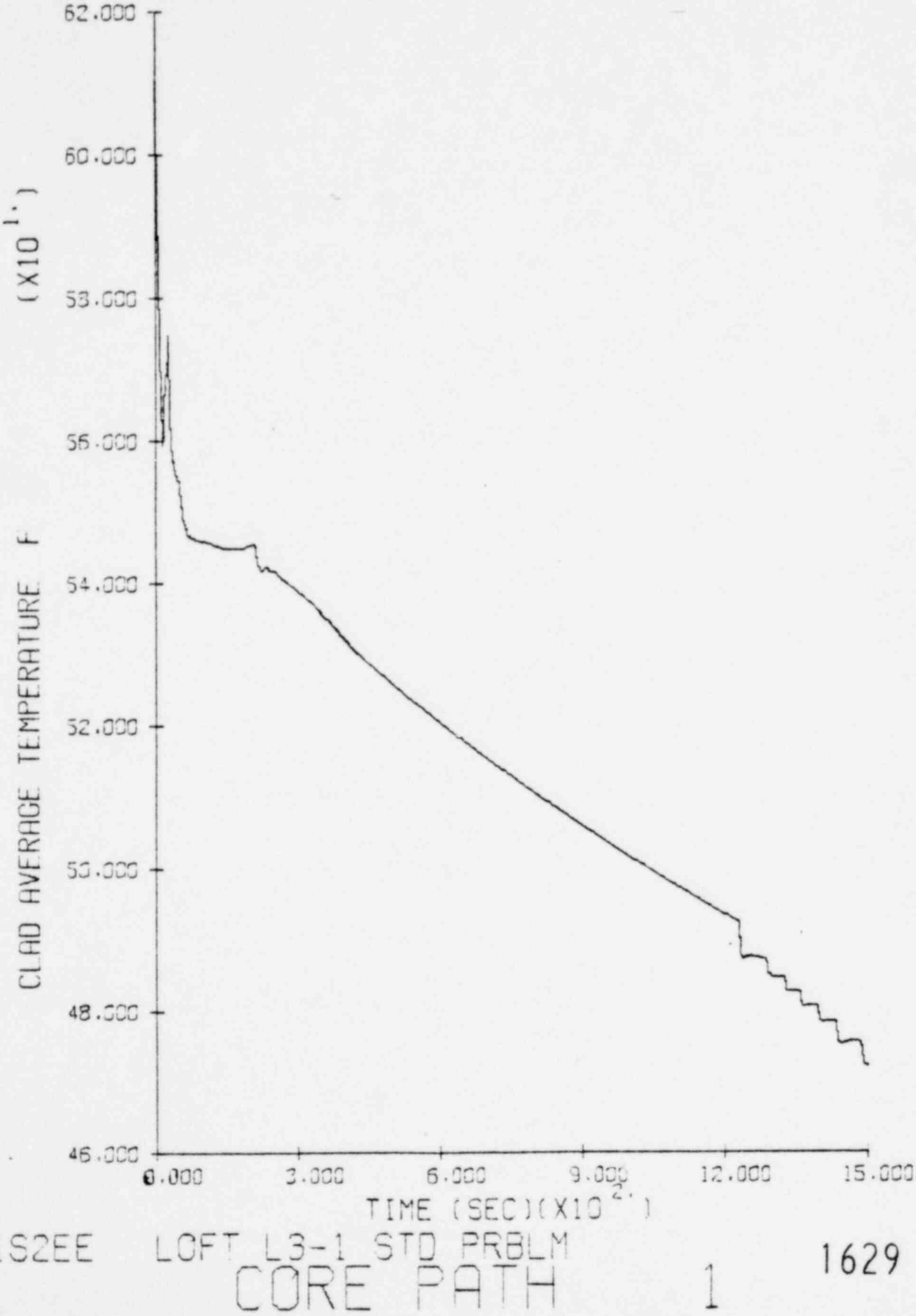


Figure 112 - Temperature, Average Clad, Core Path 1 (C_D = 0.9)

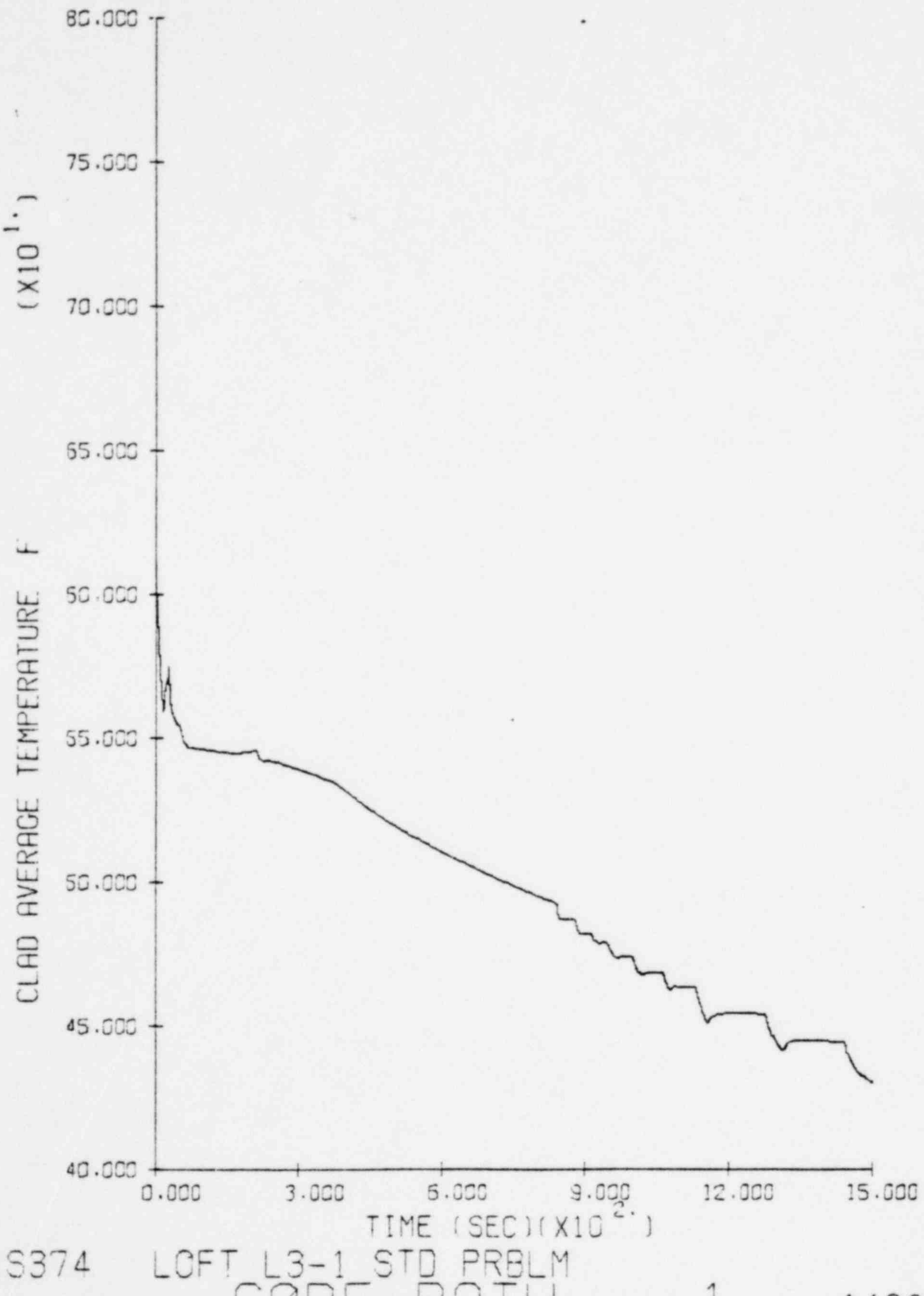


Figure 113 - Temperature, Average Clad, Core Path 2 (0 to 100 sec.)

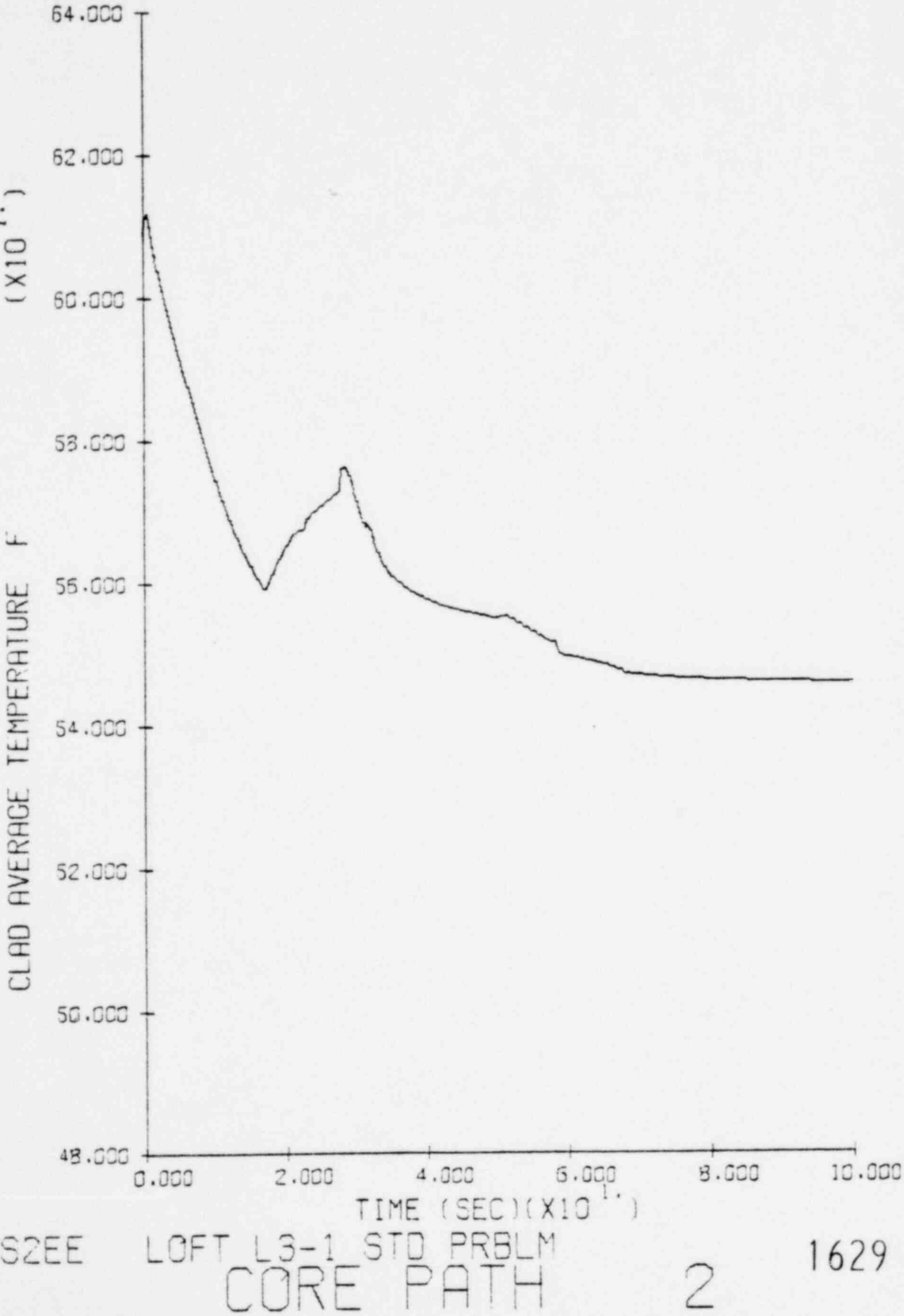


Figure 114 - Temperature, Average Clad, Core Path 2 (C_D = 0.6)

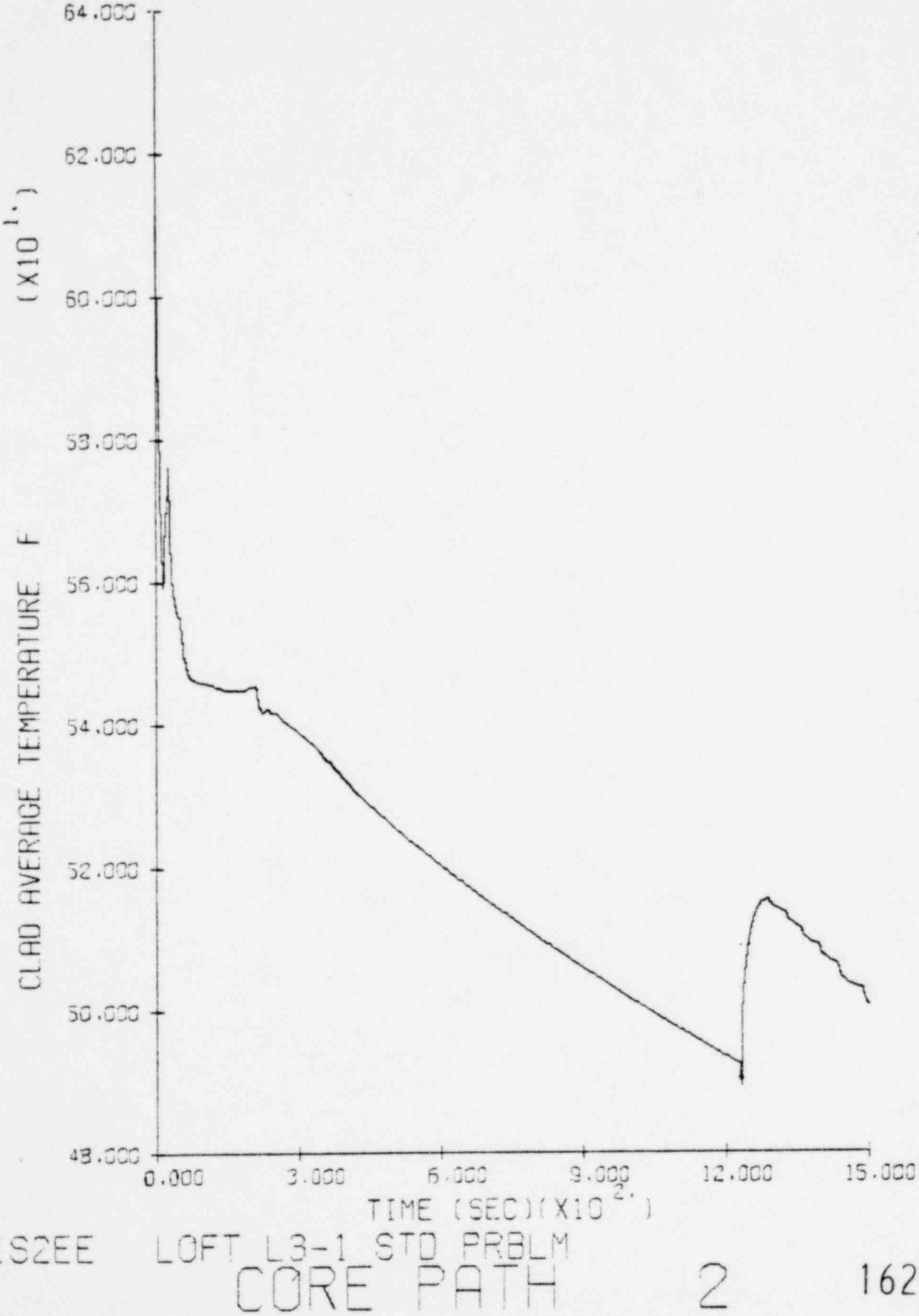
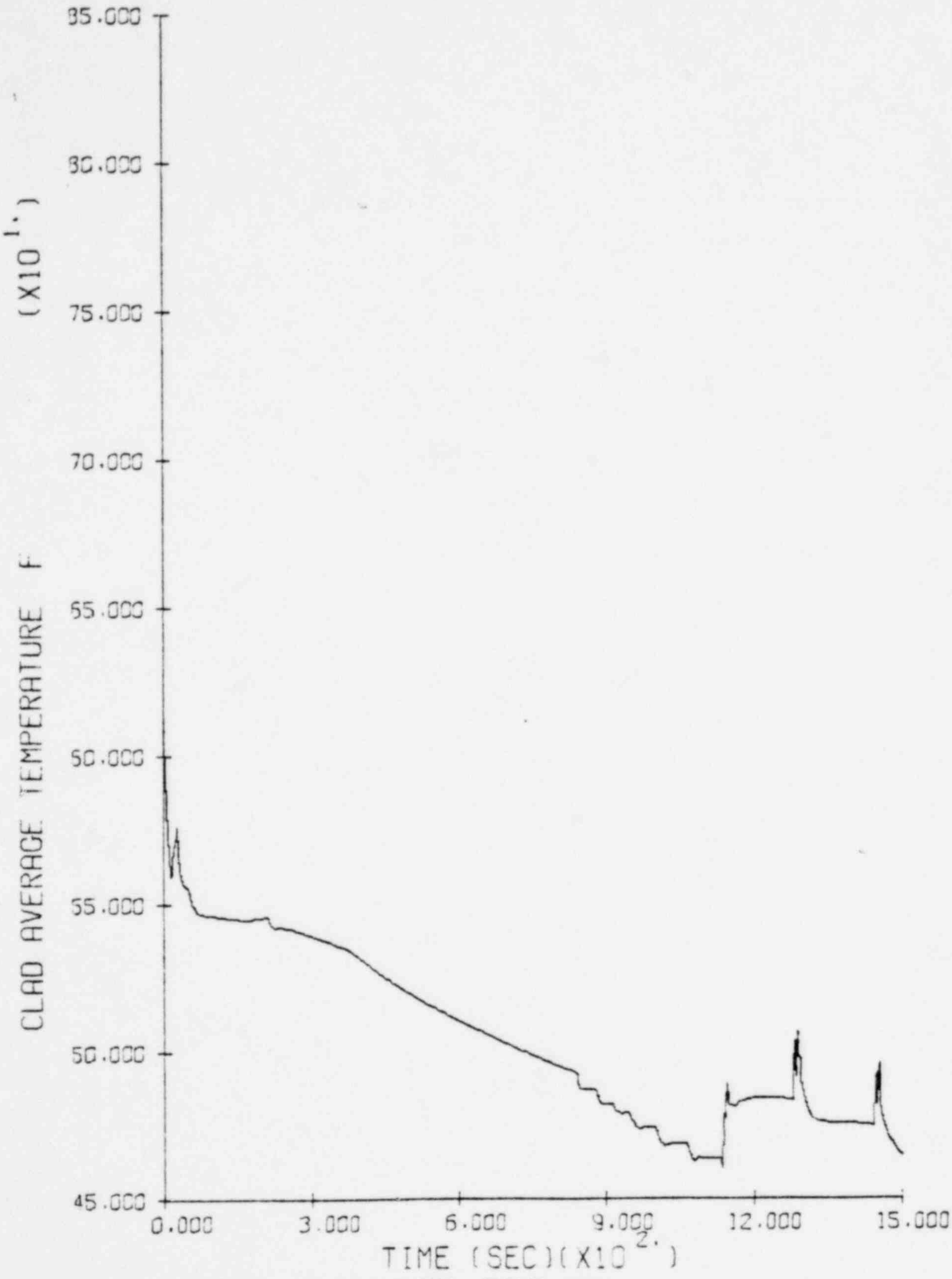


Figure 115 - Temperature, Average Clad, Core Path 2 ($C_D = 0.9$)



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CORE PATH 2

Figure 116 - Vessel Inventory, Node 1 (0 to 100 sec.)

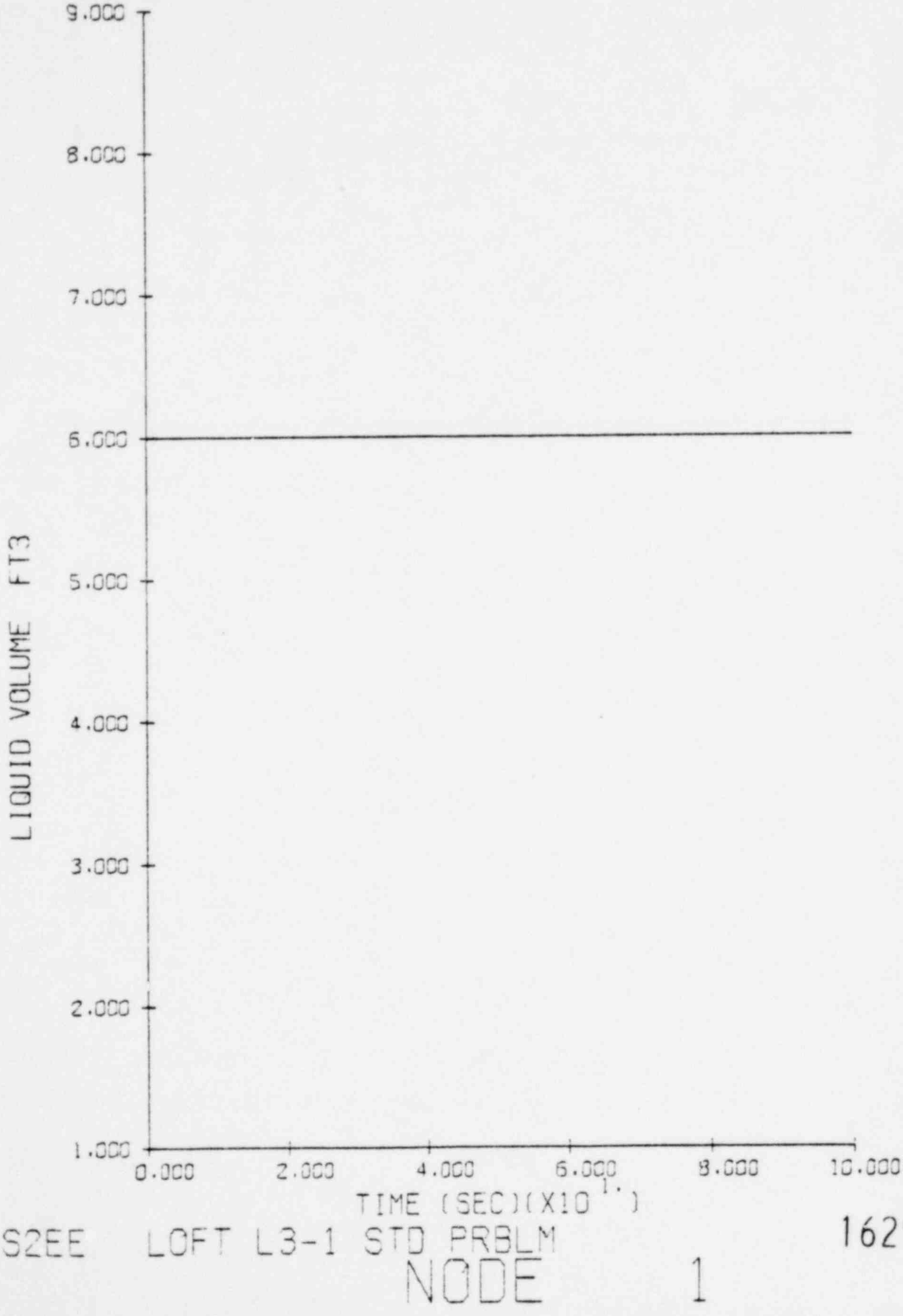


Figure 117 - Vessel Inventory, Node 2 (0 to 100 sec.)

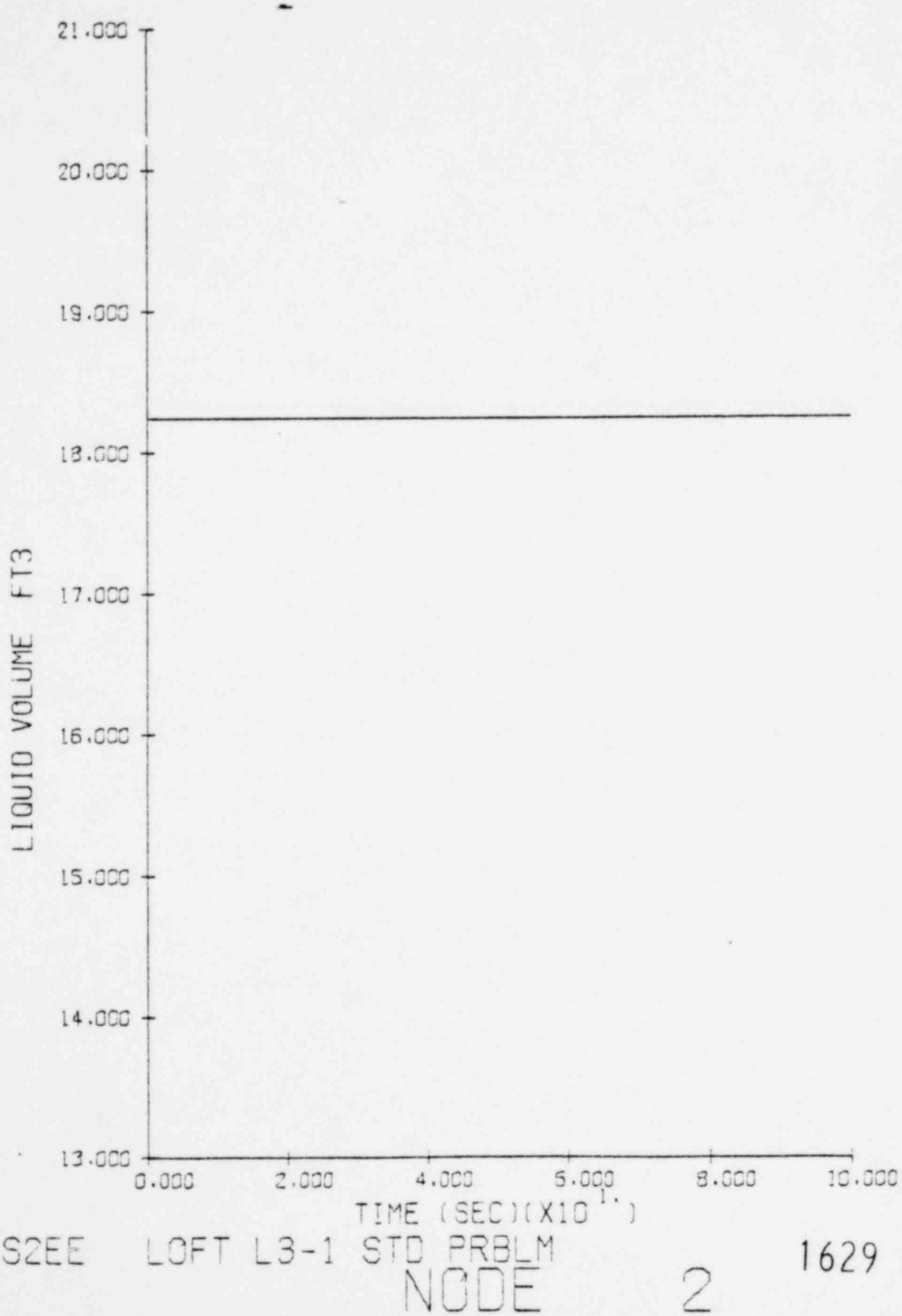


Figure 118 - Vessel Inventory, Node 3 (0 to 100 sec.)

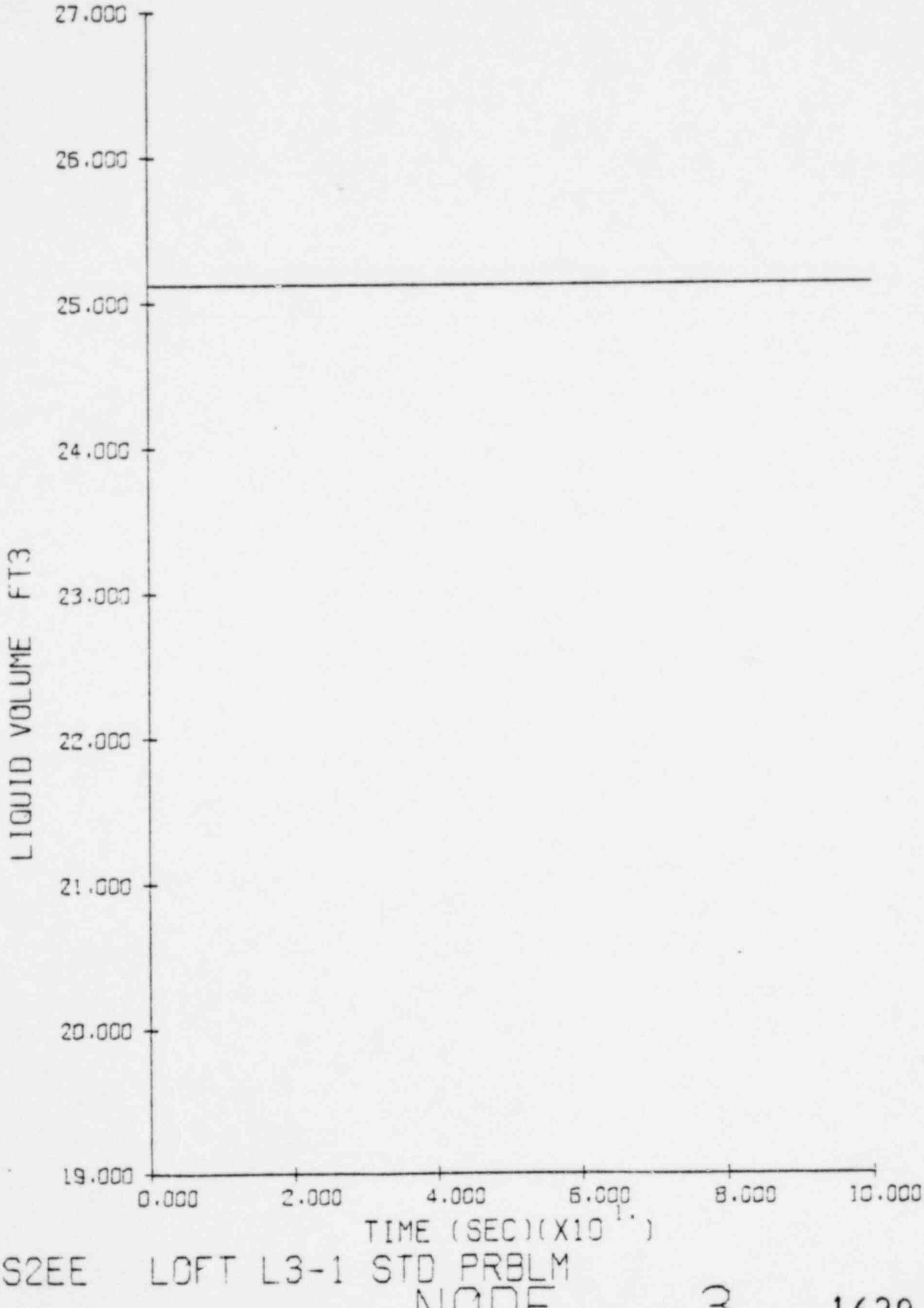
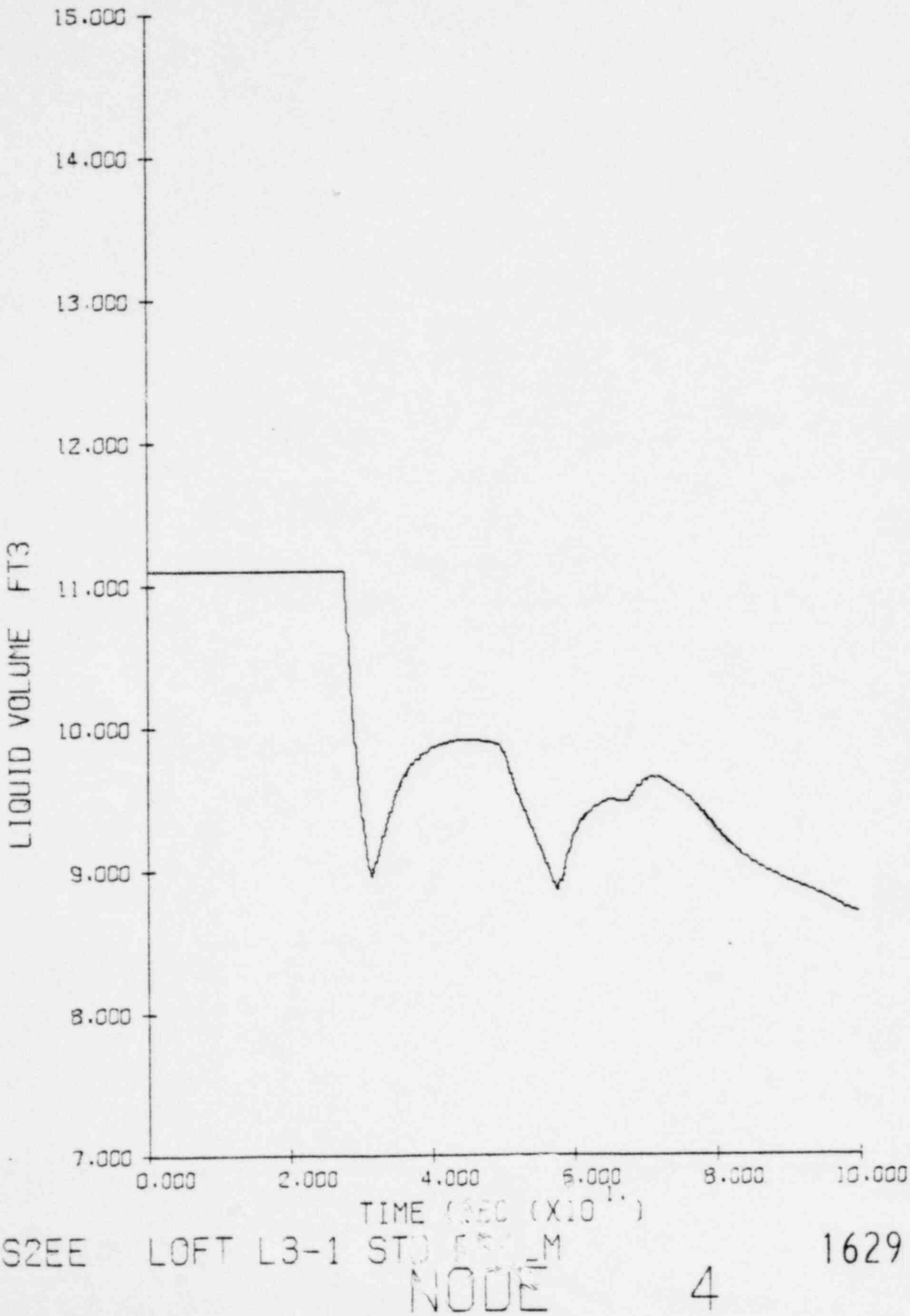
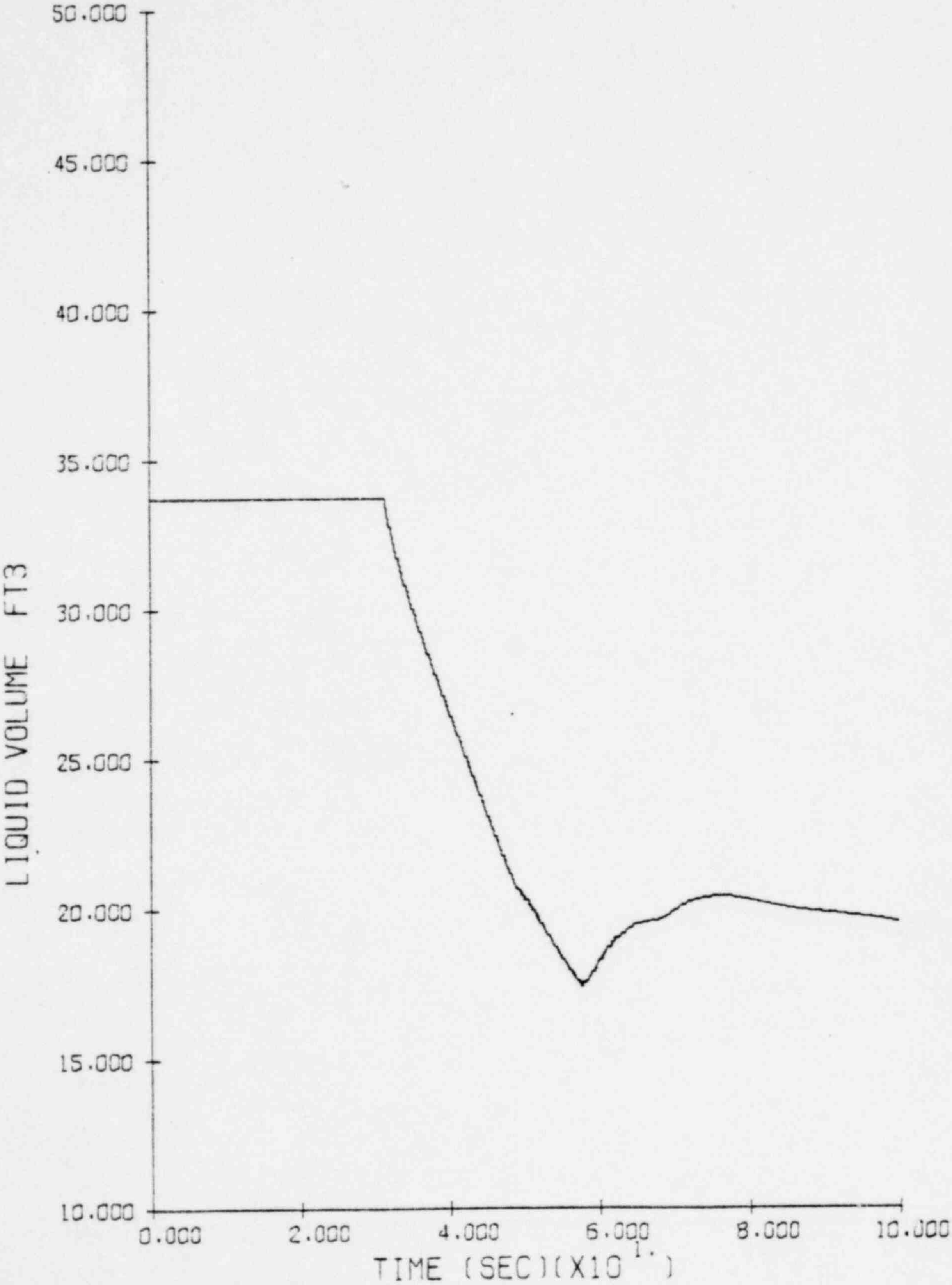


Figure 119 - Vessel Inventory, Node 4 (0 to 100 sec.)



1629 169

Figure 120 - Vessel Inventory, Node 5 (0 to 100 sec.)



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NODE 5

Figure 121 - Vessel Inventory, Node 1 (C_D = 0.6)

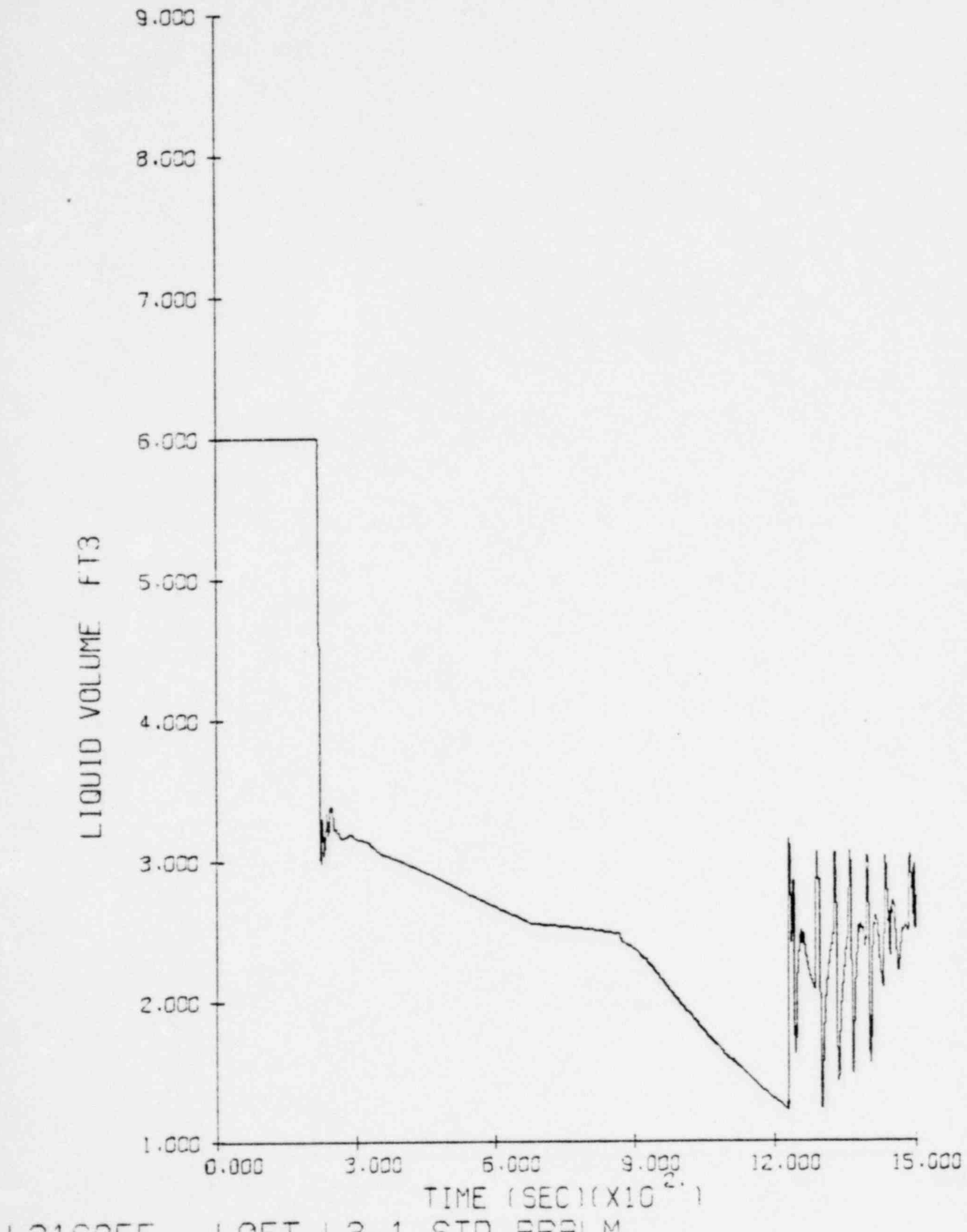


Figure 122 - Vessel Inventory, Node 2 (C_D = 0.6)

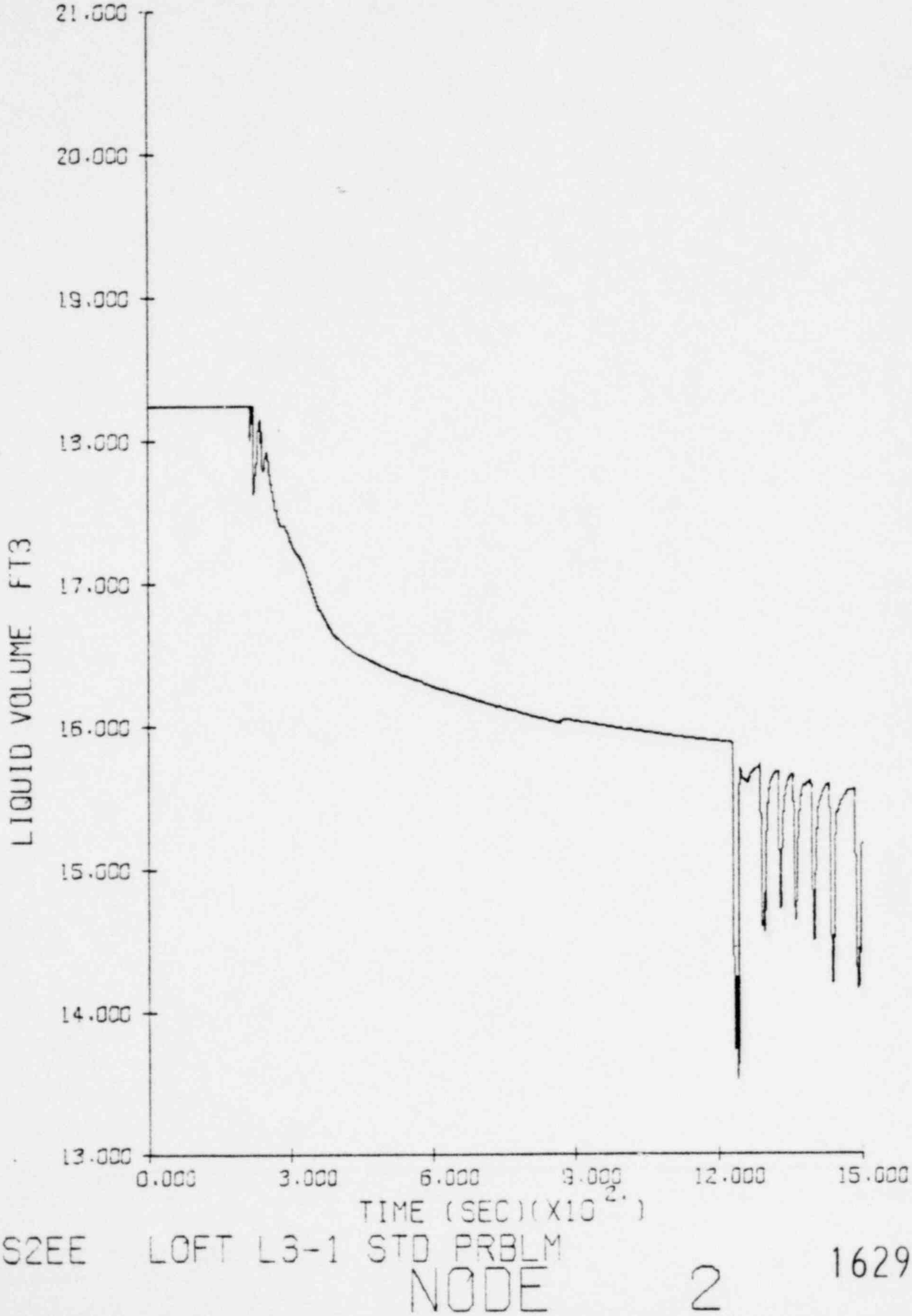


Figure 123 - Vessel Inventory, Node 3 (C_D = 0.6)

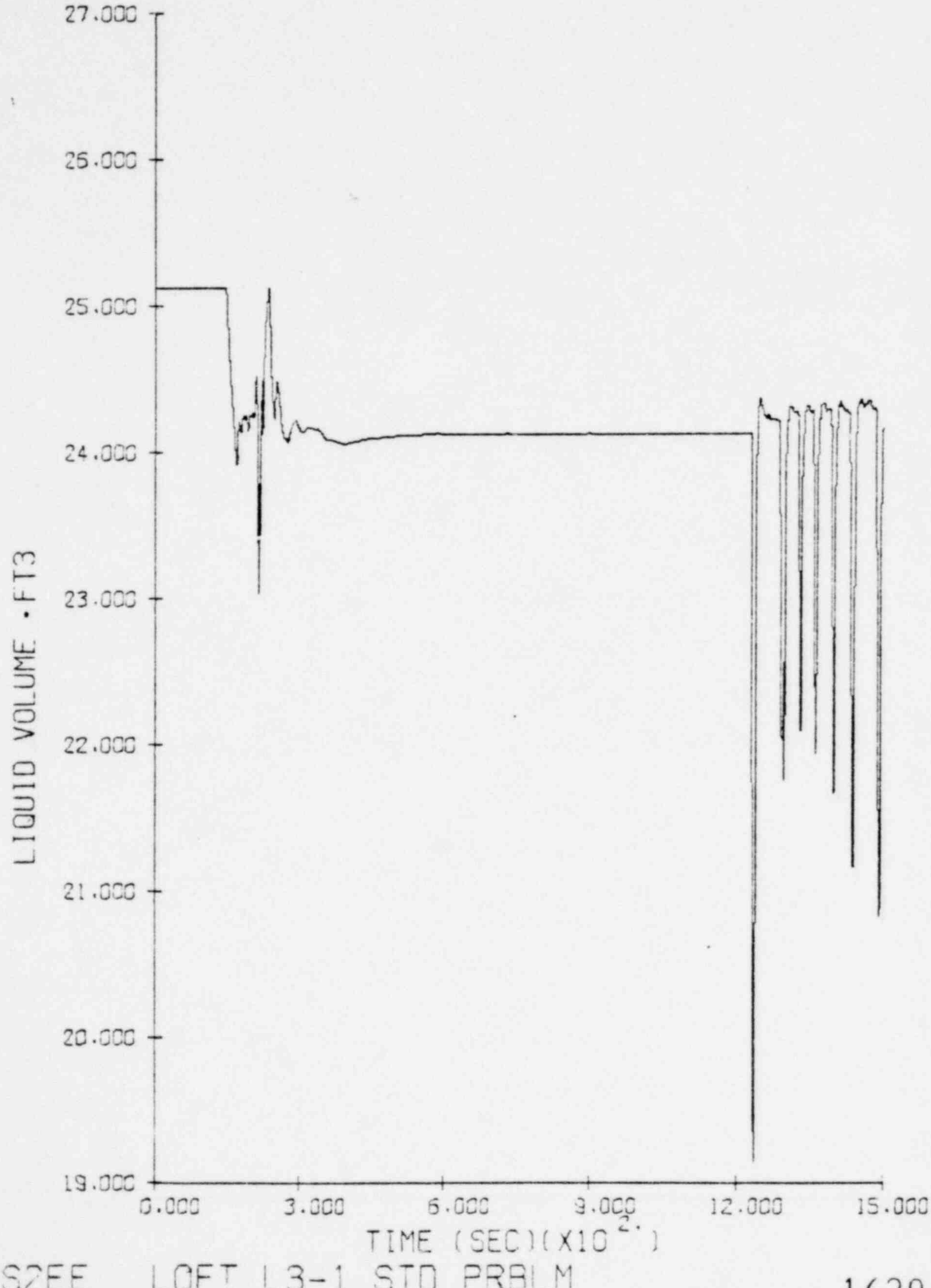


Figure 124 - Vessel Inventory, Node 4 (C_D = 0.6)

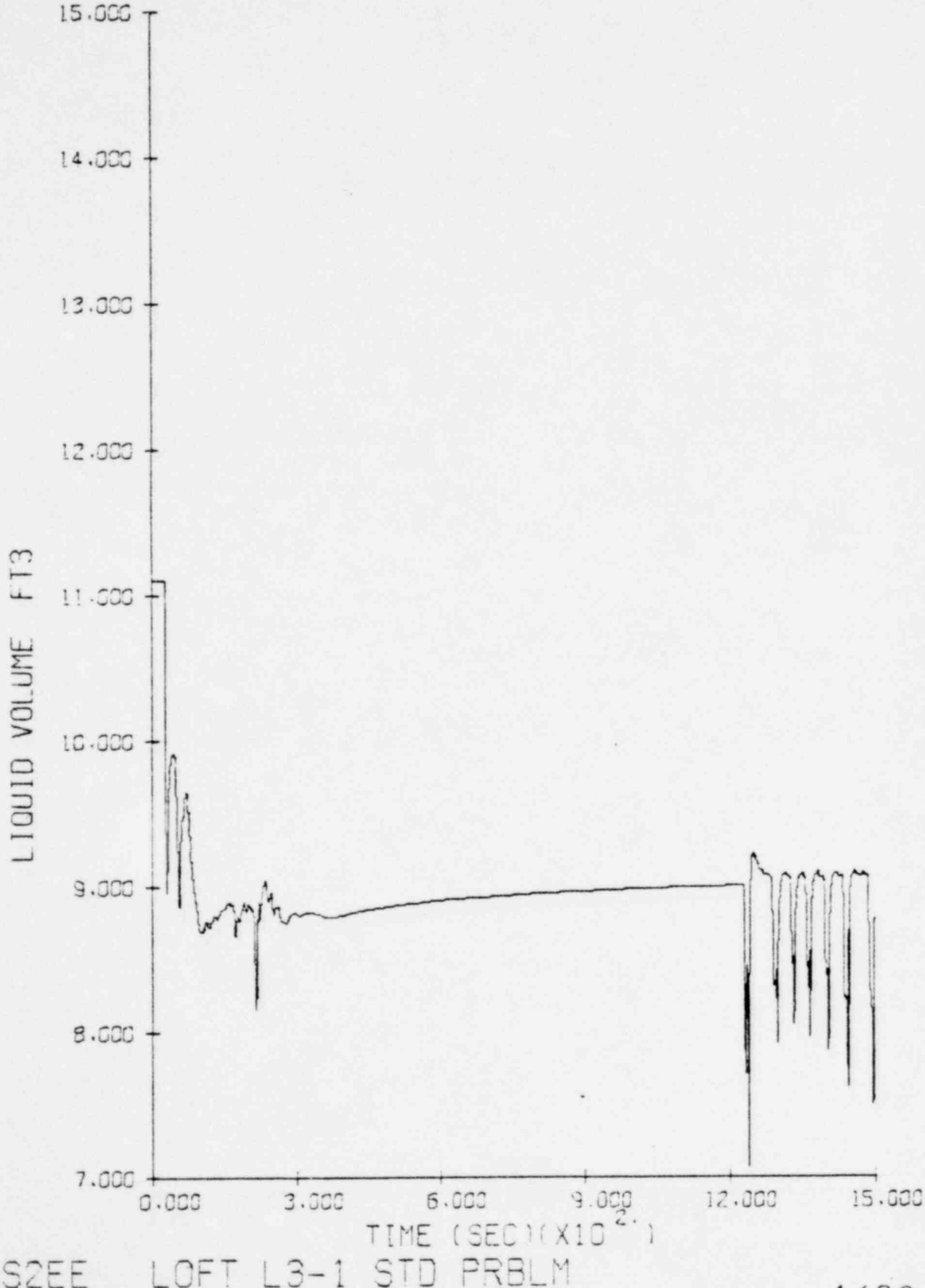


Figure 125 - Vessel Inventory, Node 5 (C_D = 0.6)

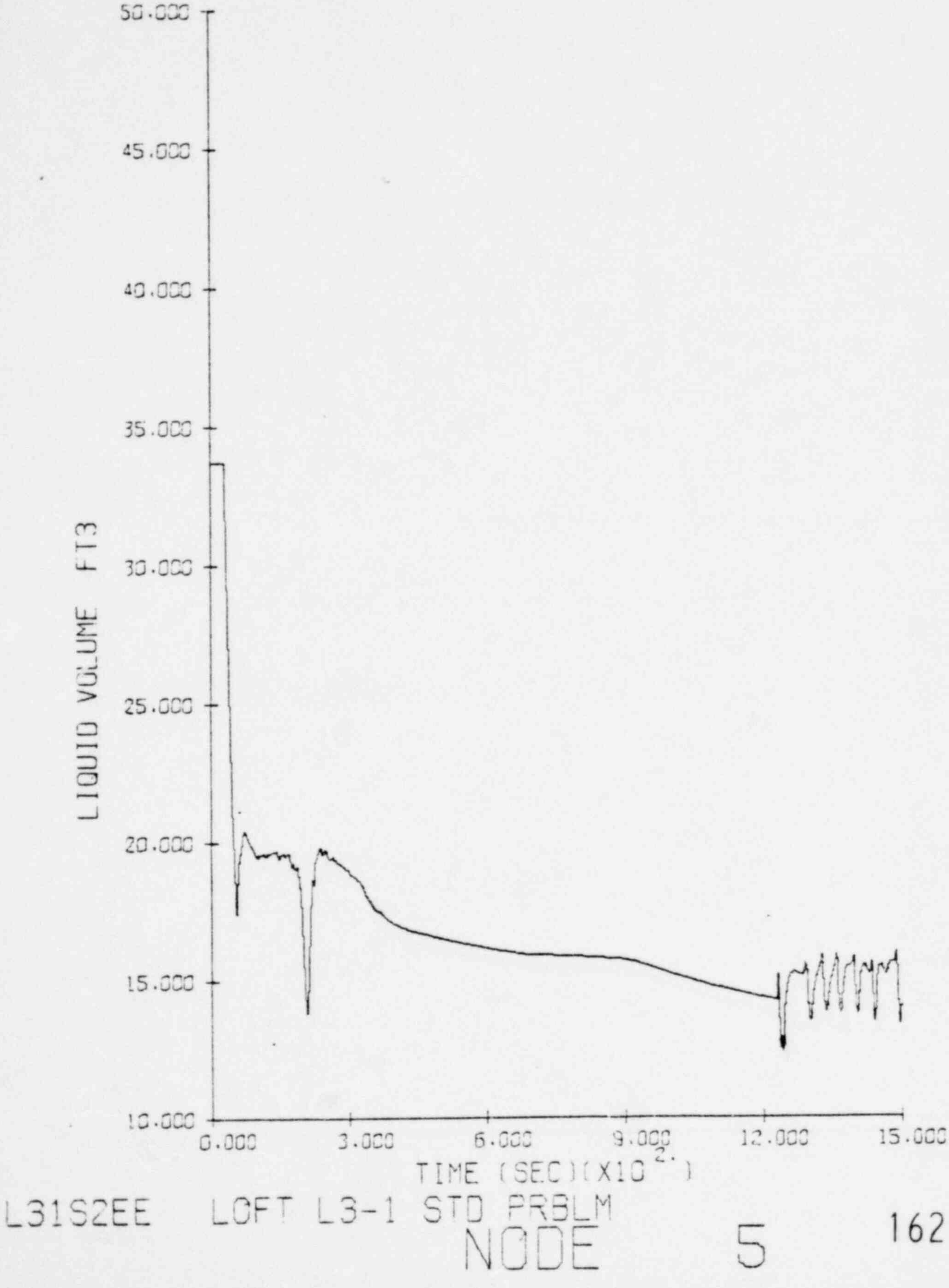
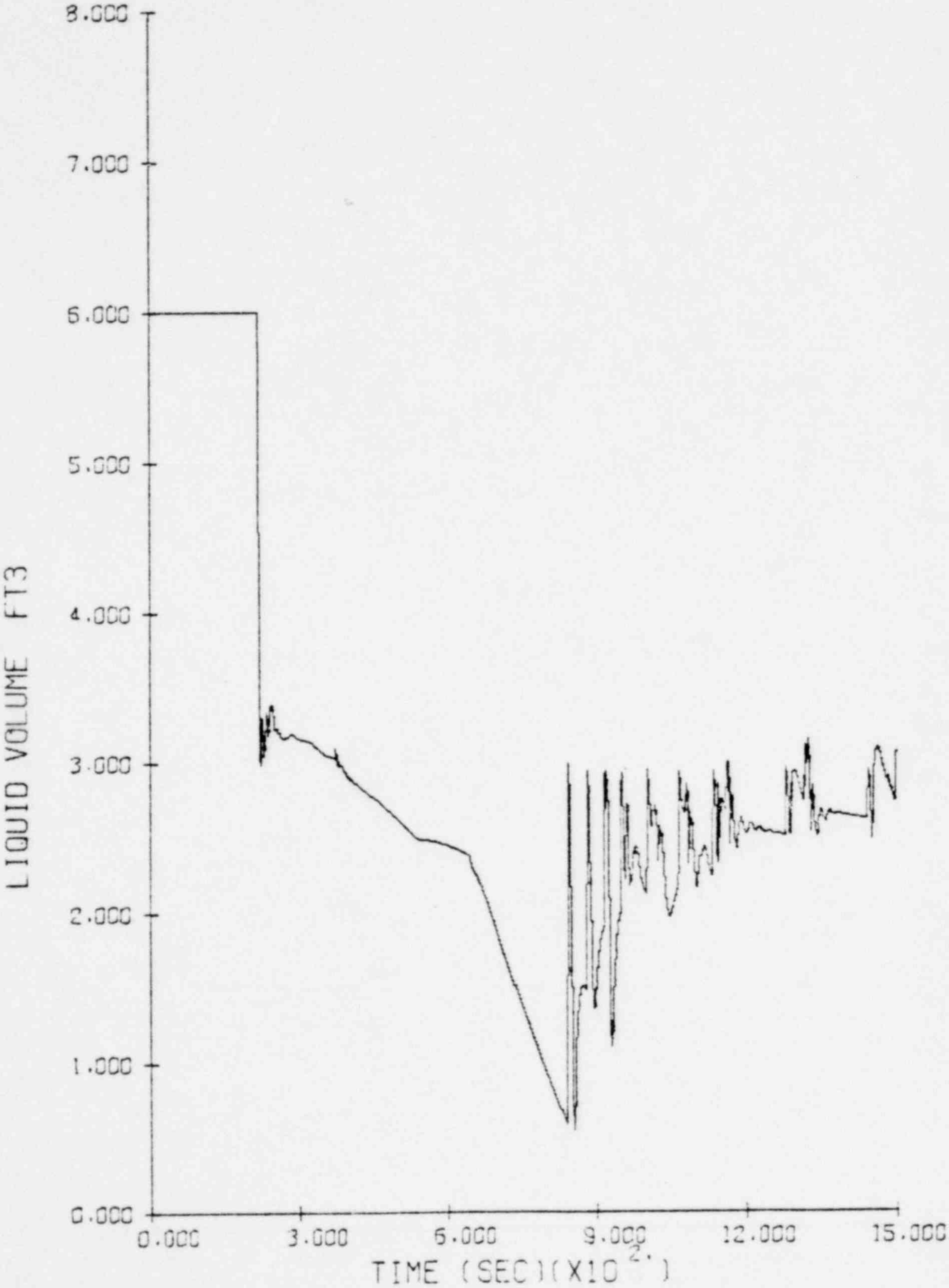


Figure 126 - Vessel Inventory, Node 1 (C_D 0.9)



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NODE 1

Figure 127 - Vessel Inventory, Node 2 (C_D = 0.9)

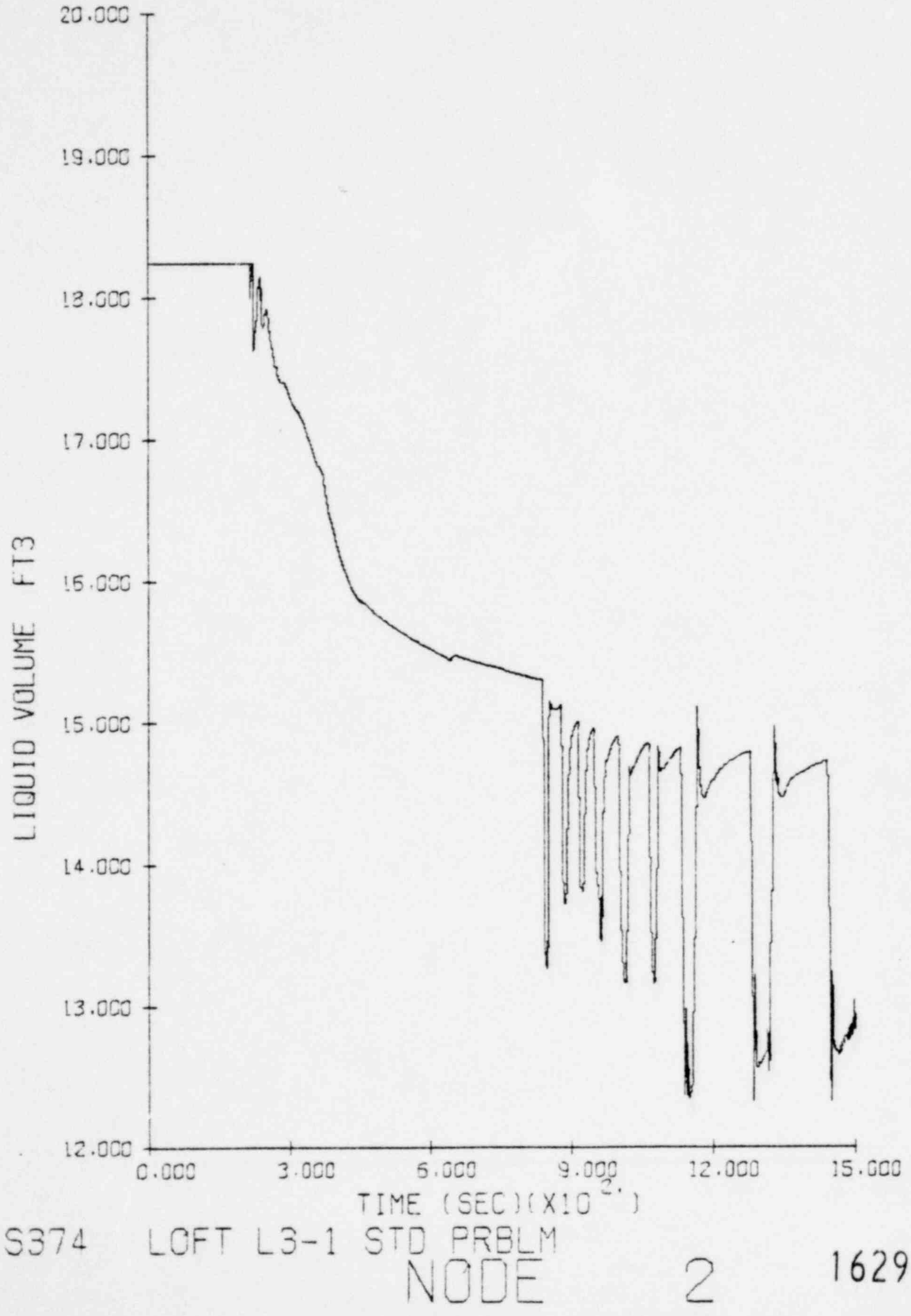

Figure 128 - Vessel Inventory, Node 3 (C_D = 0.9)

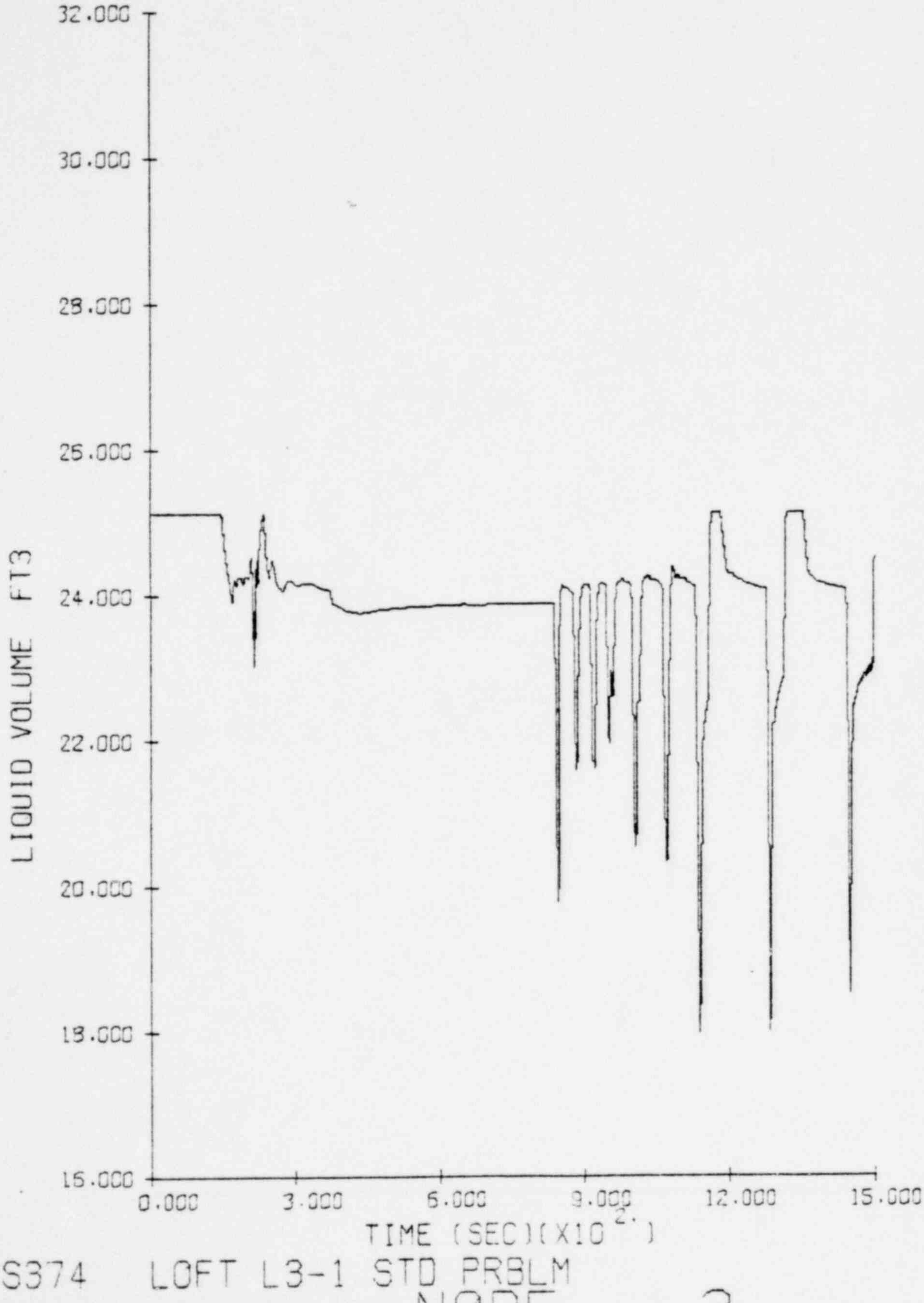

Figure 129 - Vessel Inventory, Node 4 (C_D = 0.9)

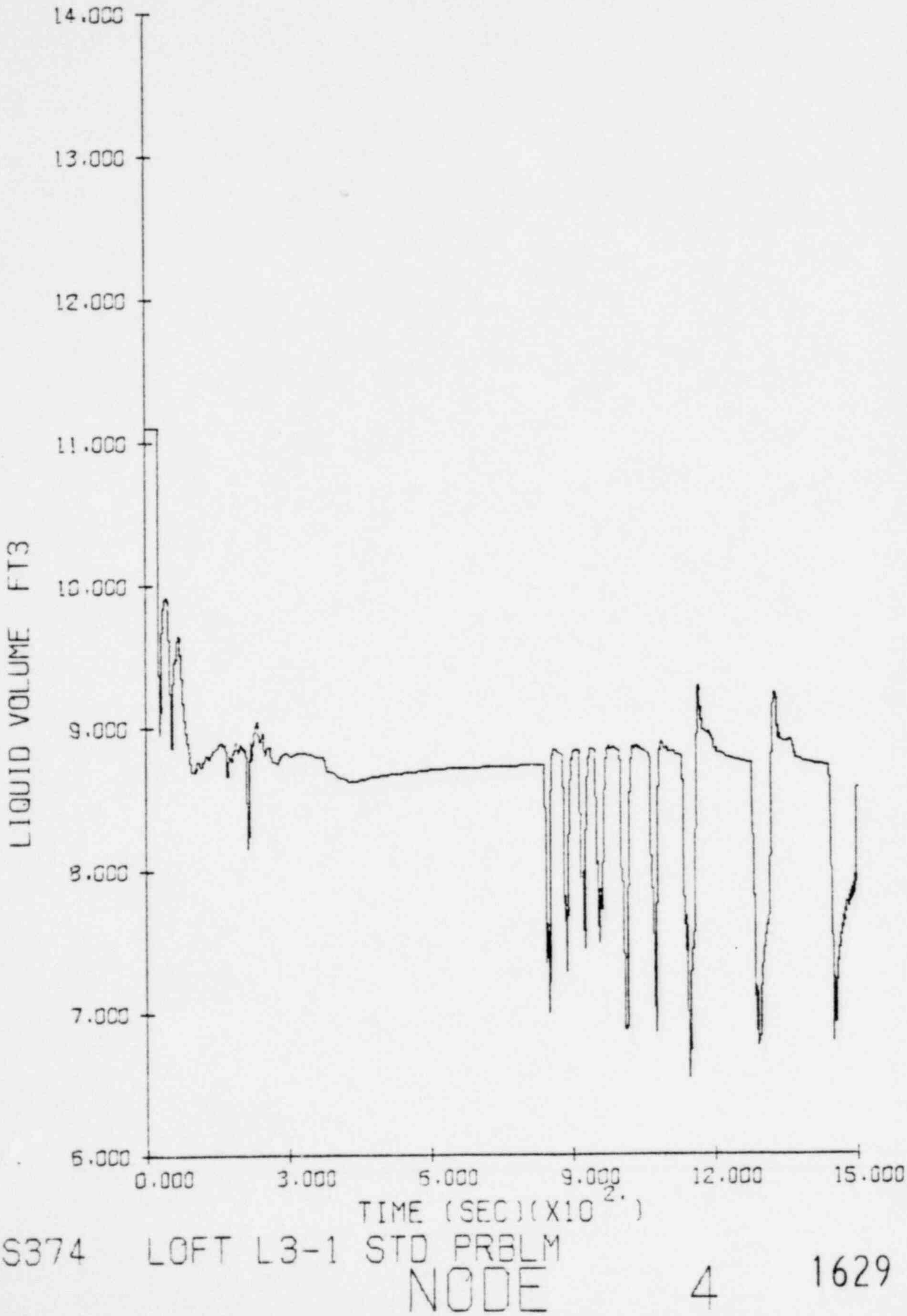

Figure 130 - Vessel Inventory, Node 5 (C_D = 0.9)

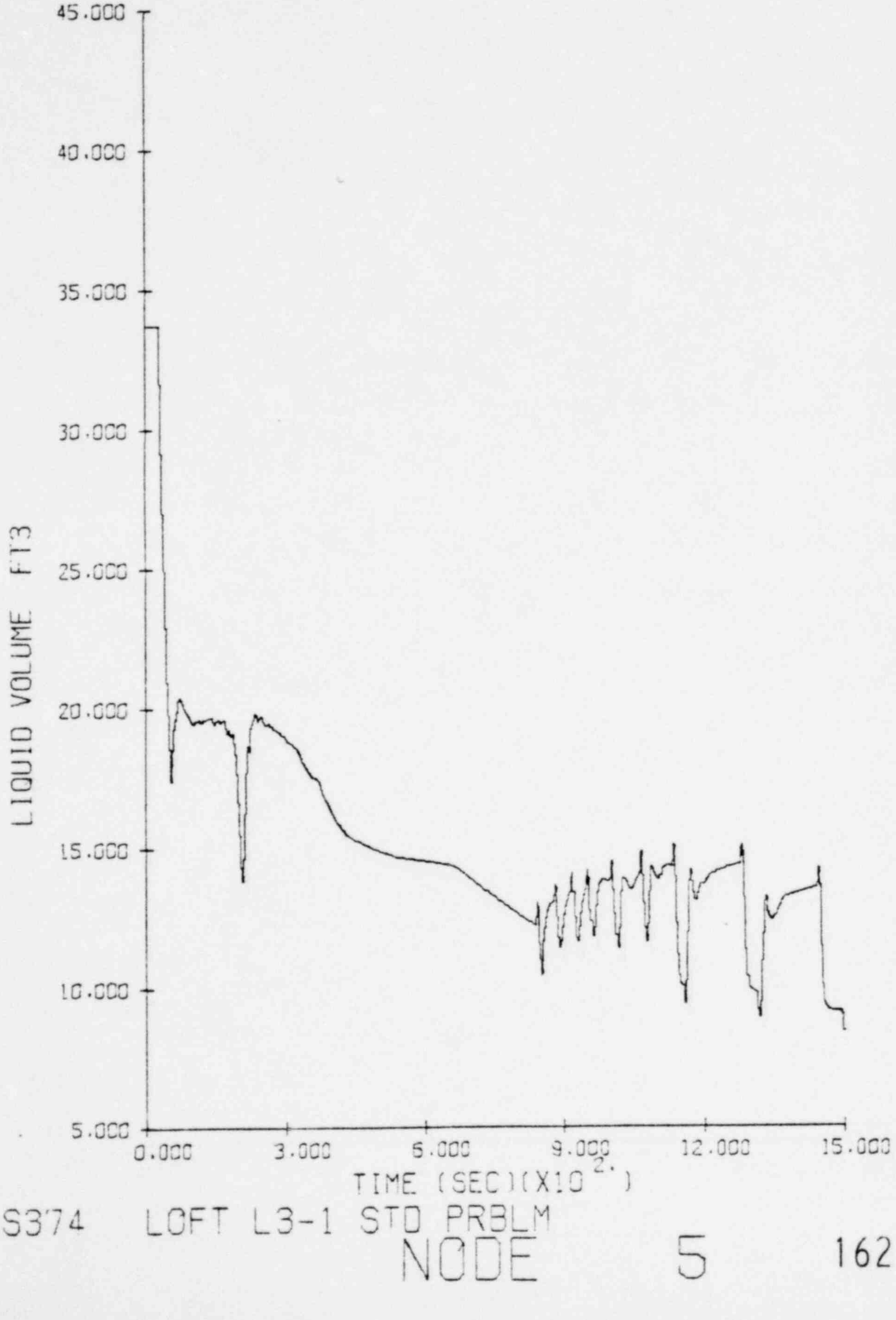

Figure 131 - Integrated Flow to Containment (0 to 100 sec.)

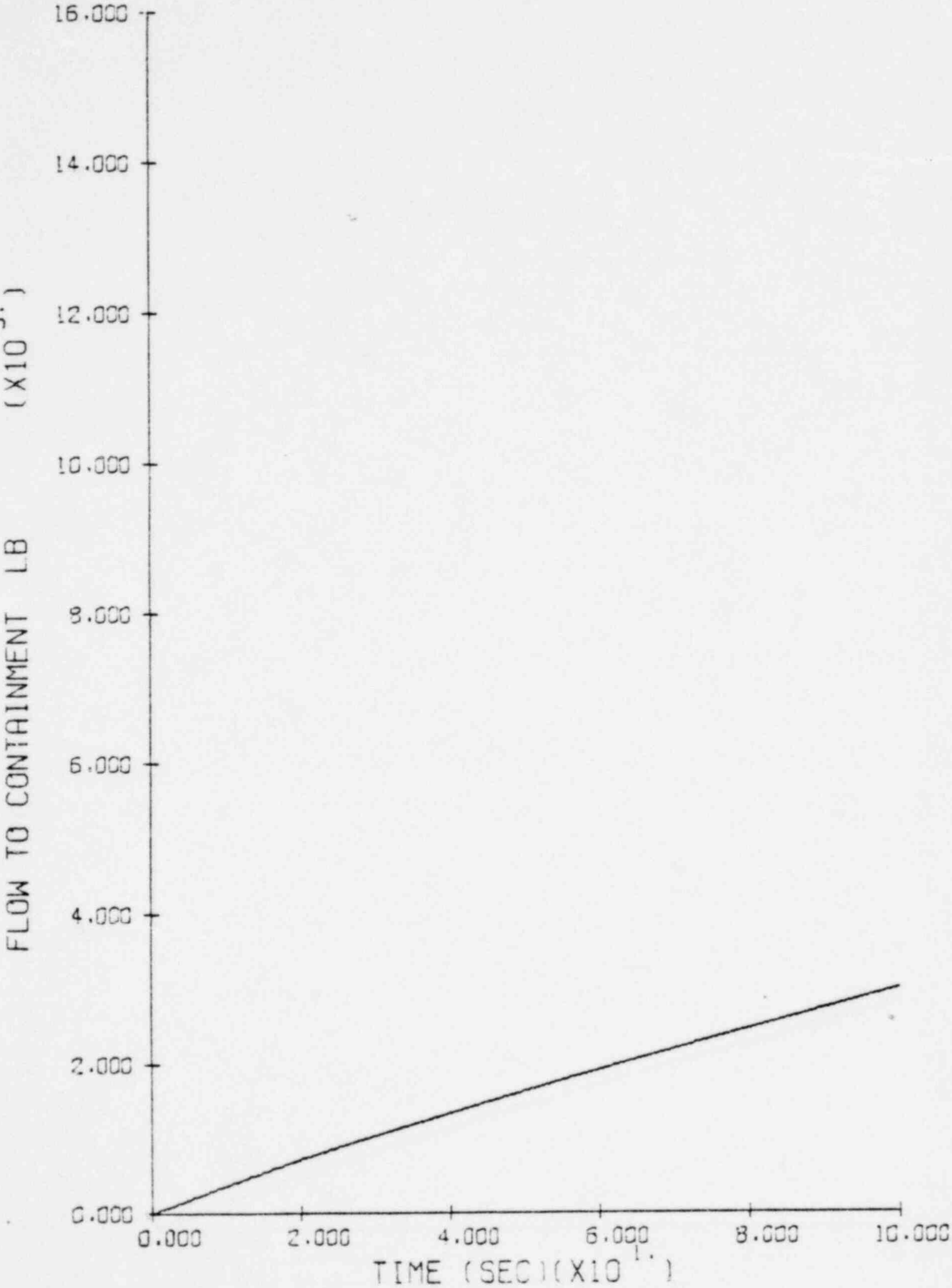

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Figure 132 - Integrated Flow to Containment (C_D = 0.6)

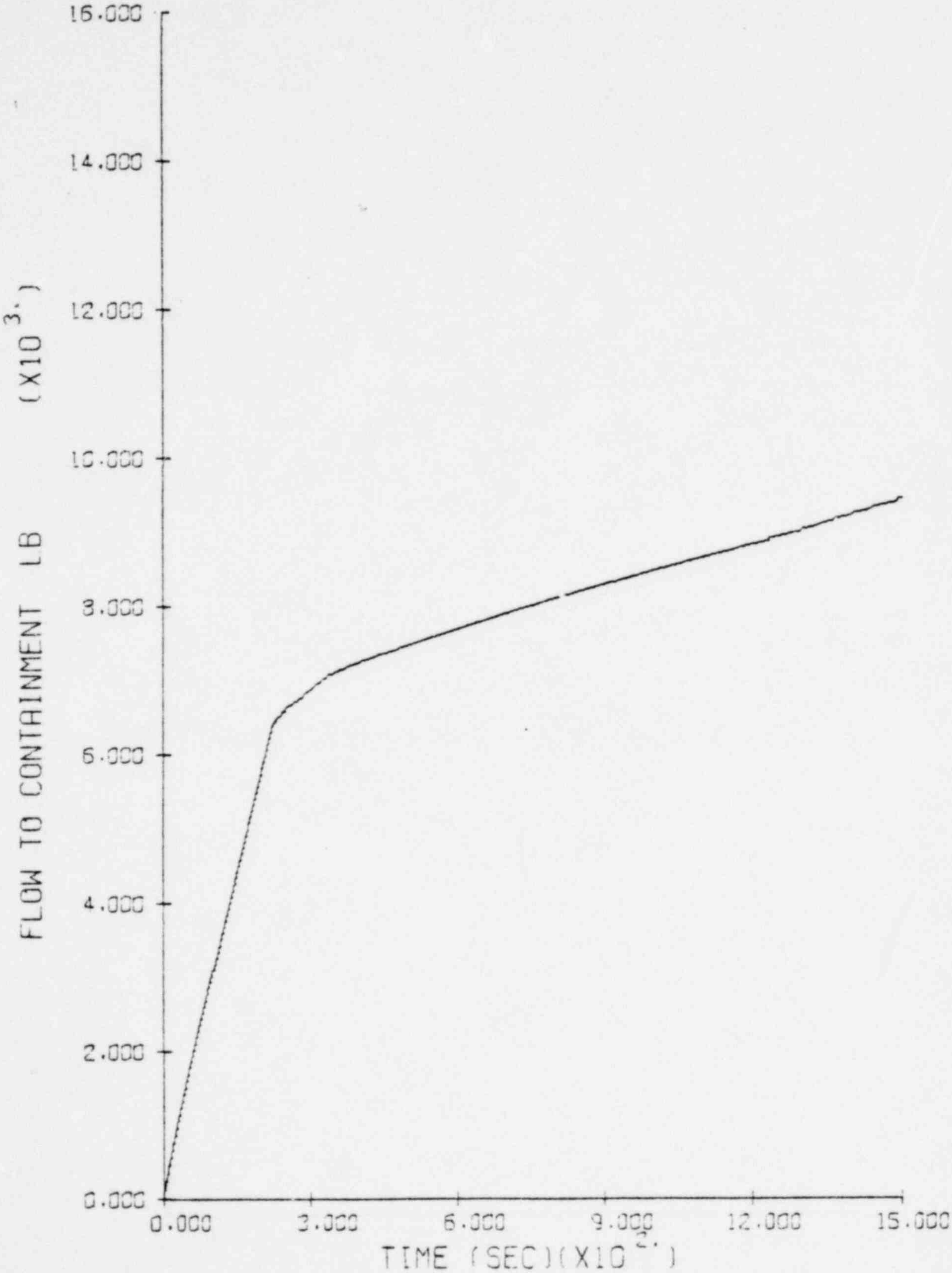

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Figure 133 - Integrated Flow to Containment (C_D = 0.9)

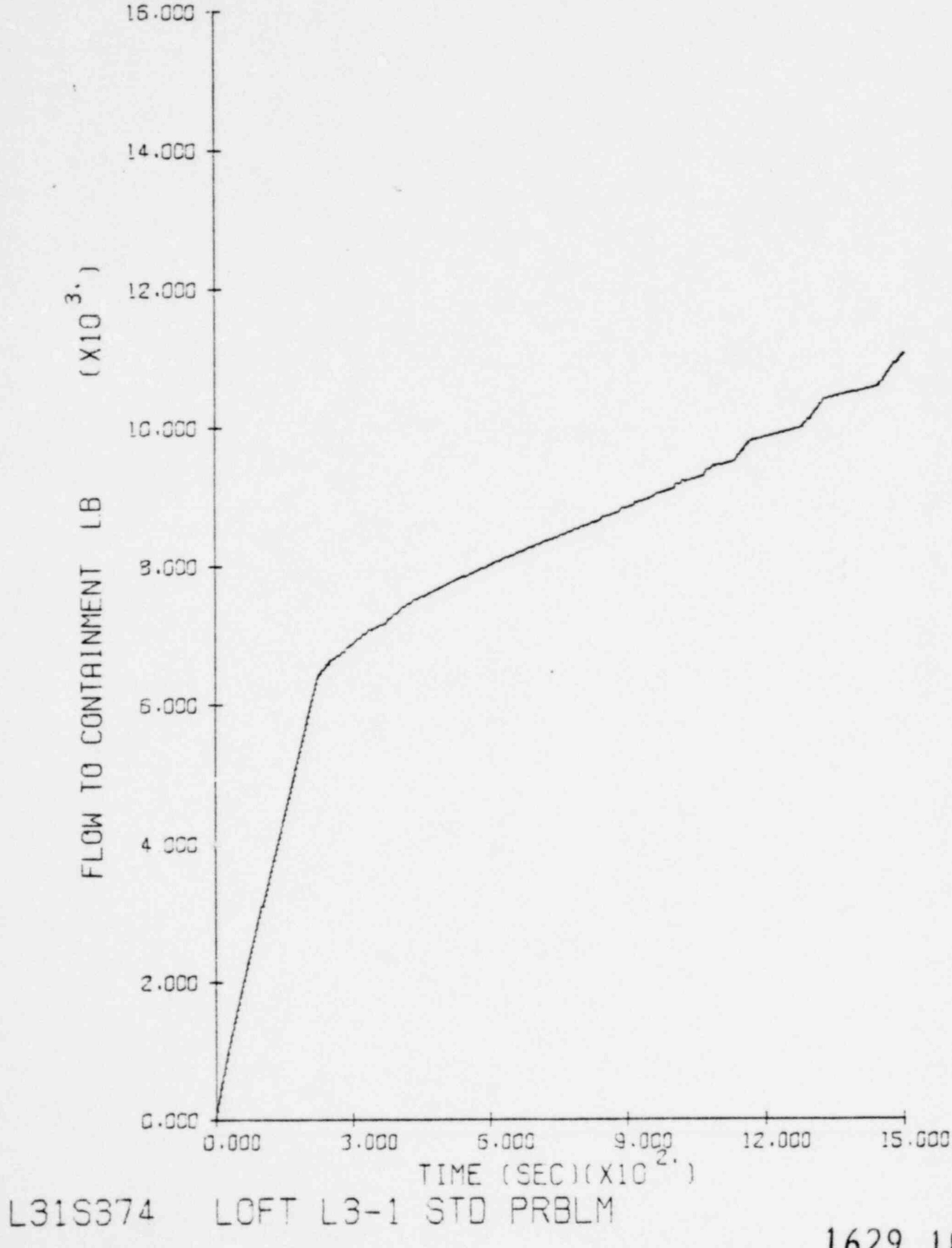

Figure 134 - Integrated Energy to Containment (0 to 100 sec.)

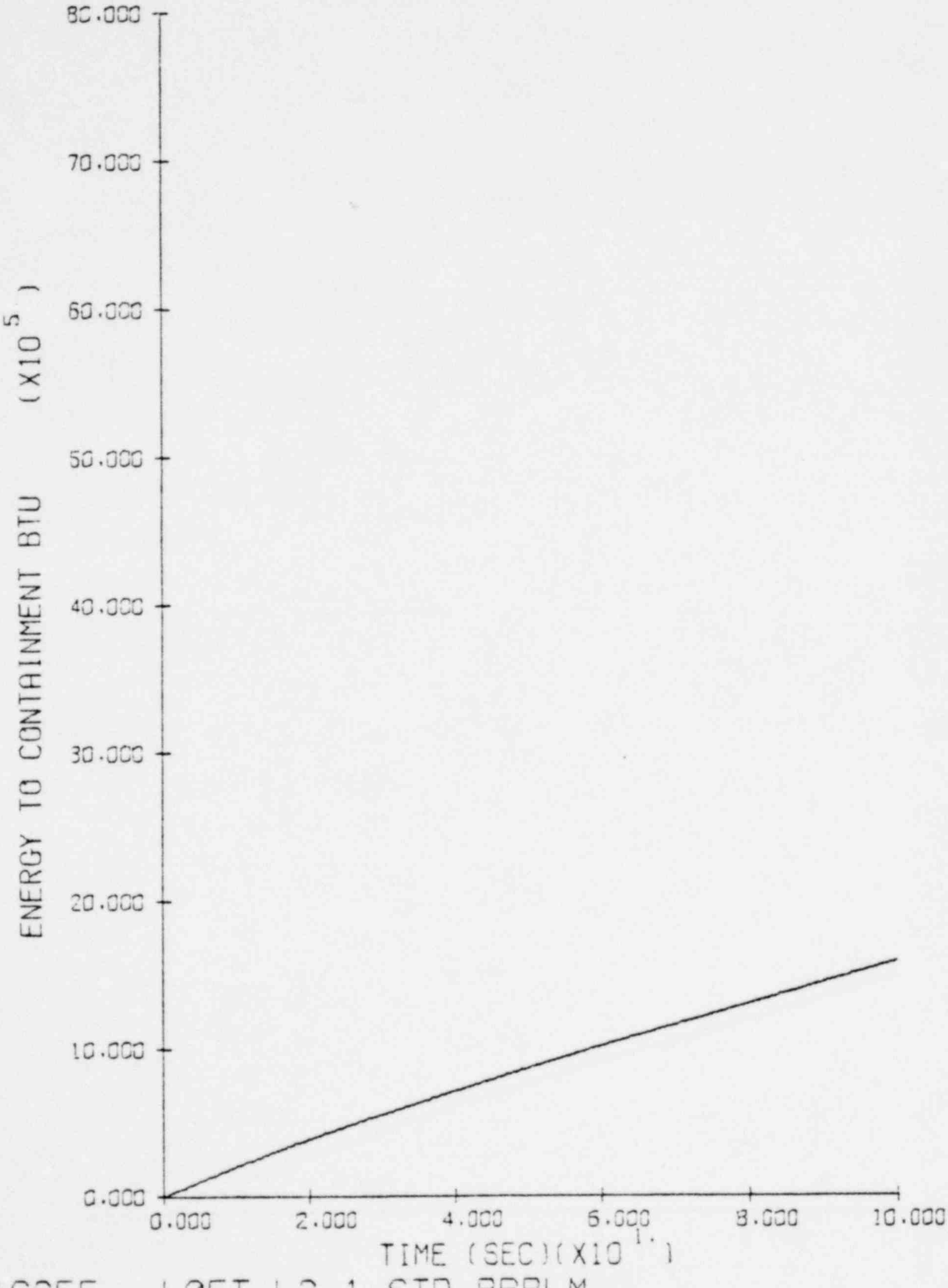

Figure 135 - Integrated Energy to Containment ($C_D = 0.6$)

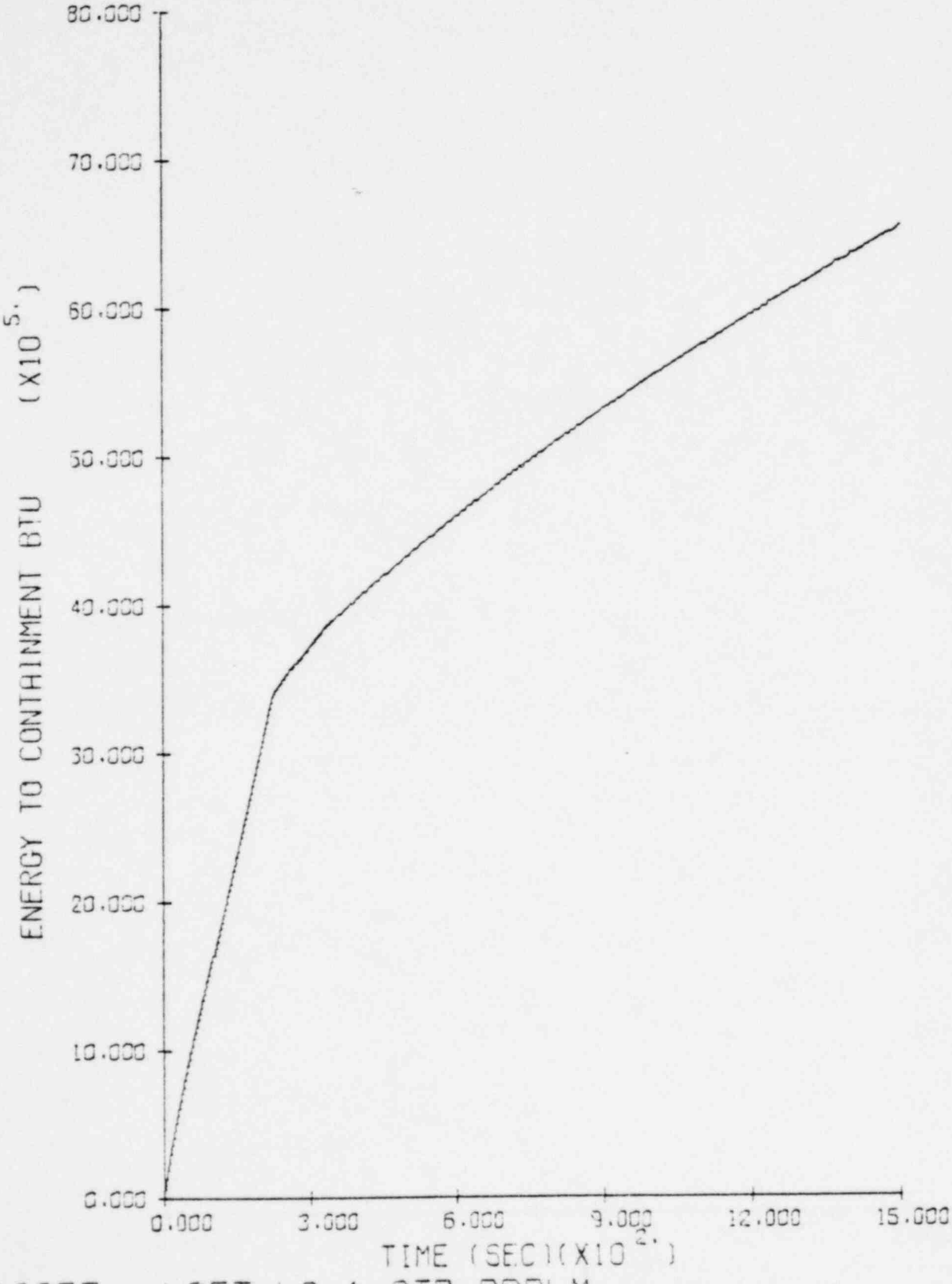

Figure 136 - Integrated Energy to Containment (C_D = 0.9)

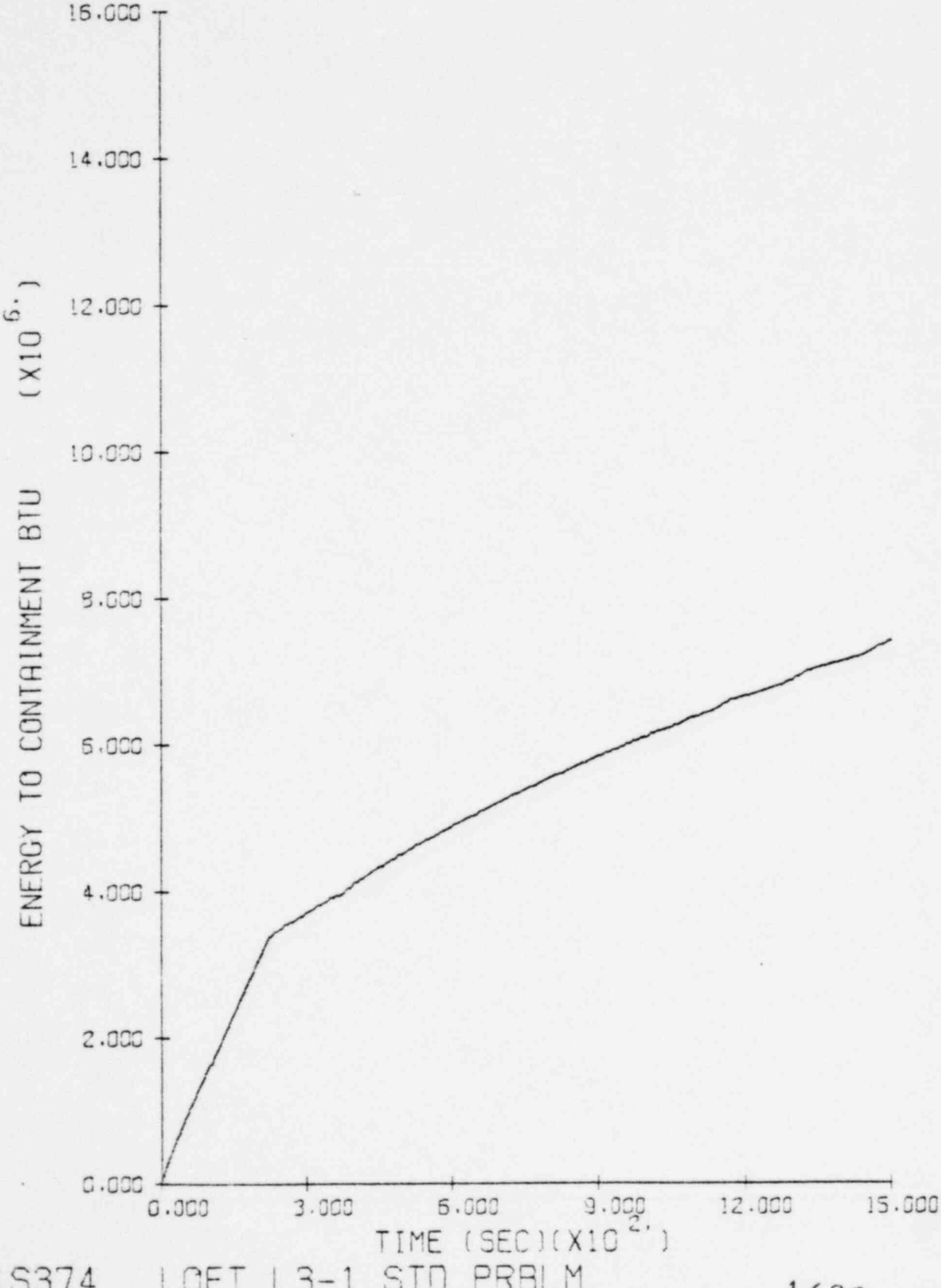

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Figure 137 - Pipe Quality, Core Path 1 (0 to 100 sec.)

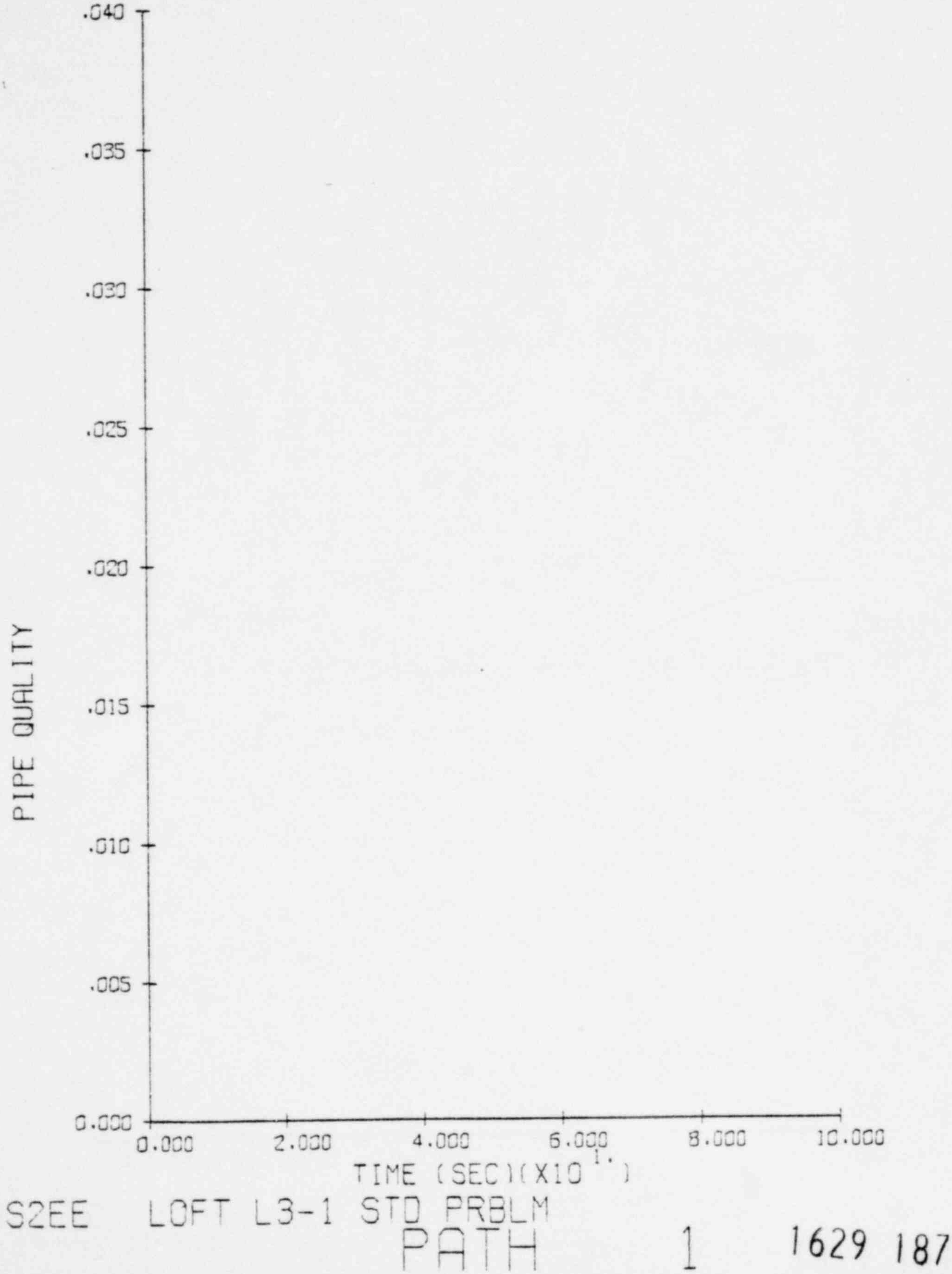


Figure 138 - Pipe Quality, Core Path 1 (C_D = 0.6)

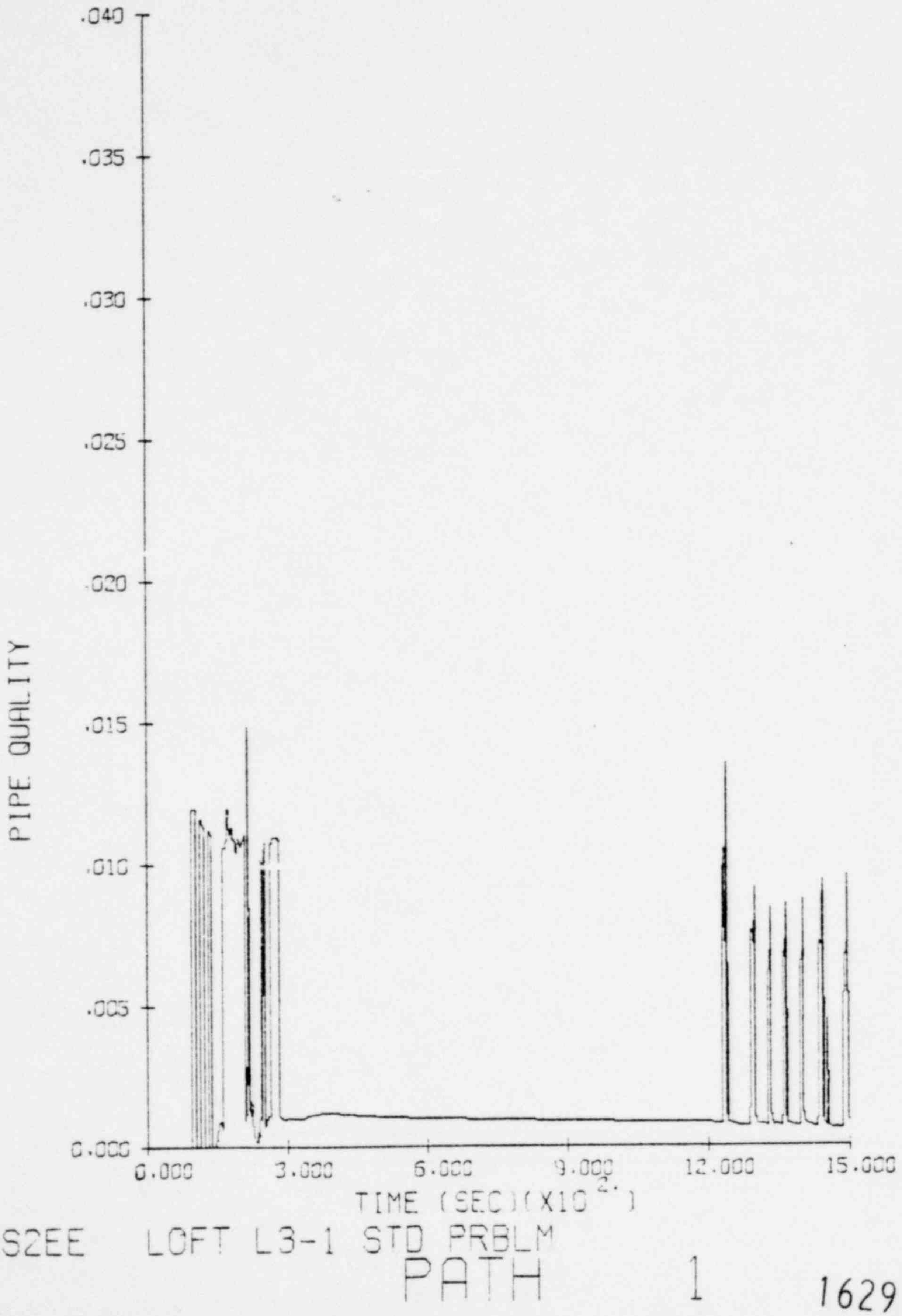


Figure 139 - Pipe Quality, Core Path 1 (C_D = 0.9)

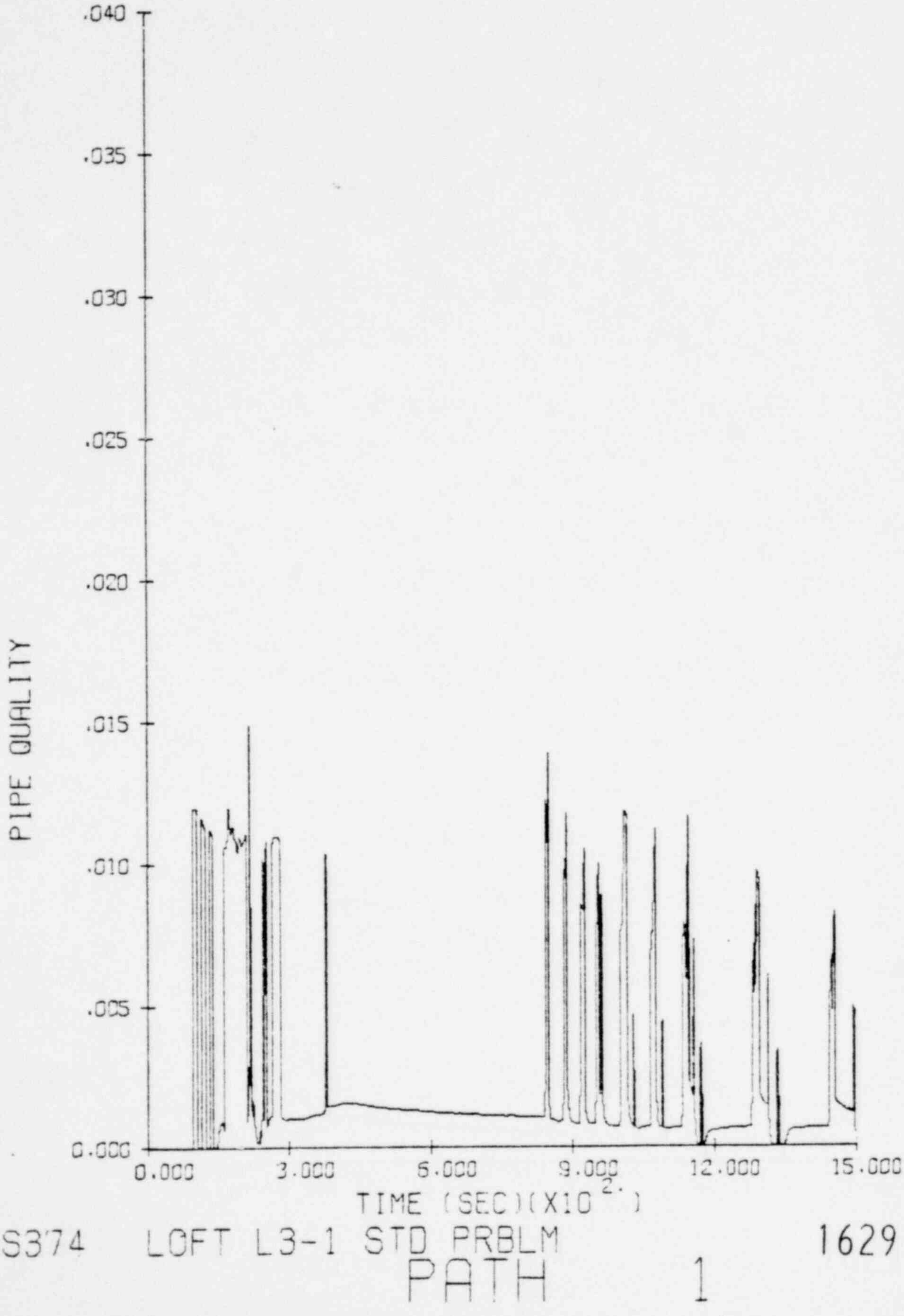
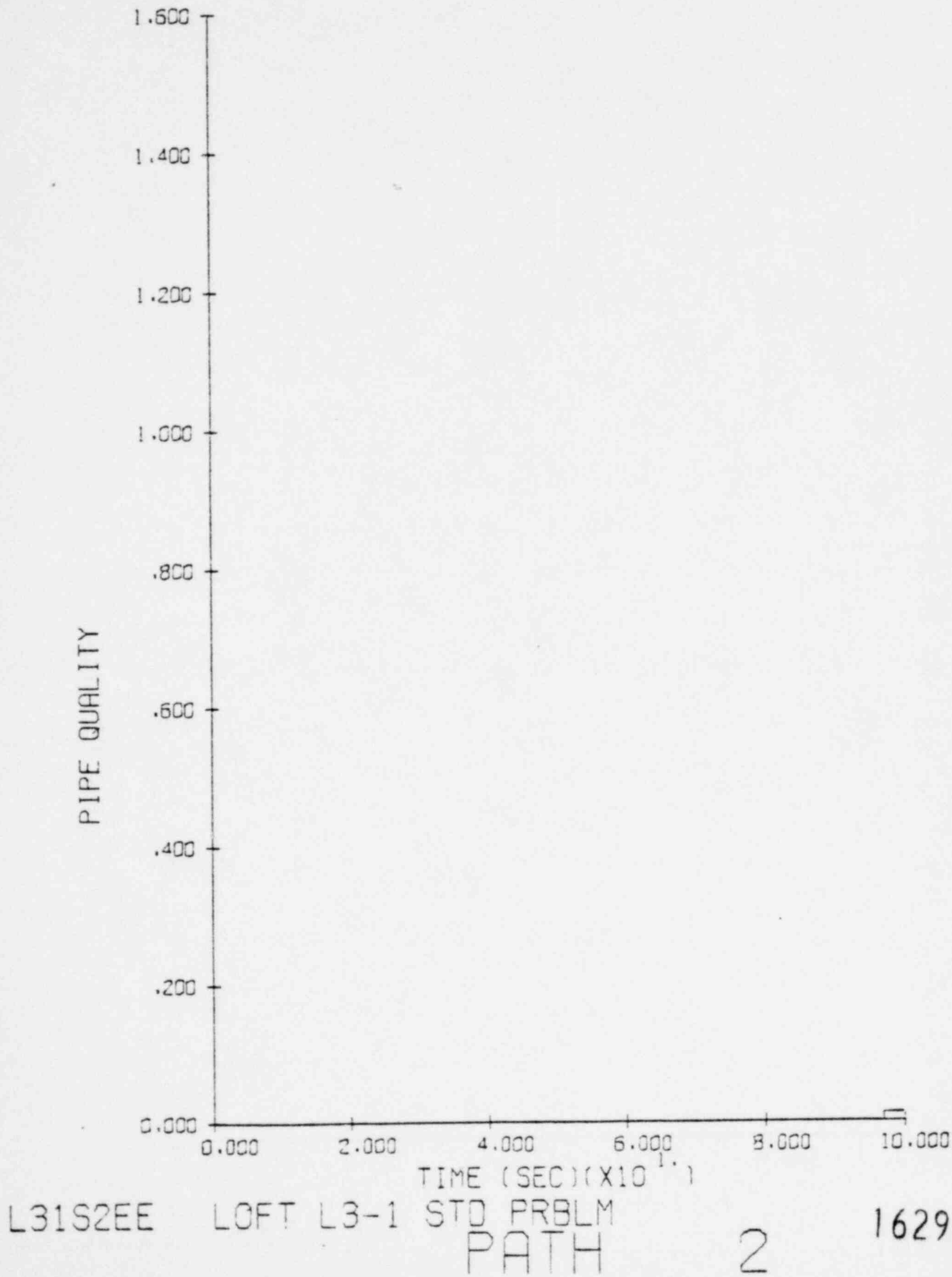
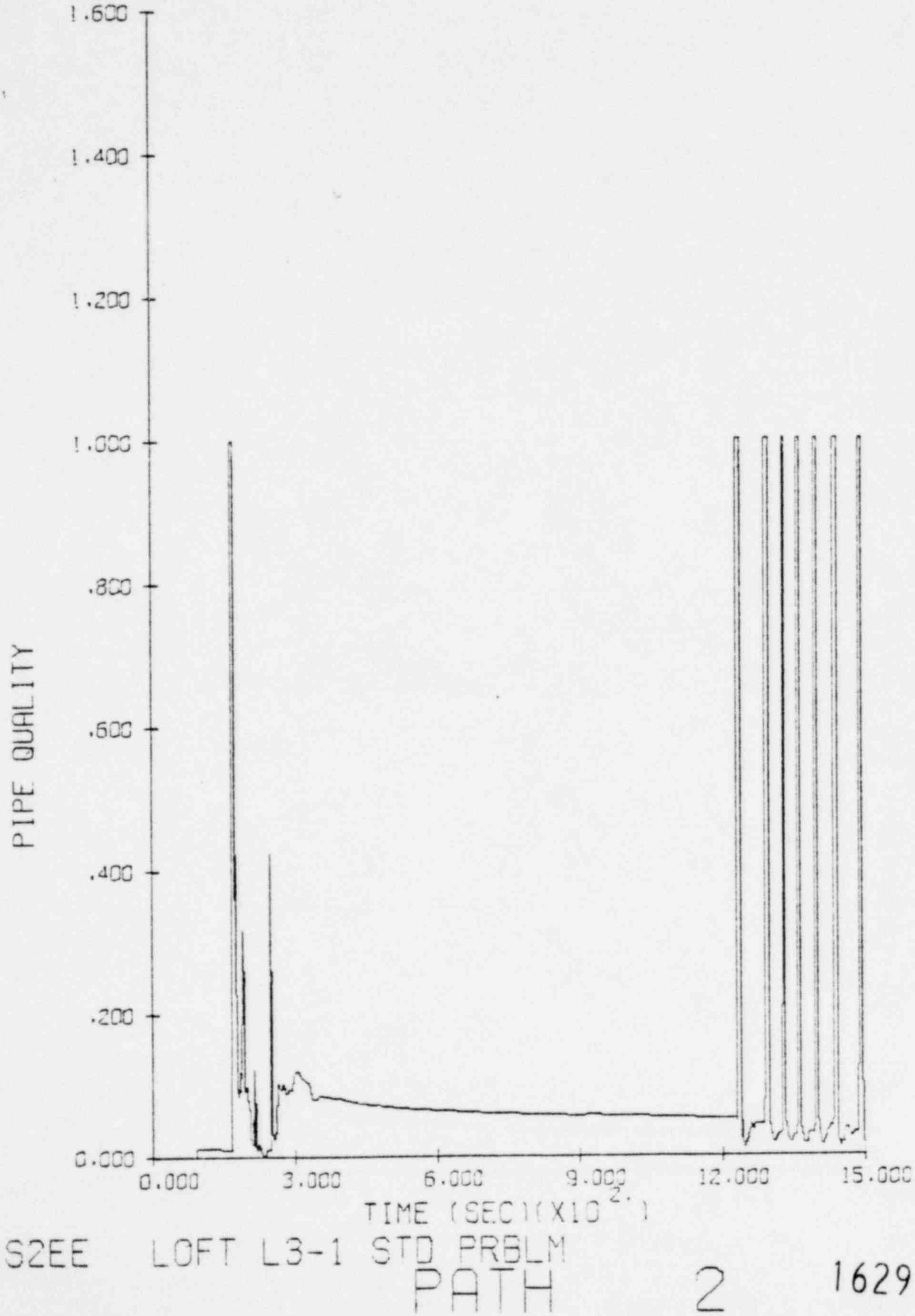


Figure 140 - Pipe Quality, Core Path 2 (0 to 100 sec.)



1629 190

Figure 141 - Pipe Quality, Core Path 2 (C_D = 0.6)



1629 191

Figure 142 - Pipe Quality, Core Path 2 (C_D = 0.9)

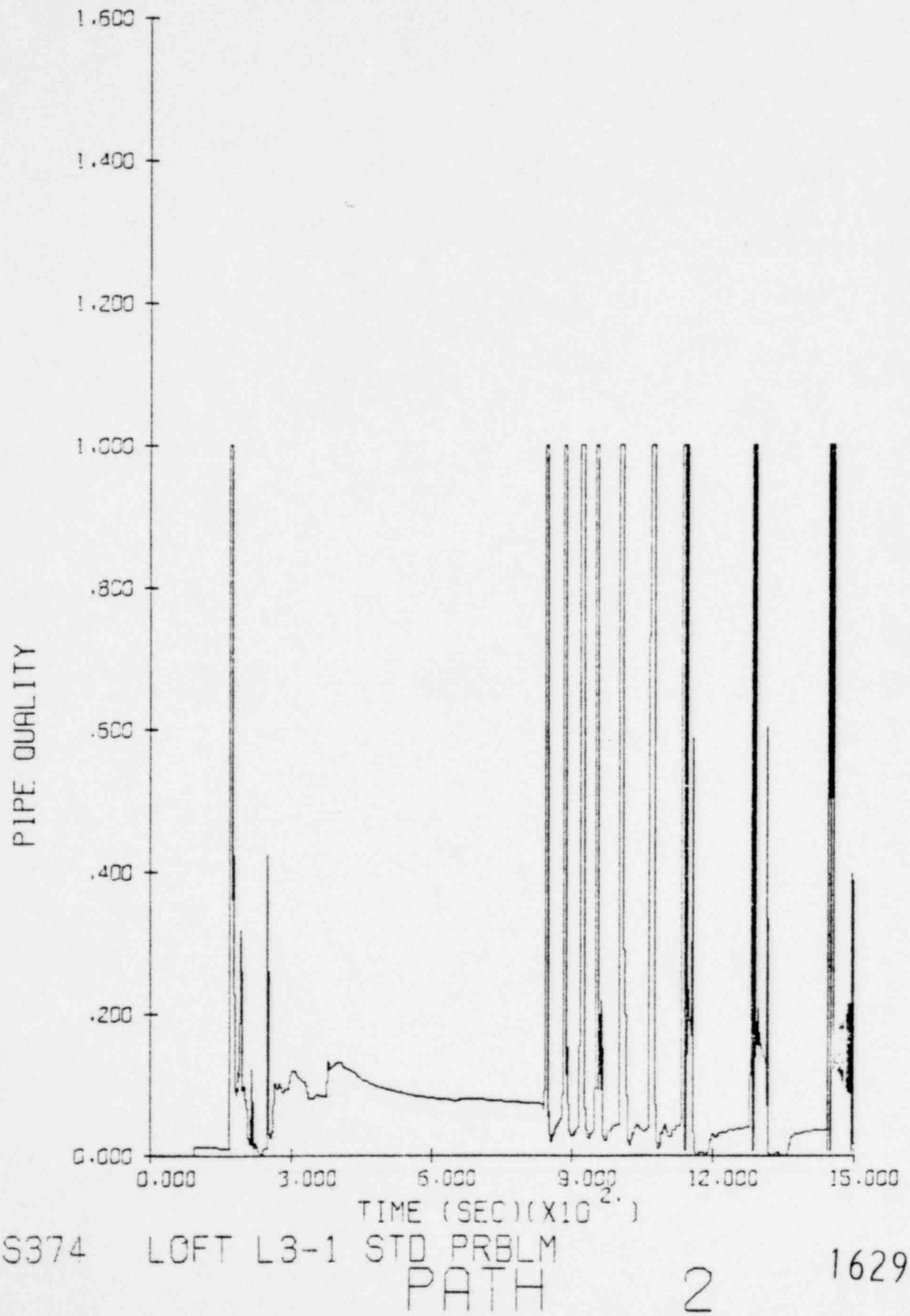
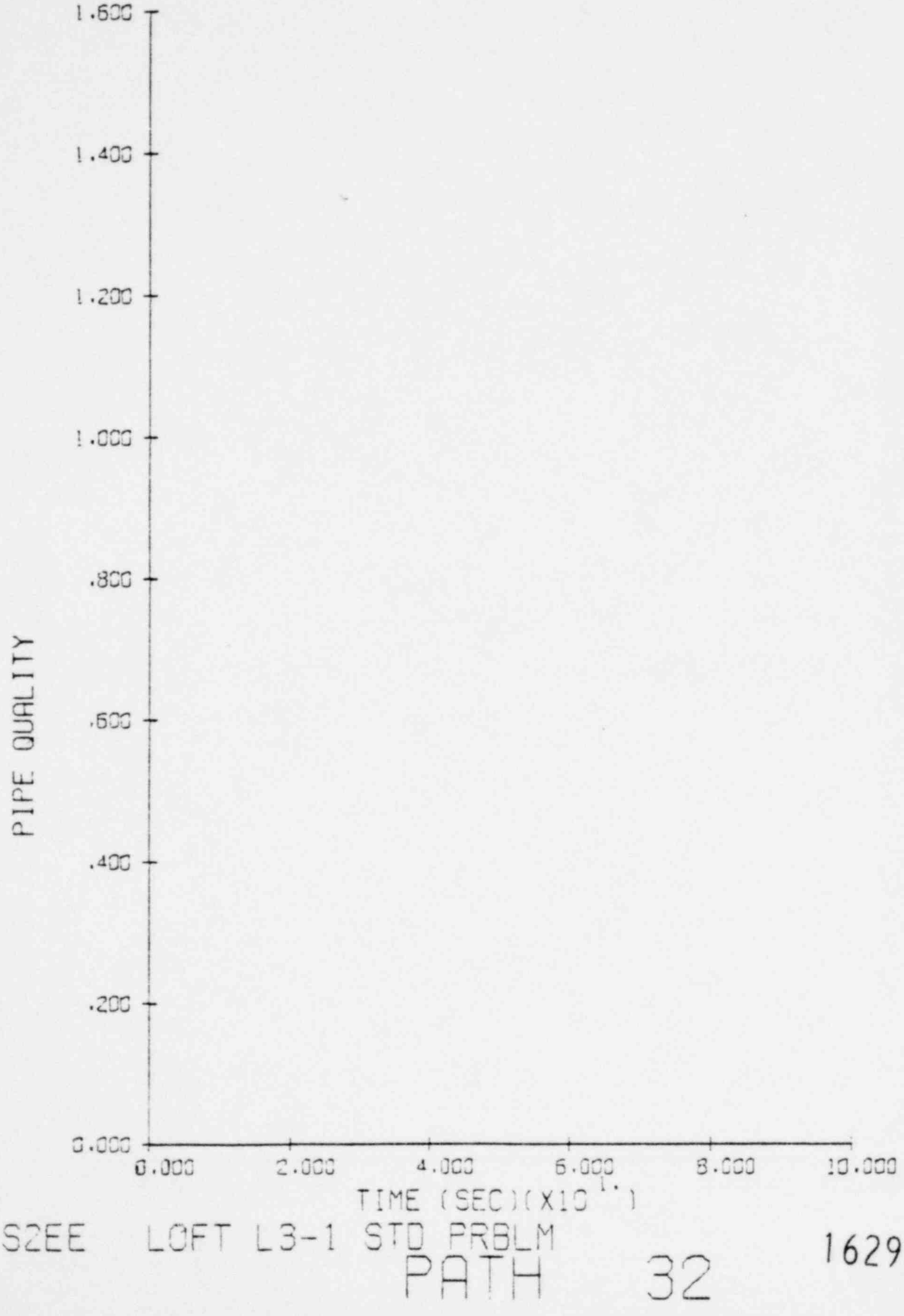
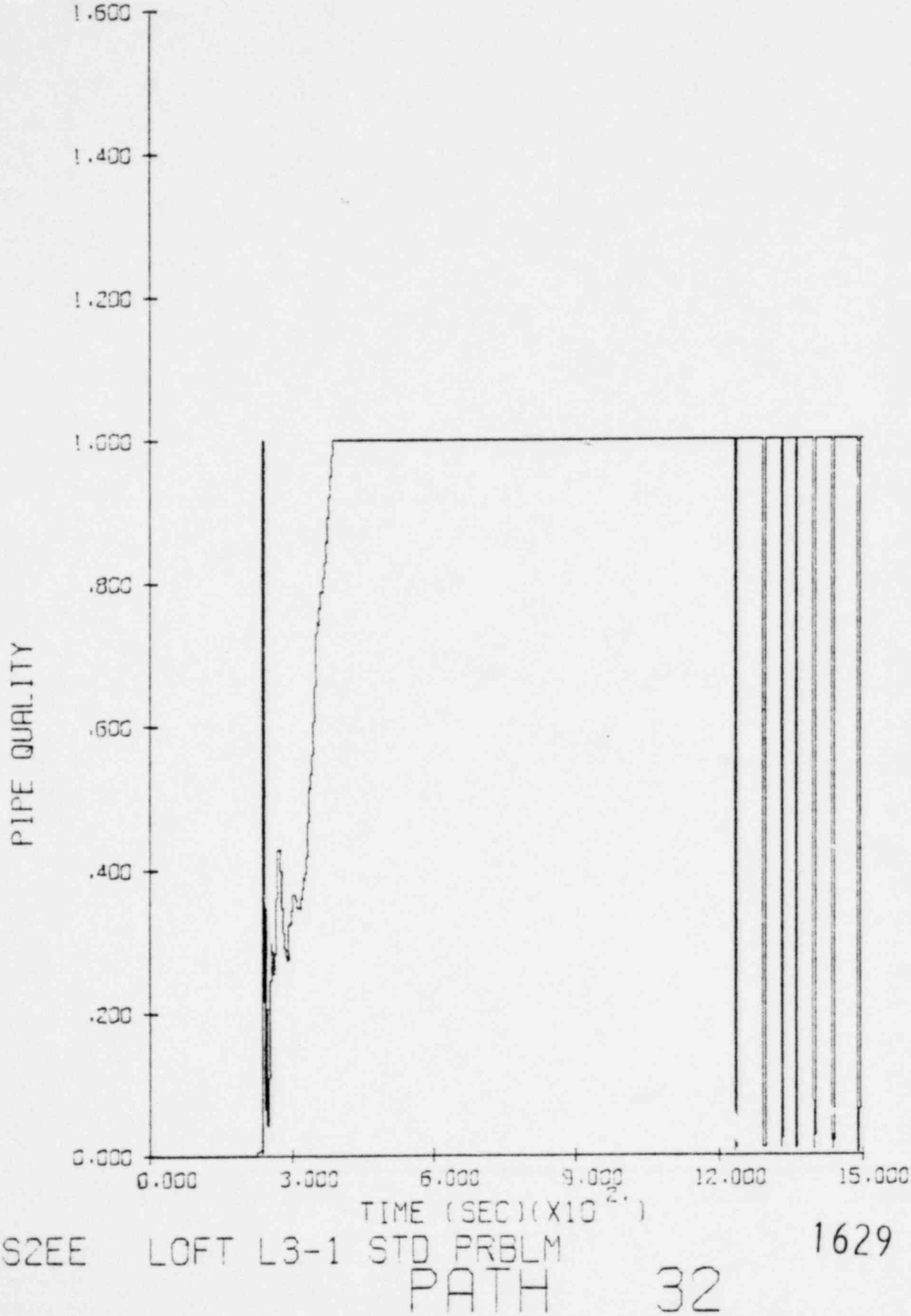


Figure 143 - Pipe Quality, Leak Path 32 (0 to 100 sec.)



1629 193

Figure 144 - Pipe Quality, Leak Path 32 (C_D = 0.6)



1629 194

Figure 145 - Pipe Quality, Leak Path 32 (C_D = 0.9)

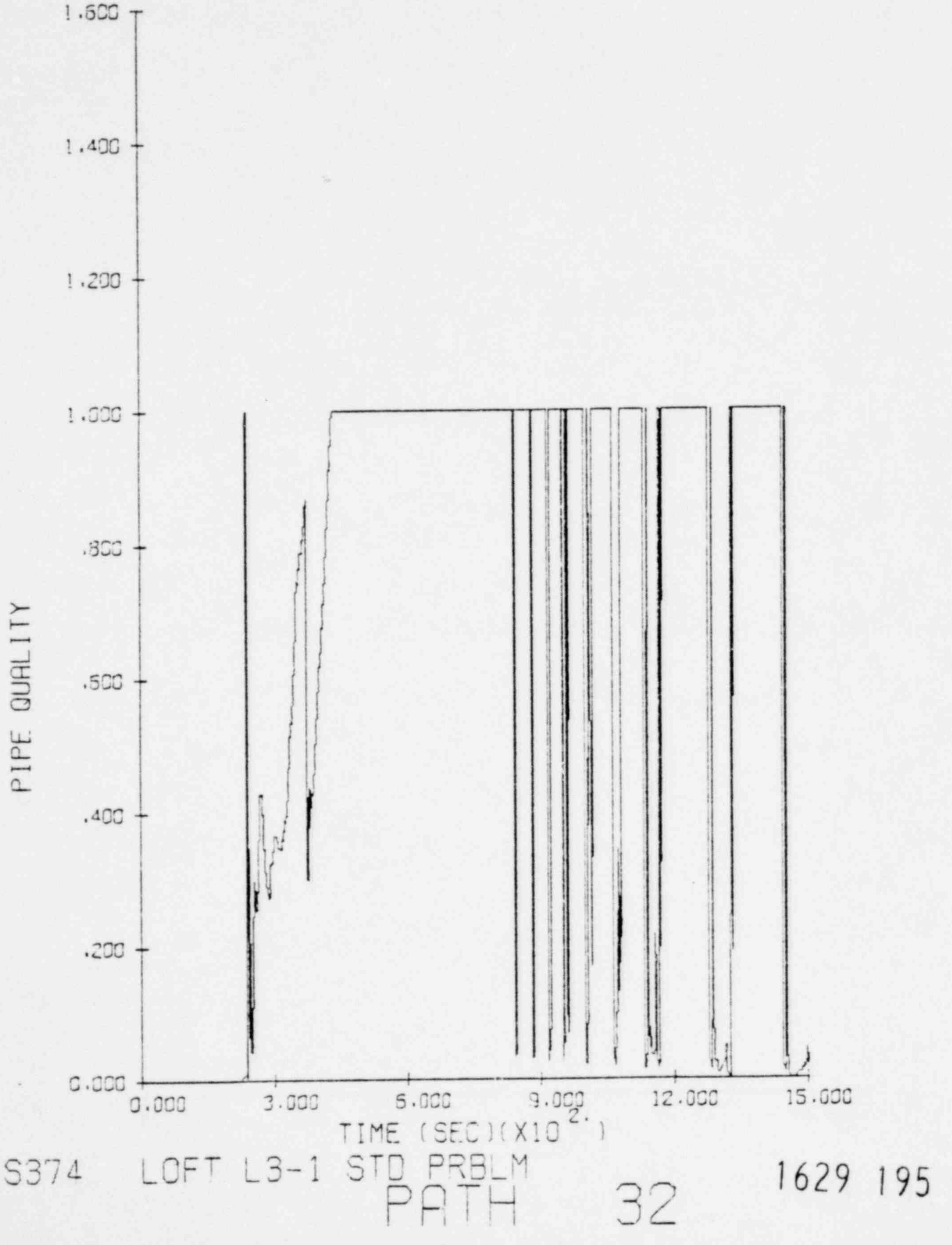


Figure 146 - Heat Transfer Coefficient, Core Path 1 (0 to 100 sec.)

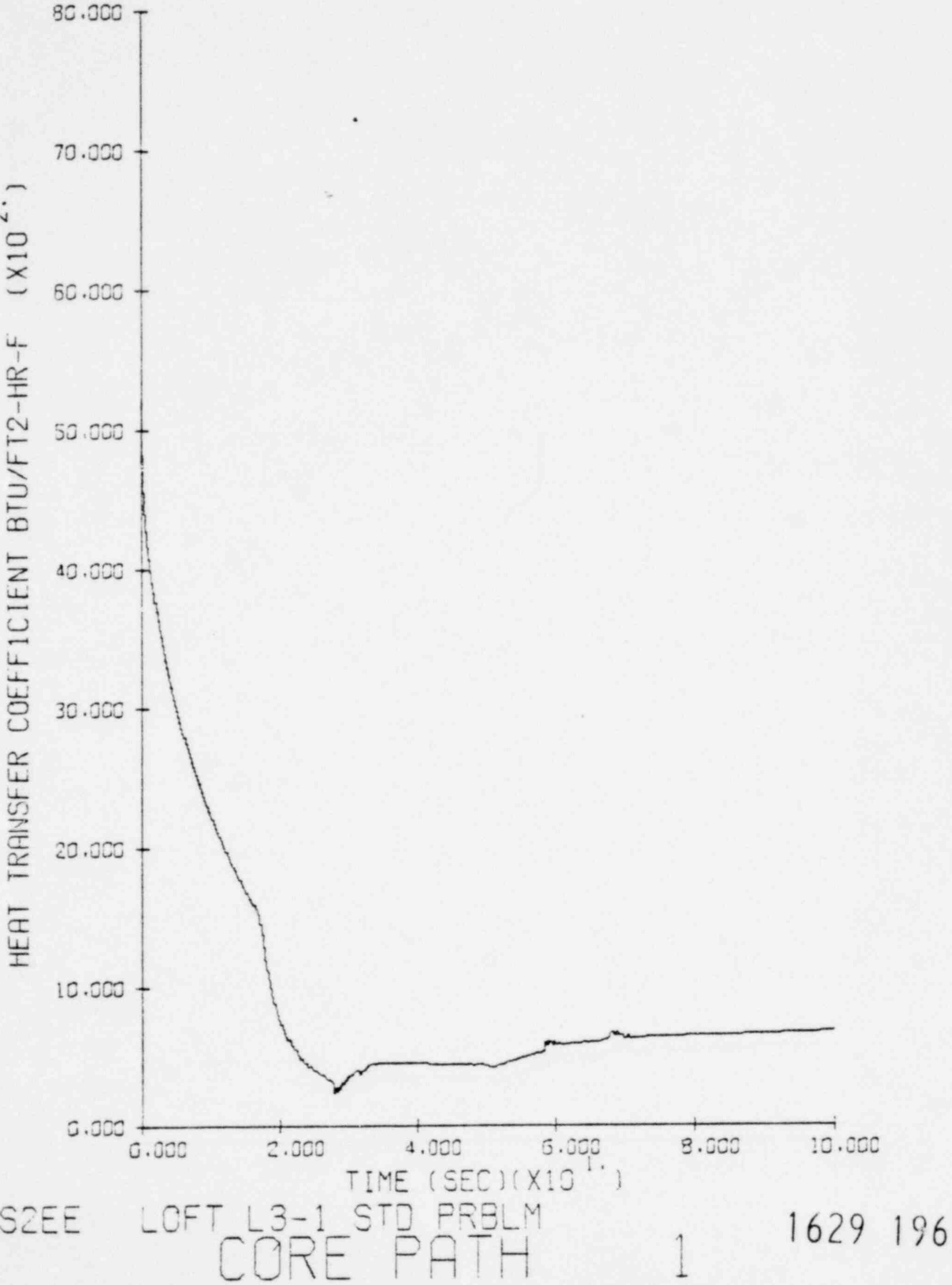


Figure 147 - Heat Transfer Coefficient, Core Path 1 ($C_D = 0.6$)

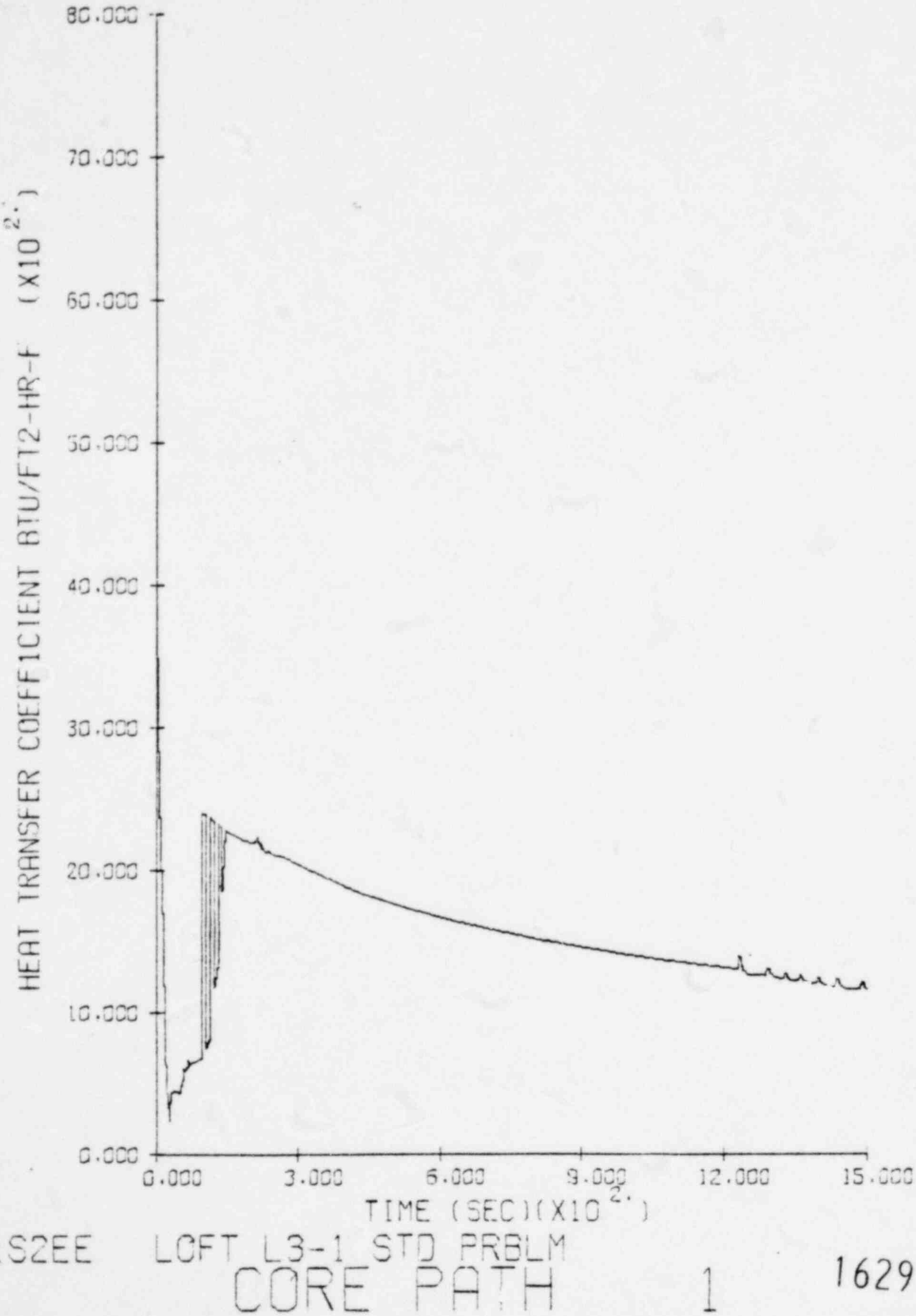
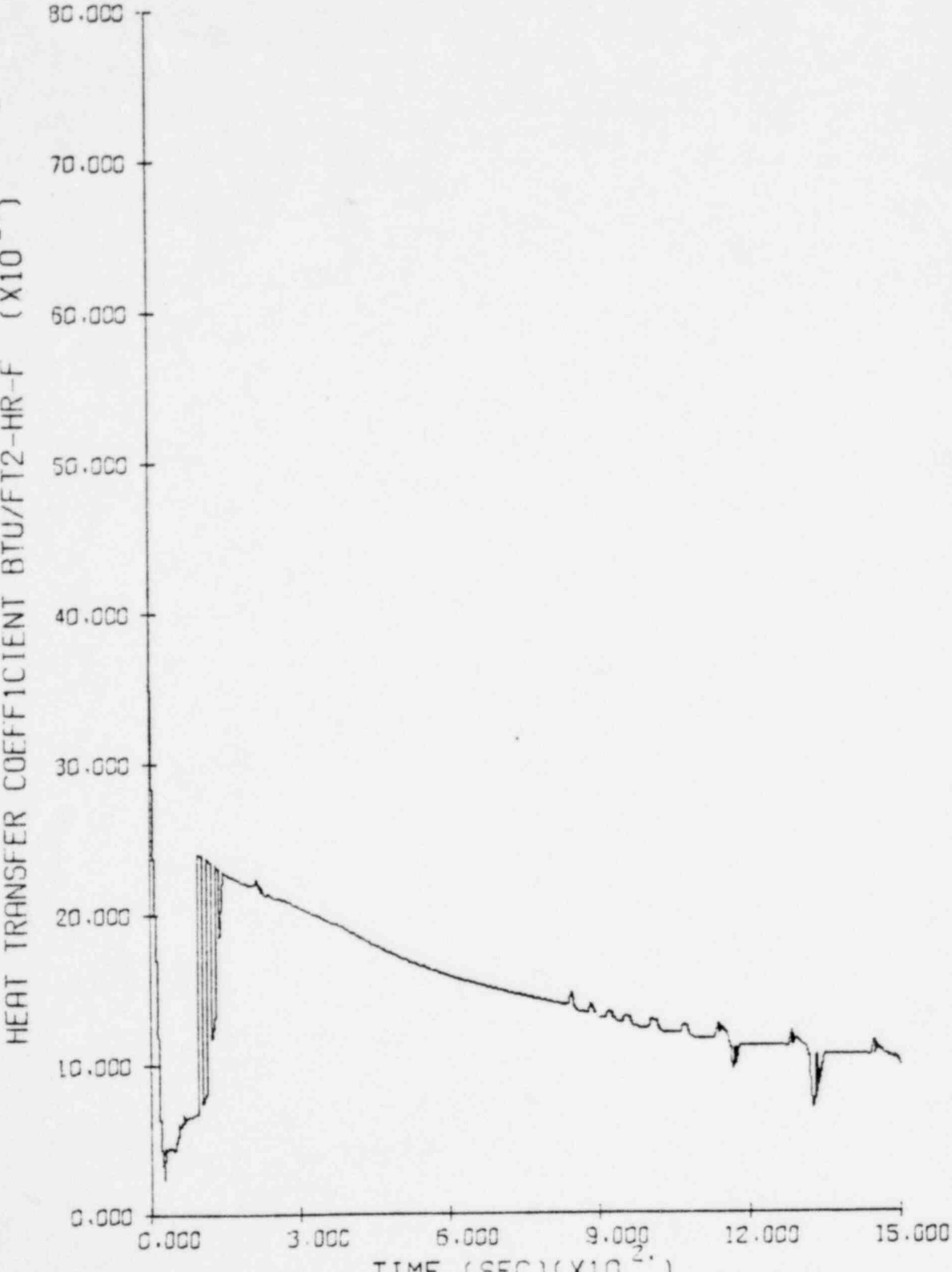


Figure 148 - Heat Transfer Coefficient, Core Path 1 (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM
CORE PATH 1

Figure 149 - Heat Transfer Coefficient, Core Path 2 (0 to 100 sec.)

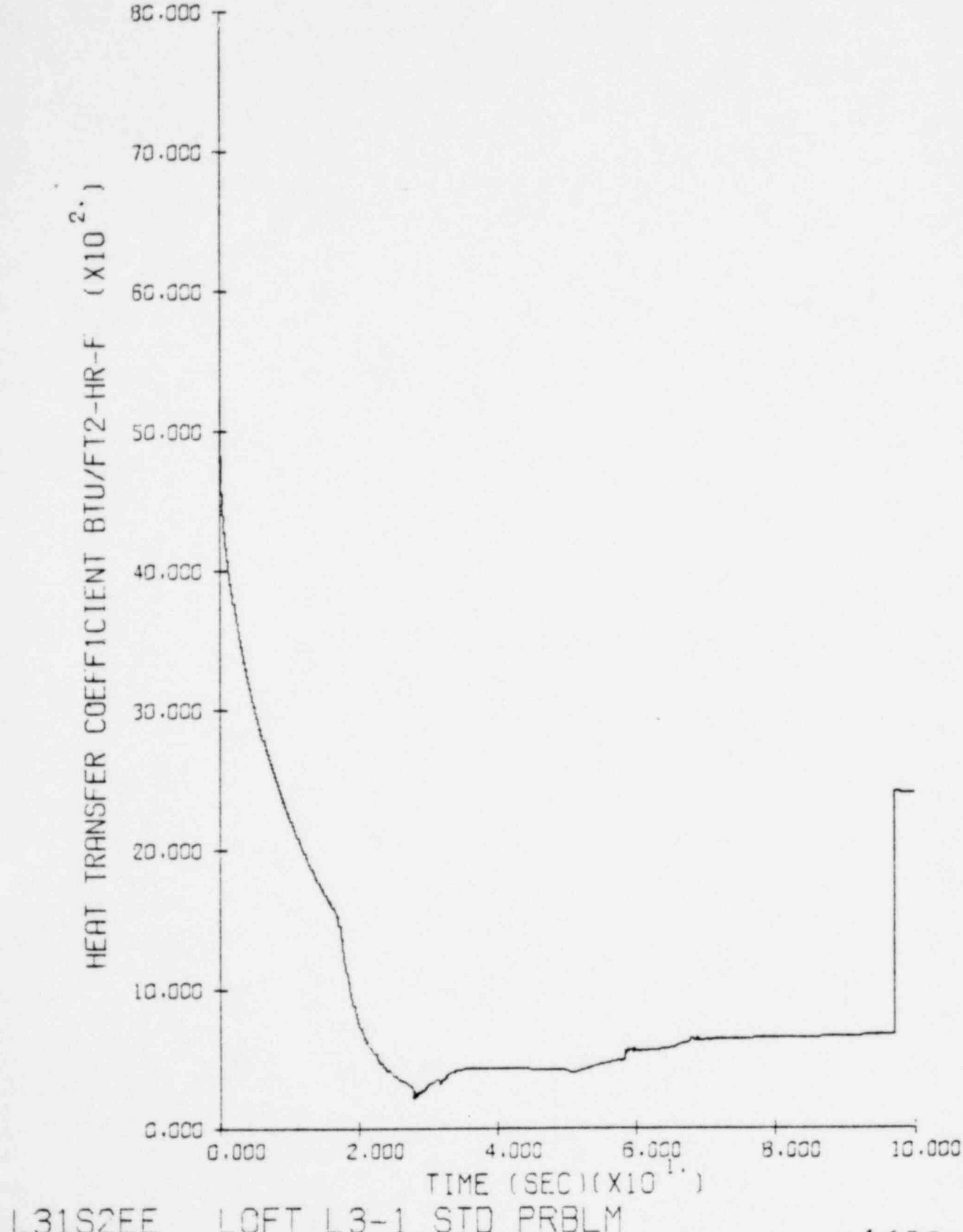
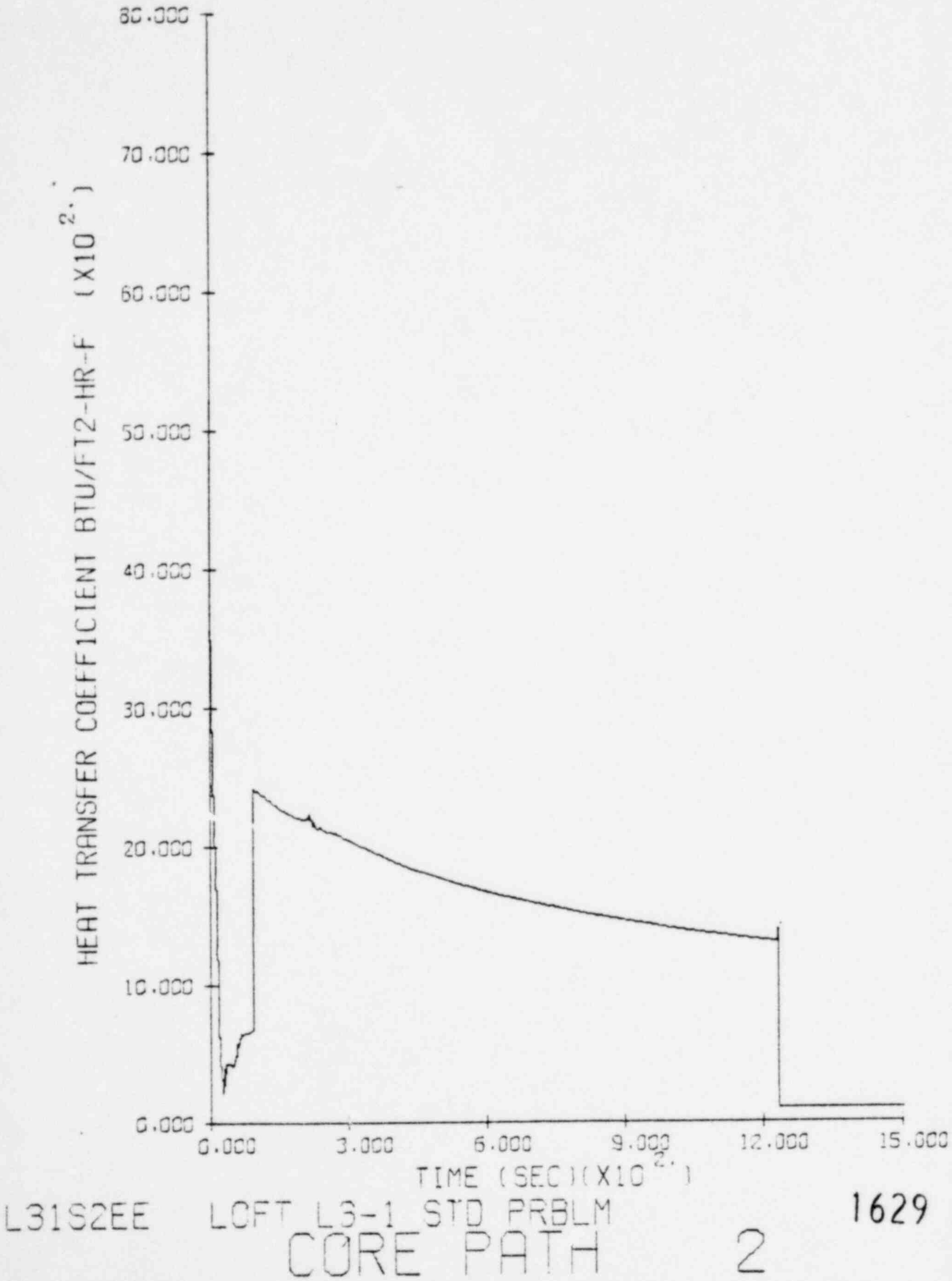
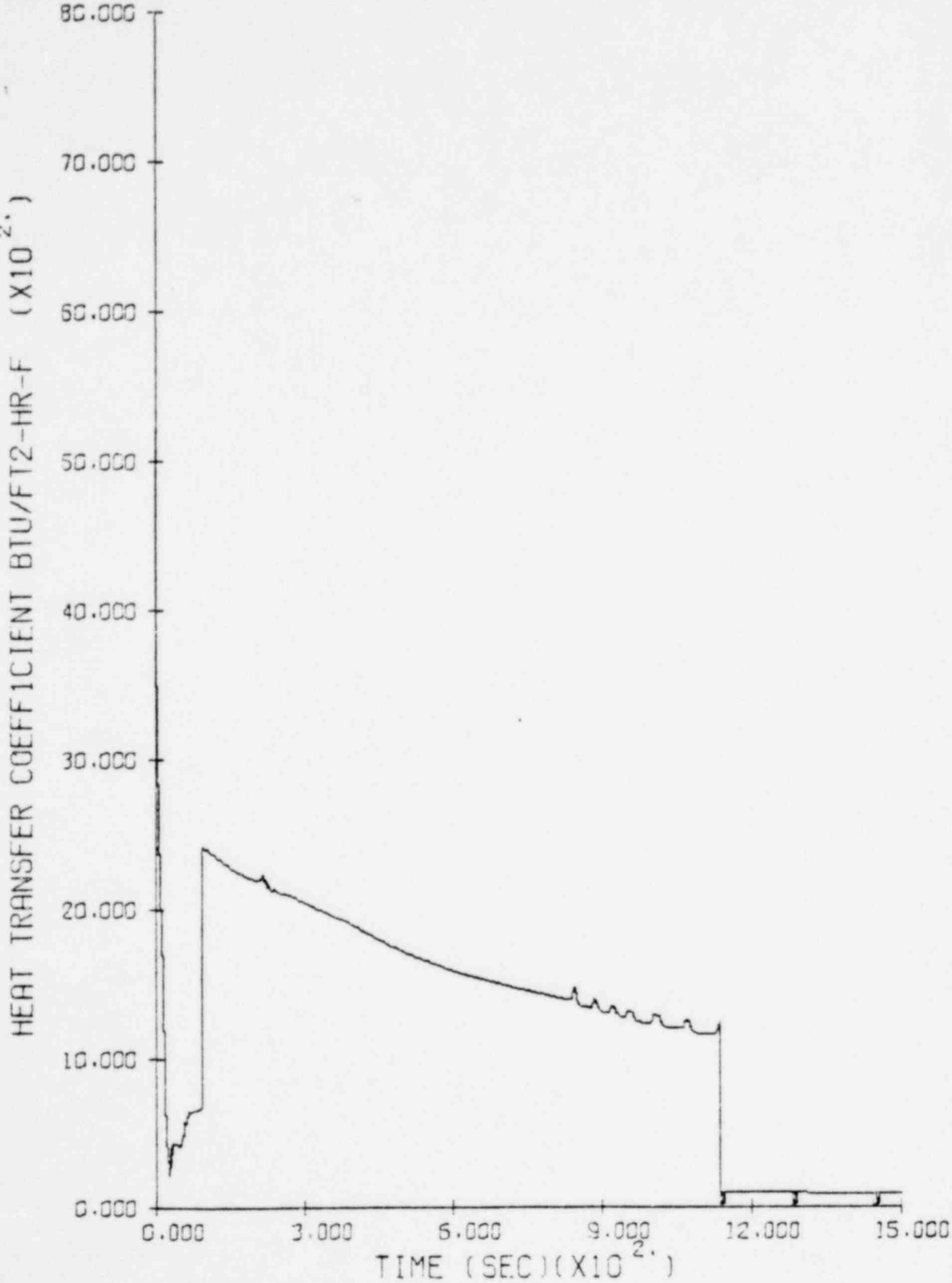


Figure 150 - Heat Transfer Coefficient, Core Path 2 (C_D = 0.6)



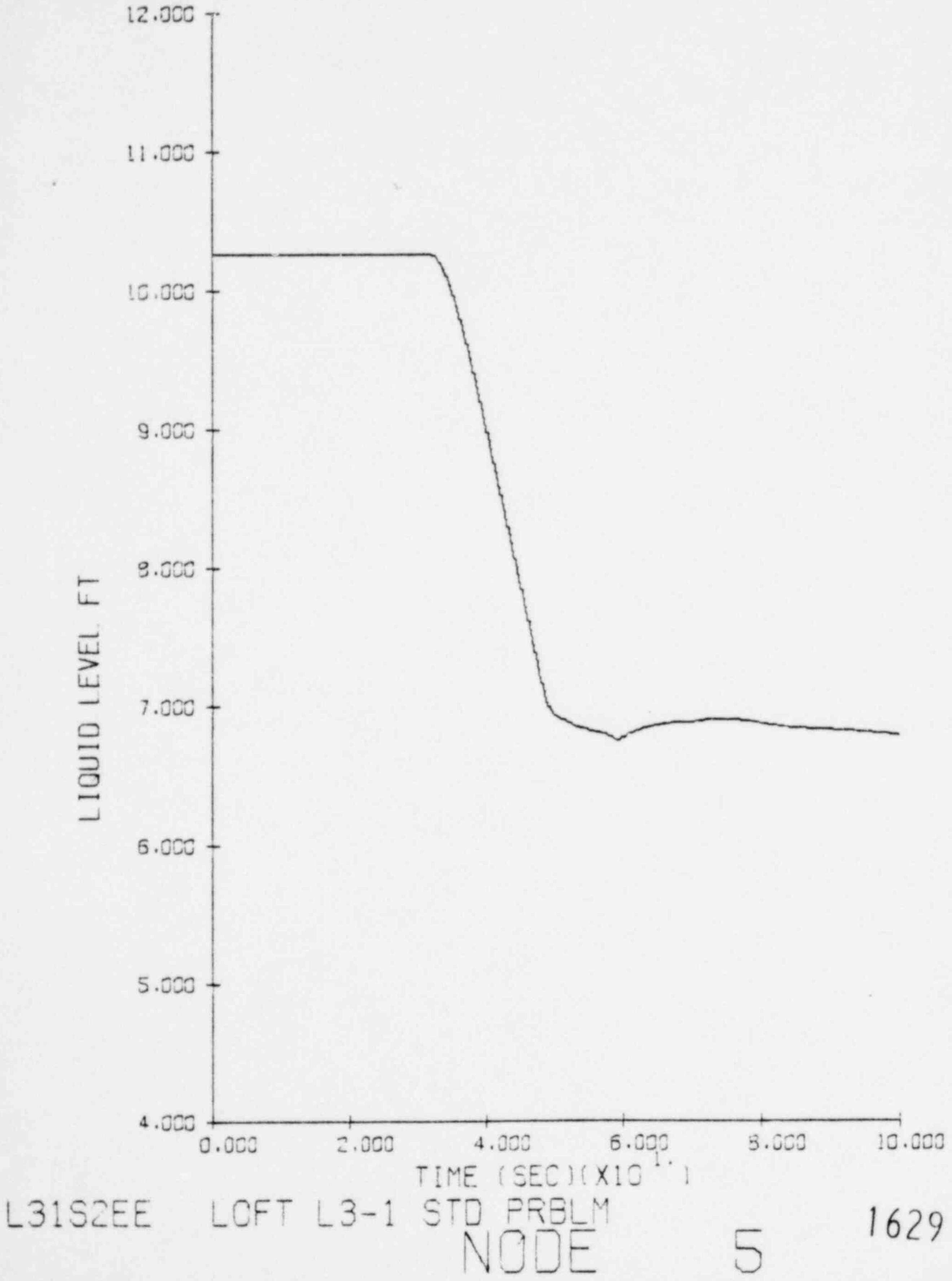
1629 200

Figure 151 - Heat Transfer Coefficient, Core Path 2 (C_D = 0.9)



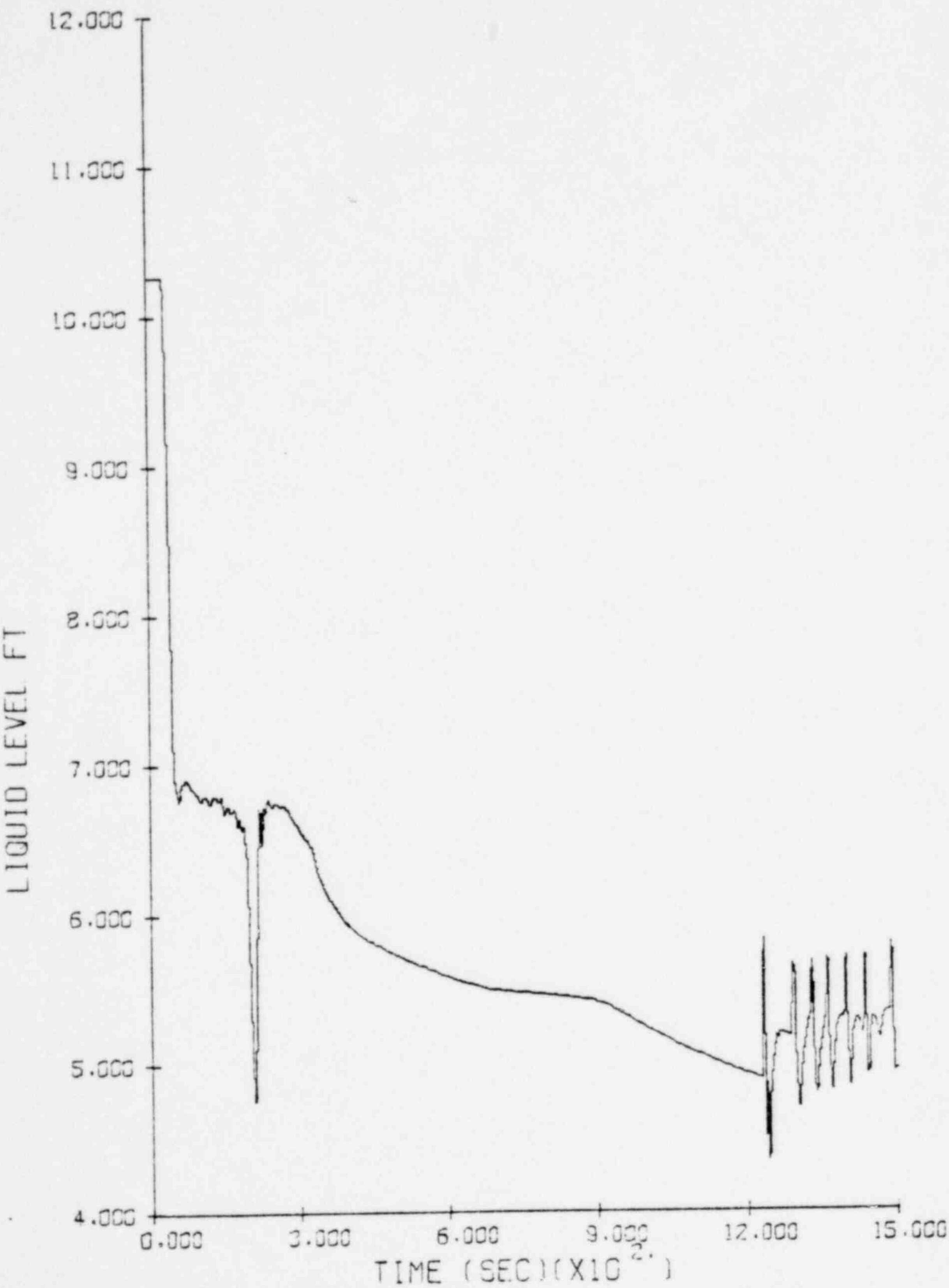
L31S374 LOFT L3-1 STD PRBLM
CORE PATH 2

Figure 152 - Water Level, Vessel (0 to 100 sec.)



1629 202

Figure 153 - Water Level, Vessel (C_D = 0.6)



L31S2EE LOFT L3-1 STD PRBLM

NODE 5

Figure 154 - Water Level, Vessel (C_D = 0.9)

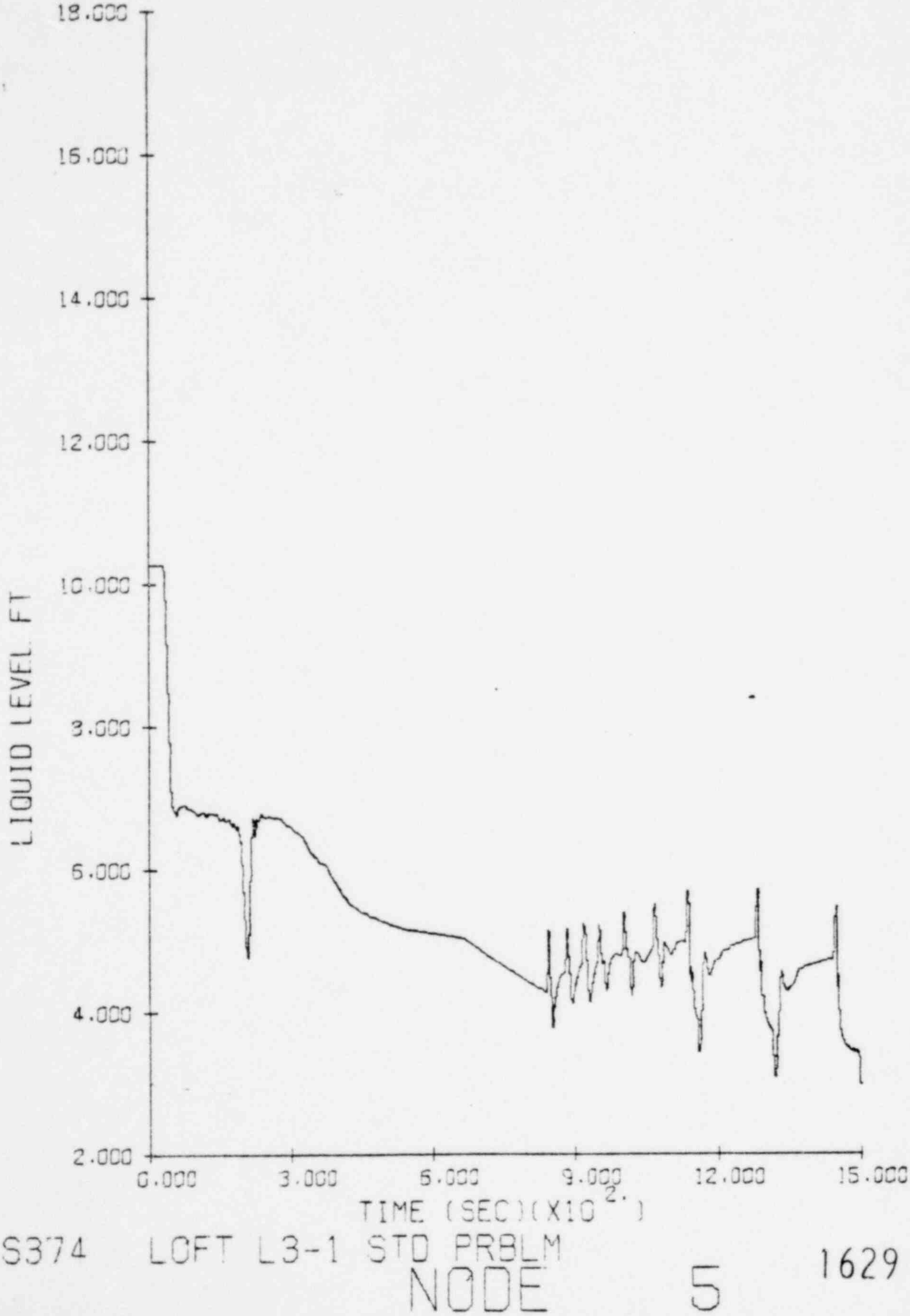


Figure 155 - Water Level, Downcomer (0 to 100 sec.)

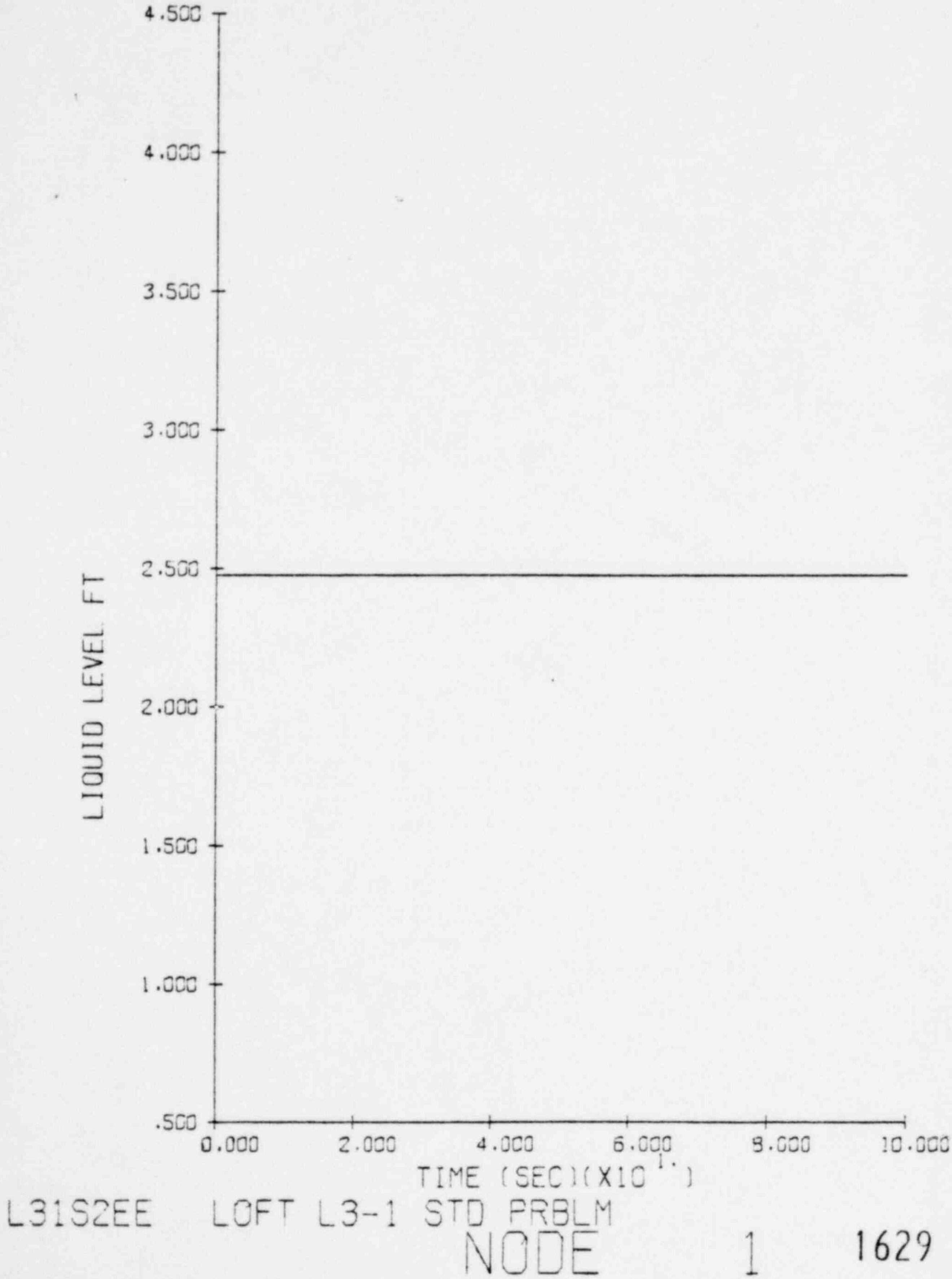


Figure 156 - Water Level, Downcomer (C_D = 0.6)

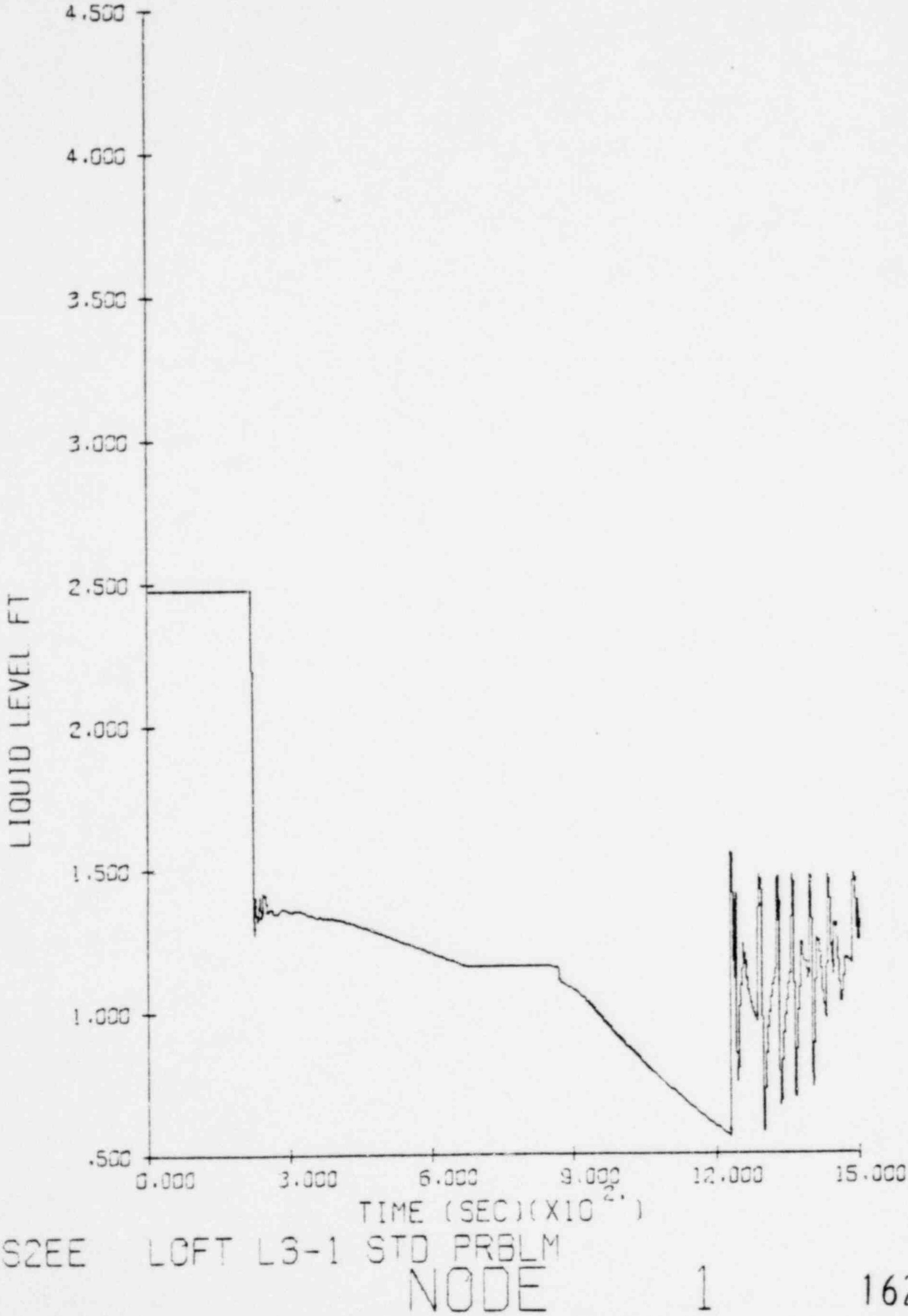


Figure 157 - Water Level, Downcomer (C_D = 0.9)

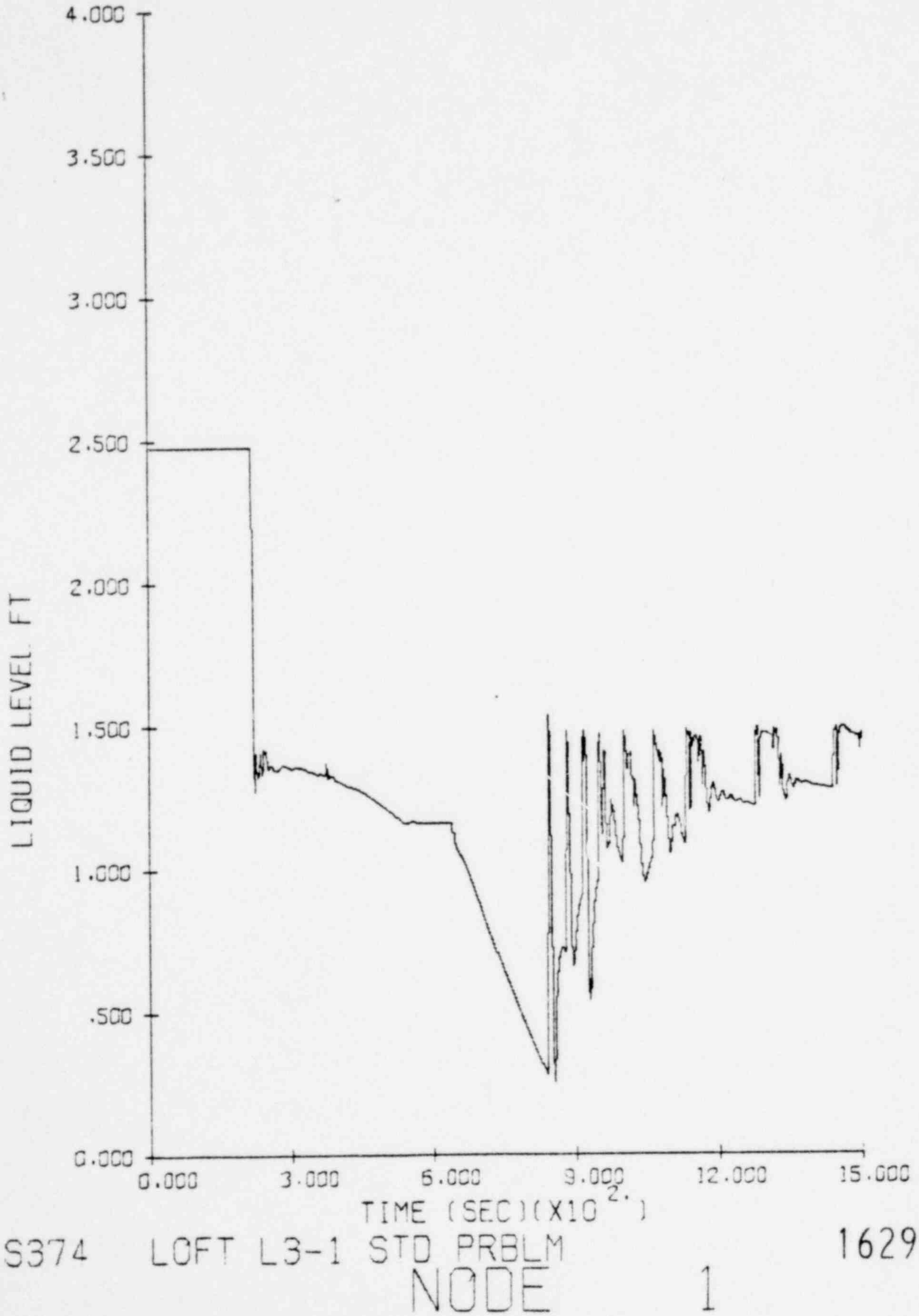
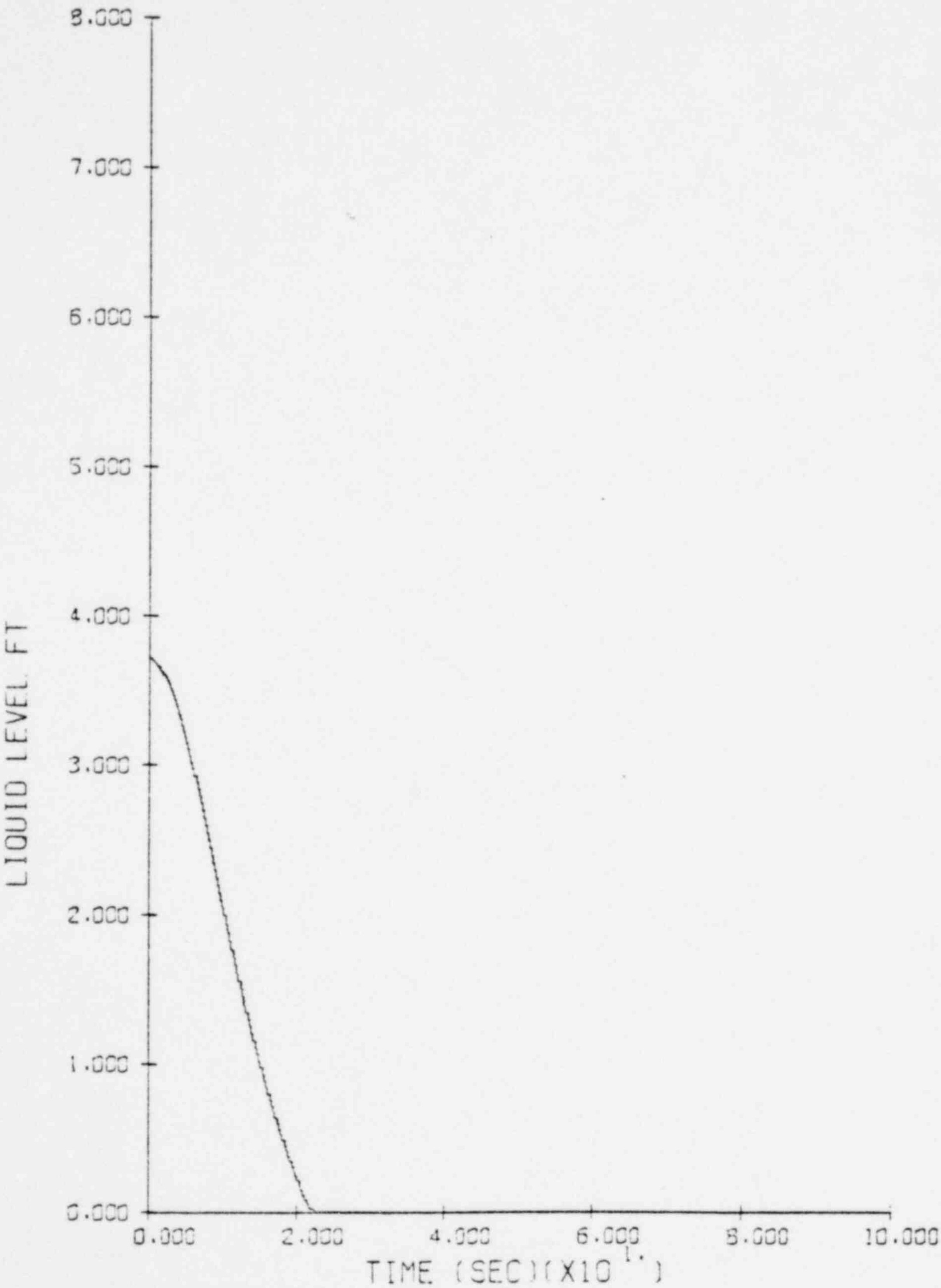


Figure 158 - Water Level, Pressurizer (C_D = 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

NODE 6

Figure 159 - Water Level, Pressurizer (C_D = 0.6)

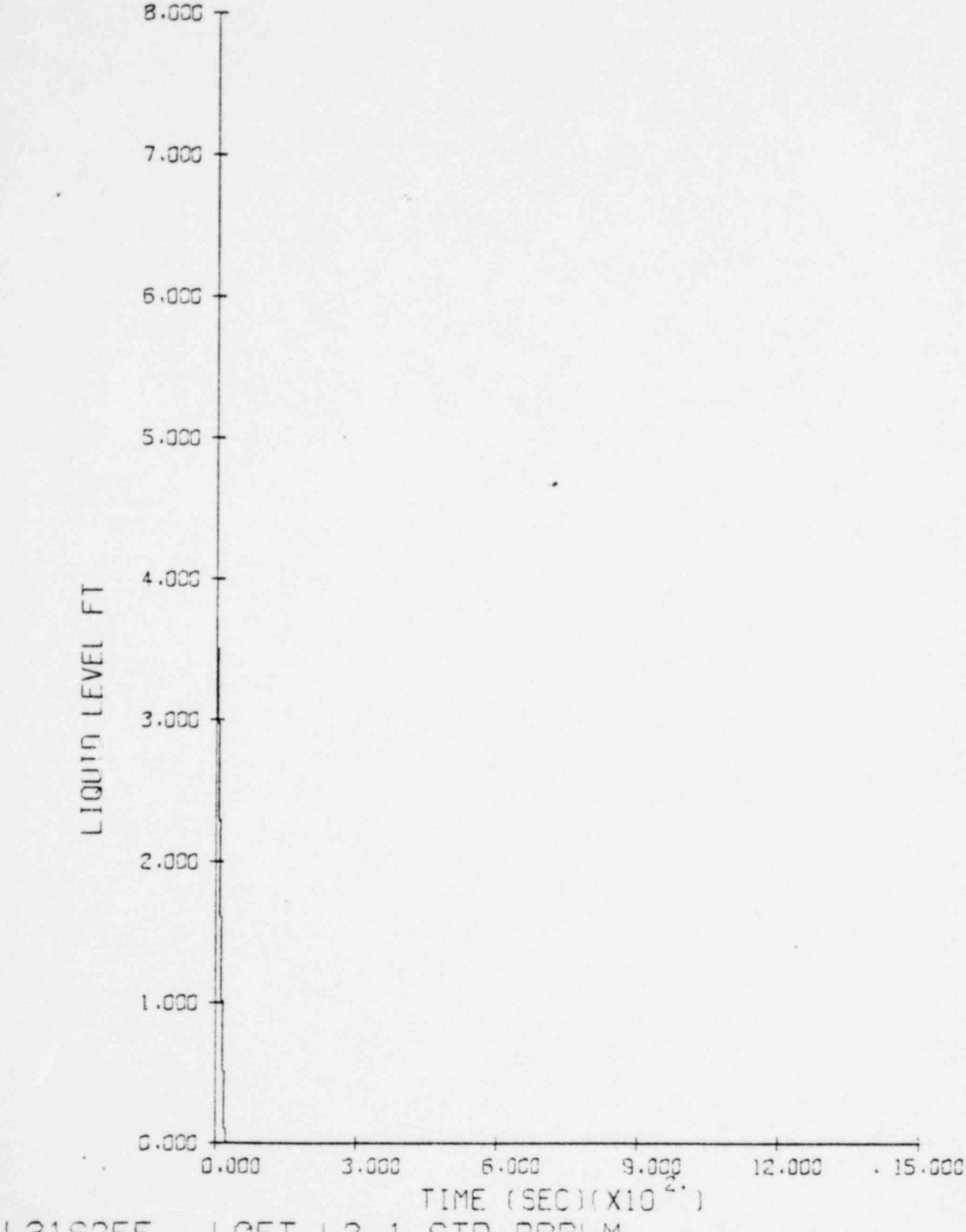
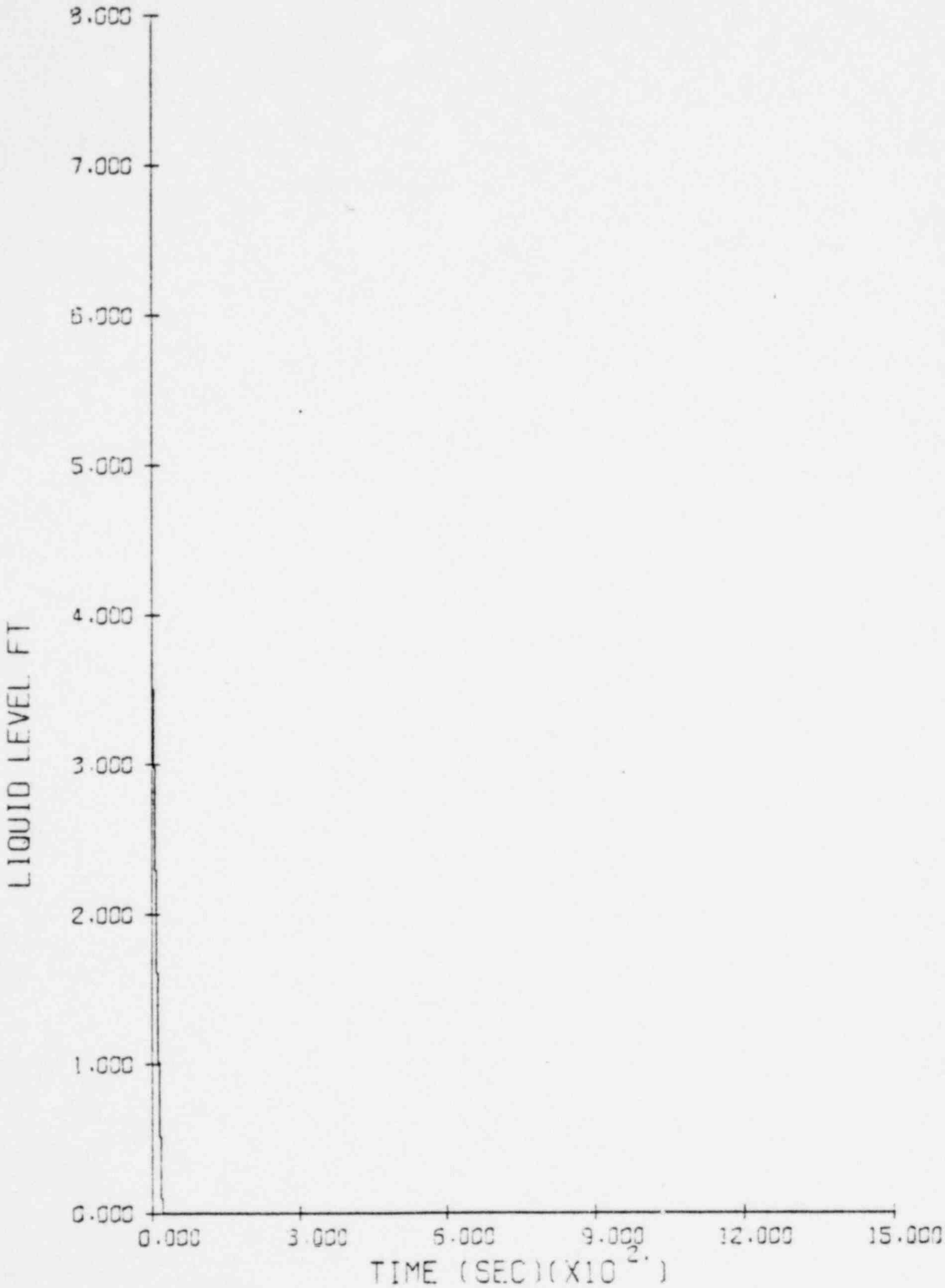


Figure 160 - Water Level, Pressurizer (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM
NODE 6

Figure 161 - Pump Speed (0 to 100 sec.)

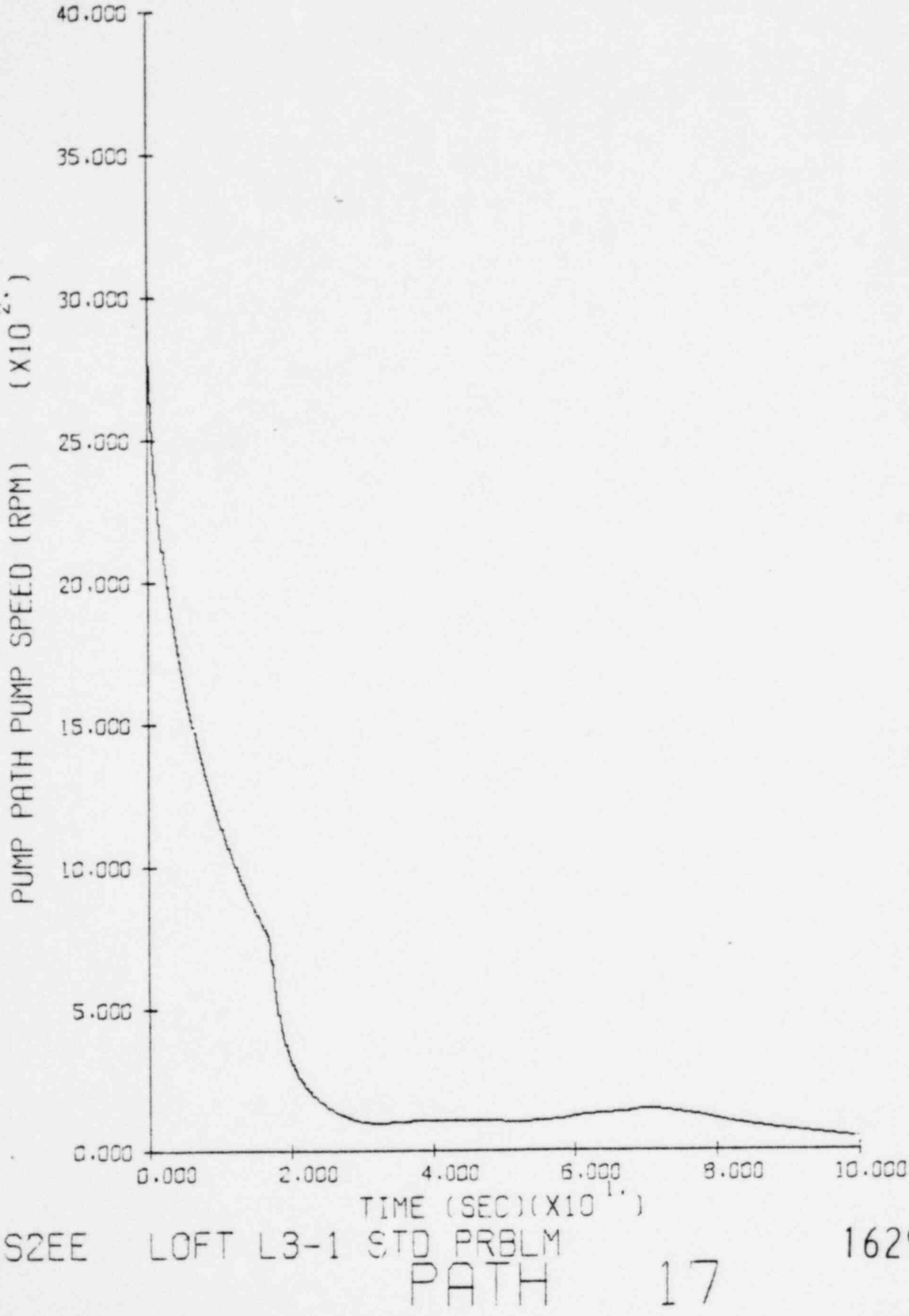
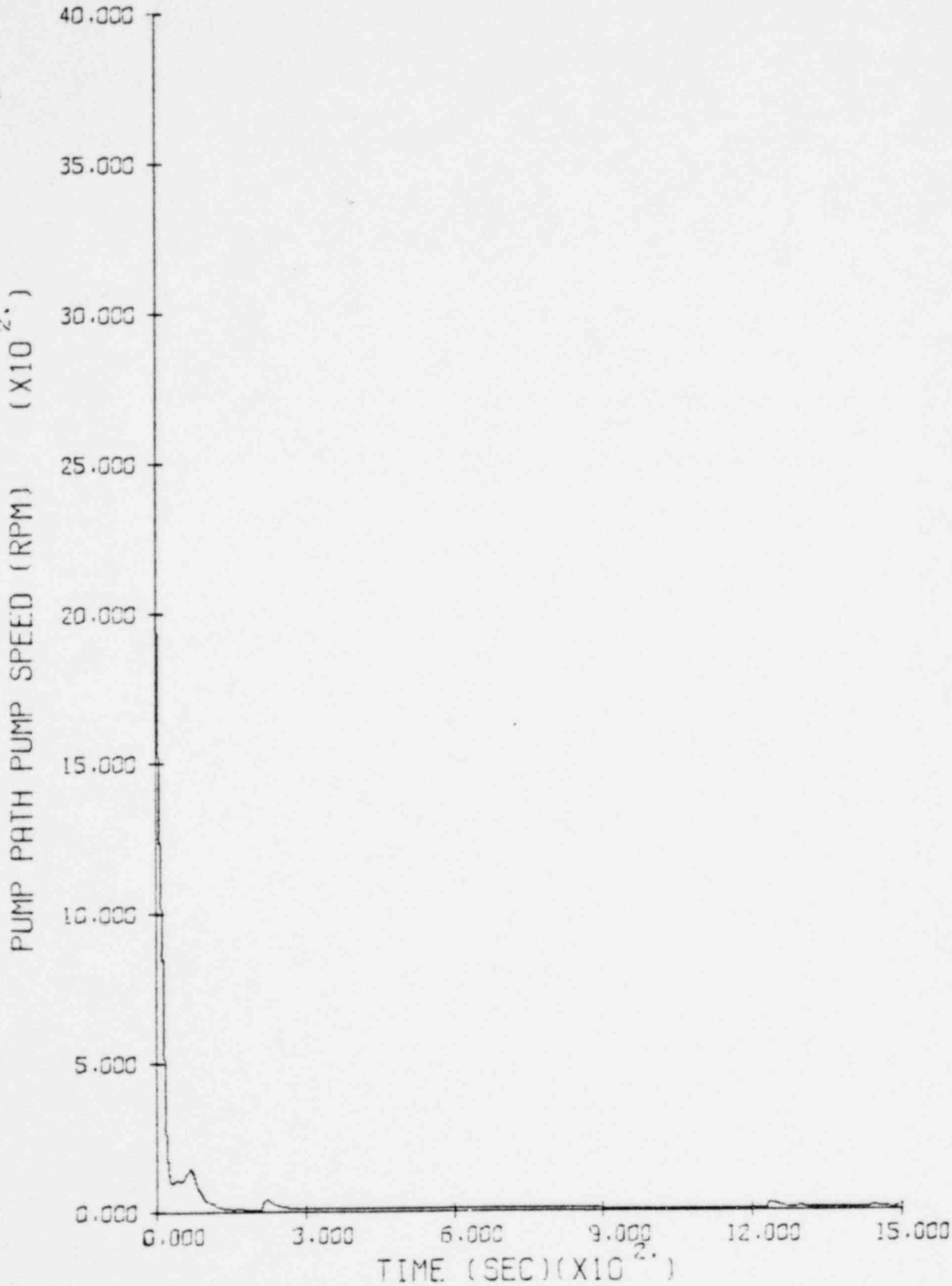


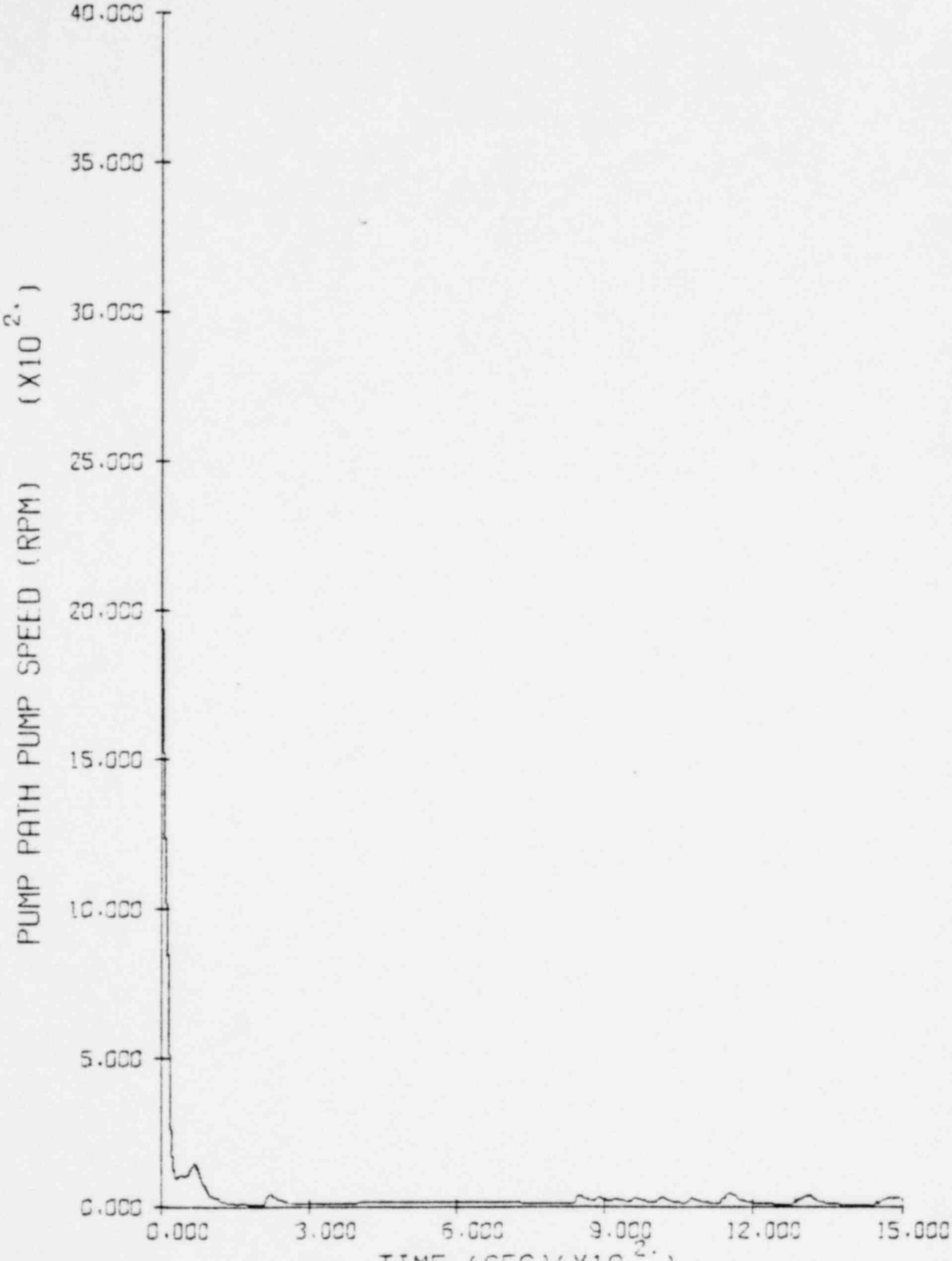
Figure 162 - Pump Speed (C_D = 0.6)



L31S2EE LOFT L3-1 STD PRBLM

PATH 17

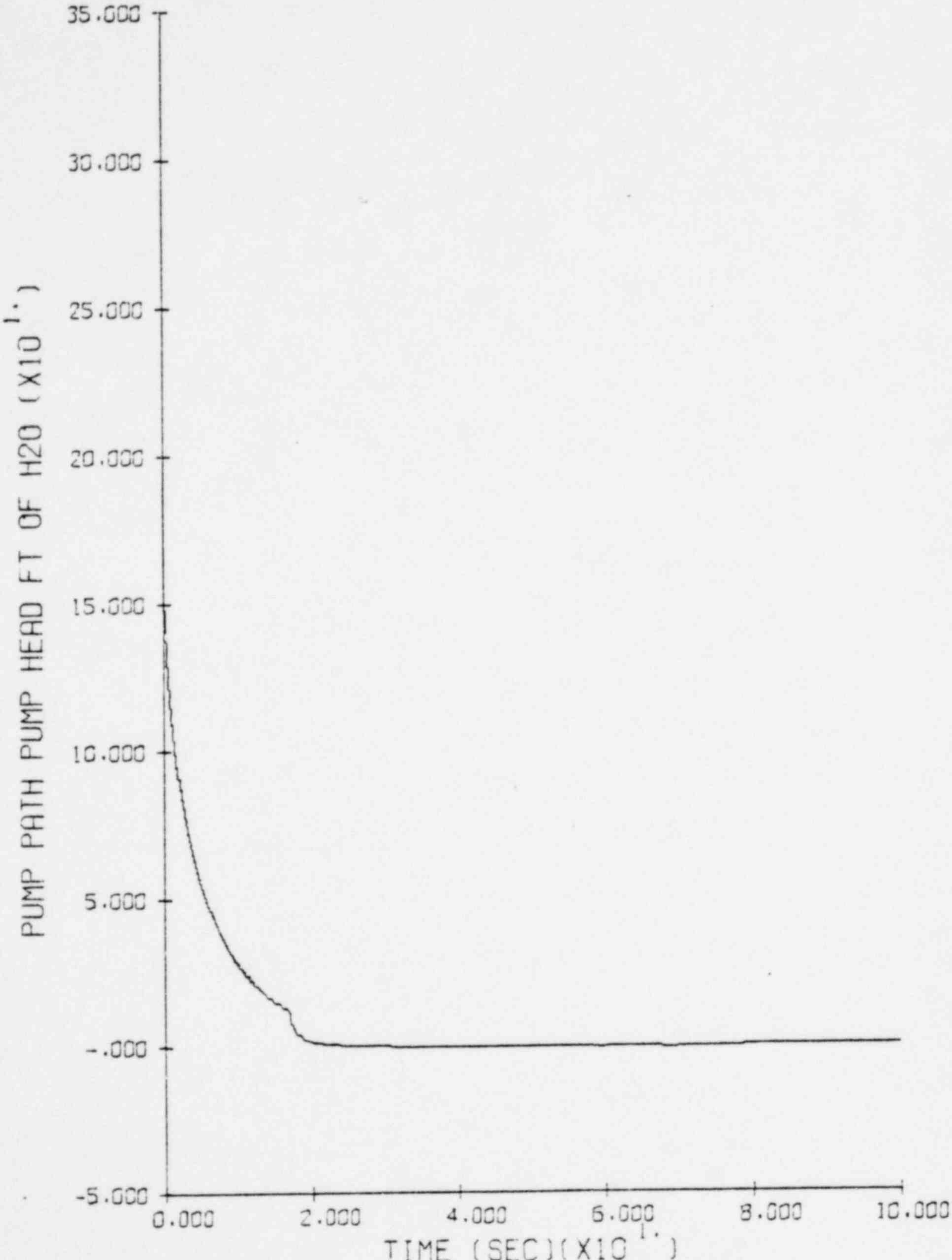
Figure 163 - Pump Speed (C_D = 0.9)



L31S374 LOFT L3-1 STD PRBLM

PATH 17

Figure 164 - Pump Head (0 to 100 sec.)



L31S2EE LOFT L3-1 STD PRBLM

PATH 17

Figure 165 - Pump Head (C_D = 0.6)

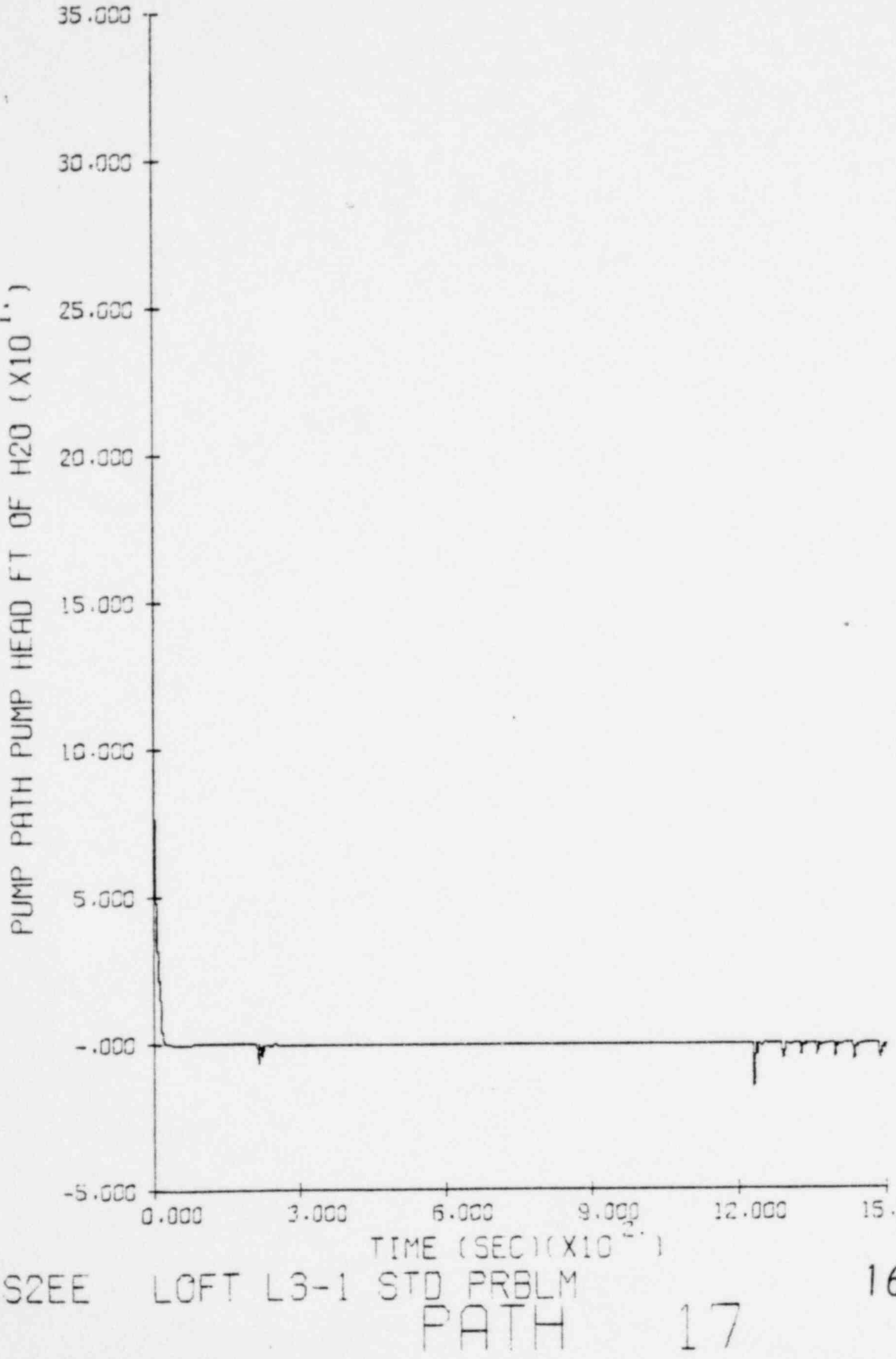


Figure 166 - Pump Head (C_D = 0.9)