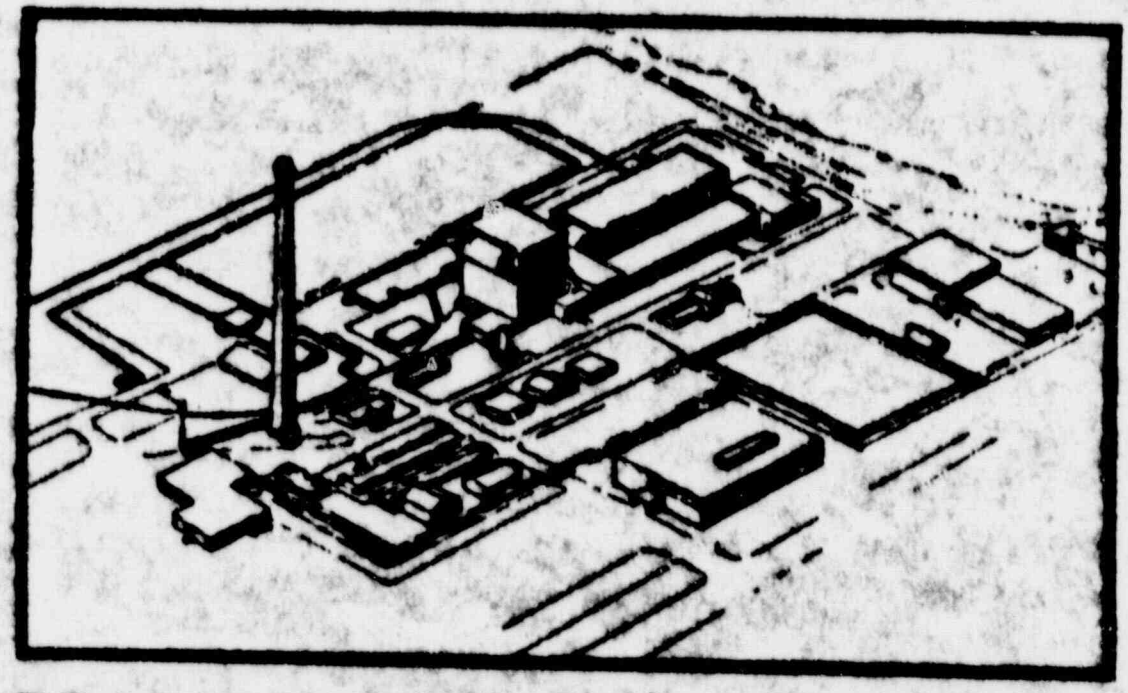
JAFP 90-0742
ATTACHMENT (1)

JAMES A. FITZPATRICK

NUCLEAR POWER PLANT



REACTOR CONTAINMENT BUILDING INTEGRATED LEAKAGE RATE TEST JUNE 1990

NEW YORK POWER AUTHORITY

REVIEWED AND ACCEPTED BY:

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10/9/90
DATE

JAMES A. FITZPATRICK

NUCLEAR POWER PLANT

INTEGRATED LEAK RATE TEST

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1.0 SYNOPSIS

The J. A. FitzPatrick Nuclear Power Plant reactor containment building was subjected to periodic integrated leakage rate test (ILRT) during the period from June 6, 1990 to June 7, 1990. The purpose of this test was to demonstrate the acceptability of the building leakage rate at an internal pressure of 60 psia (P_a). Testing was performed in accordance with the requirements of 10 CFR 50, Appendix J, ANSI N45.4-1972 and J. A. FitzPatrick Technical Specifications with interpretations. In addition, the recommendations of BN-TOP-1 and ANSI/ANS 56.8 - 1987 were considered where appropriate.

The calculated Least Squares Fit (LSF) leakage rate based on the mass point method of analysis was near zero and found to be -.06617%/day with an associated 95% Upper Confidence Level (UCL) of 0.03995%/day. The Total Time LSF was -.0084%/day with an associated 95% UCL of .27045%/day. The effect of water level changes (increases) and local leakage from valves in service during the ILRT was 0.1331%/day. The combined leakage rate at the Total Time 95% UCL is 0.4035 percent by weight per day. This is well below the Appendix J acceptance criterion of 75% L_a and the FitzPatrick Technical Specification design leakage rate (L_d) of 0.5% by weight per day. The supplemental instrumentation verification at P_a demonstrated an agreement between calculated reactor containment building integrated leakage rates of 16.6 percent of L_d which is well within the 25% requirement of 10 CFR 50, Appendix J, Section III A.3.b.

All testing was performed by New York Power Authority with consultation and technical assistance of TER Services, Inc.

2.0 INTRODUCTION

The objective of the periodic integrated leak rate test was the verification of the overall leak tightness of the reactor containment building at an internal pressure of 60 psia. The allowable leakage is defined by safety analyses and in accordance with the site exposure guidelines specified by 10 CFR 100. For J. A. Fitzpatrick Nuclear Power Plant, the maximum allowable integrated leakage rate at a pressure of 60 psia (P_a) is the design leakage rate (L_a) of 0.5 percent by weight per day.

Testing was performed in accordance with the procedural requirements as stated in J. A. FitzPatrick Nuclear Power Plant Containment Integrated Leak Rate Test Procedure ST-39Y. This procedure was reviewed by the Plant Operations Review Committee and approved by the Plant Resident Manager prior to the commencement of the test.

Leakage rate testing was accomplished at the pressure of 60.185 psia for a period of 12 hours, followed by a 6.5 hour supplemental test for a verification of test instrumentation.

3.0 GENERAL AND TECHNICAL DATA

3.1 GENERAL DATA

Owner:	New York Power Authority
Docket No.:	50-333
Location:	South shore of Lake Ontario, 6 miles east of Oswego, N. Y.
Containment Description:	BWR, Mark I, Torus and Drywell
NSSS Supplier:	General Electric

3.2 TECHNICAL DATA

Containment Net

Free Volume:	259,952 cubic feet
Design Pressure:	56 psig
Design Temperature:	340 deg F

3.3 Test Results -- ILRT Test

1. Test Method	Absolute
2. Data Analysis Technique	Mass Point
3. Test Pressure (At Completion)	60.195 psia
4. Equivalent Maximum Allowable Leakage Rate, L_a	0.6667%/day
5. 75% of Equivalent L_a (Operational Allowable or L_d)	0.5%/day

6. Integrated Leakage Rate Test Results

	Mass Point	Total Time
Type A LSF L.R.%/day	-0.06617	-0.0084
Type A UCL L.R.%/day	-0.03995	0.27045

7. Imposed Verification Leakage Rate, L_o 0.5%/day (3.6 SCFM)
8. Verification Test Results

	MP Leakage Rate	Total Time
Mass Point Analysis	0.5008%/day	0.3805

9. Verification Test Limits

	Lower	Upper
Mass Point Analysis	0.3021%/day	0.5521%/day
Total Time	0.3599%/day	0.6099%/day

*Upper Limit = $L_o + L_{am} + 0.25\ L_d$
*Lower Limit = $L_o + L_{am} - 0.25\ L_d$

10. Report Printouts

The report printouts and plots for the Type A and verification test calculations are provided in Appendices B-G.

4.0 ACCEPTANCE CRITERIA

Acceptance criteria established prior to the test and as specified by J. A. FitzPatrick Technical Specifications with interpretations and 10CFR50, Appendix J, are as follows:

a. The measured leakage rate (L_{am}) for peak pressure testing at 60 psia (P_a) shall be less than 75 percent of the maximum allowable leakage rate (L_a) specified as 1.5 percent by weight of the building atmosphere per day and less than or equal to the design leakage rate (L_d) of 0.5 weight percent per day.

b. The test instrumentation shall be verified by means of a supplemental test. Agreement between the containment leakage measured during the Type A test and the containment leakage measured during the supplemental test shall be within 25 percent of L_d.

5.0 TEST INSTRUMENTATION

5.1 SUMMARY OF INSTRUMENTS

Test instruments employed are described, by system, in the following subsections. An Instrumentation Selection Guide (ISG) formula, is discussed in Section 5.5 was calculated to be ±0.0343%/day.

5.1.1 Temperature Indicating System

Components:

a. Resistance Temperature Detectors (RTD sensors)

Quantity	18
Type	100 ohm, Platinum
Accuracy, deg F	±0.1
Sensitivity, deg F	±0.1

5.1.2 Dewpoint Indicating System

Components:

a. Dewcell Elements

Quantity	6*
Manufacturer	EG&G
Type	Model 660, Chilled Mirror
Range, deg F	-50°C to +100°C
Accuracy, deg F	±.54

*Two Foxboro 2711AG dewcells. Most conservative bounds used.

5.1.3 Pressure Monitoring System

Precision Pressure Gauges:

Quantity	2
Manufacturer	Volumetrics
Type	Model PPM 1000
Range, psia	0-100
Accuracy, psia	±0.015% of indication
Sensor Sensitivity,	±0.001% of full scale psia
Repeatability, psia	±0.0003% of full scale

5.1.4 Supplemental Test Flow Monitoring System

Flowmeter:

Quantity	1
Manufacturer	Volumetrics
Type	Model FM 10
Range, scfm	0-10
Accuracy	±1% of full scale

5.2 SCHEMATIC ARRANGEMENT

A mathematical model of the containment was developed using elevation and plan view construction drawings to define containment subvolumes boundaries. Subsequent to subvolume boundary definition, volume fractions were assigned to each subvolume in the containment. Sensors are wall mounted to detect changes in containment atmospheric conditions. The 18 temperature sensors and 6 dewcells were placed throughout the reactor containment volume to permit monitoring of internal temperature and dewpoint. Table I indicates Instrumentation locations and Weighting Factors.

The two pressure gages were weighted at 50% each.

5.3 CALIBRATION CHECKS

Temperature, dewpoint, pressure and flow measuring systems were checked for calibration before the test in accordance with JAF procedures as required by ANSI N45.4-1972, Section 6.2 and 6.3. Results of the calibration and calibration checks are on file at James A. FitzPatrick Nuclear Power Plant. The supplemental test at 60 psia confirmed the instrumentation acceptability.

5.4 INSTRUMENTATION PERFORMANCE

The two Volumetrics pressure gauges, the eighteen temperature sensors, six dewcells and flowmeter performed satisfactorily during the Type A Test and Verification Test. One dewcell encountered a one time minor spike at point 173 but was not significant to the results of the Type A and was included.

5.5 INSTRUMENT SELECTION GUIDE (ISG)

Justification of instrumentation selection was accomplished, using manufacturer's sensitivity, accuracy and repeatability tolerances stated in Section 4.1, by computing the ISG formula.

Utilizing the methods, techniques and assumptions in Appendix G to ANS 56.8-1987 (Reference 6), the ISG formula was computed for the absolute method as follows:

a. Actual Conditions

Acceptance Criteria	(L_d)	= 0.5%/day
Actual Pressure	(P_a)	= 60.195 psia
Actual Drybulb Temperature	(T)	= 542.035°R
Actual Dewpoint	(T_{dp})	= 77.170 °F
Test Duration	(t)	= 12 hours

b. Total Absolute Pressure: e_p

No. of sensors: 2
Range: 0-100 psia
Sensor sensitivity error (E): ±0.001% of full scale
Measurement system error (ϵ): ±0.0003% of full scale

$$e_p = \pm[(E_p)^2 + (\epsilon_p)^2]^{1/2}/[\text{no. of sensors}]^{1/2}$$

$$e_p = \pm[(0.001)^2 + (0.0003)^2]^{1/2}/[2]^{1/2}$$

$$e_p = \pm 0.00074 \text{ psia}$$

c. Water Vapor Pressure: e_{p_v}
No. of sensors: 6 Chilled Mirror
Sensor sensitivity error (E): ±0.54°F
Measurement system error (ϵ) excluding sensor: ±0.0142%

At a dewpoint temperature of 77.17 °F, the equivalent water vapor pressure change (as determined from the steam tables) is 0.015205 psia/°F.

$$e_{p_v} = \pm[(E_{p_v})^2 + (\epsilon_{p_v})^2]^{1/2}/[\text{no. of sensors}]^{1/2}$$

$$E_{p_v} = \pm 0.54 \text{ deg F} \times (0.015205 \text{ psia/°F}) = .00821$$

$$\epsilon_{p_v} = \pm(0.000142 \times 100°F) \times (0.00821 \text{ psia/°F})$$

$$\epsilon_{p_v} = \pm 0.00011659 \text{ psia}$$

$$e_{p_v} = \pm[(0.00821)^2 + (0.00011659)^2]^{1/2}/[6]^{1/2}$$

$$e_{p_v} = \pm 0.003352 \text{ psia}$$

d. Temperature

No. of sensors: 18
Sensor sensitivity error (E): $\pm$0.1 deg F = 0.1 degR
Measurement system error (e), $\pm$0.266 deg F

$$e_T = \pm[(ET)^2 + (eT)^2]^{1/2}/[\text{no. of sensors}]^{1/2}$$

$$e_T = \pm[(0.1)^2 + (0.266)^2]^{1/2}/18$$

$$e_T = \pm 0.058 \text{ deg R}$$

e. Instrumentation Selection Guide (ISG)

$$ISG = \pm(2400/t)\ [2(^eP/P)^2 + 2(^ePv/P)^2 + 2(^eT/T)^2]^{1/2}$$

$$ISG = \pm(2400/12)\ [2(.00074/60.195)^2 + 2(.003352/60.195)^2 + 2(.058/542.06)^2]^{1/2}$$

$$ISG = \pm 200\ [3.0225 \times 10E\text{-}10 + 6.202E\text{-}09 + 2.29E\text{-}08]^{1/2}$$

$$ISG = \pm 0.0343\%/\text{day}$$

The ISG formula does not exceed 0.25 L_d (0.125%/day) and it is therefore concluded that the instrumentation selected was acceptable for use in determining the reactor containment integrated leakage rate.

5.6 SUPPLEMENTAL VERIFICATION

In addition to the calibration checks described in Section 5.2, test instrumentation operation was verified by a supplemental test subsequent to the completion of the 12 hour leakage rate test. This test consisted of imposing a known calibrated leakage rate on the reactor containment building. After the flow rate was established it was not altered for the duration of the test.

During the supplemental test, the measured leakage rate was:

$$L_c = L_{am}' + L_o$$

where,

L_c = measured composite leakage rate consisting of the reactor building leakage rate plus the imposed leakage rate
L_o = imposed leakage rate
L_{am}' = leakage rate of the reactor building during the supplemental test phase

Rearranging the above equation: $L_{am}' = L_c - L_o$

The reactor containment building leakage during the supplemental test can be calculated by subtracting the known superimposed leakage rate from the measured composite leakage rate.

The reactor containment building leakage rate during the supplemental test (L_{am}') was then compared to the measured reactor containment building leakage rate during the preceding 12 hour test (L_{am}) to determine instrumentation acceptability. Instrumentation is considered acceptable if the difference between the two leakage rates is within 25 percent of the maximum allowable leakage rate (L_a).

6.0 TEST PERFORMANCE

6.1 PREREQUISITES

Prior to commencement of reactor containment building pressurization, the following basic prerequisites were satisfied:

a. Proper operation of all test instrumentation was verified.
b. All automatic containment building isolation valves were closed by a manual containment isolation signal without any preliminary exercising or adjustment.
c. Equipment within the reactor containment building, subject to damage, was protected from external differential pressures.
d. Portions of fluid systems which, under post-accident conditions become extensions of the containment boundary, were drained and vented.
e. Pressure gauges were provided on the following systems to provide a means of detection for leakage into these systems:
    1. Personnel Access Hatch
    2. Equipment Access Hatch
f. Reactor containment building recirculation fans were not operational
g. Potential pressure sources were removed or isolated from the reaactor containment building.
h. A general inspection of the accessible interior and exterior areas of the containment was completed.

6.2 PRESSURIZATION PHASE

During the entire ILRT period, data was collected and recorded electronically at fifteen minute intervals via the computer. (See Appendices B-G.) Following the satisfaction of the prerequisites, pressurization of the reactor containment building was started on June 6, 1990 at 01:18. Containment pressure and temperature were monitored continuously throughout the pressurization stage. The pressurization rate was approximately 7.1 psi per hour.

When containment internal pressure reached 60.931 psia at 07:45 on June 6, 1990, pressurization was secured. At 18:30 on June 6, 1990, the reactor containment building stabilization criteria had been met. The level changes in the Torus indicated a water leak. The water leak was through an RHR system relief valve plug which was not properly restored following a test conducted during this refueling outage. The restoration was made and Torus water changes stabilized.

6.3 TYPE A TESTING PHASE

Leakage rate testing started at 18:45 on June 6, 1990, and was initiated at the 60.185 psia pressure level. The Type A test ran without abnormalities or perturbating events of any significance and was completed at 06:45 on June 7, 1990.

6.4 VERIFICATION TEST PHASE

Immediately following the 12 hour Type A test, a superimposed leakage rate of 3.6 SCFM or ~.5%/Day was started at 08:15 on June 7, 1990, for an additional 6.5 hour period. The Verification test also ran without abnormalities or perturbating events and was completed at 14:45 on June 7, 1990. Depressurization was complete at 23:00, June 7, 1990.

7.0 METHODS OF ANALYSIS

The absolute method of leakage rate determination was employed during testing at the 60.195 psia pressure level. The ATEST computer code (described in Appendix A) calculated the percent per day leakage rate using the mass point technique of data analysis. The mass point technique of computing leakage rates uses the Ideal Gas Law equation to calculate the weight of air inside containment for each fifteen minute interval. The Total Time Technique in accordance with BN-TOP-1 was also used in the 12 hour Type A.

A superimposed induced flow method was used for the 6.5 hour supplemental test. ATEST computer code fits a straight line using a linear least squares fit. In addition, the computer code also computes the upper bound of the 95% Upper Confidence Level.

8.0 DISCUSSION OF RESULTS

The ILRT data and calculated leakage rates are presented as reports and plots in Appendices B through G. These reports and plots illustrate an ILRT that was performed uninterrupted and without perturbation. The Type A containment mass and mass point leakage rate plot shows that the leakage rate remained essentially constant for the entire test period data.

8.1 TYPE A RESULTS

The method used in calculating the mass point leakage rate is defined in Section 7.0. The result of this calculation is a mass point leakage rate of -0.06617%/day. The 95% UCL associated with this leakage rate is -0.03995%/day. The method used in calculating the Total Time leakage rate is defined in Section 7.0. The result of this calculation is a Total Time LSF leakage rate of -0.0084%/day. The 95% UCL associated with this leakage rate is 0.27045%/day. In addition, the valves not in ILRT configuration and Torus water level variations were also considered but had minor significance on the result.

The calculated leakage rate and the calculated leakage rate at the upper bound of the 95% UCL are well below the acceptance criteria of 0.5 percent per day L_d. Therefore, reactor containment building leakage at 60 psia (P_a) is considered acceptable.

8.2 SUPPLEMENTAL TEST RESULTS

After conclusion of the 12 hour test at 60.156 psia, Thermal Mass Flowmeter was placed in service and a flow rate, of 3.6 SCFM was established. This flow rate is about equivalent to a leakage rate of L_d (.49 %/day).

The Total Time calculated leakage rate (L_c) during the supplemental test was calculated to be 0.3805 percent per day using the Total Time method of analysis.

The building leakage rate during the supplemental test is then determined as follows:

$$L_{am}' = L_c - L_o$$
$$L_{am}' = 0.3805\%/day - 0.4932\%/day$$
$$L_{am}' = -.1127\%/day$$

Comparing this leakage rate with the building leakage rate during the 12 hour test yields the following:

$|L_{am} - L_{am}'| / L_d = |0.0084 - 0.1127|/0.5 = 0.017$

The building leakage rates agree within 1.7 percent of L_d which is below the acceptance criteria of 25 percent of L_d.

Using the formulation of ANS 56.8 - 1981,

$(L_{am} + L_{am}' - 0.25\ L_d) \leq L_c \leq (L_{am} + L_{am}' + 0.25\ L_d)$

$0.3021 \leq L_c \leq 0.5521$

Since Lc was measured to be 0.5008 percent per day, this value falls within the acceptable range. Therefore, the acceptability of the test instrumentation is considered to have been verified.

8.3 SCHEDULE FOR RETESTING

The thorough examination of the containment penetration boundaries revealed no structural deterioration or abnormalities. All portions of the containment were found to be in good repair.

Therefore, the next periodic Type A retest is proposed to be performed in approximately three years. In accordance with previously submitted schedule.

9.0 TYPE B AND C LEAKAGE RATE

9.0 LOCAL LEAKAGE RATE TESTS (TYPES B & C)

Attachments 9.1 and 9.2 summarize the results of the Local Leakage Rate Test's (LLRT's) data which has been obtained from periodic testing performed since the 1987 Periodic Type A Test. Pre-repaired data is provided for surveillance testing performed in 1988 and 1990. The leakage rates that are listed Attachments 9.1 and 9.2 are individual valve measurements, unless otherwise noted. Each penetration's leakage rate can be obtained from site reference material. These LLRT's were performed utilizing "volumetric" leakage measuring equipment using the make-up air test method by pressurizing the listed penetrations with air or nitrogen and either measuring leakage across the containment isolation valves boundary (Type C) or across the resilient seals (Type B).

Attachment 9.3 contains an analysis of the containment penetrations that were repaired during the 1990 JAFNPP Refueling Outage to assess the "as-found" containment leakage condition.

Section 9 also contains a summary of the primary containment boundary modification improvements that were made during the 1988 & 1990 JAFNPP Refueling Outages. The details of these improvements are described in Attachment 9.4.

The acceptance criteria for Types B and C testing are in accordance with 10CFR50, Appendix J. The combined "as-left" leakage rate for all penetrations and valves, subject to Types B and C tests, is well below the acceptance criteria of less than 0.60 L_a.

The data contained in this section are summarized below:

Att. No.	Title
9.1	1988 Local Leakage Rate Test Results Summary Analysis
9.2	1990 Local Leakage Rate Test Results Summary Analysis
9.3	1990 Local Leakage Rate Test "As Found" Analysis
9.4	1988 & 1990 Containment Boundary Modifications

9.1 1988 LOCAL LEAKAGE RATE TEST RESULTS SUMMARY ANALYSIS

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
Drywell Stabilizers					
0 deg (GE-90)	B	"O" rings	.1018	.1018	
45 deg (GE-135)	B	"O" rings	.1018	.1018	
90 deg (GE-180)	B	"O" rings	.1196	.1196	
135 deg (GE-225)	B	"O" rings	.1018	.1018	
180 deg (GE-270)	B	"O" rings	.1018	.1018	
225 deg (GE-315)	B	"O" rings	.1018	.1018	
270 deg (GE-0)	B	"O" rings	.1211	.1211	
315 deg (GE-90)	B	"O" rings	.1226	.1226	
Drywell Head	B	"O" rings	.6429	.9213	
X1-A Equipment & Emergency	B	"O" rings	.1018	.1018	Equip. Hatch
Escape Hatch			1.8192	40.4655	Emerg. Hatch
X-1B Equipment Hatch	B	"O" rings	.2112	.1018	No repair performed
X-2A Personnel Access Hatch	B	"O" rings	36.2917	46.1036	Modification F1 86-108 performed on this hatch
X-4B Drywell Head Manway	B	"O" rings	.1018	.1018	
X-6 CRD Removal Hatch	B	"O" rings	.1018	.1018	
X-7A "A" Main Steam Line	C	29AOV-80A (IPC) 29AOV-86A (OPC)	.1366 (combined)	.1366	
X-7B "B" Main Steam Line	C	29AOV-80B (IPC) 29AOV-86B (OPC)	106.5602 (combined)	106.5602	
X-7C "C" Main Steam Line	C	29AOV-80C (IPC) 29AOV-86C (OPC)	25.0007 (combined)	25.0007	
X-7D "D" Main Steam Line	C	29AOV-80D (IPC) 29AOV-86D (OPC)	11.0864 (combined)	11.0864	
X-8 Condensate Drain	C	29MOV-74 (IPC) 29MOV-77 (OPC)	.1018 2.8148	.1018 2.8148	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-9A Feedwater	C	FWS-28A (IPC) 13MOV-21 (OPC) 34NRV-111A (OPC) RWC-62 (OPC) 12MOV-69	16.6443 20.6654 (combined)	16.6443 156.772	MOV-69:New valve which replaces RWC-62 as a CIV Modification F1-87-068
X-9B Feedwater	C	FWS-28B (IPC) 23MOV-19 (OPC) 34NRV-11B (OPC)	3.2016 279.95 (combined)	3.2016 3.11	WR 62285 performed on 23AOV-18 (NOTE: Test performed thru 23AOV-18)
X-10 Steam to RCIC Turine	C	13MOV-15 (IPC) 13MOV-16 (OPC)	4.2858 (combined)	3.1726	MOV-15: New valve installed by modification
X-11 Steam to HPCI Turbine	C	23MOV-15 (IPC) 23MOV-16 (OPC) 23MOV-60 (OPC)	1338.67 (combined)	35.0956	MOV-15,-16: New valves installed by modification F1-86-039 (15,16)
X-12 Shutdown Cooling Supply to RHR	C	10MOV-18 (IPC) 10MOV-17 (OPC)	43.6722 88.1077	44.6902 88.1077	
X-13A RHR (LPCI) Return	C	10MOV-27A (OPC) 10MOV-25A (OPC)	11508.49 166.952	109.944 166.952	MOV-27A Packing tightened under WR 62272
X-13B RHR (LPCI Return)	C	10MOV-27B (OPC) 10MOV-25B (OPC)	120.124 4815.14	120.124 94.6740	MOV-25B: Packing tightened under WR 10/59299
X-14 RWCU Supply from Recirculation	C	12MOV-15 (IPC) 12MOV-18 (OPC) 12MOV-80 (OPC)	104.854 193.929 (combined)	39.3457 6.6933	MOV-15: New valve installed by MOD F1-87-130 MOV-18:WR# 64232 for pcking
X-16A Core Spray Pump Discharge	C	14MOV-11A (OPC) 14MOV-12A (OPC)	.1018 .1018	.1018 .1018	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-16B Core Spray Pump Discharge	C	14MOV-11B (OPC)	.1878	.1878	
		14MOV-12B (OPC)	.3762	.3762	
X-17 RPV Head Spray	C	10MOV-32 (IPC)	5.6448	5.6448	
		10MOV-33 (OPC)	1.9393	1.9393	
X-18 Floor Drain Sump Discharge	C	20MOV-82 (IPC)	.8073	3.8684	
		20AOV-83 (OPC)	.9472	.1018	
X-19 Equipment Drain Sump Discharge	C	20MOV-94 (IPC)	4.0618	4.0618	
		20AOV-95 (OPC)	3.7208	3.7208	
X-21 Service Air	C	SAS-10 (IPC)	8.1440	.2632	Deleted valves and capped penetration w/modification F1-87-056 NOTE:no longer will be B/C tested
		SAS-9 (OPC)	532.414		
X-22 Instrument Air/Nitrogen	C	IAS-22 (IPC)	.1831	.1831	
		27SOV-141 (OPC)	.1018	.1018	
X-23 Cooling Assembly "A" Supply	C	ESW-16B (OPC)	.1018	.1018	
		RBC-24A (OPC)	.1018	.1018	
		15AOV-130A (OPC)	40.8727	22.9559	AOV-130A: repaired under WR 15/60957
X-24 Cooling Assembly "B" Supply	C	ESW-16A (OPC)	15.27	.1018	ESW-16A disassembled, re-assembled per WR 61678
		RBC-24B (OPC)	.1018	.1018	
		15AOV-130B (OPC)	2.0105	2.0105	
X-25 Drywell Inerting, CAD and X-71 Purge	C	27AOV-111 (OPC)	.4912 (combined)	.4912	
		27AOV-112 (OPC)			
		27AOV-131A (OPC)	432.65 (combined)	5.003	CAD-68 repaired under WR 60958
		CAD-68 (OPC)			
		27AOV-131B (OPC)	4.2807 (combined)	4.2807	
		CAD-69 (OPC)			
X-26A Containment Atmosphere	C	27SOV-120A (OPC)	4.0363	4.0363	
		27SOV-120B (OPC)	3.1965	3.1965	
		27SOV-120E1(OPC)	25.0935	.1018	SOV-121E1 replaced under WR 62276
		27SOV-120E2(OPC)	.8220	.8220	
		27SOV-121A (OPC)	6.3269	6.3269	
		27SOV-121B (OPC)	10.0171	10.0171	
		27SOV-119F1(OPC)	1.1689	1.1689	
		27SOV-119F2(OPC)	.1018	.1018	
		27SOV-122A (OPC)	.4153	.4153	
		27SOV-122B (OPC)	11.7070	11.7070	
		27SOV-122E1(OPC)	95.2359	1.715	SOV-112E1 replaced under WR 62275
		27SOV-122E2(OPC)	.1018	.1018	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-26A Containment Vent & Purge X-26B (Drywell Exhaust)	C	27AOV-113 (OPC) 27AOV-114 (OPC) 27MOV-113 (OPC) 27MOV-122 (OPC)	GROSS (combined) .1018 (combined)	.1420 .1018	
X-31Ac "A" Recirculation Pump Seal Mini-Purge Supply	C	RWR-13A (IPC) 02-2SOV-001 (OPC)	3.0184 70.7001	3.0184 .1018	SOV-001 repaired under WR 64811
X-31Ad Drywell Continuous Atmosphere Monitor Sample Supply	C	27SOV-135A (OPC) 27SOV-135B (OPC)	.1018 .1018		
X-31Bc "B" Recirculation Pump Seal Mini-Purge Supply	C	RWR-13B (IPC) 02-2SOV-002 (OPC)	48.1514 30.7436	.9920 .4255	RWR-13B repaired under WR02/ 60712 SOV-002 replaced under WR02/ 62280
X-35A TIP Probe	C/B	Ball Valve (OPC) "O" ring (OPC)	.2932 .1018	.2932 .1018	
X-35B TIP Probe	C/B	Ball Valve (OPC) "O" ring (OPC)	2.5094 .1018	2.5094 .1018	
X-35C TIP Probe	C/B	Ball Valve (OPC) "O" ring (OPC)	.1446 9.8135	.1446 9.8135	
X-35D TIP Probe	C/B	Ball Valve (OPC) "O" ring (OPC)	.7666 .1018	.7666 .1018	
X-35E TIP Indexer Purge Supply	C/B	CAD-901 (IPC) 27SOV-001 (OPC) "O" ring	62.4034 .1018 .1018	.1018 .1018 .1018	
X-39A Containment Spray	C	10MOV-26A (OPC) 10MOV-31A (OPC) RHR-52A (OPC)	14.2011 (combined)	12.1142	MOV-26A, 31A replaced under MOD F1-87-133
X-39B Containment Spray	C	10MOV-26B (OPC) 10MOV-31B (OPC) RHR-52B (OPC)	1084.17 (combined)	1.75	MOV-26B, 31B replaced under MOD F1-87-133
X-41 Recirculation System	C	02AOV-39 (IPC) 02AOV-40 (OPC)	1.3896 5.4553	.3563 .3843	Valves replaced with SOVs: MODF1-87-045
X-42 Standby Liquid Control	C	SLC-17 (IPC) SLC-16 (OPC)	.9773 10.165	.9773 10.165	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-45 Drywell Pressure (Mensor) Sensor Connection	C	16-1AOV-101A (OPC) 16-1AOV-101B (OPC)	.5538 (combined)	.5538	
X-52A					
X-55B Drywell Continuous Atmosphere Monitor Sample Return	C	27SOV-125A (OPC) 27SOV-125B (OPC)	7.8895 1.5728	7.8895 1.5728	
X-57C Instrument Nitrogen	C	IAS-29 (IPC) 27SOV-145 (OPC)	.1018 .4581	.1018 .4581	
X58B Drywell Hydrogen/Oxygen Sample Supply	C	27SOV-122F1 (OPC) 27SOV-122F2 (OPC)	.3227 .1018	.3227 .1018	
X-58C Drywell Hydrogen/Oxygen Sample Supply	C	27SOV-120F1 (OPC) 27SOV-120F2 (OPC)	.1018 7.009	.1018 7.009	
X-58D Drywell Hydrogen/ Oxygen Sample Supply	C	27SOV-123F1 (OPC) 27SOV-123F2 (OPC)	.1018 .1018	.1018 .1018	
X-61 Breathing Air	C	BAS-5 (IPC) BAS-4 (OPC)	3.3187 1.3336	3.3187 1.3336	
X-62 Cooling Assembly "B" Return	C	15AOV-131B (OPC) RBC-26B (OPC)	.9213 .9569	.9213 .9569	
X-63 "A" Recirculation Pump & Motor Coolers Supply	C	RBC-21A (OPC) ESW-15B (OPC) 15AOV-132A (OPC)	.1018 .1018 .8780	.1018 .1018 .8780	
X-64 "A" Recirculation Pump & Motor Coolers Supply	C	15AOV-133A (OPC) RBC-22A (OPC)	6.9326 5.599	6.9326 5.599	
X-65 Equipment Drain Sump Return	C	15AOV-134A (OPC) RBC-33 (OPC)	9.8746 9.0184	9.8746 9.0184	
X-66 Cooling Assembly "A" Return	C	15AOV-131A (OPC) RBC-26A (OPC)	3.6852 .4290	3.6852 .4290	
X-67 "B" Recirculation Pump & Motor Coolers Supply	C	RBC-21 (OPC) ESW-15B (OPC) 15AOV-132B (OPC)	.1018 .1018 1.801	.1018 .1018 1.801	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-68 "B" Recirculation Pump & Motor Coolers Supply	C	15AOV-133B (OPC) RBC-22B (OPC)	3.6749 6.8816	3.6749 6.8816	
X-100A (Electrical)	B	"O" rings	.2860	.2860	
X-100B (Electrical)	B	"O" rings	.1018	.1018	
X-100C (Electrical)	B	"O" rings	.5110	.5110	
X-100D (Electrical)	B	"O" rings	.4367	.4367	
X-100F (Electrical)	B	"O" rings	.4273	.4273	
X-100G (Electrical)	B	"O" rings	.1018	.1018	
X-100K (Electrical)	B	"O" rings	.1730	.1730	
X-101A (Electrical)	B	"O" rings	.1018	.1018	
X-101B (Electrical)	B	"O" rings	.1018	.1018	
X-101C (Electrical)	B	"O" rings	.3838	.3838	
X-101D (Electrical)	B	"O" rings	.3039	.3039	
X-101E (Electrical)	B	"O" rings	.4169	.4169	
X-101F (Electrical)	B	"O" rings	.7411	.7411	
X-103A (Electrical)	B	"O" rings	.5517	.5517	
X-103B (Electrical)	B	"O" rings	.4652	.4652	
X-104C (Electrical)	B	"O" rings	.8444	.8444	
X-104D (Electrical)	B	"O" rings	.1206	.1206	
X-104E (Electrical)	B	"O" rings	.4209	.4209	
X-106A (Electrical)	B	"O" rings	.1018	.1018	
X-106B (Electrical)	B	"O" rings	.2891	.2891	
X-107 (Electrical)	B	"O" rings	.4005	.4005	
X-108 (Electrical)	B	"O" rings	.5405	.5405	
X-109 (Electrical)	B	"O" rings	.3990	.3990	
X-110C (Electrical)	B	"O" rings	.9024	.9024	
X-110D (Electrical)	B	"O" rings	.2952	.2952	
X-111B (Electrical)	B	"O" rings	.4061	.4061	
X-200A Torus Access	B	"O" rings	.1018	.1018	
X-200B Torus Access	B	"O" rings	.1018	.1018	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-200C Torus Access	B	"O" rings	.4061	.4061	
X-202B Torus to Reactor Bldg	C	27AOV-101A (OPC) 27VB-6 (OPC)	44.1817 (combined)	44.1817	
X-202G Vacuum Breakers		27AOV-101B (OPC) 27VB-7 (OPC)	685.114 (combined)	.7146	AOV-101B repaired under WR 62188
X-202F Drywell to Torus Vacuum	B	"O" rings (27VB-1)	.2677	.2677	
X-202G Drywell to Torus Vacuum	B	"O" rings (27VB-2)	.2036	.2036	
X-202H Drywell to Torus Vacuum		"O" rings (27VB-3)	.2677	.2677	
X-202D Drywell to Torus Vacuum X-202I Breaker "O" Ring Seals	B	"O" rings (27VB-4)	14.5574	.2036	VB-4 repaired under WR 60762
X-202E Drywell to Torus Vacuum X-202J Breaker "O" Ring Seals	B	"O" rings (27VB-4)	.2036	.2036	
X-203A Containment Atmosphere Sampling	C	27SOV-119A (OPC) 27SOV-119B (OPC) 27SOV-119E1 (OPC) 27SOV-119E2 (OPC)	.1018 .1018 2.4584 2.4584	.1018 .1018 2.4584 .1171	 New Valve New Valve
X-203B Containment Atmosphere Sampling Return	C	27SOV-124A (OPC) 27SOV-124B (OPC) 27SOV-124E1 (OPC) 27SOV-124E2 (OPC) 27SOV-124F1 (OPC) 27SOV-124F2 (OPC)	.1018 .1018 .3715 .2469 .1018 .2367	N/A N/A .1089 .2219 .1018 .2367	Removed Removed
X-205 Containment Vent & Purge (Torus Exhaust)	C	27AOV-117 (OPC) 27AOV-118 (OPC) 27MOV-117 (OPC) 27MOV-123 (OPC)	7451.76 (combined) 10.8417 (combined)	114.525 10.8417	AOV-118 repaired under WR 60714
X-211A Containment Spray	C	10MOV-38A (OPC) 10MOV-39A (OPC)	1033.27 (combined)	87.1408 (combined)	
X-211B Containment Spray	C	10MOV-38B (OPC) 10MOV-39B (OPC)	2733.33 (combined)	99.764	MOV-38B repaired under WR 62286
X-212 RCIC Turbine Exhaust	C	RCIC-04 (OPC) RCIC-05 (OPC) 13MOV-130 (OPC)	8459.58 677.479 .3054	17.1024 54.1067 .3054	RCIC-4, 5 replaced under MOD F1-87-136

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-214 HPCI Turbine Exhaust	C	HPI-12 (OPC) HPI-65 (OPC)	3736.06 94.8776	96.4555 94.8776	HPI-12 replaced under MOD F1-87-134
X-217		23MOV-59 (OPC)	.2352	.2352	
X-218 Torus Pressure (Mensor) Sensor Connection	C	16-1AOV-102A (OPC) 16-1AOV-102B (OPC)	17.1024 (combined)	2.7537	AOV-102A repaired under WR 62284
X-220 Torus Inerting, CAD and Purge	C	27AOV-115 (OPC) 27AOV-116 (OPC) 27AOV-132A(OPC) CAD-67 (OPC) 27AOV-132B(OPC) CAD-70 (OPC)	2.9318 (combined) 8.9228 (combined) 39.2998 (combined)	2.9318 (combined) 8.9228 (combined) 1.7052 (combined)	
X-221 Condensate Drain From	C	RCIC-07 (OPC) RCIC-08 (OPC)	4.2960 .1425	8.2814 13.0813	RCIC-7, 8 replaced under MOD F1-87-135
X-231A (Electrical)	B	"O" rings	.2229	.2229	

9.2 1990 LOCAL LEAKAGE RATE TEST RESULTS SUMMARY ANALYSIS

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
0 deg (GE-90)	B	"O" rings	.1018	.1018	
45 deg (GE-135)	B	"O" rings	.1018	.1018	
90 deg (GE-180)	B	"O" rings	.1018	.1018	
135 deg (GE-225)	B	"O" rings	.1782	.1782	
180 deg (GE-270)	B	"O" rings	.1018	.1018	
225 deg (GE-315)	B	"O" rings	.1232	.1232	
270 deg (CE-0)	B	"O" rings	.1018	.1018	
315 deg (GE-90)	B	"O" rings	.2026	.2026	
Drywell Head	B	"O" rings	25.2973	.1925	New "O" rings installed
X1-A Equipment & Emergency	B	"O" rings	.1018	.1018	Equip.Hatch
Escape Hatch			36.7498	.1018	Emerg.Hatch
X-1B Equipment Hatch	B	"O" rings	.2301	.1217	No repair performed
X-2A Personnel Access Hatch	B	"O" rings	31.2526	31.2526	
X-4B Drywell Head Manway	B	"O" rings	.1125	.1018	
X-6 CRD Removal Hatch	B	"O" rings	.2495	.2495	
X-7A "A" Main Steam Line	C	29AOV-80A (IPC) 29AOV-86A (OPC)	GROSS (combined)	21.9886	AOV-80A seat repaired under WR 29/72979
X-7B "B" Main Steam Line	C	29AOV-80B (IPC) 29AOV-86B (OPC)	GROSS (combined)	11.9615	AOV-86B seat repaired under WR 29/72980
X-7C "C" Main Steam Line	C	29AOV-80C (IPC) 29AOV-86C (OPC)	.1018 (combined)	.1018	
X-7D "D" Main Steam Line	C	29AOV-80D (IPC) 29AOV-86D (OPC)	GROSS (combined)	.3614	AOV-80D seat repaired under WR 29/72981
X-8 Condensate Drain	C	29MOV-74 (IPC) 29MOV-77 (OPC)	926.889 2.8148	.1018 2.8148	MOV-74 replaced MOD F1-87-128

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-9A Feedwater	C	FWS-28A (IPC) 13MOV-12 (OPC) 34NRV-111A (OPC) 12MOV-69	38.2768 .1018 (combined)	38.2768 .1018	NRV-111A replaced under Mod F1-87-132
X-9B Feedwater	C	FWS-28B (IPC) 23MOV-19 (OPC) 34NRV-111B (OPC)	.245 279.y5 (combined)	15.5245 3.11	NRV-111B replaced under Mod F1-87-132
X-10 Steam to RCIC Turbine	C	13MOV-15 (IPC) 13MOV-16 (OPC)	401.601 (combined)	7.7443	MOV-15: repaired under WR13/72386 MOV-16: replaced with Mod F1-88-188
X-11 Steam to HPCI Turbine	C	23MOV-15 (IPC) 23MOV-16 (OPC) 23MOV-60 (OPC)	GROSS (combined)	9.5794	MOV-15, -16: pack. retorqued under WRs 23/73064 & 23/73063 MOV-15 Discs & seats re-paired under WR 73041
X-12 Shutdown Cooling Supply to RHR	C	10MOV-18 (IPC) 10MOV-17 (OPC)	127.25 GROSS	127.25 2.8656	MOV-17 repaired by WR10/ 65175
X-13A RHR (LPCI) Return	C	10MOV-27A (OPC) 10MOV-25A (OPC)	492.712 120.124	243.811 120.124	MOV-27A packing tightened per WR 10/73030
X-13B RHR (LPCI) Return	C	10MOV-27B (OPC) 10MOV-25B (OPC)	641.34 39.1421	88.8714 39.1421	MOV-25B: Stem relaxed. Operator repaired under WR 10/71464

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-14 RWCU Supply From Recirculation	C	12MOV-15 (IPC) 12MOV-18 (OPC) 12MOV-80 (OPC)	GROSS 391.93 (combined)	28.8094 23.5158	MOV-15:New disc installed under WR 12/ 72988 MOV-18-80 replaced under Mod F1-88-189 MI-90-006
X-16A Core Spray Pump Discharge	C	14MOV-11A (OPC) 14MOV-12A (OPC)	.7539 .6928	.7539 .6928	
X-16B Core Spray Pump Discharge	C	14MOV-11B (OPC) 14MOV-12B (OPC)	.1018 .1018	.1018 .1018	
X-17 RPV Head Spray	C	10MOV-32 (IPC) 10MOV-33 (OPC)	81.7963 1.7917	24.7374 3.6241	MOV-32 repaired by WR 10/73033
X-18 Floor Drain Sump Discharge	C	20MOV-82 (IPC) 20AOV-83 (OPC)	.1558 .1553	.1558 .1553	
X-19 Equipment Drain Sump Discharge	C	20MOV-94 (IPC) 20AOV-95 (OPC)	44.1812 40.4655	21.887 15.27	Leakage past20RDW-91A, B repaired under WR 20/72978 MOV-94 Replaced by MOD F1-87-133
X-22 Instrument Air/ Nitrogen	C	IAS-22 (IPC) 27SOV-141 (OPC)	.1018 .1018	.1018 .1018	
X-23 Cooling Assembly "A" Supply	C	ESW-16B (OPC) RBC-24A (OPC) 15AOV-130A (OPC)	9.2588 (combined) 352.737	9.2588 (combined) 11.3507	AOV-130A: seat repaired under WR 73032
X-24 Cooling Assembly "B" Supply	C	ESW-16A (OPC) RBC-24B (OPC) 15AOV-130B (OPC)	15.27 193.929 4.2858	.1018 13.234 4.2858	ESW-16A repaired under WR 46/72753
X-25 Drywell Inerting, CAD and X-71 Purge	C	27AOV-111 (OPC) 27AOV-112 (OPC) 27AOV-131A (OPC) CAD-68 (OPC) 27AOV-131B (OPC) CAD-69 (OPC)	18.5785 (combined) GROSS (combined) .8765 (combined)	18.5785 .1018 .8765	CAD-68 repaired by WR 27/73082

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-26A Containment Atmosphere	C	27SOV-120E1 (OPC)	.1273	.1273	
		27SOV-120E2 (OPC)	.1018	.1018	
		27SOV-119F1 (OPC)	.1044	.1044	
		27SOV-119F2 (OPC)	387.858	.1018	SOV-119F2 replaced under WR 27/73083
		27SOV-122E1 (OPC)	2.7333	2.7333	
		27SOV-122E2 (OPC)	.6796	.6796	
X-26A Containment Vent & Purge	C	27AOV-113 (OPC)	79.2004	79.2004	
		27AOV-114 (OPC)	(combined)		
X-26B (Drywell Exhaust)		27MOV-113 (OPC)	.1181	.1181	
		27MOV-122 (OPC)	(combined)		
X-31Ac "A" Recirc Pump Seal Mini-Purge Supply	C	RWR-13A (IPC)	.1018	.1018	
		02-2SOV-001 (OPC)	618.435	2.0666	SOV-001 replaced under WR 72985
X-31Ad Drywell Continuous Atmosphere Monitor Sample Supply	C	27SOV-135A (OPC)	.1502	.1502	
		27SOV-135B (OPC)	.1018	.1018	
X-31Bc "B" Recirc Pump Seal Mini-Purge Supply	C	RWR-13B (IPC)	.1344	.1344	
		02-2SOV-002 (OPC)	438.249	.1018	SOV-002 replaced under WR02/72984
X-31Bd Drywell Continuous Atmosphere Monitor Sample Supply	C	27SOV-135B	.1018	.1018	
			6.4440	6.4440	
X-35A TIP Probe	C/B	27SOV-104d (OPC)	2.2447	-------	Valve removal by Mod F1-88-253
		"O" Ring (OPC)	.1018	-------	
X-35B TIP Probe	C/B	07SOV-104A (OPC)	2.825	.8511	Valve replaced under MOD F1-88-253
		"O" Ring (OPC)	4.3673	.1018	
X-35C TIP Probe	C/B	07SOV-104C (OPC)	5.8383	.1018	Valve replaced under Mod F1-88-253
		"O" Ring (OPC)	4.2960	.1018	
X-35D TIP Probe	C/B	07SOV-104B (OPC)	2.7639	.1018	Valve replaced under Mod F1-88-253
		"O" Ring (OPC)	.1018	.1018	
X-35E TIP Indexer Purge Supply	C/B	CAD-901 (IPC)	.1018	-------	Valves removed under Mod F1-88-253
		27SOV-001 (OPC)	.1018	-------	
		"O" Ring	.1018	-------	
X-39A Containment Spray	C	10MOV-26A (OPC)	2.4382	2.4382	
		10MOV-31A (OPC)	(combined)		
		RHR-52A (OPC)			

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-39B Containment Spray	C	10MOV-26B (OPC) 10MOV-31B (OPC) RHR-52B (OPC)	.3793 (combined)	.3793	
X-41 Recirculation System	C	02AOV-39 (IPC) 02AOV-40 (OPC)	261.117 194.947	.509 .5228	
X-42 Standby Liquid Control	C	SLC-17 (IPC) SLC-16 (OPC)	4.5505 .3314	.9773 .2540	SLC-16 replaced under Mod F1-87-129
X-45 Drywell Pressure (Mensor) Sensor Connection	C	16-1AOV-101A (OPC) 16-1AOV-101B (OPC)	.7895 (combined)	.7895	
X-52A Drywell Atmosphere Continuous Monitor Sample Return	C	27SOV-125A (OPC) 27SOV-125C (OPC)	.1018 .1018	.1018 .1018	
X-55B Drywell Continuous Atmosphere Monitor Sample Return	C	27SOV-125A (OPC) 27SOV-125B (OPC)	.4917 .1018	.4917 .1018	
X-57C Instrument Nitrogen	C	IAS-29 (IPC) 27SOV-145 (OPC)	.1502 .1018	.1502 .1018	
X-58B Drywell Hydrogen/ Oxygen Sample Suppy	C	27SOV-122F1 (OPC) 27SOV-122F2 (OPC)	.1018 .1018	.1018 .1018	
X-58C Drywell Hydrogen/ Oxygen Sample Supply	C	27SOV-120F1 (OPC) 27SOV-120F2 (OPC)	2.0819 .5717	2.0819 .5717	
X-58D Drywell Hydrogen/ Oxygen Sample Supply	C	27SOV-123F1 (OPC) 27SOV-123F2 (OPC)	.1018 .1018	.1018 .1018	
X-59 Drywell Hydrogen/ Oxygen Sample Supply	C	27SOV-123E1 (OPC) 27SOV-123E2 (OPC)	1.8884 .3314	1.8884 .3314	
X-62 Cooling Assembly "B" Return	C	15AOV-131B (OPC) RBC-26B (OPC)	20.7672 2.2142	20.7672 2.2142	
X-63 "A" Recirculation Pump & Motor Coolers Supply	C	RBC-21A (OPC) ESW-15B (OPC) 15AOV-132A (OPC)	21.2253 (combined) .3513	1.8121 .3513	Retested after check valve inspection
X-64 "A" Recirculation Pump & Motor Coolers Supply	C	15AOV-133A (OPC) RBC-22A (OPC)	5.1868 4.0466	5.1868 4.0466	
X-65 Equipment Drain Sump Cooler Return	C	15AOV-134A (OPC) RBC-33 (OPC)	7.600 5.2020	7.600 5.2020	
X-66 Cooling Assembly "A" Return	C	15AOV-131A (OPC) RBC-26A (OPC)	.3986 .7615	.3986 .7615	
X-67 "B" Recirc Pump & Motor Coolers Supply	C	RBC-21B (OPC) ESW-15B (OPC) 15AOV-132B (OPC)	.8659 (combined) 28.706	.8659 28.706	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-68 "B" Recirc Pump & Motor Coolers Supply	C	15AOV-133B (OPC) RBC-22B (OPC)	42.0434 28.0459	10.0477 28.0459	AOV-133B repaired under WR15/73031
X-100A (Electrical)	B	"O" rings	.1354	.1354	
X-100B (Electrical)	B	"O" rings	.1018	.1018	
X-100C (Electrical)	B	"O" rings	.8073	.8073	
X-100D (Electrical)	B	"O" rings	.6017	.6017	
X-100F (Electrical)	B	"O" rings	.1018	.1018	
X-100G (Electrical)	B	"O" rings	.1018	.1018	
X-100K (Electrical)	B	"O" rings	.1018	.1018	
X-101A (Electrical)	B	"O" rings	.1018	.1018	
X-101B (Electrical)	B	"O" rings	.1018	.1018	
X-101C (Electrical)	B	"O" rings	.1018	.1018	
X-101D (Electrical)	B	"O" rings	.1018	.1018	
X-101E (Electrical)	B	"O" rings	.1018	.1018	
X-101F (Electrical)	B	"O" rings	.1018	.1018	
X-103A (Electrical)	B	"O" rings	.1543	.1543	
X-103B (Electrical)	B	"O" rings	.1176	.1176	
X-104C (Electrical)	B	"O" rings	.1018	.1018	
X-104D (Electrical)	B	"O" rings	.1018	.1018	
X-104E (Electrical)	B	"O" rings	.2413	.2413	
X-106A (Electrical)	B	"O" rings	.1018	.1018	
X-106B (Electrical)	B	"O" rings	.3416	.3416	
X-107 (Electrical)	B	"O" rings	.1965	.1965	
X-108 (Electrical)	B	"O" rings	.2596	.2596	
X-109 (Electrical)	B	"O" rings	.1018	.1018	
X-110C (Electrical)	B	"O" rings	.5014	.5014	
X-110D (Electrical)	B	"O" rings	.1018	.1018	
X-111B (Electrical)	B	"O" rings	.1222	.1222	
X-200A Torus Access	B	"O" rings	.1018	.1018	
X-200B Torus Access	B	"O" rings	.1018	.1018	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-200C Torus Access	B	"O" rings	.3054	.3054	
X-202B Torus to Reactor Building X-202G Vacuum Breakers	C	27AOV-101A (OPC) 27VB-6 (OPC) 27AOV-101B (OPC) 27VB-7 (OPC)	108.417 (combined) 7.635 (combined)	108.417 7.635	
X-202A Drywell To Torus Vacuum X-202F Breaker "O" Ring Seals	B	"O" rings (27VB-1)	.1604	.1604	
X-202B Drywell to Torus Vacuum X-202G Breaker "O" Ring Seals	B	"O" rings (27VB-2)	.4892	.4892	
X-202C Drywell to Torus Vacuum X-202H Drywell to Torus Vacuum	B	"O" rings (27VB-3)	.1360	.1360	
X-202D Drywell to Torus Vacuum X-202I Breaker "O" Ring Seals	B	"O" rings (27VB-4)	.4449	.4449	
X-202E Drywell to Torus Vacuum X-202J Breaker "O" Ring Seals	B	"O" rings (27VB-5)	.4648	.4648	
X-203A Containment Atmosphere Sampling	C	27SOV-119E1 (OPC) 27SOV-119E2 (OPC)	6.9224 .1018	.1018 .1018	SOV-119E1 replaced under WR27/72982
X-203B Containment Atmosphere Sampling Return	C	27SOV-124E1 (OPC) 27SOV-124E2 (OPC) 27SOV-124F1 (OPC) 27SOV-124F2 (OPC)	.1304 .1018 .1767 .1167	.1304 .1018 .1767 .1167	Removed Removed
X-205 Containment Vent & Purge (Torus Exhaust)	C	27AOV-117 (OPC) 27AOV-118 (OPC) 27MOV-117 (OPC) 27MOV-123 (OPC)	GROSS (combined) 34.5102 (combined)	143.538 .3131	AOV-117 repaired under WR 73092 MOV-123 repaired by WR27/65165
X-211A Containment Spray	C	10MOV-38A (OPC) 10MOV-39A (OPC)	84.6976 (combined)	84.6976 (combined)	
X-211B Containment Spray	C	10MOV-38B (OPC) 10MOV-39B (OPC)	257.554 (combined)	116.561	MOV-38B repaired under WR 73036
X-212 RCIC Turbine Exhaust	C	RCIC-04 (OPC) RCIC-05 (OPC)	44.8938 49.0167	44.8938 49.0167	
X-214 HPCI Turbine Exhaust	C	HPI-12 (OPC) HPI-65 (OPC)	.2189 2.9828	.2189 2.9828	

Penetration No./ System	Type Test	Equipment/ Valves Tested	Pre-Repair Leakage (scf/day)	Post-Repair Leakage (scf/day)	Repair/ Notes
X-218 Torus Pressure (Mensor) Sensor Connection	C	16-1AOV-102A (OPC) 16-1AOV-102B (OPC)	2.3465 (combined)	2.3465	
X-220 Torus Inerting, CAD and Purge	C	27AOV-115 (OPC) 27AOV-116 (OPC) 27AOV-132A (OPC) CAD-67 (OPC) 27AOV-132B (OPC) CAD-70 (OPC)	3.1151 (combined) 1.6639 (combined) .2820 (combined)	3.1151 (combined) 1.6639 (combined) .2820 (combined)	
X-231A (Electrical)	B	"O" rings	.1018	.1018	

9.3 1990 LOCAL LEAKAGE RATE TEST "AS FOUND" ANALYSIS

The pre-repair LLRT, the repair, and the post-repair LLRT for each boundary, or penetration, was reviewed. The net leakage contribution for each penetration was determined using the following criteria:

1. A leakage equivalent to the repair improvement achieved on each valve in the penetration is calculated.

2. The leakage equivalent is the difference between the pre-repair and the post-repair LLRT results.

3. If a repair was not performed, a zero leakage equivalent is assessed to the valve.

4. The leakage equivalent assessed to a penetration may be reduced due to the safety-related service of the system associated with the penetration(s). Justification for this reduction will be provided with the analysis.

5. The net equivalent leakage for the penetration is the lowest of the inside or outside valve grouping (e.g., simulated minimum pathway leakage).

6. If the "As-Left" leakage of a repaired valve is lower than the "As-Left" leakage of a valve that didn't require a repair, then the penetration net equivalent leakage is the difference between the "As-Left" leakages.

7. For series valves tested together, the penetration net equivalent leakage is half the total leakage when both valves are repaired at the same time (prior to performing another test).

8. When the summation of the leakage equivalent and the leakage measured during a successful Type A test is greater than L_a, the penetration(s) with excessive leakage(s) shall be analyzed under a corrective action program.

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
DW HEAD	NA	25.2873	25.2873	0.1925	0.1925	25.0948	25.0948
DW STAB 0°	NA	0.1018	0.1018	0.1018	0.1018	0.0000	
DW STAB 45°	NA	0.1018	0.1018	0.1018	0.1018	0.0000	
DW STAB 90°	NA	0.1018	0.1018	0.1018	0.1018	0.0000	
DW STAB 135°	NA	0.1782	0.1782	0.1782	0.1782	0.0000	
DW STAB 180°	NA	0.1018	0.1018	0.1018	0.1018	0.0000	
DW STAB 225°	NA	0.1232	0.1232	0.1232	0.1232	0.0000	
DW STAB 270°	NA	0.1018	0.1018	0.1018	0.1018	0.0000	
DW STAB 315°	NA	0.2026	0.2026	0.2026	0.2026	0.0000	
EQUIP HATCH	X-1A	0.1018	0.1018	0.1018	0.1018	0.0000	
PERSONNEL AIRLOCK	X-2A	31.2526	31.2526	31.2526	31.2526	0.0000	
EQUIP HATCH	X-1B	0.2301	0.2301	0.1217	0.1217	0.1084	0.1084
MANWAY O-RING	X-4	0.1125	0.1125	0.1018	0.1018	0.0107	0.0107
O-RING	X-6	0.2495	0.2495	0.2495	0.2495	0.0000	
29AOV-80A/86A	X-7A	GROSS	29.5090	29.5090	29.5090	0.0000	
29AOV-80B/86B	X-7B	GROSS	16.0524	16.0524	16.0524	0.0000	
29AOV-80C/86C	X-7C	0.1018	0.1367	0.1367	0.1367	0.0000	
29AOV-80D/86D	X-7D	GROSS	0.4850	0.4850	0.4850	0.0000	
29MOV-77	X-8	966.0820	926.8890	10.1800	0.1018	926.7872	926.7872
29MOV-74	X-8	926.8890		0.1018			
34NRV-111A/	X-9A	0.1018	0.1018	0.1018	0.1018	0.0000	
12MOV69/13MOV21	"	combined					
34FWS-28A	X-9A	38.2768		38.2768			
34NRV-111B/	X-9A	26.5698	15.5254	0.1018	0.1018	15.4236	15.4236
23MOV-19	"	combined		combined			
34FWS-28B	X-9A	15.5245		15.5245			
13MOV-15	X-10	401.6010	1.6950	7.7433	7.7433	-6.0483	
13MOV-15/16	X-10	1.6950		12.3687			
23MOV-15	X-11	76.4009	76.4009	1.7052	1.7052	74.6957	74.6957

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
23MOV-15,16,60	X-11	GROSS		9.5794			
10MOV-17	X-12	GROSS	127.2500	2.8656	2.8656	124.3844	NOTE 2
10MOV-18	X-12	127.2500		127.2500			
10MOV-25A	X-13A	120.1240	120.1240	120.1240	120.1240	0.0000	
10MOV-27A	X-13A	492.7120		243.8110			
10MOV-25B	X-13B	39.1421	39.1421	39.1421	39.1421	0.0000	
10MOV-27B	X-13B	641.3400		88.8741			
12MOV-15	X-14	GROSS		28.8094			
12MOV-18,80	X-14	391.9300	391.9300	29.8274	29.8274	362.1026	362.1026
14MOV-12A	X-16A	0.6928	0.6928	0.6928	0.6928	0.0000	
14MOV-11A	X-16A	0.7539		0.7539			
14MOV-12B	X-16B	0.1018	0.1018	0.1018	0.1018	0.0000	
14MOV-11B	X-16B	0.1018		0.1018			
10MOV-32	X-17	81.7963	1.7917	24.7374	3.6241	-1.8324	
10MOV-33	X-17	1.7917		3.6241			
20MOV-82	X-18	0.1558	0.1553	0.1558	0.1553	0.0000	
20AOV-83	X-18	0.1553		0.1553			
20MOV-94	X-19	44.1812	40.4655	21.8870	21.8870	18.5785	18.5785
20AOV-95	X-19	40.4655		15.2700			
39IAS-22	X-22	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-141	X-22	0.1018		0.1018			
15RBC-24A/	X-23	9.2588	9.2588	9.2588	9.2588	0.0000	
46ESW-16B	X-23	combined		combined			
15AOV-130A	X-23	352.7370		11.3507			
15RBC-24B/	X-24	193.9290	4.2858	13.2340	4.2858	0.0000	
46ESW-16A	X-24	combined		combined			
15AOV-130B	X-24	4.2858		4.2858			
27AOV-111/112	X-25/71	18.5785		18.5785			
27AOV-131/CAD-68	X-25/71	GROSS	9.8293	0.1018	9.8293	0.0000	

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
27AOV-131B/CAD-69	X-25/71	0.8765		0.8765			
27AOV-113,114	X-26A,B	79.2004	39.6002	79.2004	39.6002	0.0000	
27MOV-113,122	X-26A,B	0.1181	0.0591	0.1181	0.0591	0.0000	
27SOV-119F1	X-26A,B	0.1044	0.1044	0.1044	0.1044	0.0000	
27SOV-119F2	X-26A,B	387.8580		0.1018			
27SOV-120E1	X-26A,B	0.1273		0.1273			
27SOV-120E2	X-26A,B	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-122E1	X-26A,B	2.7333		2.7333			
27SOV-122E2	X-26A,B	0.6796	0.6796	0.6796	0.6796	0.0000	
02-2RWR-13A	X-31AC	0.1018	0.1018	0.1018	0.1018	0.0000	
02-2SOV-001	X-31AC	618.4340		2.0666			
02-2RWR-13B	X-31BC	0.1344	0.1344	0.1344	0.1018	0.0326	0.0326
02-2SOV-002	X-31BC	438.2490		0.1018			
27SOV-135C	X-31AD	0.1502		0.1502			
27SOV-135A	X-31AD	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-135D	X-31BD	6.4440		6.4440			
27SOV-135B	X-31BD	0.1018	0.1018	0.1018	0.1018	0.0000	
07SOV-104D	X-35A	2.2447	2.3465			2.3465	2.3465
O-RING	X-35A	0.1018					
07SOV-104A	X-35B	2.8250	7.1923	0.8511	0.9529	6.2394	6.2394
O-RING	X-35B	4.3673		0.1018			
07SOV-104C	X-35C	5.8383	10.1343	0.1018	0.2036	9.9307	9.9307
O-RING	X-35C	4.2960		0.1018			
07SOV-104D	X-35D	2.7639	2.8657	0.1018	0.2036	2.6621	2.6621
O-RING	X-35D	0.1018		0.1018			

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
27CAD-901	X-35E	0.1018	0.1018			0.1018	0.1018
27SOV-001	X-35E	0.1018					
O-RING	X-35E	0.1018					
10MOV-31A,26A,	X-39A	2.4382	1.2191	2.4382	1.2191	0.0000	
10RHR-52A	"	combined		combined			
10MOV-31B,26B,	X-39B	0.3793	0.1897	0.3793	0.1897	0.0000	
10RHR-52B	"	combined		combined			
02-2SOV-39	X-41	261.1170		0.5090			
02-2SOV-40	X-41	194.9470	194.9470	0.5228	0.5228	194.4242	194.4242
11SLC-17	X-42	4.5505		4.5505			
11SLC-16A	X-42	0.3314	0.3314	0.2540	0.2540	0.0774	0.0774
16-1AOV-101A,B	X-45	0.7895	0.3948	0.7895	0.3948	0.0000	
27SOV-125C	X-52A	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-125A	X-52A	0.1018		0.1018			
27SOV-125D	X-55B	0.4917		0.4917			
27SOV-125B	X-55B	0.1018	0.1018	0.1018	0.1918	-0.0900	
39IAS-29	X-57C	0.1502		0.1502			
27SOV-145	X-57C	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-122F2	X-58B	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-122F1	X-58B	0.1018		0.1018			
27SOV-120F2	X-58C	0.5717	0.5717	0.5717	0.5717	0.0000	
27SOV-122F1	X-58C	2.0819		2.0819			
27SOV-123F2	X-58D	0.1018	0.1018	0.1018	0.1018	0.0000	
27SOV-123F1	X58D	0.1018		0.1018			
27SOV-123E2	X-59	0.3314	0.3314	0.3314	0.3314	0.0000	
27SOV-123E1	X-59	1.8884		1.8884			
15AOV-131B	X-62	20.7672	20.7672	20.7672	20.7672	0.0000	
15RBC-26B	X-62	2.2142		2.2142			
16RBC-21A/	X-63	21.2253	0.3513	1.8121	0.3513	0.0000	
46ESW-15A	"	combined		combined			

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
15AOV-132A	X-63	0.3513		0.3513			
15AOV-133A	X-64	5.1868	5.1868	5.1868	5.1868	0.0000	
15RBC-22A	X-64	4.0466		4.0466			
15AOV-134A	X-65	7.6000	7.6000	7.6000	7.6000	0.0000	
15RBC-33	X-65A	5.2020		5.2020			
15AOV-131A	X-66	0.3986	0.3986	0.3986	0.3986	0.0000	
15RBC-26A	X-66	0.7615		0.7615			
15RBC-21B/	X-67	0.8659	0.8659	0.8659	0.8659	0.0000	
46ESW-15B	"	combined					
15AOV-132B	X-67	28.7076		28.7076			
15AOV-133B	X-68	42.0434	42.0434	10.0477	10.0477	31.9957	31.9957
15RBC-22B	X-68	28.0459		28.0459			
ELEC PEN	X-100A	0.1354	0.1354	0.1354	0.1354	0.0000	
ELEC PEN	X-100B	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-100C	0.8073	0.8073	0.8073	0.8073	0.0000	
ELEC PEN	X-100D	0.6017	0.6017	0.6017	0.6017	0.0000	
ELEC PEN	X-100F	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-100G	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-100K	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101A	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101B	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101C	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101D	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101E	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-101F	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-103A	0.1543	0.1543	0.1543	0.1543	0.0000	
ELEC PEN	X-103B	0.1176	0.1176	0.1176	0.1176	0.0000	
ELEC PEN	X-104C	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-104D	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-104E	0.2413	0.2413	0.2413	0.2413	0.0000	

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
ELEC PEN	X-106A	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-106B	0.3416	0.3416	0.3416	0.3416	0.0000	
ELEC PEN	X-107	0.1965	0.1965	0.1965	0.1965	0.0000	
ELEC PEN	X-108	0.2596	0.2596	0.2596	0.2596	0.0000	
ELEC PEN	X-109	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-110C	0.5014	0.5014	0.5014	0.5014	0.0000	
ELEC PEN	X-110D	0.1018	0.1018	0.1018	0.1018	0.0000	
ELEC PEN	X-111B	0.1222	0.1222	0.1222	0.1222	0.0000	
ELEC PEN	X-231A	0.1018	0.1018	0.1018	0.1018	0.0000	
O-RING	X-200A	0.1018	0.1018	0.1018	0.1018	0.0000	
O-RING	X-200B	0.1018	0.1018	0.1018	0.1018	0.0000	
BOTTOM O-RING	X-200C	0.1018	0.3054	0.1018	0.3054	0.0000	
TOP O-RING	X-200C	0.1018		0.1018			
CAVITY O-RING	X-200C	0.1018		0.1018			
VB-1 O-RING/	X-202F	0.1604	0.1604	0.1604	0.1604	0.0000	
STUFFING BOX	X-202F	combined		combined			
VB-2 O-RING/	X-202G	0.4892	0.4892	0.4892	0.4892	0.0000	
STUFFING BOX	X-202G	combined		combined			
VB-3 O-RING/	X-202H	0.1360	0.1360	0.1360	0.1360	0.0000	
STUFFING BOX	X-202H	combined		combined			
VB-4 O-RING/	X-202I	0.4449	0.4449	0.4449	0.4449	0.0000	
STUFFING BOX	X-202I	combined		combined			
VB-5 O-RING/	X-202J	0.4648	0.4648	0.4648	0.4648	0.0000	
STUFFING BOX	X-202J	combined		combined			
27AOV-101B/	X-202B/	7.6350	58.0260	7.6350	58.0260	0.0000	
27VB-7	202G	combined		combined			
27AOV-101A	X-202B/	108.4170		108.4170			
27VB-6	202G	combined		combined			
27SOV-119E2	X-203A	0.1018	0.1018	0.1018	0.1018	0.0000	

Component ID	PEN. #	LLRT VALUE SCFD AS FOUND	PENETRATION AS FOUND MIN PATH	LLRT VALUE SCFD AS LEFT	PENETRATION AS LEFT MIN PATH	PENETRATION LEAKAGE IMPROVEMENT	TYPE "A" TEST LEAKAGE IMPROVEMENT
27SOV-119E1	X-203A	6.9224		0.1018			
27SOV-124E2	X-203B	0.1304	0.2194	0.1304	0.2194	0.0000	
27SOV-124E1	X-203B	0.1018		0.1018			
27SOV-124F2	X-203B	0.1176		0.1176			
27SOV-124F1	X-203B	0.1767		0.1767			
27AOV-117	X-205	GROSS	187.8210	143.5380	143.8511	43.9699	43.9699
27AOV-118	X-205	combined		combined			
27MOV-117	X-205	34.5102	17.2551	0.3131	0.3131	16.9420	16.9420
27MOV-123	X-205	combined		combined			
10MOV-38A	X-211A	84.6976	42.3488	84.6976	42.3488	0.0000	
10MOV-39A	X-211A	combined		combined			
10MOV-38B	X-211B	257.5540	128.7770	116.5610	108.2805	20.4965	NOTE 2
10MOV-39B	X-211B	combined		combined			
13RCIC-4	X-212	44.8938	44.8938	44.8938	44.8938	0.0000	
13RCIC-5	X-212	49.0167		49.0167			
23HPI-12	X-214	0.2189	0.2189	0.2189	0.2189	0.0000	
23HPI-65	X-214	2.9828		2.9828			
16-1AOV-102A	X-218	2.3465	1.1733	1.1733	1.1733	0.0000	
16-1AOV-102B	X-218	combined					
27AOV-115	X-220	3.1151		3.1151			
27AOV-116	X-220	combined		combined			
27AOV-132A	X-220	1.6339	2.5155	1.6339	2.5155	0.0000	
27CAD-67	X-220	combined		combined			
27AOV-132B	X-220	0.2820		0.2820			
27CAD-70	X-220	combined		combined			
TOTALS			2,700.1663		831.7323	1,868.4340	1,731.5238

9.3 1990 LOCAL LEAKAGE RATE TEST "AS FOUND" ANALYSIS

NOTES:

1. The resulting net equivalent "As Found" leakage of 5915.0128 SCFD or 0.5705 percent/day, indicates that the plant allowable "As Found" leakage rate limit of L_a or 1.5 percent/day was not exceeded.

2. The RHR system restores and maintains the coolant inventory in the reactor vessel so that the core is adequately cooled after a LOCA. The RHR system also provides containment cooling so that condensation of the steam resulting from the blowdown due to the design LOCA is ensured. The RHR system valves, piping, and components have been designed as essentially a leaktight system, (seismic, safety-related). During plant operations, periodic inspections are performed. Reference JAFNPP UFSAR Section 4.8, RHR system.

9.4 1988 & 1990 CONTAINMENT BOUNDARY MODIFICATIONS

The following changes to the primary containment were made during the 1988 Refueling Outage:

1. 12MOV-69 added with Mod. F1-87-068 (Replaces 12RWC-62 as CIV).
2. Replacement 13MOV-15 installed with Mod. F1-87-016.
3. Replacement 23MOV-15 & -16 installed with Mod. F1-86-039.
4. Replacement 12MOV-15 installed with Mod. F1-87-130.
5. Service Air Valves 39SAS-9 & -10 deleted. Penetration X-21 capped (Mod. F1-87-056).
6. Replacement 10MOV-26A, B, & -31A, B, installed with Mod. F1-87-133.
7. 02AOV-39 & -40 replaced by 02SOV-39 & -40 under Mod. F1-87-045.
8. Replacement 13RCIC-4 & -5 installed with Mod. F1-87-136.
9. Replacement 23HPI-12 & -65 installed with Mod. F1-87-134.
10. Replacement 13RCIC-7 & -8 installed with Mod. F1-87-135.

The following changes to the primary containment were made during the 1990 Refueling Outage.

1. Replacement 29MOV-74 installed with mofification F1-87-128.
2. Replacements for 34NRV-111A & -111B installed with modifications F1-87-132.
3. Replacements for 12MOV-18 & -80 installed with modifications F1-88-189 and M1-90-006.
4. Replacement 13MOV-16 installed with modification F1-88-188.
5. Replacement 20MOV-94 installed with modification F1-87-133.
6. Replacement 11SLC-16 installed with modification F1-87-129.
7. As part of the TIP system modification (F1-88-253), penetrations X-35A and X-35E were capped and spared. Isolation valves 0750V-104A, B & C were replaced and lccated on penetrations X-35B, C & D.

10.0 REFERENCES

1) ST-39F Containment Integrated Leakage Rate Test Procedure

2) Code of Federal Regulations, Title 10, Part 50, Appendix J.

3) ANSI N45.4 - 1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors," American Nuclear Society,(March 16, 1972).

4) Steam Tables, American Society of Mechanical Engineers, (1967).

5) TER Services, Inc., ATEST Computer Code.

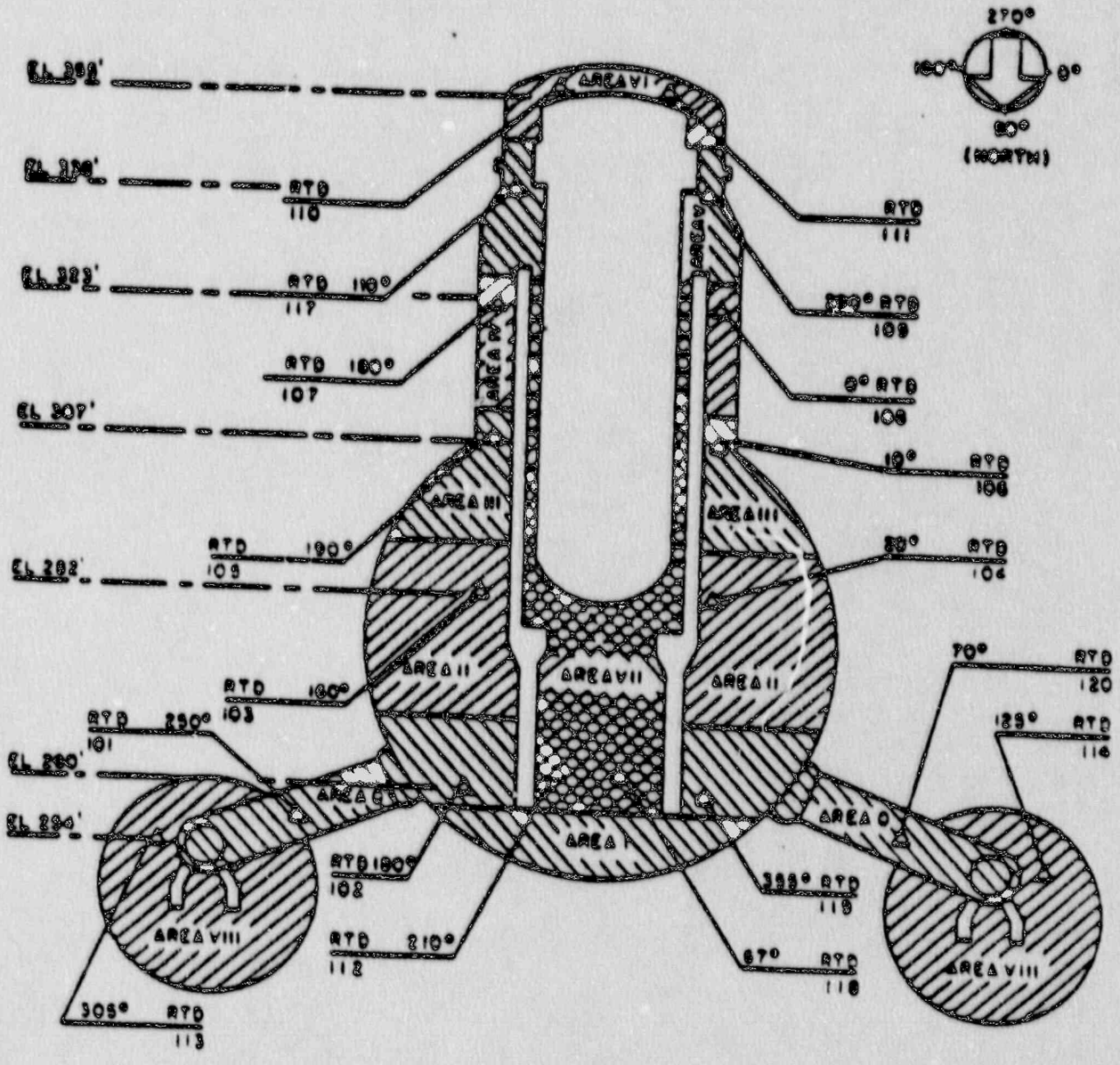
6) ANSI/ANS- 56.8 - 1987, "Containment System Leakage Testing Requirements," American Nuclear Society,

7) BN-TOP-1 - 1972, Rev. 1, Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants.

TABLE I

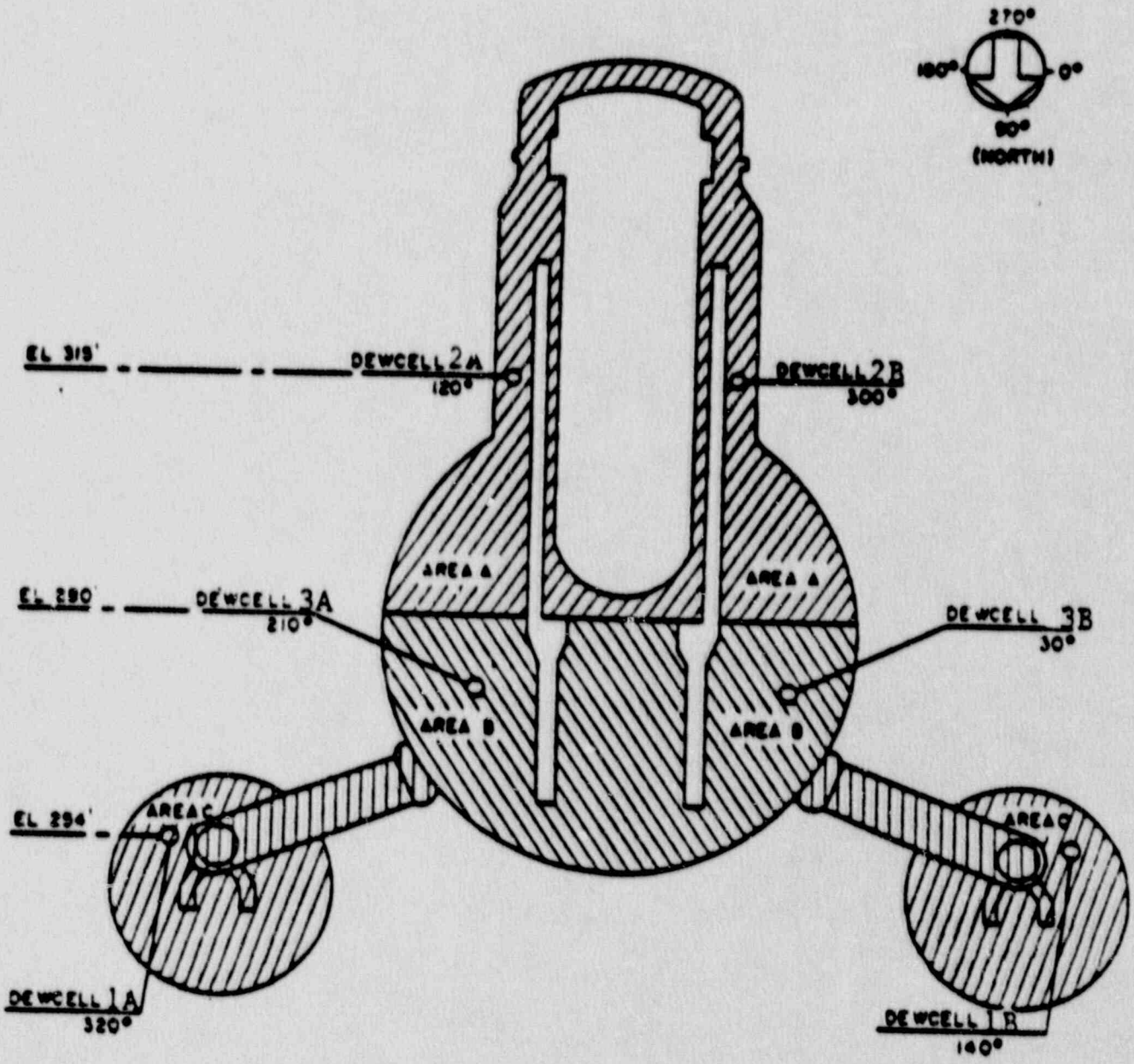
Instrumentation Locations
Schematic
Weighting Factors

TEMPERATURE DETECTOR SCHEMATIC



NOTE:
RTD ELEVATIONS AND AZIMUTH POSITIONS ARE APPROXIMATE

DEWCELL SCHEMATIC



NOTE:
MOISTURE DETECTOR ELEVATIONS AND AZIMUTH POSITIONS ARE APPROXIMATE.

WEIGHT TABLE

DESCRIPTION	WEIGHT
RTD 1	0.0490
RTD 2	0.0490
RTD 3	0.1058
RTD 4	0.1058
RTD 5	0.0390
RTD 6	0.0390
RTD 7	0.0140
RTD 8	0.0140
RTD 9	0.0159
RTD 10	0.0159
RTD 11	0.0213
RTD 12	0.0213
RTD 13	0.0185
RTD 14	0.0185
RTD 15	0.0337
RTD 16	0.0337
RTD 17	0.2029
RTD 18	0.2029
RTD 19	0.0000
RTD 20	0.0000
RTD 21	0.0000
RTD 22	0.0000
RTD 23	0.0000
RTD 24	0.0000
RTD 25	0.0000
RTD 26	0.0000
RTD 27	0.0000
RTD 28	0.0000
RTD 29	0.0000
RTD 30	0.0000
RTD 31	0.0000
RTD 32	0.0000
RTD 33	0.0000
RTD 34	0.0000
RTD 35	0.0000
RTD 36	0.0000
RTD 37	0.0000
RTD 38	0.0000
RTD 39	0.0000
RTD 40	0.0000
RTD 41	0.0000
RTD 42	0.0000
RTD 43	0.0000
RTD 44	0.0000
RTD 45	0.0000
RTD 46	0.0000
RTD 47	0.0000
RTD 48	0.0000
RTD 49	0.0000
RTD 50	0.0000

DESCRIPTION	WEIGHT
DC 1	0.2029
DC 2	0.2029
DC 3	0.1475
DC 4	0.1475
DC 5	0.1496
DC 6	0.1496
DC 7	0.0000
DC 8	0.0000
DC 9	0.0000
DC 10	0.0000
DC 11	0.0000
DC 12	0.0000
DC 13	0.0000
DC 14	0.0000
DC 15	0.0000
FLOW 1	1.0000
FLOW 2	0.0000
PRES 1	0.0000
PRES 2	0.5000
PRES 3	0.0000
PRES 4	0.5000
PRES 5	0.0000
PRES 6	0.0000

APPENDIX A

ATEST COMPUTER PROGRAM SUMMARY

ATEST PROGRAM SUMMARY

1.0 INTRODUCTION

The Type A Test is an integrated leakage rate test (ILRT) designed to verify the leak test integrity of the entire containment building. This test is performed at approximately three-year intervals as required by Appendix J of 10 CFR 50. It is performed in accordance with the American National Standard "Containment System Leakage Testing Requirements," (ANSI/ANS- 56.8-1987), American National Standard "Leakage Rate Testing of Primary Containment for Nuclear Power Plants," (ANSI N45.4-1972), and the Bechtel Topical Report "Testing Criteria for Integrated Leakage Rate Testing of Nuclear Power Plants," (BN-TOP-1, Rev. 1-1972).

The **ATEST** program computes total time leakage rates, mass point leakage rates, LSF leakage rates, and 95% upper confidence level (UCL) leakage rates during the course of the test from input measured values of containment pressure, temperature and dew point.

The **ATEST** program is designed to automate the task of sampling and reducing the data to a usable form in accordance with the above documents. This greatly limits the possibility of human error and provides intermediate results after a short delay. This makes it possible to monitor the progress of the test very closely in approximately real time. For each of the two test periods, the **ATEST** program samples the containment's environment and calculates the values needed to assess the status of the test. Interim results are provided as desired and the program checks to see if the acceptance criteria have been satisfied for the two test periods. The program also produces a printout of all data gathered as well as a record of its calculations. In addition, the data are stored on hard or floppy computer disks for future reference. The program can recover from a power failure or any other accidental interruptions of the program's execution by reloading the old data and restarting the data sampling routine at the proper location. Lastly, should one of the RTDs or dew cells fail during the test, the program will detect the problem and the user can remove that sensor form further calculations. When the test is completed, the program has the ability to recalculate all values for the test, suppressing any failed sensors or instruments from the entire series of calculations.

ATEST is written in a high level language (QuickBASIC) and is designed for use on a micro-computer with direct data input from the data acquisition system. Brief descriptions of program use, formulae used for leakage rate computations, and program logic are provided in the following sections.

2.0 EXPLANATION OF PROGRAM

The ATEST computer program is written for use by experienced ILRT personnel, to determine containment integrated leakage rates based on the Absolute Method described in ANSI N45.4-1972, ANSI/ANS56.8-1987, and BN-TOP-1.

Information loaded into the program prior to or at the start of the test:

a. Number of containment atmosphere drybulb temperature sensors, dew point temperature (water vapor pressure) sensors and pressure gages to be used in leakage rate computations for the specific test.
b. Volume fractions assigned to each of the above sensors.
c. Calibration data for above sensors.
d. Test pressure.
f. Maximum allowable leakage rate at test pressure.

Data recorded from the data acquisition system during the test, and used to compute leakage rates:

a. Time and date.
b. Containment atmosphere drybulb temperatures.
c. Containment atmosphere pressure(s).
d. Containment atmosphere dew point temperatures.
e. Containment free air volume.

If an instrument or sensor should fail during the test, the data from the sensor is not used. The volume fractions for the remaining sensors are recomputed and reloaded into the program for use in ensuing leakage rate computations.

3.0 PROGRAM LOGIC AND OPERATION SUMMARY

The ATEST computer program logic flow is controlled by a set of user options after executive questions. The user options and a brief description of their associated function are presented below:

LOG ON/OFF	Allows for the use of the data acquisition system for electronic entry and permanent recording of data. Conversely, this toggle can suspend the entry/recording process.
AUTO/MANUAL	This key (de)activates the automatic data entry and allows manual entry.
MAINT	Provides for maintenance of the data, calibration, and weighting factor files. Its features include defining weighting factors, changing the time increment of logging data, deleting a file record, displaying a record's average environmental contents, and changes the individual record's content. This key has several sub-tiers.
INPUT	Provides for either a pre-arranged manual entry(s) or in the MANUAL mode, the method to input the recorded data.
REPORTS	This key performs the calculations of program and prints the results. This key has several sub-tiers.
PLOTS	This function implements the graphics portion of the program. Any channel or leakage rate can be plotted. This key has several sub-tiers.
END JOB	This key will properly terminate the program.

4.0 COMPUTER REPORTS AND PLOTS

4.1 Reports

REPORTS Does the analysis of the data accumulated by the ILRT system and then prints out a report of the results. The types of analysis performed are: mass point, total time, environmental averages, mass loss, temperature stabilization, and data rejection. All results from the analysis are printed off a thermal printer. The subprogram REPORTS requires the user to select a valid time window or record window as listed below as a prerequisite for doing analysis.

SENSOR LIST This report outputs all the sensor data for the selected records.

MASS LOSS The mass loss analysis is based on the ANSI/ANS 56.8-1987 Standard acceptance criteria and calculations

TEMP STAB The temperature stabilization analysis is based on the Bechtel Topical Report (BN-TOP-1) and the ANSI/ANS 56.8-1987 Standard with their respective acceptance criteria and calculations.

DATA REJECTION The data rejection analysis is based on the Bechtel Topical Report (BN-TOP-1) and the ANSI/ANS 56.8-1987 Standard, Appendix D, with their respective acceptance criteria and calculations.

TOTAL TIME The total time analysis is based on the Bechtel Topical Report (BN-TOP-1) and its acceptance criteria and calculations.

MASS POINT The mass point analysis is based on the ANSI/ANS 56.8-1987 Standard acceptance criteria and calculations.

ENVIRONMENT The environment analysis is based on the Bechtel Topical Report (BN-TOP-1) and the analysis is based on the ANSI N45.4-1972 Standard and its acceptance criteria and calculations.

4.2 Plots

The Graphics subprogram allows the user to plot the mass point analysis, total time analysis, and displayed channels. Further, plots can be made in a batch mode by instrument type to a printer or a plotter. PLOTS performs autoranging on the data being plotted for axes values. PLOTS requires the user to select any valid time window or record window as a prerequisite for plotting.

APPENDIX B

STABILIZATION DATA & CALCULATIONS

********** TEMPERATURE STABILIZATILIZATION **********

DATE - 06-20-1990 TIME - 10:32:58

TIME (DELTA) (HOURS)	TEMP	TEMP DIFF INCR	TEMP AVG (1 HR)	BN-TOP-1 AVG (2 HR)	BN-TOP-1 RATE (2 HR)	TEMP AVG (4 HR)	ANSI CRIT
0.00	543.664	0.000	0.000	0.000	0.000	0.000	0.000
0.25	543.313	-0.351	0.000	0.000	0.000	0.000	0.000
0.50	543.245	-0.068	0.000	0.000	0.000	0.000	0.000
0.75	543.035	-0.210	0.000	0.000	0.000	0.000	0.000
1.00	542.945	-0.090	543.304	0.000	0.000	0.000	0.000
1.25	542.827	-0.118	543.070	0.000	0.000	0.000	0.000
1.50	542.754	-0.073	542.999	0.000	0.000	0.000	0.000
1.75	542.708	-0.046	542.871	0.000	0.000	0.000	0.000
2.00	542.453	-0.255	542.699	-0.605	0.605	0.000	0.000
2.25	542.470	0.017	542.648	-0.421	0.421	0.000	0.000
2.50	542.371	-0.099	542.563	-0.437	0.437	0.000	0.000
2.75	542.331	-0.040	542.519	-0.352	0.352	0.000	0.000
3.00	542.255	-0.076	542.354	-0.345	0.345	0.000	0.000
3.25	542.237	-0.017	542.354	-0.295	0.295	0.000	0.000
3.50	542.193	-0.045	542.282	-0.281	0.281	0.000	0.000
3.75	542.180	-0.013	542.255	-0.264	0.264	0.000	0.000
4.00	542.241	0.061	542.248	-0.106	0.106	-0.356	0.342
4.25	542.080	-0.161	542.159	-0.195	0.195	-0.308	0.151
4.50	542.076	-0.004	542.134	-0.148	0.148	-0.292	0.176
4.75	542.108	0.032	542.144	-0.111	0.111	-0.232	0.160
5.00	542.168	0.060	542.205	-0.043	0.043	-0.194	0.121
5.25	542.052	-0.116	542.066	-0.092	0.092	-0.[illegible]	0.166
5.50	542.074	0.022	542.075	-0.059	0.059	-0.170	0.168
5.75	542.140	0.066	542.124	-0.020	0.052	-0.142	0.174
6.00	542.116	-0.024	542.142	-0.063	0.063	-0.084	0.032
6.25	542.067	-0.049	542.059	-0.007	0.021	-0.101	0.115
6.50	541.980	-0.087	542.027	-0.048	0.048	-0.098	0.004
6.75	542.054	0.074	542.097	-0.027	0.059	-0.069	-0.017
7.00	541.968	-0.087	542.042	-0.100	0.100	-0.072	-0.077
7.25	541.969	0.001	542.018	-0.042	0.056	-0.067	-0.031
7.50	541.958	-0.011	541.969	-0.058	0.058	-0.059	0.037
7.75	542.005	0.046	542.030	-0.068	0.068	-0.044	-0.006
8.00	541.958	-0.047	541.963	-0.079	0.079	-0.071	0.061
8.25	542.018	0.060	541.994	-0.024	0.073	-0.016	0.065
8.50	541.899	-0.119	541.929	-0.040	0.040	-0.044	-0.015
8.75	541.937	0.038	541.948	-0.059	0.059	-0.043	0.021
9.00	541.935	-0.002	541.947	-0.016	0.016	-0.05[illegible]	0.035
9.25	541.968	0.033	541.993	-0.000	0.049	-0.071	-0.029
9.50	542.031	0.063	541.965	0.036	0.095	-0.011	0.143
9.75	541.995	-0.036	541.966	-0.005	0.063	-0.036	0.095
10.00	541.933	-0.062	541.934	-0.012	0.012	-0.046	0.044
10.25	542.091	0.157	542.029	0.036	0.086	0.006	0.116
10.50	542.082	-0.008	542.057	0.092	0.092	0.026	0.026
10.75	541.989	-0.094	541.992	0.026	0.032	-0.016	0.010

APPENDIX C

TYPE A SUMMARY DATA

By Sensor
Environment
Mass Loss

********** ENVIRONMENT LISTING **********

DATE - 06-19-1990

TIME - 12:15:18

REC NUM	DATE	TIME	TEMP	VAPOR PRESSURE	CORRECT. PRESSURE	RELATIVE HUMIDITY	AIR DENSITY	PSIA/HR VARIANCE
132	6	1845	542.067	0.4636	60.1854	84.58	0.2997	0.00000
133	6	1900	542.025	0.4636	60.1844	84.69	0.2997	-0.00403
134	6	1915	542.063	0.4640	60.1850	84.67	0.2997	0.00223
135	6	1930	541.986	0.4637	60.1843	84.81	0.2997	-0.00246
136	6	1945	542.003	0.4639	60.1831	84.80	0.2997	-0.00479
137	6	2000	542.000	0.4639	60.1801	84.82	0.2997	-0.01216
138	6	2015	541.877	0.4640	60.1850	85.17	0.2998	0.01976
139	6	2030	542.019	0.4642	60.1798	84.81	0.2997	-0.02084
140	6	2045	542.043	0.4638	60.1802	84.68	0.2997	0.00150
141	6	2100	541.989	0.4646	60.1789	84.97	0.2997	-0.00505
142	6	2115	542.012	0.4634	60.1796	84.70	0.2997	0.00243
143	6	2130	541.963	0.4646	60.1804	85.05	0.2997	0.00333
144	6	2145	542.041	0.4643	60.1797	84.78	0.2997	-0.00284
145	6	2200	541.957	0.4642	60.1798	85.00	0.2997	0.00034
146	6	2215	542.115	0.4640	60.1810	84.52	0.2996	0.00500
147	6	2230	542.074	0.4639	60.1801	84.62	0.2997	-0.00381
148	6	2245	542.085	0.4640	60.1820	84.59	0.2997	0.01196
149	6	2300	542.025	0.4647	60.1803	84.89	0.2997	-0.01083
150	6	2315	541.947	0.4645	60.1795	85.07	0.2997	-0.00325
151	6	2330	542.038	0.4648	60.1802	84.88	0.2997	0.00255
152	6	2345	541.949	0.4647	60.1793	85.11	0.2997	-0.00362
154	7	15	542.035	0.4643	60.1827	84.80	0.2997	0.01311
155	7	30	541.957	0.4656	60.1794	85.25	0.2997	-0.01309
156	7	45	542.041	0.4646	60.1794	84.84	0.2997	-0.00021
157	7	100	542.017	0.4649	60.1801	84.95	0.2997	0.00307
158	7	115	542.064	0.4649	60.1801	84.82	0.2997	0.00005
159	7	130	541.946	0.4650	60.1820	85.17	0.2997	0.00731
160	7	145	542.160	0.4647	60.1833	84.53	0.2996	0.00520
161	7	200	542.053	0.4650	60.1830	84.86	0.2997	-0.00090
162	7	215	541.969	0.4650	60.1830	85.09	0.2997	0.00002
163	7	230	542.086	0.4646	60.1829	84.72	0.2997	-0.00075
164	7	245	541.985	0.4646	60.1839	84.99	0.2997	0.00400
165	7	300	542.047	0.4646	60.1834	84.81	0.2997	-0.00175
166	7	315	541.981	0.4652	60.1838	85.10	0.2997	0.00172
167	7	330	541.953	0.4652	60.1838	85.19	0.2997	-0.00038
168	7	345	541.948	0.4646	60.1844	85.08	0.2997	0.00276
169	7	400	541.884	0.4642	60.1868	85.19	0.2998	0.00938
170	7	415	541.960	0.4641	60.1859	84.96	0.2997	-0.00357
171	7	430	542.031	0.4566	60.1934	83.40	0.2997	0.03009
172	7	445	542.000	0.4547	60.1968	83.14	0.2998	0.01344
173	7	500	542.035	0.4162	60.2353	76.02	0.3000	0.15392
174	7	515	541.926	0.4586	60.1934	84.04	0.2998	-0.16731
175	7	530	542.011	0.4616	60.1909	84.37	0.2997	-0.01022
176	7	545	541.849	0.4627	60.1903	85.01	0.2998	-0.00230
177	7	600	542.018	0.4624	60.1906	84.49	0.2997	0.00127
178	7	615	541.996	0.4623	60.1922	84.54	0.2998	0.00623
179	7	630	541.948	0.4625	60.1940	84.70	0.2998	0.00732
180	7	645	542.035	0.4619	60.1946	84.36	0.2997	0.00223

********** MASS LOSS **********

DATE - 06-19-1990 TIME - 12:15:05

REC NUM	TIME DELTA (HOURS)	CONT AIR MASS	MASS LOSS INCR	MASS LOSS (1 HR)	MASS LOSS (x 24)
132	0.00	77903.914	0.000	0.000	0.000
133	0.25	77908.719	4.805	0.000	0.000
134	0.50	77903.938	-4.781	0.000	0.000
135	0.75	77914.172	10.234	0.000	0.000
136	1.00	77910.234	-3.938	-6.320	-151.688
137	1.25	77906.789	-3.445	1.930	46.313
138	1.50	77930.867	24.078	-26.930	-646.313
139	1.75	77903.672	-27.195	10.500	252.000
140	2.00	77900.680	-2.992	9.555	229.313
141	2.25	77906.828	6.148	-0.039	-0.938
142	2.50	77904.289	-2.539	26.578	637.875
143	2.75	77912.461	8.172	-8.789	-210.938
144	3.00	77900.313	-12.148	0.367	8.813
145	3.25	77912.453	12.141	-5.625	-135.000
146	3.50	77891.438	-21.016	12.852	308.438
147	3.75	77896.078	4.641	16.383	393.188
148	4.00	77898.336	2.258	1.977	47.438
149	4.25	77903.406	5.070	9.047	217.125
150	4.50	77913.578	10.172	-22.141	-531.375
151	4.75	77901.266	-12.313	-5.188	-124.500
152	5.00	77912.914	11.648	-14.578	-349.875
153	5.25	77901.234	-11.680	2.172	52.125
154	5.50	77905.070	3.836	8.508	204.188
155	5.75	77912.016	6.945	-10.750	-258.000
156	6.00	77899.813	-12.203	13.102	314.438
157	6.25	77904.258	4.445	-3.023	-72.563
158	6.50	77897.523	-6.734	7.547	181.125
159	6.75	77916.898	19.375	-4.883	-117.188
160	7.00	77887.797	-29.102	12.016	288.375
161	7.25	77902.844	15.047	1.414	33.938
162	7.50	77914.922	12.078	-17.398	-417.563
163	7.75	77897.852	-17.070	19.047	457.125
164	8.00	77913.680	15.828	-25.883	-621.188
165	8.25	77904.297	-9.383	-1.453	-34.875
166	8.50	77914.242	9.945	0.680	16.313
167	8.75	77918.227	3.984	-20.375	-489.000
168	9.00	77919.789	1.563	-6.109	-146.625
169	9.25	77932.094	12.305	-27.797	-667.125
170	9.50	77919.969	-12.125	-5.727	-137.438
171	9.75	77919.523	-0.445	-1.297	-31.125
172	10.00	77928.250	8.727	-8.461	-203.063
173	10.25	77973.047	44.797	-40.953	-982.875
174	10.50	77934.664	-38.383	-14.695	-352.688
175	10.75	77919.039	-15.625	0.484	11.625
176	11.00	77941.633	22.594	-13.383	-321.188
177	11.25	77917.672	-23.961	55.375	1329.000
178	11.50	77922.859	5.188	11.805	283.313
179	11.75	77932.195	9.336	-13.156	-315.750
180	12.00	77920.375	-11.820	21.258	510.188

APPENDIX D

TYPE A CALCULATIONS

Mass Point Analysis
Total Time Analysis

********** MASS POINT **********

DATE - 06-19-1990

TIME - 12:15:52

TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	CONT AIR MASS	LSF LEAK RATE	UPPER CONF LEVEL
1845	542.067	0.4636	77.278	60.185	77903.91	0.00000	0.00000
1900	542.025	0.4636	77.278	60.184	77908.72	0.00000	0.00000
1915	542.063	0.4640	77.307	60.185	77903.94	-0.00144	0.00000
1930	541.986	0.4637	77.282	60.184	77914.17	-0.32030	0.38305
1945	542.003	0.4639	77.295	60.183	77910.23	-0.22297	0.12790
2000	542.000	0.4639	77.298	60.180	77906.79	-0.10265	0.15264
2015	541.877	0.4640	77.301	60.185	77930.87	-0.36660	-0.01531
2030	542.019	0.4642	77.315	60.180	77903.67	-0.16674	0.17092
2045	542.043	0.4638	77.291	60.180	77900.68	-0.03778	0.25363
2100	541.989	0.4646	77.341	60.179	77906.83	-0.01140	0.21852
2115	542.012	0.4634	77.268	60.180	77904.29	0.01773	0.20534
2130	541.963	0.4646	77.345	60.180	77912.46	-0.00487	0.15127
2145	542.041	0.4643	77.326	60.180	77900.31	0.03097	0.16691
2200	541.957	0.4642	77.320	60.180	77912.45	0.00988	0.12743
2215	542.115	0.4640	77.304	60.181	77891.44	0.06066	0.17436
2230	542.074	0.4639	77.301	60.180	77896.08	0.08069	0.18165
2245	542.085	0.4640	77.301	60.183	77898.34	0.08739	0.17627
2300	542.025	0.4647	77.348	60.180	77903.41	0.07960	0.15864
2315	541.947	0.4645	77.335	60.180	77913.58	0.05298	0.12833
2330	542.038	0.4648	77.359	60.180	77901.27	0.05451	0.12210
2345	541.949	0.4647	77.353	60.179	77912.91	0.03628	0.09991
0	542.032	0.4651	77.376	60.179	77901.23	0.03923	0.09699
15	542.035	0.4643	77.325	60.183	77905.07	0.03591	0.08862
30	541.957	0.4656	77.408	60.179	77912.02	0.02444	0.07397
45	542.041	0.4646	77.347	60.179	77899.81	0.02916	0.07487
100	542.017	0.4649	77.362	60.180	77904.26	0.02795	0.07008
115	542.064	0.4649	77.361	60.180	77897.52	0.03335	0.07265
130	541.946	0.4650	77.372	60.182	77916.90	0.01978	0.05859
145	542.160	0.4647	77.353	60.183	77887.80	0.03343	0.07192
200	542.053	0.4650	77.367	60.183	77902.84	0.03234	0.06824
215	541.969	0.4650	77.367	60.183	77914.92	0.02226	0.05723
230	542.086	0.4646	77.347	60.183	77897.85	0.02578	0.05870
245	541.985	0.4646	77.347	60.184	77913.68	0.01812	0.04992
300	542.047	0.4646	77.343	60.183	77904.30	0.01748	0.04738
315	541.981	0.4652	77.380	60.184	77914.24	0.01103	0.03989
330	541.953	0.4652	77.386	60.184	77918.23	0.00333	0.03158
345	541.948	0.4646	77.341	60.184	77919.79	-0.00403	0.02362
400	541.884	0.4642	77.319	60.187	77932.09	-0.01640	0.01242
415	541.960	0.4641	77.311	60.186	77919.97	-0.02116	0.00655
430	542.031	0.4566	76.818	60.193	77919.52	-0.02495	0.00161
445	542.000	0.4547	76.695	60.197	77928.25	-0.03188	-0.00575
500	542.035	0.4162	74.043	60.235	77973.05	-0.05611	-0.02185
515	541.926	0.4586	76.949	60.193	77934.66	-0.06192	-0.02880
530	542.011	0.4616	77.150	60.191	77919.04	-0.06096	-0.02934
545	541.849	0.4627	77.220	60.190	77941.63	-0.06801	-0.03705
600	542.018	0.4624	77.199	60.191	77917.67	-0.06580	-0.03612
615	541.996	0.4623	77.196	60.192	77922.86	-0.06538	-0.03698
630	541.948	0.4625	77.207	60.194	77932.20	-0.06779	-0.04048
645	542.035	0.4619	77.170	60.195	77920.38	-0.06617	-0.03995

MAX ALLOWABLE LEAK RATE : .5

EPRI EQUATION #6 IS SATISFIED.
EPRI EQUATION #7 IS SATISFIED

********** TOTAL TIME CALCULATION RESULTS **********

DATE - 06-19-1990 TIME - 12:15:33

TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	LSF LEAK RATE	UPPER CONF LEVEL	MEASURED LEAK RATE
1845	542.067	0.4636	77.278	60.185	0.0000	0.00000	0.00000
1900	542.025	0.4636	77.278	60.184	0.0000	0.00000	-0.59174
1915	542.063	0.4640	77.307	60.185	-0.0014	0.00000	-0.00139
1930	541.986	0.4637	77.282	60.184	-0.2529	4.06250	-0.42125
1945	542.003	0.4639	77.295	60.183	-0.1865	1.27920	-0.19464
2000	542.000	0.4639	77.298	60.180	-0.0863	0.83952	-0.07082
2015	541.877	0.4640	77.301	60.185	-0.2906	0.75496	-0.55355
2030	542.019	0.4642	77.315	60.180	-0.1505	0.70452	0.00423
2045	542.043	0.4638	77.291	60.180	-0.0455	0.68875	0.04989
2100	541.989	0.4646	77.341	60.179	-0.0119	0.63119	-0.03993
2115	542.012	0.4634	77.268	60.180	0.0217	0.60284	-0.00464
2130	541.963	0.4646	77.345	60.180	0.0153	0.56808	-0.09569
2145	542.041	0.4643	77.326	60.180	0.0485	0.55307	0.03703
2200	541.957	0.4642	77.320	60.180	0.0400	0.53184	-0.08095
2215	542.115	0.4640	77.304	60.181	0.0816	0.53775	0.10986
2230	542.074	0.4639	77.301	60.180	0.1024	0.53565	0.06441
2245	542.085	0.4640	77.301	60.183	0.1133	0.53035	0.04300
2300	542.025	0.4647	77.348	60.180	0.1129	0.52148	0.00370
2315	541.947	0.4645	77.335	60.180	0.0977	0.50984	-0.06613
2330	542.038	0.4648	77.359	60.180	0.1008	0.49267	0.01718
2345	541.949	0.4647	77.353	60.179	0.0894	0.48224	-0.05544
0	542.032	0.4651	77.376	60.179	0.0921	0.46878	0.01575
15	542.035	0.4643	77.325	60.183	0.0902	0.46009	-0.00646
30	541.957	0.4656	77.408	60.179	0.0823	0.44944	-0.04341
45	542.041	0.4646	77.347	60.179	0.0853	0.43986	0.02105
100	542.017	0.4649	77.362	60.180	0.0842	0.43291	-0.00168
115	542.064	0.4649	77.361	60.180	0.0877	0.42737	0.03029
130	541.946	0.4650	77.372	60.182	0.0779	0.42009	-0.05927
145	542.160	0.4647	77.353	60.183	0.0868	0.41591	0.07094
200	542.053	0.4650	77.367	60.183	0.0858	0.41134	0.00455
215	541.969	0.4650	77.367	60.183	0.0784	0.40386	-0.04521
230	542.086	0.4646	77.347	60.183	0.0803	0.39678	0.02410
245	541.985	0.4646	77.347	60.184	0.0744	0.39050	-0.03761
300	542.047	0.4646	77.343	60.183	0.0732	0.38310	-0.00143
315	541.981	0.4652	77.380	60.184	0.0679	0.37639	-0.03743
330	541.953	0.4652	77.386	60.184	0.0617	0.36820	-0.05039
345	541.948	0.4646	77.341	60.184	0.0555	0.35963	-0.05433
400	541.884	0.4642	77.319	60.187	0.0457	0.35104	-0.09385
415	541.960	0.4641	77.311	60.186	0.0409	0.34110	-0.05205
430	542.031	0.4566	76.818	60.193	0.0368	0.33370	-0.04933
445	542.000	0.4547	76.695	60.197	0.0305	0.32609	-0.07496
500	542.035	0.4162	74.043	60.235	0.0121	0.32073	-0.20778
515	541.926	0.4586	76.949	60.193	0.0060	0.30487	-0.09021
530	542.011	0.4616	77.150	60.191	0.0046	0.29844	-0.04334
545	541.849	0.4627	77.220	60.190	-0.0022	0.29126	-0.10563
600	542.018	0.4624	77.199	60.191	-0.0027	0.28543	-0.03766
615	541.996	0.4623	77.196	60.192	-0.0043	0.28070	-0.05075
630	541.948	0.4625	77.207	60.194	-0.0077	0.27490	-0.07416
645	542.035	0.4619	77.170	60.195	-0.0084	0.27045	-0.04225

MEASURED LEAK RATE USING TOTAL TIME: -0.008380

THE MEAN TOTAL TIME RATE OF -0.050326
IS LESS THAN ALLOWABLE MAXIMUM RATE OF .5

APPENDIX E

VERIFICATION TEST CALCULATIONS

Total Time Analysis
Mass Point Analysis

********** TOTAL TIME WITH VERIFICATION TEST **********

DATE - 06-20-1990 TIME - 10:21:45

TIME	MASS	TOTAL TIME GROSS LSF	TOTAL TIME GROSS 95% UCL	SCFM	VERIFICATION NET LSF	VERIFICATION NET 95% UCL
815	77912	0.0000	0.0000	3.600	-0.5002	-0.5002
830	77926	0.3452	0.0000	3.595	-0.1542	-0.4994
845	77905	0.6159	12.5164	3.606	0.1148	12.0154
900	77916	0.3164	4.5118	3.600	-0.1837	4.0116
915	77896	0.4396	3.5923	3.599	-0.0605	3.0922
930	77905	0.3523	2.6868	3.617	-0.1503	2.1842
945	77904	0.2831	2.2296	3.611	-0.2187	1.7279
1000	77892	0.3010	2.0579	3.611	-0.2008	1.5561
1015	77882	0.3473	1.9682	3.617	-0.1554	1.4654
1030	77889	0.3275	1.7843	3.616	-0.1750	1.2818
1045	77879	0.3378	1.7036	3.622	-0.1656	1.2002
1100	77862	0.3865	1.7012	3.622	-0.1170	1.1977
1115	77872	0.3840	1.6058	3.621	-0.1194	1.1025
1130	77876	0.3648	1.5159	3.633	-0.1402	1.0109
1145	77866	0.3628	1.4639	3.622	-0.1407	0.9604
1201	77865	0.3534	1.4065	3.594	-0.1462	0.9069
1215	77857	0.3583	1.3722	3.594	-0.1414	0.8725
1230	77856	0.3564	1.3328	3.594	-0.1433	0.8331
1245	77859	0.3473	1.2876	3.595	-0.1527	0.7878
1301	77855	0.3380	1.2490	3.595	-0.1618	0.7492
1315	77845	0.3414	1.2277	3.589	-0.1577	0.7287
1330	77836	0.3477	1.2134	3.594	-0.1521	0.7136
1345	77830	0.3551	1.2010	3.589	-0.1440	0.7019
1401	77825	0.3610	1.1887	3.589	-0.1382	0.6895
1415	77812	0.3754	1.1887	3.546	-0.1179	0.6954
1430	77817	0.3805	1.1745	3.546	-0.1127	0.6813

LEAK RATE < MAX AND > MIN ALLOWED

(Lo + Lam - .25 La) <= Lc <= (Lo + Lam + .25 La)

0.3599 <= 0.3805 <= 0.6099

********** MASS POINT WITH VERIFICATION TEST **********

DATE - 06-19-1990 TIME - 12:20:36

		MASS POINT			VERIFICATION	
		GROSS	GROSS		NET	NET
TIME	MASS	LSF	95% UCL	SCFM	LSF	95 UCL
800	77931.3	0.0000	0.0000	3.584	-0.4978	-0.4978
815	77911.8	0.0000	0.0000	3.600	-0.5002	-0.5002
830	77925.6	0.3450	0.0000	3.595	-0.1543	-0.4994
845	77904.9	0.8015	2.5422	3.606	0.3005	2.0411
900	77916.0	0.4605	1.3888	3.600	-0.0396	0.8887
915	77896.4	0.6416	1.2352	3.599	0.1415	0.7351
930	77904.9	0.5257	0.9448	3.617	0.0232	0.4422
945	77904.1	0.4421	0.7576	3.611	-0.0597	0.2558
1000	77891.9	0.4732	0.7139	3.611	-0.0286	0.2121
1015	77881.5	0.5331	0.7322	3.617	0.0304	0.2295
1030	77889.2	0.4986	0.6630	3.616	-0.0040	0.1604
1045	77879.1	0.5072	0.6428	3.622	0.0038	0.1394
1100	77861.8	0.5663	0.6953	3.622	0.0628	0.1918
1115	77871.9	0.5516	0.6623	3.621	0.0483	0.1590
1130	77875.7	0.5165	0.6183	3.633	0.0115	0.1133
1145	77865.9	0.5082	0.5972	3.622	0.0047	0.0936
1201	77865.3	0.4934	0.5728	3.594	-0.0062	0.0731
1215	77857.2	0.4925	0.5627	3.594	-0.0072	0.0631
1230	77855.9	0.4865	0.5494	3.594	-0.0132	0.0497
1245	77858.6	0.4705	0.5292	3.595	-0.0293	0.0294
1301	77854.8	0.4582	0.5124	3.595	-0.0417	0.0126
1315	77844.9	0.4584	0.5076	3.589	-0.0407	0.0086
1330	77835.7	0.4659	0.5113	3.594	-0.0340	0.0115
1345	77838.8	0.4742	0.5166	3.589	-0.0249	0.0175
1401	77824.7	0.4819	0.5215	3.589	-0.0173	0.0223
1415	77812.3	0.4971	0.5366	3.546	0.0038	0.0433
1430	77816.8	0.5008	0.5375	3.546	0.0075	0.0442

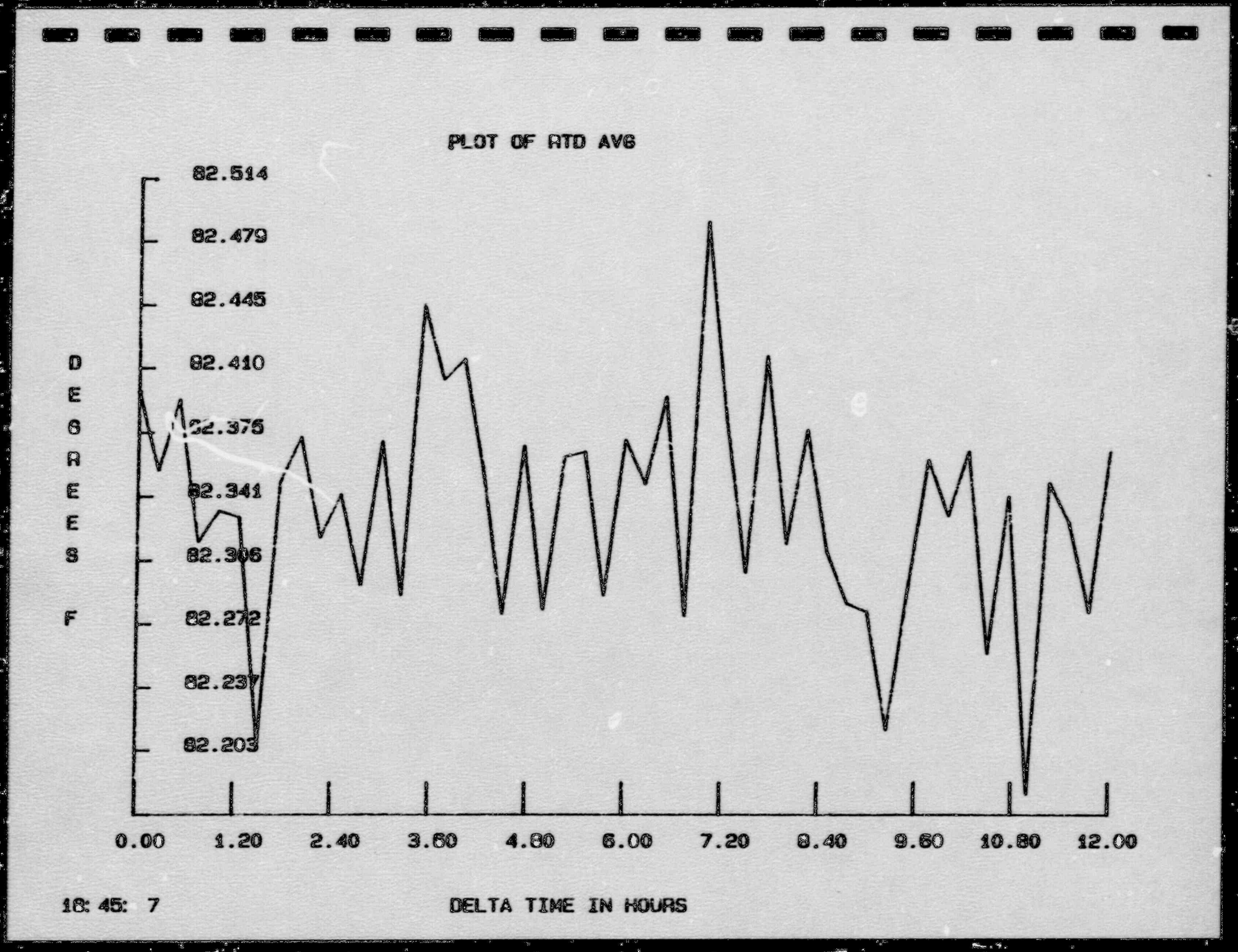
(Lo + Lam - .25 La) <= Lc <= (Lo + Lam + .25 La)

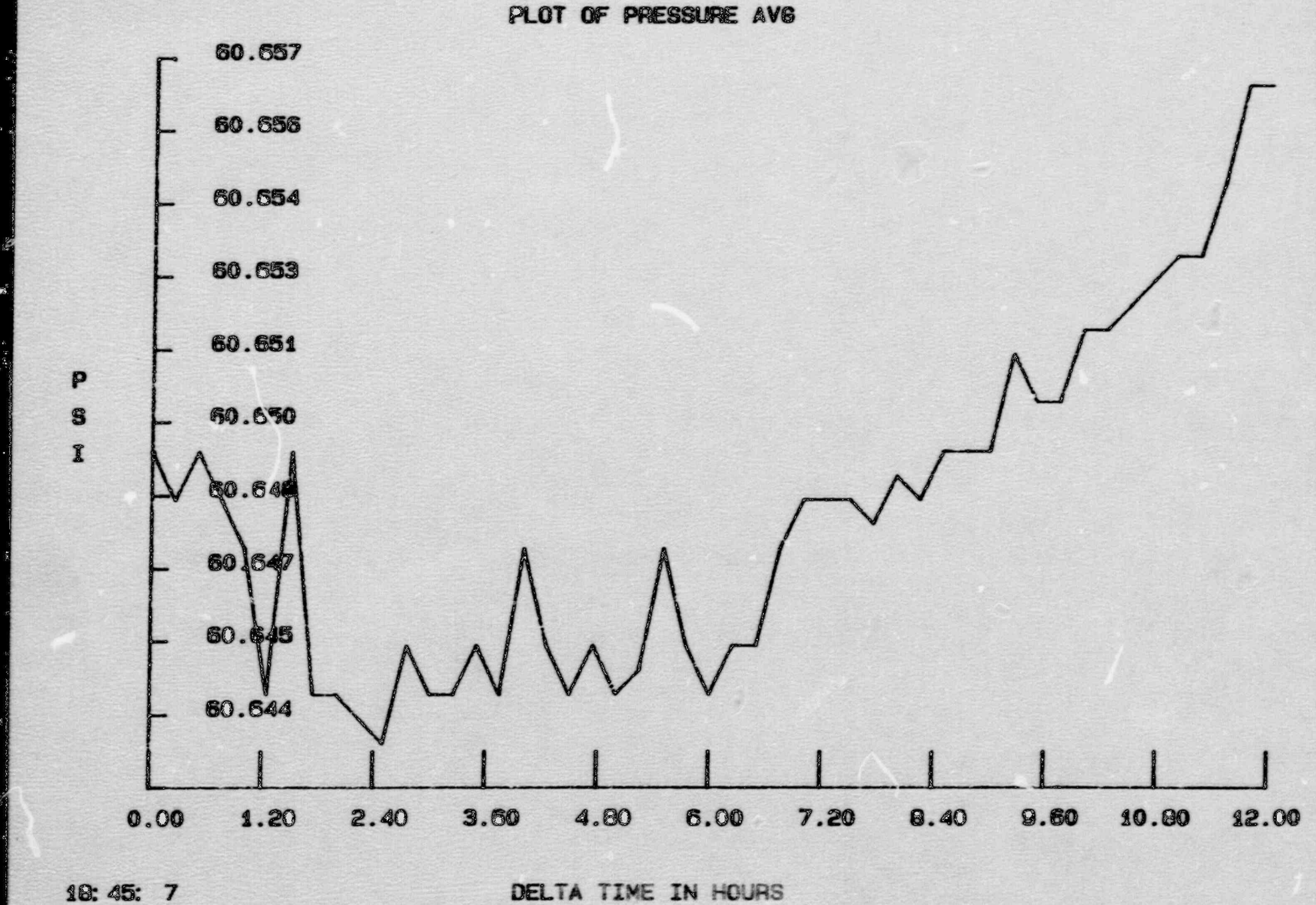
0.3021 <= 0.5008 <= 0.5521

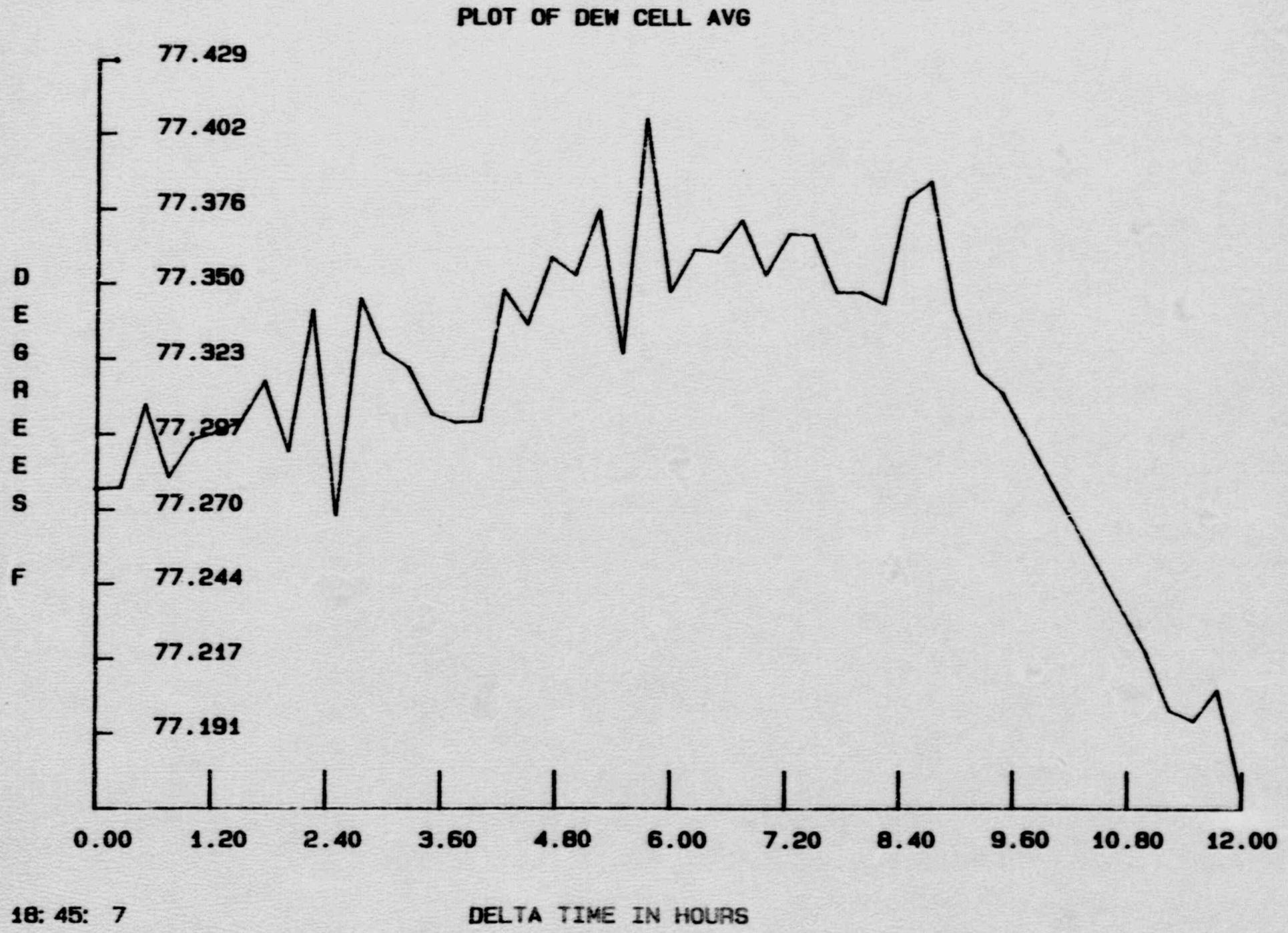
APPENDIX F

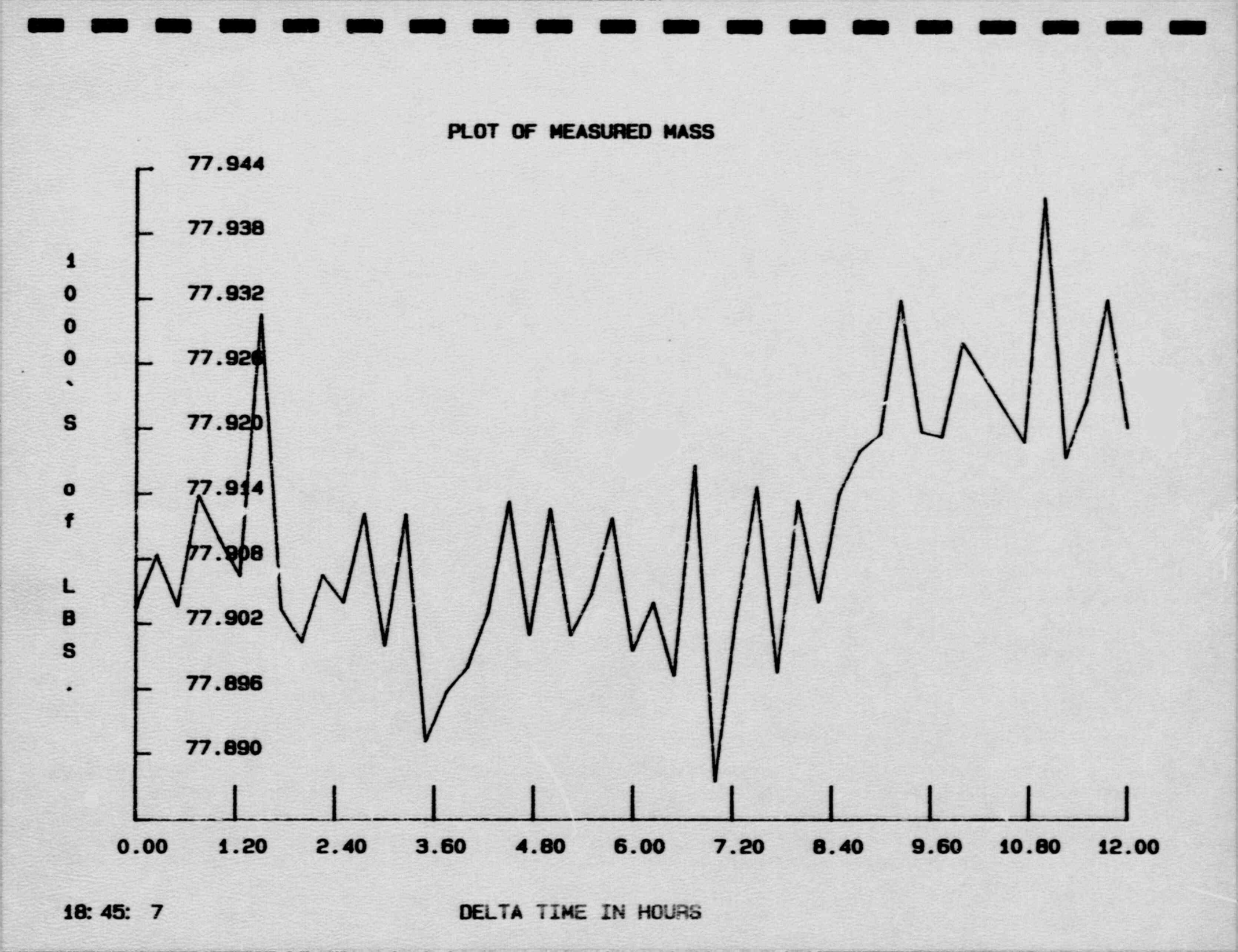
TYPE A PLOTS

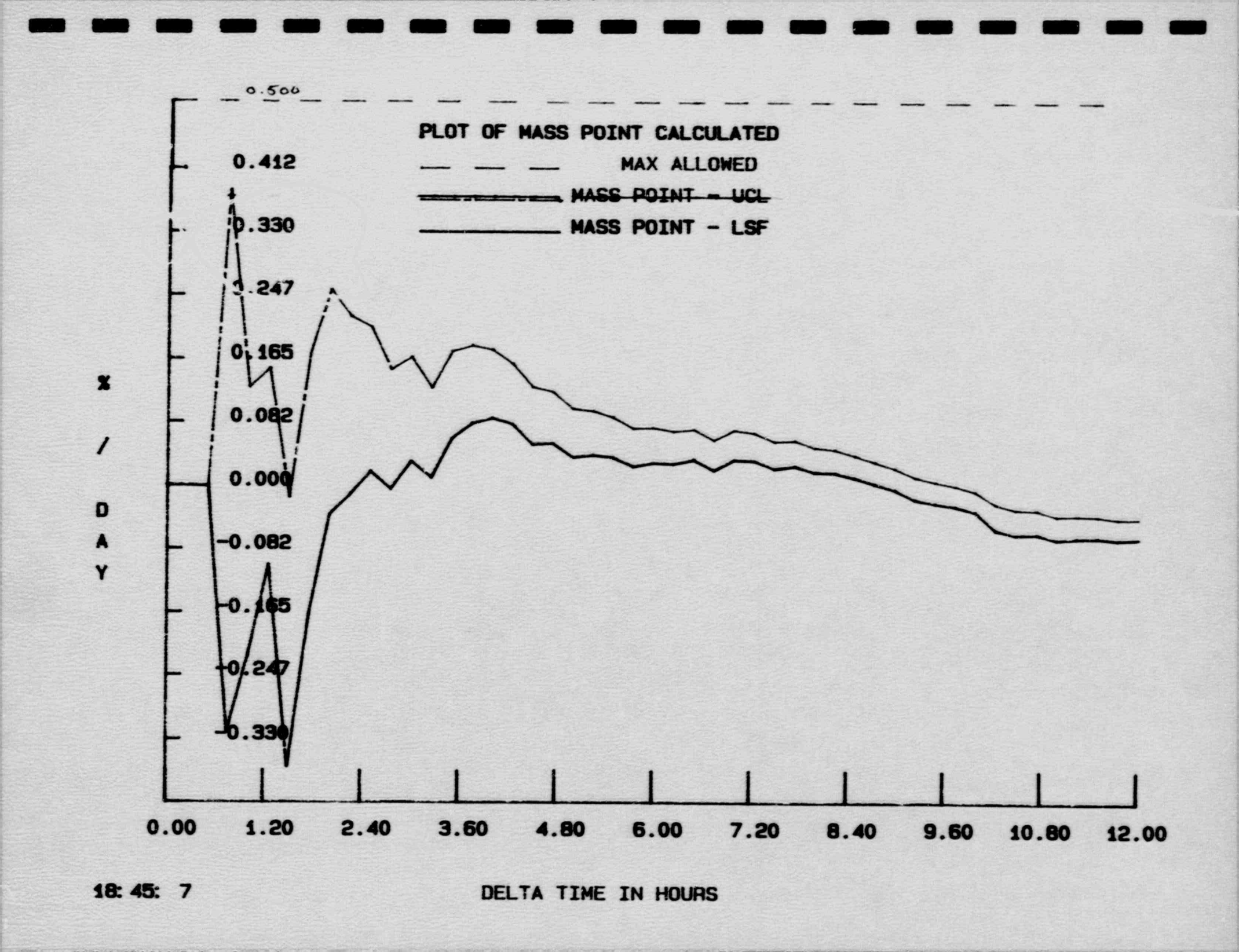
Average Temperature vs Time
Average Pressure vs Time
Average Dew Point vs Time
Containment Mass vs Time
Mass Point Leakage Rate vs Time
Total Time Leakage Rate vs Time

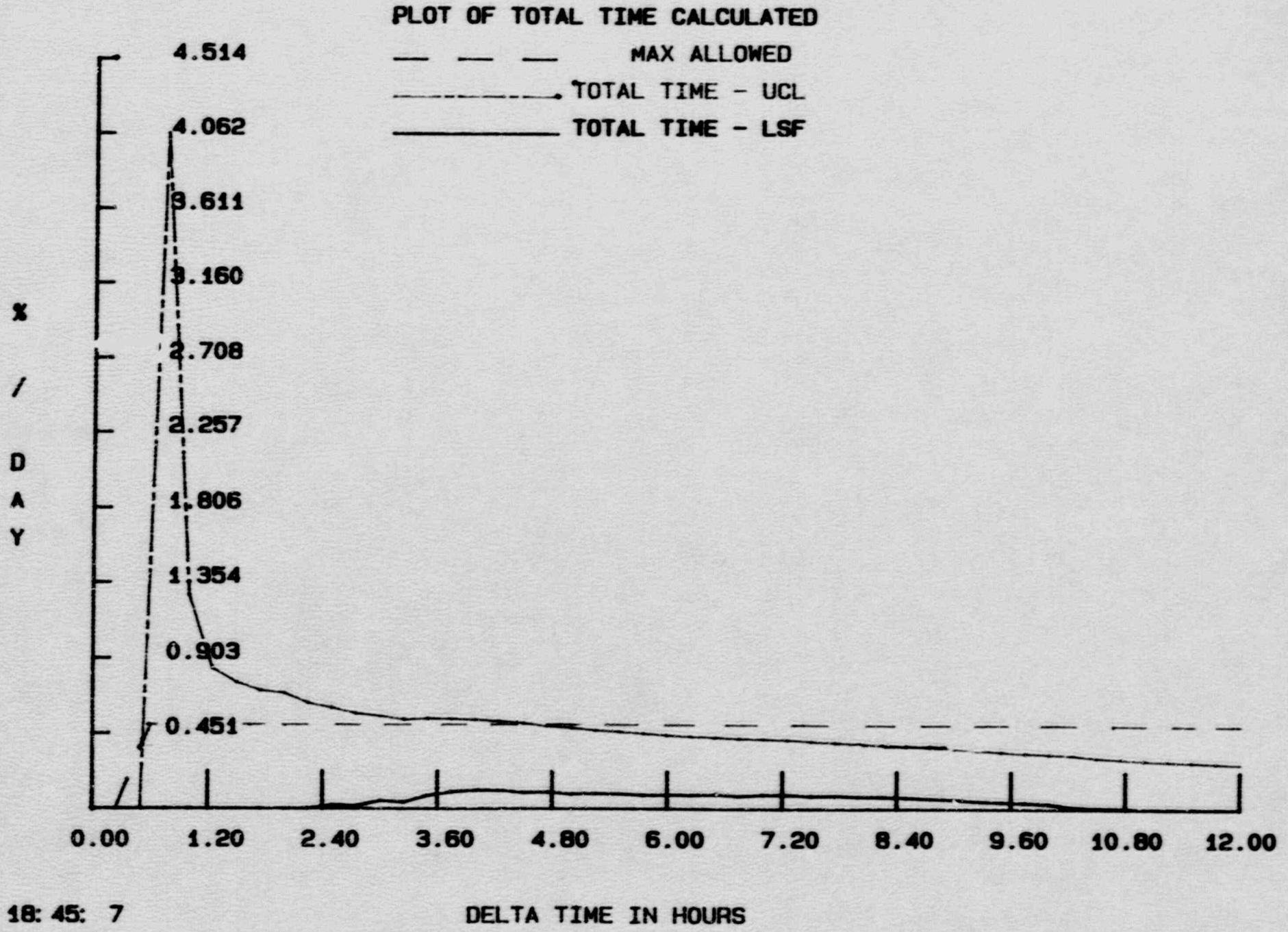

PLOT OF RTD AVG
82.514
82.479
82.445
82.410
82.375
82.341
82.306
82.272
82.237
82.203
DEGREES F
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
18: 45: 7
DELTA TIME IN HOURS


PLOT OF PRESSURE AVG
60.657
60.656
60.654
60.653
60.651
P
S
I
60.647
60.645
60.644
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
18: 45: 7
DELTA TIME IN HOURS


PLOT OF DEW CELL AVG
77.429
77.402
77.376
77.350
77.323
77.297
77.270
77.244
77.217
77.191
D
E
G
R
E
E
S
F
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
18: 45: 7
DELTA TIME IN HOURS


PLOT OF MEASURED MASS
77.944
77.938
77.932
77.926
77.920
77.914
77.908
77.902
77.896
77.890
1000's of LBS.
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
18: 45: 7
DELTA TIME IN HOURS

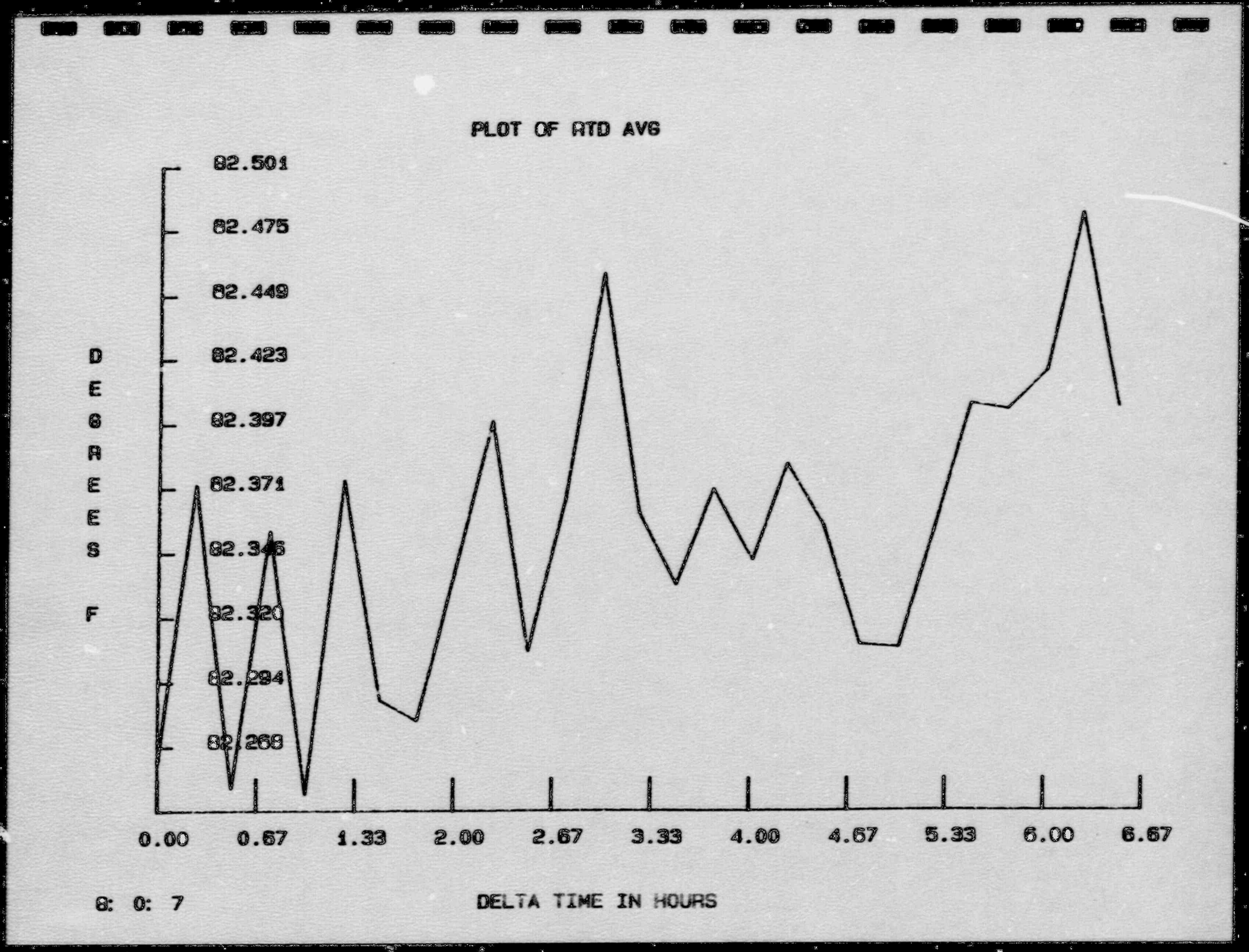

PLOT OF MASS POINT CALCULATED
MAX ALLOWED
MASS POINT - UCL
MASS POINT - LSF
0.500
0.412
0.330
0.247
0.165
0.082
0.000
-0.082
-0.165
-0.247
-0.330
X / DAY
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
DELTA TIME IN HOURS
18: 45: 7

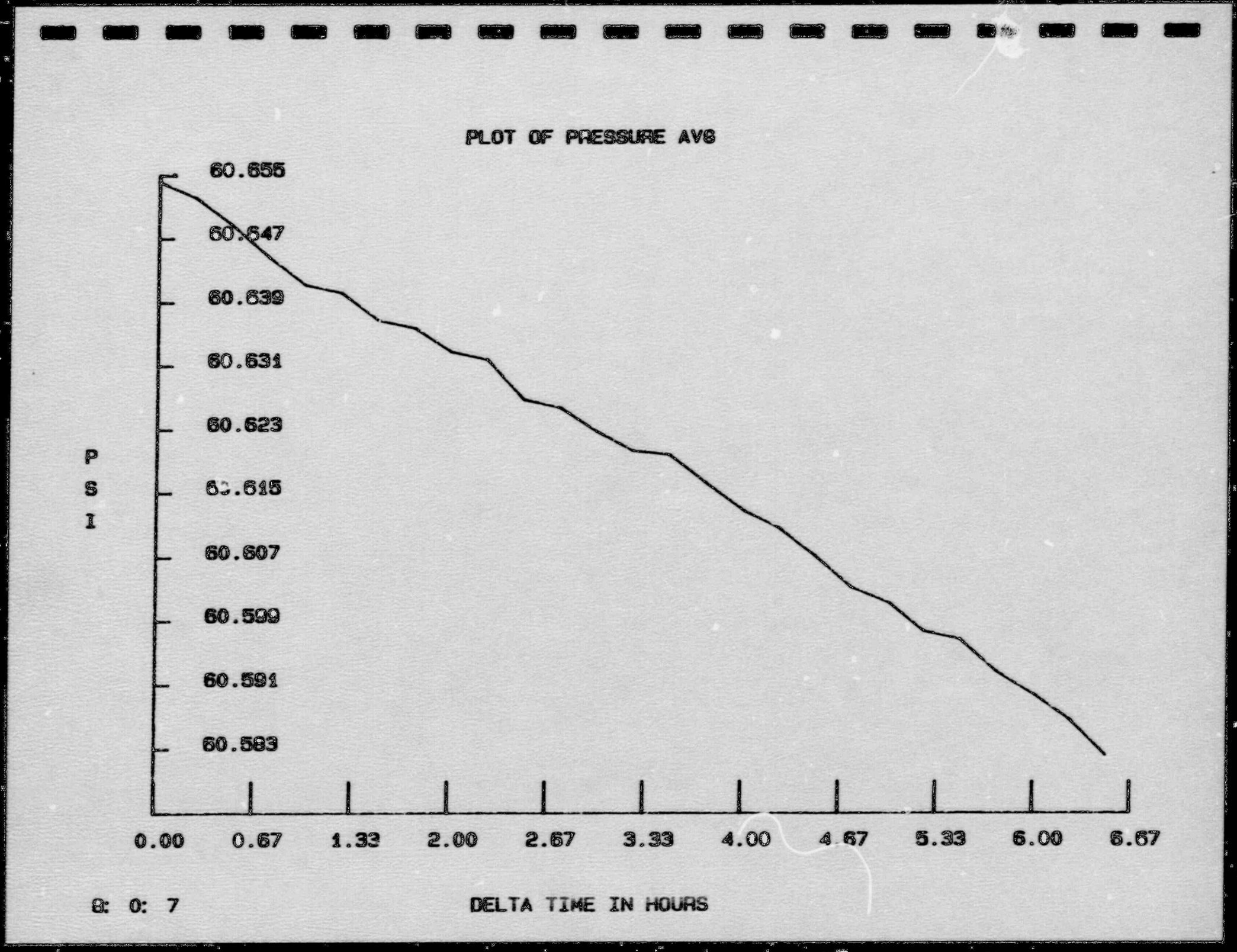

PLOT OF TOTAL TIME CALCULATED
MAX ALLOWED
TOTAL TIME - UCL
TOTAL TIME - LSF
4.514
4.062
3.611
3.160
2.708
2.257
1.806
1.354
0.903
0.451
% / DAY
0.00
1.20
2.40
3.60
4.80
6.00
7.20
8.40
9.60
10.80
12.00
18: 45: 7
DELTA TIME IN HOURS

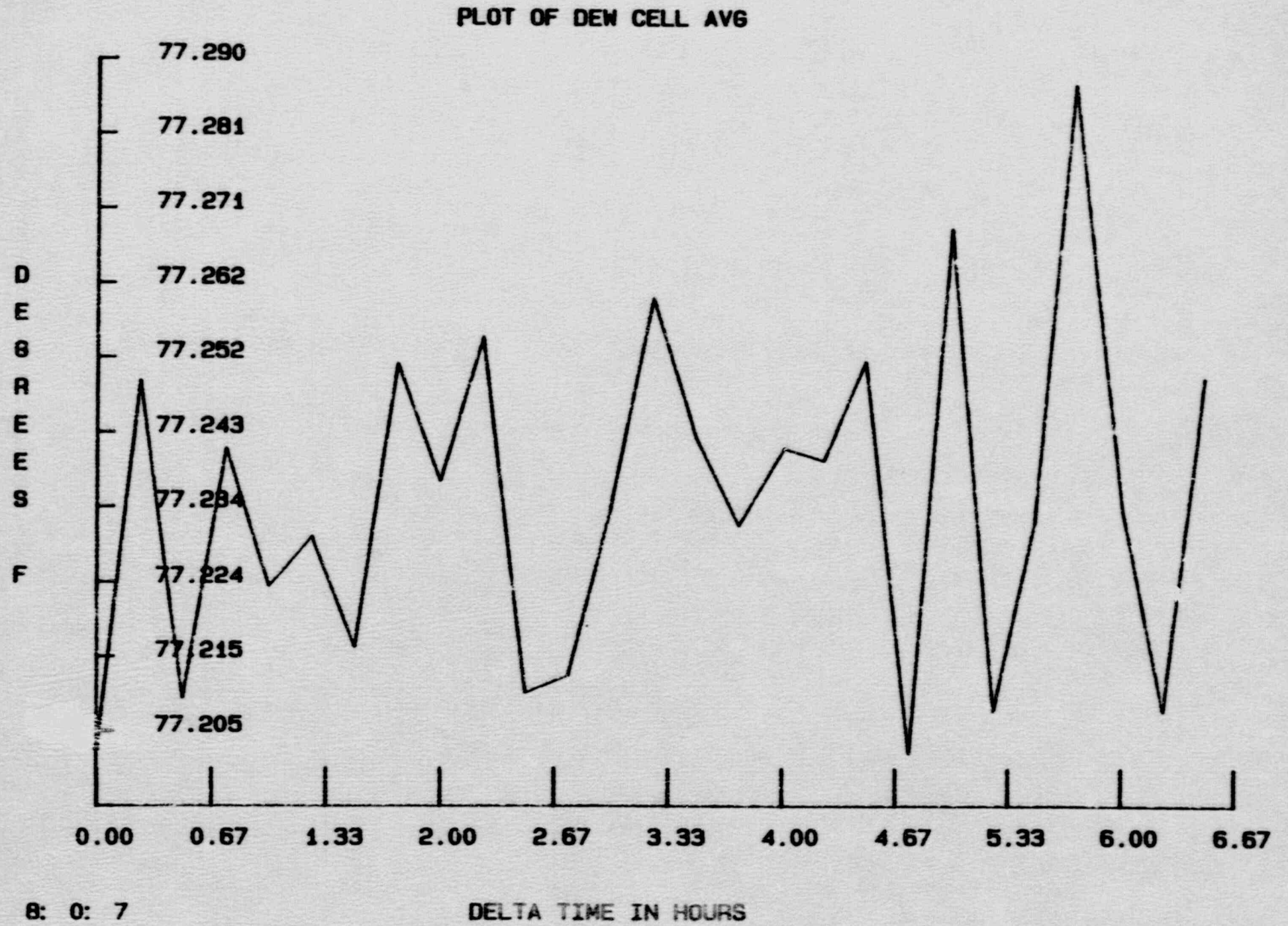
APPENDIX G

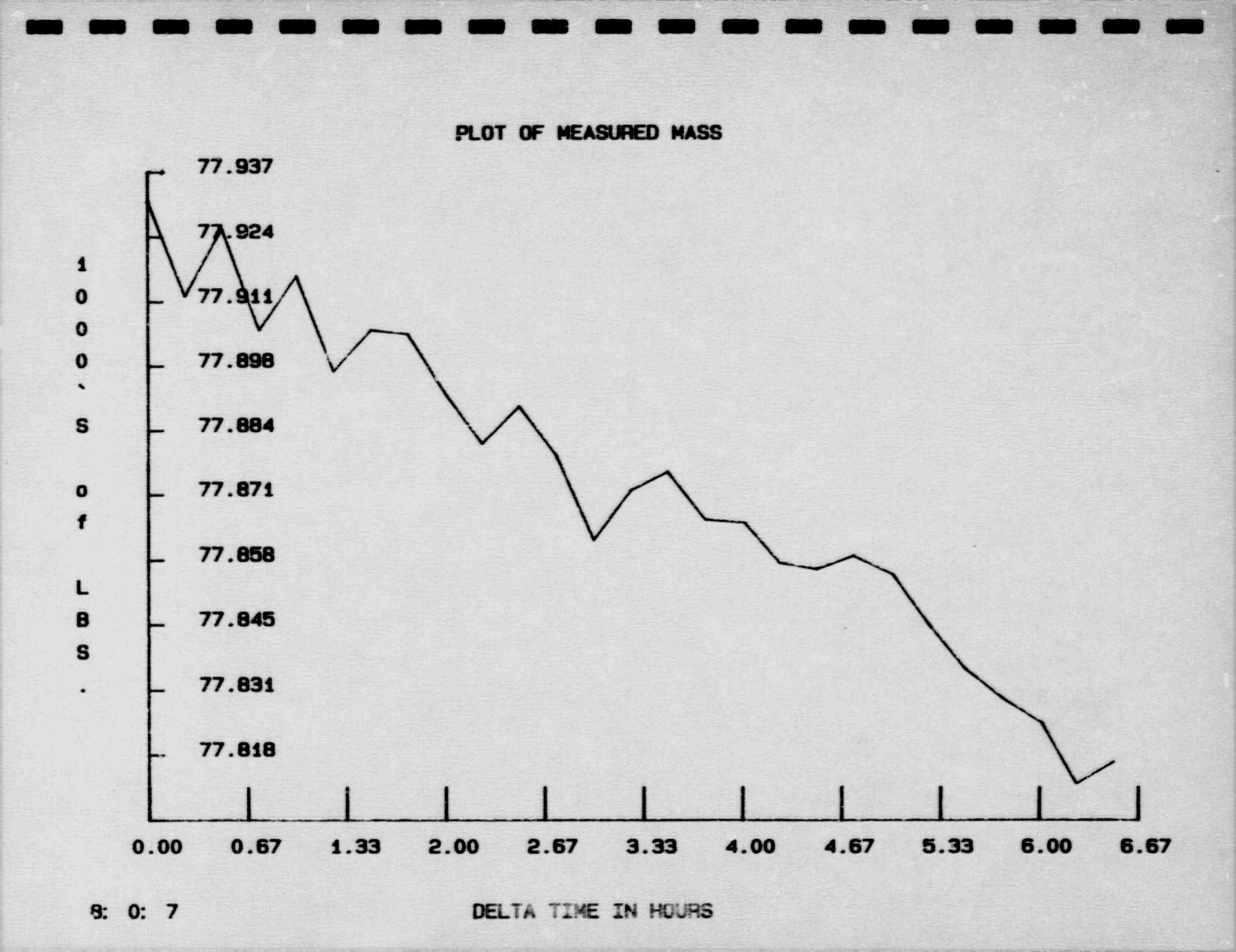
VERIFICATION TEST PLOTS

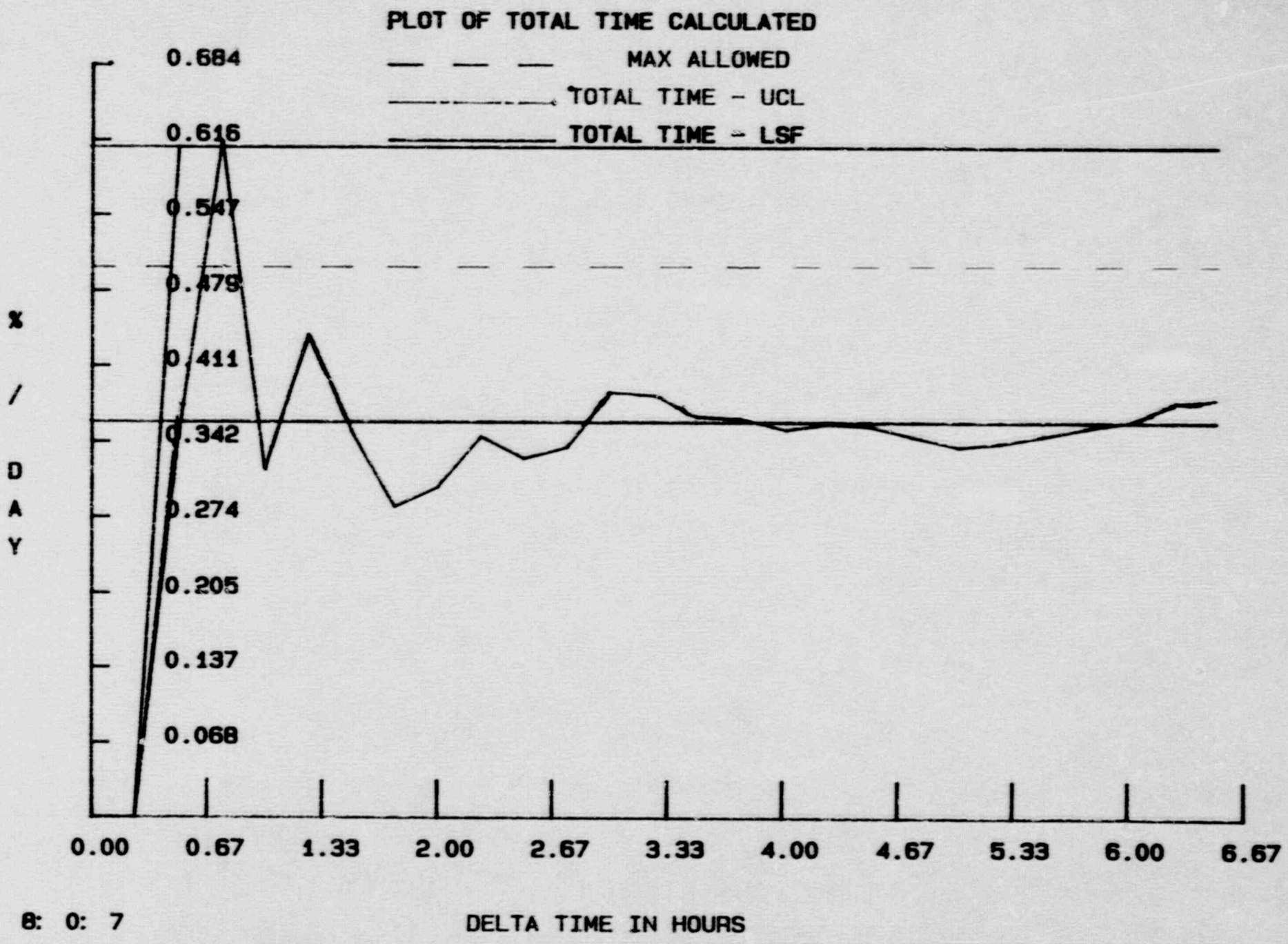
Average Temperature vs Time
Average Pressure vs Time
Average Dew Point vs Time
Containment Mass vs Time
Mass Point Leakage Rate vs Time
Total Time Leakage Rate Vs Time

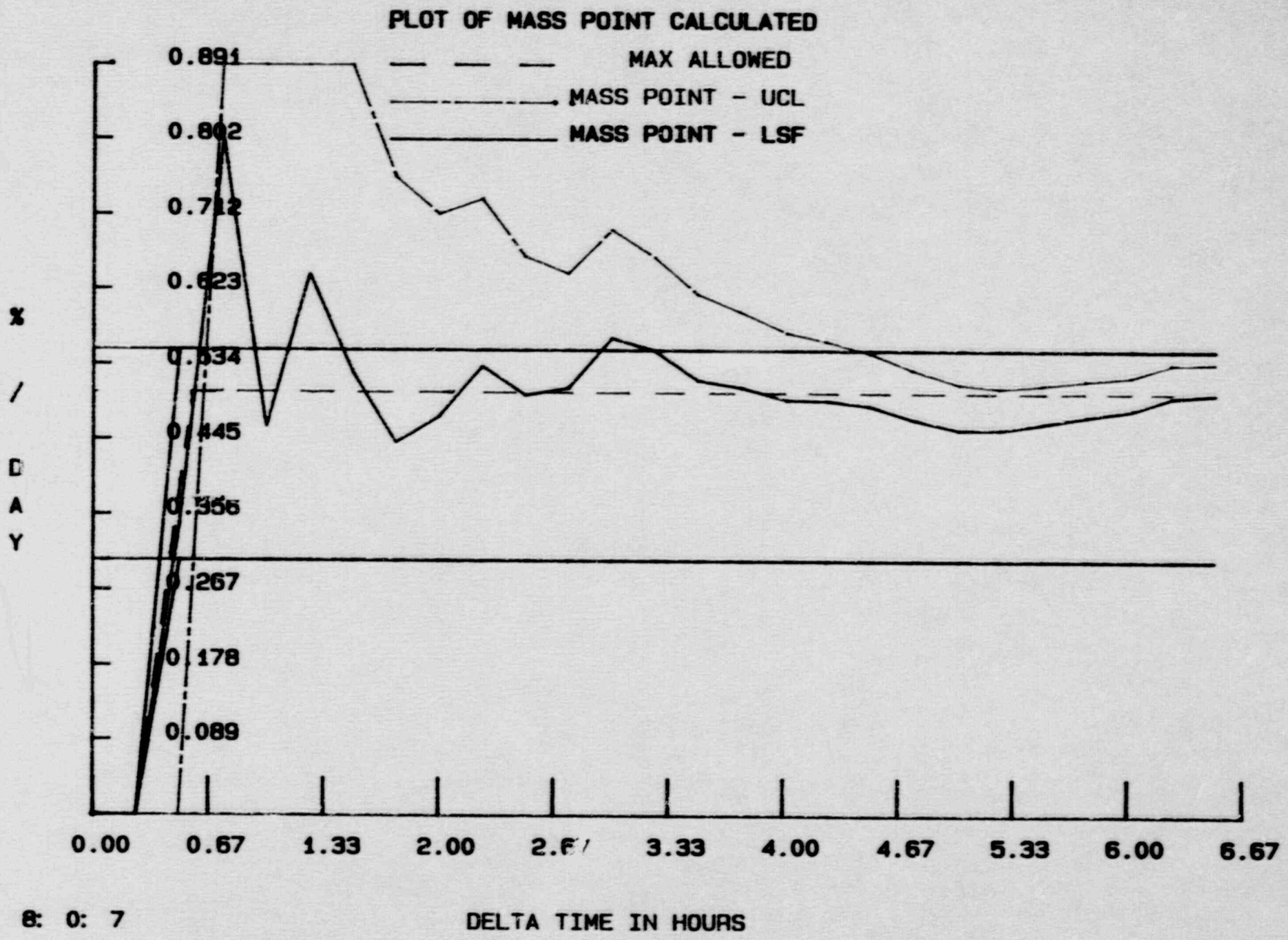

PLOT OF RTD AVG
82.501
82.475
82.449
82.423
82.397
82.371
82.346
82.320
82.294
82.268
DEGREES F
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
8: 0: 7
DELTA TIME IN HOURS


PLOT OF PRESSURE AVG
60.655
60.647
60.639
60.631
60.623
60.615
60.607
60.599
60.591
60.583
P
S
I
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
DELTA TIME IN HOURS


PLOT OF DEW CELL AVG
77.290
77.281
77.271
77.262
77.252
77.243
77.234
77.224
77.215
77.205
DEGREES F
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
8: 0: 7
DELTA TIME IN HOURS


PLOT OF MEASURED MASS
77.937
77.924
77.911
77.898
77.884
77.871
77.858
77.845
77.831
77.818
1000's of LBS.
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
DELTA TIME IN HOURS
8: 0: 7


PLOT OF TOTAL TIME CALCULATED
MAX ALLOWED
TOTAL TIME - UCL
TOTAL TIME - LSF
0.684
0.616
0.547
0.479
0.411
0.342
0.274
0.205
0.137
0.068
X / DAY
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
8: 0: 7
DELTA TIME IN HOURS


PLOT OF MASS POINT CALCULATED
MAX ALLOWED
MASS POINT - UCL
MASS POINT - LSF
0.891
0.802
0.712
0.623
0.534
0.445
0.356
0.267
0.178
0.089
X / DAY
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
6.67
DELTA TIME IN HOURS

8: 0: 7