

Docket No. 50-336
B12864

Northeast Nuclear Energy Company
Millstone Unit No. 2
Reactor Containment Building Integrated Leak Rate Test

May 1988

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1.0 RESULTS

Type A Containment Leakage Rate Test Results

<u>Description</u>	<u>Total Time Method (wt% per day)</u>
(a) LSF L_{am} (1)	0.100
(b) 95% UCL L_{am} (2)	0.134
(c) Leakage Savings (3)	0.063
(d) Leakage Penalties (4)	0.004
(e) As-Found ILRT (sum of b+c+d)	0.201
(f) As-Left ILRT (sum of b+d)	0.138

- NOTE:
- (1) LSF L_{am} - Least Square Fit Type A Total Measured Containment Leakage Rate, wt% per day.
 - (2) 95% UCL L_{am} - 95% Upper Confidence Limit Type A Total Measured Containment Leakage Rate, wt% per day.
 - (3) Leakage Savings - Sum of the difference between penetrations "as-found" and "as-left" minimum pathway leakage, in wt% per day. Applies to repaired or retested penetrations.
 - (4) Leakage Penalties - Sum of the leakages from those penetrations isolated during the test, valves not in proper postaccident positions, and penetrations (due to design) unable to be vented or drained, in wt% per day.
 - (5) $L_a = 0.500 \frac{\text{wt}\%}{\text{day}}$ or 1827.18 SCFH.

1.1 Discussion

On February 8, 1988, MP2 performed a reduced duration Integrated Leak Rate Test (ILRT) at 54 psig.

The containment leak rate was calculated using the total time method in accordance with ANSI N45.4-1972 and BN-TOP-1.

The test duration was eight hours.

Containment As-Found Condition:

The as-found ILRT (0.201 wt% per day) was less than the Appendix J limit of $0.75 L_a$ (0.375 wt% per day) and is deemed a success.

Containment As-Left Condition:

The as-left ILRT (0.138 wt% per day) was less than the Appendix J limit of $0.75 L_a$ (0.375 wt% per day) and is judged a success.

Verification Superimposed Leak Test:

The composite leak rate, L_c , satisfied the verification test inequality, per the requirements of ANS56.8-1981 (Ref. 3).

Total Time Test:

A total time reduced duration test was conducted, per the requirements of Reference 4.

Type A Test Duration: 8 hours

Temperature Stabilization Period: 4 hours minimum

Superimposed Leak Stabilization Period: 1 hour minimum

Verification Test Duration: 4 hours

Calculational Method: BN-TOP-1 (Ref. 4)

Total Time Containment Leakage (L_{am}) results are shown in Table 2.

Superimposed Verification results are shown in Table 3.

Figures 1 thru 5 depict Containment Leakage parameters plotted against time.

2.0 INTRODUCTION AND PURPOSE

In accordance with 10CFR50, Appendix J, the Type A Reactor Containment Building Integrated Leakage Rate Test (ILRT) was performed to demonstrate that leakage through the primary reactor containment and systems, and components penetrating the primary containment, do not exceed the allowable leakage rate specified in the Plant

Technical Specifications. The Type A ILRT was performed at MP2 on February 8, 1988. The test results contained herein are being reported in accordance with 10CFR50, Appendix J, Section V.B.3. The test method as required by the Technical Specifications is the absolute method as described in ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." The total time leakage rate was calculated using formulas from BN-TOP-1 (Ref. 4). The duration of the Type A Test used 8 hours of data and the verification test used 4 hours of data in accordance with the requirements of Reference 4.

The allowable leakage rate limit (L_a) is 0.5 wt%/day with the operational limit of $.75 L_a$ (0.375 wt%/day).

3.0 DESCRIPTION OF PLANT

General

- a. Owner - Northeast Nuclear Energy Company
- b. Plant - Millstone Unit 2
- c. Location - Waterford, Connecticut
- d. Containment Type - Prestressed, post-tensioned concrete
- e. Nuclear Steam System - CE PWR

Technical Information

- a. Containment Net Free Air Volume - $1.92 \times 10^6 \text{ ft}^3$
- b. Design Pressure - 54 psig
- c. Design Temperature - 120°F
- d. Calculated Peak Accident Pressure P_a - 54 psig
- e. Containment ILRT Average Temperature Limits - 50 to 120°F
- f. Calculated Peak Accident Temperature - 289°F
- g. $L_a = 0.5 \text{ wt\%/day}$
- h. $P_a = 54 \text{ psig}$
- i. 75 percent $L_a = 0.375 \frac{\text{wt\%}}{\text{day}}$

4.0 DESCRIPTION OF ILRT TEST INSTRUMENTATION AND PRESSURIZATION EQUIPMENT

Integrated Leakage Rate Measurement System

Absolute Pressure (2)

Heise Precision Pressure Gages (Model PPG-149)

- a. Accuracy - $\pm 0.0005\%$ F.S. Plus 0.0065% of reading
- b. Range - 0 to 100 PSI

Drybulb Temperature (18 Sensors)

Rosemount Resistance Temperature Detectors (RTD) (Model 104AHC)

- a. Range(s) - 0 to 200°F, 0 to 350°F
- b. Accuracy - $\pm 1.6^\circ\text{F}$ @ 100°F
- c. Repeatability - 0.1% full scale

Dewpoint Temperature (4 Sensors)

Foxboro Dewcells (Models 2701G and 2717G)

- a. Range - 0 to 120°F
- b. Accuracy - $\pm 0.1^\circ\text{F}$
- c. Repeatability - 0.1% full scale

Verification Flow (1 Channel)

Volumetric Flow Meters (Model 2010)

- a. Range - 0 to 35 SCFM
- b. Accuracy - $\pm 1\%$ full scale
- c. Repeatability - $\pm 0.3\%$ full scale

5.0 DESCRIPTION OF ILRT TEST, SOFTWARE, AND DATA ANALYSIS TECHNIQUES

The MP2 ILRT (Integrated Leak Rate Test) was conducted by NNECO personnel and others, per the requirements of Test Procedure Number SP 2605B, Rev. 6.

The test procedure was the administrative document utilized to set up the required plant system prerequisites and initial conditions necessary to conduct an ILRT.

The containment structure itself was isolated (i.e., plant systems penetrating the containment boundary were isolated, via closure of boundary isolation valves). A pressurization system was set up and connected to the containment through a temporary piping path. The pressurization system consists of a group of oil-free air compressors, refrigerator-dryer units, after-coolers, interconnecting spool pieces, and valves.

A fully automated data acquisition system (with backup capability) was used to record and monitor ILRT containment-related test parameters, e.g., containment air pressures, temperatures, dewpoint data, etc. The data acquisition system consists of two portable computers and floppy disc drives. The test data is processed via the ILRT software system computer program.

With test prerequisites and initial conditions satisfied, the containment was first pressurized (slowly) to 10 psig and external inspections of the containment were completed, while pressurization continued. When the pressure reaches 54 psig, containment pressurization was stopped and isolated. The containment air mass system was then allowed to thermodynamically stabilize itself. Once stabilization has been attained, the data acquisition system records the test data and computes the ILRT leakage rate.

The Type A test and the supplemental verification test were performed according to the requirements of the MP2 Technical Specification and 10CFR50, Appendix J. The test method as required by the Technical Specifications is the absolute method as described in ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." The leakage rate is calculated using formulas from BN-TOP-1. The durations of the Type A and verification tests are in accordance with the requirements of BN-TOP-1.

The computed leakage rate was then "adjusted," using techniques specified in IEN 85-71, to reflect LLRT rework/retest results. The adjusted as-left ILRT containment leakage rate is then compared to the procedures acceptance criteria limit and verified satisfactory.

Prior to depressurization of the containment, a verification test was completed. The verification test induces a known leakage rate and a calculation is made to verify that the test instrument-data acquisition system was operating satisfactorily and yielding accurate results.

Once this is verified, the containment is then slowly depressurized to normal atmospheric conditions and restoration is started.

6.0 EDITED TEST LOG

February 6, 1988

0500-0600 Hr.	Equipment hatch closed and leak tested.
0630 Hr.	Operations performing plant line-ups for ILRT. Vessel level is 90 inches.
1906 Hr.	Personnel hatch door closed.
2055 Hr.	Personnel hatch door leak check completed.

2058 Hr. CAR Fans A, B, C, and D started in slow speed. Containment Aux. Recirculation Fans running.

2208 Hr. Pressurization of containment begins. Eight air compressors operating.

2220 Hr. ILRT Software Program indicates dewcells out of range. Range expanded and alarm reset.

2231 Hr. Pressurization rate approximately 4.5 psi/hr. Temperature increase approximately 7.5°F/hr.

2235 Hr. Cooling water hose ruptured to the after coolers. Repairs initiated.

2250 Hr. Cooling water hose repaired. Seven compressors operating.

2315 Hr. Increased after coolers cooling water flow to maximum and evaluated effect on temperature rise.

2345 Hr. Temperature rise approximately 0.8°F/hr.

2350 Hr. HV-1 adjusted; no change in compressor back pressure observed.

February 7, 1988

0000 Hr. Test Director (TD) notified at 22 psia point in preparation for the 10 psig (24.7 psia) leak check walkdown.

0105 Hr. 10 psig (24.7 psia) leak check walkdown completed. No detectable leakage found.

0130 Hr. Five compressors running.

0238 Hr. Containment air pressure and temperature is 31.04 psia and 70.81°F, respectively. Pressurization rate is 2.9 psi/hr.

0438 Hr. Pressurization rate is 3.0 psi/hr.

0530 Hr. Walkdown of penetrations indicate slight leakage through pen. #3 (RCS charging) and pen. #21 (sample system).

0730 Hr. Containment pressure and temperature is 45.53 psia and 71.899°F, respectively.

1210 Hr. Containment pressure is 58.7 psia.

1330 Hr. Containment pressure is 62.2 psia.

1400 Hr. Containment pressure is 63.77 psia.

1445-1500 Hr. Shut down two air compressors.

1510 Hr. Returned two air compressors to service.

1540 Hr. Containment pressure is 68.695 psia.

1550 Hr. Test pressure, P = 69.201 psia achieved. Containment air temperature is 73.252°F. Pressurization ceased. Start of temperature stabilization period.

1940 Hr. Operations found valve 2-MS-409 closed. Valve should be open. Valve left as is and a penetration add-on penalty will be made to final test result (L_{am}).

2000 Hr. Containment pressure is 69.1221 psia. Temperature stabilization achieved (less than 0.353°F/hr). Continue to monitor trends increased air mass stability.

2100 Hr. Review of temperature stabilization indicates rise is approximately 0.1072°F/hr.

2313 Hr. Anchorage and adjacent concrete inspection ended.

February 8, 1988

0005 Hr. Start of official test; computers initialized.

0019 Hr. First leakage data point recorded. Containment pressure is 69.111 psia. Start of eight-hour minimum duration total time test.

0845 Hr. Total time UCL L_{am} calculated to be 0.134 wt%/day. Calculated leakage well within 0.75 L_{am} (0.375 wt%/day) limits. End of eight-hour minimum duration test.

0935 Hr. Chemistry has completed air sampling of verification path exhaust outlet.

0939 Hr. Verification test commenced.

0950 Hr. Verification superimposed flow L_o set at 29.76 SCFM. Start of one-hour minimum wait interval to allow for stabilization.

1052 Hr. Test Engineer reviewing containment trending plots and verifying stable trends exist.

1053 Hr. Calculation of L_c , composite leakage rate commences. Minimum time is four hours.

1459 Hr. L_c calculation completed and found satisfactory.

1600 Hr. Start of depressurization.

February 9, 1988

1200 Hr. (approx.) End of depressurization.

Note: For Log entry Feb. 7, 1988 at 1940 hr., no add-on penalty to final ILRT test result (UCL L_{amp}) is required because 2-MS-409 is not a Containment Isolation Valve (CIV) or a containment boundary.

7.0 TYPE A TEST DATA

Refer to Appendix A for details.

8.0 TYPE B AND C LOCAL LEAK RATE TEST RESULTS

Refer to Appendix B for details.

9.0 LEAKAGE PENALTIES AND LEAKAGE SAVINGS

Refer to Appendix C for details.

10.0 REFERENCES

- (1) 10CFR50, Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors, 1973.
- (2) ANSI N45.4-1972, American National Standard Leakage - Rate Testing of Containment Structures of Nuclear Reactors, 1972.
- (3) ANS 56.8-1981, Containment System Leakage Testing Requirements, 1987.
- (4) BN-TOP-1, Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants, 1972, Rev. 1.
- (5) IEN 85-71, August 22, 1985.

11.0 LIST OF APPENDICES

- Appendix A - Type A Test Data
- Appendix B - Types B and C Test Data
- Appendix C - Leakage Penalties and Savings

12.0 LIST OF FIGURES

- Figure 1 - Total Time L_{am} versus time
- Figure 2 - Containment Temperature versus time
- Figure 3 - Containment Air Pressure versus time
- Figure 4 - Containment Air Mass versus time
- Figure 5 - Containment Vapor Pressure versus time

13.0 LIST OF TABLES

- Table 1 - Containment RTD/Dewcell Sensor Weight Fractions
- Table 2 - Total Time L_{am} Test Results
- Table 3 - Total Time L_c Verification Test Results

APPENDIX A

TYPE A TEST DATA
(February 8, 1988)

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0019	71.4179	.1919	68.9031	69094	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.799	68.320	70.779	77.735	72.870	71.377	71.732	71.710	71.210	72.224	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.273	70.966	72.065	71.200	71.912	71.627	70.736	72.160	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.388	52.974	53.283	52.035	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0034	71.4168	.1918	68.9022	69093	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.807	68.320	70.787	77.744	72.861	71.379	71.734	71.712	71.191	72.224	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.253	70.925	72.073	71.189	71.926	71.641	70.810	72.077	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.715	52.866	52.932	51.990	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0049	71.4168	.1917	68.9023	69093	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.772	68.294	70.787	77.753	72.870	71.389	71.734	71.728	71.149	72.220	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.295	70.978	72.073	71.187	71.926	71.638	70.782	72.079	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.583	52.722	53.121	52.053	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0104	71.4177	.1913	68.9027	69093	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.825	68.329	70.779	77.744	72.870	71.399	71.738	71.716	71.210	72.216	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.257	70.949	72.085	71.183	71.918	71.627	70.709	72.160	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.316	52.884	53.172	51.954	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0119	71.4248	.1922	68.9008	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.825	68.303	70.770	77.761	72.870	71.407	71.764	71.722	71.107	72.218	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.323	70.955	72.109	71.194	71.968	71.637	70.752	72.099	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.589	53.307	52.878	52.002	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0134	71.4323	.1918	68.9013	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.816	68.320	70.814	77.753	72.879	71.395	71.764	71.730	71.187	72.222	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.277	70.962	72.113	71.206	71.944	71.645	70.800	72.132	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.268	52.950	53.367	52.017	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0149	71.4322	.1911	68.9019	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.843	68.329	70.779	77.761	72.887	71.403	71.738	71.718	71.177	72.226	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.279	70.982	72.115	71.203	71.954	71.647	70.822	72.129	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.307	52.776	53.151	51.975	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0204	71.4364	.1920	68.9010	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.843	68.346	70.787	77.779	72.896	71.407	71.746	71.722	71.185	72.232	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.269	71.000	72.121	71.189	71.962	71.643	70.786	72.198	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.436	52.917	53.340	52.035	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
12/08	0219	71.4425	.1909	68.9021	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.869	68.364	70.770	77.770	72.887	71.428	71.758	71.730	71.242	72.232	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.267	71.030	72.138	71.196	71.974	71.643	70.804	72.131	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.169	52.959	52.962	52.023	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0234	71.4505	.1915	68.9015	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.860	68.381	70.796	77.796	72.896	71.415	71.774	71.730	71.192	72.242	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.293	70.998	72.136	71.206	71.970	71.658	70.784	72.222	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.316	52.809	53.253	52.029	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0249	71.4542	.1922	68.9008	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.886	68.346	70.787	77.796	72.922	71.420	71.779	71.746	71.206	72.240	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.231	71.022	72.140	71.214	72.002	71.647	70.832	72.166	0.000	0.000	
D1	D2	D3	D4	D5	D6					
50.436	53.145	53.178	52.092	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0304	71.4583	.1906	68.9024	69092	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
69.904	68.338	70.814	77.796	72.940	71.430	71.777	71.746	71.220	72.244	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.297	71.028	72.160	71.228	71.966	71.643	70.849	72.158	0.000	0.000	

D1 49.929 D2 52.890 D3 53.094 D4 52.062 D5 0.000 D6 0.000

DATE 02/08 HOUR 0319 TEMP 71.4603 VAPOR PRESSURE .1917 CONTAINMENT PRESSURE 68.9013 COUNT 1 69092 COUNT 2 0

RTD T 1 69.921 RTD T 2 68.346 RTD T 3 70.787 RTD T 4 77.805 RTD T 5 72.940 RTD T 6 71.432 RTD T 7 71.791 RTD T 8 71.752 RTD T 9 71.216 RTD T 10 72.250
 RTD T 11 72.295 RTD T 12 71.008 RTD T 13 72.166 RTD T 14 71.204 RTD T 15 72.010 RTD T 16 71.657 RTD T 17 70.826 RTD T 18 72.172 RTD T 19 0.000 RTD T 20 0.000

D1 50.064 D2 53.253 D3 53.346 D4 51.978 D5 0.000 D6 0.000

DATE 02/08 HOUR 0334 TEMP 71.4686 VAPOR PRESSURE .1927 CONTAINMENT PRESSURE 68.9003 COUNT 1 69092 COUNT 2 0

RTD T 1 69.851 RTD T 2 68.390 RTD T 3 70.796 RTD T 4 77.805 RTD T 5 72.940 RTD T 6 71.444 RTD T 7 71.795 RTD T 8 71.752 RTD T 9 71.268 RTD T 10 72.253
 RTD T 11 72.277 RTD T 12 71.040 RTD T 13 72.160 RTD T 14 71.220 RTD T 15 72.037 RTD T 16 71.657 RTD T 17 70.899 RTD T 18 72.182 RTD T 19 0.000 RTD T 20 0.000

D1 50.382 D2 53.268 D3 53.373 D4 52.113 D5 0.000 D6 0.000

DATE 02/08 HOUR 0349 TEMP 71.4704 VAPOR PRESSURE .1920 CONTAINMENT PRESSURE 68.9010 COUNT 1 69092 COUNT 2 0

RTD T 1 69.834 RTD T 2 68.355 RTD T 3 70.814 RTD T 4 77.822 RTD T 5 72.949 RTD T 6 71.450 RTD T 7 71.787 RTD T 8 71.764 RTD T 9 71.252 RTD T 10 72.255
 RTD RTD RTD RTD RTD RTD RTD RTD RTD RTD

T11	T12	T13	T14	T15	T16	T17	T18	T19	T20
72.311	71.048	72.184	71.236	72.017	71.684	70.812	72.164	0.000	0.000
D1	D2	D3	D4	D5	D6				
50.919	52.698	52.911	52.065	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0404	71.4731	.1926	68.9004	69092	0				

RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T10
69.904	68.373	70.822	77.814	72.957	71.456	71.805	71.760	71.218	72.263
RTD T11	RTD T12	RTD T13	RTD T14	RTD T15	RTD T16	RTD T17	RTD T18	RTD T19	RTD T20
72.297	71.076	72.188	71.210	72.027	71.643	70.859	72.184	0.000	0.000
D1	D2	D3	D4	D5	D6				
50.754	52.896	53.280	52.083	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0419	71.4855	.1924	68.9006	69092	0				

RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T10
69.947	68.373	70.805	77.822	72.957	71.462	71.809	71.768	71.248	72.271
RTD T11	RTD T12	RTD T13	RTD T14	RTD T15	RTD T16	RTD T17	RTD T18	RTD T19	RTD T20
72.299	71.070	72.208	71.230	72.053	71.674	70.863	72.208	0.000	0.000
D1	D2	D3	D4	D5	D6				
50.655	52.971	53.187	52.089	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0434	71.4856	.1926	68.9004	69092	0				

RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T10
69.904	68.399	70.822	77.840	72.975	71.464	71.813	71.779	71.230	72.279

RTD T11	RTD T12	RTD T13	RTD T14	RTD T15	RTD T16	RTD T17	RTD T18	RTD T19	RTD T20
72.321	71.060	72.200	71.208	72.047	71.666	70.885	72.182	0.000	0.000

D1	D2	D3	D4	D5	D6
50.604	53.184	53.157	52.101	0.000	0.000

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2
02/08	0449	71.4968	.1931	68.8999	69092	0

RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T10
69.912	68.355	70.857	77.840	72.992	71.476	71.823	71.791	71.250	72.283

RTD T11	RTD T12	RTD T13	RTD T14	RTD T15	RTD T16	RTD T17	RTD T18	RTD T19	RTD T20
72.331	71.091	72.218	71.238	72.065	71.682	70.838	72.210	0.000	0.000

D1	D2	D3	D4	D5	D6
50.715	53.130	53.319	52.131	0.000	0.000

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2
02/08	0504	71.5084	.1941	68.8989	69092	0

RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T10
69.956	68.399	70.814	77.849	73.001	71.490	71.827	71.787	71.296	72.287

RTD T11	RTD T12	RTD T13	RTD T14	RTD T15	RTD T16	RTD T17	RTD T18	RTD T19	RTD T20
72.305	71.113	72.242	71.244	72.087	71.702	70.927	72.222	0.000	0.000

D1	D2	D3	D4	D5	D6
51.093	53.364	53.250	52.137	0.000	0.000

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2
02/08	0519	71.5176	.1923	68.9007	69092	0

RTD T 1 69.947	RTD T 2 58.425	RTD T 3 70.831	RTD T 4 77.856	RTD T 5 73.010	RTD T 6 71.492	RTD T 7 71.841	RTD T 8 71.805	RTD T 9 71.305	RTD T 10 72.293
RTD T 11 72.347	RTD T 12 71.123	RTD T 13 72.248	RTD T 14 71.236	RTD T 15 72.107	RTD T 16 71.698	RTD T 17 70.925	RTD T 18 72.198	RTD T 19 0.000	RTD T 20 0.000
D1 50.085	D2 53.535	D3 53.187	D4 52.146	D5 0.000	D6 0.000				

DATE 02/08	HOUR 0534	TEMP 71.5258	VAPOR PRESSURE .1933	CONTAINMENT PRESSURE 68.8997	COUNT 1 69092	COUNT 2 0
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RTD T 1 69.956	RTD T 2 68.460	RTD T 3 70.822	RTD T 4 77.857	RTD T 5 73.019	RTD T 6 71.510	RTD T 7 71.853	RTD T 8 71.809	RTD T 9 71.313	RTD T 10 72.299
RTD T 11 72.341	RTD T 12 71.127	RTD T 13 72.259	RTD T 14 71.254	RTD T 15 72.119	RTD T 16 71.708	RTD T 17 70.925	RTD T 18 72.218	RTD T 19 0.000	RTD T 20 0.000
D1 50.547	D2 53.400	D3 53.400	D4 52.149	D5 0.000	D6 0.000				

DATE 02/08	HOUR 0549	TEMP 71.5314	VAPOR PRESSURE .1934	CONTAINMENT PRESSURE 68.9006	COUNT 1 69093	COUNT 2 0
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RTD T 1 69.930	RTD T 2 68.451	RTD T 3 70.849	RTD T 4 77.875	RTD T 5 73.028	RTD T 6 71.520	RTD T 7 71.855	RTD T 8 71.813	RTD T 9 71.315	RTD T 10 72.303
RTD T 11 72.351	RTD T 12 71.175	RTD T 13 72.287	RTD T 14 71.254	RTD T 15 72.113	RTD T 16 71.694	RTD T 17 70.939	RTD T 18 72.257	RTD T 19 0.000	RTD T 20 0.000
D1 50.652	D2 53.217	D3 53.412	D4 52.203	D5 0.000	D6 0.000				

DATE 02/08	HOUR 0604	TEMP 71.5382	VAPOR PRESSURE .1940	CONTAINMENT PRESSURE 68.9011	COUNT 1 69094	COUNT 2 0
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RTD T 1 69.965	RTD T 2 68.425	RTD T 3 70.866	RTD T 4 77.892	RTD T 5 73.028	RTD T 6 71.518	RTD T 7 71.867	RTD T 8 71.815	RTD T 9 71.304	RTD T 10 72.309
RTD T 11 72.345	RTD T 12 71.175	RTD T 13 72.271	RTD T 14 71.270	RTD T 15 72.132	RTD T 16 71.708	RTD T 17 70.915	RTD T 18 72.307	RTD T 19 0.000	RTD T 20 0.000
D1 50.868	D2 52.977	D3 53.751	D4 52.188	D5 0.000	D6 0.000				

DATE 02/08	HOUR 0619	TEMP 71.5460	VAPOR PRESSURE .1929	CONTAINMENT PRESSURE 68.9021	COUNT 1 69094	COUNT 2 0
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RTD T 1 69.982	RTD T 2 68.442	RTD T 3 70.866	RTD T 4 77.892	RTD T 5 73.045	RTD T 6 71.530	RTD T 7 71.867	RTD T 8 71.829	RTD T 9 71.278	RTD T 10 72.317
RTD T 11 72.357	RTD T 12 71.175	RTD T 13 72.293	RTD T 14 71.260	RTD T 15 72.144	RTD T 16 71.728	RTD T 17 70.941	RTD T 18 72.295	RTD T 19 0.000	RTD T 20 0.000
D1 50.952	D2 53.118	D3 52.818	D4 52.233	D5 0.000	D6 0.000				

DATE 02/08	HOUR 0634	TEMP 71.5487	VAPOR PRESSURE .1939	CONTAINMENT PRESSURE 68.9011	COUNT 1 69094	COUNT 2 0
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RTD T 1 69.982	RTD T 2 68.477	RTD T 3 70.875	RTD T 4 77.910	RTD T 5 73.045	RTD T 6 71.541	RTD T 7 71.869	RTD T 8 71.827	RTD T 9 71.313	RTD T 10 72.321
RTD T 11 72.357	RTD T 12 71.208	RTD T 13 72.287	RTD T 14 71.264	RTD T 15 72.113	RTD T 16 71.726	RTD T 17 70.931	RTD T 18 72.265	RTD T 19 0.000	RTD T 20 0.000
D1 50.778	D2 53.172	D3 53.511	D4 52.302	D5 0.000	D6 0.000				

VAPOR CONTAINMENT

DATE	HOUR	TEMP	PRESSURE	PRESSURE	COUNT 1	COUNT 2			
02/08	0649	71.5606	.1934	68.9016	69094	0			
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10
69.982	68.486	70.849	77.901	73.045	71.536	71.889	71.845	71.304	72.329
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20
72.392	71.175	72.293	71.282	72.162	71.738	71.002	72.285	0.000	0.000
D1	D2	D3	D4	D5	D6				
50.985	52.881	53.319	52.215	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2			
02/08	0704	71.5691	.1936	68.9014	69094	0			
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10
69.982	68.460	70.875	77.927	73.071	71.545	71.887	71.855	71.266	72.331
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20
72.446	71.175	72.317	71.313	72.166	71.734	71.006	72.257	0.000	0.000
D1	D2	D3	D4	D5	D6				
50.895	52.761	53.670	52.236	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2			
02/08	0719	71.5684	.1953	68.8997	69094	0			
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10
69.991	68.477	70.857	77.927	73.071	71.569	71.910	71.853	71.278	72.335
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20
72.386	71.198	72.319	71.304	72.186	71.728	70.986	72.299	0.000	0.000
D1	D2	D3	D4	D5	D6				
51.123	53.406	53.757	52.242	0.000	0.000				

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0734	71.5817	.1930	68.9030	69095	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
70.009	68.495	70.892	77.963	73.089	71.577	71.912	71.869	71.258	72.351	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.432	71.198	72.335	71.306	72.182	71.724	70.992	72.325	0.000	0.000	
D1	D2	D3	D4	D5	D5					
51.090	53.208	52.509	52.278	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0749	71.5942	.1934	68.9026	69095	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
70.053	68.460	70.910	77.936	73.097	71.579	71.918	71.883	71.236	72.353	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.452	71.246	72.347	71.315	72.190	71.750	71.046	72.339	0.000	0.000	
D1	D2	D3	D4	D5	D5					
50.412	53.259	53.607	52.266	0.000	0.000					

DATE	HOUR	TEMP	VAPOR PRESSURE	CONTAINMENT PRESSURE	COUNT 1	COUNT 2				
02/08	0804	71.5818	.1947	68.9013	69095	0				
RTD T 1	RTD T 2	RTD T 3	RTD T 4	RTD T 5	RTD T 6	RTD T 7	RTD T 8	RTD T 9	RTD T 10	
70.035	68.495	70.892	77.954	73.115	71.583	71.922	71.873	71.296	72.357	
RTD T 11	RTD T 12	RTD T 13	RTD T 14	RTD T 15	RTD T 16	RTD T 17	RTD T 18	RTD T 19	RTD T 20	
72.380	71.234	72.371	71.288	72.129	71.732	71.042	72.329	0.000	0.000	
D1	D2	D3	D4	D5	D5					
51.264	53.067	53.490	52.287	0.000	0.000					

DATE 02/08 HOUR 0819 TEMP 71.6046 VAPOR PRESSURE .1934 CONTAINMENT PRESSURE 68.9046 COUNT 1 69097 COUNT 2 0

RTD T 1 70.053 RTD T 2 68.530 RTD T 3 70.919 RTD T 4 77.963 RTD T 5 73.106 RTD T 6 71.585 RTD T 7 71.944 RTD T 8 71.900 RTD T 9 71.321 RTD T 10 72.369
 RTD T 11 72.462 RTD T 12 71.254 RTD T 13 72.359 RTD T 14 71.323 RTD T 15 72.123 RTD T 16 71.756 RTD T 17 71.044 RTD T 18 72.337 RTD T 19 0.000 RTD T 20 0.000
 D1 50.829 D2 52.935 D3 53.286 D4 52.344 D5 0.000 D6 0.000

DATE 02/08 HOUR 0834 TEMP 71.6107 VAPOR PRESSURE .1939 CONTAINMENT PRESSURE 68.9051 COUNT 1 69098 COUNT 2 0

RTD T 1 70.061 RTD T 2 68.513 RTD T 3 70.928 RTD T 4 77.980 RTD T 5 73.124 RTD T 6 71.599 RTD T 7 71.948 RTD T 8 71.910 RTD T 9 71.306 RTD T 10 72.365
 RTD T 11 72.466 RTD T 12 71.268 RTD T 13 72.390 RTD T 14 71.321 RTD T 15 72.164 RTD T 16 71.766 RTD T 17 71.026 RTD T 18 72.335 RTD T 19 0.000 RTD T 20 0.000
 D1 50.823 D2 53.280 D3 53.298 D4 52.335 D5 0.000 D6 0.000

DATE 02/08 HOUR 0849 TEMP 71.6201 VAPOR PRESSURE .1926 CONTAINMENT PRESSURE 68.9054 COUNT 1 69097 COUNT 2 0

RTD T 1 70.070 RTD T 2 68.556 RTD T 3 70.919 RTD T 4 77.980 RTD T 5 73.141 RTD T 6 71.615 RTD T 7 71.952 RTD T 8 71.902 RTD T 9 71.343 RTD T 10 72.392
 RTD T 11 72.438 RTD T 12 71.264 RTD T 13 72.388 RTD T 14 71.365 RTD T 15 72.111 RTD T 16 71.781 RTD T 17 71.087 RTD T 18 72.359 RTD T 19 0.000 RTD T 20 0.000
 D1 D2 D3 D4 D5 D6

APPENDIX B

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY		ADD'N TO ILRT MIN. PATHWAY	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$Y1E4 :ELECT SEXA4 TUBE 1 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$Y1E8 :ELECT SEXA8 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y1W2 :ELECT SWXA2 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y1W8 :ELECT SWXA8 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y2E4 :ELECT SEXA4 TUBE 2 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$Y2E8 :ELECT SEXA8 TUBE 2 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y2W2 :ELECT SWXA2 TUBE 2 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y2W8 :ELECT SWXA8 TUBE 2 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y3E4 :ELECT SEXA4 TUBE 3 DBL SEAL	16.101	16.101	16.101	16.101	0.000	0.000
\$\$\$Y3E8 :ELECT SEXA8 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y3W2 :ELECT SWXA2 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y3W8 :ELECT SWXA8 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YEQU :EQUIPMENT HATCH DBL SEAL	0.212 ⁽³⁾	0.273	0.212	0.273	-0.031 ⁽⁴⁾	0.000
\$\$\$YPER :PERSONNEL HATCH DBL DOOR	12.037	8.910	12.037	8.910	1.564	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY		ADD'N TO ILRT MIN. PATHWAY	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$YTRA :TRANSFER TUBE DBL SEAL	0.367	0.254	0.367	0.254	0.056	0.000
\$\$\$YWB2 :ELECT SWXB2 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB3 :ELECT SWXB3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB4 :ELECT SWXB4 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB5 :ELECT SWXB5 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB6 :ELECT SWXB6 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB7 :ELECT SWXB7 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB8 :ELECT SWXB8 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWB9 :ELECT SWXB9 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWC3 :ELECT SWXC3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWC5 :ELECT SWXC5 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWD1 :ELECT SWXC1 DBL SEAL	0.034	0.034	0.034	0.034	0.000	0.000
\$\$\$YWD3 :ELECT SWXD3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YWD5 :ELECT SWXD5 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY		ADD'N TO ILRT MIN. PATHWAY	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$YWD8 :ELECT SWXD8 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$YWD9 :ELECT SWXD9 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$YWE5 :ELECT SWXE5 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$YWE9 :ELECT SWXE9 DBL SEAL	0.048	0.048	0.048	0.048	0.000	0.000
\$\$\$YXA5 :ELECT SEXA5 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXA6 :ELECT SEXA6 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB1 :ELECT SWXB1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB2 :ELECT SEXB2 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB4 :ELECT SEXB4 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB5 :ELECT SEXB5 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB6 :ELECT SEXB6 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB7 :ELECT SEXB7 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB8 :ELECT SEXB8 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXB9 :ELECT SEXB9 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY		ADD'N TO ILRT MIN. PATHWAY	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$YXC1 :ELECT SEXC1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXC3 :ELECT SEXC3 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXD1 :ELECT SEXD1 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXD3 :ELECT SFXD3 DBL SEAL	0.044	0.044	0.044	0.044	0.000	0.000
\$\$\$YXD6 :ELECT SEXD6 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YSD8 :ELECT SEXD8 DBL SEAL	0.058	0.058	0.058	0.058	0.000	0.000
\$\$\$YXD9 :ELECT SEXD9 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXE6 :ELECT SEXE6 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$YXE9 :ELECT SEXE9 DBL SEAL	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y1 :PMW TO QUENCH TANK 2-PMW-43C	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y2 :LETDOWN 2-CH-516 2-CH-89	0.042 0.669	0.042 0.669	0.669	0.669	0.000	0.000
\$\$\$Y3 :CHARGING 2-CH-517, 518, 519, 429	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y4 :CTMT SPRAY 2-CS-5A 2-CS-4.1A	0.042 0.180	0.042 0.221	0.180	0.221	0.000	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY		ADD'N TO ILRT MIN. PATHWAY	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$Y5 :CTMT SPRAY 2-CS-5B 2-CS-4.1B	0.042 0.364	0.042 0.854	0.364	0.854	0.000	0.000
\$\$\$Y10 :SHUTDOWN COOLING 2-SI-709, 2-SI-651	3.025	3.025	3.025	3.025	1.512	1.512
\$\$\$Y11 :SI TEST LINE 2-SI-463	0.953	0.953	0.953	0.953	0.000	0.000
\$\$\$Y14 :NORMAL SUMP (BYPASS) 2-SSP-16.1 S-SSP-16.2	105.930 0.879	4.131 0.042	105.930	4.131	0.837	0.000
\$\$\$Y21 :RCS QUENCH TANK SMPL 2RC001+2RC002+2RC003+2LRR61.1 2-RC-45	UD (5) 2.712	0.207 0.042	(5)	0.207	(5)	0.000
\$\$\$Y24 :RBCCW A IN 2-RB-30.1A	4.746	4.746	4.746	4.746	4.746	4.746
\$\$\$Y29 :RBCCW A OUT 2-RB-37.2A	4.125	4.125	4.125	4.125	4.125	4.125
\$\$\$Y34 :NITROGEN TO SIT 2-SI-312	0.150	0.150	0.150	0.150	0.000	0.000
\$\$\$Y35 :PRIMARY DRAIN TANK 2-LLR-43.1, 2-LLR-43.2	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y36 :INST. AIR 2-1A-569 2-1A-566	139.403 0.042	0.154 0.042	139.403	0.154	0.000	0.000
\$\$\$Y37 :INST. AIR 2-1A-27.1	3.563	0.175	3.563	0.175	3.388	0.000
\$\$\$Y38 :STA. AIR 2-SA-19	2.032	2.032	2.032	2.032	0.000	0.000
\$\$\$Y39 :CTMT PURGE SUPPLY 2-AC-5, 2-AC-4	175.420	5.932	175.420	5.932	84.744	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

<u>PENETRATION DESCRIPTION</u>	<u>BARRIER LEAKAGE</u>		<u>SUMMATION BY MAX. PATHWAY</u>		<u>ADD'N TO ILRT MIN. PATHWAY</u>	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$Y40 :CTMT EXHAUST 2-AC-6, 2-AC-7	249.359	4.301	249.359	4.301	122.529	0.000
\$\$\$Y43 :RCP SEAL LEAKOFF 2-CH-506 2-CH-198, 2-CH-505	0.042 0.042	0.042 0.042	0.042	0.042	0.000	0.000
\$\$\$Y49 :FIRE 2-FIRE-109 2-FIRE-108	0.049 0.050	0.049 0.076	0.050	0.076	0.000	0.000
\$\$\$Y51 :WASTE GAS HDR 2-GR-11.1, 2-GR-11.2	8.856	8.819	8.856	8.819	0.018	0.000
\$\$\$Y53 :RBCCW B IN 2-RB-30.1B	0.331	3.771	0.331	3.771	0.331	3.771
\$\$\$Y54 :RBCCW B OUT 2-RB-37.2B	0.128	0.089	0.128	0.089	0.128	0.089
\$\$\$Y61 :CTMT AIR SMPL 2-EB-88 2-AC-12	0.097 0.042	0.097 0.042	0.097	0.097	0.000	0.000
\$\$\$Y62 :CTMT AIR SMPL 2-AC-54 2-AC-15	5.508 0.238	5.508 0.238	5.508	5.508	0.000	0.000
\$\$\$Y63 :ILRT FLOW CONN 2-AC-117, 2-AC-114	0.826	0.650	0.826	0.650	0.413	0.325
\$\$\$Y64 :ILRT PRESS CONN 2-AC-116, 2-AC-112	0.042	0.042	0.042	0.042	0.021	0.021
\$\$\$Y67 :REFUEL WATER (BYPASS) 2-RW-232, 2-RW-21	0.240	0.240	0.240	0.240	0.000	0.000
\$\$\$Y68 :REFUEL WATER (BYPASS) 2-RW-154, 2-RW-63	0.057	0.057	0.057	0.057	0.000	0.000
\$\$\$Y82 :HYDROGEN PURGE 2-EB-91, 2-EB-92	0.042	0.538	0.042	0.538	(4)	0.000

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1988) (Units in SCFH)

<u>PENETRATION DESCRIPTION</u>	<u>BARRIER LEAKAGE</u>		<u>SUMMATION BY MAX. PATHWAY</u>		<u>ADD'N TO ILRT MIN. PATHWAY</u>	
	FOUND	LEFT	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED						
\$\$\$Y33 :HYDROGEN PURGE 2-EB-100, 2-EB-99	4.301	0.068	4.301	0.068	2.117	0.000
\$\$\$Y85 :ILRT CONNECTION BLANK FLANGE, SF01	0.337	0.192	0.337	0.192	0.169	0.096
\$\$\$Y86 :CTMT AIR SAMPLE 2-EB-89 2-AC-47	0.067 0.042	0.042 0.042	0.067	0.042	0.000	0.000
\$\$\$Y87 :CTMT AIR SAMPLE 2-AC-55 2-AC-20	0.042 0.075	0.192 0.042	0.075	0.192	0.000	0.000
\$\$\$Y88 :HYDROGEN SAMPLE 2-AC-51	0.042	0.042	0.042	0.042	0.000	0.000
\$\$\$Y89 :HYDROGEN SAMPLE 2-AC-46	0.042	0.042	0.042	0.042	0.000	0.000
TOTALS			744.577	79.866	226.377	14.686
ADJUSTMENTS			298.5 ^{+1UD(2)}	3.9 ⁽²⁾	2.949 ^(4,5)	
TOTALS			1043.077 ^{+1UD}	83.766	229.326	14.686

Notes to MP2 LLRT Analysis:

1. Units are SCFH (SCCM + 472)
2. Adjustment for SG blowdown, which is additive for Max. Pathway Only (Y22/65 and Y23/72). AF Total = 298.5 AL Total = 3.9 SCFH
3. Data from 9/16/87. After high usage during the outage, a test on 2/2/88 indicated UD leakage due to wear of the shaft seals for the door latching mechanism.
4. Credit for increased leakage (negative additions) are not permitted. Therefore, total is corrected by $.031 + 0.248 = 0.279$ SCFH, plus 2.670 from (5) = 2.949
5. The AF test of 2-RC-45 found UD leakage (greater than 20,000 SCCM) through the body-to-bonnet flange of 2-RC-65. This leakage path is in parallel with the inboard barriers; thus, UD is assigned to the inboard barriers. The addition to the as-found ILRT is calculated by minimum pathway as $2.712 - .042$ or 2.670 SCFH.
6. RBCCW penetrations to CAR coolers are not included; consistent with NRC submittal.
7. UD means "Undetermined" leakage.
8. Leakage data for SG blowdown:

Barrier Tested	<u>Barrier Leakage</u>		<u>Summation by Max. Pathway</u>	
	Found	Left	Found	Left
\$\$\$Y22/65 :SG BL.DWN 2MS-220A+191A	286.011	3.531	286.011	3.531
\$\$\$Y23/72 :SG BL.DWN 2-MS-220B+191B	12.521	0.494	12.521	0.494

9. No add-on penalty is required for 2-MS-409, found in incorrect position (closed) during the test, because it is neither a containment isolation valve (CIV) or containment boundary.

APPENDIX B

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

<u>PENETRATION DESCRIPTION</u>	<u>BARRIER LEAKAGE</u>		<u>SUMMATION BY MAX. PATHWAY</u>	
	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED				
\$\$\$Y1E4 :ELECT SEXA4 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$Y1E8 :ELECT SEXA8 TUBE 1 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$Y1W2 :ELECT SWXA2 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$Y1W8 :ELECT SWXA8 TUBE 1 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$Y2E4 :ELECT SEXA4 TUBE 2 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$Y2E8 :ELECT SEXA8 TUBE 2 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$Y2W2 :ELECT SWXA2 TUBE 2 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$Y2W8 :ELECT SWXA8 TUBE 2 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$Y3E4 :ELECT SEXA4 TUBE 3 DBL SEAL	1.153	1.153	1.153	1.153
\$\$\$Y3E8 :ELECT SEXA8 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$Y3W2 :ELECT SWXA2 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$Y3W8 :ELECT SWXA8 TUBE 3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$EQU :EQUIPMENT HATCH DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YPER :PERSONNEL HATCH DBL DOOR	201.072	18.368	201.072	18.368
\$\$\$YTRA :TRANSFER TUBE DBL SEAL	0.367	0.367	0.367	0.367

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

<u>PENETRATION DESCRIPTION</u>	<u>BARRIER LEAKAGE</u>		<u>SUMMATION BY MAX. PATHWAY</u>	
	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED				
\$\$\$YWB2 :ELECT SWXB2 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YWB3 :ELECT SWXB3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWB4 :ELECT SWXB4 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YWB5 :ELECT SWXB5 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YWB6 :ELECT SWXB6 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YWB7 :ELECT SWXB7 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YWB8 :ELECT SWXB8 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YWB9 :ELECT SWXB9 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YWC3 :ELECT SWXC3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWC5 :ELECT SWXC5 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWD1 :ELECT SWXD1 DBL SEAL	0.372	0.372	0.372	0.372
\$\$\$YWD3 :ELECT SWXD3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWD5 :ELECT SWXD5 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWD8 :ELECT SWXD8 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWD9 :ELECT SWXD9 DBL SEAL	0.042	0.042	0.042	0.042

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY	
	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED				
\$\$\$YWE5 :ELECT SWXE5 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YWE9 :ELECT SWXE9 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YXA5 :ELECT SEXA5 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXA6 :ELECT SEXA6 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXB1 :ELECT SWXB1 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXB2 :ELECT SEXB2 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YXB4 :ELECT SEXB4 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$YXB5 :ELECT SEXB5 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YXB6 :ELECT SEXB6 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YXB7 :ELECT SEXB7 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXB8 :ELECT SEXB8 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YXB9 :ELECT SEXB9 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXC1 :ELECT SEXC1 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$YXC3 :ELECT SEXC3 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$YXD1 :ELECT SEXD1 DBL SEAL	0.042	0.042	0.042	0.042

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY	
	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED				
\$\$\$\$YXD3 :ELECT SEXD3 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$\$YXD6 :ELECT SEXD6 DBL SEAL	0.042	0.042	0.042	0.042
\$\$\$\$YXD8 :ELECT SEXD8 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$\$YXD9 :ELECT SEXD9 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$\$YXE6 :ELECT SEXE6 DBL SEAL	0.213	0.213	0.213	0.213
\$\$\$\$YXE9 :ELECT SEXE9 DBL SEAL	0.043	0.043	0.043	0.043
\$\$\$\$Y1 :PMW TO QUENCH TANK 2-PMW-43C	0.212	0.212	0.212	0.212
\$\$\$\$Y2 :LETDOWN 2-CH-516 2-CH-89	0.212 0.042	0.042 0.042	0.212	0.042
\$\$\$\$Y3 :CHARGING 2-CH-517, 518, 519, 429	0.212	0.212	0.212	0.212
\$\$\$\$Y4 :CTMT SPRAY 2-CS-5A 2-CS-4.1A	0.212 0.212	0.212 0.212	0.212	0.212
\$\$\$\$Y5 :CTMT SPRAY 2-CS-5B 2-CS-4.1B	0.042 0.212	0.042 0.212	0.212	0.212
\$\$\$\$Y10 :SHUTDOWN COOLING 2-SI-709, 2-SI-651	9.629	9.629	9.629	9.629
\$\$\$\$Y11 :SI TEST LINE 2-SI-463	0.212	0.497	0.212	0.497
\$\$\$\$Y14 :NORMAL SUMP (BYPASS) 2-SSP-16.1 S-SSP-16.2	0.6 L 2.552 ^a	0.424 3.909	2.552	3.909

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY	
	FOUND	LEFT	FOUND	LEFT
\$\$\$Y21 :RCS QUENCH TANK SMPL 2RC001+2RC002+2RC003+2LRR61.1 2-RC-45	0.324	1.447	3.318	1.447
\$\$\$Y22/65 :SG BLOWDOWN 2-MS-220A + 2-MS-191A	128.383	0.053	128.383	0.053
\$\$\$Y23/72 :SG BLOWDOWN 2-MS-220B + 2-MS-191B	0.213	9.077	0.213	9.077
\$\$\$Y24 :RBCCW A IN 2-RB-30.1A	7.232	7.232	7.232	7.232
\$\$\$Y25/30 :RBCCW 2RB28.1D + 2RB28.2D + 2RB28.3D	8.960	2.128	8.960	2.128
\$\$\$Y26/31 :RBCCW 2RB28.1B + 2RB28.2B + 2RB28.3B	greater than 0.6 L _a	3.410	0.000	3.410
\$\$\$Y27/32 :RBCCW 2RB28.1A + 2RB28.2A + 2RB28.3A	84.837	0.849	84.837	0.849
\$\$\$Y28/33 :RBCCW 2RB28.1C + 2RB28.2C + 2RB28.3C	157.442	6.156	157.442	6.156
\$\$\$Y29 :RBCCW A OUT 2-RB-37.2A	7.224	7.224	7.224	7.224
\$\$\$Y34 :NITROGEN TO SIT 2-SI-312	0.529	0.076	0.529	0.076
\$\$\$Y35 :PRIMARY DRAIN TANK 2-LLR-43.1, 2-LLR-43.2	0.042	0.473	0.042	0.473
\$\$\$Y36 :INST. AIR 2-1A-569 2-1A-566	1.193 0.054	1.193 0.054	1.193	1.193
\$\$\$Y37 :INST. AIR 2-1A-27.1	0.212	1.289	0.212	1.289
\$\$\$Y38 :STA. AIR 2-SA-19	0.117	0.042	0.117	0.042

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

PENETRATION DESCRIPTION	BARRIER LEAKAGE		SUMMATION BY MAX. PATHWAY	
	FOUND	LEFT	FOUND	LEFT
BARRIER TESTED				
\$\$\$Y39 :CTMT PURGE SUPPLY 2-AC-5, 2-AC-4	8558.453	6.087	8558.453	6.087
\$\$\$Y40 :CTMT EXHAUST 2-AC-6, 2-AC-7	471.346	4.783	471.346	4.783
\$\$\$Y43 :RCP SEAL LEAKOFF 2-CH-506 2-CH-198, 2-CH-505	0.042 0.042	0.042 0.212	0.042	0.212
\$\$\$Y49 :FIRE 2-FIRE-109 2-FIRE-108	0.042 0.212	0.042 0.212	0.212	0.212
\$\$\$Y51 :WASTE GAS HDR 2-GR-11.1, 2-GR-11.2	0.937	1.188	0.937	1.188
\$\$\$Y53 :RBCCW E IN 2-RB-30.1B	8.345	8.345	8.345	8.345
\$\$\$Y54 :RBCCW B OUT 2-RB-37.2B	10.057	0.746	10.057	0.746
\$\$\$Y61 :CTMT AIR SMPL 2-EB-88 2-AC-12	0.383 0.042	0.383 0.042	0.383	0.383
\$\$\$Y62 :CTMT AIR SMPL 2-AC-54 2-AC-15	0.042 0.053	0.212 0.053	0.053	0.212
\$\$\$Y63 :ILRT FLOW CONN 2-AC-117, 2-AC-114	0.253	0.253	0.253	0.253
\$\$\$Y64 :ILRT PRESS CONN 2-AC-116, 2-AC-112	0.042	0.042	0.042	0.042
\$\$\$Y67 :REFUEL WATER (BYPASS) 2-RW-232, 2-RB-21	0.212	0.212	0.212	0.212
\$\$\$Y6B :REFUEL WATER (BYPASS) 2-RW-154, 2-RW-63	0.212	0.212	0.212	0.212

APPENDIX B (Continued)

SUMMARY OF TYPE B AND C LEAK RATE RESULTS (1986) (Units in SCFH)

<u>PENETRATION DESCRIPTION</u>	<u>BARRIER LEAKAGE</u>		<u>SUMMATION BY MAX. PATHWAY</u>	
	<u>FOUND</u>	<u>LEFT</u>	<u>FOUND</u>	<u>LEFT</u>
BARRIER TESTED				
\$\$\$Y82 :HYDROGEN PURGE 2-EB-91, 2-EB-92	0.212	0.091	0.212	0.091
\$\$\$Y83 :HYDROGEN PURGE 2-EB-100, 2-EB-99	0.212	0.042	0.212	0.042
\$\$\$Y85 :ILRT CONNECTION BLANK FLANGE, SF01	0.677	0.523	0.677	0.523
\$\$\$Y86 :CTMT AIR SAMPLE 2-EB-89 2-AC-47	0.042 0.212	0.042 0.212	0.212	0.212
\$\$\$Y87 :CTMT AIR SAMPLE 2-AC-55 2-AC-20	0.212 0.042	0.042 0.042	0.212	0.042
\$\$\$Y88 :HYDROGEN SAMPLE 2-AC-51	0.042	0.212	0.042	0.212
\$\$\$y89 :HYDROGEN SAMPLE 2-AC-46	0.042	0.212	0.042	0.212
TOTALS			9673.336	105.116

APPENDIX C

LEAKAGE PENALTIES AND SAVINGS

Leakage Penalties:

From Appendix B, the leakage penalty is 14.686 SCFH.

Convert leakage rate into units of $\frac{\text{wt}\%}{\text{day}}$:

$$\text{Leakage penalty} = 14.686 \text{ (SCFH)} \times 0.5 \frac{\text{wt}\%}{\text{day}} \times \frac{1}{1827.18} \text{ (SCFH)}$$

$$\text{Leakage penalty} = 0.004 \frac{\text{wt}\%}{\text{day}}$$

Leakage Savings to ILRT (applicable to as-found test only):

From Appendix B, leakage savings is 229.326 SCFH.

Convert leakage rate into units of $\frac{\text{wt}\%}{\text{day}}$:

$$\text{Leakage penalty} = 229.326 \text{ (SCFH)} \times 0.5 \frac{\text{wt}\%}{\text{day}} \times \frac{1}{1827.18} \text{ (SCFH)}$$

$$\text{Leakage penalty} = 0.063 \frac{\text{wt}\%}{\text{day}}$$

TABLE 1

Containment RTD/Dewcell Sensor Volume Weight Fractions

RTD	ELEV. (Ft.)	AZ (Deg.)	Dist. From Center Line (Ft.)	Volume Fraction
TE 9769	150	90	12	0.096
TE 8110	105	220	60	0.086
TE 9767	105	40	60	0.087
TE 8111	90	320	60	0.086
TE 8112	90	105	60	0.087
TE 8084	44	5	45	0.058
TE 8108	44	103	65	0.058
TE 8109	44	235	65	0.058
TE 8097	30	125	20	0.016
TE 8098	30	235	20	0.014
TE 8094	20	350	45	0.040
TE 9770	18	220	55	0.040
TE 9771	18	90	50	0.040
TE 8087	3	5	32	0.032
TE 9765	3	240	65	0.032
TE 9766	3	125	65	0.032
TE 8091	-15	330	35	0.069
TE 9768	-18	135	50	0.069
				TOTAL 1.000
<hr/>				
Dewcells				
<hr/>				
ME 9772	19	320	60	0.279
ME 8064	19	105	60	0.279
ME 9773	105	10	45	0.221
ME 9774	105	165	45	0.221
				TOTAL 1.000

TABLE 2

Total Time L_{am} Test Results

***** TOTAL TIME CALCULATED RESULTS *****

TIME	TEMP	VAPOR PRESS	DEW PT	COUNT #1	COUNT #2	CONT AIR PRESS	LSF LEAK RATE	UPPER CONF LEVEL	MEASURED LEAK RATE
19	531.121	0.1920	52.073	69104	00000	68.919	0.00E+00	0.00E+00	6.73E+05
34	531.121	0.1917	52.022	69101	00000	68.916	0.00E+00	0.00E+00	3.56E-01
49	531.120	0.1918	52.039	69101	00000	68.916	1.77E-01	0.00E+00	1.77E-01
104	531.122	0.1912	51.961	69100	00000	68.916	1.27E-01	2.89E-01	1.52E-01
119	531.129	0.1922	52.096	69102	00000	68.917	8.56E-02	8.35E-01	1.11E-01
134	531.134	0.1918	52.040	69101	00000	68.916	7.84E-02	6.13E-01	1.24E-01
149	531.136	0.1911	51.948	69101	00000	68.917	6.12E-02	4.32E-01	9.38E-02
204	531.139	0.1919	52.057	69100	00000	68.915	6.69E-02	3.95E-01	1.23E-01
219	531.145	0.1910	51.934	69100	00000	68.916	6.46E-02	3.34E-01	1.06E-01
234	531.153	0.1915	52.003	69100	00000	68.915	6.87E-02	3.05E-01	1.13E-01
249	531.158	0.1923	52.109	69100	00000	68.915	7.50E-02	2.86E-01	1.26E-01
304	531.161	0.1907	51.880	69100	00000	68.916	7.14E-02	2.50E-01	9.89E-02
319	531.162	0.1918	52.035	69099	00000	68.914	7.44E-02	2.34E-01	1.16E-01
334	531.172	0.1927	52.172	69099	00000	68.913	8.14E-02	2.29E-01	1.32E-01
349	531.176	0.1921	52.075	69099	00000	68.914	8.39E-02	2.16E-01	1.20E-01
404	531.175	0.1925	52.139	69099	00000	68.913	8.51E-02	2.04E-01	1.16E-01
419	531.188	0.1926	52.157	69099	00000	68.913	8.83E-02	1.97E-01	1.25E-01
434	531.188	0.1926	52.151	69099	00000	68.913	8.92E-02	1.88E-01	1.16E-01
449	531.200	0.1932	52.231	69099	00000	68.913	9.22E-02	1.83E-01	1.27E-01
504	531.211	0.1941	52.361	69099	00000	68.912	9.69E-02	1.82E-01	1.37E-01
519	531.223	0.1923	52.109	69100	00000	68.915	9.79E-02	1.76E-01	1.21E-01
534	531.227	0.1934	52.266	69100	00000	68.914	9.98E-02	1.73E-01	1.27E-01
549	531.235	0.1933	52.248	69100	00000	68.914	1.02E-01	1.69E-01	1.27E-01
604	531.242	0.1940	52.342	69100	00000	68.913	1.04E-01	1.67E-01	1.30E-01
619	531.248	0.1930	52.206	69100	00000	68.914	1.05E-01	1.63E-01	1.24E-01
634	531.251	0.1939	52.336	69100	00000	68.913	1.06E-01	1.61E-01	1.27E-01
649	531.264	0.1934	52.252	69101	00000	68.915	1.06E-01	1.57E-01	1.23E-01
704	531.272	0.1935	52.281	69106	00000	68.919	1.03E-01	1.50E-01	9.81E-02
719	531.271	0.1953	52.528	69105	00000	68.917	1.02E-01	1.46E-01	1.08E-01
734	531.283	0.1929	52.200	69103	00000	68.917	1.01E-01	1.42E-01	1.10E-01
749	531.295	0.1934	52.268	69104	00000	68.918	1.01E-01	1.39E-01	1.11E-01
804	531.285	0.1946	52.426	69103	00000	68.915	1.00E-01	1.36E-01	1.11E-01
819	531.307	0.1933	52.247	69103	00000	68.917	1.00E-01	1.34E-01	1.15E-01

CALCULATED LEAK RATE USING TOTAL TIME: .1003
 THE MEAN TOTAL TIME RATE OF .1202
 IS LESS THAN THE ALLOWABLE MAXIMUM LEAK RATE OF .500

TABLE 3

Total Time L_c Verification Test Results

*** TOTAL TIME WITH VERIFICATION TEST ***

TIME	MASS	TOTAL TIME		SCFM	VERIFICATION	
		GROSS LSF	GROSS 95% UCL		NET LSF	NET 95% UCL
1047	672149	0.00E+00	0.00E+00	29.92	0.00E+00	0.00E+00
1106	672077	0.00E+00	0.00E+00	30.00	0.00E+00	0.00E+00
1120	672063	5.59E-01	0.00E+00	29.96	7.71E-02	-4.82E-01
1135	672016	5.47E-01	7.99E-01	30.00	6.44E-02	3.17E-01
1150	671972	5.52E-01	1.26E+00	30.00	7.00E-02	7.81E-01
1205	671938	5.45E-01	9.11E-01	30.08	6.21E-02	4.28E-01
1220	671871	5.76E-01	8.45E-01	30.12	9.19E-02	3.61E-01
1235	671824	5.96E-01	7.95E-01	30.08	1.12E-01	3.11E-01
1250	671773	6.14E-01	7.66E-01	30.13	1.29E-01	2.82E-01
1305	671739	6.18E-01	7.35E-01	30.12	1.34E-01	2.50E-01
1320	671709	6.15E-01	7.06E-01	30.16	1.30E-01	2.21E-01
1335	671657	6.16E-01	6.90E-01	30.16	1.30E-01	2.04E-01
1350	671629	6.11E-01	6.72E-01	30.21	1.26E-01	1.86E-01
1405	671572	6.12E-01	6.63E-01	30.20	1.26E-01	1.77E-01
1420	671538	6.10E-01	6.54E-01	30.17	1.24E-01	1.68E-01
1435	671516	6.04E-01	6.42E-01	30.17	1.18E-01	1.56E-01
1450	671463	6.02E-01	6.34E-01	30.22	1.15E-01	1.48E-01
1456	671449	6.01E-01	6.30E-01	30.18	1.15E-01	1.44E-01

FIGURE 1

Total Time L_{am} Versus Time

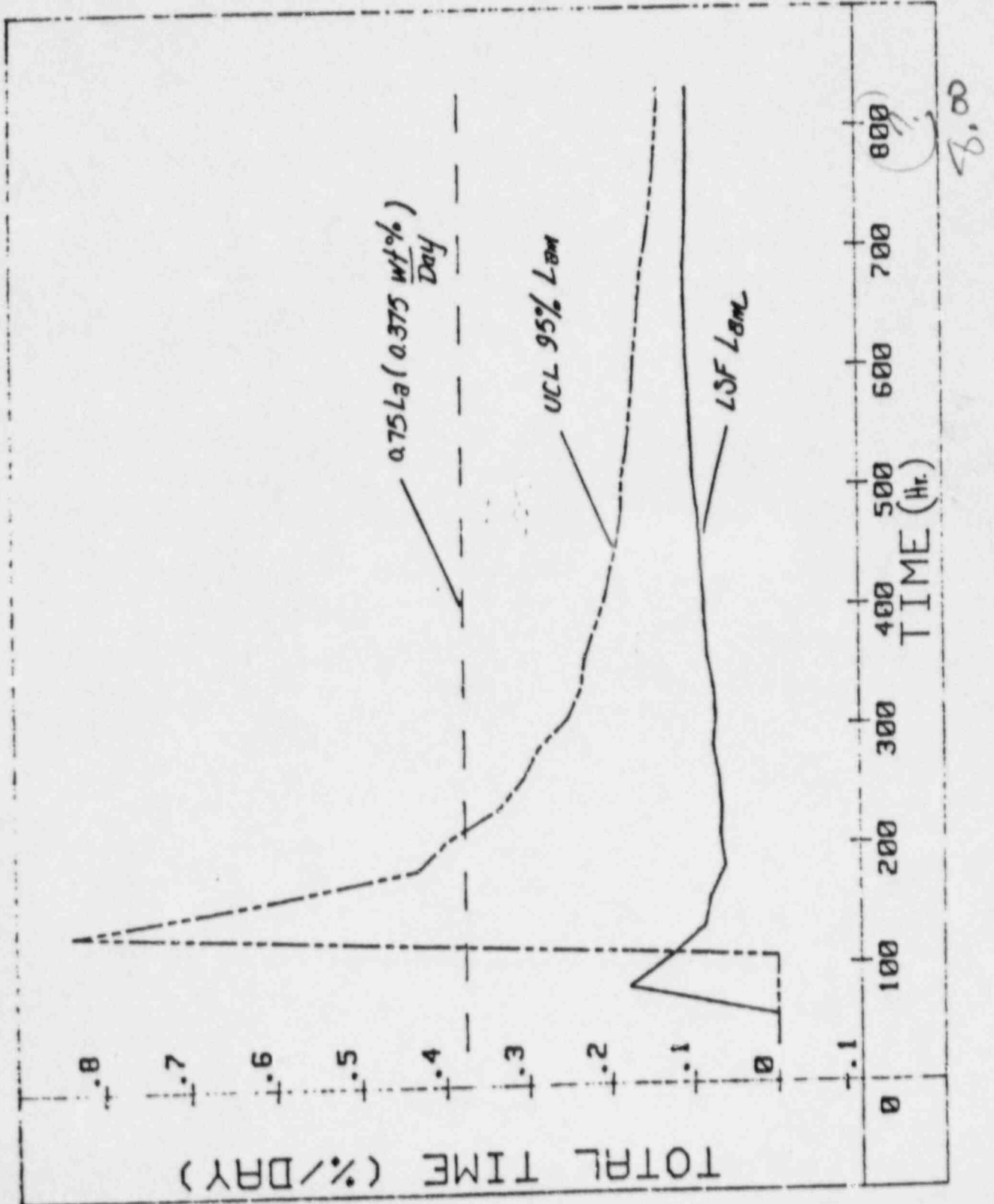


FIGURE 2

Containment Temperature Versus Time

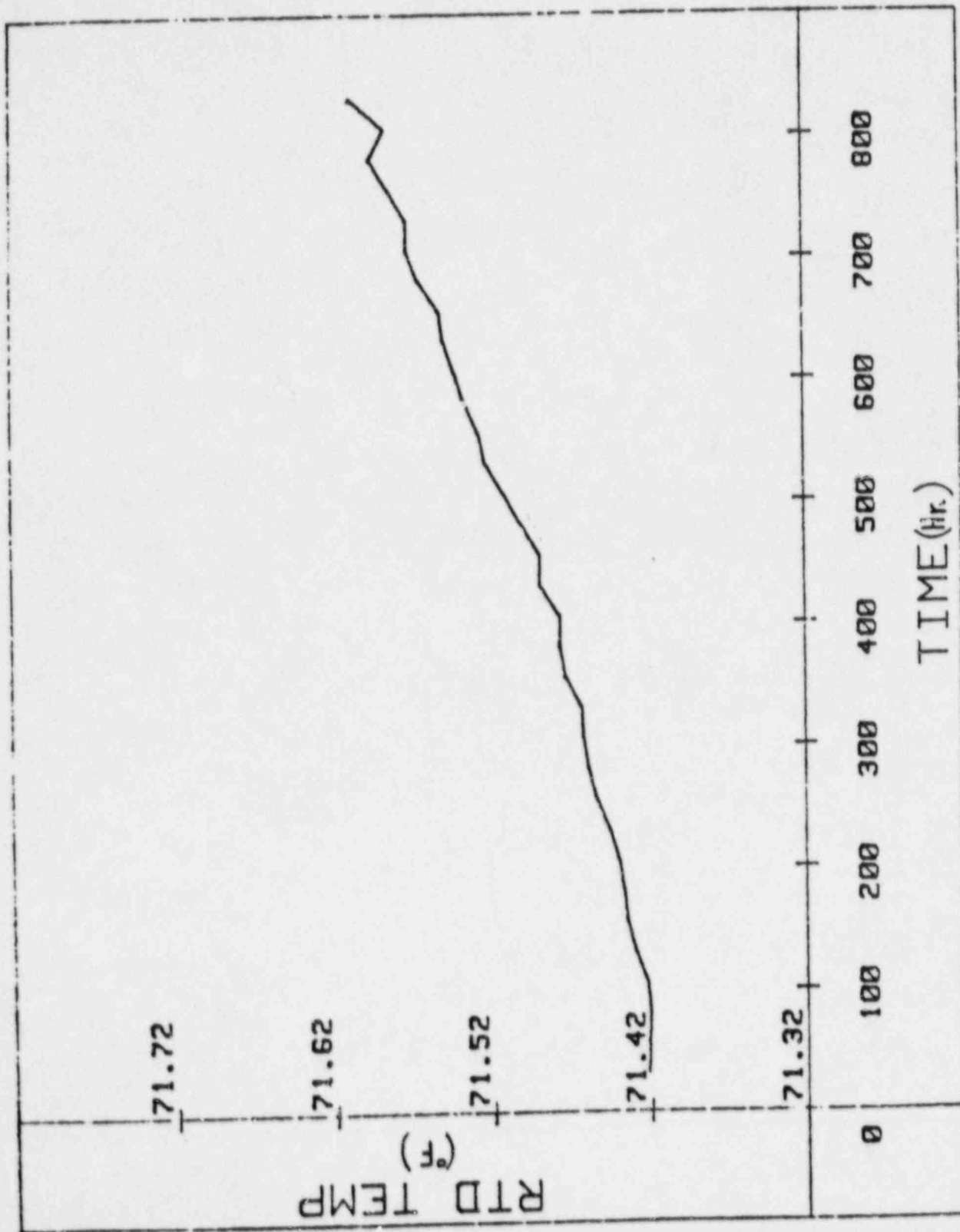


FIGURE 3
Containment Air Pressure Versus Time

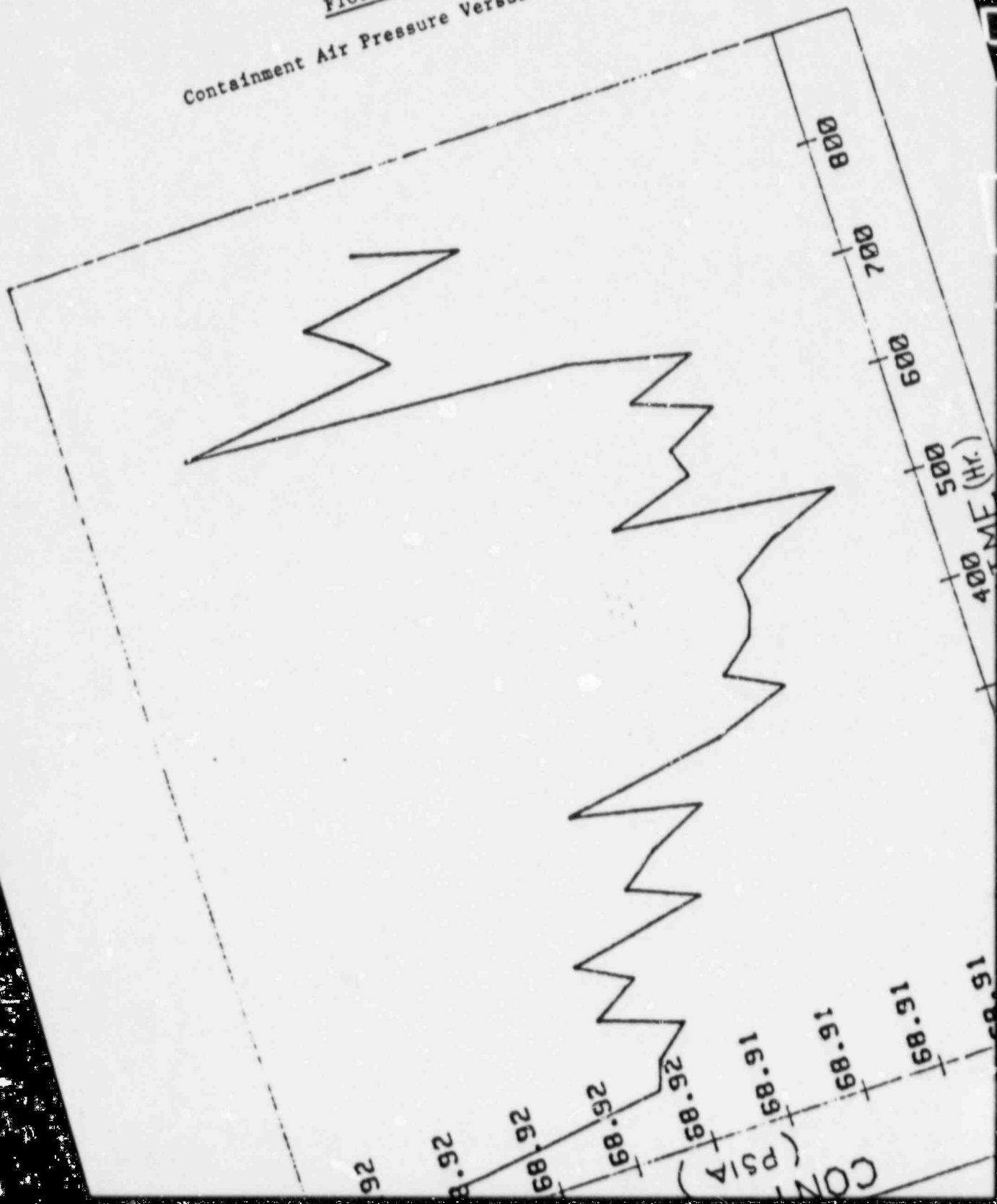


FIGURE 3

Containment Air Pressure Versus Time

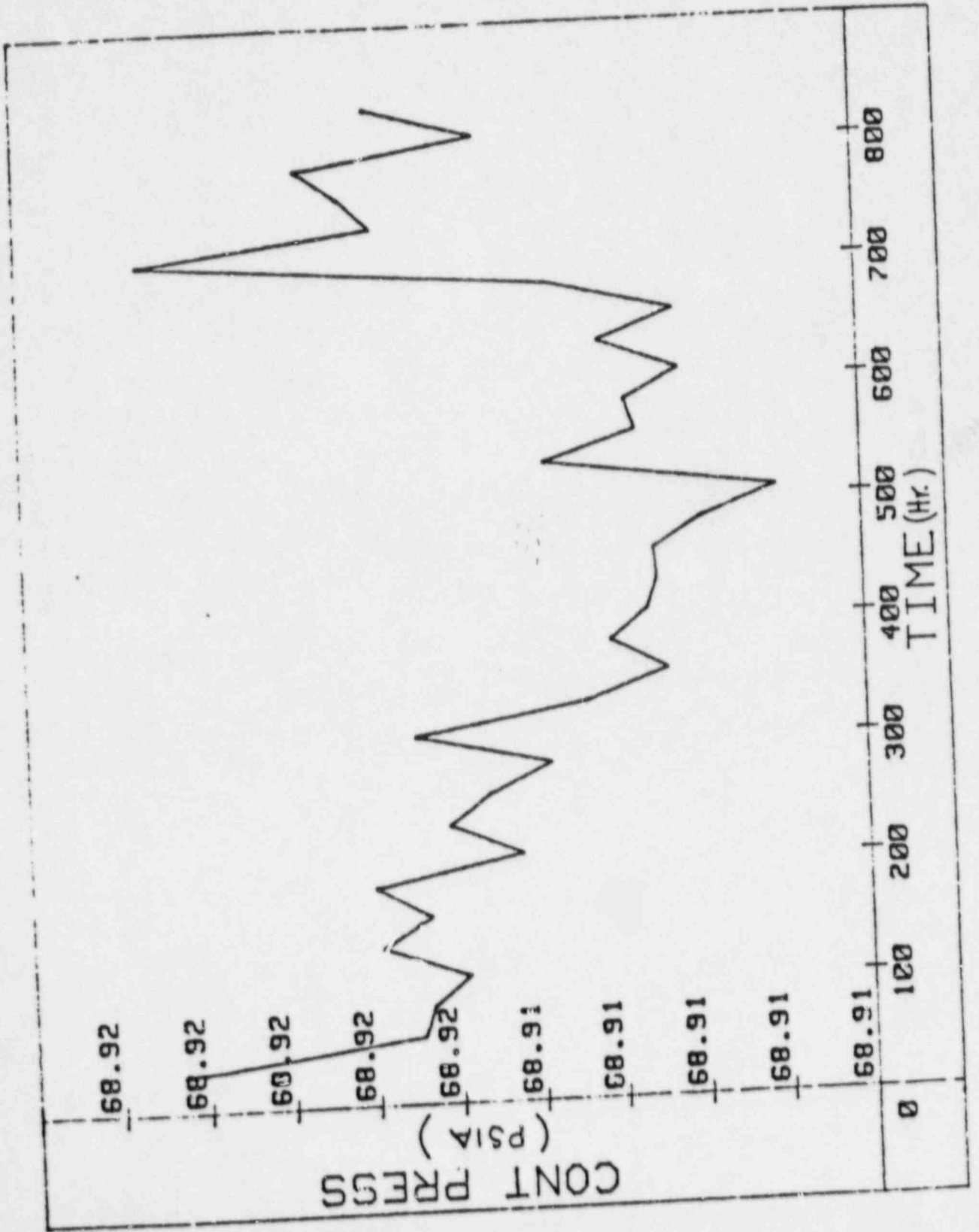


FIGURE 4

Containment Air Mass Versus Time

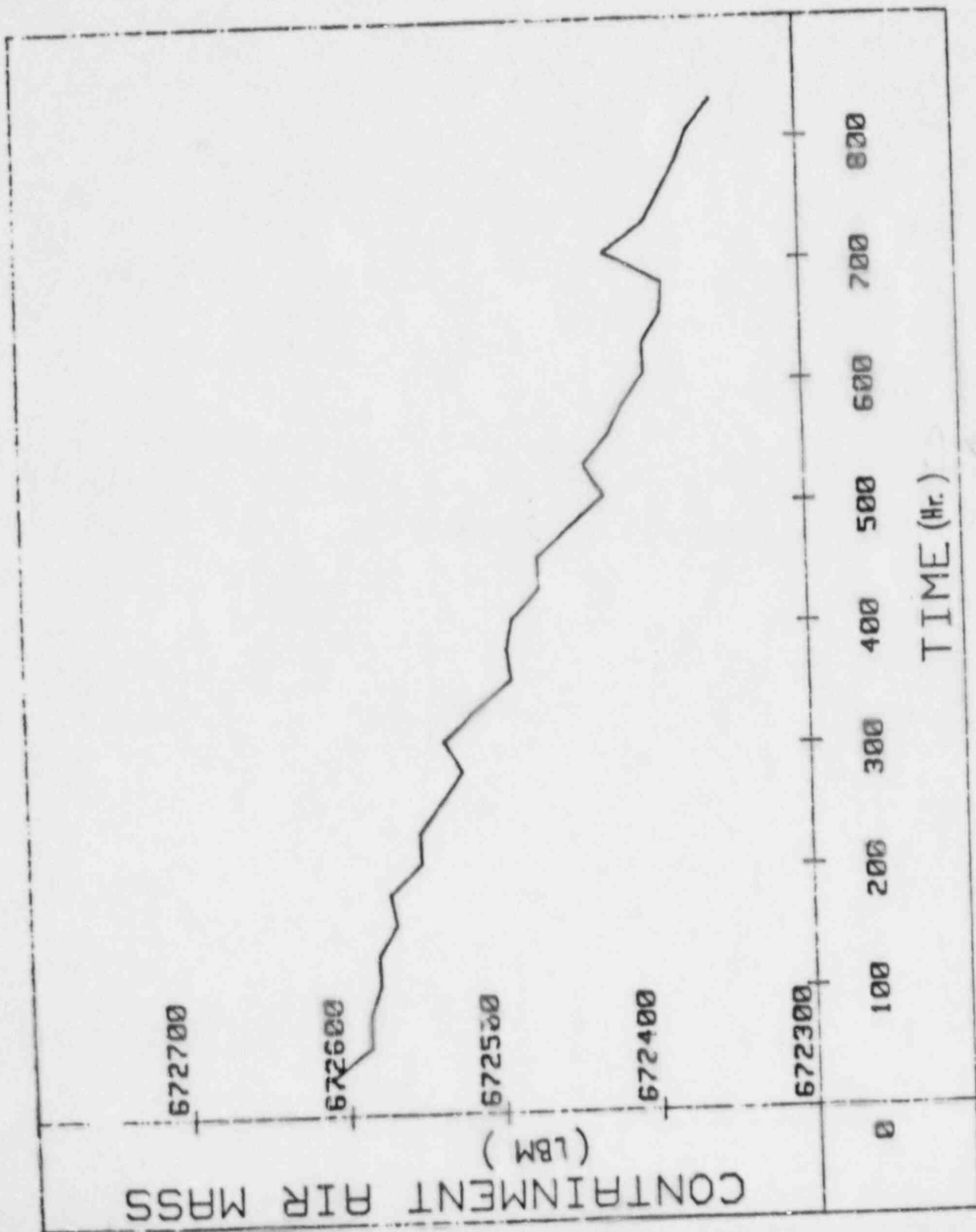
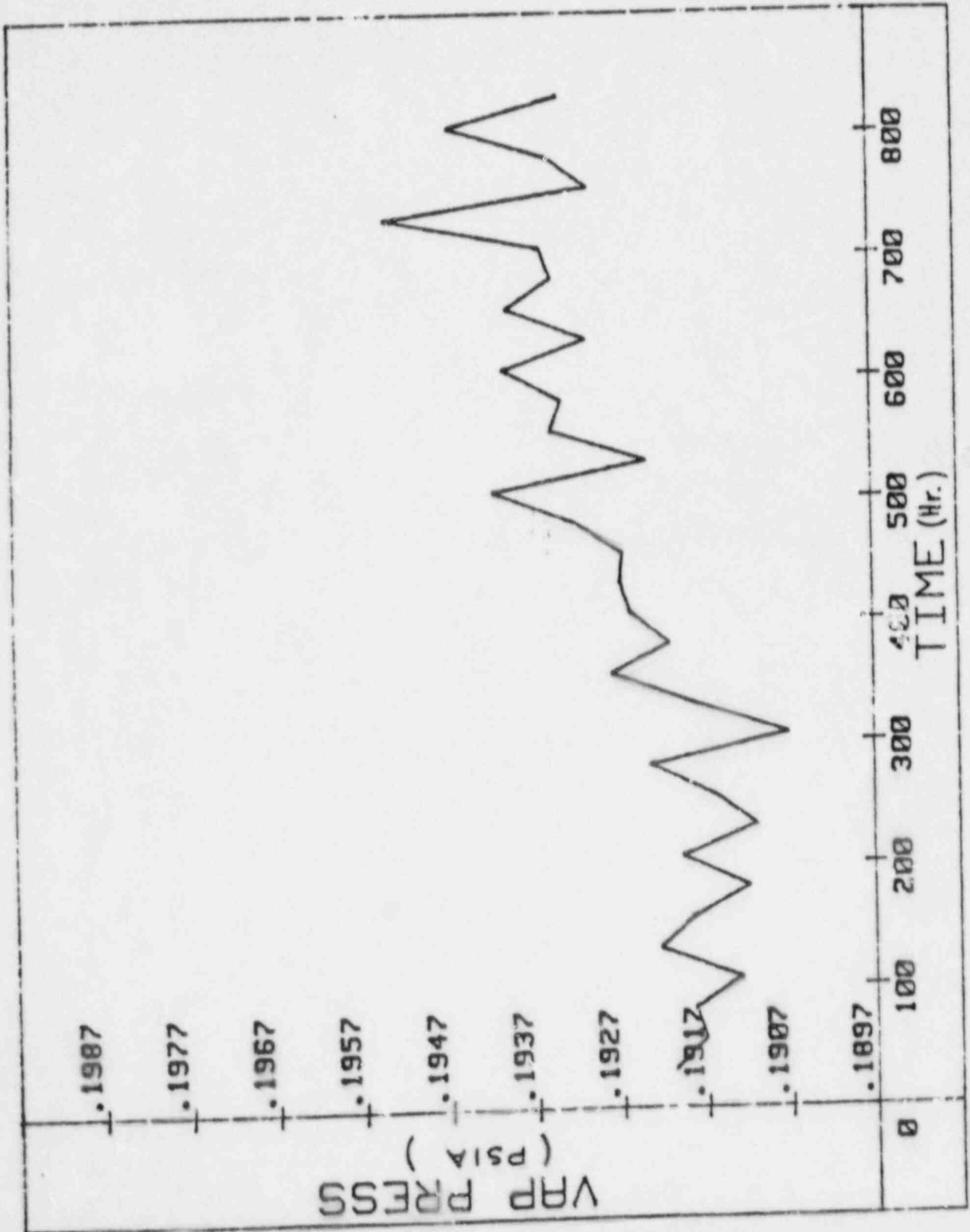


FIGURE 5

Containment Vapor Pressure Versus Time



NORTHEAST UTILITIES



THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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May 2, 1988

Docket No. 50-336

B12864

Re: 10CFR50 Appendix J

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

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Integrated Leak Rate Test

On February 8, 1988, an Integrated Leakage Rate Test (ILRT) was performed for the Millstone Unit No. 2 Containment Building in fulfillment of Technical Specification 4.6.1.2. This test is the first test in the second ten-year in-service period. Pursuant to the provisions of Section V.B.1 of Appendix J of 10CFR50, Northeast Nuclear Energy Company hereby submits a summary report of the subject test. The schedule for this test was discussed in our November 6, 1985⁽¹⁾ letter.

We trust you will find the attached information satisfactory.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

E. J. Mroczka

E. J. Mroczka
Senior Vice President

C. F. Sears

By: C. F. Sears
Vice President

cc: W. T. Russell, Region I Administrator
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 2
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3
P. Habighorst, Resident Inspector, Millstone Unit No. 2

(1) J. F. Opeka letter to E. J. Butcher, dated November 6, 1985.

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