DUKE POWER COMPANY

OCONEE NUCLEAR STATION

UNIT 1

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

AUGUST 1983

DUKE POWER COMPANY

Oconee Nuclear Station

Unit 1

Reactor Containment Building

Integrated Leak Rate Test

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1.0 Introduction

The Periodic Integrated Leak Rate Test (ILRT) of the Oconee Nuclear Station Unit 1 containment building was attempted at ~ 29.5 PSIG at the end of July 1983. The Leak Rate and Upper Confidence Limit (UCL) were above the allowable limits and a decision was made to complete full pressure test at ~ 59 PSIG.

The Full Pressure Integrated Leak Rate Test (ILRT) on Unit 1 was satisfactorily completed on August 3, 1983. The testing was conducted in accordance with the requirements of Technical Specification 4.4, BN-TOP-1 (Bechtel Testing Criteria for ILRT), ANSI ANS 56.8 - 1981 and 10CFR50, Appendix J. The absolute method of testing was employed with the containment temperatures measured at 24 locations and containment dewpoint temperatures at two locations. Leakage was measured at design basis accident pressure of ~ 59 PSIG. A measured induced leakage was used to verify the results.

Analysis of final test data shows the results to be within the specified limits for this containment, which has a maximum allowable leak rate of 0.1875 Wt%/day. The leakage rate was measured at 0.14485 Wt%/day, and the Upper Confidence Limit (UCL) was determined to be 0.15205 Wt%/day.

Analysis of verification test data shows the results to be within the specified range for this test, which has a maximum deviation of ± 25% L_a. The deviation as measured was -0.0366 Wt %/day or -19.52% L_a.

2.0 Summary and Conclusions

2.1 Synopsis

The Unit 1 Containment ILRT was performed in accordance with the Periodic Test Procedure PT/1/A/0150/03A as approved for use on July 24, 1983.

Pressurization began at 0000 hours on July 30, 1983, using two permanent compressors and three (rental) temporary compressors. Instrumentation showed that pressurization was not occuring and the compressors were shut down. Investigation showed that the control air supplies to 1LRT-15 (Pressurization Line Block Valve) and 1LRT-16 (Depressurization Vent to Atmosphere) had been cross-connected. (These valves are normally closed. The controllers are on the portable LRT Instrument Cabinet and are connected to instrument air only for the ILRT.) Due to the erroneous connections, the pressurization line was blocked and a relief valve opened. This connection was corrected and pressurization began with all five compressors running by 0400 hours. At 1045 hours the compressors were secured with the containment pressure at approximately 30.8 PSIG, and the stabilization period began. During stabilization an indicated leak of approximately 1 Wt%/day was observed. Inspection for leaks began.

At 1645 hours on July 30, 1983, a small leak from the Emergency Hatch Equalization Line was found. Inspection for additional leaks continued. At 1800 hours leakage was found around the personnel hatch handwheel - the personnel hatch was pressurized to 8 PSIG. Following pressurizing the personnel hatch to 8 PSIG, the leak rate was calculated to be 0.67 Wt%/day.

At 0002 hours on July 31, 1983, the following was systematically done: A cap was installed on the equipment hatch equalization line; 1LRT-16 (Depressurization Vent to Atmosphere Outside of 1LRT-17) was closed; the personnel hatch was pressurized to 20 PSIG; 1LWD-5 (Vent to the LAWT on Penetration 54) was closed; and both root valves to 1PG-186 were closed (Vent Outside of N_2 Penetrations #39 and #53). At 0200 hours it became obvious that all of the above had little or no effect on the leak rate. At about 1100 hours the emergency hatch equalization line was plugged. A leak was found on the flange on 1CC-76 and repaired. At 1250 hours the following actions were taken to restore the system to normal test line-up: Personnel hatch depressurized; 1LRT-16 opened; 1LWD-5 opened; plug on emergency hatch line removed; equipment hatch equalization line plug removed. At 1524 hours both root valves to 1PG-186 opened. At 1730 hours penetration number 44 was isolated by closing 1CC-72 and 1CC-74.

At 0650 hours on August 1, 1983, the leak rate and upper confidence limit were still greater than 0.1000 Wt%/day. At 2000 hours a decision was made to pressurize to 60 PSIG and perform the test at full test pressure Pa. Between 2035 and 2050 hours all five compressors were started to pressurize containment.

At 0330 hours on August 2, 1983, 1CC-72 and 1CC-74 were opened returning penetration 44 to its test line-up. At 0602 hours the compressors were secured with the containment pressure at approximately 61.1 PSIG. At 1000 hours stem leaks were found on the following valves: 1IA-90, 1BS-1, 1LPSW-242, 1CC-76 and 1FDW-408. At 1020 hours 1CC-72 and 1CC-74 were closed to isolate 1CC-76 and 1CC-77 penetration 44. At 1300 hours 1IA-1125, (the Rotometer Isolation Valve), 1IA-1126 and 1IA-1117 (Instrument Air Isolation Valves) were closed. The line between 1IA-1126 and 1IA-1117 was cut and mechanically separated to allow proper venting and prevent inleakage should 1IA-1126 and 1IA-1117 leak. 1IA-90 was back seated. The stem leak on 1IA-90 decreased considerably. At 1645 hours 1N-128 and 1N-130 were closed to isolate one path through penetrations 39 and 53. At 2050 hours the personnel hatch was pressurized to 49 PSIG.

At 0030 hours on August 3, 1983, 1N-128 and 1N-130 were reopened for proper line-up for these paths on penetrations 39 and 53. At 0448 hours on August 3, 1983, the Reactor Building Integrated Leak Rate Test was terminated. The leak rate was 0.1386 and the 95% Upper Confidence Limit was 0.1458.

2.2 Supplement Type "C" Leak Rate Tests

Supplemental Type "C" Leak Rate Tests were performed on penetrations 41 and 44 and the personnel hatch. Shown in Table 1 are the results of these tests before and after any subsequent maintenance. As can be seen in Table 1, the addition of these post maintenance leakages to the measured total does not exceed the acceptance criteria for either the ILRT or for the 95% Upper confidence Limit.

2.3 Test Results

Tabulated below are the leak rates measured for the test and the total leak rate when the supplemental type "C" results are added to the CILRT Leak Rate. All leak rates are reported in weight percent per day (Wt%/day) of containment mass at Post-Accident Conditions.

Test	Acceptance Criteria	Tech. Spec. Limit	Calculated Leak Rate	95% (UCL)
59 PSIG	0.1875	0.1875	0.1386	0.1458
Test 95% UCL				0.1458
Supplemental Type "C" Tests				0.00625
Total Leakage				0.15205

The verification test consisted of imposing a known leak rate on the containment at the end of the CILRT. Results from this supplemental test is acceptable provided the difference between the Suppmental Test Data and the Type "A" Test Data is within 25% of L_a.

Test Leak Rate	0.1386	Wt%/day
Imposed Leak Rate	0.1761	Wt%/day
Total	0.3147	Wt%/day
Verification Leak Rate (Measured)	0.2781	Wt%/day
Difference	0.0366	Wt%/day
Percent of L_a	-19.52%	(Maximum Allowed ±25%)

This verification data demonstrates the accuracy of the CILRT Data and demonstrates the validity of the verification test.

TABLE 1 SUPPLEMENTAL TYPE "C" LEAK RATE TEST

LEAK SOURCE (OR TROUBLE-SHOOTING ACTION)	TIME/DATE IDENTIFIED	CORRECTIVE ACTION	RETURNED TO ILRT LINEUP	OBSERVED EFFECT ON ILRT	SUPPLEMENTAL TYPE C REQUIRED	TYPE C RESULTS IN WT%/DAY	EFFECT ON FINAL LEAK RATE *	EFFECT ON FINAL 95% ULC *
VALUES FROM THE AUGUST 1983 ILRT							0.1386	0.1458
Isolated Pen. 44 Closed 1CC-72, 74	8-2-83/ 1020	None	No	None	Yes	B-0.0025 A-0.00012	B-0.1411 A-0.13872	B-0.1483 A-0.14592
1IA-90 Stem Leak	8-2-83/ 1300	Backseat	No	None (No maintenance performed)	Yes	0.006 0.006	B-0.1471 A-0.14472	B-0.1543 A-0.15192
PG-186	8-2-83/ 1600	Closed 1N-128	Yes-1N-128 Open	None	No			
Isolated Pen. 33	8-2-83/ 1700	Closed 1N-130	Yes-1N-130 Open	None	No			
Outer Door Handwheel Seal on Pers. Hatch	8-2-83/ 1830	Repaired	N/A	None	Yes	B-0.062	B-0.2091	B-0.2163
Personnel Hatch	8-2-83/ 2050	Press. to 49 PSIG	No	None	Yes	A-0.00013	A-0.14485	A-0.15205

*Note: B - Results are before repair added to leak rate from ILRT.

A - Results are after repair added to leak rate from ILRT.

All leak rates are reported in weight percent per day (Wt%/day) of containment mass at post-accident conditions.

2.4 Error Analysis

Three kinds of errors can be introduced into the leak rate test calculations. They are: 1) systematic measurement error due to instrumentation; 2) random measurement error due to instrumentation; and 3) inclusion of a bad data point into the calculation. Each of these types of errors is addressed below and is based on information in ANS-N274, work group 56.8, revision 3, Nov., 1978.

A) Systematic Measurement Errors

Systematic error is the error introduced by a difference between the measured parameter and the actual value of the parameter, produced by predictable or identifiable effects.

Instrument calibration traceable to the National Bureau of Standards is one method of holding this error to a minimum. However, since the mass-plot data analysis technique calculates the leakage based on a ratio of these measured parameters and not the actual value, the overall effect of these systematic instrumentation errors can be considered negligable, if the instrument drift over the test period is not significant.

The instrument calibration, and instrument drift, can be determined to be acceptable at the end of the test period by the Verification Test. This test imposes a known leakage on the containment structure through an independently calibrated instrument which causes a known change in the leak rate. If the instrumentation has not experienced a calibration shift, and no other system change has occurred, the verification test measured leak rate would compare well with the sum of the test leak rate and the imposed leak rate. Therefore, a successful Verification Test confirms that the leak rate test instrumentation systematic error is within acceptable limits. Any other error associated with the measurement is due to random error.

B) Random Measurement Error

Random errors are those errors in the measured parameters whose sign and magnitude vary without pattern or discernable cause, such as instrument calibration.

For the leak rate test, the effect of random errors must be considered in the data analysis. This is accomplished by statistical techniques in which the deviation from at least a square fit regression line of measured data is bounded such that a certain fraction of the data points lie within the bounds. These bounds define a region called the confidence interval. The probability that any measured data point will fall within the confidence interval is called the confidence level.

The confidence level set for this test is 95%, and from this, the limits or values of the confidence interval are calculated. The lower limit of this interval is of no significant consequence since the reported leak rate is higher. If the actual leakage is lower than the reported value, due to the inclusion of erroneously high values, then the reported value is of a conservative nature. If, on the other hand, random measurement errors has caused the inclusion of erroneously low values, then the actual leakage would be higher than the reported value. For this reason, the upper boundary (limit) to the 95% confidence interval is of significance to the test results and is included in the report.

C) Inclusion of Bad Data Points in the Calculations

Criteria exist in statistical analysis for the rejection of bad data points in the process of data analysis. This is not necessary in the mass-plot method for two reasons. First, since the mass-plot calculation is based on a regression fit of all the data points, a single erroneous value will have little effect on the calculated leak rate. Secondly, since the random error analysis clearly shows the need to calculate and report the upper limit of the 95% confidence interval, the inclusion of a bad data point in the calculation is already accounted for in the data analysis.

D) Analysis Conclusions

The information above, on each type of error, demonstrates that if the 95% upper confidence limit is less than 75% L_t and that the verification test results are acceptable, then the containment leakage rate accurately accounts for any instrument errors in the leak rate measurement system.

2.5 Test Organization

The Performance Section at the Oconee Nuclear Station has overall responsibility for the CILRT. The testing activities were supervised by the test co-ordinator. The organizational chart is presented in Figure 2.6.1. The test personnel were as follows:

A.	Test Co-ordinator responsible for all ILRT activities	T. S. Barr
B.	Shift Co-ordinator (one per shift) responsible for testing activities on their assigned shifts	T. D. Curtis B. G. Davenport
C.	Data Engineers (one per shift) responsible Data Analysis	M. J. Robinson K. G. Rohde
D.	Support Engineer (technical support- engineer from System Results Group, Duke Power) (one per shift)	D. Hubbart T. Welch

E. Operators (normal shift)

F. Test Computer Support (filled in for T. D. Curtis as needed) R. P. Todd

Minor changes were made due to length of test.

OCONEE ILRT ORGANIZATION

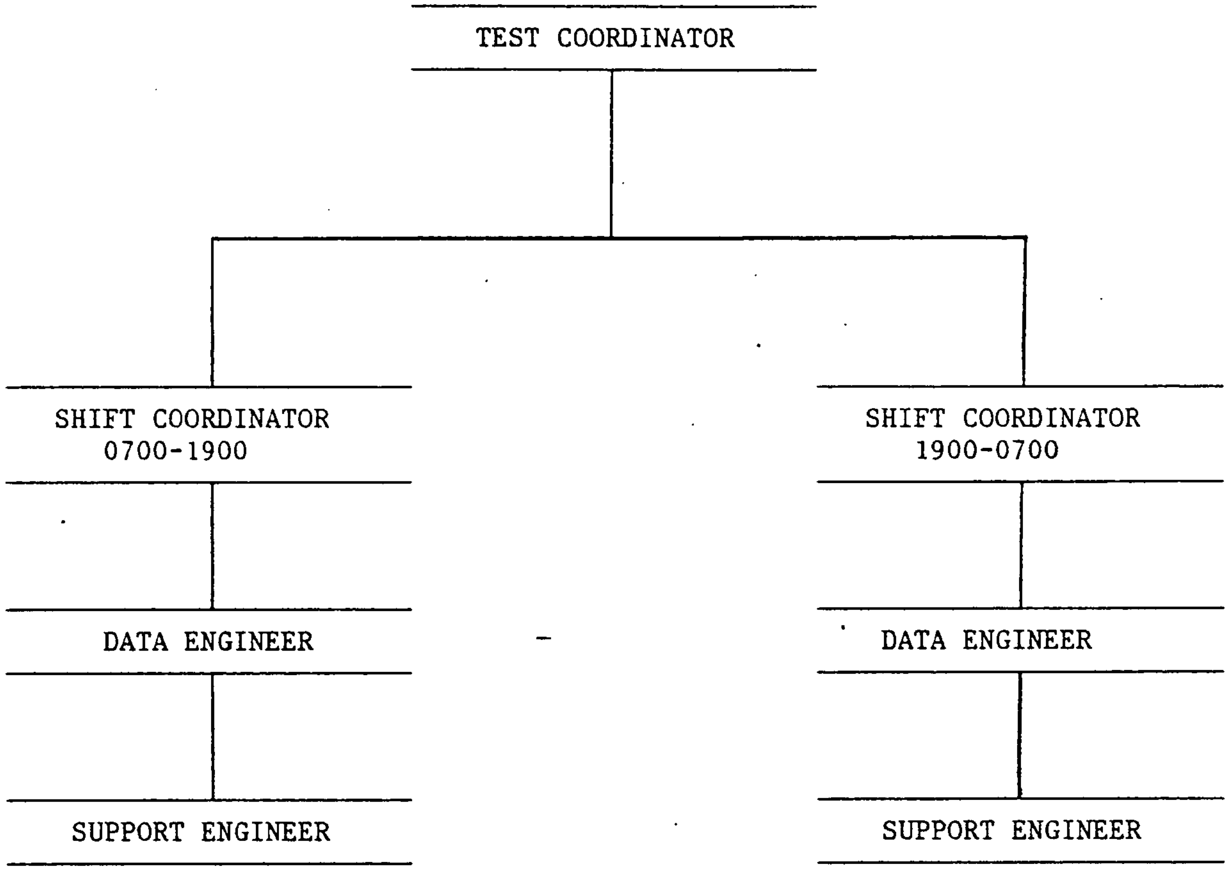


Figure 2.6-1

3.0 Design Information

3.1 Reactor Building

The reactor building is a reinforced and post-tensioned concrete structure designed to contain any accidental release of radioactivity from the reactor coolant system as defined in the Final Safety Analysis Report (Reference 1).

The structure consists of a post-tensioned reinforced concrete cylinder and dome connected to and supported by a massive reinforced concrete foundation slab as shown in Figure 3.1-1. The entire interior surface of the structure is lined with a 1/4 inch thick welded ASTM A36 steel plate to assure a high degree of leak tightness. Numerous mechanical and electrical systems penetrate the Reactor Building wall through welded steel penetrations.

Principal dimensions are as follows:

Inside Diameter	116 ft.
Inside Height (including Dome)	208-1/2 ft.
Vertical Wall Thickness	3-3/4 ft.
Dome Thickness	3-1/4 ft.
Foundation Slab Thickness	8-1/2 ft.
Liner Plate Thickness	1/4 inch
Internal Free Volume	1,910,000 Cu. ft.

3.2 Measurement Systems

Instrumentation used for the Oconee Unit 1 ILRT is similar to that used on previous tests conducted by Bechtel. The leak rate test measurement system is shown schematically in Figure 3.2-1.

Reactor Building pressure was measured by a Ruska Instrument precision pressure gauge. The unit was calibrated before the test.

Reactor Building temperature was measured by twenty-four (24) calibrated RTDs and read on a Kaye RAMP digital recorder. Each RTD was assumed to be representative of a fraction of the total containment volume.

Reactor Building dewpoint temperature was measured by two (2) General Eastern Dewpoint Hygrometers.

The relative location of the humidity sensors is shown in Figure 3.4-1. A 0-10.45 SCFM Brooks rotometer was used in establishing a known leak rate.

3.2.1 Instrument List

Specifications for the instrumentation used for the Oconee Unit 1 ILRT are listed in Table 3.2-1.

3.2.2 Temperature Sensor Locations

The locations of temperature sensors within the Reactor Building are shown in Figures 3.2-2 through 3.3-6.

3.2.3 RTD and Dewpoint Volume Fractions

Volume fractions were used for calculating the average temperature and the average dewpoint temperature in the containment. These fractions were determined using an equivalent volume for each sensor. The free volume of the containment was divided into "cells" with a sensor center in each. Volume fractions are given in Table 3.2-2.

3.3 Pressurization System

Reactor Building pressurization was accomplished by two (2) electric motor driven and three (3) diesel driven air compressors operating in parallel. These compressors also include aftercoolers as integral equipment. The discharge from the compressors passes through a air dryer which reduces the moisture content in the air prior to its entry into the Reactor Building. The specifications for these components are as follows:

A. Two (2) electric driven Joy Turbo-Air (20V2) centrifugal type air compressors with a capacity of 2300 SCFM @ 80 PSIG. Three (3) diesel driven Atlas Compco Oil Free Air Compressors with a capacity of 1500 SCFM @ 102 PSIG.

B. Two (2) Basco size 22048 aftercoolers (Integral to Compressors), type "ES" Fixed Tubesheet, with a capacity of 2100 SCFM @ 14.4 PSIA and with a design pressure of 150 PSIG. One (1) RP Adams Aftercoolers with a capacity of 5500 SCFM @ 80 PSIA and a design pressure of 150 PSIG.

C. One (1) Hankison (Model H-15) refrigerator type air dryer with inertial impingement separator, and a capacity of 3750 SCFM (100°F Sat. inlet) @ 100 PSIG. Three (3) Van Air Refrigerator Type Air Dryer with a capacity of 1500 SCFM @ 100 PSIG.

These valves, 1LRT-15, 1LRT-16, and 1LRT-17 are used to control pressurization of the Reactor Building. The controls for these valves are located in the test panel. The pressurization system is shown schematically in Figure 3.3-1. The valves used to control depressurization are as follows: 1LRT-15, 1LRT-16, and 1LRT-17 for minimum release, 2LRT-15, and 2LRT-16 for increased release, finally remove rental equipment leaving flange open, remove flange to Unit 3 and open LRT-13, and LRT-10 for unlimited release rate.

3.4 Recirculation System

One Reactor Building Cooling Fan was on low speed for this test.

3.5 Computer Programs

The containment integrated leak rate test specified that the test would utilize the IBM-XT Program or the plant computer program in data analysis. Both programs calculate the mass-plot leak rate.

The off-line programs were written for and run on the IBM-XT system. Two programs were used, one to calculate the corrected values of building pressure and temperature, the second to calculate the leak rate. Tables of corrected temperature and pressure were stored in separate permanent files.

3.5.1 ILRT Program

3.5.1.1 Purpose

This program is used to process the raw data for use in leak rate calculations and print out these values.

3.5.1.2 Program Inputs

a) 24 RTD temperatures in °F

b) 2 Dewpoint temperature in °F

c) absolute pressure in PSIA

3.5.1.3 Calculations

Three calculations are performed with the input data. They are:

a) Corrected building temperature

b) Vapor pressure of water from dewpoint temperatures

c) Corrected building pressure

3.5.1.4 Temperature

a) Apply the instrument calibration correction factors for each RTD, loaded as part of the program.

b) Multiply each temperature by the volume fraction associated with each RTD.

c) Sum the volume weighted temperatures for building average.

3.5.1.5 Dewpoint Temperature

a) The values entered into this program have already been corrected for instrument calibration.

b) Average the two values.

c) From the dewpoint temperature (Saturation Temperature), the vapor pressure (Saturation Pressure) is determined from the steam tables. The tables are available from the IBM-XT as a library program.

3.5.1.6 Pressure

a) Subtract vapor pressure from input absolute pressure.

3.5.1.7 Program Summary

This program will calculate the leak rate and 95% UCL from the input data, corrected pressure and temperature, based on the mass-plot method. It includes two output options, either the leak rate calculated from the designated start/stop points or a table of the leak rate and 95% UCL for each data point. The calculations are based on the formulas in Appendix B to ANS N274, work group 56.8, revision 3 - Nov. 15, 1978. As this work is readily available, it is not duplicated here.

TABLE 3.2-1

INSTRUMENT SPECIFICATIONS

Absolute Pressure Gauge

Mfg.	Ruska
Model	6000-151-100
Range	0-100 PSIA
Resolution	0.01%
Accuracy	0.006% + 0.024 PSI
Oconee I.D.	28024 and 28025

Pressure Gauge

Mfg.	Heise
Range	0-100 psig
Accuracy	0.1 psi
Repeatability	0.1 psi

Temperature Elements

Mfg.	Leeds & Northrup
Model	8197
Type	RTD, Copper, 100 ohms
Range	0-150°F
Repeatability and hysterisis	±.02°F
Accuracy	±.0.12°F

Temperature, Pressure and Dewpoint Indication for Sensors

Mfg.	Kaye Instrument
Model	64RR
Type	Ramp Relay Scanner DVM
Range	40,000 mV, 400.00 mV 4.0000 V, 10.000 V
Oconee I.D.	OCPRF-28121
Accuracy	±0.01% + 2 Counts + 4 μV

Dewpoint Temperature

Mfg.	General Eastern
Model	1200 AP
Range	120°F
Accuracy	±0.4°F
Sensitivity	±0.05°F
Standard Lab I.D.	SYIAC 11111 and SYIAC 11174

TABLE 3.2-1 (Cont'd)

Flow Indicator

Mfg.	Brooks
Type	Rotometer
Model	1110-24
Range	0 to 10.45 SCFM
Accuracy	± 1% of instantaneous reading
Repeatability	Better than 1/4% of instrument reading
Serial No.	7004-39848

TABLE 3.2-2

VOLUME FRACTIONS

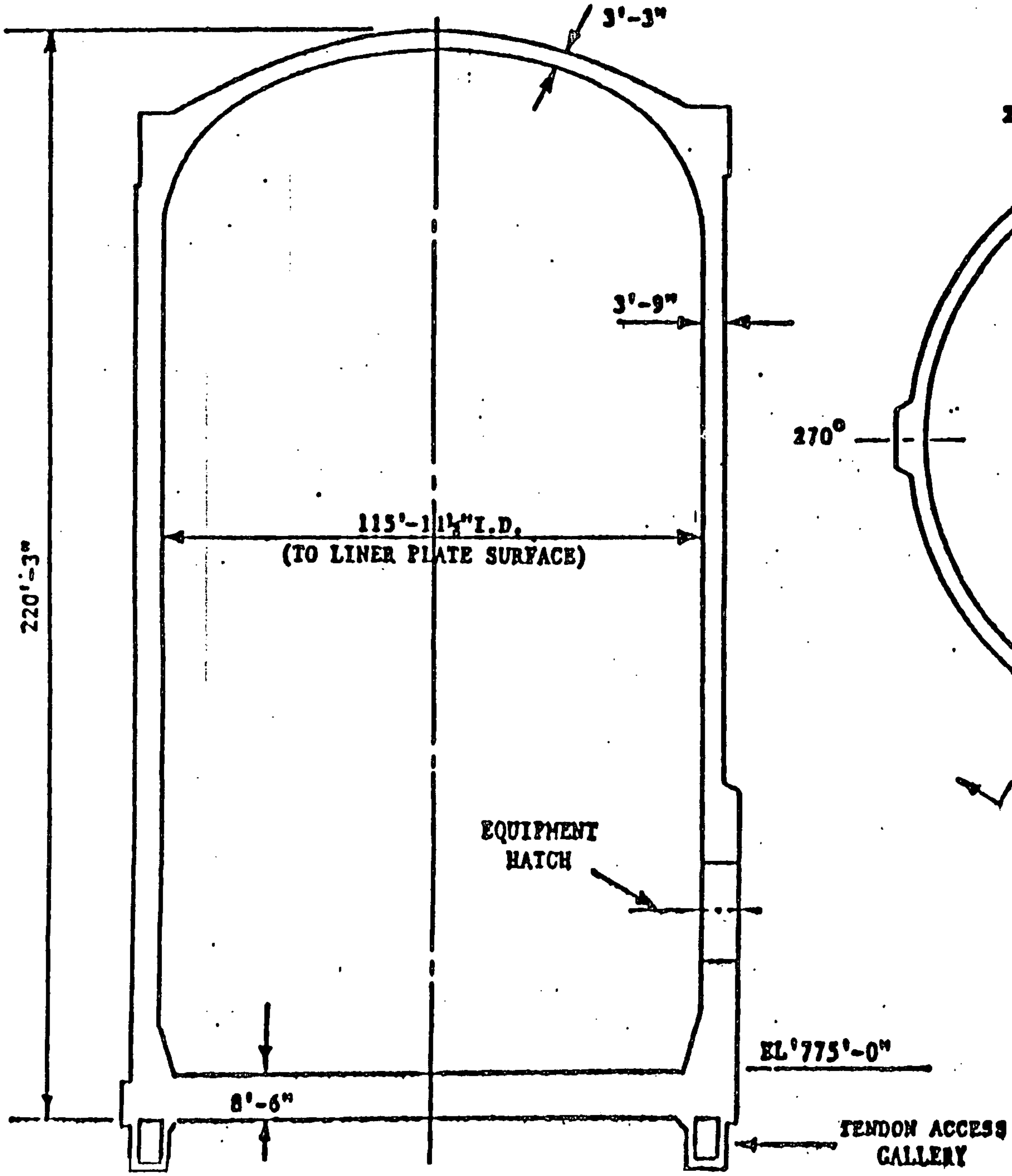
Volume Fractions for RTDS

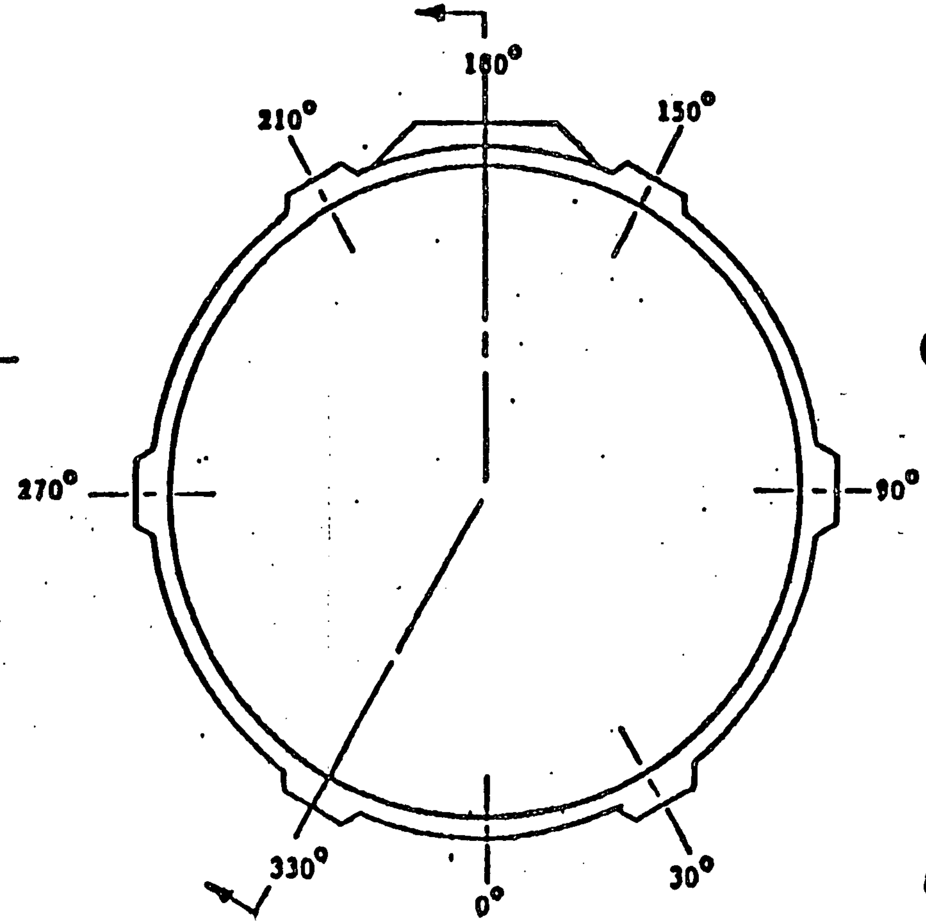
RTD #	Volume Fraction
1	.03
2	.02
3	.02
4	.05
5	.02
6	.03
7	.01
8	.08
9	.05
10	.05
11	.02
12	.02
13	.01
14	.02
15	.02
16	.01
17	.05
18	.09
19	.11
20	.01
21	.01
22	.09
23	.11
24	.07
Total	1.00

Dewpoint Sensors Volume Fraction

Dewpoint Sensor #	Volume Fraction
1 (Azimuth 100° Elevation 850')	0.4
2 (Aximuth 260° Elevation 850')	0.6
Total	1.0

REACTOR BUILDING





HORIZONTAL SECTION THROUGH
REACTOR BUILDING

LEAK RATE MEASUREMENT SYSTEM

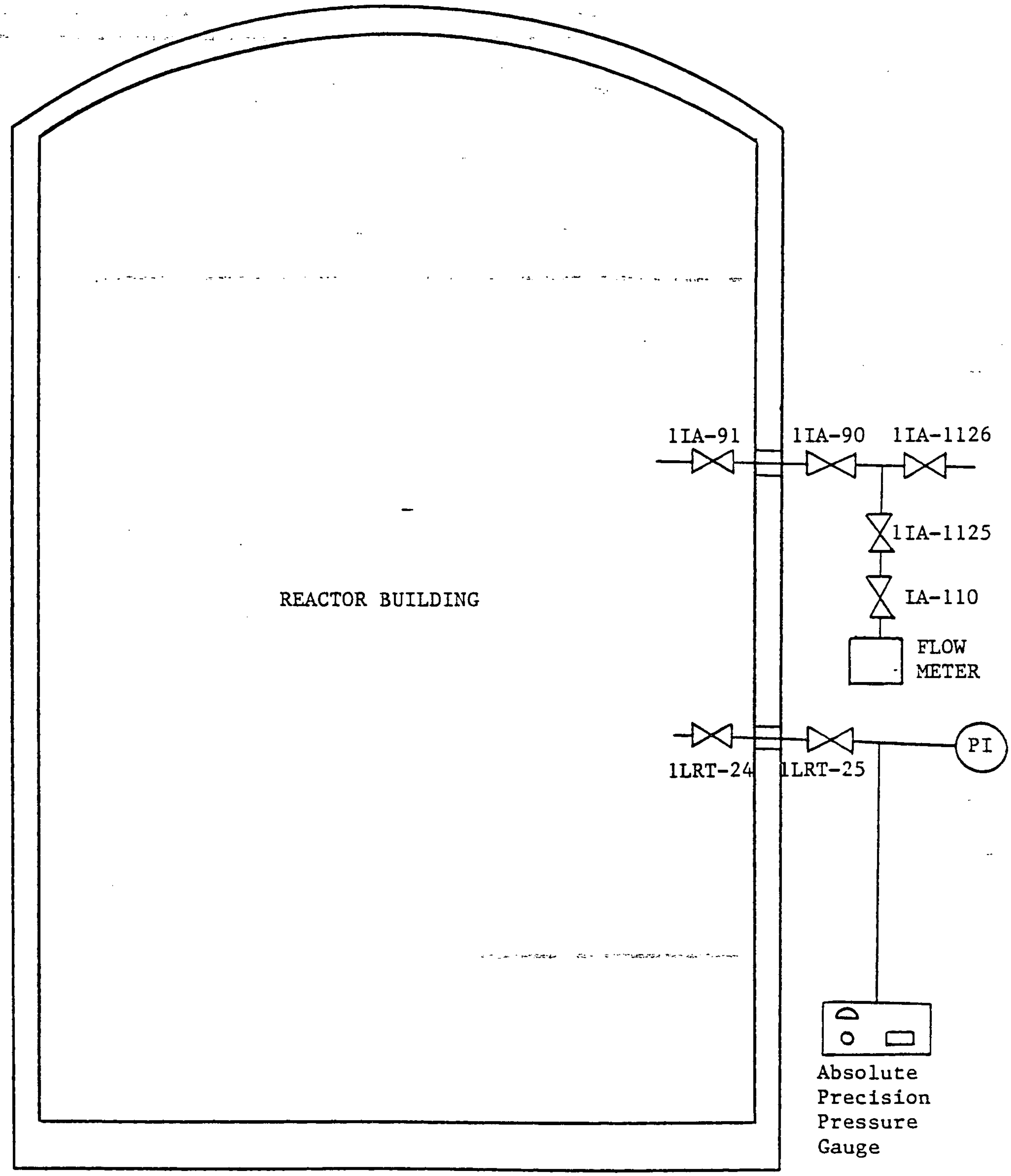


Figure 3.2-1 Test Measurement System Schematic.

REACTOR BUILDING

BASEMENT FLOOR

ELEVATION 787'

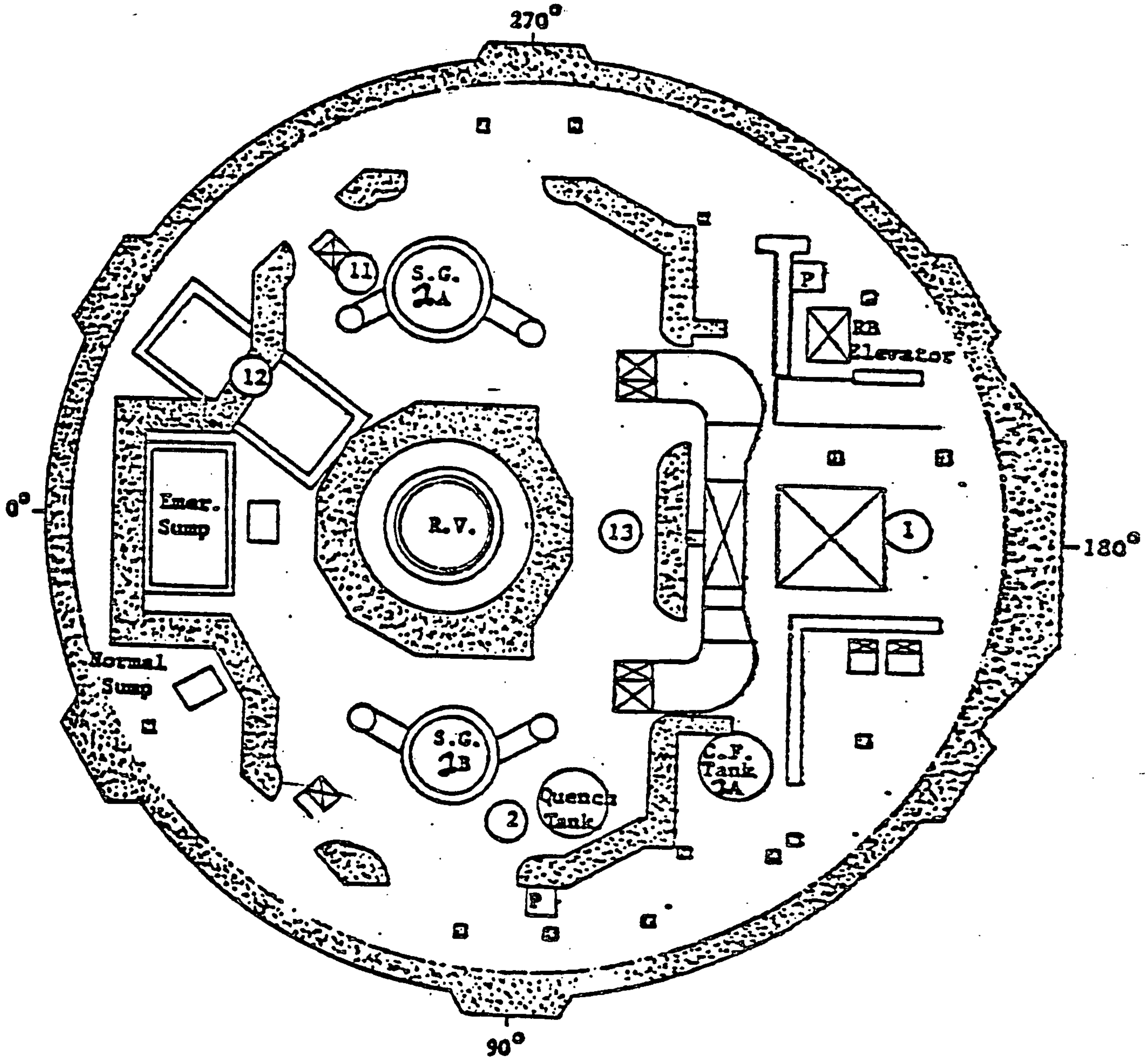


Figure 3.2-2

REACTOR BUILDING

INSTERMEDIATE FLOOR

ELEVATION 830'

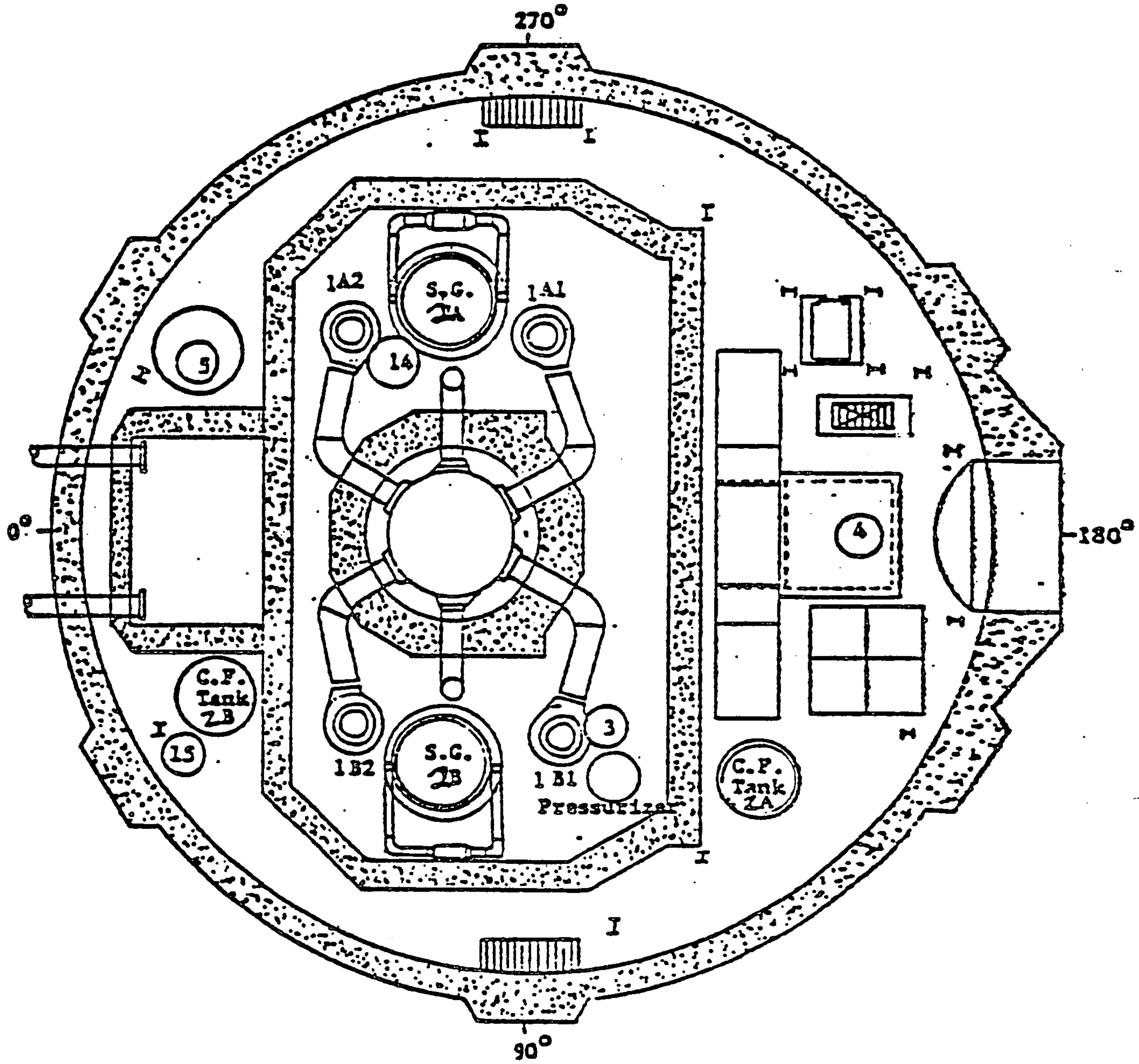


Figure 3.2-3

REACTOR BUILDING
OPERATING FLOOR
ELEVATION 850'

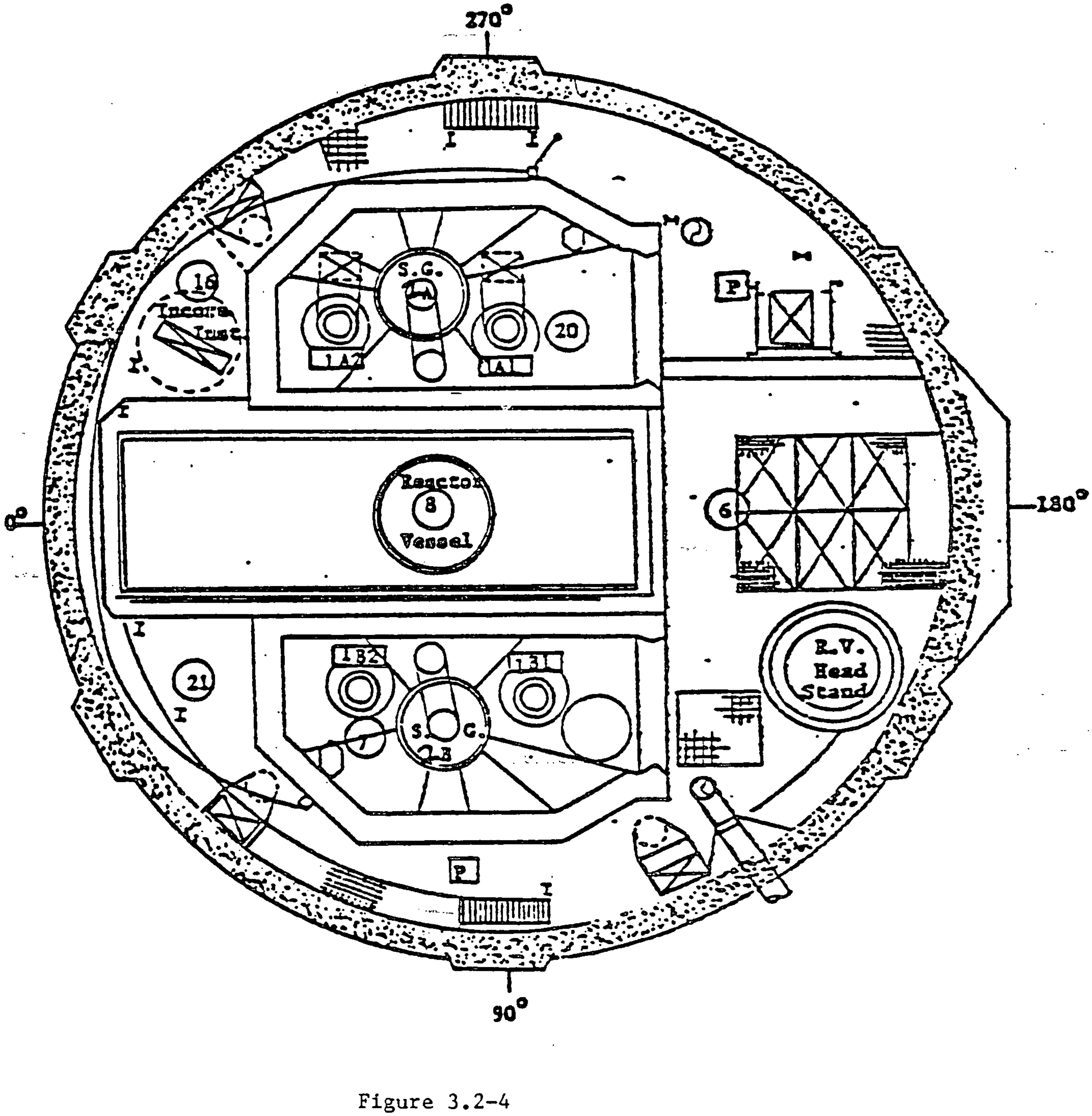


Figure 3.2-4

REACTOR BUILDING

SHIELDING FLOOR

ELEVATION 866'

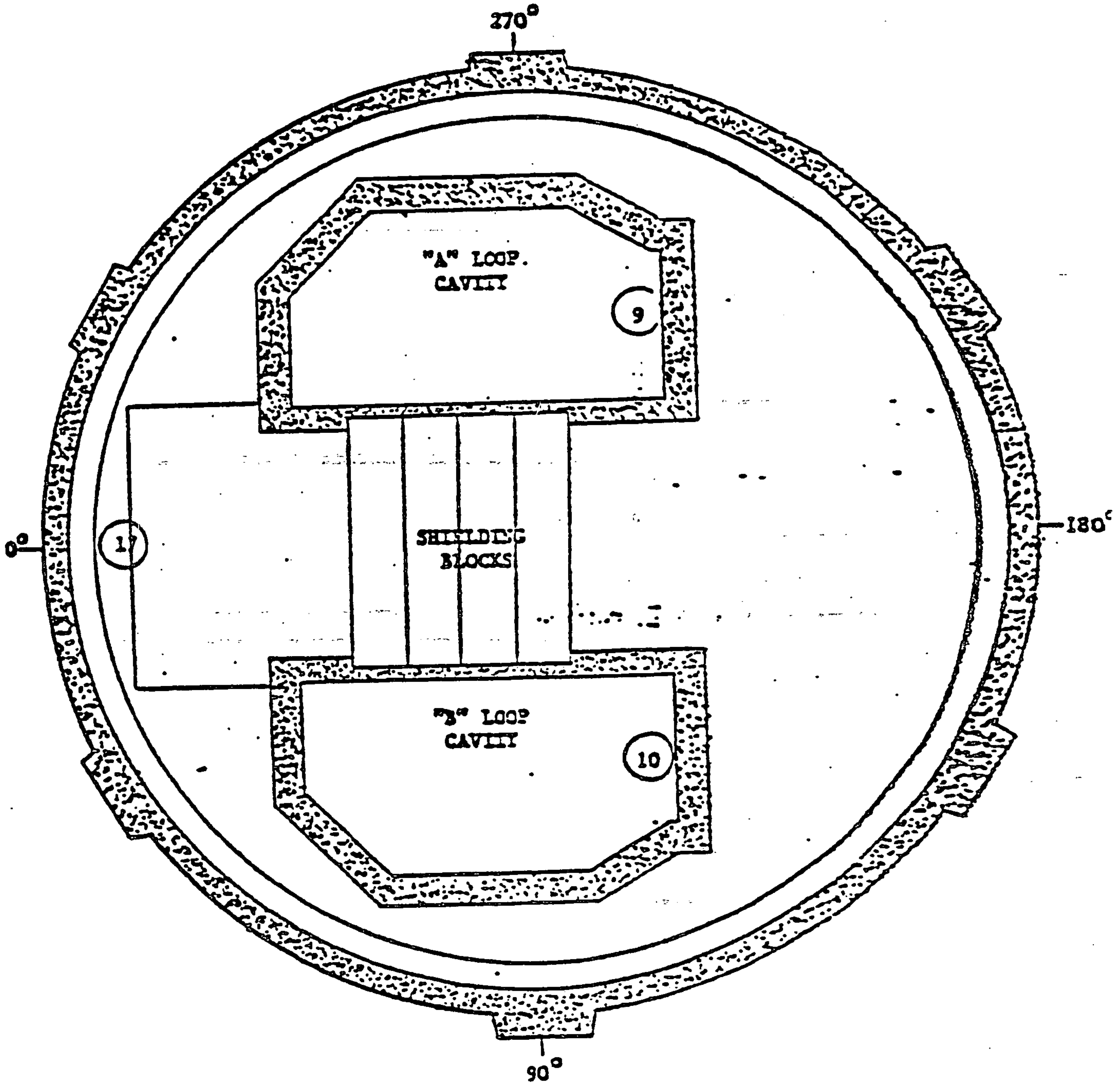
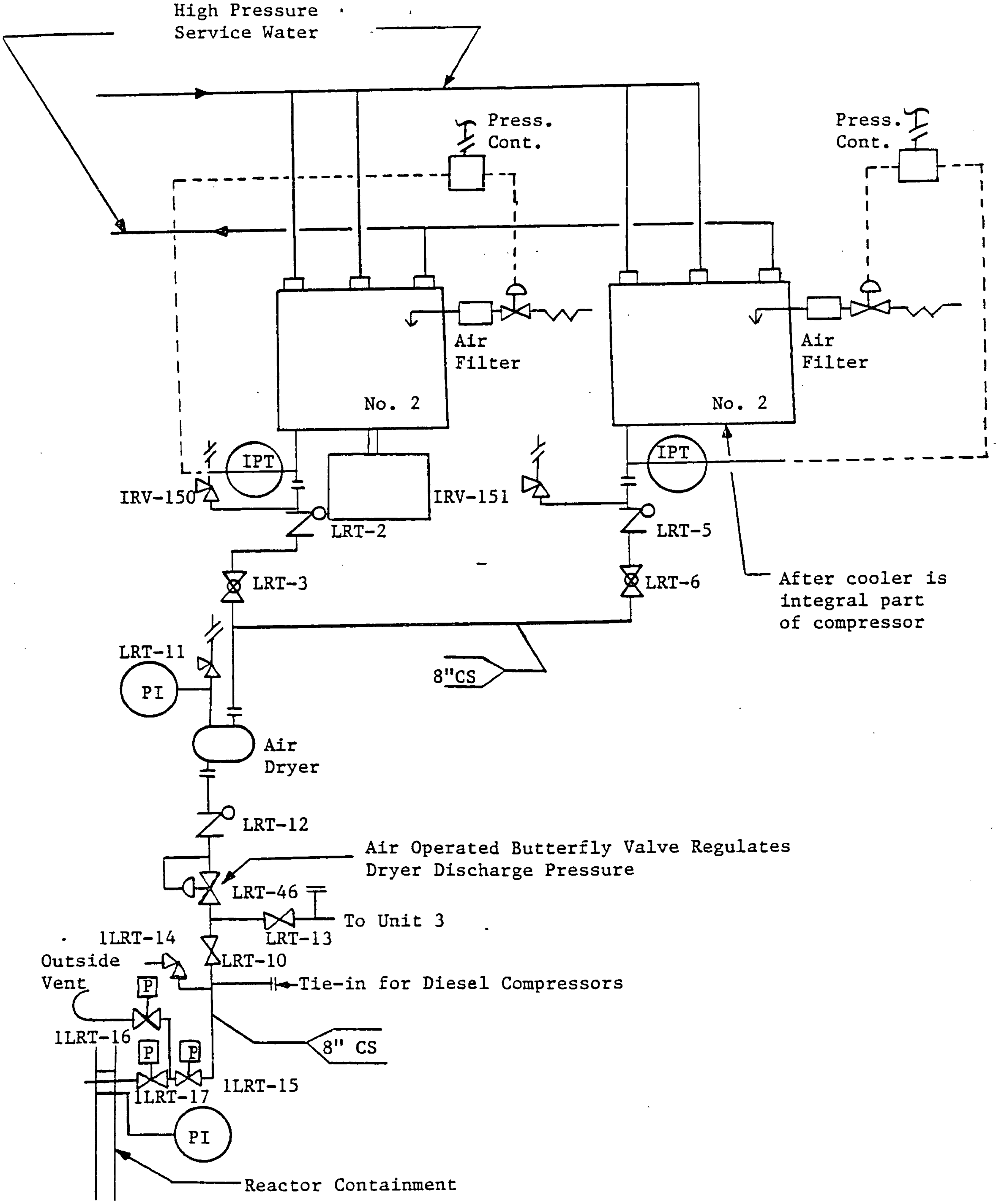


Figure 3.2-5

REACTOR BUILDING PRESSURIZATION SYSTEM



4.0 Conduct of Local Leak Tests

4.1 Local Leak Rate Test

The purpose of the Local Leak testing program was to systematically check the integrity of valves (seats and packing), flanges, pipe and electrical penetration welds, seals and compression fittings that are part of the boundaries of the containment system. These tests, specified by section 4.4.1.2 of the Technical Specifications, have a combined Acceptance Criteria of less than or equal to 0.125% of the Reactor Building atmosphere per 24 hours. Final analysis of all penetration leakage rates shows that the total penetration leakage rate was approximately 26.34 percent of the allowable.

4.1.1 Test Method

All electrical and mechanical penetration, including locks and hatches, were tested by pressurizing ~59 PSIG. The pressure, temperature and barometric pressure were recorded before and after the leak test (duration of test determined by penetration volume) and the leak rate determined by the mass difference method.

4.1.2 Penetration Test Results

Per Technical Specification 4.4.1.2.3, the total leakage from all penetrations and isolation valves shall not exceed 0.125% of the Reactor Building atmosphere in 24 hours. The total measured leak rate from all penetrations prior to this test was 0.0329% per 24 hours. Results of all local penetration tests done since the last type A test are given in Tables 4.1-1 through 4.1-2.

4.2 Local Leak Test Failure Data

Per 10CFR50, Appendix J, V.B.3, a listing of all type "C" local leak tests that are failed to meet the acceptance criteria since the last ILRT are reported in Table 4.2.

TABLE 4.1-1

TYPE "B" TESTS

PENETRATION	DATE	WT%/DAY LEAKAGE
Electrical Penetrations	07/11/81	5.529×10^{-7}
	06/15/83	1.257×10^{-6}
Equipment Hatch	02/07/80	5.003×10^{-5}
	12/16/81	6.408×10^{-7}
	06/02/82	0.000
	06/08/82	0.000
	07/29/83	1.005×10^{-7}
	08/04/83	1.885×10^{-7}
	08/07/83	1.257×10^{-7}
Personnel Hatch	04/17/80	4.310×10^{-4}
	09/02/80	0.000
	02/20/81	2.416×10^{-3}
	03/01/81	0.000
	12/17/81	0.000
	01/14/82	3.331×10^{-3}
	01/17/82	2.410×10^{-3}
	01/22/82	7.444×10^{-4}
	02/22/82	8.177×10^{-4}
	03/20/82	1.315×10^{-4}
	06/08/82	7.228×10^{-4}
	09/09/82	3.603×10^{-5}
	10/27/82	1.314×10^{-3}
	01/27/83	0.000
	04/27/83	1.303×10^{-4}
	07/24/83	4.145×10^{-3}
	08/04/83	1.667×10^{-2}
	08/14/83	3.566×10^{-5}
Personnel Hatch O'Rings	06/01/81	0.000
	06/23/81	1.257×10^{-6}
	08/06/81	6.157×10^{-7}
	12/21/81	1.083×10^{-5}
	12/24/81	4.373×10^{-7}
	12/26/81	2.224×10^{-6}
	12/29/81	1.257×10^{-6}
	12/31/81	2.434×10^{-6}
	01/26/82	6.660×10^{-7}
	02/05/82	8.620×10^{-7}
	02/26/82	6.283×10^{-7}
	03/03/82	8.670×10^{-7}
	03/24/82	1.206×10^{-5}

TABLE 4.1-1 (Cont'd)

PENETRATION	DATE	WT%/DAY LEAKAGE
Personnel Hatch O'Ring (Cont'd)	03/26/82	$6.534x10^{-7}$
	04/01/82	$1.081x10^{-7}$
	04/22/82	$3.267x10^{-7}$
	05/01/82	$6.609x10^{-7}$
	06/10/82	$4.360x10^{-7}$
	06/13/82	$1.106x10^{-6}$
	06/15/82	$1.106x10^{-6}$
	06/27/82	$1.257x10^{-6}$
	07/16/82	$4.272x10^{-7}$
	09/13/82	$8.796x10^{-7}$
	09/22/82	$4.297x10^{-7}$
	10/09/82	$1.382x10^{-6}$
	10/28/82	$2.488x10^{-6}$
	10/30/82	$1.709x10^{-6}$
	12/22/82	$1.257x10^{-6}$
	03/25/83	$1.257x10^{-6}$
	08/17/83	$6.283x10^{-6}$
	08/20/83	$2.513x10^{-7}$
	09/14/83	$2.513x10^{-6}$
	09/16/83	$2.513x10^{-6}$
Emergency Hatch	05/20/80	$2.972x10^{-4}$
	09/16/80	$1.155x10^{-4}$
	02/04/81	$6.459x10^{-4}$
	02/21/81	$6.256x10^{-4}$
	12/13/81	$2.538x10^{-4}$
	12/15/81	$1.411x10^{-5}$
	02/18/82	$2.508x10^{-4}$
	03/19/82	$1.723x10^{-4}$
	06/29/82	$1.009x10^{-4}$
	09/14/82	$9.899x10^{-5}$
	12/14/82	$3.393z10^{-5}$
	03/17/83	$3.342x10^{-5}$
	03/24/83	$4.637x10^{-4}$
	07/26/83	$4.147x10^{-4}$
	08/14/83	0.000
Emergency Hatch O'Ring	03/21/83	$7.225x10^{-7}$
	04/14/83	$3.644x10^{-7}$
Purge Valves	02/22/82	$1.157x10^{-3}$
	03/20/82	$1.873x10^{-3}$
	06/03/82	$8.972x10^{-4}$
	06/08/82	$3.239x10^{-4}$
	10/26/82	$3.288x10^{-4}$
	10/26/82	$3.198x10^{-4}$
	07/29/83	$1.157x10^{-4}$
	08/11/83	$7.979x10^{-5}$
	08/12/83	$2.400x10^{-4}$

TABLE 4.1-2

TYPE "C" TESTS

PENETRATION	DATE	WT%/DAY LEAKAGE
Mechanical Penetration	07/02/80	5.114×10^{-5}
	12/19/81	5.980×10^{-3}
	08/19/82	5.585×10^{-3}
	10/25/82	5.585×10^{-3}
	08/08/83	8.145×10^{-3}

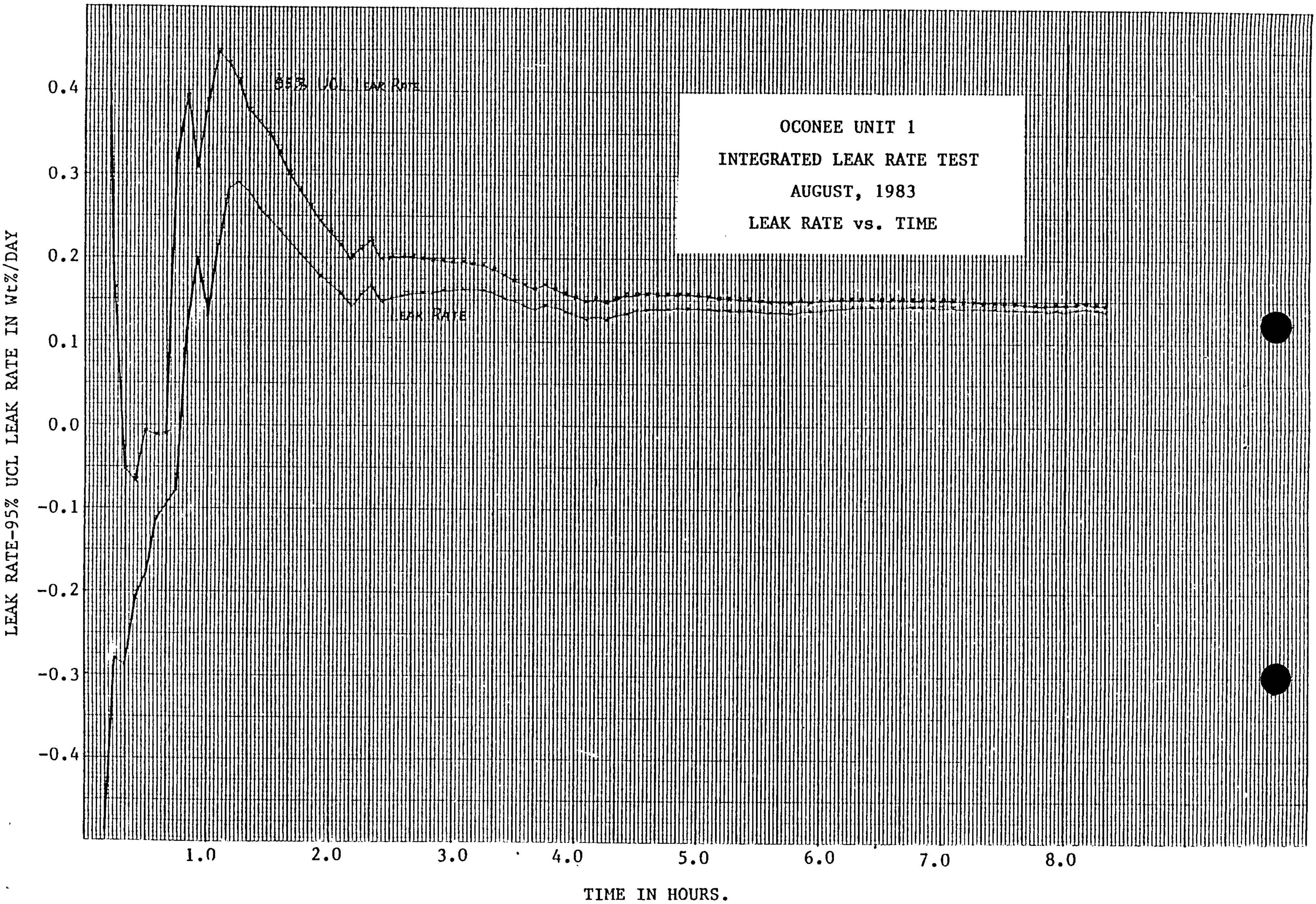
TABLE 4.2

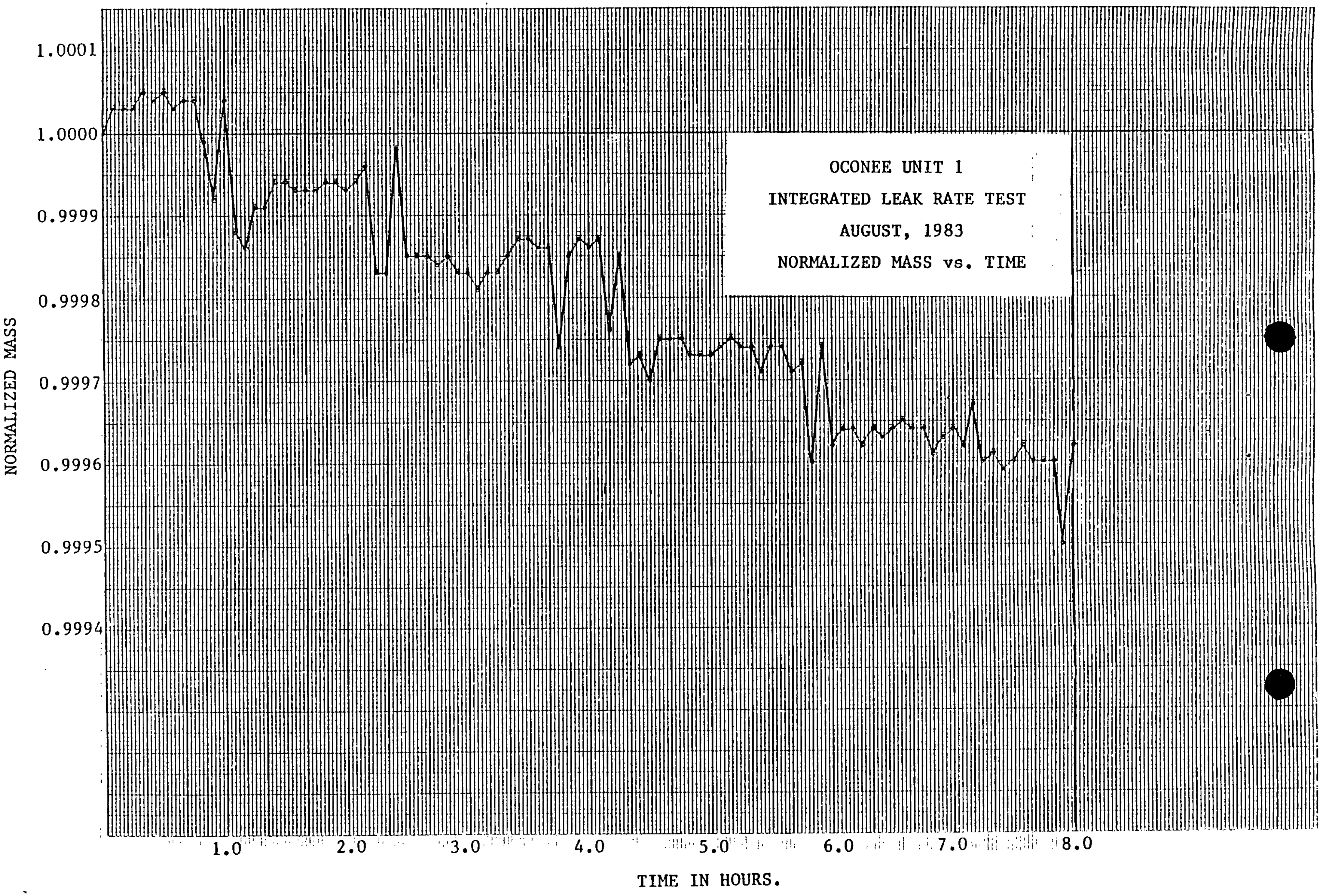
LOCAL TEST FAILURE DATA

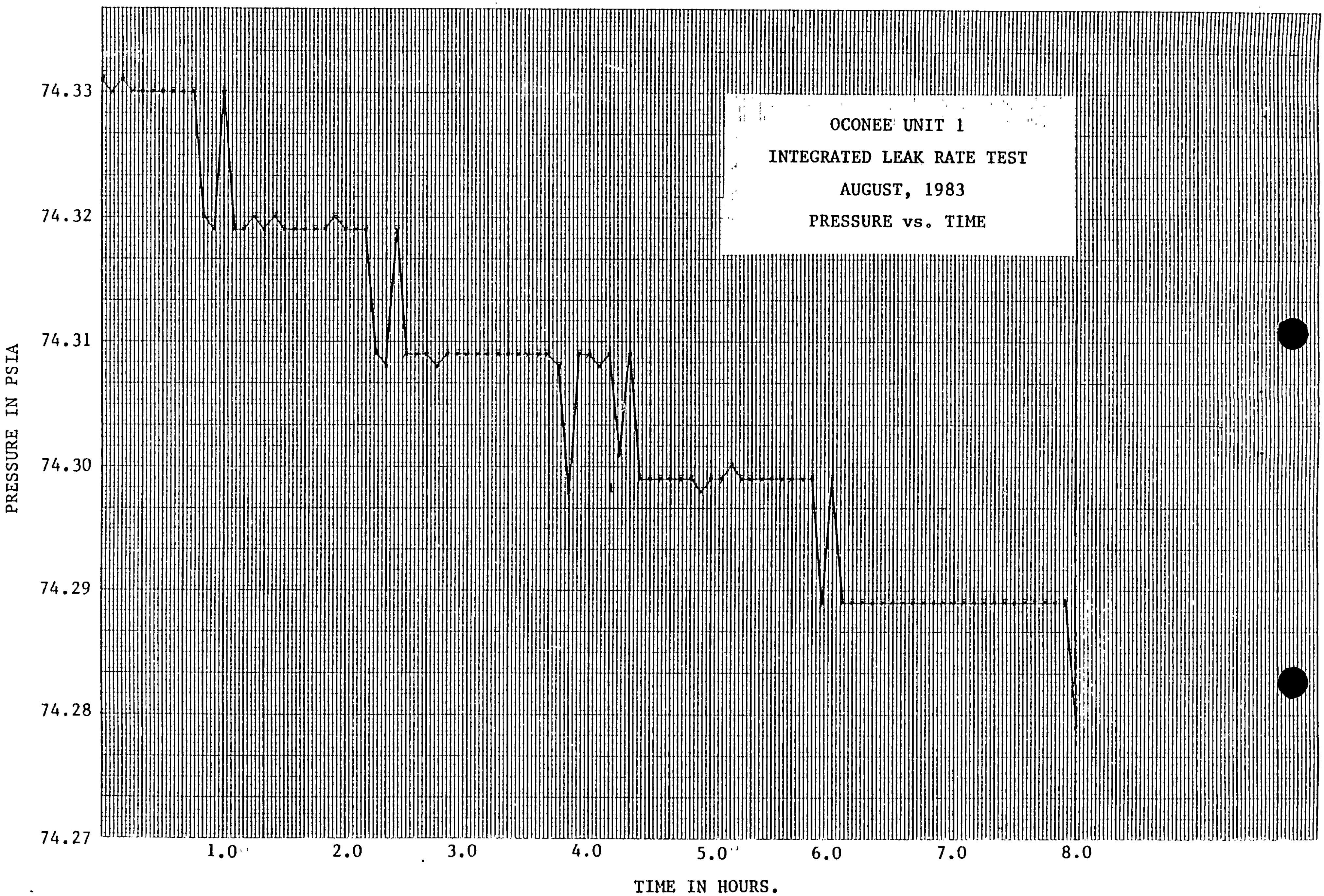
ITEM	DATE	REASON FOR FAILURE	CORRECTIVE ACTION
HP-393	07/05/81	Leaking Past Seat	Lapped Seat
RC-7	07/25/81	Leaking Past Seat	Replaced Valve
HP-283	07/25/81	Leaking Past Seat	Replaced Valve
HP-145	07/25/81	Leaking Past Seat	Replaced Valve
HP-284	07/25/81	Leaking Past Seat	Cleaned Internal Parts
HP-144	07/25/81	Leaking Past Seat	Replaced Valve
HP-146	09/03/81	Leaking Past Seat	Replaced Valve
HP-147	10/02/81	Leaking Past Seat	Lapped Seat & Disc
FDW-108	10/26/81	Leaking Past Seat	Replaced Valve
CC-7	11/10/81	Leaking Past Seat	Readjusted Torque Switch
DW-155	12/01/81	Leaking Past Seat	Lapped Seat
DW-156	12/01/81	Leaking Past Seat	Replaced Valve
HP-253	01/21/82	Leaking Past Seat	Replaced Valve
HP-236	01/21/82	Leaking Past Seat	Replaced Valve
HP-254	01/21/82	Leaking Past Seat	Replaced Valve
HP-242	01/21/82	Leaking Past Seat	Replaced Valve
HP-286	06/12/83	Leaking Past Seat	Lapped Seat & Disc
HP-146	06/12/83	Leaking Past Seat	Lapped Seat & Disc
CS-12	06/17/83	Leaking Past Seat	Lapped New Seat to Body
CC-77	06/17/83	Leaking Past Seat	Cleaned and Adjusted Seat
CC-76	06/17/83	Leaking Past Seat	Cleaned Parts & Reassembled
HP-284	07/18/83	Leaking Past Seat	Lapped Seat & Disc
HP-393	07/24/83	Leaking Past Seat	Lapped Seat & Disc
SF-97	07/24/83	Not Seating Fully	Adjusted Limit Torque
HP-417	07/25/83	Not Seating Fully	Adjusted Limit Torque

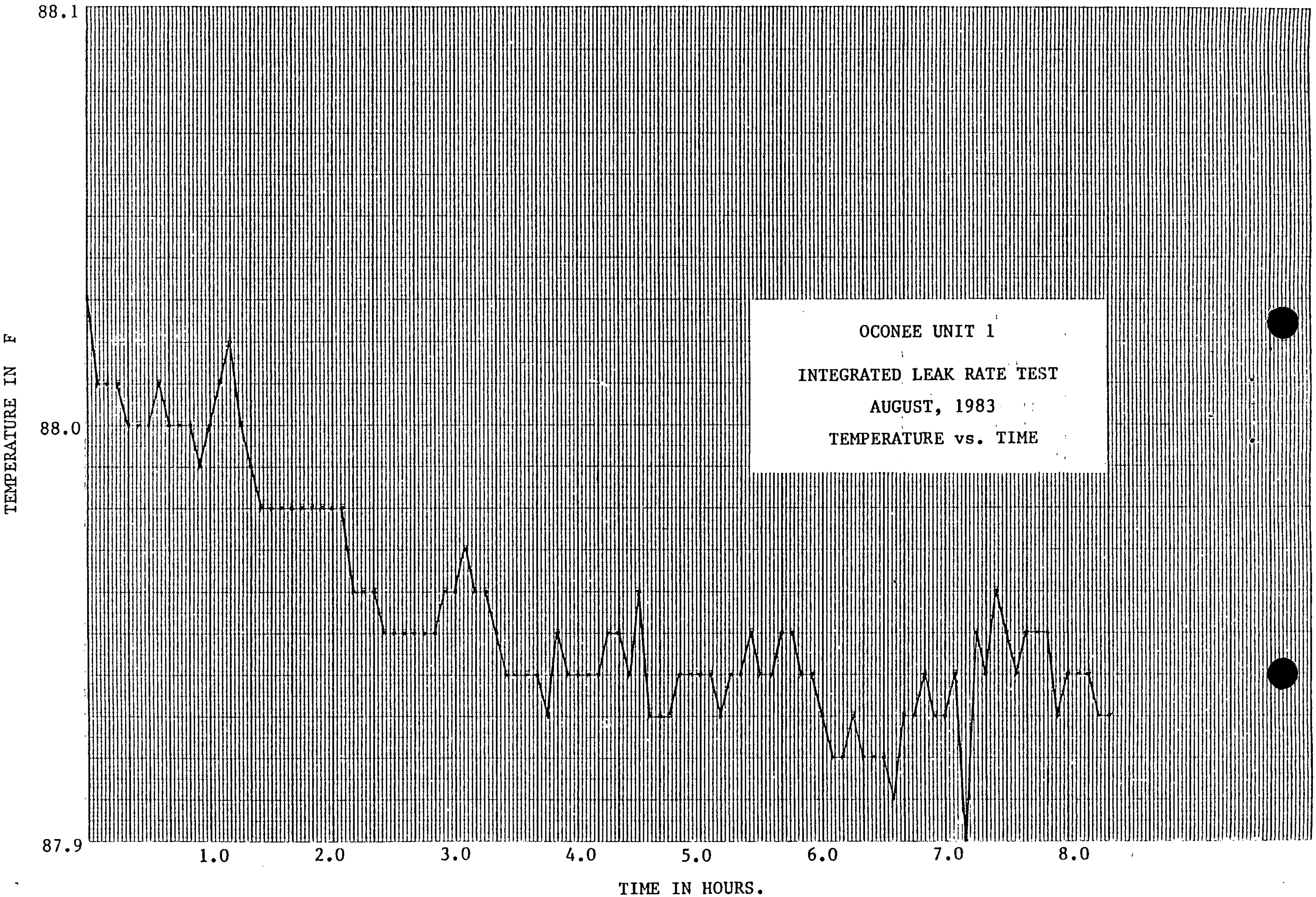
DATA SET NO	CLOCK TIME	CORRECTED PRESSURE	CORRECTED TEMPERATURE	MASS	LEAK RATE	95% UCL LEAK RATE
179	2058	74.331	88.0100	699816.1	-0.4861	0.8271
180	2103	74.330	88.0100	699814.0	-0.2301	0.1646
181	2108	74.330	88.0000	699827.1	-0.2889	-0.0814
182	2113	74.330	88.0000	699820.3	-0.2099	-0.0534
183	2118	74.330	88.0000	699824.3	-0.1776	-0.0661
184	2123	74.330	88.0100	699813.7	-0.1146	-0.0062
185	2128	74.330	88.0000	699820.7	-0.0960	-0.0116
186	2133	74.330	88.0000	699819.9	-0.0790	-0.0106
187	2138	74.320	88.0000	699724.9	0.1114	0.3202
188	2143	74.319	87.9900	699736.5	0.1994	0.3937
189	2148	74.330	88.0000	699821.4	0.1302	0.3081
190	2153	74.319	88.0100	699709.6	0.2149	0.3891
191	2158	74.319	88.0200	699693.6	0.2808	0.4452
192	2203	74.320	88.0000	699726.9	0.2898	0.4329
193	2208	74.319	87.9900	699732.6	0.2845	0.4103
194	2213	74.320	87.9800	699751.1	0.2623	0.3758
195	2218	74.319	87.9800	699747.6	0.2451	0.3478
196	2223	74.319	87.9800	699740.1	0.2326	0.3254
197	2228	74.319	87.9800	699746.5	0.2170	0.3020
198	2233	74.319	87.9800	699745.4	0.2038	0.2821
199	2238	74.319	87.9800	699747.2	0.1904	0.2629
200	2243	74.320	87.9800	699749.6	0.1769	0.2445
201	2248	74.319	87.9800	699744.3	0.1678	0.2305
202	2253	74.319	87.9800	699747.2	0.1571	0.2158
203	2258	74.319	87.9600	699767.8	0.1415	0.1980
204	2303	74.309	87.9600	699675.3	0.1562	0.2104
205	2308	74.308	87.9600	699670.4	0.1675	0.2192
206	2313	74.319	87.9500	699781.6	0.1466	0.1991
207	2318	74.309	87.9500	699686.4	0.1517	0.2010
208	2323	74.309	87.9500	699690.7	0.1548	0.2010
209	2328	74.309	87.9500	699686.7	0.1570	0.2005
210	2333	74.308	87.9500	699683.5	0.1585	0.1994
211	2338	74.309	87.9500	699686.7	0.1582	0.1968
212	2343	74.309	87.9600	699673.6	0.1603	0.1967
213	2348	74.309	87.9600	699674.6	0.1607	0.1951
214	2353	74.309	87.9700	699662.2	0.1630	0.1956
215	2358	74.309	87.9600	699672.9	0.1619	0.1929
216	3	74.309	87.9600	699672.1	0.1614	0.1908
217	8	74.309	87.9500	699686.0	0.1575	0.1857
218	13	74.309	87.9400	699702.0	0.1522	0.1795
219	18	74.309	87.9400	699698.8	0.1472	0.1737
220	23	74.309	87.9400	699697.4	0.1424	0.1681
221	28	74.308	87.9400	699693.8	0.1385	0.1634
222	33	74.298	87.9300	699612.8	0.1436	0.1680
223	38	74.309	87.9500	699686.4	0.1402	0.1637
224	43	74.309	87.9400	699698.8	0.1353	0.1584
225	48	74.308	87.9400	699694.9	0.1311	0.1536
226	53	74.309	87.9400	699699.6	0.1264	0.1484
227	58	74.301	87.9400	699621.8	0.1292	0.1506
228	103	74.309	87.9500	699684.9	0.1261	0.1469
229	108	74.299	87.9500	699594.3	0.1307	0.1511
230	113	74.299	87.9400	699606.4	0.1336	0.1535
231	118	74.299	87.9600	699580.5	0.1378	0.1574
232	123	74.299	87.9300	699619.6	0.1384	0.1573
233	128	74.299	87.9300	699619.2	0.1391	0.1573
234	133	74.299	87.9300	699617.4	0.1392	0.1568
235	138	74.298	87.9400	699602.5	0.1401	0.1572
236	143	74.299	87.9400	699606.8	0.1403	0.1568
237	148	74.299	87.9400	699604.6	0.1407	0.1566
238	153	74.300	87.9400	699613.2	0.1399	0.1553
239	158	74.299	87.9300	699620.3	0.1387	0.1537
240	203	74.299	87.9400	699608.1	0.1381	0.1526
241	208	74.299	87.9400	699607.8	0.1377	0.1518
242	213	74.299	87.9500	699592.3	0.1380	0.1516
243	218	74.299	87.9400	699610.3	0.1367	0.1499
244	223	74.299	87.9400	699610.3	0.1356	0.1485
245	228	74.299	87.9500	699591.5	0.1354	0.1479
246	233	74.299	87.9500	699594.0	0.1348	0.1470
247	238	74.289	87.9400	699511.2	0.1381	0.1504
248	243	74.299	87.9400	699609.6	0.1365	0.1486
249	248	74.289	87.9300	699525.4	0.1385	0.1504
250	253	74.289	87.9200	699539.5	0.1398	0.1514
251	258	74.289	87.9200	699543.0	0.1406	0.1519
252	303	74.289	87.9300	699528.6	0.1419	0.1530
253	308	74.289	87.9200	699538.1	0.1427	0.1535
254	313	74.289	87.9200	699534.9	0.1429	0.1535
255	318	74.289	87.9200	699539.2	0.1433	0.1536
256	323	74.289	87.9100	699549.8	0.1425	0.1525
257	328	74.289	87.9200	699539.2	0.1425	0.1523
258	333	74.289	87.9200	699538.1	0.1426	0.1521
259	338	74.289	87.9300	699522.8	0.1431	0.1524
260	343	74.289	87.9200	699536.3	0.1426	0.1517
261	348	74.289	87.9200	699541.6	0.1420	0.1509
262	353	74.289	87.9300	699526.1	0.1420	0.1507
263	358	74.289	87.9000	699563.3	0.1406	0.1492
264	403	74.289	87.9400	699512.6	0.1407	0.1491
265	408	74.289	87.9300	699521.8	0.1403	0.1485
266	413	74.289	87.9500	699502.3	0.1404	0.1485
267	418	74.289	87.9400	699513.3	0.1401	0.1479
268	423	74.289	87.9300	699524.0	0.1395	0.1473
269	428	74.289	87.9400	699513.7	0.1392	0.1468
270	433	74.289	87.9400	699514.4	0.1388	0.1462
271	438	74.289	87.9400	699513.3	0.1384	0.1456
272	443	74.279	87.9200	699442.1	0.1396	0.1468
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.1458

DATA SET NO	CLOCK TIME	CORRECTED PRESSURE	CORRECTED TEMPERATURE	MASS	LEAK RATE	95% UCL LEAK RATE
376	1323	74.234	87.9800	698948.1	0.0309	0.5955
377	1328	74.234	87.9800	698944.1	0.0603	0.1826
378	1333	74.224	87.9900	698836.5	0.9419	2.1397
379	1338	74.234	87.9900	698932.5	0.4945	1.3934
380	1343	74.233	88.0000	698907.8	0.3917	1.0043
381	1348	74.234	87.9900	698933.3	0.2185	0.6987
382	1353	74.234	88.0000	698922.2	0.1607	0.5287
383	1358	74.234	88.0000	698918.3	0.1295	0.4194
384	1403	74.224	88.0000	698824.8	0.2844	0.5684
385	1408	74.224	88.0000	698825.9	0.3605	0.6071
386	1413	74.235	88.0100	698912.7	0.2771	0.5014
387	1418	74.234	88.0100	698905.5	0.2254	0.4234
388	1423	74.224	88.0200	698802.9	0.2910	0.4744
389	1428	74.225	88.0100	698817.8	0.3163	0.4776
390	1433	74.225	88.0200	698804.0	0.3370	0.4803
391	1438	74.224	88.0200	698801.5	0.3483	0.4757
392	1443	74.224	88.0200	698799.0	0.3523	0.4659
393	1448	74.224	88.0300	698783.7	0.3587	0.4608
394	1453	74.224	88.0300	698790.5	0.3552	0.4473
395	1458	74.224	88.0200	698801.1	0.3436	0.4279
396	1503	74.225	88.0300	698791.6	0.3355	0.4127
397	1508	74.223	88.0300	698780.8	0.3298	0.4006
398	1513	74.225	88.0300	698791.3	0.3184	0.3844
399	1518	74.224	88.0300	698786.6	0.3083	0.3699
400	1523	74.224	88.0400	698771.6	0.3037	0.3609
401	1528	74.224	88.0300	698784.1	0.2928	0.3467
402	1533	74.224	88.0300	698787.6	0.2814	0.3328
403	1538	74.214	88.0400	698683.6	0.2981	0.3488
404	1543	74.224	88.0500	698763.9	0.2902	0.3382
405	1548	74.224	88.0200	698799.3	0.2730	0.3208
406	1553	74.214	88.0400	698683.6	0.2836	0.3296
407	1558	74.214	88.0300	698695.3	0.2884	0.3318
408	1603	74.214	87.9900	698740.9	0.2815	0.3229
409	1608	74.224	88.0400	698771.6	0.2691	0.3100
410	1613	74.215	88.0400	698685.4	0.2728	0.3116
411	1618	74.214	88.0400	698681.1	0.2758	0.3127
412	1623	74.214	88.0500	698667.6	0.2789	0.3140
413	1628	74.214	88.0500	698671.1	0.2805	0.3138
414	1633	74.214	88.0500	698668.3	0.2808	0.3124
415	1638	74.214	88.0400	698678.9	0.2788	0.3090
416	1643	74.214	88.0600	698653.1	0.2794	0.3082
417	1648	74.214	88.0600	698653.5	0.2795	0.3069
418	1653	74.214	88.0600	698653.3	0.2785	0.3048
419	1658	74.214	88.0600	698653.5	0.2770	0.3021
420	1703	74.213	88.0500	698660.8	0.2740	0.2982
421	1708	74.214	88.0600	698649.8	0.2718	0.2951
422	1713	74.214	88.0600	698652.3	0.2689	0.2914
423	1718	74.214	88.0600	698651.0	0.2659	0.2877
424	1723	74.204	88.0800	698530.6	0.2739	0.2962
425	1728	74.204	88.0600	698560.1	0.2781	0.2998

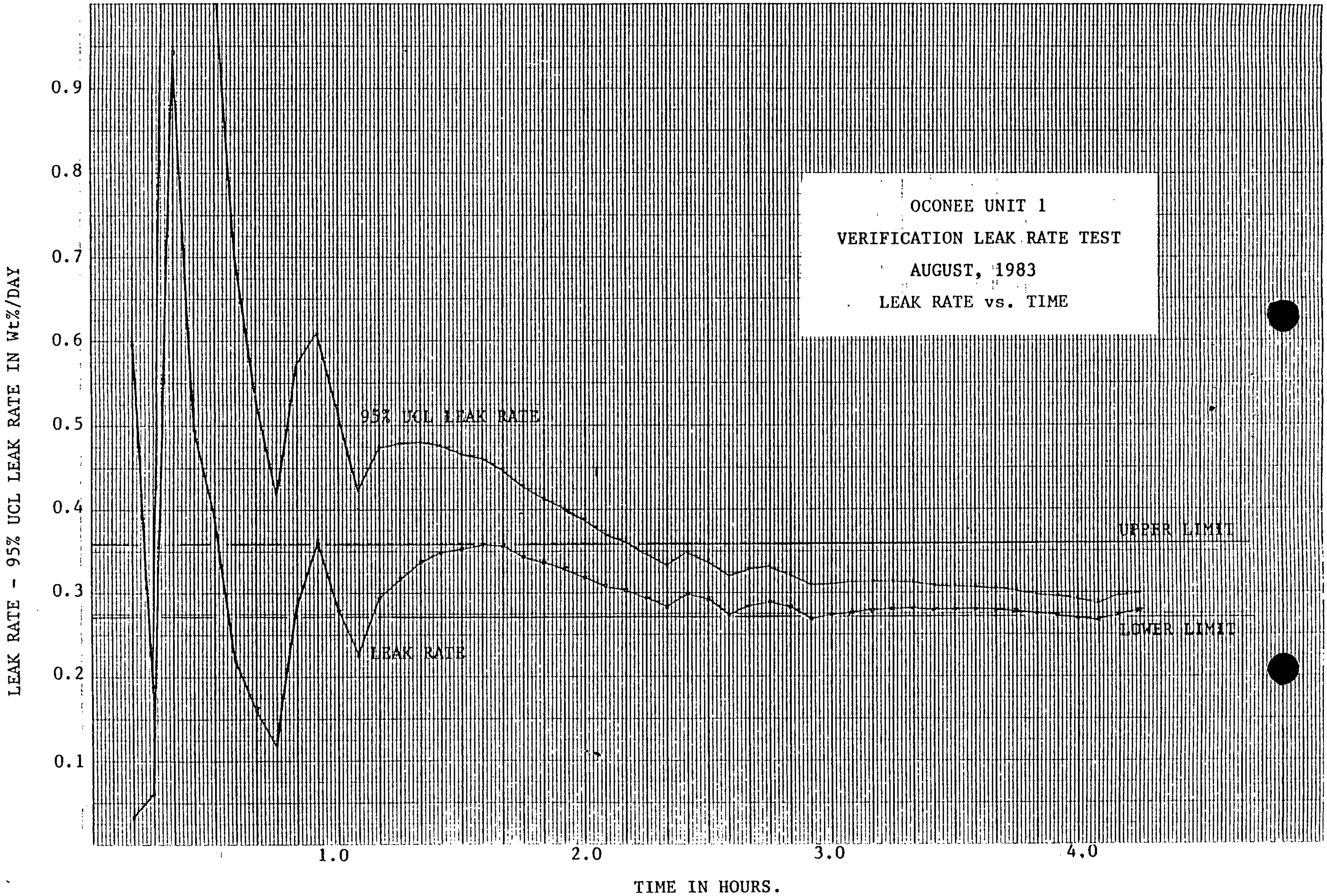

OCONEE UNIT 1
INTEGRATED LEAK RATE TEST
AUGUST, 1983
LEAK RATE vs. TIME
95% UCL LEAK RATE
LEAK RATE
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
LEAK RATE-95% UCL LEAK RATE IN Wt%/DAY
TIME IN HOURS.

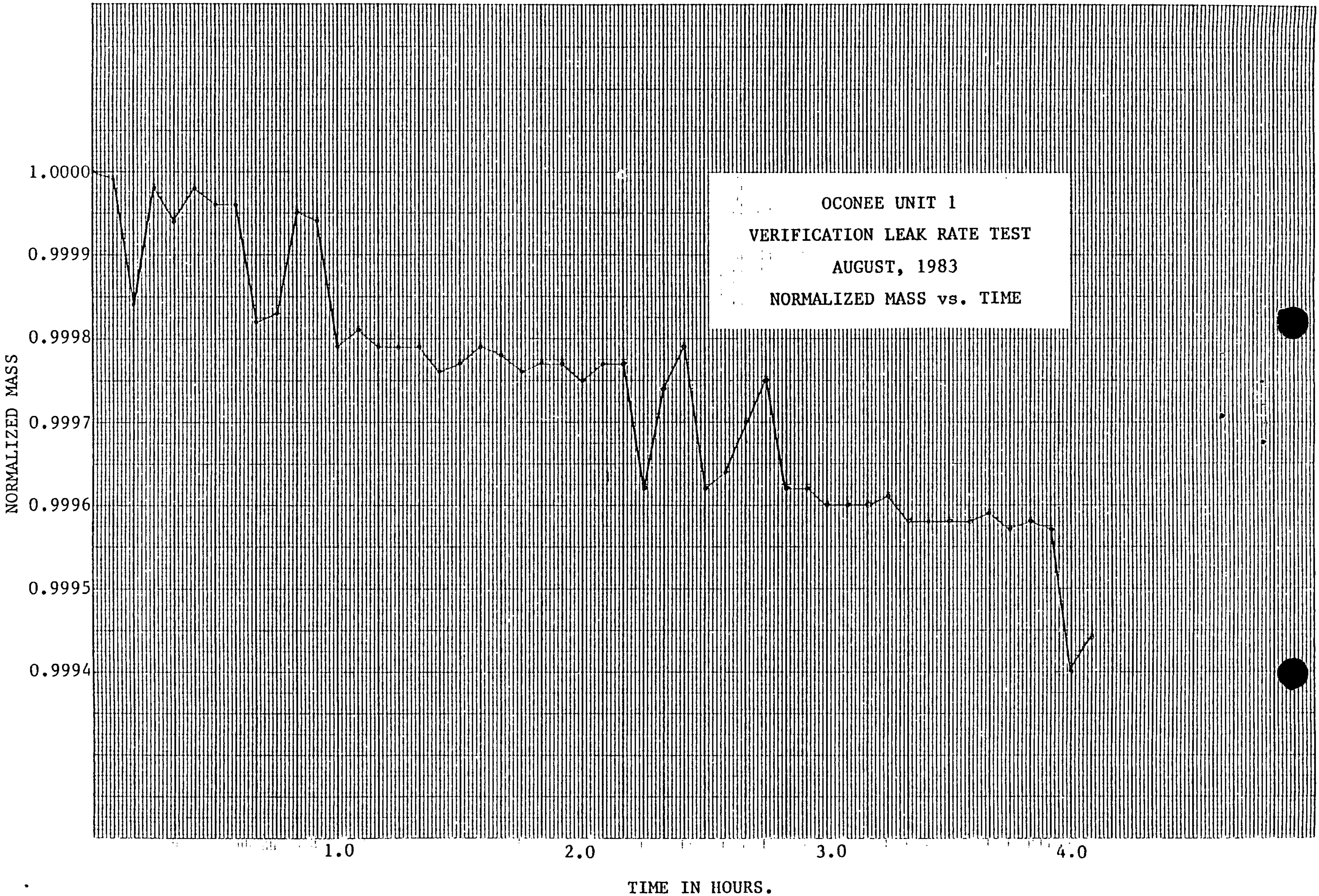

OCONEE UNIT 1
INTEGRATED LEAK RATE TEST
AUGUST, 1983
NORMALIZED MASS vs. TIME
NORMALIZED MASS
1.0001
1.0000
0.9999
0.9998
0.9997
0.9996
0.9995
0.9994
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
TIME IN HOURS.


OCONEE UNIT 1
INTEGRATED LEAK RATE TEST
AUGUST, 1983
PRESSURE vs. TIME
PRESSURE IN PSIA
74.33
74.32
74.31
74.30
74.29
74.28
74.27
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
TIME IN HOURS.

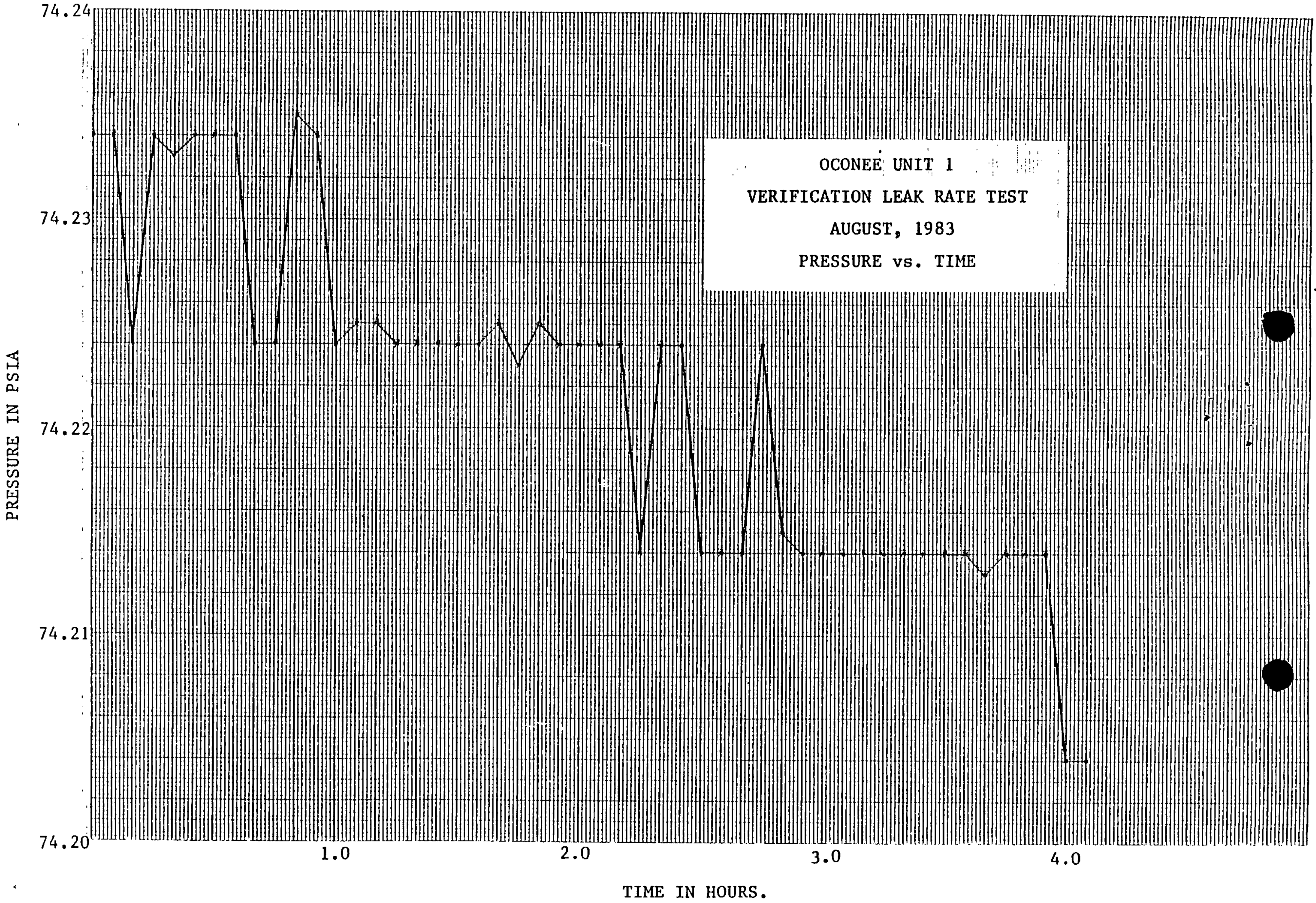


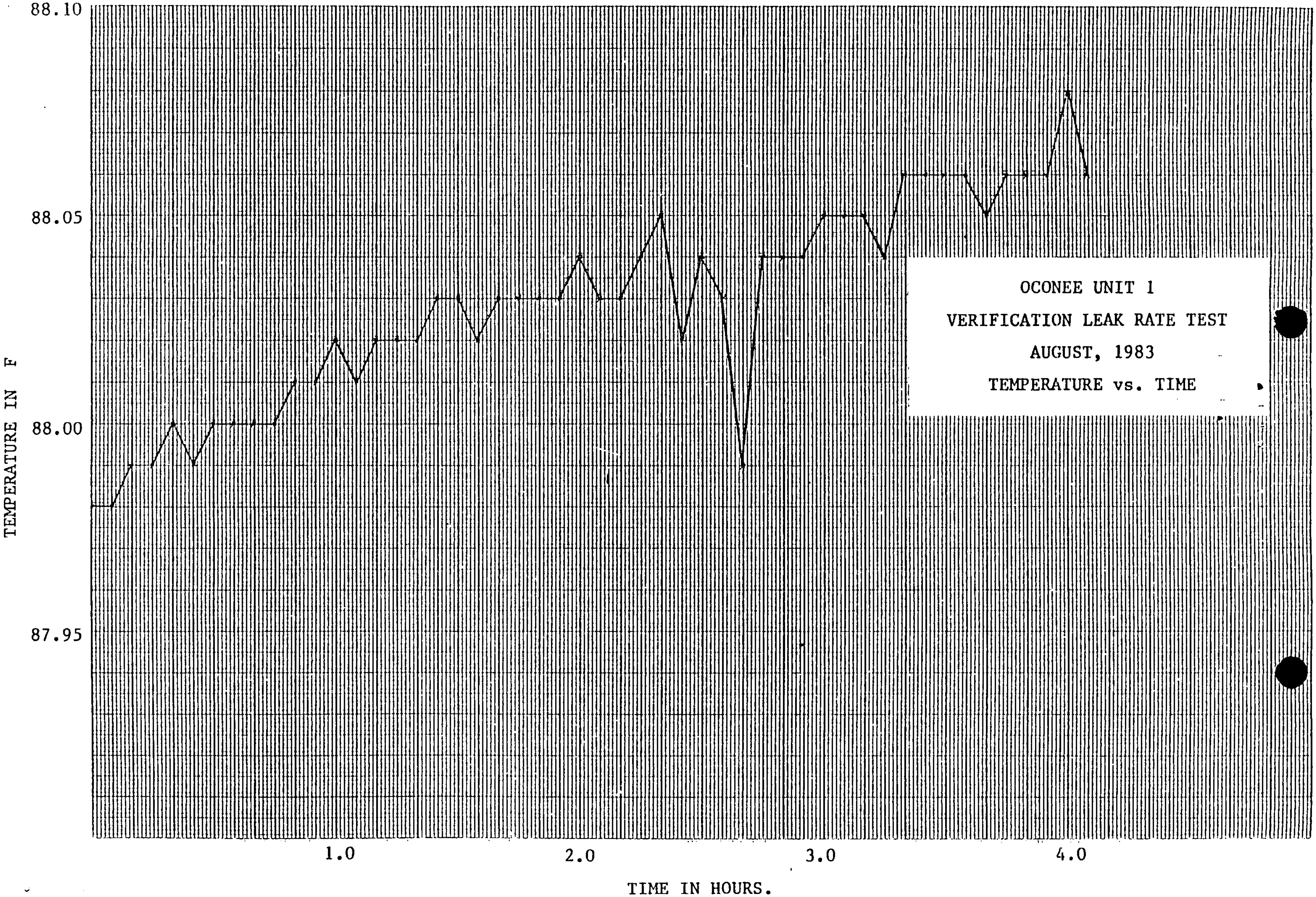
88.1
88.0
87.9
TEMPERATURE IN F
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
TIME IN HOURS.
OCONEE UNIT 1
INTEGRATED LEAK RATE TEST
AUGUST, 1983
TEMPERATURE vs. TIME


OCONEE UNIT 1
VERIFICATION LEAK RATE TEST
AUGUST, 1983
LEAK RATE vs. TIME
95% UCL LEAK RATE
LEAK RATE
UPPER LIMIT
LOWER LIMIT
LEAK RATE - 95% UCL LEAK RATE IN Wt%/DAY
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1.0
2.0
3.0
4.0
TIME IN HOURS.



OCONEE UNIT 1
VERIFICATION LEAK RATE TEST
AUGUST, 1983
NORMALIZED MASS vs. TIME
NORMALIZED MASS
1.0000
0.9999
0.9998
0.9997
0.9996
0.9995
0.9994
1.0
2.0
3.0
4.0
TIME IN HOURS.


OCONEE UNIT 1
VERIFICATION LEAK RATE TEST
AUGUST, 1983
PRESSURE vs. TIME
74.24
74.23
74.22
74.21
74.20
PRESSURE IN PSIA
1.0
2.0
3.0
4.0
TIME IN HOURS.


OCONEE UNIT 1
VERIFICATION LEAK RATE TEST
AUGUST, 1983
TEMPERATURE vs. TIME
88.10
88.05
88.00
87.95
TEMPERATURE IN F
1.0
2.0
3.0
4.0
TIME IN HOURS.

Attachment 3

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

October 25, 1983

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Re: Oconee Nuclear Station
Docket No. 50-269
Unit 1 RB Integrated Leak Rate Test

Dear Mr. O'Reilly:

Pursuant to Oconee Nuclear Station Technical Specification 4.4.1.1.5, please find attached a copy of the Unit 1 Reactor Containment Building Integrated Leak Rate Test that was completed in August 1983.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

JCP/php

Attachment

bcc: (w/o attachment)
R. S. Bhatnagar
K. S. Canady
N. A. Rutherford
R. L. Gill
P. F. Guill
R. C. Futrell
R. T. Bond (ONS)
B. G. Davenport
Group File: OS-801.01

(w/attachment)
Group File: OS-818.01