PEACH BOTTOM ATOMIC POWER STATION
UNIT 2

REACTOR CONTAINMENT BUILDING
INTEGRATED LEAK RATE TEST

JANUARY 1989

PHILADELPHIA ELECTRIC COMPANY

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1.0 SYNOPSIS

The Peach Bottom Atomic Power Station Unit No. 2 reactor containment building was subjected to a periodic integrated leak rate test during the period of January 2 to January 4, 1989. The purpose of this test was to demonstrate the acceptability of the building leakage rate at an internal pressure of 49.1 psig (P_a). Testing was performed in accordance with the requirements of 10CFR50 Appendix J, ANSI N45.4-1972, and Peach Bottom Atomic Power Station Unit No. 2 Technical Specifications.

The Mass Point method of analysis resulted in a measured leakage rate of 0.208% by weight per day at 49.1 psig. The leakage rate at the upper bound of the 95% confidence interval was 0.215% by weight per day. A correction factor of 0.018% by weight per day for 9 penetrations which were not vented for the test, sump level changes, and HCU accumulator in leakage must be added to the test results. Therefore, the leakage rate at the upper bound of the 95% confidence interval is 0.233% by weight per day which is well below the allowable leakage rate of 0.375% by weight per day (0.75 L_a).

Using the minimum pathway leakage analysis to determine the leakage savings indicates an additional 0.135% by weight per day needs to be added to the "as left" reactor containment integrated leakage rate. Therefore the "as found" containment integrated leakage rate is 0.368% by weight per day which is below the allowable leakage rate of 0.375% by weight per day.

The supplemental instrumentation verification test at P_a demonstrated an agreement between measured reactor containment building integrated leakage rates of 18.4% of L_a, using the Mass Point method which is within the 25% of L_a requirement of 10CFR50, Appendix J, Section III A.3.b.

Testing was performed by Philadelphia Electric Company with the technical assistance of United Energy Services Corporation. Procedural and calculational methods were witnessed by Nuclear Regulatory Commission personnel.

2.0 INTRODUCTION

The objective of the integrated leak rate test was the establishment of the degree of overall leak tightness of the reactor containment building at the calculated design basis accident pressure of 49.1 psig. The allowable leakage is defined by the design basis accident applied in the safety analysis in accordance with site exposure guidelines specified by 10CFR100. For Peach Bottom Atomic Power Station Unit No. 2, the maximum allowable integrated leak rate at the design basis accident pressure of 49.1 psig (P_a) is 0.5% by weight per day (L_a).

Testing was performed in accordance with the procedural requirements as stated in Peach Bottom Unit 2 Surveillance Test, Integrated Leak Rate Test ST 12.5. This procedure was reviewed by the Plant Operations Review Committee and approved by the Plant Manager prior to the commencement of the test.

Leakage rate testing was accomplished at the pressure level of 49.1 psig for a period of 24 hours. The 24 hour test period was followed by a 4 hour supplemental test for a verification of test accuracy.

3.0 GENERAL, TECHNICAL AND TEST DATA

3.1 GENERAL DATA

Owner:	Philadelphia Electric Company
Docket No.	50-277
Location:	Delta, Pennsylvania
Type:	Mark 1, BWR-4
Containment Description:	Steel lined, reinforced concrete, 'light bulb' shaped drywell with torus shaped suppression chamber connected by a vent system. Vacuum breakers are provided between the suppression chamber and both the drywell and reactor building.
Date Test Completed:	January 4, 1989

3.2 TECHNICAL DATA

Containment Net Free Volume:	293,900 cubic feet
Design Pressure:	56 psig
Design Temperature:	281°F
Calculated Accident Peak Pressure:	49.1 psig
Calculated Accident Peak Temperature:	283°F

3.3 TEST DATA

Test Method:	Absolute
Data Analysis:	Mass Point
Test Pressure:	63.875 psia
Max Allowable Leakage Rate (L_a):	0.500 wt % per day
Measured Leakage Rate:	
Mass Point	0.208 wt % per day
Measured Leakage Rate at UCL:	
Mass Point	0.215 wt % per day
Supplemental Test Flow Rate:	0.500 wt % per day
Supplemental Test Measured Leak Rate:	
Mass Point	0.616 wt % per day
Supplemental Test and L_{am} Agreement:	
Mass Point	18.4% of L_a

4.0 ACCEPTANCE CRITERIA

Acceptance criteria established prior to the test and as specified by 10CFR50, Appendix J, ANSI N45.4-1972 and the Peach Bottom Atomic Power Station Unit No. 2 Technical Specifications are as follows:

1. The measured leakage rate (L_{am}) at the calculated design accident pressure of 49.1 psig (P_a) shall be less than 75% of the maximum allowable leakage rate (L_a), specified as 0.5% by weight of the building atmosphere per day. The acceptance criteria is determined as follows:

$$L_a = 0.5\%/\text{day}$$

$$0.75\ L_a = 0.375\%/\text{day}$$

2. 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% of L_a.

5.0 TEST INSTRUMENTATION

5.1 SUMMARY OF INSTRUMENTS

Test instruments employed are described, by system, in the following subsections.

5.1.1 Temperature Indicating System

Components:

Resistance Temperature Detectors:

Quantity	12
Supplier	Volumetrics
Range, ^{o}F	0 to 120
Accuracy, ^{o}F	+/- 0.1
Sensitivity, ^{o}F	+/- 0.01

5.1.2 Dewpoint Indicating System

Dewpoint Sensors:

Quantity	6
Supplier	Volumetrics
Type	Chilled mirror hygrometer
Range, ^{o}F	40 - 120 dewpoint
Accuracy, ^{o}F	+/- 0.54
Sensitivity, ^{o}F	+/- 0.1

5.1.3 Pressure Monitoring System

Precision Pressure Gauges

Quantity	2 (1 operational, 1 standby)
Manufacturer	Mensor
Type	Quartz Manometer
Range, psia	0 - 100
Accuracy, psia	+/- .015% of reading + .00?% of full scale
Sensor sensitivity, psia	+/- 0.01
Repeatability, psia	+/- 0.001

5.1.4 Supplemental Test Flow Monitoring System

Flowmeter

Quantity	1
Supplier	Volumetrics
Type	Thermal Mass Flowmeter
Range, scfm	0 - 9.73
Accuracy	+/- 1% of full scale

5.1.5 Data Acquisition System

Quantity	1
Manufacturer	Volumetrics
Type	Model A 100
Accuracy	+/- 0.005% of full scale
Repeatability/ Resolution	+/- 0.01°F +/- 0.001 psia

5.2 SCHEMATIC ARRANGEMENT

The arrangement of the four measuring systems summarized in Section 5.1 is depicted in Appendix A.

Drybulb temperature sensors were placed throughout the reactor containment vessel volume to permit monitoring of internal temperature variations at 12 locations. Dewcells were placed at six locations to permit monitoring of the reactor containment partial pressure of water vapor.

5.3 CALIBRATION CHECKS

Temperature, dewpoint, and pressure measuring systems were checked for calibration before the test as recommended by ANSI N45.4-1972, Section 6.2 and 6.3. The results of the calibration checks are on file at Peach Bottom Atomic Power Station. The supplemental test at 49.1 psig confirmed the instrumentation acceptability.

5.4 INSTRUMENTATION PERFORMANCE

The six dewcells, 12 RTDs, precision pressure gauges, and flow meter performed satisfactorily throughout the performance of the integrated leak rate test and provided sufficient coverage of the reactor primary containment.

5.5 VOLUME WEIGHTING FACTORS

Weighting factors were assigned to each drybulb temperature sensor and dewpoint temperature sensor based on the calculated volume of the reactor containment building each sensing device monitored. Drybulb and dewpoint temperature sensors weighting factors for the test were as follows:

Temperature Element	Weighting Factor
TE 1	0.0603
TE 2	0.0603
TE 3	0.0640
TE 4	0.0640
TE 5	0.0923
TE 6	0.0923
TE 7	0.0522
TE 8	0.0522
TE 9	0.0274
TE 10	0.1450
TE 11	0.1450
TE 12	0.1450
DPE 1	0.1206
DPE 2	0.1280
DPE 3	0.1846
DPE 4	0.1318
DPE 5	0.2175
DPE 6	0.2175

5.6 SYSTEMATIC ERROR ANALYSIS

Systematic error, in this test, is induced by the operation of the temperature indicating system, dewpoint indicating system, and the pressure indicating system.

Justification of instrumentation selection was accomplished, using manufacturer's sensitivity and repeatability tolerances stated in Section 5.1, by computing the instrumentation selection guide (ISG) formula.

5.6 SYSTEMATIC ERROR ANALYSIS
(Continued)

Containment leakage determined by the Absolute Method requires accurate measurement of small changes in containment pressure with suitable corrections for temperature and water vapor. Since the Absolute Method utilizes the change in a reading (i.e., pressure and temperature) to calculate leak rate, the repeatability, sensitivity, and readability of the instrument system is of more concern than the accuracy. To perform the ISG calculation, the sensitivity error of the sensor and the repeatability error of the measurement system must be used.

Sensitivity is defined as "the capability of a sensor to respond to change." Sensitivity is usually a function of the system measuring the sensor output. When the sensor energy state is raised or lowered an amount equal to the smallest value which the entire system will process, a change of indication will occur. To determine sensitivity for ILRT sensors, it is necessary to analyze the smallest value of the analog sensor output which will cause a one digit change in the digital display.

Repeatability is defined as "the capability of the measurement system to reproduce a given reading from a constant source."

Utilizing the methods, techniques, and assumptions in Appendix G to ANS 56.8-1987, the ISG formula was computed for the Absolute Method as follows:

1. Conditions:

   L_a = 0.5 wt.%/day

   P = 63.875 psia

   T = 525.79°R drybulb

   T_{dp} = 55.77°F dewpoint

   t = 24 hours

2. Total Absolute Pressure: e_p

   No. of sensors = 1

   Range = 0 - 100 psia

   Sensor sensitivity error (E_p) = +/- 0.001 psia

5.6 SYSTEMATIC ERROR ANALYSIS
(Continued)

Measurement system error (ε_p): Resolution: 0.001 psia
Repeatability: 0.001 psia

$$\varepsilon_p = [\ (0.001)^2 + (0.001)^2\ ]^{1/2}$$

$$\varepsilon_p = 1.414 \times 10^{-3} \text{ psia}$$

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

$$e_p = +/- [(0.001)^2 + (0.001414)^2]^{1/2} / [1]^{1/2}$$

$$e_p = +/- 0.001732 \text{ psia}$$

3. Water Vapor Pressure: e_{pv}

No. of sensors = 6

Sensor sensitivity error (E_{pv}) = +/- 0.1°F

Measurement system error (ε_{pv}): Resolution: 0.01°F
excluding sensor Repeatability: 0.01°F

$$\varepsilon_{pv} = [(0.01)^2 + (0.01)^2]^{1/2}$$

$$\varepsilon_{pv} = 0.01414^{\circ}F$$

At a dewpoint temperature of approximately 56°F, the equivalent water vapor pressure change (as determined from steam tables) is 0.0081 psia/°F

$$E_{pv} = +/- 0.1^{\circ}F\ (0.0081 \text{ psia}/^{\circ}F)$$

$$E_{pv} = +/- 0.00081 \text{ psia}$$

$$\varepsilon_{pv} = +/- .01414^{\circ}F\ (0.0081 \text{ psia}/^{\circ}F)$$

$$_{pv} = +/- 0.00011 \text{ psia}$$

$$e_{pv} = +/- [(E_{pv})^2 + (\varepsilon_{pv})^2]^{1/2}/[\text{no. of sensors}]^{1/2}$$

$$e_{pv} = +/- [(0.00081)^2 + (0.00011)^2]^{1/2}/[6]^{1/2}$$

$$e_{pv} = +/- 0.00033 \text{ psia}$$

5.6 SYSTEMATIC ERROR ANALYSIS
(Continued)

4. Temperature: e_T

No. of sensors = 12

Sensor sensitivity error (ε_T) = +/- $0.01^{\circ}F$ = +/- $0.01^{\circ}R$

Measurement system error (ε_T): excluding sensor — Resolution: $0.01^{\circ}F$, Repeatability: $0.01^{\circ}F$

$$\varepsilon_T = [(0.01)^2 + (0.01)^2]^{1/2}$$

$$\varepsilon_T = +/- \ 0.01414^{\circ}F = +/- \ 0.01414^{\circ}R$$

$$e_T = +/- \ [(E_T)^2 + (\varepsilon_T)^2]^{1/2} \ / \ [\text{no. of sensors}]^{1/2}$$

$$e_T = +/- \ [(0.01)^2 + (0.01414)^2]^{1/2} \ / \ [12]^{1/2}$$

$$e_T = +/- \ 0.00499^{\circ}R$$

5. Instrument Selection Guide (ISG):

$$ISG = +/- \frac{2400}{t} \left[2\left(\frac{e_p}{P}\right)^2 + 2\left(\frac{e_{pv}}{P}\right)^2 + 2\left(\frac{e_T}{T}\right)^2\right]^{1/2}$$

$$ISG = +/- \frac{2400}{24}\left[2\left(\frac{0.001732}{63.875}\right)^2 + 2\left(\frac{0.00033}{63.875}\right)^2 + 2\left(\frac{0.00499}{525.79}\right)^2\right]^{1/2}$$

$$ISG = +/- 100[1.470 \times 10^{-9} + 5.338 \times 10^{-11} + 1.801 \times 10^{-10}]^{1/2}$$

ISG = +/- 0.004 wt.%/day

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

5.7 SUPPLEMENTAL VERIFICATION

In addition to the calibration checks described in Section 5.3, test accuracy was verified by a supplemental test subsequent to the completion of the 24 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:

$$L_c = L_v' + L_o$$

Where:

L_c = Measured composite leakage rate consisting of the reactor containment building leakage rate plus the imposed leakage rate

L_o = Imposed leakage rate

L_v' = Leakage rate of the reactor containment building during the supplemental test phase

Rearranging the above equation,

$$L_v' = L_c - L_o$$

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_v') was then compared to the measured reactor containment building leakage rate during the preceding 24 hour test (L_{am}) to determine instrumentation acceptability. Test accuracy is considered acceptable if the difference between the two building leakage rates is within 25% of the maximum allowable leakage rate (L_a).

6.0 TEST PROCEDURE

6.1 PREREQUISITES

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

1. Proper operation of test instrumentation was verified.

2. The reactor containment building isolation valves were closed using the normal mode of operation. The associated system valves were placed in post-accident positions.

3. Portions of fluid systems, which under post-accident conditions become extensions of the containment boundary, were drained and vented to the extent possible or the Type C penalty taken as appropriate.

4. Type B and C testing was completed with a leakage value less than 0.6 L_a.

5. Containment pressurization system was operational.

6. Drywell cooling fans were in operation.

7. Potential pressure sources were removed or isolated from the containment.

8. An inspection of the accessible interior and exterior surfaces of the containment was completed.

6.2 GENERAL DISCUSSION

Following the satisfaction of the prerequisites stated in Section 6.1, the reactor containment building pressurization was initiated at a rate of approximately 7.3 psi per hour. After containment conditions had stabilized, leak rate testing was initiated at the 49.1 psig pressure level.

6.2 GENERAL DISCUSSION
(Continued)

During the test the following occurred at 15 minute intervals (see Appendix B - Reduced Leakage Data):

1. Readings indicated by the precision pressure gauges were recorded and entered automatically into the computer.

2. Readings indicated by the 12 RTDs were recorded and automatically entered into the computer. The computer program calculated the weighted average containment building drybulb temperature by use of a weighting factor that was assigned to each RTD. This value was subsequently converted to degrees Rankine for use in the ideal gas law equation to calculate containment building weight of air.

3. Readings indicated by the six dewpoint temperature sensors were recorded and automatically entered into the computer. The computer program converted the readings to dewpoint temperatures and then calculated the average containment dewpoint temperature by use of a weighting factor assigned to each sensor. This weighted average dewpoint temperature was then converted to a partial pressure of water vapor.

The use of water vapor pressure (P_{wv}), temperature (T), and the total pressure (P_t) is described in more detail in Section 7.1.

Data was entered into an IBM AT Portable Computer located at the leak rate panel. The ILRT computer program utilized for the test had been previously checked with sample data of known results and certified prior to the test. The computer program then calculated the following at 15 minute intervals:

1. Total weight of containment air.

2. Mass point least squares fit leakage rate.

3. Mass point 95% upper confidence level leakage rate.

4. Observed total time leakage rate.

5. Total time mean leakage rate.

6.2 GENERAL DISCUSSION
(Continued)

6. Total time least squares fit leakage rate.

7. Total time 95% upper confidence level leakage rate.

A plot of weighted average containment temperature, containment total pressure, containment average dewpoint temperature, and weight of air was performed for each 15 minute data set (see Appendix C).

Immediately following the 24 hour leak test, a superimposed leakage rate was established for a 4 hour test period. During this time, temperature, pressure, and vapor pressure were monitored as described above.

6.3 TEST PERFORMANCE

6.3.1 Pressurization and Stabilization Phase

Pressurization of the reactor containment building was started at approximately 0625 on January 2, 1989. The pressurization rate was approximately 7.3 psi per hour. During pressurization, a leak survey of the containment isolation valves found no significant leakage. When containment internal pressure reached 63.77 psig at approximately 1810 on January 2, 1989, pressurization was secured. By 2230, on January 2, 1989, temperature stabilization criteria had been met.

6.3.2 Integrated Leak Rate Testing Phase

At 2236 on January 2, 1989, 15 minute frequency test data collection was initiated. At 0700 on January 3, 1989, the leakage rate calculations at the upper 95% confidence interval were 0.53%/day (total time) and 0.36%/day (mass point). Both total time and mass point leakage rates showed a decreasing trend. A decision was made to proceed with a 24 hour mass point leakage rate test. At 1430 hours on January 3, 1989, the mass point upper confidence leakage rate was 0.272%/day and continued to show a slow decrease. At 2236 on January 3, 1989, the 24 hour integrated leakage rate test was concluded with an upper 95% mass point leakage rate of 0.215%/day.

6.3.3 Supplemental Leakage Rate Test Phase

Following completion of the 24 hour integrated leak rate test, a leakage rate of 4.43 scfm was imposed on the containment building through a calibrated thermal flow meter at 2240 on January 3, 1989. Leakage rate data was again collected at 15 minute intervals beginning at 2252 on January 3, 1989, for a period of 4 hours. With an imposed leak rate of 0.500% per day, a measured composite leakage rate of 0.616% per day was obtained using the Mass Point method. This results in a containment building leakage rate agreement of 18.4% of L_a with the results of the 24 hour test. This value is within the acceptance limit of 25% of L_a.

6.3.4 Drywell to Torus Bypass Test

After required data was obtained and evaluated, containment building depressurization to conduct the Drywell to Torus Bypass test was started. The test was started at 0851 on January 5, 1989 and was successfully completed after 1 hour. The calculated bypass area was 0.0446 square inches which is well below the maximum allowable value of 0.785 square inches. Subsequently, the drywell and torus were depressurized to 0 psig and a post test inspection revealed no unusual findings.

7.0 METHODS OF ANALYSIS

7.1 ABSOLUTE METHOD

7.1.1 General

The Absolute Method of leakage rate determination was employed during testing at the 49.1 psig pressure level. The ILRT computer code calculates the percent per day leakage rate using the mass point method.

7.1.2 Mass Point Analysis

The Mass Point method of computing leakage rates uses the following ideal gas law equation to calculate the weight of air inside containment for each 15 minute interval:

$$W = \frac{144\ PV}{RT} = \frac{KP}{R}$$

Where:

W = Mass of air inside containment, lbm

$K = 144\ V/R = 7.93282 \times 10^5\ \frac{\text{lbm} - {}^{\circ}\text{R} - \text{in.}^2}{\text{lbf}}$

P = Partial pressure of air, psia

T = Average internal containment temperature, ${}^{\circ}$R

$V = 293{,}900\ \text{ft}^3$

$R = 53.35\ \frac{\text{lbf} - \text{ft}}{\text{lbm}-{}^{\circ}\text{R}}$

The partial pressure of air, P, is calculated as follows:

$$P = P_T - P_{wv}$$

7.1.2 Mass Point Analysis
(Continued)

Where:

P_T = Total containment pressure

P_{wv} = Partial pressure of water vapor determined by averaging the six dewpoint temperatures and converting to partial pressure of water vapor, psia

The average internal containment temperature, T, is calculated as follows:

$$T = \frac{1}{\sum_i \frac{V_{fi}}{T_i}}$$

Where:

V_{fi} = Volume fraction of the i^{th} sensor

T_i = Absolute temperature of the i^{th} sensor

The weight of air is plotted versus time for the 24 hour test and for the 4 hour supplemental test. The ILRT computer code fits the locus of these points to a straight line using a linear least squares fit. The equation of the linear least squares fit line is of the form $W = At + B$, where A is the slope in lbm per hour and B is the initial weight at time zero. The least squares parameters are calculated as follows:

$$A = \frac{N\left(\sum t_i W_i\right) - \left(\sum t_i\right)\left(\sum W_i\right)}{S_{xx}}$$

$$B = \frac{\left(\sum t_i^2\right)\left(\sum W_i\right) - \left(\sum t_i\right)\left(\sum t_i W_i\right)}{S_{xx}}$$

7.1.2 Mass Point Analysis
(Continued)

Where:

$S_{xx} = N \ (\Sigma t_i^2) - (\Sigma t_i)^2$

N = Number of data points

W_i = Measured mass of containment air

t_i = Time interval

The weight percent leakage per day can then be determined from the following equation:

$$L_{am} = \frac{-2400\ A}{B}$$

where the negative sign is used since A is a negative slope to express the leakage rate as a positive quantity.

7.2 STATISTICAL EVALUATION

7.2.1 General

After performing the least squares fit, the ILRT computer code calculates the limits of the 95 percent confidence interval for the mass point leakage rate (C_M).

This statistical parameter is then used to determine that the measured leakage rate plus the 95 UCL meets the acceptance criteria.

7.2.2 Mass Point Confidence

The upper 95 percent confidence limit for the mass point leakage rate is calculated as follows:

$C_M = 2400\ t_{95}\ (S_A/B)$.

Where:

C_M = Upper 95 percent confidence limit

t_{95} = Student's t distribution with N-2 degrees of freedom

S_A = Standard deviation of the slope of the least squares fit line

8.0 DISCUSSION OF RESULTS

8.1 RESULTS AT P_a

Mass Point Method of Analysis

Data obtained during the leak rate test at P_a indicated the following changes (highest to lowest) during the 24 hour test.

Variable	Maximum Change
P_T	0.383 psia
P_{WV}	0.0017 psia
T	0.786°F

The method used in calculating the Mass Point leakage rate is described in Section 7.1.2. The results of this calculation is a mass point leakage rate of 0.208%/day (see Appendix D).

The 95 percent confidence limit associated with this leakage rate is 0.007% per day. Thus, the leakage rate at the upper bound of the 95 percent confidence level becomes:

$$UCL = 0.208 + 0.007$$

$$UCL = 0.215\%/day$$

Additional leakage rates must be applied to the measured leakage rate at the upper 95 percent confidence level to account for penetration paths not exposed to the test pressure and for changes in the net free volume of the containment due to water level changes. Penetration paths not exposed to the test pressure and the corresponding leakage rates based on analysis of minimum pathway local leakage rate testing are as follows:

System	Containment Isolation Valves	Minimum Pathway Local Leakage Rate (SCCM)
Shutdown Cooling	MO-10-017	206
Reactor Building Cooling Water	MO-2373	35
	MO-2374	30

8.1 RESULTS AT P_a
(Continued)

System	Containment Isolation Valves	Minimum Pathway Local Leakage Rate(SCCM)
Drywell Chilled Water	MO-2200 A	1171
	MO-2200 B	974
	MO-2201 A	591
	MO-2201 B	448
IIRT Test Valves	7A-29871/7A-29872	10
	7A-29873/7A-29874	10
	7A-29875/7A-29876	10
Drywell Floor Drain Sump	A0-20-082/ A0-20-83	10
Drywell Equipment Drain Sump	A0-20-094/ A0-20-095	10
PCAC Sample		40

The total applicable local leakage rate is 3545 sccm which is equivalent to a leakage rate of 0.014%/day.

Water level changes in the containment during the 24 hour integrated leakage rate test are summarized below:

Reactor Vessel Water Level/Torus Water Level:

During the test, both the reactor vessel level and torus level showed a decrease. The decrease in levels is accounted for in the calculated containment integrated leakage rate and no further correction is required.

Drywell Sump Level:

During the test, the drywell equipment drain sump and the drywell floor train sump each showed a 3 inch increase in level. This level increase is equivalent to a decrease in the containment net free volume of 566 sccm, which equates to an addition of 0.002% wt/day to the calculated integrated leakage rate.

8.1 RESULTS AT P_a
(Continued)

Since the HCU accumulators were not vented for the test, pressure readings were taken prior to the start of the test and at the end of the test. The pressure changes were equivalent to an addition of 0.002%/day to the calculated integrated leakage rate.

The total containment leakage rate at the upper 95 percent confidence level (UCL) is calculated as follows:

$$UCL = L_{am} + \text{95 percent confidence limit} + \text{Type C leakage} + \text{changes in net free volume} + \text{HCU accumulator leakage}$$

$$UCL = 0.208\%/day + 0.007\%/day + 0.014\%/day + 0.002\%/day + 0.002\%/day$$

$$UCL = 0.233\%/day$$

This value is below the acceptance criteria leakage rate of 0.375%/day ($.75L_a$).

Therefore, the reactor containment building leakage rate, based on the mass point method of analysis, at the calculated design basis accident pressure (P_a) of 49.1 psig is acceptable.

8.2 SUPPLEMENTAL TEST RESULTS

After conclusion of the 24 hour test at 49.1 psig (P_a), the flowmeter was placed in service and a flow rate of 4.43 scfm was established. This flow rate is equivalent to a leakage rate of 0.500% per day. After the flow rate was established it was not altered for the duration of the supplemental test. The measured leakage rate (L_c) during the supplemental test was calculated to be 0.616% per day using the Mass Point method of analysis.

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

$$L_v' = L_c - L_o$$

$$L_v' = 0.616 - 0.500$$

$$L_v' = 0.116\%/day$$

8.2 SUPPLEMENTAL TEST RESULTS
(Continued)

Comparing this leakage rate with the building leakage rate measured during the 24 hour test yields the following:

$$\text{Mass Point} = \frac{L_{am} - L_v'}{L_a} = \frac{.208 - .116}{0.5} = 0.184$$

The building leakage rates agree within 18.4% of L_a using the Mass Point method which is below the acceptance criteria of 25% of L_a.

Using the formulation of ANS 56.8-1987,

$$(L_o + L_{am} - 0.25L_a) \leq L_c \leq (L_o + L_{am} + 0.25L_a)$$

$$(0.500 + 0.208 - 0.125) \leq L_c \leq (0.500 + 0.208 + 0.125)$$

$$0.583 \leq L_c \leq 0.833$$

Since L_c was measured to be 0.616%/day, this value falls within the acceptable range of 0.583% to 0.833% per day. Therefore, the acceptability of the test instrumentation is considered to have been verified.

8.3 AS FOUND ANALYSIS

To determine the as-found containment leakage rate, an analysis was performed to evaluate any leakage savings from repairs or maintenance to containment isolation barriers. Leakage savings are realized when containment isolation barrier repairs or maintenance result in a lower minimum pathway leakage than that which existed prior to the repair or maintenance. The results of the analysis are presented in Appendix F.

8.4 TYPE B AND C TESTING

The results of the Type B and Type C tests conducted since the last containment integrate leakage rate on Peach Bottom Atomic Power Station Unit 2 in 1985 are presented in Appendix G.

9.0 REFERENCES

1. ST-12.5, Integrated Leak Rate Test.

2. Peach Bottom Atomic Power Station Unit No. 2 Final Safety Analysis Report, and Technical Specifications.

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

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

5. ANS-56.8-1987, "Containment System Leakage Testing Requirements", American Nuclear Society.

6. ILRT Computer Code, Gilbert Services, Inc.

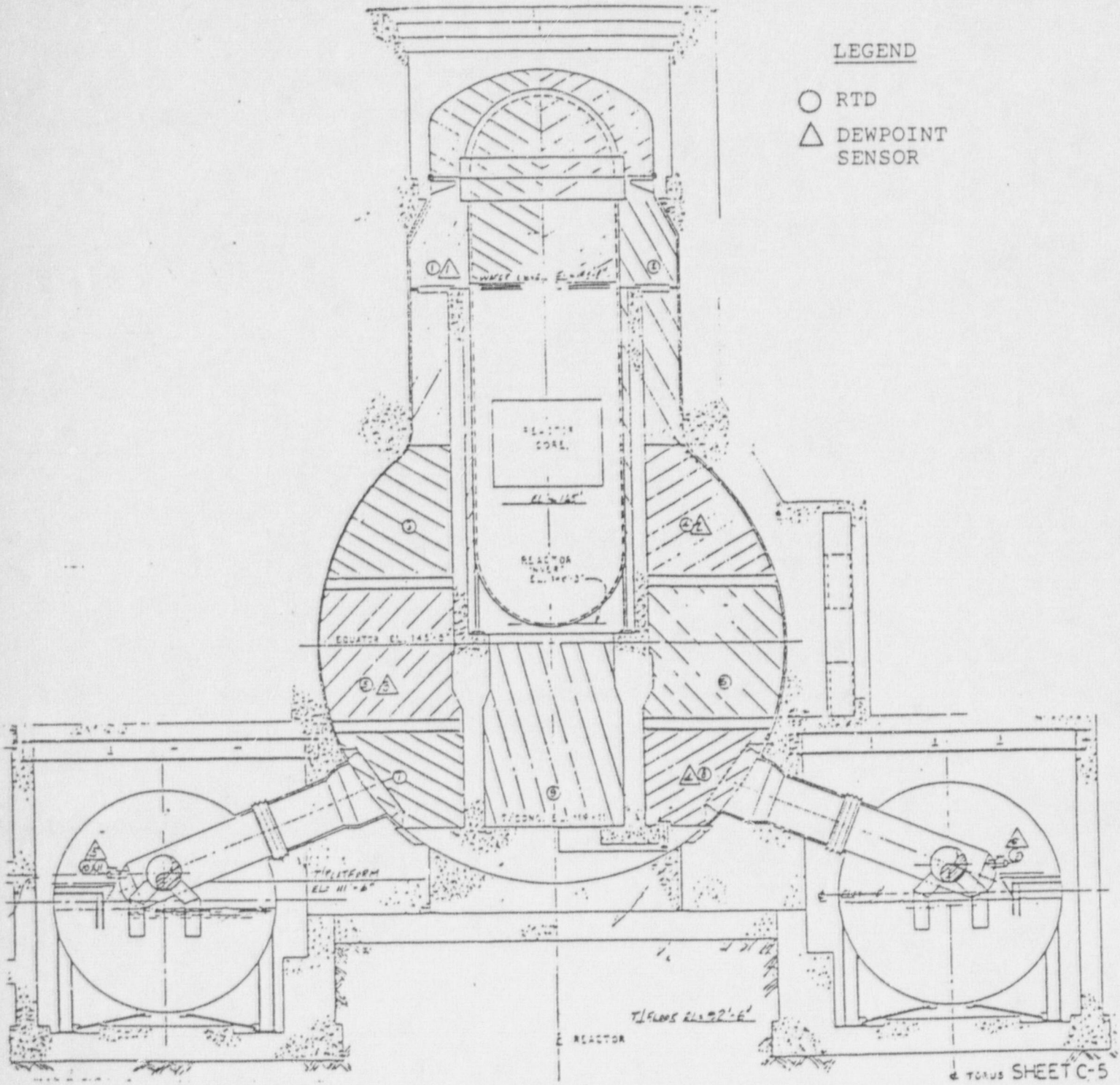
7. Steam Tables, American Society of Mechanical Engineers, 1967.

APPENDICES

APPENDIX A

SCHEMATIC ARRANGEMENT OF TEST INSTRUMENTATION

APPENDIX A



SHEET C-5

APPENDIX B

REDUCED TEST DATA

REDUCED ILRT TEST DATA

DATE	TIME	PAVG	PWV	TAVG	MASS WEIGHT
01-02-89	2236	63.875	0.2200	66.102	96038.05
	2251	63.864	0.2203	66.016	96037.92
	2306	63.856	0.2199	66.002	96028.65
	2321	63.847	0.2198	65.935	96027.27
	2336	63.840	0.2198	65.898	96023.20
	2351	63.832	0.2197	65.841	96021.57
01-03-89	6	63.823	0.2190	65.809	96014.45
	21	63.816	0.2192	65.777	96010.84
	36	63.809	0.2189	65.704	96013.91
	51	63.801	0.2194	65.663	96008.38
	106	63.795	0.2192	65.650	96001.84
	121	63.789	0.2188	65.622	95998.30
	136	63.781	0.2185	65.579	95994.26
	151	63.775	0.2184	65.549	95990.59
	206	63.769	0.2184	65.505	95989.47
	221	63.762	0.2183	65.503	95980.66
	236	63.756	0.2181	65.456	95980.45
	251	63.750	0.2182	65.376	95985.70
	306	63.745	0.2181	65.408	95972.12
	321	63.739	0.2178	65.372	95969.91
	336	63.734	0.2178	65.347	95966.76
	351	63.729	0.2178	65.330	95962.27
	406	63.724	0.2176	65.300	95960.34
	421	63.720	0.2174	65.300	95954.55
	436	63.718	0.2176	65.270	95956.52
	451	63.714	0.2179	65.310	95944.18
	506	63.709	0.2180	65.248	95947.56
	521	63.706	0.2186	65.273	95937.71
	536	63.702	0.2184	65.260	95934.22
	551	63.697	0.2185	65.194	95938.31
	606	63.694	0.2185	65.198	95932.91
	621	63.689	0.2180	65.124	95939.41
	636	63.685	0.2184	65.130	95931.67
	651	63.682	0.2183	65.150	95923.55
	706	63.678	0.2181	65.072	95931.86
	721	63.673	0.2181	65.084	95922.10
	736	63.669	0.2181	65.032	95925.49
	751	63.664	0.2178	65.020	95920.20
	806	63.659	0.2177	65.003	95917.50
	821	63.654	0.2178	64.982	95913.35
	836	63.650	0.2176	64.938	95915.44
	851	63.646	0.2173	64.924	95912.46
	906	63.642	0.2170	64.922	95907.09
	921	63.637	0.2169	64.904	95902.92
	936	63.634	0.2170	64.864	95905.42

REDUCED ILRT TEST DATA

DATE	TIME	PAVG	PWV	TAVG	MASS WEIGHT
01-03-89	951	63.630	0.2168	64.888	95894.98
	1006	63.628	0.2171	64.815	95904.88
	1021	63.624	0.2170	64.809	95900.02
	1036	63.621	0.2170	64.778	95901.15
	1051	63.617	0.2170	64.763	95897.70
	1106	63.614	0.2171	64.776	95890.50
	1121	63.609	0.2168	64.721	95894.94
	1136	63.606	0.2168	64.705	95892.99
	1151	63.602	0.2169	64.697	95888.21
	1206	63.599	0.2166	64.666	95889.65
	1221	63.596	0.2165	64.675	95883.55
	1236	63.594	0.2166	64.652	95884.48
	1251	63.590	0.2168	64.631	95881.83
	1306	63.587	0.2168	64.593	95884.31
	1321	63.585	0.2165	64.623	95876.18
	1336	63.582	0.2168	64.580	95879.02
	1351	63.580	0.2166	64.571	95877.91
	1406	63.577	0.2169	64.571	95872.71
	1421	63.575	0.2166	64.544	95875.04
	1436	63.571	0.2167	64.527	95871.85
	1451	63.569	0.2165	64.518	95870.55
	1506	63.566	0.2164	64.502	95869.27
	1521	63.563	0.2164	64.487	95867.21
	1536	63.560	0.2164	64.456	95868.24
	1551	63.556	0.2162	64.461	95862.96
	1606	63.554	0.2166	64.453	95860.87
	1621	63.550	0.2168	64.430	95858.59
	1636	63.547	0.2165	64.392	95861.36
	1651	63.545	0.2164	64.409	95855.33
	1706	63.542	0.2158	64.377	95857.42
	1721	63.540	0.2162	64.367	95855.55
	1736	63.538	0.2160	64.367	95852.90
	1751	63.535	0.2162	64.356	95849.75
	1806	63.534	0.2162	64.315	95855.83
	1821	63.530	0.2162	64.293	95853.61
	1836	63.529	0.2161	64.280	95854.63
	1851	63.526	0.2160	64.291	95848.03
	1906	63.523	0.2162	64.250	95850.68
	1921	63.521	0.2157	64.281	95842.59
	1936	63.518	0.2161	64.248	95843.52
	1951	63.516	0.2162	64.227	95844.22
	2006	63.514	0.2158	64.226	95841.81
	2021	63.511	0.2159	64.215	95838.98
	2036	63.510	0.2159	64.221	95836.41
	2051	63.507	0.2157	64.202	95835.55

REDUCED ILRT TEST DATA

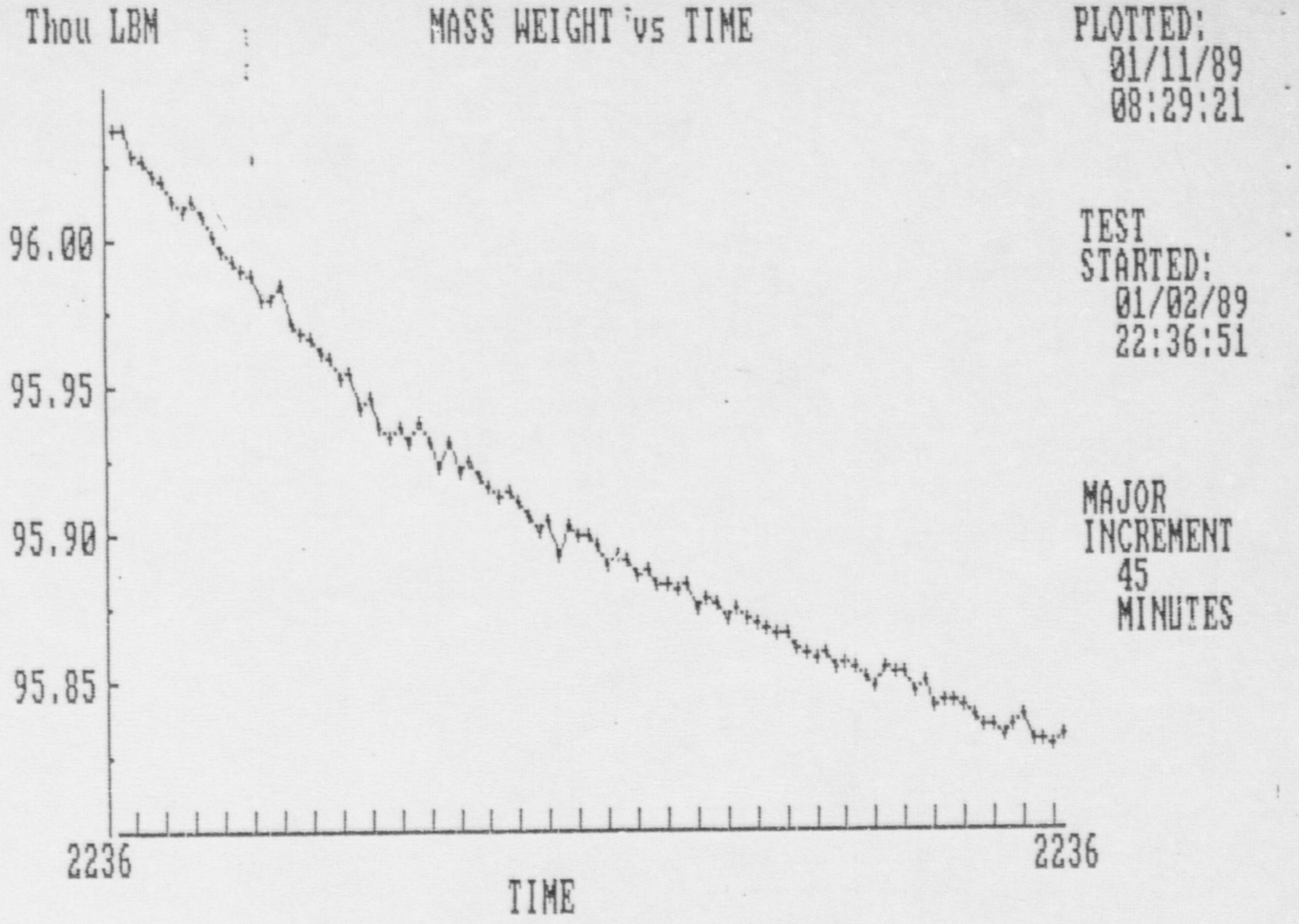
DATE	TIME	PAVG	PWV	TAVG	MASS WEIGHT
01-03-89	2106	63.504	0.2158	64.201	95832.36
	2121	63.502	0.2157	64.164	95836.35
	2136	63.499	0.2156	64.122	95839.44
	2151	63.498	0.2155	64.161	95830.97
	2206	63.495	0.2154	64.137	95830.80
	2221	63.493	0.2159	64.125	95829.23
	2236	63.492	0.2157	64.102	95832.31

VERIFICATION TEST DATA

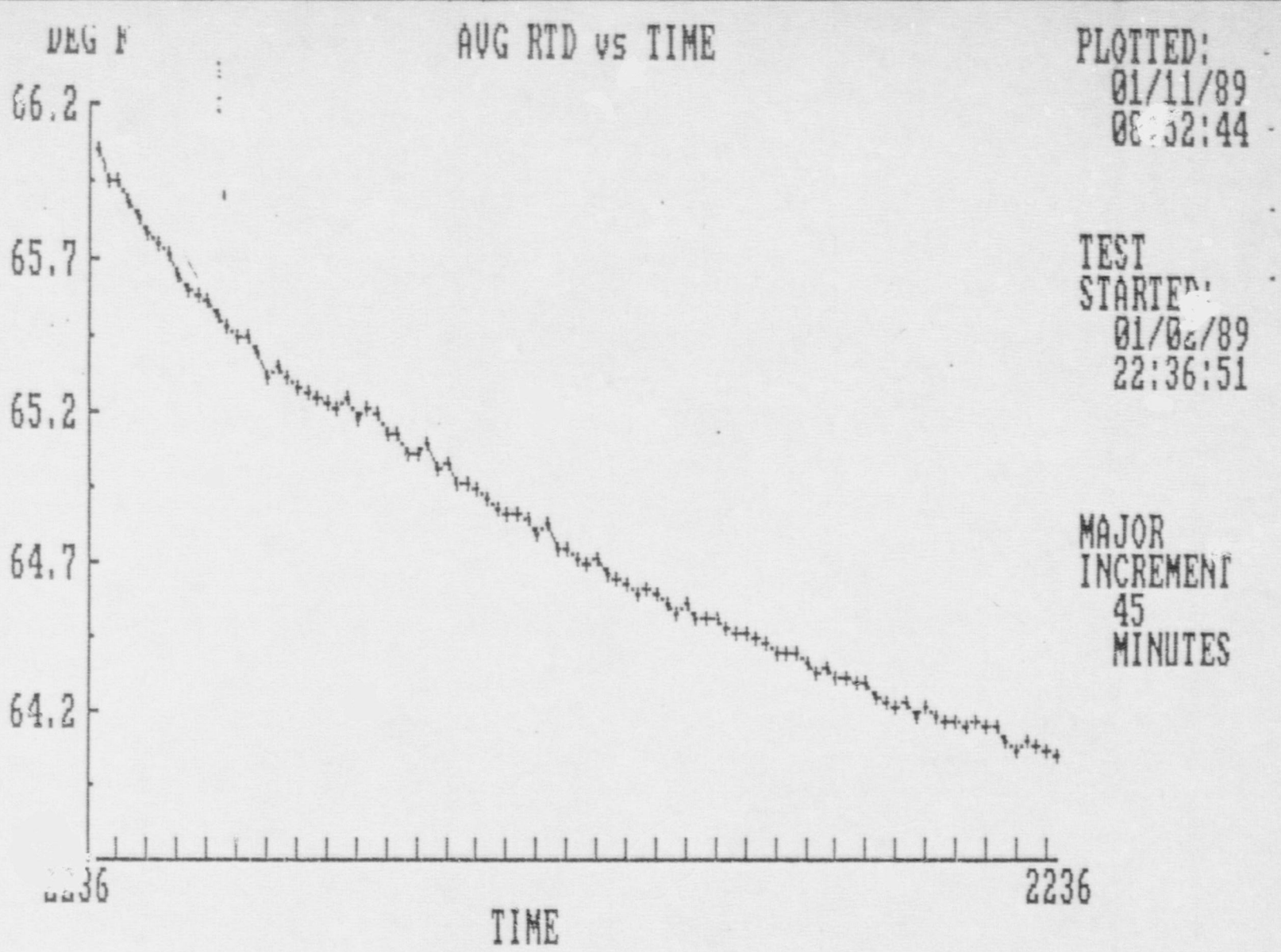
	2252	63.486	0.2157	64.121	95819.54
	2307	63.481	0.2155	64.106	95814.80
	2322	63.475	0.2156	64.082	95809.88
	2337	63.471	0.2156	64.088	95802.47
	2352	63.465	0.2156	64.049	95800.48
01-04-89	7	63.460	0.2154	64.068	95789.49
	22	63.455	0.2157	64.035	95787.23
	37	63.449	0.2155	64.032	95780.58
	52	63.444	0.2157	64.036	95771.73
	107	63.439	0.2159	64.019	95766.83
	122	63.433	0.2156	64.043	95753.69
	137	63.428	0.2156	63.991	95755.42
	152	63.422	0.2154	63.993	95746.09
	207	63.417	0.2155	63.990	95738.81
	222	63.412	0.2156	63.967	95735.16
	237	63.407	0.2152	63.954	95730.33
	252	63.401	0.2156	63.925	95725.82

APPENDIX C

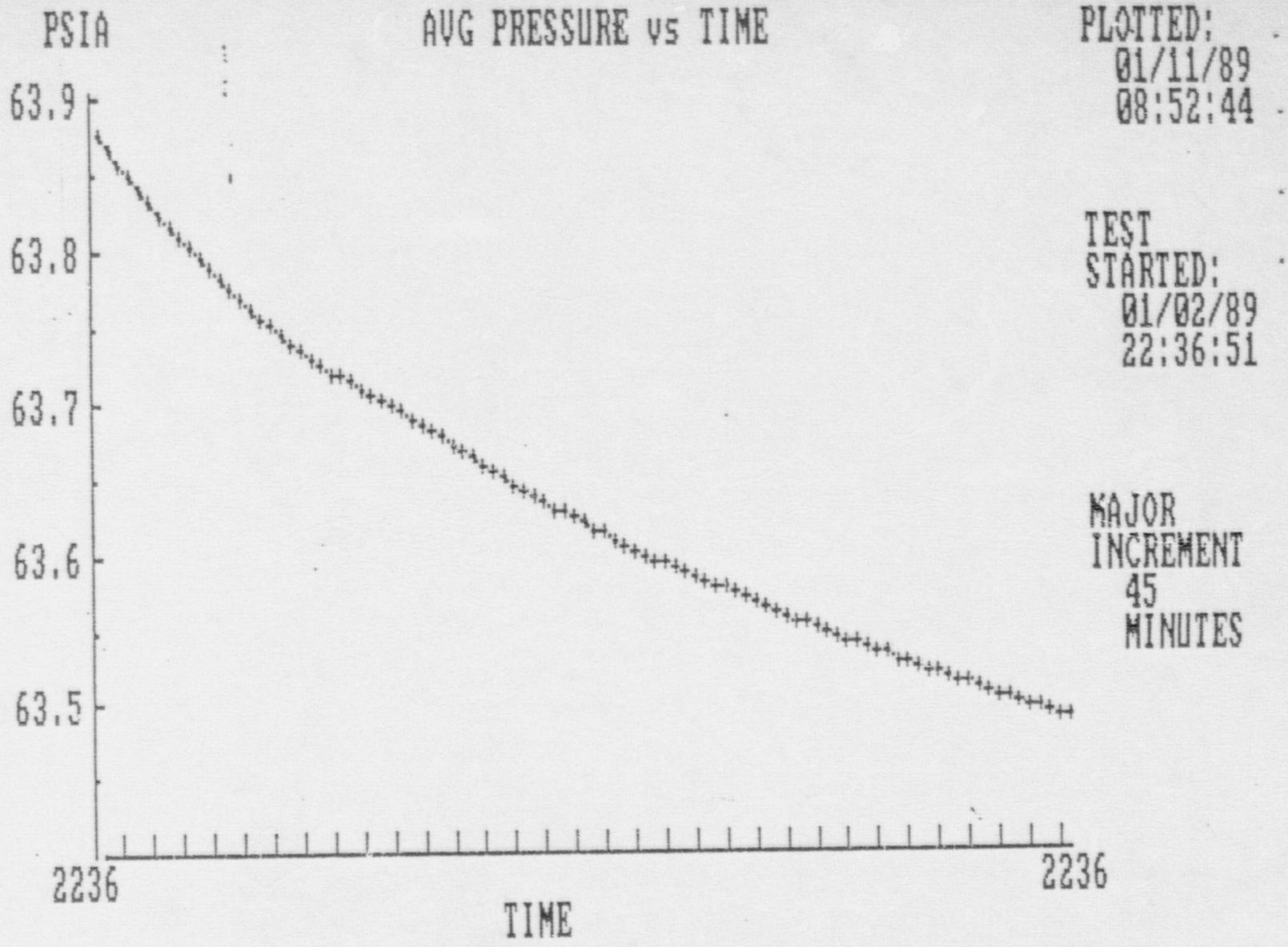
LEAKAGE RATE TEST GRAPHS



PHILADELPHIA ELECTRIC CO.
PEACH BOTTOM UNIT #2
ILRT PHASE



PHILADELPHIA ELECTRIC CO.
PEACH BOTTOM UNIT #2
ILRT PHASE



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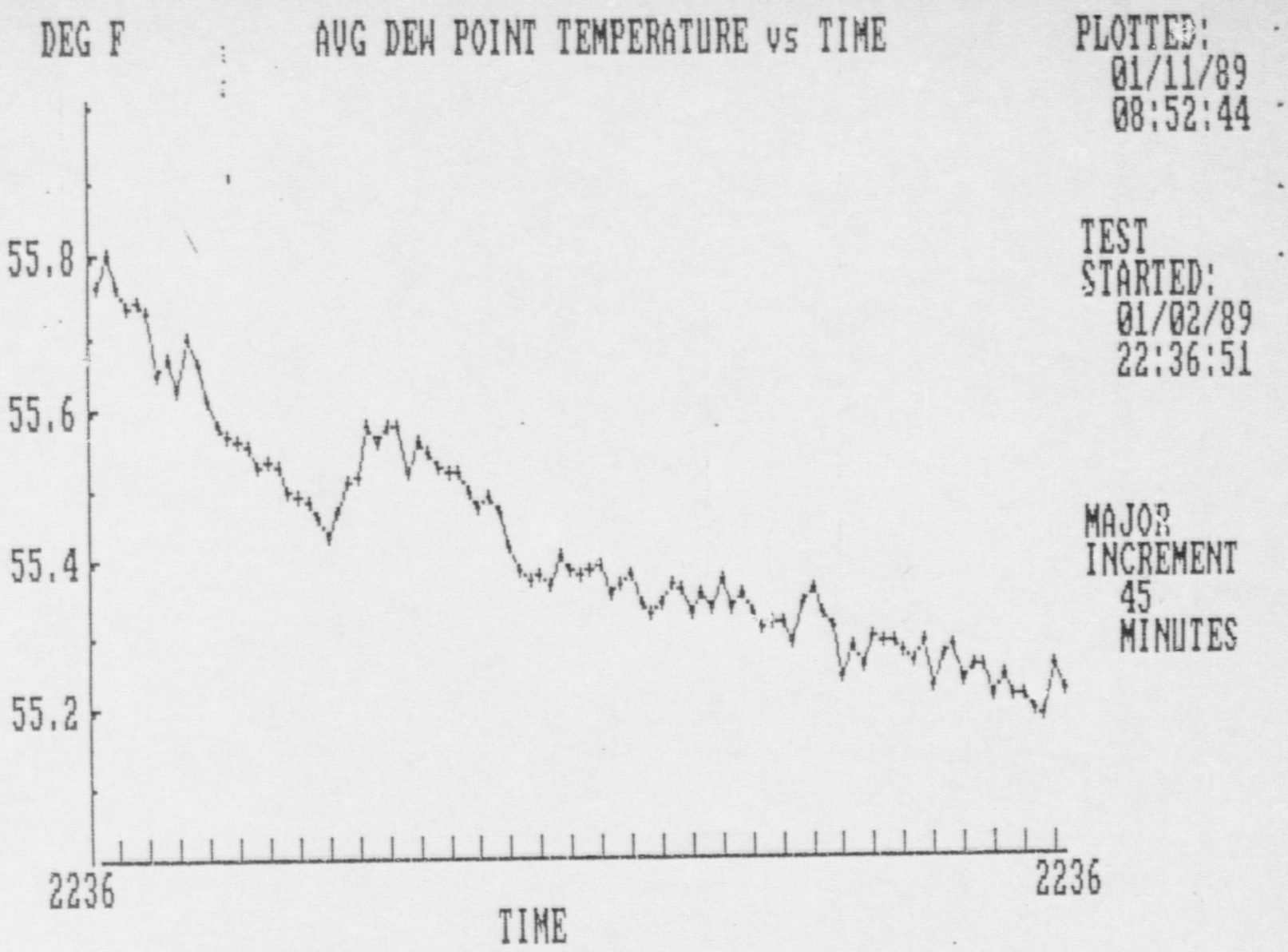
PEACH BOTTOM UNIT #2
ILRT PHASE



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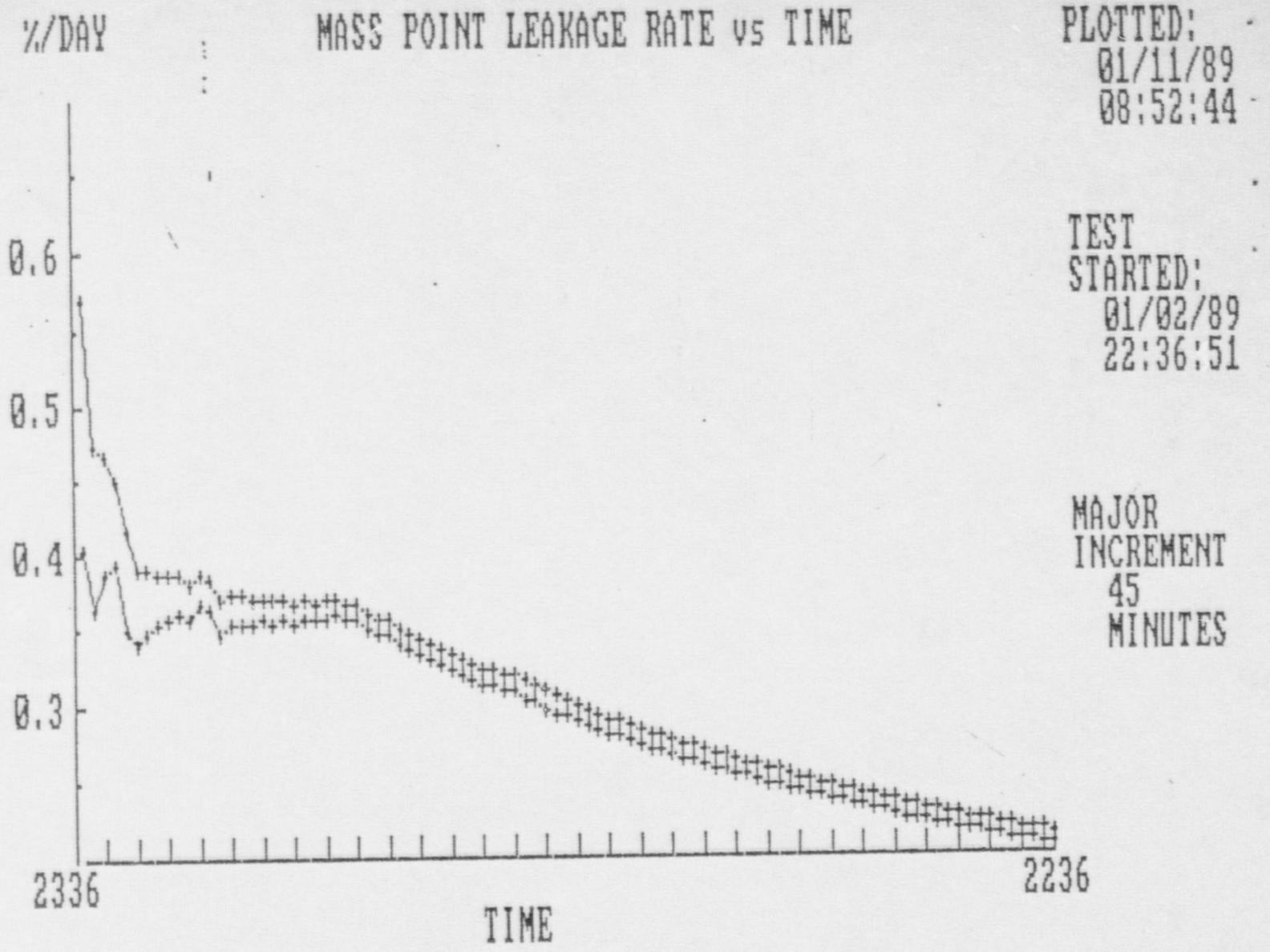
PEACH BOTTOM UNIT #2
ILRT PHASE



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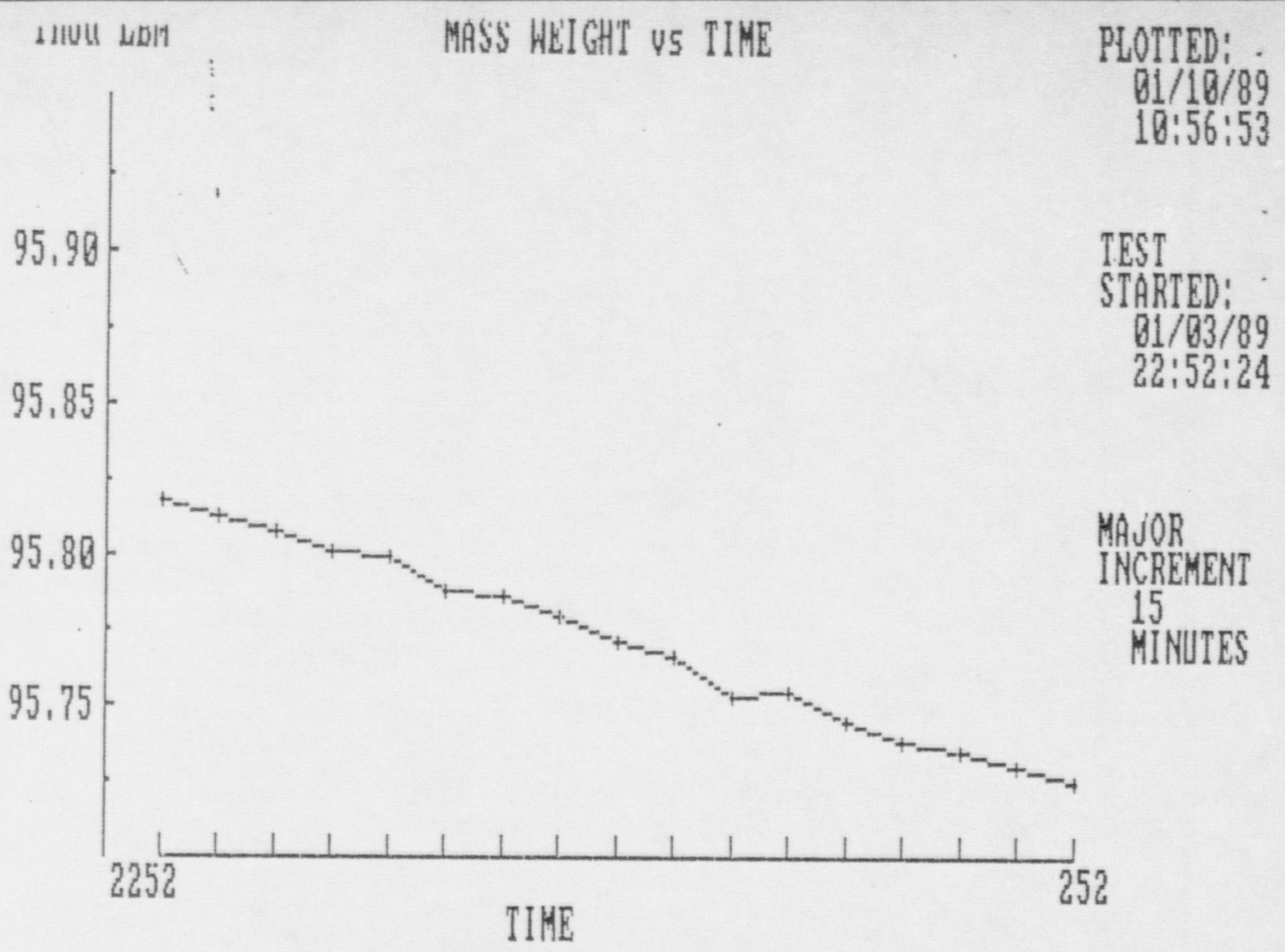
PEACH BOTTOM UNIT #2
ILRT PHASE



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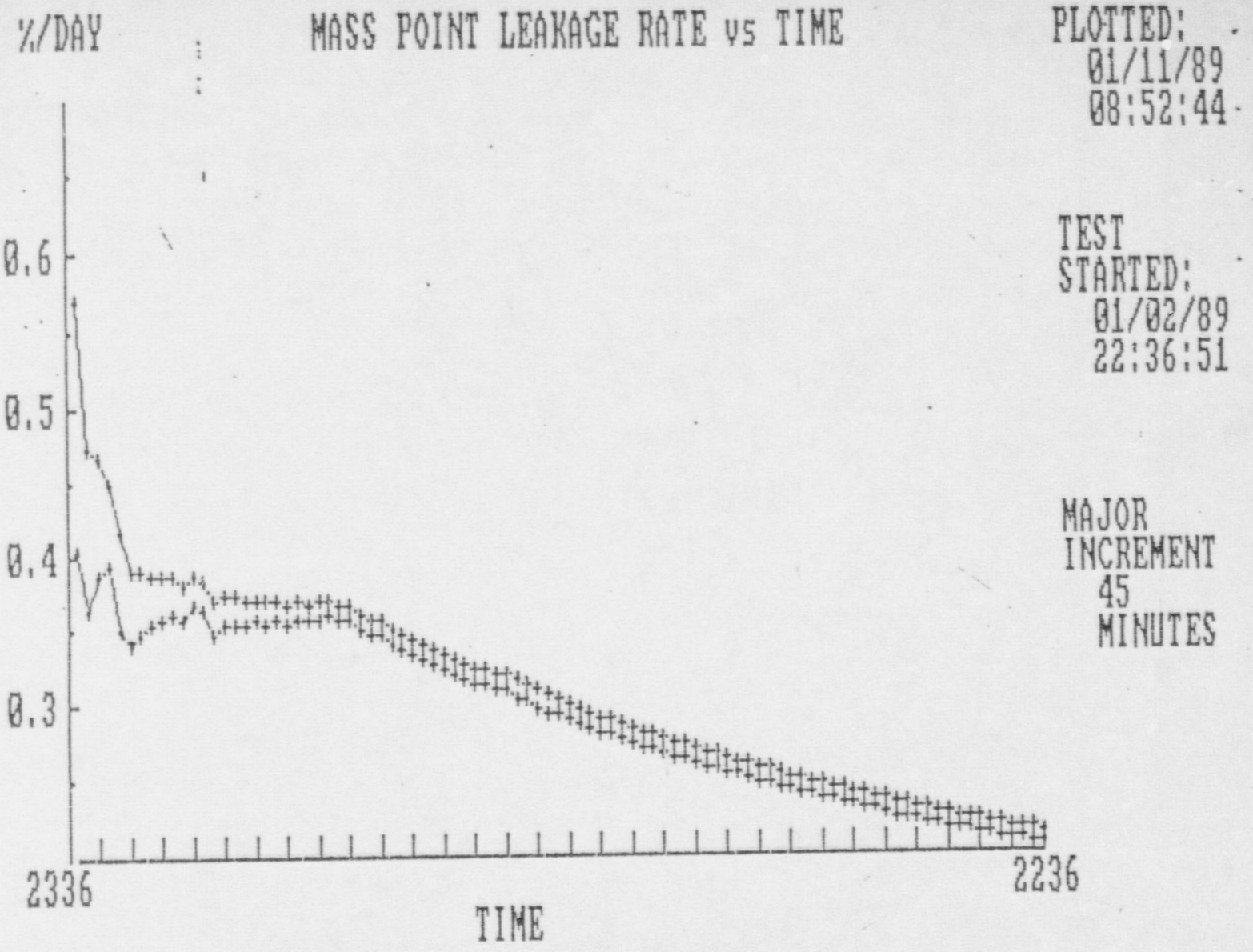
PEACH BOTTOM UNIT #2
SUPERIMPOSED PHASE



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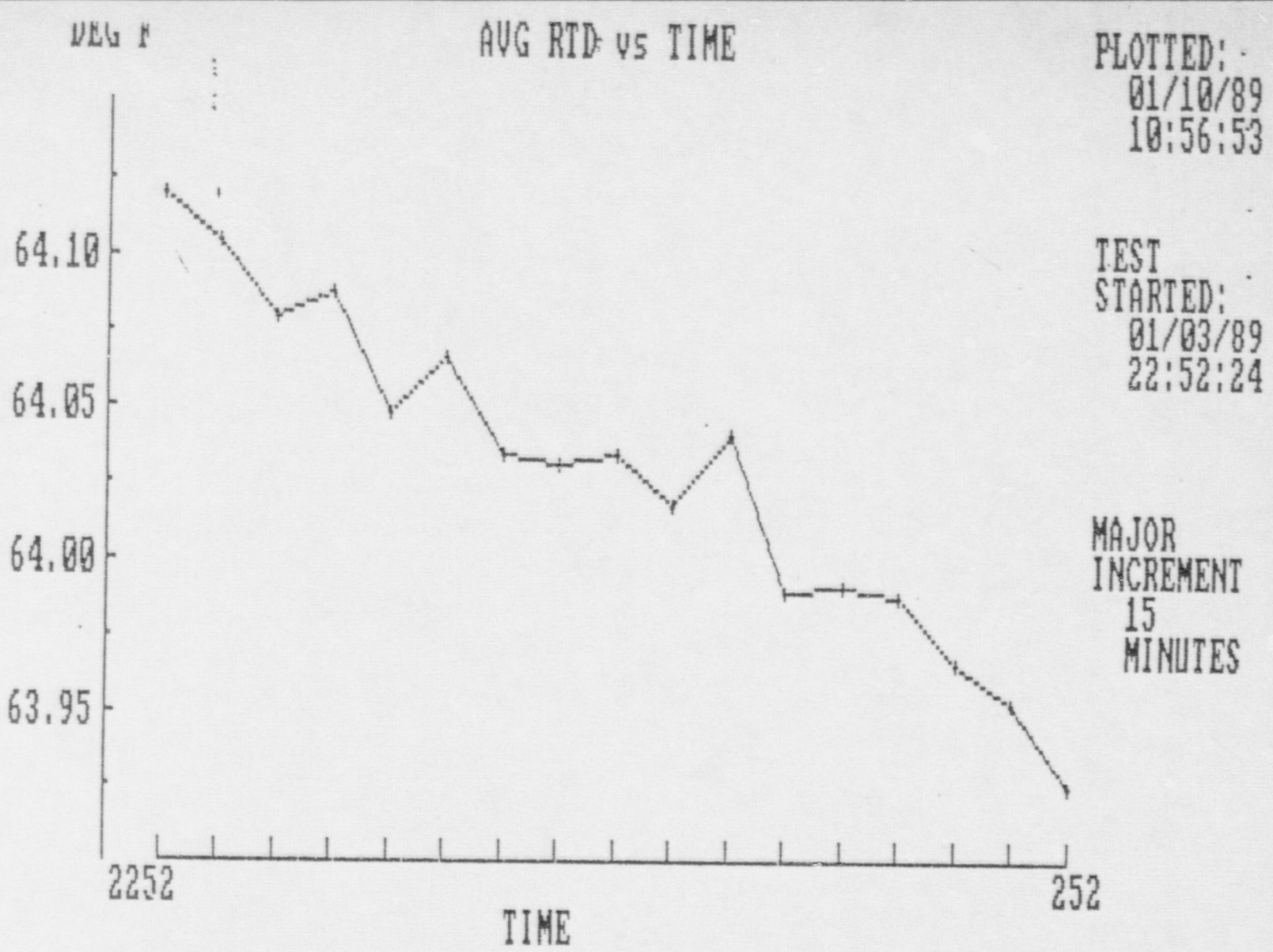
PEACH BOTTOM UNIT #2
ILRT PHASE



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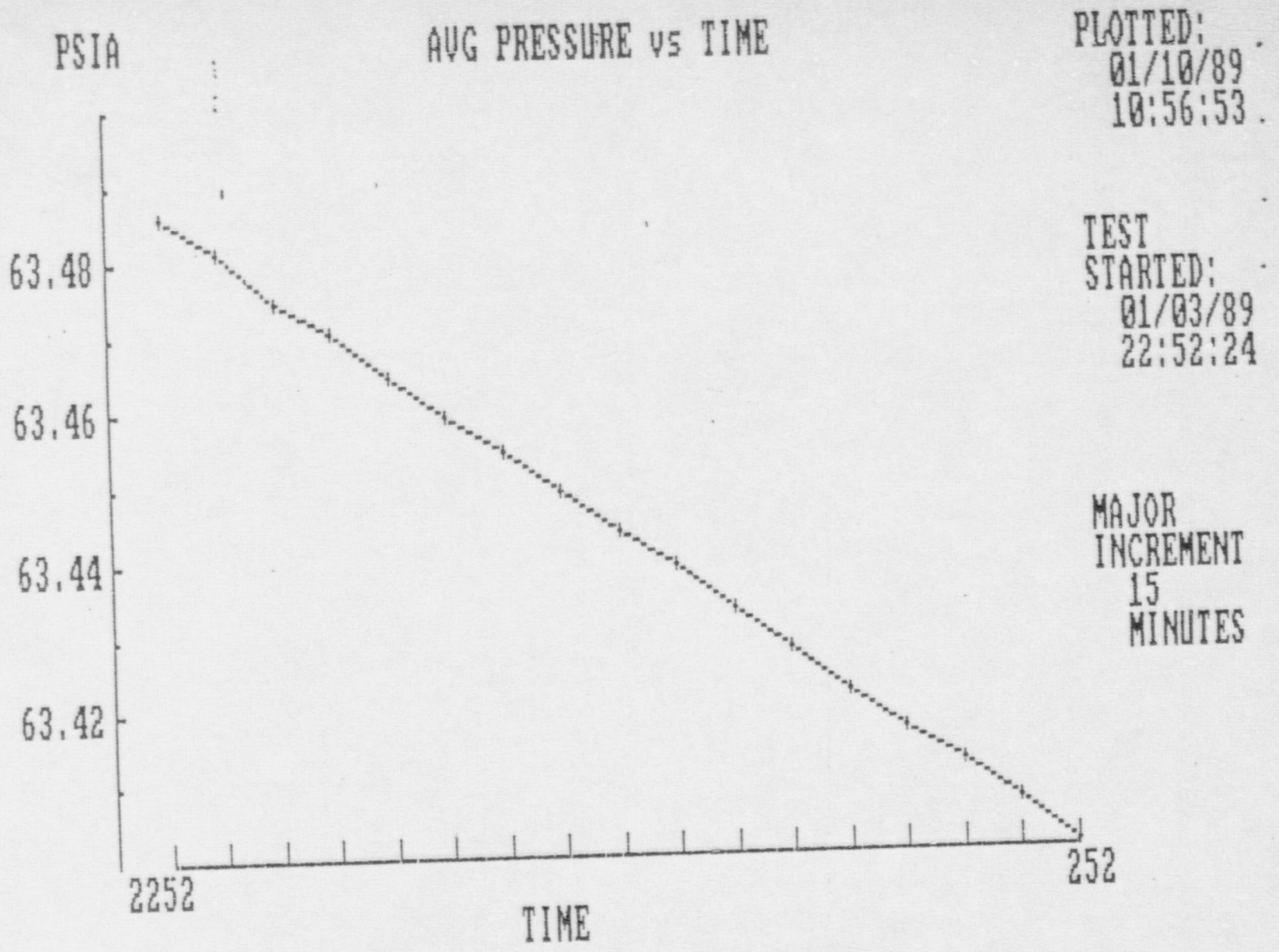
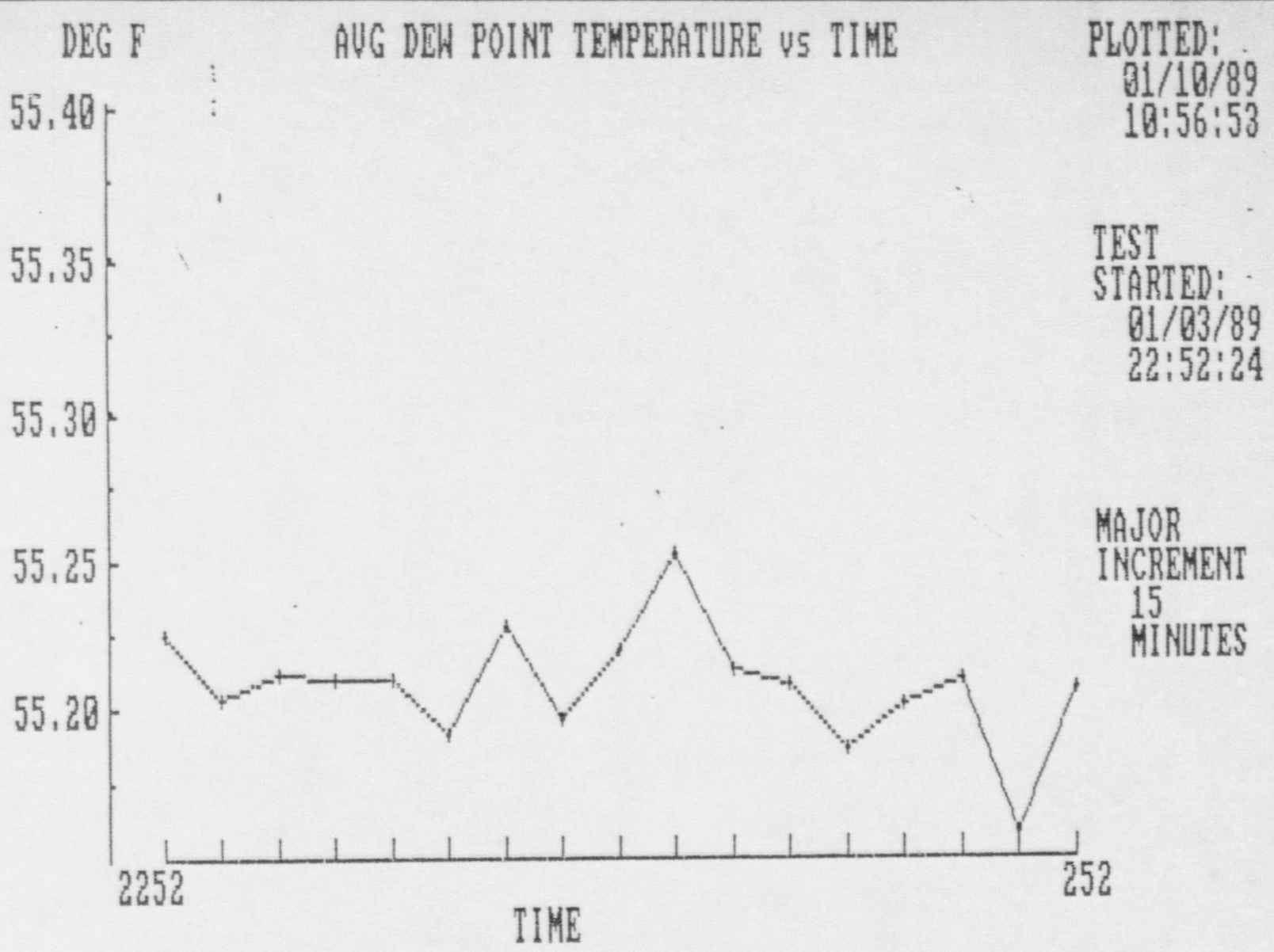
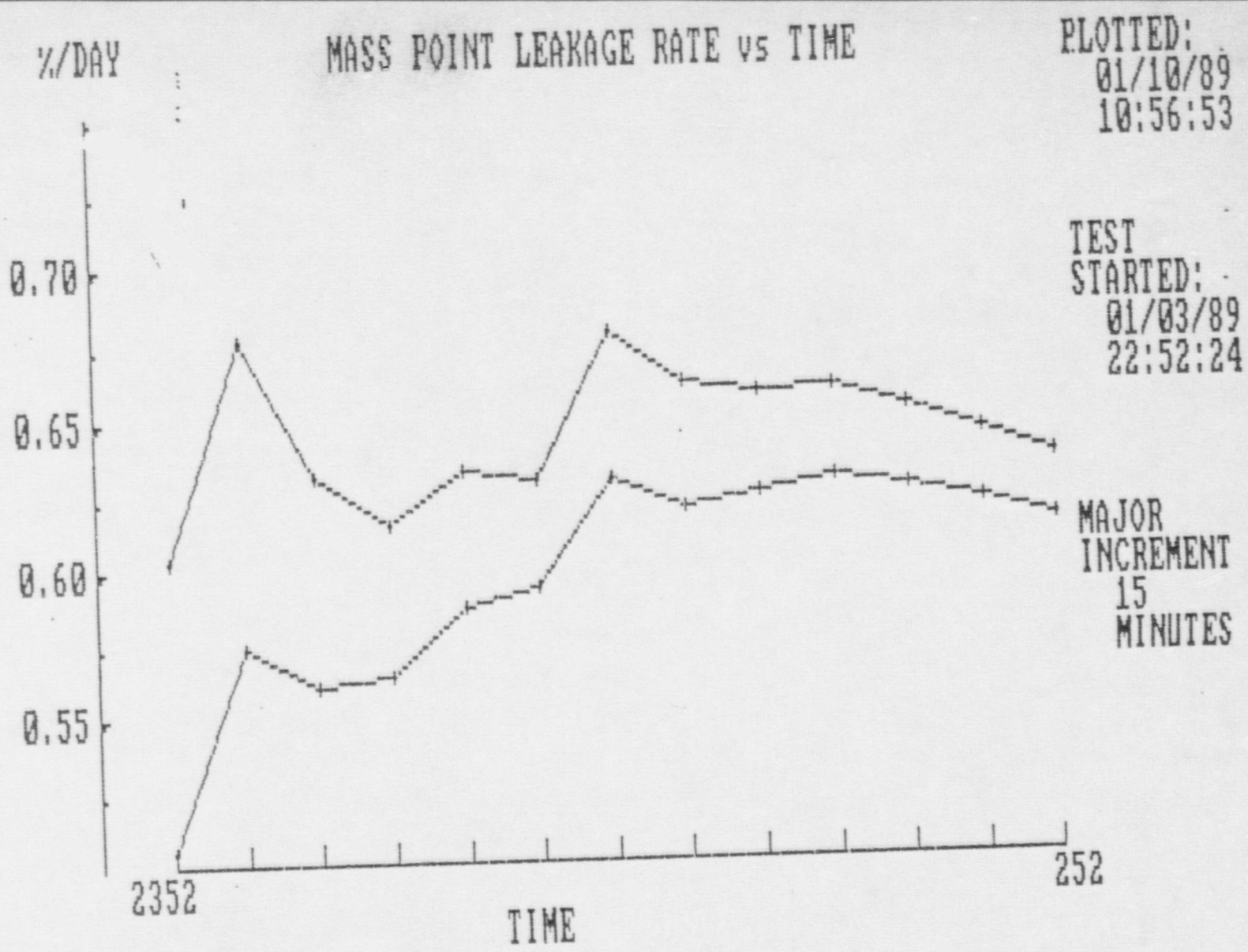
PEACH BOTTOM UNIT #2
SUPERIMPOSED PHASE



PHILADELPHIA ELECTRIC CO.
PEACH BOTTOM UNIT #2
SUPERIMPOSED PHASE



PHILADELPHIA ELECTRIC CO.
PEACH BOTTOM UNIT #2
SUPERIMPOSED PHASE



PHILADELPHIA ELECTRIC CO.
PEACH BOTTOM UNIT #2
SUPERIMPOSED PHASE

APPENDIX D

COMPUTER RESULTS

INTEGRATED LEAK RATE TEST RESULTS

by GILBERT/SERVICES INC.

CURRENT DATE : 01-24-1989

*** MASS POINT ANALYSIS ***

*** ILRT ***

FROM 2236 (01/02/89) TO 2236 (01/03/89)

TIME INTERVAL	OBS. WEIGHT (LB)	OBS. MIN. CALC. (LB)
0	96038.06	27.89603
.25	96037.92	29.8433
.5	96028.65	22.64994
.75	96027.27	23.35502
1	96023.2	21.35698
1.25	96021.57	21.81206
1.5	96014.45	16.77495
1.75	96010.84	15.24565
2	96013.91	20.38823
2.25	96008.38	16.94487
2.5	96001.84	12.47808
2.75	95998.31	11.02691
3	95994.26	9.060113
3.25	95990.59	7.47613
3.5	95989.47	8.43121
3.75	95980.66	1.698789
4	95980.45	3.567931
4.25	95985.7	10.89801
4.5	95972.12	-.6000351
4.75	95969.91	-.7230805
5	95966.76	-1.799251
5.25	95962.27	-4.203547
5.5	95960.34	-4.053155
5.75	95954.55	-7.76995
6	95956.52	-3.713308
6.25	95944.18	-13.97698
6.5	95947.56	-8.514086
6.75	95937.71	-16.28557
7	95934.22	-17.69768
7.25	95938.31	-11.52385
7.5	95932.91	-14.84221
7.75	95939.41	-6.262126
8	95931.67	-11.92423
8.25	95923.56	-17.96134
8.5	95931.86	-7.576575
8.75	95922.1	-15.25431
9	95925.49	-9.783603
9.25	95920.2	-13.0004
9.5	95917.5	-13.61563
9.75	95913.35	-15.68399
10	95915.44	-11.51797
10.25	95912.46	-12.41446
10.5	95907.09	-15.70938
10.75	95902.92	-17.79336
11	95905.42	-13.21328

TIME INTERVAL	OBS. WEIGHT (LB)	OBS. MIN. CALC. (LB)
11.25	95894.98	-21.5707
11.5	95904.88	-9.592182
11.75	95900.02	-12.37148
12	95901.15	-9.166398
12.25	95897.7	-10.53944
12.5	95890.5	-15.65468
12.75	95894.94	-9.137097
13	95892.99	-9.00233
13.25	95888.21	-11.7035
13.5	95889.65	-8.185921
13.75	95883.55	-12.2074
14	95884.48	-9.197637
14.25	95881.83	-9.765995
14.5	95884.31	-5.20154
14.75	95876.18	-11.25427
15	95879.02	-6.338256
15.25	95877.91	-5.367551
15.5	95872.71	-8.482784
15.75	95875.04	-4.07458
16	95871.85	-5.182
16.25	95870.56	-4.398796
16.5	95869.27	-3.607779
16.75	95867.21	-3.582387
17	95868.24	-.4710569
17.25	95862.96	-3.672227
17.5	95860.87	-3.685898
17.75	95858.59	-3.887068
18	95861.36	.9664488
18.25	95855.33	-2.984722
18.5	95857.42	1.189108
18.75	95855.56	1.402
19	95852.9	.8258296
19.25	95849.75	-.2425284
19.5	95855.83	7.915676
19.75	95853.61	7.777006
20	95854.63	10.87271
20.25	95848.03	6.35904
20.5	95850.68	11.08756
20.75	95842.59	5.073886
21	95843.52	8.083654
21.25	95844.22	10.86686
21.5	95841.81	10.54069
21.75	95838.98	9.72483
22	95836.41	9.294897
22.25	95835.56	10.52311

TIME INTERVAL	OBS. WEIGHT (LB)	OBS. MIN. CALC. (LB)
22.5	95832.36	9.407881
22.75	95836.35	15.48015
23	95839.44	20.64617
23.25	95830.97	14.25749
23.5	95830.8	16.1657
23.75	95829.23	16.67547
24	95832.31	21.84148

W0 = 96010.15865473122 LB
W1 = -8.320318252945508 LB/HR

LEAKAGE RATE = .207986 % PER DAY *
THE 95% UPPER CONFIDENCE INCREMENT = 7.467175E-03 % PER DAY
UPPER LIMIT OF THE 95% CONFIDENCE LEVEL = .2154531 % PER DAY *

* RATE IS < 75% OF LA (.375)

INTEGRATED LEAK RATE TEST RESULTS

by GILBERT/SERVICES INC.

CURRENT DATE : 01-24-1989

*** MASS POINT ANALYSIS ***

*** ILRT ***

FROM 2252 (01/03/89) TO 252 (01/04/89)

TIME INTERVAL	OBS. WEIGHT (LB)	OBS. MIN. CALC. (LB)
0	95819.54	-1.898744
.25	95814.81	-.4854473
.5	95809.88	.7325368
.75	95802.47	-.5260417
1	95800.48	3.637255
1.25	95789.49	-1.207261
1.5	95787.23	2.682598
1.75	95780.58	2.17402
2	95771.73	-.5298713
2.25	95766.83	.7193627
2.5	95753.69	-6.273591
2.75	95755.42	1.608456
3	95746.09	-1.571998
3.25	95738.81	-2.705576
3.5	95735.16	-.2063419
3.75	95730.33	1.105392
4	95725.82	2.745251

W0 = 95821.43780637255 LB

W1 = -24.590686274509 8 LB/HR

LEAKAGE RATE = .6159128 % PER DAY

THE 95% UPPER CONFIDENCE INCREMENT = 2.160389E-02 % PER DAY

UPPER LIMIT OF THE 95% CONFIDENCE LEVEL = .6375167 % PER DAY

* RATE IS < 75% OF LA (.375)

APPENDIX E

SUMMARY OF LEAKAGE

RATE RESULTS

01-24-1989

*** SUMMARY OF LEAK RATE RESULTS ***

*** ILRT ***

FOR : PHILAELPHIA ELECTRIC CO.
PEACH BOTTOM
UNIT :2

FROM 2236 (01/02/89) TO 2236 (01/03/89)

TIME	MASS WEIGHT	TOTAL TIME	< 24 UCL	> 24 UCL	MASS POINT	UCL
2236	96038.055					
2251	96037.922					
2306	96028.648					
2321	96027.273					
2336	96023.195	0.4480	1.4095	0.9193	0.4035	0.5703
2351	96021.570	0.4155	1.0933	0.7344	0.3655	0.4748
6	96014.453	0.4292	0.9470	0.6663	0.3890	0.4670
21	96010.844	0.4332	0.8651	0.6256	0.3964	0.4531
36	96013.906	0.3980	0.7975	0.5710	0.3531	0.4170
51	96008.383	0.3845	0.7451	0.5363	0.3418	0.3933
106	96001.836	0.3859	0.7125	0.5197	0.3499	0.3922
121	95998.305	0.3863	0.6866	0.5060	0.3547	0.3899
136	95994.258	0.3872	0.6663	0.4957	0.3592	0.3891
151	95990.594	0.3877	0.6494	0.4869	0.3623	0.3878
206	95989.469	0.3832	0.6313	0.4751	0.3580	0.3804
221	95980.656	0.3881	0.6231	0.4732	0.3667	0.3881
236	95980.445	0.3867	0.6111	0.4662	0.3659	0.3847
251	95985.695	0.3742	0.5934	0.4502	0.3497	0.3730
306	95972.117	0.3758	0.5860	0.4472	0.3540	0.3752
321	95969.914	0.3756	0.5780	0.4429	0.3552	0.3743
336	95966.758	0.3749	0.5703	0.4387	0.3556	0.3728
351	95962.273	0.3750	0.5640	0.4356	0.3570	0.3727
406	95960.344	0.3737	0.5572	0.4316	0.3563	0.3706
421	95954.547	0.3742	0.5523	0.4294	0.3580	0.3711
436	95956.523	0.3709	0.5447	0.4239	0.3542	0.3668
451	95944.180	0.3735	0.5425	0.4242	0.3587	0.3712
506	95947.563	0.3716	0.5367	0.4204	0.3567	0.3684
521	95937.711	0.3733	0.5344	0.4201	0.3598	0.3711
536	95934.219	0.3746	0.5319	0.4197	0.3622	0.3729
551	95938.313	0.3722	0.5266	0.4158	0.3592	0.3696
606	95932.914	0.3709	0.5222	0.4131	0.3578	0.3677
621	95939.414	0.3657	0.5154	0.4069	0.3510	0.3624
636	95931.672	0.3628	0.5100	0.4028	0.3475	0.3588
651	95923.555	0.3618	0.5064	0.4006	0.3470	0.3576
706	95931.859	0.3571	0.5001	0.3949	0.3410	0.3526
721	95922.102	0.3548	0.4956	0.3916	0.3388	0.3499
736	95924.492	0.3508	0.4899	0.3867	0.3340	0.3455
751	95920.195	0.3477	0.4850	0.3828	0.3307	0.3421
806	95917.500	0.3448	0.4803	0.3790	0.3277	0.3388
821	95913.352	0.3424	0.4760	0.3757	0.3254	0.3362
836	95915.438	0.3389	0.4710	0.3715	0.3216	0.3325
851	95912.461	0.3357	0.4662	0.3676	0.3182	0.3291
906	95907.086	0.3332	0.4621	0.3644	0.3160	0.3266
921	95902.922	0.3312	0.4584	0.3616	0.3143	0.3246
936	95905.422	0.3282	0.4540	0.3580	0.3113	0.3215

01-24-1989

*** SUMMARY OF LEAK RATE RESULTS ***

*** ILRT ***

FOR : PHILAELPHIA ELECTRIC CO.
PEACH BOTTOM
UNIT :2

FROM 2236 (01/02/89) TO 2236 (01/03/89)

TIME	MASS WEIGHT	TOTAL TIME	< 24 UCL	> 24 UCL	MASS POINT	UCL
951	95894.984	0.3268	0.4511	0.3560	0.3106	0.3204
1006	95904.883	0.3232	0.4463	0.3518	0.3066	0.3168
1021	95900.023	0.3202	0.4421	0.3482	0.3035	0.3137
1036	95901.148	0.3167	0.4375	0.3442	0.2998	0.3102
1051	95897.695	0.3136	0.4333	0.3406	0.2966	0.3070
1106	95890.500	0.3113	0.4297	0.3378	0.2947	0.3049
1121	95894.938	0.3081	0.4255	0.3342	0.2914	0.3017
1136	95892.992	0.3050	0.4214	0.3306	0.2883	0.2986
1151	95888.211	0.3024	0.4176	0.3276	0.2858	0.2961
1206	95889.648	0.2994	0.4136	0.3241	0.2829	0.2932
1221	95883.547	0.2971	0.4102	0.3213	0.2808	0.2909
1236	95884.477	0.2944	0.4065	0.3182	0.2782	0.2883
1251	95881.828	0.2919	0.4029	0.3153	0.2759	0.2859
1306	95884.313	0.2889	0.3991	0.3120	0.2730	0.2830
1321	95876.180	0.2867	0.3959	0.3094	0.2712	0.2810
1336	95879.016	0.2841	0.3923	0.3064	0.2687	0.2785
1351	95877.906	0.2814	0.3888	0.3034	0.2662	0.2760
1406	95872.711	0.2792	0.3857	0.3008	0.2643	0.2739
1421	95875.039	0.2766	0.3822	0.2979	0.2618	0.2715
1436	95871.852	0.2742	0.3790	0.2952	0.2597	0.2693
1451	95870.555	0.2719	0.3758	0.2925	0.2575	0.2671
1506	95869.266	0.2695	0.3726	0.2899	0.2554	0.2649
1521	95867.211	0.2673	0.3695	0.2873	0.2534	0.2628
1536	95868.242	0.2648	0.3663	0.2846	0.2511	0.2605
1551	95862.961	0.2627	0.3634	0.2822	0.2494	0.2586
1606	95860.867	0.2607	0.3607	0.2800	0.2477	0.2569
1621	95858.586	0.2588	0.3580	0.2778	0.2462	0.2552
1636	95861.359	0.2566	0.3550	0.2753	0.2442	0.2531
1651	95855.328	0.2548	0.3524	0.2732	0.2427	0.2516
1706	95857.422	0.2527	0.3497	0.2709	0.2409	0.2497
1721	95855.555	0.2507	0.3470	0.2687	0.2392	0.2479
1736	95852.898	0.2488	0.3444	0.2665	0.2376	0.2462
1751	95849.750	0.2471	0.3420	0.2646	0.2362	0.2447
1806	95855.828	0.2449	0.3391	0.2621	0.2341	0.2427
1821	95853.609	0.2428	0.3364	0.2598	0.2322	0.2407
1836	95854.625	0.2406	0.3335	0.2574	0.2301	0.2386
1851	95848.031	0.2387	0.3311	0.2553	0.2285	0.2370
1906	95850.680	0.2367	0.3284	0.2531	0.2266	0.2351
1921	95842.586	0.2350	0.3262	0.2512	0.2254	0.2337
1936	95843.516	0.2333	0.3238	0.2493	0.2239	0.2322
1951	95844.219	0.2315	0.3214	0.2473	0.2224	0.2306
2006	95841.813	0.2297	0.3191	0.2454	0.2209	0.2290
2021	95838.977	0.2281	0.3169	0.2436	0.2196	0.2276
2036	95836.406	0.2266	0.3148	0.2418	0.2184	0.2263
2051	95835.555	0.2250	0.3128	0.2401	0.2172	0.2250

01-24-1989

*** SUMMARY OF LEAK RATE RESULTS ***

*** ILRT ***

FOR : PHILAELPHIA ELECTRIC CO.
PEACH BOTTOM
UNIT :2

FROM 2236 (01/02/89) TO 2236 (01/03/89)

TIME	MASS WEIGHT	TOTAL TIME	< 24 UCL	> 24 UCL	MASS POINT	UCL
2106	95832.359	0.2236	0.3108	0.2385	0.2161	0.2239
2121	95836.352	0.2219	0.3086	0.2367	0.2147	0.2224
2136	95839.438	0.2201	0.3063	0.2347	0.2130	0.2207
2151	95830.969	0.2186	0.3043	0.2331	0.2118	0.2195
2206	95830.797	0.2171	0.3023	0.2314	0.2106	0.2182
2221	95829.227	0.2157	0.3003	0.2298	0.2094	0.2169
2236	95832.313	0.2140	0.2982	0.2280	0.2080	0.2155

01-24-1989

*** SUMMARY OF LEAK RATE RESULTS ***

*** ILRT ***

FOR : PHILAELPHIA ELECTRIC CO.
PEACH BOTTOM
UNIT :2

FROM 2252 (01/03/89) TO 252 (01/04/89)

TIME	MASS WEIGHT	TOTAL TIME	< 24 UCL	> 24 UCL	MASS POINT	UCL
2252	95819.539					
2307	95814.805					
2322	95809.875					
2337	95802.469					
2352	95800.484	0.5157	0.7880	0.6492	0.5054	0.6044
7	95789.492	0.5713	0.7746	0.6669	0.5742	0.6773
22	95787.234	0.5664	0.7331	0.6427	0.5615	0.6320
37	95780.578	0.5713	0.7101	0.6331	0.5650	0.6158
52	95771.727	0.5909	0.7106	0.6428	0.5881	0.6340
107	95766.828	0.5988	0.7058	0.6438	0.5945	0.6311
122	95753.688	0.6289	0.7319	0.6711	0.6308	0.6793
137	95755.422	0.6258	0.7299	0.6673	0.6209	0.6621
152	95746.094	0.6317	0.7297	0.6698	0.6252	0.6600
207	95738.813	0.6382	0.7309	0.6734	0.6308	0.6610
222	95735.164	0.6382	0.7299	0.6722	0.6279	0.6540
237	95730.328	0.6360	0.7281	0.6693	0.6228	0.6461
252	95725.820	0.6319	0.7254	0.6650	0.6159	0.6375

APPENDIX F

AS FOUND ILRT

CALCULATIONS

Leakage Savings Data

All Type 'C' LLRTs are included due to the extended length of the outage.

Type C Tests

Pen No.		NOTES	
7A	A0-1A-080A	As Found	10
	A0-1A-086A	As Left	452
		Savings	0
7B	A0-1A-080B	As Found	10
	A0-1A-086B	As Left	1984
		Savings	0
7C	A0-1A-080C	As Found	10
	A0-1A-086C	As Left	280
		Savings	0
7D	A0-1A-080D	As Found	10
	A0-1A-086D	As Left	2319
		Savings	0
8	M0-1A-074	As Found	10000[1]
	M0-1A-077	As Left	10
		Savings	9990
9A	M0-23-019; M0-6-038A	As Found	603
	Check Valves 6-028A and 6-096A	As Left	581
		Savings	22
9B	M0-13-021; M0-6-038B; M0-12-068	As Found	1110
	Check Valves 6-028B and 6-096B	As Left	372
		Savings	738
10	M0-13-015	As Found	120
	M0-13-016	As Left	13
		Savings	107
11	M0-23-015	As Found	280
	M0-23-016	As Left	100
	A0-4807	Savings	180
12	M0-10-018	As Found	123
	M0-10-017	As Left	242
		Savings	0
13A	M0-10-025B; A0-10-154B	As Found	87
		As Left	1582
		Savings	0
13B	M0-10-025A; A0-10-154A	As Found	21
		As Left	20
		Savings	1
14	M0-12-015;	As Found	94
	M0-12-018;	As Left	80
		Savings	14

1. As-Found data is not available for this penetration. 10,000 sccm has been assigned as a conservative as-found leakage. See attached discussion for details.

Pen No.		NOTES	
16A	MO-14-012B; AO-14-011B;	As Found As Left Savings	20 20 0
16B	MO-14-012A; AO-14-011A;	As Found As Left Savings	20 300 0
17	MO-10-032 MO-10-033	As Found As Left Savings	28 56 0
18	AO-20-082 AO-20-083	As Found As Left Savings	67 10 57
19	AO-20-094 AO-20-095	As Found As Left Savings	2162 10 2152
21	Service Air System Inner Globe Valve(36A-20165) Service Air System Outer Globe Valve(36A-20163)	As Found As Left Savings	10 10 0
22	AO-2969A Check Valve(16-23202A)	As Found As Left Savings	10 10 0
23	MO-2373	As Found As Left Savings	72 35 37
24	MO-2374	As Found As Left Savings	290 30 260
25, 205B	AO-2502A ;AO-2505 AO-2519 ;AO-2520 AO-2521A ;AO-2521B AO-2523 ;Check Valve 9-026A; Two Check Valves(9-40095A, 9-40095B)	As Found As Left Savings	680 463 217
26	AO-2506;AO-2507 AO-2509 ;AO-2510 SV-2671G ;SV-2978G AO-4235 ;SV-4960B SV-4961B ;SV-4966B SV-8100 ;SV-8101	As Found As Left Savings	61 88 0
32C	ILRT System, Two Globe Valves (7A-29871, 7A-29872)	As Found As Left Savings	10 10 0
32D	ILRT System, Two Globe Valves (7A-29873, 7A-29874)	As Found As Left Savings	120 10 110
35A to E	TIP Ball Valves(7E-104A to E) Tip Shear Valves(7E-102A to E)	As Found As Left Savings	255 522 0

Pen No.			NOTES
35F	SV-7E-109; Check Valve(7E-41504)	As Found	20
		As Left	20
		Savings	0
38	CV-3-032A; CV-3-032B; CV-3-033	As Found	1394
	CV-3-035A; CV-3-035B; CV-3-036	As Left	256
	CRD Withdrawal; HCU	Savings	1138
39A	M0-10-031B ;M0-10-026B	As Found	1816
	SV-4949B ;Check Valve(7C-40143)	As Left	60
		Savings	1756
39B	M0-10-031A ;M0-10-026A	As Found	181
	SV-4949A ;Check Valve(7C-40142)	As Left	250
		Savings	0
41	A0-2-039	As Found	10
	A0-2-040	As Left	10
		Savings	0
42	Check Valve 11-016	As Found	10
	XV-014A,B	As Left	10
		Savings	0
47	SV-8130B	As Found	30
	Check Valve(16A-23299B)	As Left	20
		Savings	10
51A	SV-2671E	As Found	20
	SV-2978E	As Left	20
		Savings	0
51B	SV-2671D	As Found	20
	SV-2978D	As Left	20
		Savings	0
51C	SV-2671C ;SV-2978C	As Found	50
	SV-4960C ;SV-4961C	As Left	40
	SV-4966C ;	Savings	10
51D	SV-2980	As Found	630
	Check Valve(16-23202B)	As Left	32
		Savings	598
52F	A0-2969B	As Found	20
	Check Valve(16-23202A)	As Left	20
		Savings	0
53	M0-2201B	As Found	860
		As Left	448
		Savings	412
54	M0-2200B	As Found	20
		As Left	974
		Savings	0
55	M0-2200A	As Found	40
		As Left	1171
		Savings	0

Pen No.			NOTES
56	MO-2201A	As Found	3658
		As Left	591
		Savings	3067
57	AO-1J-316	As Found	10
	AO-1J-317	As Left	10
		Savings	0
102B	SV-8130A ;	As Found	340
	Check Valve(16A-23299A)	As Left	290
		Savings	50
203	SV-2671B ; SV-2978B ;	As Found	155
	SV-4960D ; SV-4961D ;	As Left	40
	SV-4966D ;	Savings	115
205A	AO-2502B ;	As Found	10
	Check Valve 9-026B	As Left	175
		Savings	0
210A	MO-10-034B; MO-10-038B	As Found	7892
211A	MO-10-039B; SV-4951B	As Left	2205
		Savings	5660
210B	MO-10-034A; MO-10-038A	As Found	1270
211B	MO-10-039A; SV-4951A ;	As Left	336
		Savings	934
212,	MO-4244	As Found	44
214,	AO-4240 ; AO-4241 ;	As Left	10
217B	Check Valve 13-050; Check Valve 23-065	Savings	34
	MO-4244A ;	As Found	56
	AO-4247 ; AO-4248 ;	As Left	63
	Check Valve 13-009; Check Valve 23-012	Savings	0
218A	AO-2968 ;	As Found	100
	Check Valve(16-23261)	As Left	20
		Savings	80
218B	SV-2671A	As Found	20
	SV-2978A	As Left	20
		Savings	0
218C	ILRT System-Two Globe Valves	As Found	10
	(7A-29875, 7A-29876)	As Left	10
		Savings	0
219	AO-2511 ; AO-2512 ;	As Found	452
	AO-2513 ; AO-2514 ;	As Left	220
	SV-2671F ; SV-2978F ;	Savings	232
	SV-4960A ; SV-4961A ;		
	SV-4966A ;		
221	Check Valve 13-038	As Found	47
		As Left	20
		Savings	27
223	Check Valve 23-056	As Found	1243
		As Left	136
		Savings	1107

Pen No.			NOTES
225	MO-14-071; MO-13-039 MO-13-041; MO-14-070	As Found As Left Savings	463 130 333
227	MO-23-057 MO-23-058	As Found As Left Savings	21 375 0
234	PASS Check Valve (14-40244)	As Found As Left Savings	20 210 0

Packing LLRTs

210A	MO-10-034B;	As Found As Left Savings	3400 10 3390
210B	MO-10-034A;	As Found As Left Savings	10 10 0
211A	MO-10-038B;	As Found As Left Savings	10 60 0
211B	MO-10-038A;	As Found As Left Savings	400 10 390

Type B Tests

-	Drywell Head (Remove and Reinstall 'O-Ring')	As Found As Left Savings	423 10 413
-	RPV Stabalizer Manways	As Found As Left Savings	210 80 130
1	Equipment Hatch (Remove and Reinstall 'O-Ring')	As Found As Left Savings	10 22 0
2	Airlock (Remove and Reinstall 'O-Ring')	As Found As Left Savings	2618 6774 0
6	CRD Hatch (Remove and Reinstall 'O-Ring')	As Found As Left Savings	10 10 0
200A	Torus Hatch (Remove and Reinstall 'O-Ring')	As Found As Left Savings	10 10 0
200B	Torus Hatch (Remove and Reinstall 'O-Ring')	As Found As Left Savings	10 10 0

TOTAL SAVINGS 33,896 sccm
% LEAKAGE 0.135%
ILRT AS FOUND 0.368%

PENETRATION N-8 DISCUSSION

Due to the problems encountered at the beginning of this refuel outage an As-Found leakage was not obtained on penetration N-8, Main Steam Line Drains. The assumption has been made that the MO-77 leakage was minimal prior to the troubleshooting done on 4/4/87 and conservative leakage of 10,000 cc/min has been assigned to this penetration. The actual leakage was most likely much less. This assumption is based on the following:

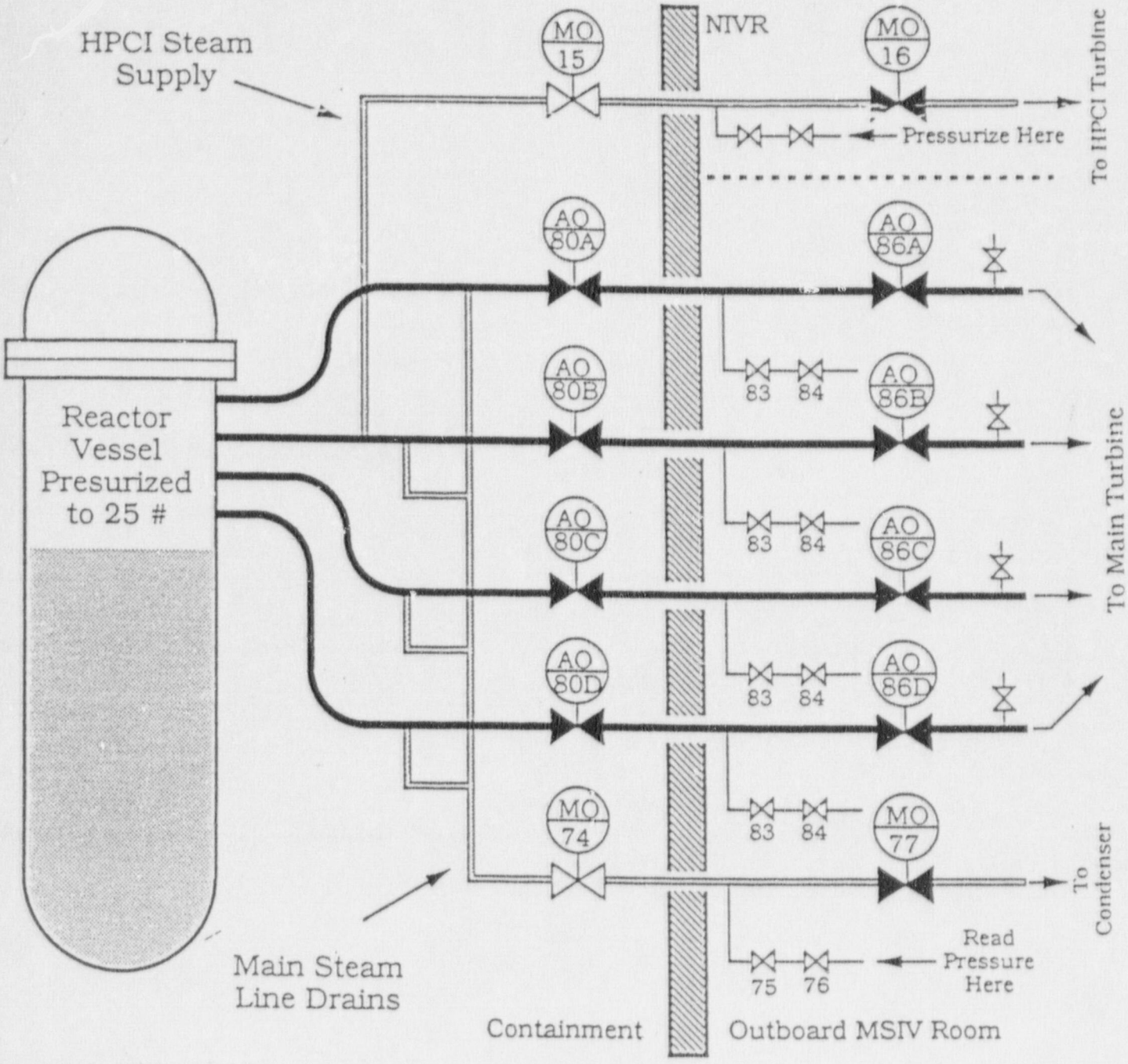
- The MO-77 was a tight boundary during the MSIV Local Rate test conducted on 3/14/87. This test involves pressurizing the reactor vessel to 25.1 pounds. The inboard MSIV's, HPCI Steam Supply, RCIC Steam Supply, and the Main Steam Line Drains are all part of the pressure boundary (See Figure 1, next page). In past tests it was always necessary to maintain flow with the pressurizing system in order to maintain test pressure due to leakage of the different boundaries. During the test conducted on 3/14/87 make-up flow was stopped for as much as fifteen minutes at times indicating that the boundary valves were tight.

- The LLRT performed on the MO-77 on 4/4/87 (prior to the troubleshooting) involved closing the valve manually prior to the test. The valve could not be closed under its own power due to a wiring problem and was closed by hand until it felt "snug". This test resulted in a leakage rate of 350 cc/min for the MO-77 valve.

- The MO-77 and MO-74 are new valves that were installed under MOD 1117 during the last Refuel outages on both Units 2 and 3. The as-left test result for Unit 2 was 221 cc/min. There have been 3 LLRTs performed on the Unit 3 valves, all of which resulted in a leakage of less than 600 cc/min.

These three items indicate that the MO-77 did not have a significant amount of leakage at the end of the operating cycle. An estimation would be less than 1,000 cc/min. This estimate has been increased by a factor of ten in order to be conservative.

MSIV LLRT



Valve alignment for the
Main Steam Isolation Valve
Local Leak Rate Test

Figure 1.

drs 89

APPENDIX G

TYPE B AND C

TEST RESULTS

APPENDIX G
PEACH BOTTOM UNIT 2
TYPE B TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
--	Drywell Head		3/14/87	423 ±50	
			12/16/88	10 ±10	
					10
--	Rpv stabilizer		5/2/87	210 ±50	
	Assy's (A thru H)		7/19/88	80 ±10	
					80
N-1	Equipment Access Hatch		3/14/87	10 ±10	
			6/27/88	22 ±10	
					22
N-2	Personnel Airlock		9/29/85	1579 ±450	
			10/20/85	628 ±50	
			12/25/85	1828 ±450	
			1/19/86	1953 ±450	
			2/7/86	1039 ±450	
			3/20/86	1300 ±450	
			6/26/86	1039 ±450	
			8/27/86	2217 ±450	
			10/20/86	1560 ±450	
			3/4/87	2598 ±450	
			12/31/88	6754 ±450	
	Airlock "O" Ring		3/15/87	20 ±10	
			6/27/88	20 ±10	
					6774
N-4	Head Access		4/30/8[illegible]	1[illegible] ±10	
			8/18/88	1[illegible] ±10	
					10
N-6	CRD Hatch		2/4/86	10 ±10	
			8/15/86	10 ±10	
			3/14/87	10 ±10	
			12/21/88	10 ±10	
					10
N-7A	Main Steam Line	*1-total for N-7A,7B	3/24/87	40 ±10	
	Bellows	7C,7D,9A, and 9B, is	6/9/88	773 ±50	
		reported under N-7A			773

APPENDIX G

PEACH BOTTOM UNIT 2
TYPE B TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-7B	Main Steam Line			*1	
	Bellows				
N-7C	Main Steam Line			*1	
	Bellows				
N-7D	Main Steam Line			*1	
	Bellows				
N-9A	Feedwater Line			*1	
	Bellows				
N-9B	Feedwater Line			*1	
	Bellows				
N-11	HPCI Steam line	*2-total for N-11,12	3/17/87	330 ± 50	
	Bellows	,13A,&16A is	6/16/88	265 ± 50	
		reported under N-11			265
N-12	RHR Suction Line			*2	
	Bellows				
N-13A	RHR Suction Line			*2	
	Bellows				
N-13B	RHR Injection LIne	*3-total for N-13B,	3/17/87	10 ± 10	
	Bellows	14,16B, and 17 is	6/7/88	10 ± 10	
		reported under N-13B			10
N-14	RWCU Suction Line			*3	
	Bellows				
N-16A	Core Spray Bellows			*2	

APPENDIX G

PEACH BOTTOM UNIT 2

TYPE B TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-16B	Core Spray Bellows			*3	
N-17	Head Spray Bellows			*3	
N-25	AO-2505,2519,2520		3/16/87	30 ± 10	
			12/2/87	30 ± 10	
			9/13/88	30 ± 10	
					30
N-26	AO-2507,2506		3/16/87	20 ± 10	
			9/8/87	20 ± 10	
			9/9/88	10 ± 10	
					10
N-35A-G	Tip Penetration		3/22/87	10 ± 10	
	"O" Rings		6/13/88	10 ± 10	
					10
N-100A	Electrical	*4-total for N-100A	3/24/87	70 ± 10	
		100C,104A,104B	6/10/88	10 ± 10	
		104C,104D,105A			10
		105B,106A,106B			
		107 & 220 is			
		reported under N-100A			
N-100C	Electrical			*4	
N-100D	Electrical	*5-total for N-100D	3/17/87	20 ± 10	
		100E,101C,101D,	6/8/88	20 ± 10	
		101E,103B,104B,			20
		104F,104G,104H,			
		105C,105D,106C,			
		106D is reported			
		under N-100D			
N-100E	Electrical			*5	

APPENDIX G
PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-7A	MSIV 80A and 86A	Total Boundary	3/14/87	3352±450	
		Total Boundary	6/11/87	3040±450	
		Total Boundary	8/11/88	913±50	
					913
N-7B	MSIV 80B and 86B	80B	3/14/87	30±10	
		86B	3/14/87	130000±450	
		86B	3/25/87	6429±450	
		Total Boundary	5/16/87	Off scale	
		Total Boundary	5/20/87	Off scale	
		86B	6/3/87	533±50	
		Total Boundary	6/11/87	Off scale	
		Total Boundary	6/19/87	Off scale	
		Total Boundary	6/29/87	Off scale	
		Total Boundary	6/30/87	Off scale	
		Total Boundary	7/6/87	Off scale	
		86B	7/7/87	640±50	
		Total Boundary	7/10/87	1956±450	
		Total Boundary	3/16/88	Off scale	
		Total Boundary	8/11/88	Off scale	
		86B	8/19/88	628±50	
		Total Boundary	8/29/88	Off scale	
		Total Boundary	8/30/88	Off scale	
		80B	10/15/88	Off scale	
		86B	10/17/88	903±50	
		80B	10/21/88	1279±450	
		Total Boundary	10/23/88	Off scale	
		Total Boundary	10/26/88	Off scale	
		Total Boundary	10/27/88	Off scale	
		Total Boundary	10/29/88	3009±450	
		Total Boundary	10/30/88	3968±450	
					3968

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-7C	MSIV 80C and 86C	Total Boundary	3/14/87	2016±450	
		Total Boundary	5/16/87	2257±450	
		Total Boundary	8/11/88	Off scale	
		86C	8/20/88	Off scale	
		86C	9/7/88	119±50	
		86C	9/13/88	143±50	
		Total Boundary	10/12/88	Off scale	
		Total Boundary	10/13/88	Off scale	
		86C	10/14/88	287±50	
		80C	10/18/88	Off scale	
		80C	10/30/88	Off scale	
		Total Boundary	11/1/88	2182±450	
		Total Boundary	11/2/88	560±50	
					560
N-7D	MSIV 80D and 86D	Total Boundary	3/14/87	1418±450	
		Total Boundary	6/11/87	1656±450	
		Total Boundary	8/11/88	4638±450	
					4638
N-8	Main Steam Line Drain	Total Boundary	6/20/86	Not Quantified	
		Total Boundary	6/22/86	221±50	
		Total Boundary	3/14/87	Off scale	
		Total Boundary	3/16/87	Off scale	
		Total Boundary	4/5/87	Off scale	
		Total Boundary	4/6/87	1001±450	
		Total Boundary	4/7/87	Off scale	
		Total Boundary	7/1/87	Off scale	
		MO-74	8/17/87	10±10	
		Total Boundary	9/18/87	Off scale	
		Total Boundary	9/23/87	10±10	
		Total Boundary	9/22/88	10±10	
		Total Boundary	12/7/88	5315±450	
		Total Boundary	12/9/88	Off scale	
		Total Boundary	12/10/88	220±50	
					220

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-9A	Feedwater Check 28A	28A	3/14/87	1504±450	
			3/22/87	1121±450	
			12/16/87	Off scale	
			12/17/87	7515±450	
			7/13/88	581±50	
	MO-6-29A,MO-6-38A		12/13/85	600±50	
	MO-23-19,Feed Check		8/20/86	15567±450	
	96A		3/24/86	395±50	
			3/22/87	613±50	
			5/15/87	Off scale	
			12/17/87	1041±450	
			7/13/87	2512±450	
	HPCI Pump Discharge		12/13/85	30±10	
			3/19/87	181±50	
			9/6/88	243±50	
					2512
N-9B	Feedwater Check 28B		8/10/86	4705±450	
			3/22/87	1120±450	
			12/17/87	1658±450	
			7/13/88	372±50	
	MO-6-38B,MO-13-21,		8/9/86	198219±450	
	MO-12-68,Feedwater,		8/12/86	6807±450	
	Check 96B		3/22/87	Off scale	
			4/1/87	717±50	
			4/5/87	1912±450	
			12/17/87	4057±450	
			7/13/88	1817±450	
	RCIC Pump Discharge		3/19/87	20±10	
			12/10/88	Off scale	
			12/16/88	10±10	
					1817

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-10	RCIC Steam Supply		6/20/86	Off scale	
			6/21/86	10886.±450	
			8/19/86	15943.±450	
			8/20/86	16192.±450	
			8/24/86	Off scale	
			8/25/86	65±10	
			3/14/87	220.±50	
			12/1/88	26±10	
					26
N-11	HPCI Steam Supply	MO-13-15 & 16	3/14/87	480.±50	
		Test Tap	11/3/88	200.±50	
					200
N-12	Shutdown Cooling		4/20/87	225.±50	
			6/6/87	485.±50	
			6/19/87	674.±50	
			6/10/88	20±10	
			11/9/88	391.±50	
			12/19/88	483.±50	
					483
N-13A	LPCI Injection		12/19/85	960.±50	
	MO-10-25B,		9/19/88	1582.±450	
	MO-10-154B,				
	SV-4222				
	MO-10-25B		4/22/87	2803.±450	
			7/9/87	20±10	
			9/19/88	2743.±450	
					2743

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-13B	LPCI Injection		8/15/85	20±10	
	MO-10-25A,		8/25/85	20±10	
	MO-10-154A				
	SV-4221				
	MO-10-25A		3/15/87	2370.±450	
			4/18/87	441.±50	
			11/6/87	800.±50	
			10/12/88	1401.±450	
	MO-10-154A &		3/15/87	21±10	
	SV-4221		4/18/87	1542.±450	
			10/12/88	10±10	
					1401
N-14	RWCU Suction		3/23/87	177.±50	
			7/11/87	20±10	
			6/25/88	149.±50	
					149
N-16A	Core Spray Injection	SV 4225 only	3/7/87	20±10	
			4/16/87	20±10	
			5/21/87	10±10	
			7/26/88	160±50	
					160
N-16B	Core Spray Injection	Total Boundary	8/12/86	600.±50	
		Total Boundary	3/16/87	10±10	
		12A & 14A	3/16/87	289.±50	
		Total Boundary	4/4/87	465.±50	
		Total Boundary	4/11/87	Off scale	
		Total Boundary	10/26/87	Off scale	
		Total Boundary	9/24/88	389.±50	
					389
N-17	Head Spray		12/7/85	30±10	
			3/20/87	28±10	
			10/13/88	120.±50	
			11/4/88	56±10	
					56

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-18	Drywell Floor Drain		8/9/86	16±10	
	Sump		3/24/87	86±10	
			10/23/87	657.±50	
			8/24/88	10±10	
					10
N-19	Drywell Equipment		8/8/86	823.±50	
	Drain Sump		3/25/87	1123.±450	
			10/26/87	219.±50	
			8/22/88	10±10	
					10
N-21	Service Air		6/6/85	10±10	
			7/1/85	10±10	
			3/26/87	20±10	
			6/1/88	82±10	
					82
N-22	Instrument Nitrogen				
	AO-2969A		8/8/86	20±10	
			8/10/86	20±10	
			3/16/87	81±10	
			7/21/87	145.±50	
			6/6/88	205.±50	
	Check Valve		8/8/86	Off scale	
			8/10/86	20±10	
			3/16/87	20±10	
			7/21/87	10±10	
			6/6/88	10±10	
					205
N-23	RBCW to/from Drywell		8/19/86	117.±50	
			4/7/87	72±10	
			6/24/87	118.±50	
			7/25/88	622.±50	
			8/23/88	539.±50	
			9/9/88	Off scale	
			9/13/88	Off scale	
			9/21/88	24±10	
					24

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-24	RBCW to/from Drywell		8/19/86	208.±50	
			4/7/87	280.±50	
			6/24/87	43±10	
			7/25/88	30±10	
					30
N-25	Drywell Purge Supply		3/12/87	243.±50	
			11/23/87	270.±50	
			9/9/88	665.±50	
	AO-2523, Check valves		3/12/87	642.±50	
			9/9/88	509.±50	
					1174
N-26	Drywell Purge Exhaust		3/13/87	20±10	
	AO-2506,AO-2507		11/18/87	Off Scale	
			9/9/88	75±10	
	AO-2509,2510,4235,		3/13/87	71±10	
	SV-8106		6/22/88	55±10	
		AO-2509,2510,4235	7/9/88	82±10	
	PCAC 1		8/14/86	20±10	
			3/10/87	10±10	
			3/29/87	10±10	
			9/1/88	10±10	
	PCAC 2		8/14/86	20±10	
			3/10/87	10±10	
			3/29/87	10±10	
			9/1/88	10±10	
	'B' CAD Analyzer	SV-4960B	8/13/86	20±10	
	Isolation Valves		11/12/86	31±10	
			3/12/87	11±10	
			9/14/88	10±10	
			12/13/88	10±10	

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
		SV-4961B & 4966B	7/17/86	65±10	
			8/13/86	20±10	
			3/12/87	26±10	
			9/14/88	1301.±450	
			12/13/88	10±10	
		SV-8101	8/13/86	40±10	
			3/12/87	31±10	
			9/14/88	Off Scale	
			12/13/88	20±10	
					187
N-32C	ILRT Test Valves		3/23/87	20±10	
			5/18/87	40±10	
			6/21/88	10±10	
					10
N-32D	ILRT Test Valves		3/23/87	150.±50	
			5/18/87	10±10	
			6/21/88	10±10	
					10
N-35A	TIP Ball Valves		3/21/87	10±10	
			8/25/88	122.±50	
					122
N-35B	TIP Ball Valves		10/17/86	143.±50	
			3/21/87	10±10	
			8/25/88	20±10	
					20
N-35C	TIP Ball Valves		12/17/85	Off Scale	
			12/18/85	300.±50	
			3/21/87	10±10	
			8/25/88	10±10	
					10

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TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-35D	TIP Ball Valves		3/21/87	200.±50	
			8/25/88	175.±50	
		Check & Manual Vlvs	3/31/86	50±10	
			3/22/87	10±10	
			6/20/88	10±10	
		SV-7113 & Manual Vlv	3/31/86	10±10	
			3/22/87	10±10	
			6/20/88	10±10	
					185
N-35E	TIP Ball Valves		3/21/87	15±10	
			8/25/88	135.±50	
					135
N-39A	Containment Spray		9/22/86	2198.±450	
			4/22/87	2950.±450	
			4/22/87	3400.±450	
			6/16/87	388.±50	
			9/10/88	50±10	
		MO-31B	9/26/88	40±10	
	CAD Injection	Check Valve	3/10/87	10±10	
	SV-4948B, SV-4949B,	SV-4948B only	3/10/87	126.±50	
	Check Valve	SV-4949B only	3/10/87	131.±50	
		Check Valve	12/16/88	10±10	
		SV-4948B only	12/16/88	10±10	
		SV-4949B only	12/16/88	35±10	
	MO-31B Packing		9/20/88	5643.±450	
			9/26/88	75±10	
					160

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-39B	Containment Spray		3/11/87	311.±50	
			4/17/87	146.±50	
			10/13/88	220.±50	
	CAD Injection	Check Valve	3/13/87	10±10	
	SV-4948A, SV-4949A,	SV-4948A only	3/13/87	10±10	
	Check Valve	SV-4949A only	3/13/87	10±10	
		Check Valve	12/15/88	10±10	
		SV-4948A only	12/15/88	300.±50	
		SV-4949A only	12/15/88	430.±50	
	MO-31A Packing		10/3/88	80±10	
					730
N-41	Recirc. Sample		8/12/86	20±10	
			3/17/87	20±10	
			8/23/88	20±10	
					20
N-42	Standby Liquid Control	X-14 A, 14 B	3/20/87	20±10	
			6/1/87	10±10	
			11/8/88	20±10	
			12/16/88	20±10	
		Check Valve	5/20/87	Off Scale	
			5/24/87	2403.±450	
			5/26/87	800.±50	
			5/27/87	1400.±450	
			5/28/87	Off Scale	
			5/30/87	621.±50	
			9/30/88	6506.±450	
			10/17/88	Off Scale	
			11/5/88	Off Scale	
			12/12/88	10±10	
					20
N-47	ADS Backup Nitrogen	Check Valve	3/18/87	20±10	
	Supply		7/24/87	10±10	
			11/28/88	10±10	
		SV-8130B	3/18/87	145.±50	
			7/24/87	25±10	
			11/28/88	Off Scale	
			12/30/88	10±10	
					10

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-51A	PCAC Sample	SV-2671E	3/9/87	10±10	
			4/6/87	20±10	
			9/1/88	10±10	
		SV-2978E	3/9/87	10±10	
			4/6/87	20±10	
			9/1/88	10±10	
					10
N-51B	PCAC Sample	SV-2671D	3/10/87	2100.±450	
			3/13/87	220.±50	
			4/6/87	20±10	
			9/1/88	10±10	
		SV-2978D	3/10/87	10±10	
			4/6/87	20±10	
			9/1/88	10±10	
					10
N-51C	PCAC Sample	SV-2671C	12/12/85	20±10	
			2/4/87	16±10	
			3/9/87	10±10	
			3/31/87	10±10	
			9/1/88	10±10	
		SV-2978C	12/12/85	20±10	
			5/1/87	20±10	
			3/9/87	10±10	
			3/31/87	10±10	
			9/1/88	10±10	
	'C' CAD Analyzer	SV-4961C, 4966C	3/11/87	30±10	
	Isolation Valves		9/21/87	Off Scale	
			10/7/88	10±10	
		SV-4960C & Globe	3/11/87	10±10	
			9/21/87	20±10	
			10/7/88	10±10	
					20

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-51D	PCAC Sample Return	Check Valve	2/4/86	310±50	
			11/1/86	90±10	
			3/13/87	66552±450	
			5/6/87	3504±450	
			7/13/87	600±50	
			9/7/88	Off Scale	
			10/18/88	380±50	
		SV-2980	2/4/86	20.±10	
			2/6/86	10.±10	
			7/31/86	20.±10	
			10/31/86	Off Scale	
			11/6/86	20.±10	
			12/11/86	26.±10	
			3/13/87	620.±50	
			7/17/87	10.±10	
			9/7/88	22.±10	
					380
N-52F	Instrument Nitrogen	AO-2969B	8/11/86	20.±10	
			3/15/87	20.±10	
			7/16/87	40.±10	
			6/24/88	20.±10	
		Check Valve	8/11/86	20.±10	
			3/15/87	20.±10	
			7/16/87	10.±10	
			6/25/88	20.±10	
					20
N-53	Drywell Chilled Water	MO-2201B	5/9/87	20.±10	
			9/10/87	10.±10	
		Test Tap= 1400	7/23/88	1508.±450	
			8/2/88	448.±50	
					448
N-54	Drywell Chilled Water	MO-2200B	5/9/87	20.±10	
			9/10/87	2508.±450	
			7/23/88	974.±50	
					974
N-55	Drywell Chilled Water	MO-2200A	5/9/87	20.±10	
			9/10/87	1243.±450	
			7/23/88	1171.±450	
					1171

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-56	Drywell Chilled Water	MO-2201A	8/20/86	1658.±450	
			5/9/87	3648.±450	
			9/10/87	1243.±450	
			7/23/88	591.±50	
					591
N-57	Main Steam Sample		10/16/86	1120.±450	
			3/15/87	30.±10	
			4/16/87	4764.±450	
			2/10/88	2610.±450	
			8/12/88	20.±10	
					20
N-102B	ADS Backup Nitrogen	Check Valve	3/16/87	360.±50	
			7/24/87	280.±50	
			11/28/88	280.±50	
		SV-8130A	3/16/87	340.±50	
			7/24/87	280.±50	
			11/28/88	280.±50	
					280
N-203	PCAC Sample	SV-2671B	3/9/87	500.±50	
			3/31/87	20.±10	
			8/31/88	10.±10	
		SV-2978B	3/9/87	10.±10	
			3/31/87	20.±10	
			8/31/88	10.±10	
		SV-4961D & 4966D	3/11/87	115.±50	
			10/21/88	Off Scale	
			12/14/88	Off Scale	
			12/15/88	Off Scale	
			12/23/88	Off Scale	
			12/31/88	751.±50	
		SV-4960D	3/11/87	150.±50	
			10/21/88	Off Scale	
			12/14/88	Off Scale	
			12/15/88	Off Scale	
			12/23/88	45.±10	
			12/31/88	10.±10	
					761

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TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-205A	Torus Vacuum Breaker		12/18/85	701.±50	
			12/21/85	960.±50	
			1/17/86	55.±10	
			1/20/86	50.±10	
			3/13/87	20.±10	
			4/14/87	Off Scale	
			4/16/87	6051.±450	
			6/29/87	370.±50	
			6/28/88	893.±50	
			8/11/88	350.±50	
					350
N-205B	Torus Vacuum Breaker		1/20/86	50.±10	
			3/21/86	122.±50	
			4/11/86	100.±50	
			3/13/87	20.±10	
			6/28/88	130.±50	
					130
N-210A,	Torus Cooling		4/22/87	46728.±450	
211A			6/6/87	7854.±450	
			7/8/87	1897.±450	
			9/15/88	4167.±450	
	'B' CAD Injection	SV-4950B	3/11/87	61.±10	
		Test Taps= 850	12/17/88	1001.±450	
			12/22/88	40.±10	
		Post Accident √ Valve	3/11/87	71.±10	
		Test Taps= 850	12/17/88	1001.±450	
			12/22/88	40.±10	
		Check Valve	3/11/87	51.±10	
			12/17/88	10.±10	
		SV-4951B	3/11/87	81.±10	
		Test Taps= 850	12/17/88	1001.±450	
			12/22/88	40.±10	

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TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
		MO-34B packing	4/22/87	3400.±450	
			9/10/87	2000.±450	
			11//20/87	31.±10	
			9/17/88	10.±10	
		MO-38B packing	4/22/87	10.±10	
			9/10/87	10.±10	
			9/17/88	60.±10	
					4277
N-210B,	Torus Cooling		3/10/87	2339.±450	
211B			4/18/87	1174.±450	
			10/4/88	624.±50	
	'A' CAD Injection	SV-4950A	3/12/87	281.±50	
			12/14/88	Off Scale	
			12/30/88	10.±10	
		SV-4951A	3/12/87	50.±10	
			12/14/88	10.±10	
		Check Valve	3/12/87	10.±10	
			12/14/88	10.±10	
		MO-34A packing	4/23/87	10.±10	
			9/10/87	20.±10	
			10/3/88	10.±10	
		MO-38A packing	4/23/87	400.±50	
			9/10/87	500.±50	
			10/3/88	10.±10	
					654
N-212	RCIC Exhaust		3/16/87	80.±10	
			7/15/88	21.±10	
	RCIC Exhaust Drain		3/9/87	782.±50	
		Test Tap= 2400	7/18/88	3021.±450	
			9/28/88	621.±50	
	Stop Check O-ring		3/9/87	10.±10	
			3/16/87	10.±10	
			9/14/87	10.±10	
			7/15/88	10.±10	
					652

APPENDIX G
PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-214	HPCI Exhaust		3/16/87	8925.±450	
			5/21/87	Off Scale	
			9/15/87	3921.±450	
			9/28/87	Off Scale	
			11/4/87	6883.±450	
			5/18/88	8910.±450	
			7/18/88	Off Scale	
			7/19/88	Off Scale	
			7/20/88	Off Scale	
			7/27/88	1201.±450	
			8/17/88	1801.±450	
			8/18/88	1201.±450	
			8/23/88	2202.±450	
	HPCI Exhaust Drain		3/12/87	10451.±450	
			9/16/87	Off Scale	
			8/3/88	550.±50	
	Stop Check O-ring		3/12/87	10.±10	
			9/15/87	10.±10	
			8/18/88	250.±50	
			8/19/88	300.±50	
			8/23/88	10.±10	
					2762
N-217B	RCIC Exh. Vacuum Relief		3/9/87	44.±10	
			9/9/87	104.±50	
			7/22/88	20.±10	
	HPCI Exh. Vacuum Relief		3/12/87	56.±10	
			9/11/87	39.±10	
			10/8/88	63.±10	
					83
N-218A	Torus Inst. Nitrogen	AO-2968	3/22/87	170.±50	
			7/24/87	80.±10	
			6/2/88	67.±10	
		Check Valve	3/22/87	100.±50	
			7/24/87	10.±10	
			6/2/88	10.±10	
					67

APPENDIX G
PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-218B	PCAC Sampling	SV-2671A	10/8/85	20.±10	
			11/4/85	20.±10	
			3/10/87	580.±50	
			3/30/87	180.±50	
			7/9/87	10.±10	
			8/31/88	10.±10	
		SV-2978A	11/4/85	20.±10	
			3/10/87	10.±10	
			3/30/87	10.±10	
			7/9/87	10.±10	
			8/31/88	10.±10	
					10
N-218C	ILRT Test Valves		3/23/87	20.±10	
			5/18/87	10.±10	
			6/21/88	10.±10	
					10
N-219	PCAC Sample	SV-2671F	3/10/87	10.±10	
			4/7/87	30.±10	
			9/7/88	10.±10	
		SV-2978F	3/10/87	10.±10	
			4/7/87	20.±10	
			9/7/88	10.±10	
	Torus Purge Exhaust	AO-2511,2512	3/12/87	10.±10	
			11/16/87	40.±10	
			9/2/88	75.±10	
		AO-2513,2514	3/12/87	803.±50	
			8/10/88	730.±50	
			10/14/88	961.±50	
			10/25/88	450.±50	
			10/31/88	340.±50	
	'A' CAD Analyzer	SV-4960A	3/12/87	10.±10	
	Isolation Valves		9/18/87	10.±10	
			10/8/88	10.±10	
		SV-4961A,4966A	3/12/87	10.±10	
			9/18/87	20.±10	
			10/8/88	10.±10	
					435

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PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
N-221	RCIC Vacuum Pump		3/9/87	37.±10	
	Discharge		7/8/88	20.±10	
					20
N-223	HPCI Exhaust Drain		3/12/87	1243.±450	
			8/30/88	1529.±450	
			9/22/88	126.±50	
		MO-31 Packing	10/11/88	45.±10	
					171
N-225	Torus Water Clean-up		3/18/87	496.±50	
			6/25/87	494.±50	
			7/24/87	32.±10	
			6/29/88	20.±10	
	RCIC Pump Suction		3/9/87	440.±50	
			11/30/88	240.±50	
					260
N-227	HPCI Suction		3/12/87	52.±10	
			8/4/88	750.±50	
					750
N-234	Post Accident		3/19/87	20.±10	
	Sampling Return		8/20/88	210.±50	
					210
---	Scram Discharge Volume	CV-32A	8/8/86	55.±10	
	Vent and Drains		4/30/87	22.±10	
			9/23/88	10.±10	
		CV-35A	8/8/86	6009.±450	
			8/10/86	1202.±450	
			4/30/87	788.±50	
			9/23/88	530.±50	
			10/24/88	39.±10	
		CV-32B	8/8/86	561.±50	
			4/30/87	357.±50	
			9/23/88	806.±50	
			10/24/88	1598.±450	
			11/2/88	255.±50	
			11/3/88	156.±50	

APPENDIX G
PEACH BOTTOM UNIT 2
TYPE C TEST SUMMARY

PEN'T NO.	SYSTEM OR DESCRIPTION	REMARKS	TEST DATE	LEAKAGE SCC/MIN	PEN'T TOTAL SCC/MIN
		CV-35B	8/8/86	1302.±450	
			4/30/87	320.±50	
			9/23/88	190.±50	
		CV-33	8/8/86	177.±50	
			4/30/87	8226.±450	
			5/10/87	155.±50	
			9/23/88	Off Scale	
			10/24/88	Off Scale	
			10/31/88	Off Scale	
			11/2/88	851.±50	
			11/3/88	298.±50	
			11/3/88	209.±50	
			11/5/88	54.±10	
		CV-36	8/8/86	1618.±450	
			4/30/87	1022.±450	
			9/23/88	117.±50	
			10/24/88	10.±10	
					283

NOTE : All leak rates are reported using the format specified in ANSI/ANS 56.8-1981, which requires that a leakage rate deviation be specified.

Total leakage: 49358 ±1526 scc/min.

PEACH BOTTOM—THE POWER OF EXCELLENCE

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
R. D. 1, Box 208
Delta, Pennsylvania 17314
(717) 456-7014

D. M. Smith
Vice President

April 11, 1989

Docket No. 50-277

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Peach Bottom Atomic Power Station Unit 2 Reactor Containment Building Integrated Leak Rate Test

Gentlemen:

Attached is the Peach Bottom Unit 2 Reactor Containment Building Integrated Leak Rate Test (ILRT) Report for the ILRT performed in January, 1989. This submittal is in accordance with 10CFR Part 50, Appendix J, Section V, paragraph B.

Sincerely,

DMS/MJB:cmc

Attachment

cc: W.T. Russell, Administrator, Region I, USNRC
T.P. Johnson, USNRC Senior Resident Inspector

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