DUKE POWER COMPANY

Oconee Nuclear Station

Unit 2

Reactor Containment Building

Integrated Leak Rate Test

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1.0 Introduction

The periodic Containment Integrated Leak Rate Test (CILRT) of the Duke Power Company, Oconee Nuclear Station Unit 2 Containment Building was satisfactorily completed on June 2, 1980. The testing was conducted in accordance with the requirements of FSAR Section 5.6.2.1, Technical Specification 4.4, BN-TOP-1 (Bechtel Testing Criteria for CILRT), ANSI N45.4-1972, ANS N274-Nov., 1978 Work Group 56.8, Rev. 3 and 10CFR50, Appendix J, with one exception. 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 half the design basis accident pressure of ~29.5 psig. A measured induced leakage was used to verify the results. Analysis of final test data shows the results to be well within the specified limits for this containment, which has a maximum allowable leak rate of 0.176 wt.%/day. The leak rate for the Oconee Unit 2 containment was measured at 0.0574 wt%/day, and the 95% upper confidence limit (UCL) was determined to be 0.0595 wt%/day.

2.0 Summary and Conclusions

2.1 Synopsis

The Unit 2 Containment ILRT was performed in accordance with periodic test procedure PT/0/A/150/03 as approved for use on May 24, 1980.

While performing the valve line-up for the CILRT per PT/0/A/150/3, it was discovered that some of the penetration vent line pipe caps were still in place even though the vent valves had been opened. To ensure proper venting, procedure change #22 was implemented to remove the pipe caps on the applicable penetration vent lines. It was also noted by the NRC inspectors that the documentation of draining of some of the penetrations was inadequate. Procedure change #24 was implemented to sequence the valve line-up to verify and ensure that the applicable penetrations were drained of water.

Pressurization for the CILRT began at 1203 hrs. on May 30, 1980 using both compressors. Pressurization was ceased at 1735 hrs. on May 30, 1980 when the containment pressure reached ∿ 10 psig.

Containment entry to inspect for leakage was delayed until 2135 hrs. due to difficulties in obtaining a reactor building air sample. An error in the valve line-up caused the delay. The inspection personnel saw no indication of leakage and exited the containment at 2315 hrs. The compressors were restarted at 2340 hrs. to continue with containment pressurization. At 1015 hrs. on May 31, 1980, the compressors were secured with the containment pressure at ∿ 30 psig, and the stabilization period begun.

At 1530 hrs. on May 31, 1980, a step increase of approximately one half of a decade on RIA-43 (Unit Vent Stack Monitor) was observed. It was noted at 1745 hrs. that the leak rate had continually increased since 1530 hrs. An inspection of the penetration room and the leak rate test equipment connections was performed and no major leaks were found.

At 0130 hrs. on June 1, 1980, leakage was discovered on the inner door of both the personnel and emergency air locks. A pressure of ∿ 30 psig was also discovered between the isolation valves of the R.B. Purge penetrations (Pen. #19 and Pen. #20). Procedure change #27 was implemented to pressurize the personnel and emergency air locks to a pressure of 5 psig less than the average containment pressure to reduce leakage into the hatches from the containment. The emergency hatch was pressurized to 25 psig (it was already pressurized to 16 psig because of inner door leakage) at 0400 on June 1, 1980 and the leak rate decreased. The personnel hatch was not pressurized because of the significant decrease in the leak rate.

At 1215 hrs. on June 1, 1980, the final data analysis was completed. The test period was fixed from 2145 hrs. on May 31, 1980 through 1215 hrs. on June 1, 1980. The calculated leak rate was .0574 wt%/day and the 95% upper confidence limit (UCL) was .0595 wt%/day. These results were well below the acceptance of .75 Lt. or .132 wt%/day.

An imposed leak rate of .176 wt%/day or 6.86 SCFM was calculated for the verification leak rate test. This leak was imposed at 1430 hrs. on June 1, 1980.

At 0015 hrs. on June 2, 1980, the verification leak rate test was completed. The calculated leak rate was .2032 wt%/day, and the UCL was .2188 wt%/day.

At 0100 hrs. on June 2, 1980, depressurization of the containment began. Depressurization was completed at 1430 hrs. on June 2, 1980. An entry to the containment was made at 1600 hrs. on June 2, 1980, to inspect for damage caused by the CILRT. No damage due to the test was observed.

2.2 Appendix J Exceptions

Exception - Change of Data Analysis Method

In an internal NRC memorandum from V. Stello to K. V. Seyfrit dated 10/25/77, the Division of Operating Reactors (Office of Nuclear Reactor Regulation) took the position that in order to meet the intent of 10CFR50, Appendix J and for the test results to be considered acceptable, the test results will demonstrate that a calculated 95% upper confidence limit is less than or equal to 75% La (75% L_t for reduced pressure tests). On December 11, 1979, R.C. Lewis of the US NRC transmitted a letter to W. O. Parker, Jr., re-affirming the NRC's position on the 95% UCL and the test acceptance. Discussions were then held with M. Fairtile, NRC/ONRR and H. Whitener, NRC/RII about the data analysis method used for the test. The NRC approved the use of the mass-plot method of data analysis for the Oconee Unit 1 CILRT on January 16, 1980 with the following restraints:

1) Acceptance criteria of 0.75 La (L_{tm}/L_{pm}) which must be met, including 95% UCL.

2) Mass plot test methodology used on reduced pressure test.

3) Test duration of 24 hrs.

The mass plot test method of data analysis was also approved by the NRC for use on the Oconee 2 CILRT. The same restraints as the Oconee 1 CILRT applied, except that the NRC allowed, per discussion with H. Whitener NRC/RII, a 10 hr. test period provided a 6 hr. stable leak rate could be obtained.

This change of data analysis required the approval of the NRC per Appendix J, section III.A.3(a) "....The method chosen for the initial test shall normally be used for the periodic tests."

2.3 Test Results

Tabulated below are the leak rates measured for the test and the verification leak rate test. As can be seen, the acceptance criteria was met in both cases. 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
29.5 psig	.132	.176	.0574	.0595

The verification test consisted of imposing a known leak rate on the containment at the end of the CILRT. Results from this supplemental test are acceptable provided the difference between the supplemental test data and the type test data is within 25% of L_t.

Test leak rate	0.0574
Imposed leak rate............................	0.176
Total	0.2334
Verification leak rate (measured)............	0.2032
Difference	0.0302
percent of L_t	17.16%

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

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 sytematic 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 a least 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.

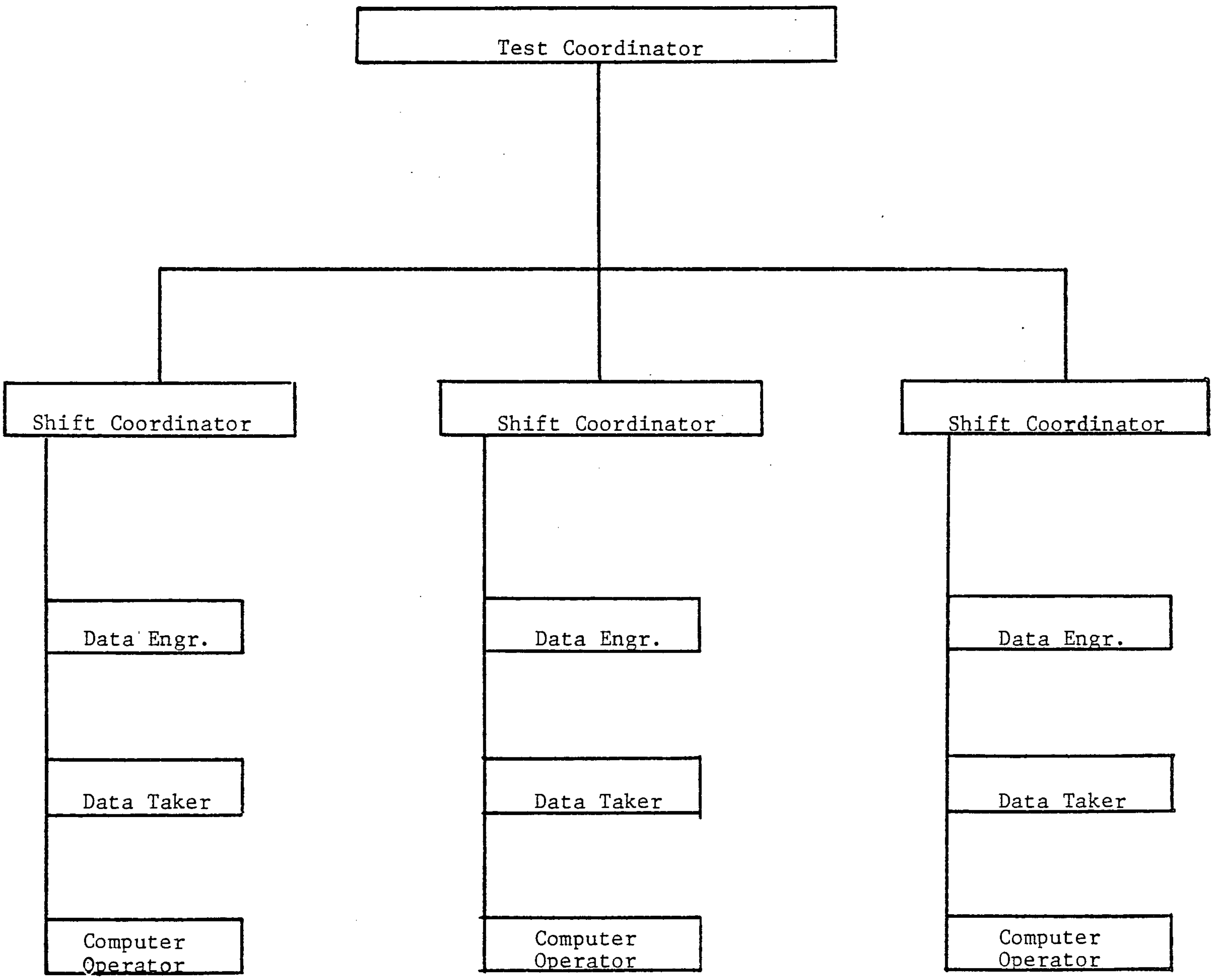
2.5 Test Organization

The Performance Section at the Oconee Nuclear Station has overall responsibility for the CILRT. The testing activities were supervised by the test coordinator. The organizational chart is presented in Figure 2.5.1. The test personnel were as follows:

A.	Test Coordinator - responsible for all CILRT activities	T. S. Barr
B.	Shift Coordinators - responsible for testing activities on their assigned shifts	J. W. Collier W. G. Neuman R. P. Todd
C.	Data Engineers (one per shift) - responsible for trending and analyzing data	T. W. Pellisero D. Goolsby B. Pitesa
D.	Data Takers (one per shirt) - responsible for obtaining and recording data	J. Harviel W. Sullivan M. L. Baker
E.	Computer Operators (one per shift) - responsible for inputting data and computer calculations	T. E. Evans M. A. Pruitt B. A. Whitlock
F.	Support Engineer - (Technical Support Engineer from System Results Group, Duke Power)	J. E. Snyder
G.	Operators (normal shift)	

Figure 2.5-1
Oconee Unit 2
May, 1980
CILRT

TEST ORGANIZATION



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.

The structure consists of a post-tensioned reinforced conrete 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 System

Instrumentation used for the Oconee Unit 2 CILRT 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 Texas 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 Leeds and Northrup Numatron digital readout device. Each RTD was assumed to be representative of a fraction of the total containment volume.

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

Air samples for the two (2) dewpoint sensors came from two (2) of the auxiliary fans which continually circulated air in the Reactor Building during the leak rate test. 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 2 CILRT 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 3.2-6.

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 air compressors operating in parallel. These compressors, purchased for pressurization of the Oconee Reactor Building, also include aftercoolers as integral equipment. The discharge from the compressors passes through a single 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.

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.

C. One (1) Hankison (Model H-15) refreigerator type air dryer with inertial impingement separator, and a capacity of 3750 SCFM (100^{o}F Sat. inlet) @ 100 psig.

Three valves, 2LRT-15, 2LRT-16, and 2LRT-17 are used to control pressurization and depressurization 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.

3.4 Recirculation System

The Reactor Building Air Recirculation System consists of four (4) auxiliary fans and three (3) Reactor Building cooling fans. The auxiliary fans take suction through ducts in the upper region of the Reactor Building and circulate it downward. The Reactor Building cooling fans take air from midheight in the Reactor Building and exhaust it through duct work down to the lower levels of the Reactor Building.

3.5 Computer Program

The off-line computer program as referenced in the CILRT procedure calculated the corrected values of building pressure and temperature, and calculated the leak rate using the mass plot method of data analysis. Tables of corrected temperatures and pressures were stored in separate permanent files. The off-line program was written for and run on the G.E. terminet time sharing system.

3.5.1 DPCILRT 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. This program will also calculate the leak rate and 95% UCL from the input data, and corrected pressure and temperature, based on the mass-plot method.

3.5.1.2 Program Inputs

a) 24 RTD temperatures in ^{o}F

b) 2 Dewpoint temperature in ^{o}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) Multiply by the applicable volume fraction.

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

3.5.1.6 Pressure

a) Subtract vapor pressure from input absolute pressure.

3.5.1.7 Leak Rate

a) Calculate the leak rate using the mass plot method formulas in Appendix B of ANS N274, Nov. 1978, Work Group 56.8, Rev. 3. As this work is readily available, it is not duplicated here.

TABLE 3.2-1

INSTRUMENT SPECIFICATIONS

Pressure Digital Readout

Serial No.	10132 2646
Mfg.	Texas Instrument
Model	145
Type	Precision pressure gauge
Range	0-100 psia or 100,000 counts full scale
Stability	± .001 psi
Repeatability	± .0005 psi
Resolution	± .001 psi
Accuracy	± .015% of reading

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^{o}F
Repeatability and hysterisis	± .02^{o}F
Accuracy	± 0.12^{o}F

Temperature Indications for Temperature Elements

Mfg.	Leeds & Northrup
Model	245 Numatron
Range	0-150^{o}F
Reproductivity	± .07^{o}F from 60^{o}F to 120^{o}F
Accuracy	± .12 from 60^{o}F to 120^{o}F and ± .48 Below 60^{o}F

Dewpoint Temperature

Mfg.	Cambridge
Model	992-C1
Range	-100^{o}F to +200^{o}F
Accuracy	± 0.5^{o}F
Serial No.	332 and 333

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 (Azimuth 260° Elevation 850')	0.6
Total	1.0

REACTOR BUILDING

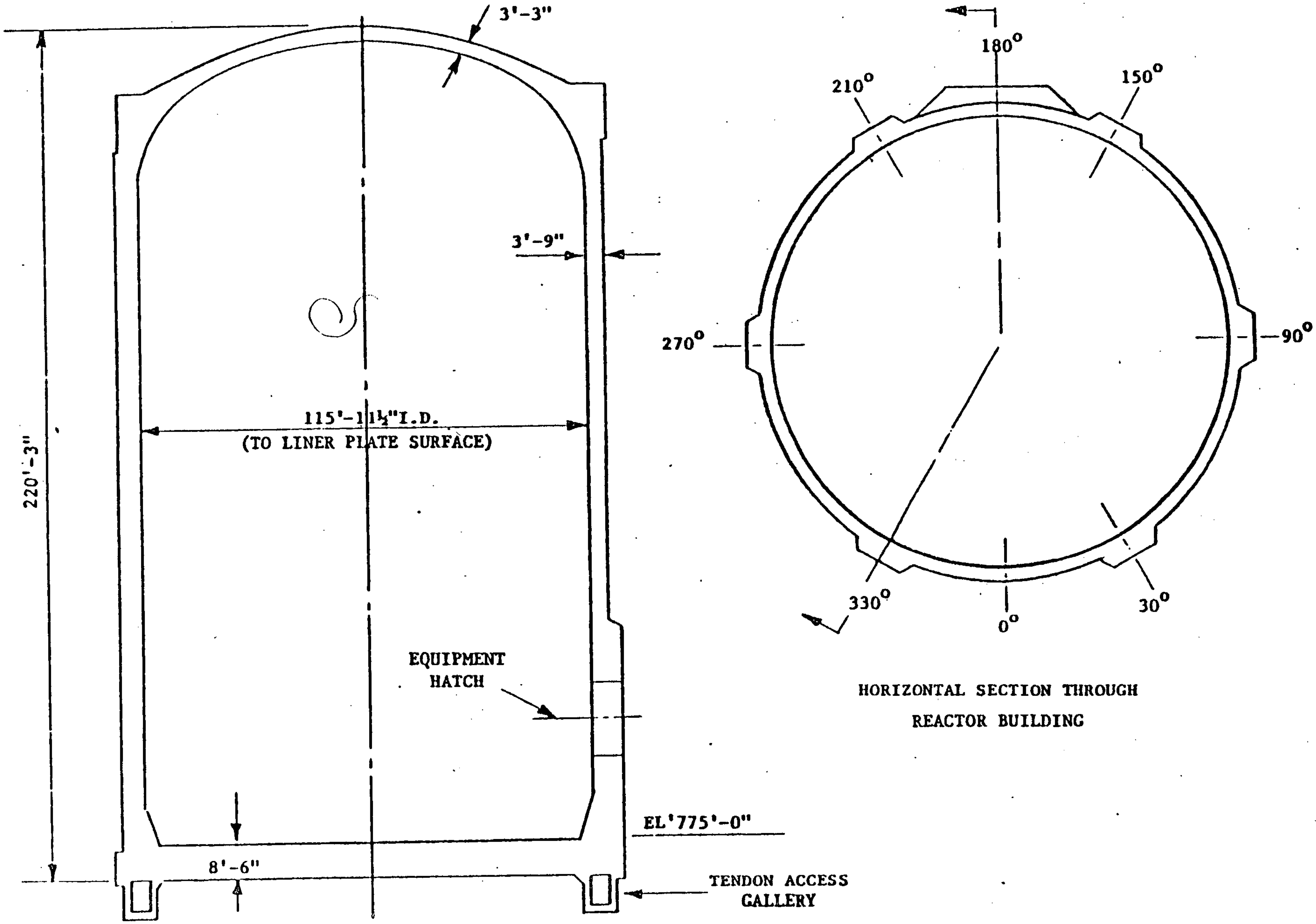


Figure 3.1-1

LEAK RATE MEASUREMENT SYSTEM

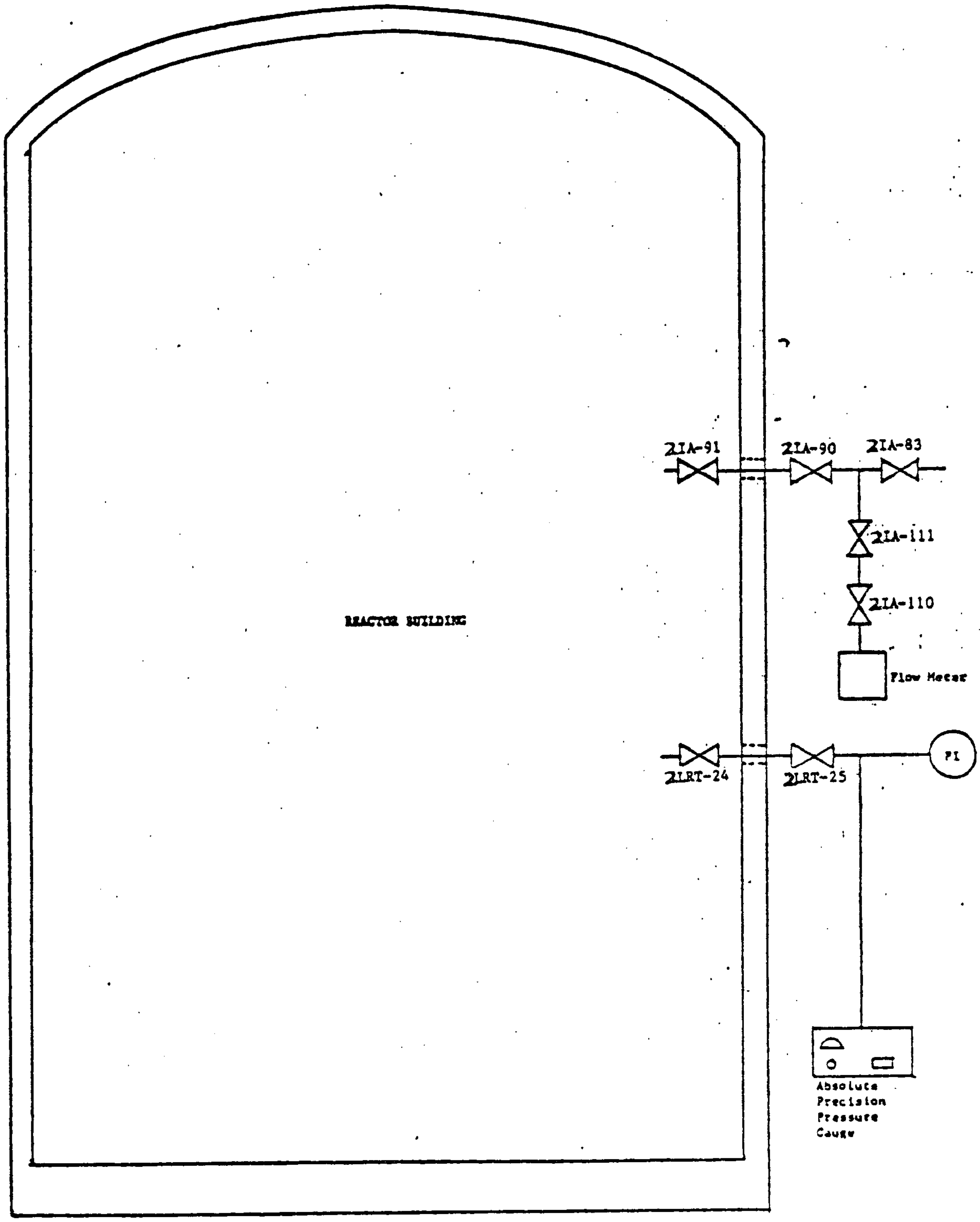


Figure 3.2-1

REACTOR BUILDING

BASEMENT FLOOR

ELEVATION 787'

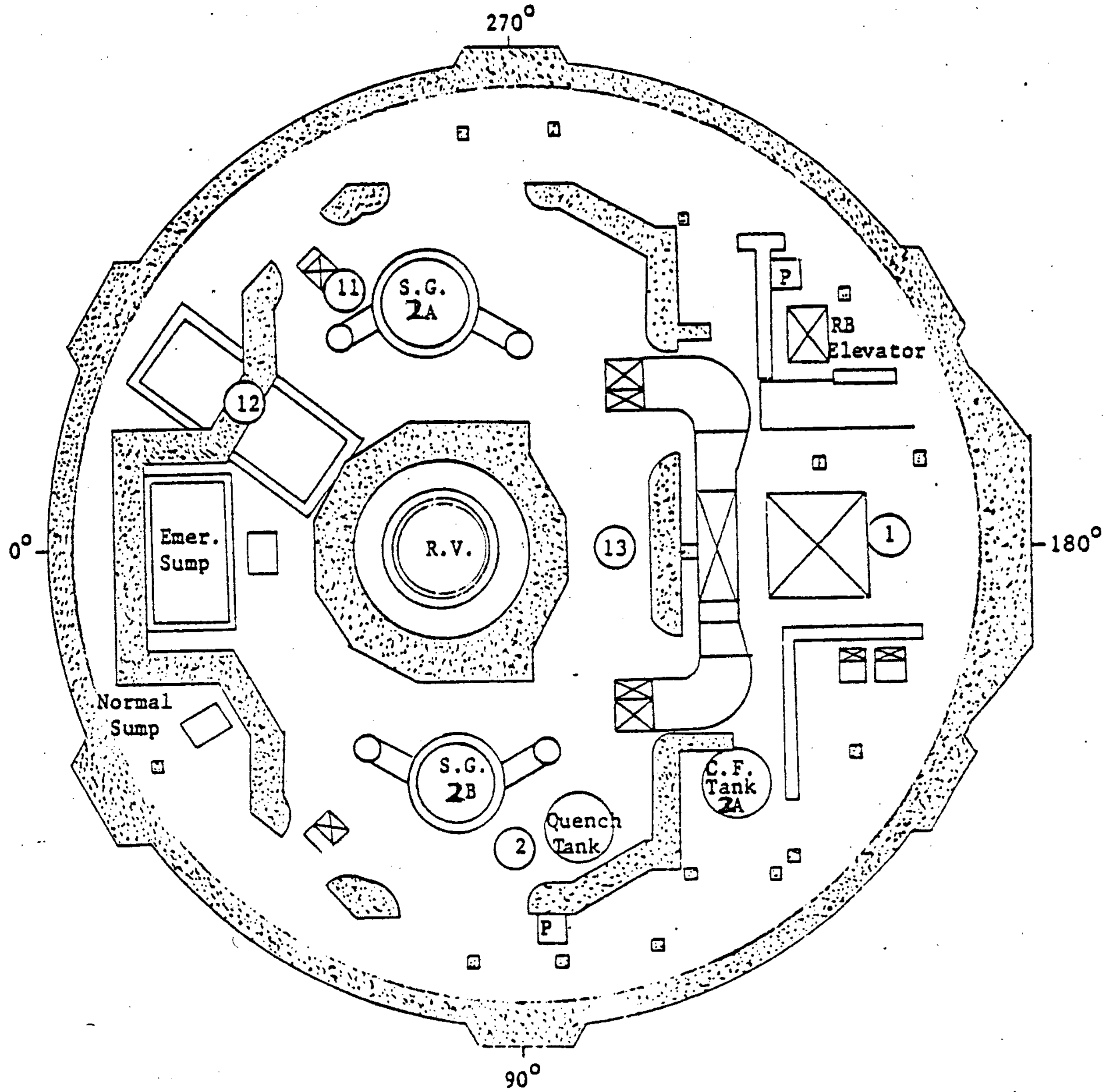


Figure 3.2-2

REACTOR BUILDING

INTERMEDIATE FLOOR

ELEVATION 830'

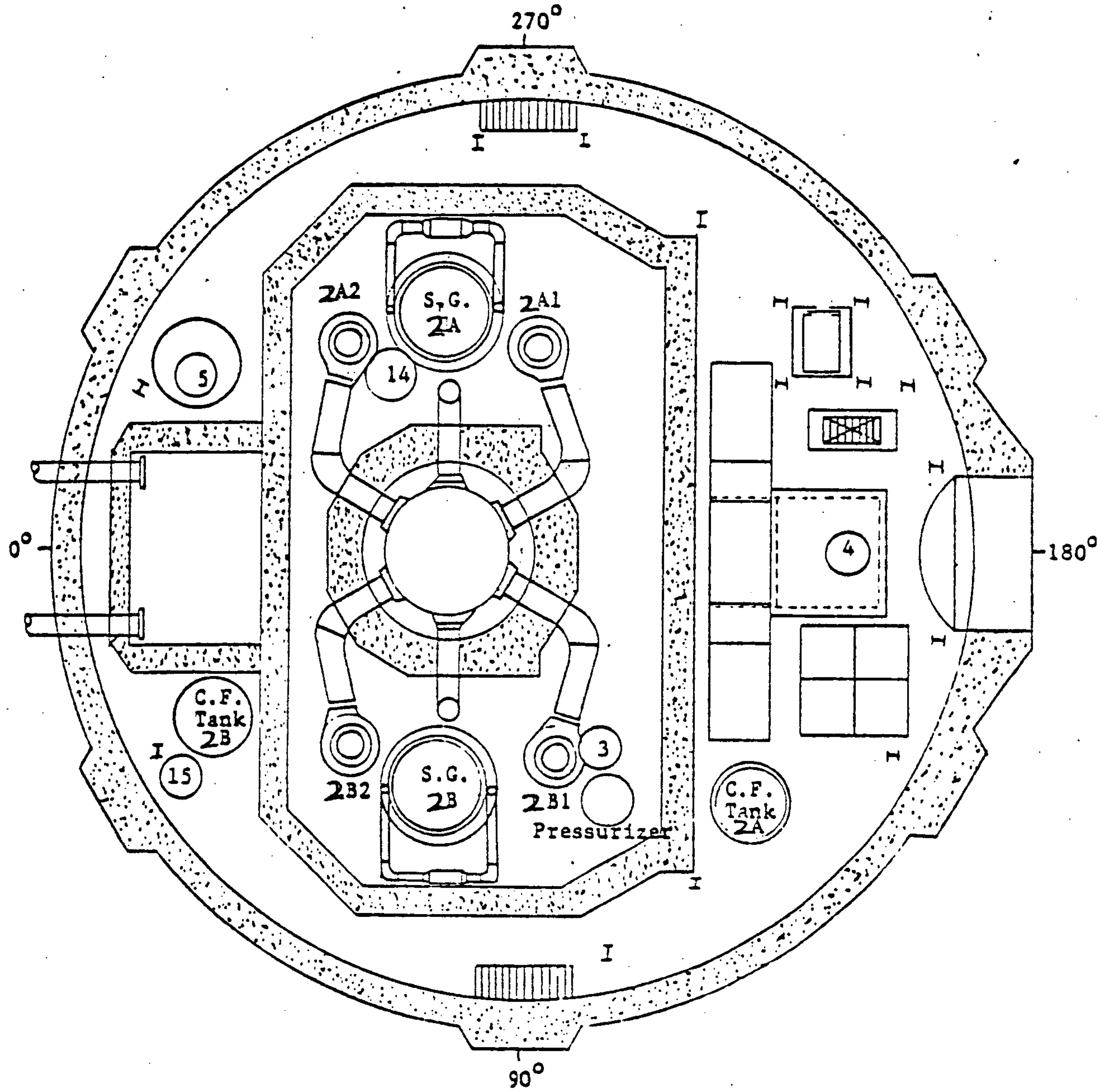


Figure 3.2-3

REACTOR BUILDING

OPERATING FLOOR

ELEVATION 850'

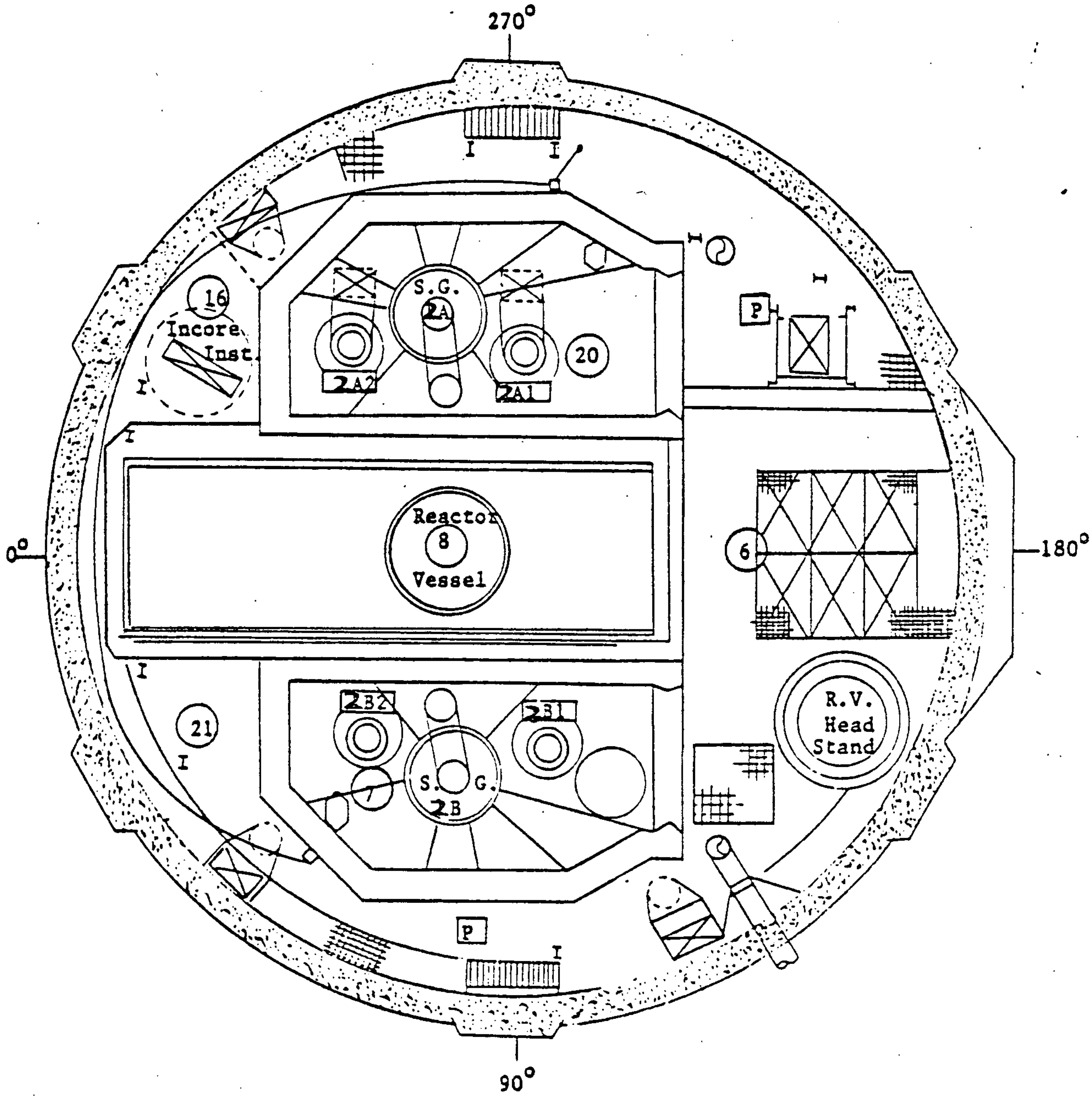


Figure 3.2-4

REACTOR BUILDING
SHIELDING FLOOR
ELEVATION 866'

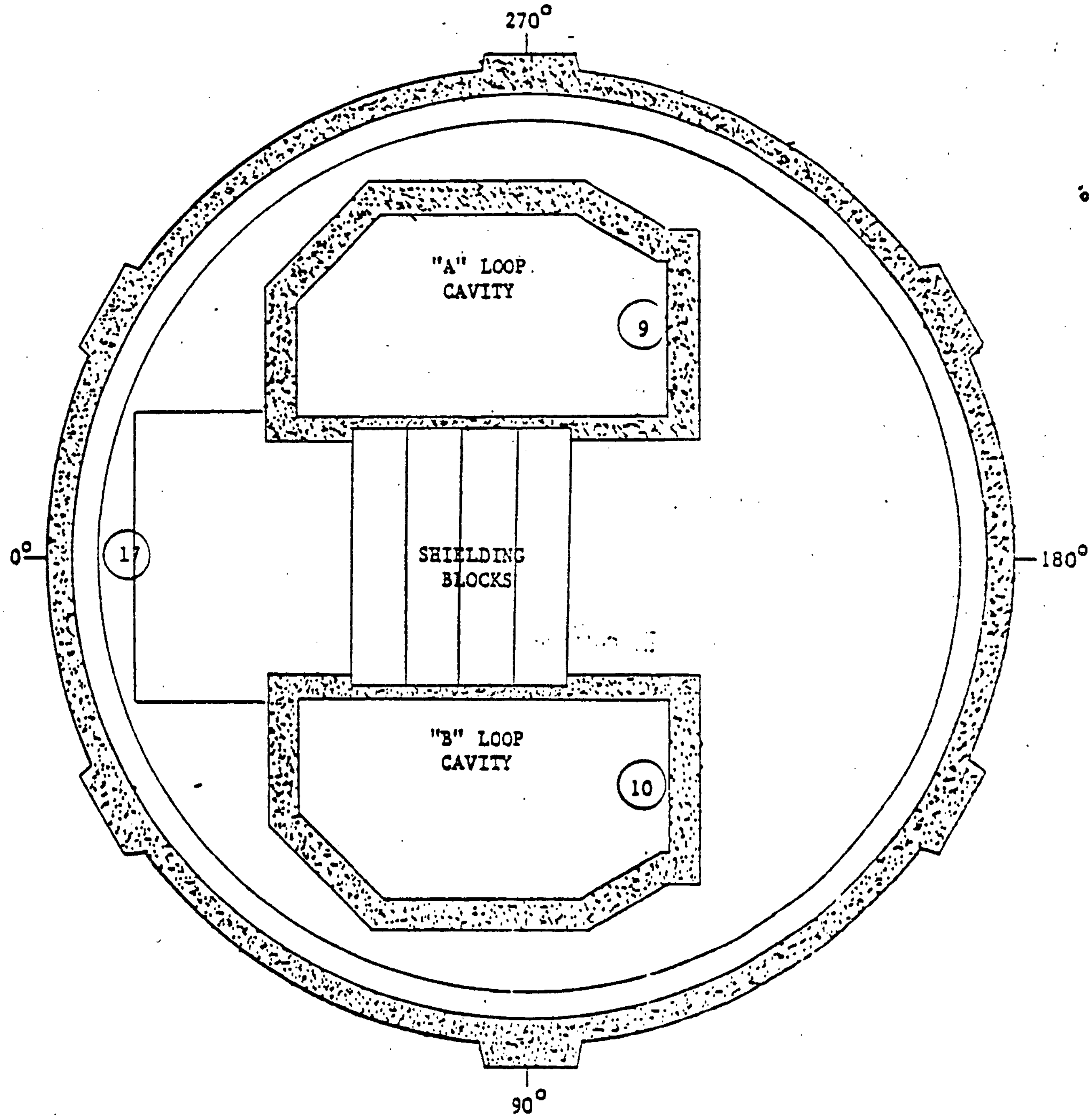


Figure 3.2-5

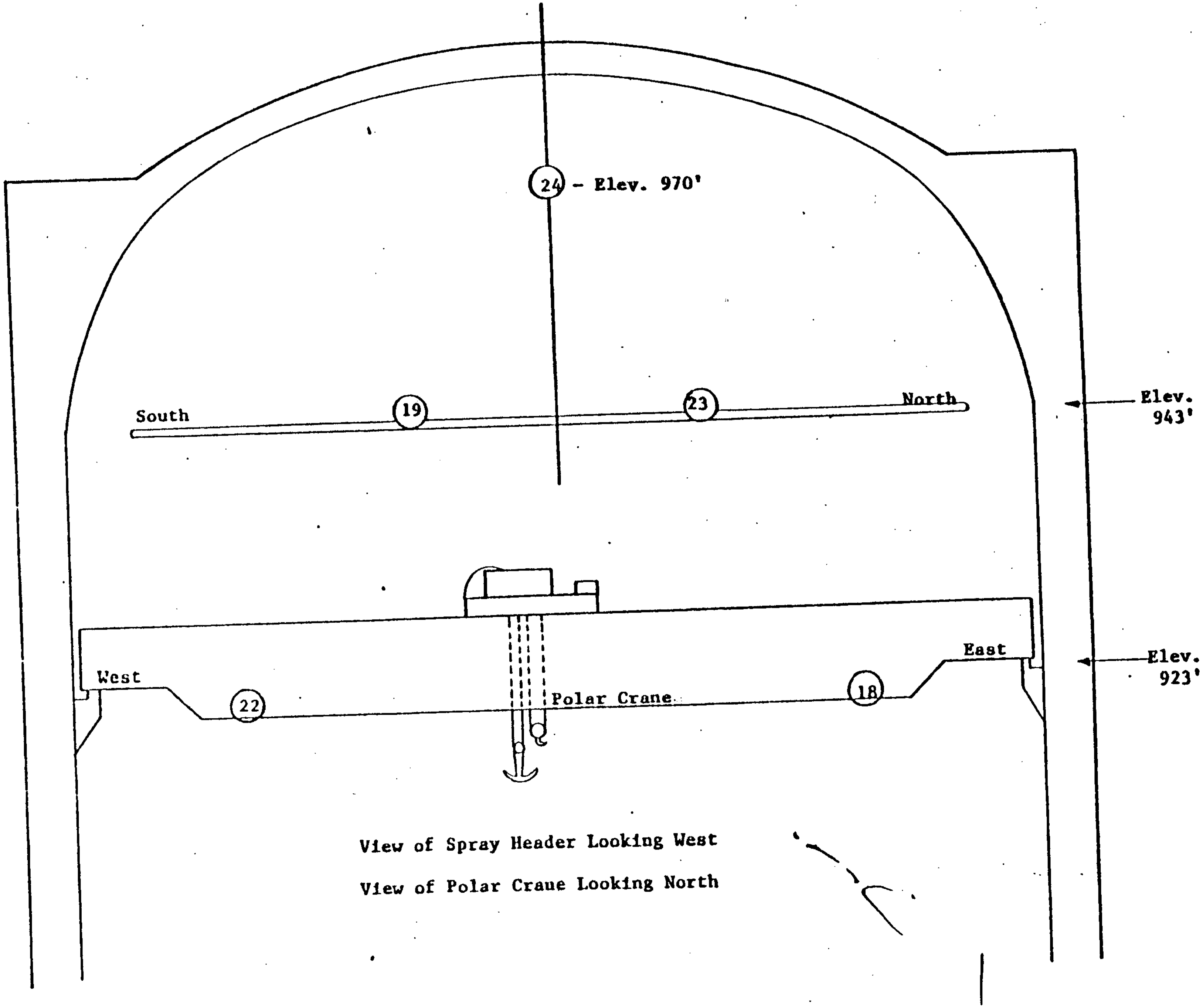

24 - Elev. 970'
South
19
23
North
Elev. 943'
East
West
22
18
Polar Crane
Elev. 923'
View of Spray Header Looking West
View of Polar Crane Looking North

Figure 3.2-6

REACTOR BUILDING PRESSURIZATION SYSTEM

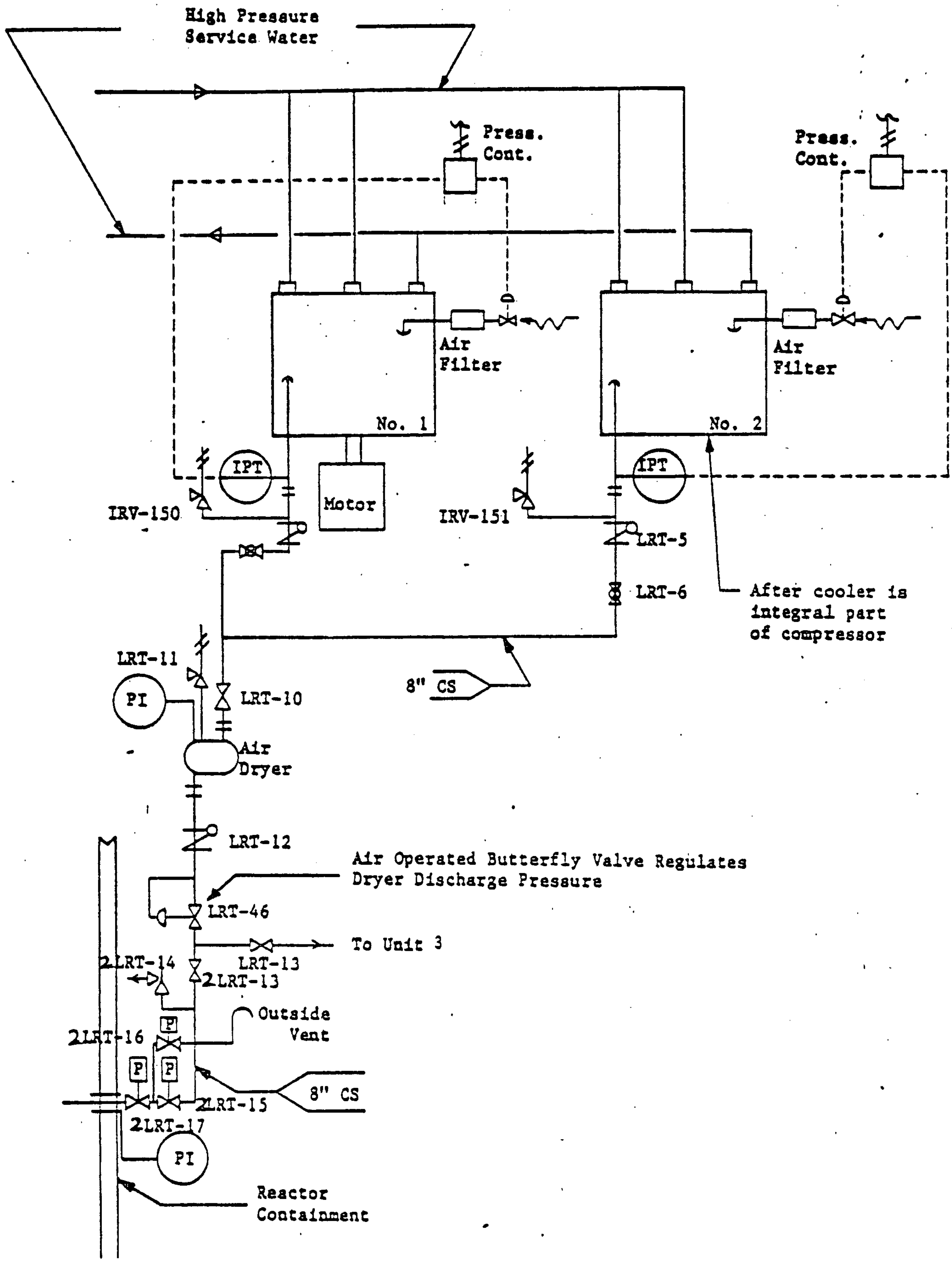


Figure 3.3-1

REACTOR BUILDING AIR RECIRCULATION SYSTEM

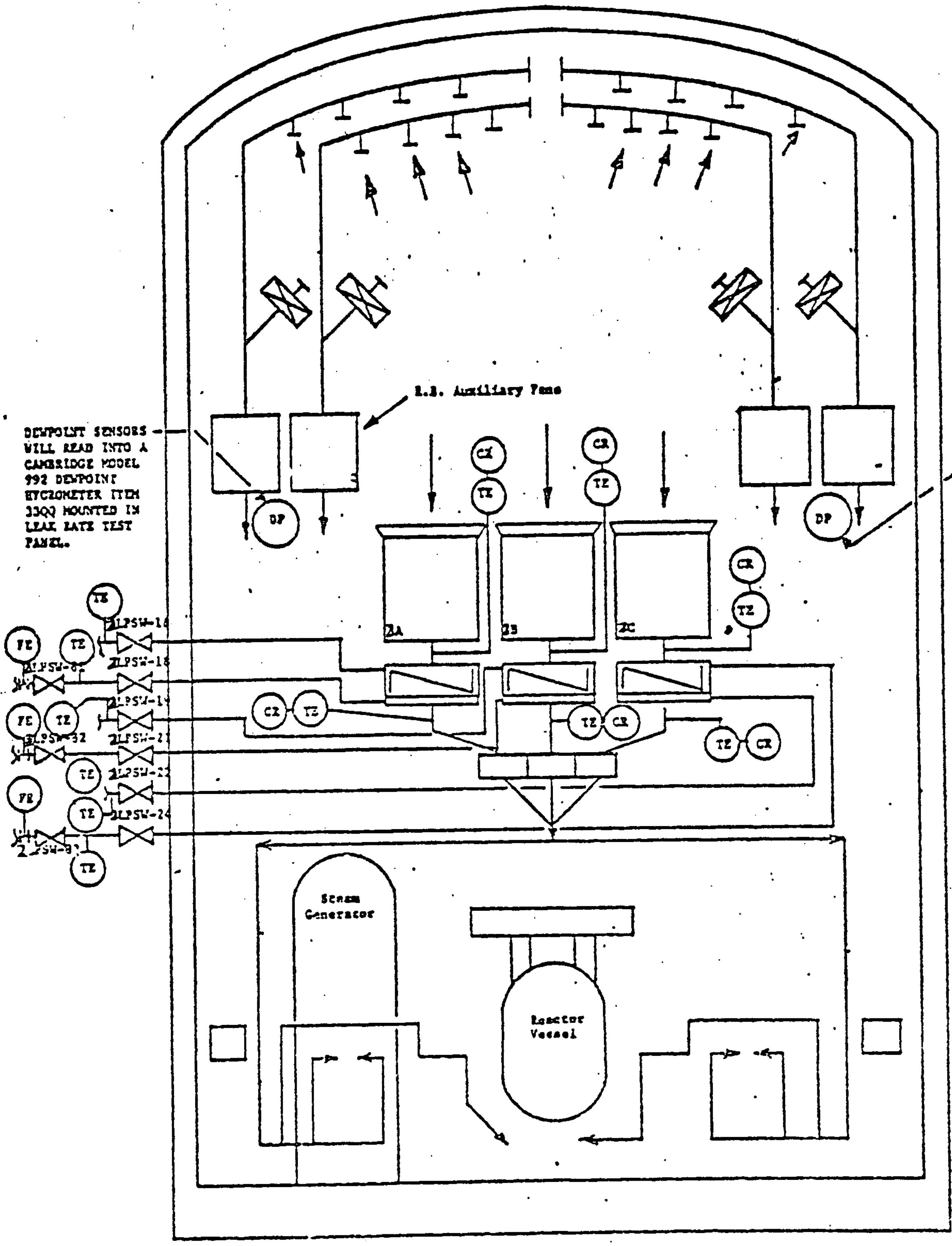


Figure 3.4-1

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 wt% of the Reactor Building atmosphere per 24 hours. Final analysis of all penetration leakage rates shows that the total penetration leakage rate was approximately 14 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 .125 wt% of the Reactor Building atmosphere in 24 hours. The total measured leak rate from all penetrations prior to this test was .017 wt% 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 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	11/06/78	7.258×10^{-6}
	05/22/80	8.089×10^{-6}
Equipment Hatch	12/14/78	2.808×10^{-7}
	05/25/79	1.170×10^{-6}
	05/27/80	0
	06/10/80	7.489×10^{-7}
Personnel Hatch	08/08/77	3.632×10^{-4}
	12/13/77	2.513×10^{-4}
	05/19/78	0
	08/30/78	0
	12/27/78	5.717×10^{-4}
	01/03/79	8.416×10^{-4}
	06/07/79	6.275×10^{-4}
	10/26/79	0
	02/21/80	6.476×10^{-2}
	05/29/80	2.521×10^{-3}
Emergency Hatch	11/21/77	1.372×10^{-3}
	03/09/78	7.165×10^{-4}
	07/12/78	8.547×10^{-5}
	07/31/78	0
	12/14/78	4.770×10^{-3}
	05/14/79	2.669×10^{-2}
	09/20/79	1.120×10^{-3}
	01/17/80	0
	05/10/80	3.075×10^{-4}

TABLE 4.1-2

TYPE "C" TESTS

PENETRATION	DATE	WT%/DAY LEAKAGE
Mechanical Penetrations	11/06/78	2.224×10^{-2}
	03/04/80	1.443×10^{-2}

TABLE 4.2

LOCAL TEST FAILURE DATA

ITEM	DATE	REASON FOR FAILURE	CORRECTIVE ACTION
Type C			
2CC-7	11/20/78	Leaking past seat	Lapped seat
2CC-8	11/20/78	Leaking past seat	Lapped seat
2HP-390	11/25/78	Leaking past seat	Lapped seat
2PR-5	12/02/78	Leaking past seat	Lubed and reset seat
2PR-6	12/02/78	Leaking past seat	Lubed and reset seat
2PR-1	12/02/78	Leaking past seat	Lubed and reset seat
2PR-2	12/02/78	Leaking past seat	Lubed and reset seat
2CC-77	11/23/78	Leaking past seat	Lapped seat
2HP-152	11/22/78	Leaking past seat	Lapped seat
2HP-153	11/22/78	Leaking past seat	Lapped seat
2HP-146	11/22/78	Leaking past seat	Lapped seat
2HP-147	11/22/78	Leaking past seat	Lapped seat
2FDW-212	12/06/78	Leaking past packing	Repacked Valve
2FDW-214	12/06/78	Leaking past packing	Repacked Valve
2CC-8	03/16/80	Leaking past seat	Installed new spring, lapped and polished seat
2LRT-36	05/24/80	Leaking past seat	Reinstalled valve with flow in opposite direction
2CS-11	03/21/80	Leaking past seat	Replaced disk gasket and cleaned surface
2HP-390	03/14/80	Leaking past seat	Replaced with a spring check and lapped seat
2HP-145	03/14/80	Leaking past seat and packing	Cleaned and repacked
2PR-1	03/04/80	Leaking past seat	Lubed and reset seat
2PR-2	03/04/80	Leaking past seat	Lubed and reset seat
2LPSW-144	03/18/80	Leaking past seat	Replaced valve
2HP-286	03/25/80	Leaking past seat and packing	Replaced packing
2HP-146	03/25/80	Leaking past seat	Lapped seat
2HP-385	03/25/80	Leaking past seat	Lapped seat
2HP-147	03/25/80	Leaking past seat	Lapped seat
Type B			
2ED-1	03/06/80	Leak around o-ring seal	Replaced o-ring seal
2EMV-2	03/18/80	Leak around o-ring seal	Replaced o-ring seal

OCONEE UNIT 2
10 HOUR LEAK RATE TEST
MAY 1980

FINAL TEST RUN
PT/0/A/150/3
6/1/80
[illegible]

DATA SET NO	CLOCK TIME	CORRECTED PRESSURE	CORRECTED TEMPERATURE	MASS	LEAK RATE	95% UCL LEAK RATE
39	2145	44.241	82.6540	420640.3	0.	0.
40	2200	44.240	82.6590	420629.8	0.2395	0.
41	2215	44.241	82.6560	420637.8	0.0287	0.7980
42	2230	44.240	82.6570	420631.4	0.0429	0.2038
43	2245	44.240	82.6520	420629.5	0.0457	0.1207
44	2300	44.240	82.6500	420627.3	0.0472	0.0917
45	2315	44.239	82.6500	420621.6	0.0567	0.0883
46	2330	44.239	82.6400	420627.4	0.0448	0.0712
47	2345	44.238	82.6340	420627.3	0.0365	0.0584
48	2400	44.238	82.6370	420620.2	0.0391	0.0565
49	15	44.237	82.6340	420618.8	0.0401	0.0542
50	30	44.237	82.6290	420616.0	0.0417	0.0533
51	45	44.237	82.6200	420627.7	0.0324	0.0461
52	100	44.237	82.6260	420619.3	0.0312	0.0429
53	115	44.236	82.6250	420612.4	0.0335	0.0438
54	130	44.235	82.6130	420616.0	0.0325	0.0416
55	145	44.235	82.6200	420605.9	0.0357	0.0443
56	200	44.235	82.6160	420614.7	0.0338	0.0416
57	215	44.235	82.6180	420605.5	0.0352	0.0424
58	230	44.234	82.6200	420599.2	0.0379	0.0448
59	245	44.234	82.6250	420597.2	0.0399	0.0464
60	300	44.234	82.6280	420595.9	0.0413	0.0474
61	315	44.235	82.6290	420599.8	0.0409	0.0465
62	330	44.234	82.6320	420590.8	0.0422	0.0475
63	345	44.234	82.6290	420595.1	0.0420	0.0468
64	400	44.234	82.6340	420585.5	0.0433	0.0480
65	415	44.234	82.6320	420589.9	0.0433	0.0476
66	430	44.232	82.6360	420569.7	0.0463	0.0513
67	445	44.233	82.6400	420568.5	0.0486	0.0537
68	500	44.233	82.6430	420568.1	0.0502	0.0553
69	515	44.232	82.6390	420566.4	0.0515	0.0564
70	530	44.232	82.6460	420562.9	0.0527	0.0574
71	545	44.232	82.6550	420549.2	0.0550	0.0600
72	600	44.232	82.6470	420557.3	0.0558	0.0606
73	615	44.232	82.6410	420564.9	0.0554	0.0599
74	630	44.233	82.6560	420556.1	0.0557	0.0599
75	645	44.232	82.6540	420551.9	0.0561	0.0601
76	700	44.232	82.6540	420552.9	0.0561	0.0599
77	715	44.232	82.6610	420551.2	0.0561	0.0597
78	730	44.232	82.6590	420545.2	0.0563	0.0598
79	745	44.231	82.6640	420534.7	0.0572	0.0606
80	800	44.232	82.6670	420540.9	0.0573	0.0605
81	815	44.230	82.6710	420521.6	0.0585	0.0619
82	830	44.232	82.6680	420544.9	0.0579	0.0611
83	845	44.231	82.6760	420521.5	0.0587	0.0619
84	900	44.231	82.6770	420526.5	0.0589	0.0620
85	915	44.231	82.6760	420527.2	0.0589	0.0618
86	930	44.232	82.6720	420534.2	0.0583	0.0612
87	945	44.231	82.6810	420526.2	0.0581	0.0609
88	1000	44.230	82.6760	420513.9	0.0585	0.0611
89	1015	44.230	82.6800	420513.7	0.0587	0.0612
90	1030	44.230	82.6880	420508.4	0.0590	0.0615
91	1045	44.230	82.6870	420509.2	0.0591	0.0615
92	1100	44.230	82.6870	420511.1	0.0590	0.0613
93	1115	44.231	82.6890	420512.4	0.0587	0.0610
94	1130	44.231	82.6930	420509.3	0.0585	0.0607
95	1145	44.231	82.6930	420511.2	0.0581	0.0602
96	1200	44.231	82.6950	420510.6	0.0577	0.0598
97	1215	44.231	82.7090	420505.0	0.0574	0.0595

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OCONEE UNIT 2
VERIFICATION FOR 10 HOUR LEAK RATE TEST
MAY 1980

DATA SET NO	CLOCK TIME	CORRECTED PRESSURE	CORRECTED TEMPERATURE	MASS	LEAK RATE	95% UCL LEAK RATE
111	1545	44.240	82.7590	420545.6	0.	0.
112	1600	44.239	82.7600	420540.1	0.1256	0.
113	1615	44.239	82.7680	420532.9	0.1452	0.2160
114	1630	44.238	82.7700	420522.8	0.1727	0.2215
115	1645	44.238	82.7690	420516.0	0.1746	0.1975
116	1700	44.237	82.7720	420506.1	0.1825	0.1992
117	1715	44.235	82.7820	420486.9	0.2128	0.2497
118	1730	44.231	82.7920	420433.5	0.3092	0.4205
119	1745	44.229	82.7880	420420.5	0.3534	0.4504
120	1800	44.226	82.7910	420391.5	0.3927	0.4796
121	1815	44.227	82.7910	420403.9	0.3834	0.4540
122	1830	44.225	82.7970	420378.3	0.3857	0.4439
123	1845	44.232	82.8110	420426.4	0.3383	0.4075
124	1900	44.231	82.8160	420413.0	0.3075	0.3743
125	1915	44.230	82.8140	420406.0	0.2838	0.3462
126	1930	44.229	82.8250	420388.0	0.2707	0.3266
127	1945	44.228	82.8150	420389.1	0.2560	0.3072
128	2000	44.227	82.8200	420377.6	0.2458	0.2923
129	2015	44.226	82.8230	420363.9	0.2395	0.2814
130	2030	44.225	82.8170	420363.8	0.2315	0.2700
131	2045	44.220	82.8270	420308.5	0.2390	0.2745
132	2100	44.219	82.8270	420291.4	0.2464	0.2794
133	2115	44.218	82.8230	420285.0	0.2510	0.2814
134	2130	44.221	82.8220	420317.1	0.2446	0.2731
135	2145	44.221	82.8310	420311.1	0.2387	0.2655
136	2200	44.220	82.8270	420303.7	0.2335	0.2587
137	2215	44.220	82.8360	420296.8	0.2287	0.2525
138	2230	44.220	82.8350	420299.5	0.2227	0.2456
139	2245	44.218	82.8330	420282.9	0.2190	0.2405
140	2300	44.217	82.8340	420272.7	0.2161	0.2363
141	2315	44.217	82.8360	420269.2	0.2128	0.2320
142	2330	44.216	82.8570	420248.2	0.2117	0.2297
143	2345	44.217	82.8500	420256.5	0.2086	0.2258
144	2400	44.217	82.8550	420254.5	0.2052	0.2217
145	15	44.216	82.8640	420237.6	0.2032	0.2188

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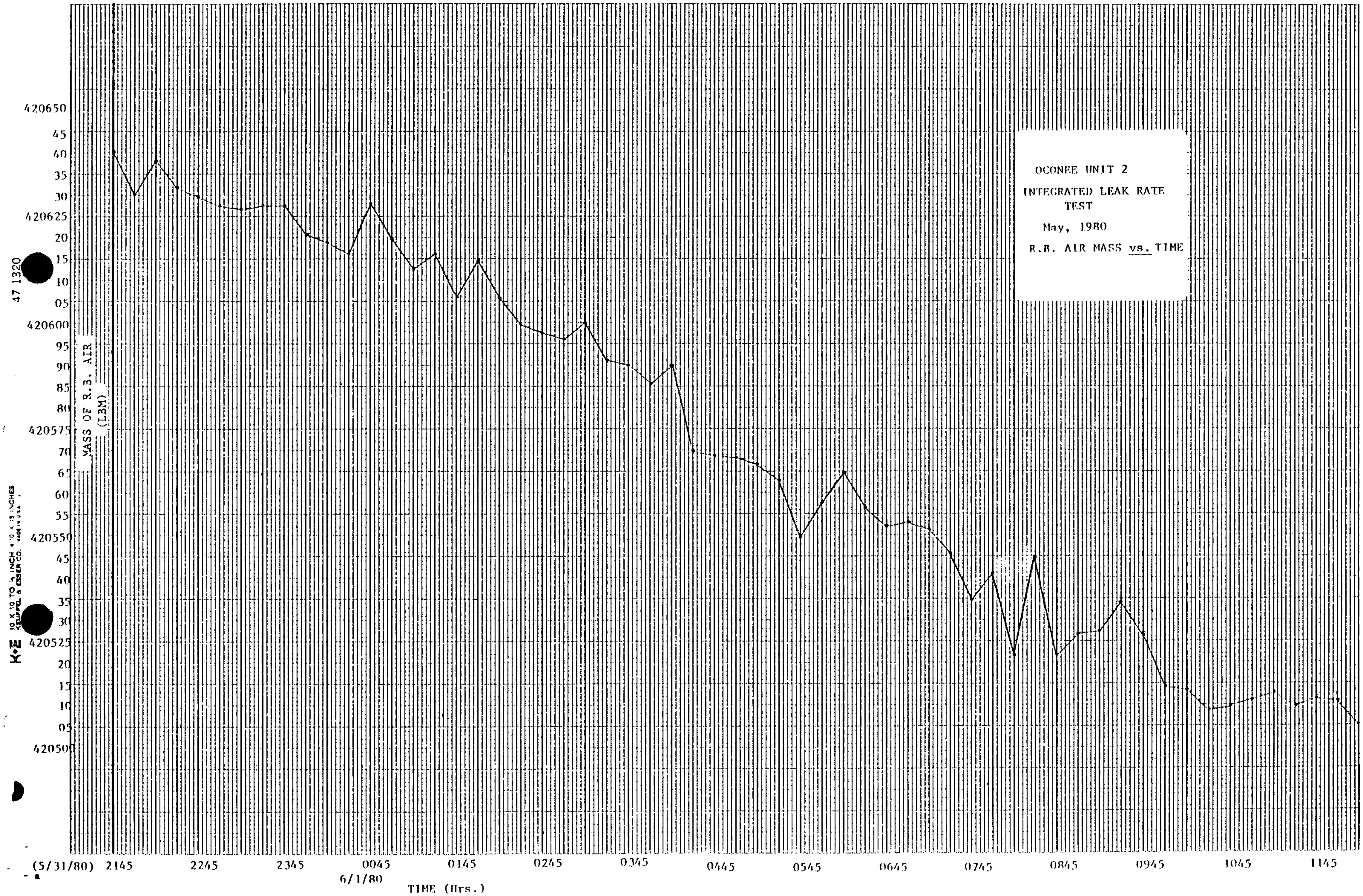
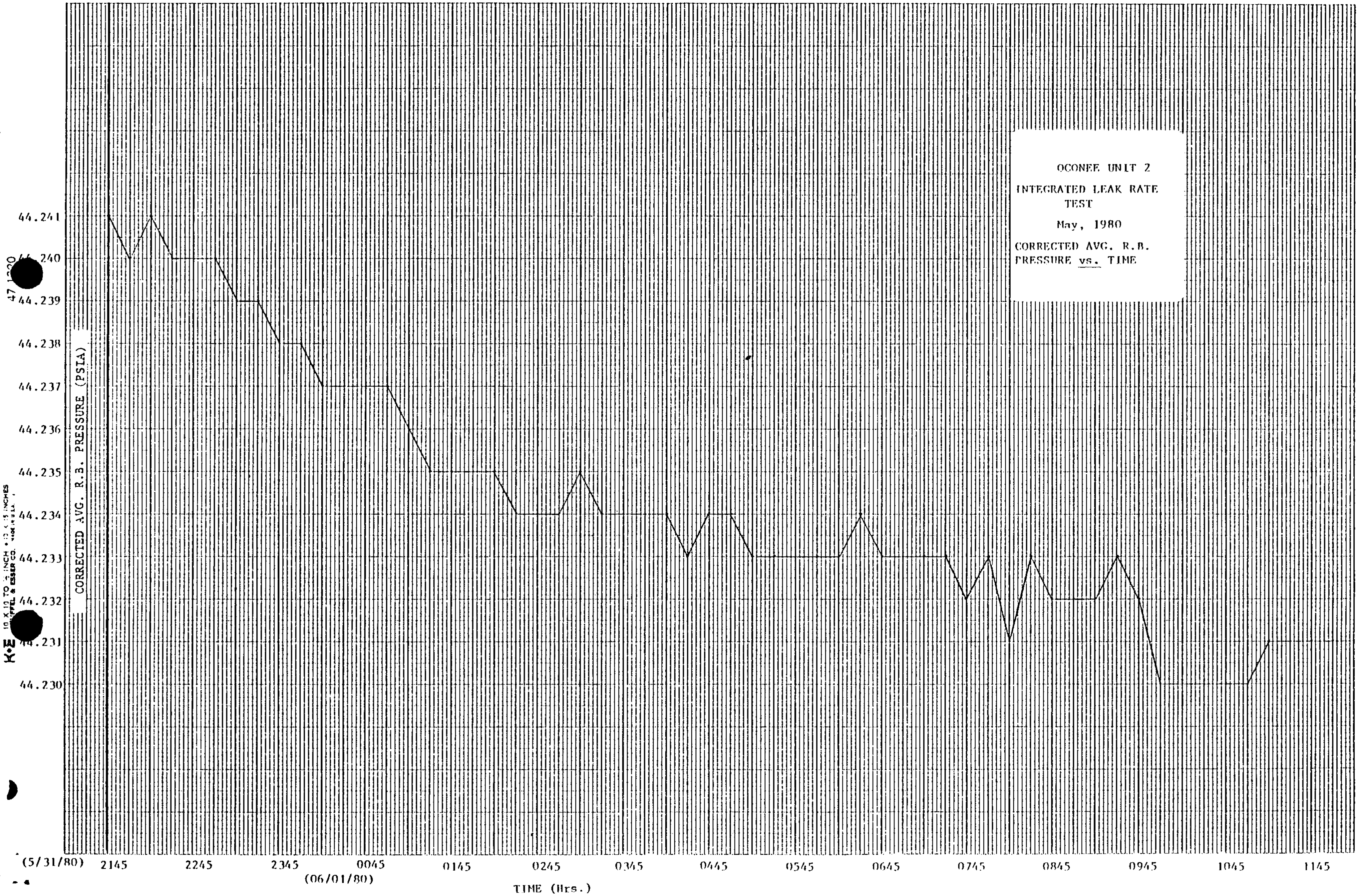
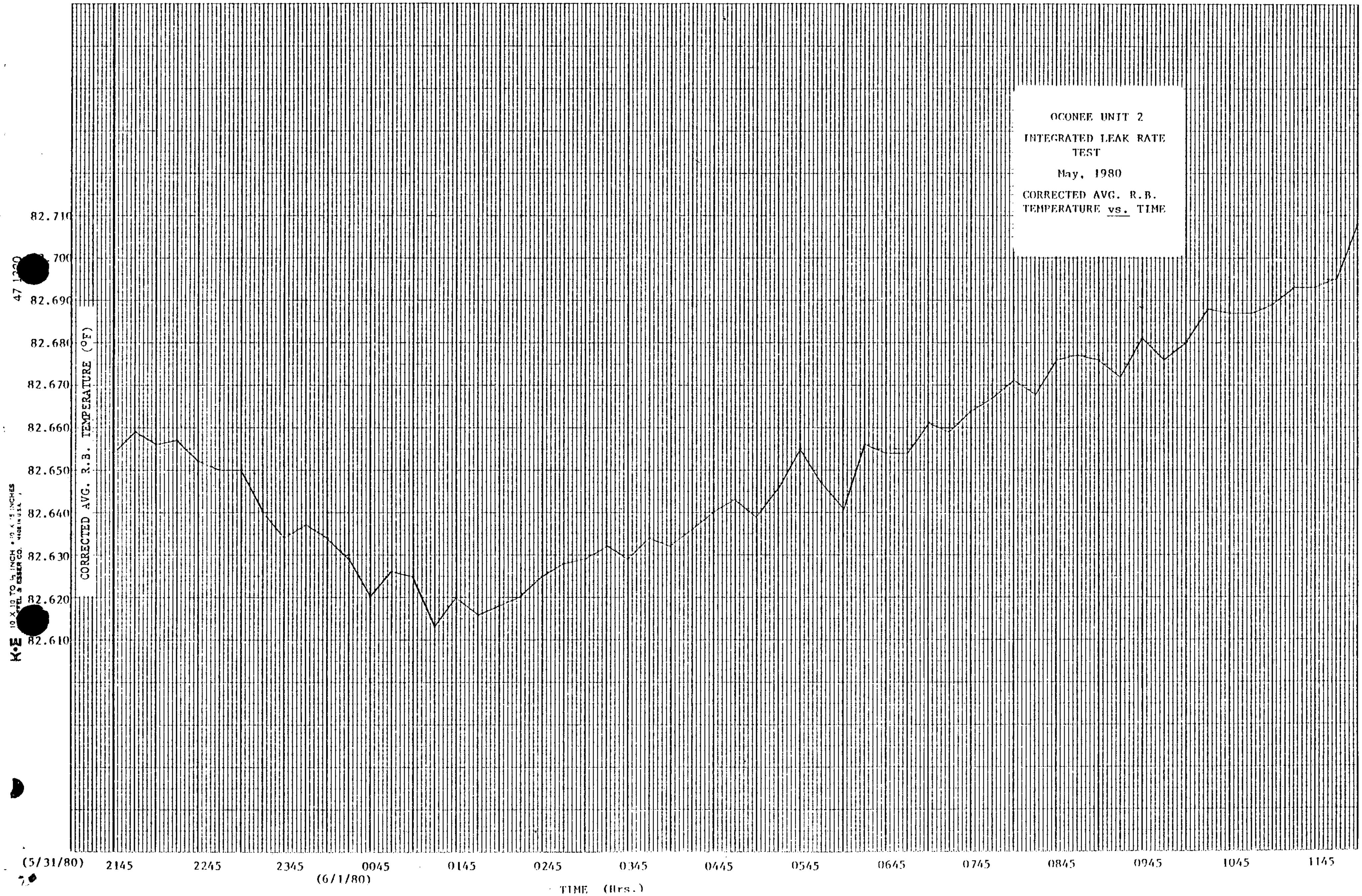
Final Verification
Test Run
PT/0/A/150/3
6/1/80
Jerry W. Collier

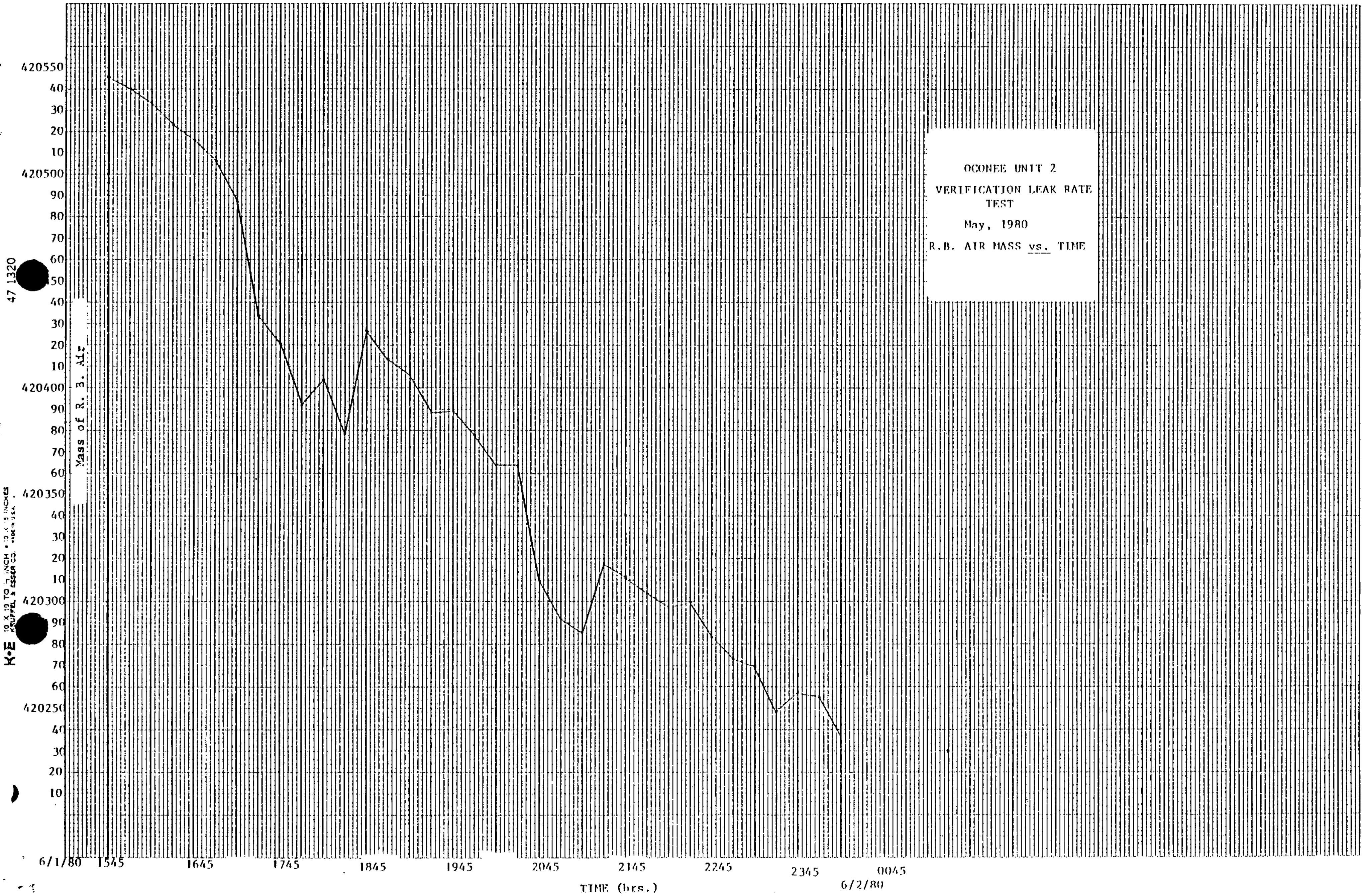

OCONEE UNIT 2
INTEGRATED LEAK RATE TEST
May, 1980
R.B. AIR MASS vs. TIME
MASS OF R.B. AIR (LBM)
420650
45
40
35
30
420625
20
15
10
05
420600
95
90
85
80
420575
70
65
60
55
420550
45
40
35
30
420525
20
15
10
05
420500
(5/31/80) 2145
2245
2345
0045
6/1/80
0145
0245
0345
0445
0545
0645
0745
0845
0945
1045
1145
TIME (Hrs.)

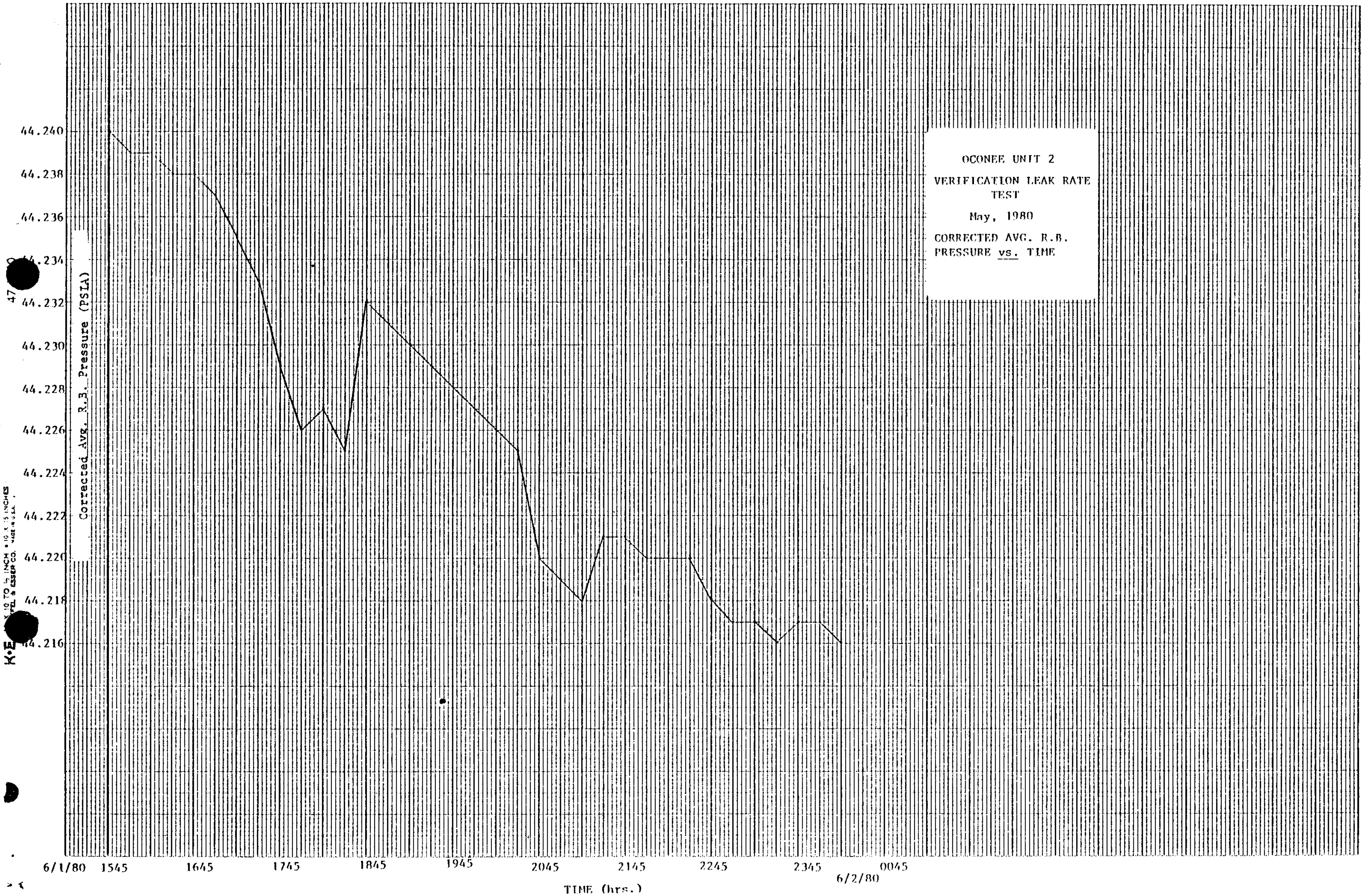


OCONEE UNIT 2
INTEGRATED LEAK RATE TEST
May, 1980
CORRECTED AVG. R.B. PRESSURE vs. TIME
CORRECTED AVG. R.B. PRESSURE (PSIA)
44.241
44.240
44.239
44.238
44.237
44.236
44.235
44.234
44.233
44.232
44.231
44.230
(5/31/80)
2145
2245
2345
0045
(06/01/80)
0145
0245
0345
0445
0545
0645
0745
0845
0945
1045
1145
TIME (Hrs.)

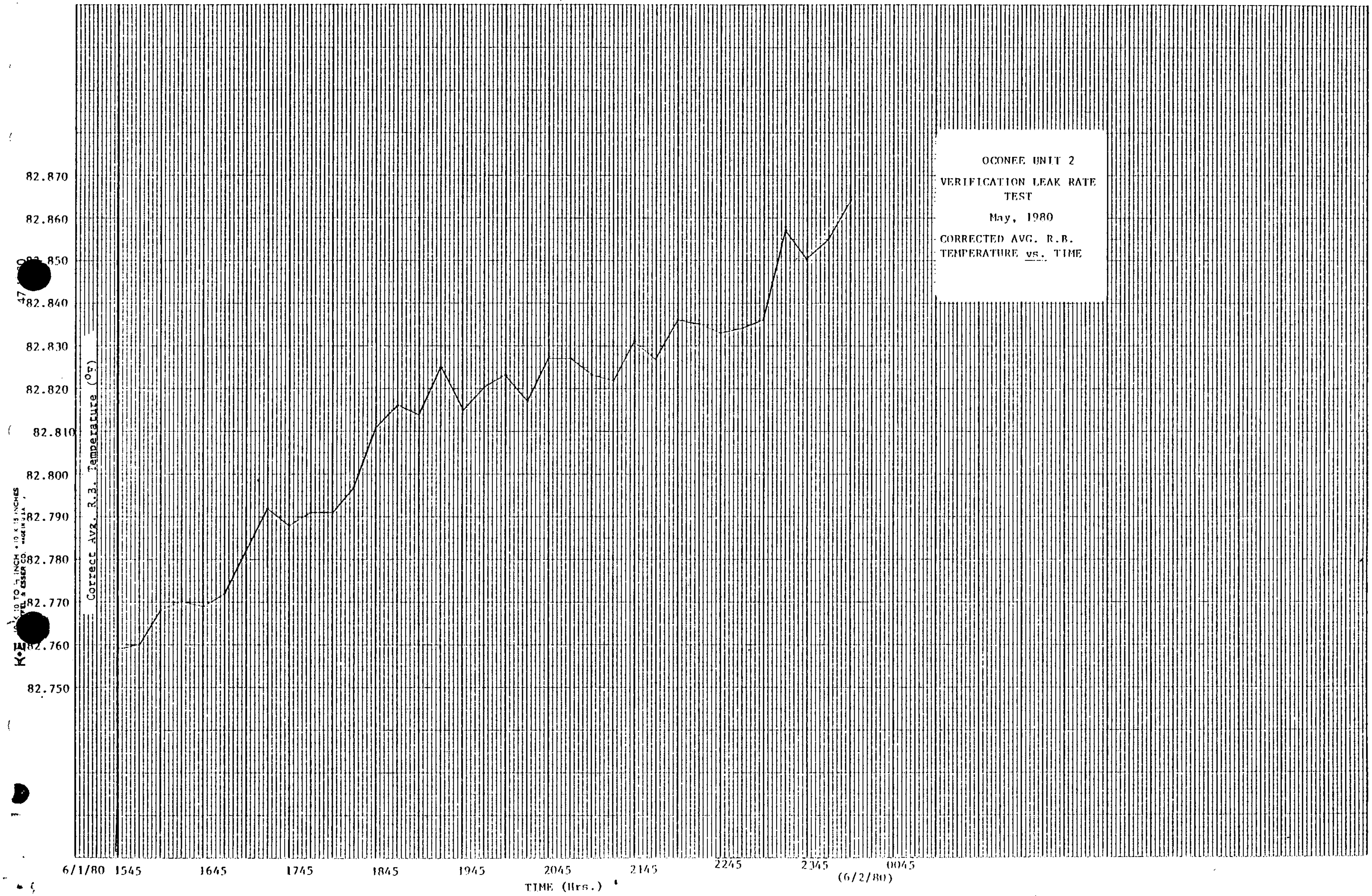


OCONEE UNIT 2
INTEGRATED LEAK RATE TEST
May, 1980
CORRECTED AVG. R.B. TEMPERATURE vs. TIME
CORRECTED AVG. R.B. TEMPERATURE (°F)
82.710
82.700
82.690
82.680
82.670
82.660
82.650
82.640
82.630
82.620
82.610
(5/31/80)
2145
2245
2345
0045
(6/1/80)
0145
0245
0345
0445
0545
0645
0745
0845
0945
1045
1145
TIME (Hrs.)
K•E 10 X 10 TO ½ INCH
47 1320


OCONEE UNIT 2
VERIFICATION LEAK RATE TEST
May, 1980
R.B. AIR MASS vs. TIME
Mass of R. B. Air
420550
40
30
20
10
420500
90
80
70
60
50
40
30
20
10
420400
90
80
70
60
420350
40
30
20
10
420300
90
80
70
60
420250
40
30
20
10
6/1/80
1545
1645
1745
1845
1945
2045
2145
2245
2345
0045
6/2/80
TIME (hrs.)
47 1320



OCONEE UNIT 2
VERIFICATION LEAK RATE TEST
May, 1980
CORRECTED AVG. R.B. PRESSURE vs. TIME
Corrected Avg. R.B. Pressure (PSIA)
44.240
44.238
44.236
44.234
44.232
44.230
44.228
44.226
44.224
44.222
44.220
44.218
44.216
6/1/80
1545
1645
1745
1845
1945
2045
2145
2245
2345
0045
6/2/80
TIME (hrs.)



OCONEE UNIT 2
VERIFICATION LEAK RATE TEST
May, 1980
CORRECTED AVG. R.B. TEMPERATURE vs. TIME
Correct Avg. R.B. Temperature (°C)
82.870
82.860
82.850
82.840
82.830
82.820
82.810
82.800
82.790
82.780
82.770
82.760
82.750
6/1/80 1545
1645
1745
1845
1945
2045
2145
2245
2345
0045
(6/2/80)
TIME (Hrs.)