REACTOR CONTAINMENT BUILDING

INTEGRATED LEAKAGE RATE TEST

Vermont Yankee Nuclear Power Station

Vermont Yankee Nuclear Power Corporation

Docket No. 50-271

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I. Introduction

In accordance with 10 CFR 50, Appendix J, Section V.B.3, this report provides information pertinent to the activities related to the preparation, test performance, and reporting of the 1992 Vermont Yankee Primary Containment Integrated Leakage Rate Test (Type A ILRT). In addition, results and evaluations related to the Vermont Yankee Local Leakage Rate Testing (Type B&C LLRT) performed since 1989 are provided.

Both the Type A ILRT and Type B&C LLRT are performed to demonstrate that leakage through both the primary containment and those systems and components penetrating the primary containment do not exceed the allowable leakage rates specified in the Vermont Yankee Technical Specifications and 10 CFR 50, Appendix J.

Paragraphs III.B.3 and III.C.3 of 10 CFR 50, Appendix J state that the combined leakage rate for all pentrations and valves subject to Type B and C tests shall be less than 0.60 La. The Vermont Yankee Technical Specifications also state that the leakage from any one isolation valve shall not exceed 5 percent of Ltm (Total Measured Leakage Rate) and that the leakage from any one main steam line isolation valve shall not exceed 11.5 scf/hr at 24 psig. These supplemental, single valve leakage surveillance limits provide added assurance, beyond the

requirements of 10 CFR 50, Appendix J, that valves receive the proper attention and maintenance before excessive leakage occurs.

Section II of this report, entitled "Type A Test Summary," contains data and results necessary to demonstrate containment atmosphere stabilization, acceptable leakage rate, and successful verification test. The plots and data tables provided in Appendices A through C provide a visual history of the containment atmospheric conditions beginning with the start of the stabilization phase and ending with the completion of the verification test. Highlights of activities and events which occurred both prior to and during the Type A ILRT and the verification test are also provided in Section II.

Section III of this report, entitled "Type B and C Testing Summary," contains data and results from Type B&C LLRT performed since 1989. Also included are evaluations of those valves that did not meet the acceptance criteria specified in the Vermont Yankee Technical Specifications and discussions of additional LLRT that was performed. Further data is provided in Appendices D and E.

Section IV of this report, entitled "Analysis and Interpretation," provides an evaluation of the as-found state of the primary containment system and a summary of the corrective actions planned with respect to both the Type A ILRT and the Type B&C LLRT, as required.

Section V of this report lists the documents referenced for the conduct of the Type A ILRT and the Type B&C LLRT.

II. Type A Test Summary

During the 1992 Refueling Outage (March 7 to April 21, 1992) Vermont Yankee performed a successful Type A ILRT of the primary containment system, including the required verification test. The results of the previous Type A ILRT were filed with the USNRC in July 1989 [Reference (E)].

The successful 1992 Type A ILRT and verification test were performed according to the requirements of the Vermont Yankee Technical Specifications and 10 CFR 50, Appendix J. The Type A ILRT was performed using the Absolute Method as described in ANSI N45.4-1972, "Leakage-Rate Testing of Containment Structures for Nuclear Reactors". Leakage rate was calculated using the Mass Point Method as described in ANSI/ANS 56.8-1987, "Containment System Leakage Testing Requirements". The verification test was performed using Appendix C of ANSI N45.4-1972. The instruments used for data collection met the applicable requirements of ANSI N45.4-1972.

In accordance with 10 CFR 50 Appendix J, the acceptance criteria for the Type A ILRT is 0.75 La or 0.6 wt%/day.

A. Preparation

Prior to the start of primary containment pressurization on April 15, 1992, Vermont Yankee test and maintenance personnel were engaged in activities related to primary containment leakage. Primary containment leakage was identified through Type B&C LLRT and reduced by repairs to those systems and components having excessive leakage. Plant modifications were also performed both to reduce primary containment leakage and to aid in future testing. Further discussion is provided in Section III and Appendices D and E of this report.

Pre-pressurization activities also included:

1) Review and revision of the Type A ILRT test procedure,

2) Calibration and operability checks of the Type A ILRT instrumentation, and

3) Revision, verification and validation of the Type A ILRT computer programs.

The Type A ILRT test procedure was reviewed and revised to:

1) Ensure the inclusion of the current requirements of the Vermont Yankee Technical Specifications and FSAR, 10 CFR 50 Appendix J, and ANSI N45.4-1972,

2) Reflect changes in plant design since the last Type A ILRT, and

3) Reflect lessons learned from previous Type A ILRTs performed both at Vermont Yankee and other utilities.

The Type A ILRT computer programs were revised, verified and validated to reflect changes in the plant process computer system since the last Type A ILRT and to ensure that the computer programs are technically correct and function as required.

Preparation of the primary containment for the Type A ILRT included:

1) Performance of a general inspection of the accessible interior and exterior surfaces of the primary containment structures and components. No evidence of structural deterioration which could affect primary containment structural integrity or leak tightness was discovered,

2) Closure of the primary containment isolation valves by normal operation. No preliminary exercising or adjustments was allowed,

3) Venting of those portions of fluid systems that are part of the reactor fluid pressure boundary and are open directly to the primary containment atmosphere under post-accident conditions,

4) Draining of those portions of fluid systems to the extent necessary to expose the isolation valves, and

5) Removal or venting of pressurized tanks and accumulators.

B. Pressurization

Primary containment pressurization for the Type A ILRT commenced on April 15, 1992 at 1423 hours. Pressurization proceeded at a rate which did not exceed the procedural limit of 7 psi/hr.

Two air compressors with a total rating of 2100 scfm were used along with fan driven aftercoolers and desiccant air dryers. Flow control valves were manually throttled as required to maintain backpressure and flowrate. The aftercooler fans were operated as required to control air compressor discharge temperature.

Primary containment inspections were performed at 5, 15 and 30 psig to attempt to locate any excessive primary containment leakage. No significant leaks were identified.

Pressurization continued until the primary containment pressure test pressure of 59.2 psia (120.54 in hg abs) was reached.

Pressurization was completed on April 16, 1992 at 0014 hours. The elapsed time for the pressurization phase was 9 hours and 51 minutes.

C. Stabilization

ANSI N45.4-1972, Section 7.6, states that "leakage-rate tests should not be started until essential temperature equilibrium has been attained." To quantify this statement, the stabilization criteria established in ANSI/ANS 56.8-1987, Section 5.3.1.3, was used.

ANSI/ANS 56.8-1987, Section 5.3.1.3, states that "the latest rate of change of the containment atmosphere volume weighted absolute drybulb temperature, averaged over the last hour, does not deviate by more than 0.5 °F/hr(0.3 °C/hr) from the average rate of change of the containment atmosphere volume weighted absolute drybulb temperature, averaged over the last four hours," or:

$$\frac{T_t - T_{t-4}}{4} - (T_t - T_{t-1}) \leq 0.5^{\circ}F/hr$$

The stabilization period commenced on April 16, 1992 at 0043 hours. Satisfactory stabilization was achieved on April 16, 1992 at 0453 hours, with the results of the above equation being 0.055 °F/hr for the drywell and 0.128 °F/hr for the wetwell. The elapsed time for the stabilization phase was 4 hours and 10 minutes.

D. 24 Hour ILRT

Subsequent to meeting the temperature stabilization criteria, the 24 hour ILRT commenced on April 16, 1992 at 0504 hours.

The 24 hour ILRT was successfully completed on April 17, 1992 at 0514 hours. The primary containment leakage rate results were as follows:

Calculated Leakage Rate from regression line	0.1119	wt%/day
95% Upper Confidence Limit	0.1172	wt%/day *

* Does not include penalties for nonstandard alignments and water level changes. These corrections are provided in Section II.F of this report.

E. Verification Test

In accordance with Appendix C of ANSI N45.4-1972, Vermont Yankee uses the superimposed leak method for the verification test. In this method, a known leakage rate (Lo), equal to 75 to 125 percent of La, is imposed on the primary containment through a calibrated flow meter. The composite leakage rate, equal to the sum of the leakage rate after the 24 hour ILRT (Lam) and the superimposed leak (Lo), is then compared with the composite leakage rate determined by the Type A ILRT computer programs (Lc).

Satisfactory verification is achieved if:

$$(Lo + Lam - 0.25\ La) \leq Lc \leq (Lo + Lam + 0.25\ La)$$

On April 17, 1992 at 0530 hours, a leakage rate of 5.51 scfm was imposed on the primary containment and allowed to stabilize. The 5.51 scfm leak imposed (Lo) was equivalent to 100 percent of La.

The verification test commenced on April 17, 1992 at 0555 hours. Satisfactory verification was achieved on April 17, 1992 at 1095 hours, with the results stabilizing to within the acceptance criteria of 75 to 125 percent of La. A summary is provided on the following page:

Leakage Rate at end of Type A ILRT (Lam)	0.1119	wt%/day
Imposed Leak (Lo)	0.798	wt%/day
Lower limit: Lo + Lam - 0.25 La	0.7099	wt%/day
Composite Leakage (Lc)	0.9574	wt%/day
Upper limit: Lo + Lam + 0.25 La	1.1099	wt%/day

Based on obtaining a composite leakage rate (Lc) between the upper and lower limits, the 1992 Vermont Yankee Verification Test was successful. The elapsed time for the Verification Test was 4 hours and 10 minutes.

F. Test Corrections

Several corrections must be considered for addition to the calculated results of the 24 hour ILRT.

a. Type B&C Penalties

Corrections are required for containment valves/penetrations that were not in the normal post accident position during the 24 hour ILRT. The total correction, based on Minimum Pathway Leakage for the penetrations, was 0.0290 wt%/day. The listing is provided on the following page:

Penetration	Description	Minimum Pathway Leakage (lbm/hr)
X - 9A	"A" Feedwater Line	0.007
X - 9B	"B" Feedwater Line	0.015
X - 14	Reactor Water Cleanup Suction	0.002
X - 22 X - 47	Containment Air Compressor Suction and Discharge	0.012
X - 26 X - 205	Containment Purge Makeup	0.002
X - 31F	Reactor Recirc Pump Seal Purge	0.125
X - 32F	Reactor Recirc Pump Seal Purge	0.228
X - 35A	Tip Purge	0.002
X - 41	Reactor Recirc Sample	0.034
X - 50A-C X - 209D	H_2O_2 Monitors	0.478
	Total correction =	0.903

This equates to an addition of 0.0290 wt%/day

2) Volume Change Corrections

Corrections are required for any liquid level changes during the 24 hour ILRT which resulted in a change in the net free volume of the primary containment:

Description	Calculated Correction (wt%/day)
RPV Volume Change	0.0121
Equipment Drain Sump Volume Change	0.0030
Floor Drain Sump Volume Change	0.0013
Total correction =	0.0164

Corrections in the net free volume of the primary containment resulting from changes in Torus water volume are automatically calculated by the Type A ILRT computer programs during the course of the test.

G. Reported "As-Left" ILRT Results

The results of the Type A ILRT to be reported, including all corrections are:

95% Upper Confidence Limit	0.1172	wt%/day
Total Type B&C Penalties	0.0290	wt%/day
Total Volume Change Corrections	0.0164	wt%/day
"As-Left" Type A ILRT Leakage Rate	0.1626	wt%/day
Type A ILRT Acceptance Criteria (0.75 La)	0.6	wt%/day

Based on obtaining a final "As-Left" leakage rate less than the acceptance criteria, the 1992 Vermont Yankee Type A ILRT was successful.

III. Type B and C Testing Summary

Since the completion of the previous Type A ILRT in March of 1989, Type B&C LLRT was performed on primary containment penetrations and valves. This testing was performed during both the 1990 Refueling Outage (August to October 1990) and the 1992 Refueling Outage. Required non-outage testing was also performed as necessary.

As discussed in Section I of this report, Paragraphs III.B.3 and III.C.3 of 10 CFR 50, Appendix J state that the combined leakage rate for all pentrations and valves subject to Type B and C tests shall be less than 0.60 La. The Vermont Yankee Technical Specifications also state that the leakage from any one isolation valve shall not exceed 5 percent of Ltm and that the leakage from any one main steam line isolation valve shall not exceed 11.5 scf/hr at 24 psig. These supplemental, single valve leakage surveillance limits provide added assurance, beyond the requirements of 10 CFR 50, Appendix J, that valves receive the proper attention and maintenance before excessive leakage occurs.

Vermont Yankee calculates the sum total Type B and C leakage rate using the Maximum Pathway Leakage method with single valve failure assumed for all applicable penetrations. The results of this calculation are presented in Section III.C of this report.

A. Types of Tests Performed

Type B leak tests were performed on containment penetrations utilizing gasketed seals prior to opening to determine the as-found leakage rates. After each containment penetration was closed, a Type B leak test was again performed to provide as-left data.

A summary of the Type B tests that were performed during the 1990 and 1992 Refueling Outages is provided in Attachment D.

Type C leak tests were performed on all containment isolation valves both prior to and after any outage maintenance to provide both as-found and as-left data.

A summary of the Type C tests that were performed during the 1990 and 1992 Refueling Outages is provided in Attachment E.

B. Valves That Exceeded Acceptance Criteria

The following is a summary of the valves that failed to meet the Vermont Yankee Technical Specifications acceptance criteria of 5 percent of Ltm (0.522 Lbm/hr at 44 psig) for any single valve. For each valve an evaluation of the root cause and a summary of the Vermont Yankee action plan to address the failure is provided. This information supplements the information provided in LERs 90-12, 90-12, Supplement 1, and 92-010. Specific leakage rates are provided in Attachment E.

Test Period	Containment Penetration	Containment Isolation Valve	Description
1990 Outage:			
	X-9B	FDW-96A	Reactor Feedwater
	X-25	PCAC-6B	Drywell Atmospheric Control Exhaust
1992 Outage:			
	X-9B	FDW-28B	Reactor Feedwater
	X-18	LRW-83	Drywell Floor Drain
	X-31F	CRD-413A	Recirc Pump Seal Purge
	X-32F	CRD-413B	Recirc Pump Seal Purge

X-9B, FDW-96A:

During the 1990 Refueling Outage, the outboard Feedwater isolation valve, FDW-96A, was tested. The leakage rate could not be measured with available on-site testing equipment. The valve w[illegible] disassembled and physical abrasion of the elastomeric seat was observed.

The physical abrasion was determined to be caused by low flow conditions which exist during Feedwater system startup and during refueling outages and cold shutdowns when only Reactor Water Cleanup and Control Rod Drive return flow is present in the Feedwater system. The root cause was determined to be the failure by the manufacturer, in the design of the valve, to anticipate the potential adverse affects of low flow conditions.

To resolve this concern, the elastomeric seats were removed from all four (4) Anchor Darling feedwater check valves, FDW-28A/B, FDW-96A and FDW-27A. The resulting stellite to stellite seating surface is not as susceptible to wear due to the low flow condition and, based upon information from other plants who have experience with similar valves in similar installations, is not expected to be a concern.

Vermont Yankee has experienced failures of this valve in the past and has aggressively pursued ways, along with the industry, to improve the feedwater check valve leak tightness. These improvements have included previous repair of misalignments and grinding of the seats.

To improve the reliability of both penetrations X-9A and X-9B, Vermont Yankee replaced the inboard check valves, FDW-28A/B, with new check valves during the 1990 Refueling Outage.

Following the above maintenance and installations, valves FDW-96A and FDW-28A/B were successfully leakage rate tested.

X-25, PCAC-6B:

During the 1990 Refueling Outage, the Primary Containment Atmospheric Control (PCAC) system exhaust line was tested. The PCAC exhaust is comprised of six valves tested as a group. The leakage rate could not be measured with available on-site testing equipment. Valve PCAC-6B was disassembled and failure of the elastomeric seat was observed.

The root cause of the failure was determined to be a tear in the elastomeric seat caused by excessive flexing of the seat. The compression gasket that compresses the seat material was found to be misaligned. This allowed the disc to flex the seat material more than is intended, causing the seat to tear. Valve PCAC-6B is regularly cycled during operation for surveillance testing.

The root cause of the compression gasket misalignment is believed to be the maintenance performed on the valve during the 1989 Refueling Outage. In 1989, the elastomeric seat was replaced due to excessive leakage resulting from a torn seat. The root cause of this torn seat was determined to be normal wear. The seat had been in service for 12 years, from 1977 to 1989

Following the above maintenance, valve PCAC-6B was successfully leakage rate tested.

To address continuing concerns with the performance of the PCAC valves, Vermont Yankee has developed a preventive maintenance schedule for replacing the seats. Included in the preventive maintenance instructions will be steps to ensure the proper alignment of the compression gasket.

X-9B, FDW-28B:

During the 1992 Refueling Outage, the inboard Feedwater isolation valve, FDW-28B, was tested. The leakage rate could not be measured with available on-site testing equipment. The valve was disassembled and the disc was found to be stuck in the fully open position.

The root cause of the failure was determined to be a manufacturing defect. Excess material was present in the valve body casting which caused the disc to stick in the fully open position. The valve was repaired by removing the excess material and proper clearances and valve operation were assured.

The remaining three (3) Anchor Darling feedwater check valves, FDW-27A, FDW-28A and FDW-96A, were also inspected for this same defect. Valves FDW-27A and FDW-96A, the outboard isolation valves for penetrations X-9A/B, were found not to have the defect. Valve FDW-28A, the inboard isolation valve for penetration X-9A, was found to have the defect. The disc could be manually made to stick in the fully open position even though the valve had successfully passed leakage rate testing and was not found stuck open. The valve was also repaired by removing the excess material and proper clearances and valve operation was assured.

Following the above maintenance and inspections, valves FDW-27A, FDW-28A/B and FDW-96A were successfully leakage rate tested.

Based on similar concerns noted with Anchor Darling check valves [Reference (I)], Vermont Yankee has revised our purchase specifications to explicitly require free travel of the valve disc over the entire range of motion and has increased vendor surveillance of Anchor Darling fabrication and inspection activities.

X-18, LRW-83:

During the 1992 Refueling Outage, the outboard isolation valve for the drywell floor drain sump line, LRW-83, was tested. The as-found leakage rate was 0.990 lbm/hr and determined to be caused by valve wear and a failure to properly seat, both resulting from equipment age.

As a result of excessive leakage rates observed for the LRW valves in both 1989 and 1990, Vermont Yankee undertook additional action to improve the reliability of penetrations X-18 and X-19. This resulted in the replacement of valves LRW-82, -83, -94, and -95 during the 1992 Refueling Outage. Following installation, valves LRW-82, -83, -94, and -95 were successfully leakage rate tested.

X-31F and 32F, CRD-413A/B:

During the 1992 Refueling Outage, the inboard isolation check valves for the reactor recirculation seal purge lines, CRD-413A and -413B, were tested. The as-found leakage rates were 0.788 lbm/hr for CRD-413A and 0.873 lbm/hr for CRD-413B. The valves were disassembled and teflon tape was found within valve CRD-413B, preventing proper seating.

The root cause of the presence of the teflon tape was determined to be incorrect use of teflon tape during the installation of the reactor recirculation seal purge lines. Disassembly and inspection of the threaded joints in the lines identified excessive teflon tape. The tape extended into the process stream where system flow could erode the tape and allow pieces to foul the downstream surfaces and valves. The joints were properly taped and the valves cleaned and inspected. Following this maintenance, valves CRD-413A and -413B were successfully leakage rate tested.

The use of excessive teflon tape is considered to be an isolated incident for the following reasons:

1) The installation was performed by a contractor, and
2) The installation of teflon tape by Vermont Yankee personnel is properly controlled by an existing guideline.

To prevent reoccurrence, Vermont Yankee will revise our installation procedures to ensure the proper installation of teflon tape. These procedures are used by both contractor and Vermont Yankee personnel.

C. Sum Total Type B and Type C Leakage

The Vermont Yankee Technical Specifications and 10 CFR 50, Appendix J require the sum total Type B (penetrations) and Type C (valves) leakage rate to be less than or equal to 0.6 La prior to startup from a Refueling Outage (0.6 La equals 14.75 lbm/hr).

Vermont Yankee calculates the sum total Type B and C leakage rate using the Maximum Pathway Leakage method with single active failure assumed for all applicable penetrations. The results of the calculations for the as-left sum totals for the 1990 and 1992 Refueling Outages are presented below, along with the Minimum Pathway Leakage Rates:

Test Period	Sum Total Maximum Pathway Leakage (lbm/hr)	Sum Total Minimum Pathway Leakage (lbm/hr)
1990 Outage:	6.951	4.879
1992 Outage:	8.907	3.866

Based on obtaining final "As-Left" leakage rates less than the acceptance criteria, the 1990 and 1992 Refueling Outage Type B&C LLRTs were successful.

D. Additional Leakage Rate Testing Performed

The following leakage rate tests were performed between the 1990 and 1992 Refueling Outages:

Pen. No.	Test Date	Description	Measured Leakage (lbm/hr)
X-2	10-22-90	Personnel Airlock	1.6
X-13B	11-07-90	RHR-66	0.031
X-2	12-28-90	Personnel Airlock	0.966
X-2	3-15-91	Personnel Airlock	1.21
X-2	3-18-91	Personnel Airlock	1.3
X-2	3-19-91	Personnel Airlock	1.41
X-2	4-24-91	Personnel Airlock	1.14
X-2	4-27-91	Personnel Airlock	1.07
X-2	4-29-91	Personnel Airlock	1.119
X-2	5-01-91	Personnel Airlock	1.03
X-2	6-20-91	Personnel Airlock	0.582
X-2	9-06-91	Personnel Airlock	1.04
X-6	9-06-91	CRD Removal	0.0
X-2	9-14-91	Personnel Airlock	1.71
X-6	9-14-91	CRD Removal	0.0
X-2	9-16-91	Personnel Airlock	0.162
X-35E	10-07-91	TIP Ball Valve No. 3	0.001
X-2	12-26-91	Personnel Airlock	0.971
	2-19-92	'A' H2O2 Monitor	1.632
	2-26-92	'B' H2O2 Monitor	0.648

IV. Analysis and Interpretation

All testing performed during the period covered in this report satisfied the requirements of Vermont Yankee Technical Specifications and 10 CFR 50, Appendix J.

Due to the success of the 1992 Type A ILRT and Type B&C LLRT, coupled with the corrective actions discussed in Section IV.B of this report, Vermont Yankee plans to perform the next Type A ILRT during the 1995 Refueling Outage.

A. Assessment of the As-Found State of Containment

Integrated Leak Rate tests are performed on the Primary Containment System to ensure that the leakage rate is within allowable limits. Many utilities, including Vermont Yankee, perform this test at the end of Refueling Outages, following repairs or adjustments to the Primary Containment boundary.

To assess the As-Found state of the Primary Containment, Type B&C ILRT data is used to determine the Minimum Pathway Leakage Savings. Leakage Savings is realized when containment penetrations or valve repairs or adjustments result in a lower minimum pathway leakage than that measured prior to the repairs or adjustments. The Leakage Savings is determined as follows:

1) The post-repair minimum pathway leakage is compared to the pre-repair minimum pathway leakage. If the post repair minimum pathway leakage is smaller, a leakage savings has been realized for that penetration.

2) If the post-repair minimum pathway leakage is equal to or greater than the pre-repair minimum pathway leakage, no leakage savings has been realized for that penetration, and no contribution is made by that penetration to the As-Found correction.

The results of the As-Found State of the Primary Containment to be reported, including all corrections are:

"As-Left" Type A ILRT Leakage Rate at 95% Upper Confidence Limit	0.1626	wt%/day
Leakage Savings	0.0524	wt%/day
"As-Found" Leakage Rate at 95% Upper Confidence Limit	0.2150	wt%/day
Type A ILRT Acceptance Criteria (0.75 La)	0.6	wt%/day

Based on obtaining a final "As-Found" leakage rate less than the acceptance criteria, it is concluded that had the 1992 Type A ILRT been performed at the start of the Refueling Outage the acceptance criteria would have been met.

B. Summary of Corrective Actions Planned

The following is a summary of the corrective actions currently planned for implementation prior to or during the 1993 Refueling Outage.

1) To address continuing concerns with the performance of the PCAC valves, Vermont Yankee has developed a preventive maintenance schedule for replacing the seats. Included in the preventive maintenance instructions will be steps to ensure the proper alignment of the compression gasket.

2) Based on the root cause analysis performed for the presence of teflon tape in the recirculation seal purge lines and valves CRD-413A and -413B, Vermont Yankee will revise our installation procedures to ensure the proper installation of teflon tape. These procedures are used by both contractor and Vermont Yankee personnel.

V. References

A) License No. DPR-28 (Docket No. 50-271)

B) Code of Federal Regulations, Title 10, Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors".

C) ANSI N45.4-1972, "Leakage-Rate Testing of Containment Structures for Nuclear Reactors".

D) ANSI/ANS 56.8-1987, "Containment System Leakage Testing Requirements".

E) Letter, VYNPC to USNRC, "Primary Containment Leak Rate Test Report," dated July 7, 1989.

F) Reportable Occurrence No. LER 90-12, VYV 90-281, dated October 5, 1990.

G) Reportable Occurrence No. LER 90-12, Supplement 1, VYV 90-320, dated October 24, 1990.

H) Reportable Occurrence No. LER 92-010, dated April 7, 1992.

I) Letter, VYNPC to USNRC, "10 CFR 21.21 Notification Regarding Anchor Darling Swing Check Valves," BVY 92-49, dated April 29, 1992.

J) Vermont Yankee Analysis/Calculation No. 92-007, "Calculation of Required Corrections for the 1992 Type A Test," dated June 24, 1992.

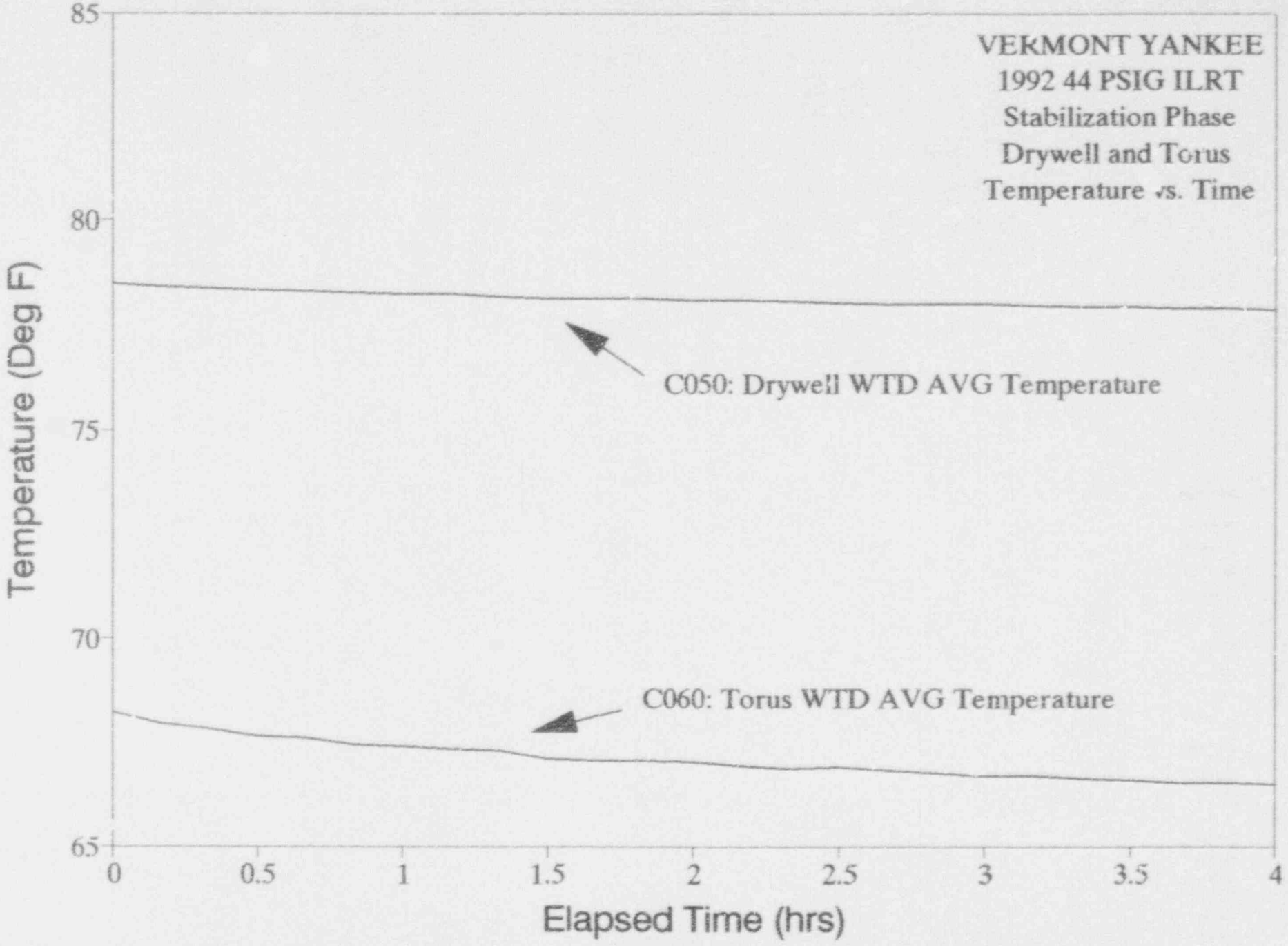
K) Vermont Yankee Analysis/Calculation No. 92-008, "Determination of the As-Found State of the Primary Containment for the 1992 Type A Test," dated June 24, 1992.

APPENDIX A

STABILIZATION PHASE DATA AND PLOTS

1992 Primary Containment Leakage Rate Data Sheet (Stabilization Phase)

Date	Time	Drywell Temperature (F) C050	Torus Temperature (F) C060
16-Apr-92	00:31:22.8	78.485	68.232
16-Apr-92	00:43:37.4	78.397	67.935
16-Apr-92	00:53:35.6	78.382	67.810
16-Apr-92	01:03:35.6	78.348	67.638
16-Apr-92	01:13:35.6	78.310	67.598
16-Apr-92	01:23:35.6	78.271	67.450
16-Apr-92	01:33:35.6	78.252	67.415
16-Apr-92	01:43:35.6	78.220	67.321
16-Apr-92	01:53:35.6	78.182	67.283
16-Apr-92	02:03:35.6	78.145	67.111
16-Apr-92	02:13:35.6	78.142	67.077
16-Apr-92	02:23:35.6	78.121	67.050
16-Apr-92	02:33:35.6	78.114	67.013
16-Apr-92	02:43:35.6	78.096	66.923
16-Apr-92	02:53:35.6	78.071	66.860
16-Apr-92	03:03:35.8	78.049	66.883
16-Apr-92	03:13:35.6	78.008	66.816
16-Apr-92	03:23:35.6	78.009	66.765
16-Apr-92	03:33:35.6	77.996	66.700
16-Apr-92	03:43:35.6	77.977	66.691
16-Apr-92	03:53:35.6	77.929	66.615
16-Apr-92	04:03:35.6	77.938	66.601
16-Apr-92	04:13:35.6	77.901	66.514
16-Apr-92	04:23:35.6	77.899	66.514
16-Apr-92	04:33:35.6	77.858	66.483
16-Apr-92	04:43:35.6	77.850	66.363
16-Apr-92	04:53:35.6	77.851	66.387


VERMONT YANKEE
1992 44 PSIG ILRT
Stabilization Phase
Drywell and Torus
Temperature vs. Time
C050: Drywell WTD AVG Temperature
C060: Torus WTD AVG Temperature
Temperature (Deg F)
85
80
75
70
65
0
0.5
1
1.5
2
2.5
3
3.5
4
Elapsed Time (hrs)

APPENDIX B

24 HOUR ILRT DATA AND PLOTS

1992 Primary Containmen[illegible] Leakage Rate Data Sheet (24 Hour Test Phase)

Date	Time	Containment Mass (lbm) CMASS	Containment Pressure (in. Hg.) M006	Regression Line Leakage Rate (wt%/day) LAM	95% Upper Confidence Limit (wt%/day) UCL
16-Apr-92	05:04:10.9	74929.0	120.038		
16-Apr-92	05:14:09.6	74925.1	120.022		
16-Apr-92	05:24:09.6	74940.7	120.030	-1.1243	8.1267
16-Apr-92	05:34:09.6	74928.6	120.015	-0.2767	1.7475
16-Apr-92	05:44:09.6	74933.8	120.008	-0.2518	0.6842
16-Apr-92	05:54:09.6	74923.9	119.985	0.0631	0.7398
16-Apr-92	06:04:09.6	74932.1	120.000	0.0[illegible]0	0.4582
16-Apr-92	06:14:09.6	74927.2	119.978	0.0522	0.3867
16-Apr-92	06:24:09.6	74934.3	119.993	-0.0179	0.2461
16-Apr-92	06:34:09.6	74917.7	119.955	0.1214	0.3765
16-Apr-92	06:44:09.6	74929.3	119.978	0.0905	0.2984
16-Apr-92	06:54:09.6	74926.5	119.962	0.0899	0.2610
16-Apr-92	07:04:09.6	74930.4	119.962	0.0619	0.2080
16-Apr-92	07:14:09.6	74918.0	119.932	0.1106	0.2445
16-Apr-92	07:24:09.6	74922.1	119.932	0.1198	0.2354
16-Apr-92	07:34:09.6	74921.4	119.925	0.1262	0.2270
16-Apr-92	07:44:09.6	74922.8	119.932	0.1229	0.2115
16-Apr-92	07:54:09.6	74921.7	119.917	0.1222	0.2005
16-Apr-92	08:04:09.6	74913.6	119.902	0.1443	0.2175
16-Apr-92	08:14:09.6	74913.9	119.902	0.1575	0.2245
16-Apr-92	08:24:09.6	74914.3	119.902	0.1642	0.2250
16-Apr-92	08:34:09.6	74906.0	119.880	0.1862	0.2456
16-Apr-92	08:44:09.6	74911.8	119.887	0.1889	0.2430
16-Apr-92	08:54:09.6	74901.9	119.865	0.2080	0.2610
16-Apr-92	09:04:09.6	74916.9	119.880	0.1944	0.2449
16-Apr-92	09:14:09.6	74924.3	119.880	0.1699	0.2223
16-Apr-92	09:24:09.6	74913.9	119.857	0.1649	0.2137
16-Apr-92	09:34:09.6	74914.5	119.850	0.1589	0.2045
16-Apr-92	09:44:09.6	74911.2	119.842	0.1573	0.1997
16-Apr-92	09:54:09.6	74899.0	119.813	0.1701	0.2116
16-Apr-92	10:04:09.6	74902.3	119.813	0.1757	0.2149
16-Apr-92	10:14:09.6	74905.1	119.813	0.1763	0.2130

1992 Primary Containment Leakage Rate Data Sheet (24 Hour Test Phase)

Date	Time	Containment Mass (lbm) CMASS	Containment Pressure (in. Hg.) M006	Regression Line Leakage Rate (wt%/day) LAM	95% Upper Confidence Limit (wt%/day) UCL
16-Apr-92	10:24:09.6	74912.5	119.820	0.1683	0.2035
16-Apr-92	10:34:09.6	74888.3	119.783	0.1841	0.2208
16-Apr-92	10:44:09.6	74904.1	119.798	0.1821	0.2167
16-Apr-92	10:54:09.6	74909.6	119.805	0.1748	0.2082
16-Apr-92	11:04:09.6	74886.4	119.775	0.1869	0.2206
16-Apr-92	11:14:09.6	74899.5	119.783	0.1863	0.2182
16-Apr-92	11:24:09.6	74901.3	119.783	0.1837	0.2140
16-Apr-92	11:34:09.6	74904.9	119.790	0.1782	0.2075
16-Apr-92	11:44:09.6	74887.7	119.745	0.1844	0.2129
16-Apr-92	11:54:09.6	74897.2	119.760	0.1831	0.2103
16-Apr-92	12:04:09.6	74892.9	119.752	0.1840	0.2099
16-Apr-92	12:14:09.6	74897.9	119.760	0.1814	0.2062
16-Apr-92	12:24:09.6	74894.1	119.752	0.1806	0.2043
16-Apr-92	12:34:09.6	74893.7	119.737	0.1797	0.2024
16-Apr-92	12:44:09.6	74894.7	119.745	0.1779	0.1996
16-Apr-92	12:54:09.6	74899.1	119.737	0.1736	0.1949
16-Apr-92	13:04:09.6	74883.7	119.715	0.1768	0.1974
16-Apr-92	13:14:09.6	74891.9	119.715	0.1754	0.1952
16-Apr-92	13:24:09.6	74890.2	119.723	0.1745	0.1936
16-Apr-92	13:34:09.6	74884.5	119.707	0.1757	0.1941
16-Apr-92	13:44:09.6	74890.4	119.707	0.1741	0.1918
16-Apr-92	13:54:09.6	74897.5	119.723	0.1695	0.1871
16-Apr-92	14:04:09.6	74884.5	119.707	0.1699	0.1869
16-Apr-92	14:14:09.6	74880.6	119.692	0.1714	0.1878
16-Apr-92	14:24:09.6	74871.6	119.685	0.1756	0.1919
16-Apr-92	14:34:09.6	74876.8	119.685	0.1772	0.1931
16-Apr-92	14:44:09.6	74869.3	119.670	0.1809	0.1966
16-Apr-92	14:54:09.6	74879.4	119.685	0.1807	0.1959
16-Apr-92	15:04:09.6	74878.1	119.678	0.1807	0.1954
16-Apr-92	15:14:09.6	74873.3	119.663	0.1818	0.1960
16-Apr-92	15:24:09.6	74877.7	119.663	0.1812	0.1950
16-Apr-92	15:34:09.6	74871.5	119.655	0.1822	0.1956

1992 Primary Containment Leakage Rate Data Sheet (24 Hour Test Phase)

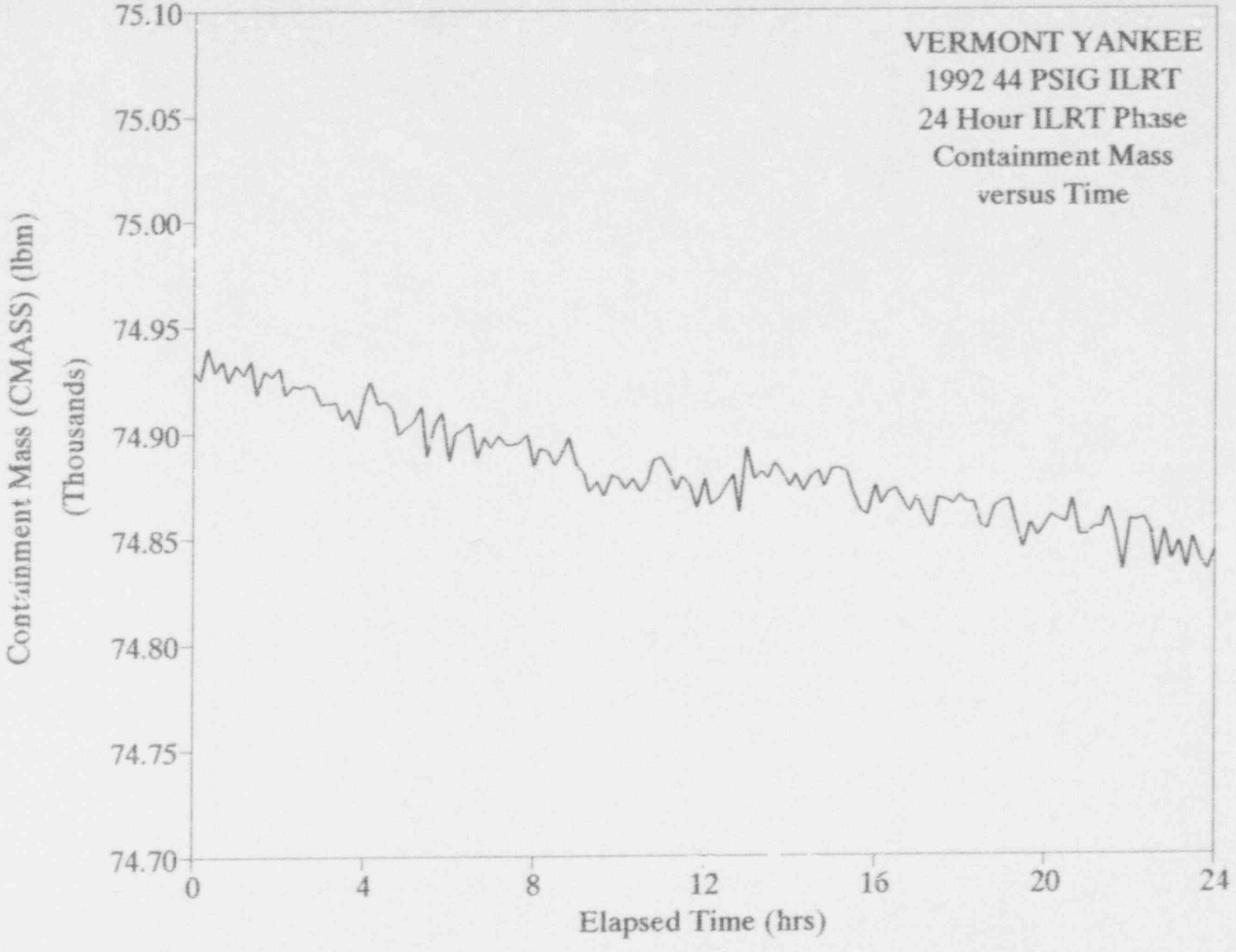
Date	Time	Containment Mass (lbm) CMASS	Containment Pressure (in. Hg.) M006	Regression Line Leakage Rate (wt%/day) LAM	95% Upper Confidence Limit (wt%/day) UCL
16-Apr-92	15:44:09.6	74876.5	119.663	0.1815	0.1945
16-Apr-92	15:54:09.6	74886.0	119.670	0.1781	0.1911
16-Apr-92	16:04:09.6	74887.7	119.670	0.1744	0.1875
16-Apr-92	16:14:09.6	74881.1	119.655	0.1724	0.1852
16-Apr-92	16:24:09.6	74872.2	119.640	0.1724	0.1849
16-Apr-92	16:34:09.6	74878.9	119.640	0.1707	0.1830
16-Apr-92	16:44:09.6	74874.5	119.640	0.1699	0.1819
16-Apr-92	16:54:09.6	74863.6	119.625	0.1714	0.1831
16-Apr-92	17:04:09.6	74878.2	119.640	0.1695	0.1810
16-Apr-92	17:14:09.6	74865.1	119.625	0.1702	0.1814
16-Apr-92	17:24:09.6	74867.8	119.625	0.1702	0.1811
16-Apr-92	17:34:09.6	74873.8	119.625	0.1688	0.1795
16-Apr-92	17:44:09.6	74879.1	119.633	0.1663	0.1770
16-Apr-92	17:54:09.6	74861.8	119.610	0.1671	0.1776
16-Apr-92	18:04:09.6	74892.5	119.625	0.1621	0.1734
16-Apr-92	18:14:09.6	74877.2	119.595	0.1600	0.1712
16-Apr-92	18:24:09.6	74880.7	119.602	0.1573	0.1685
16-Apr-92	18:34:09.6	74877.8	119.595	0.1552	0.1663
16-Apr-92	18:44:09.6	74884.8	119.602	0.1519	0.1632
16-Apr-92	18:54:09.6	74880.0	119.602	0.1495	0.1607
16-Apr-92	19:04:09.6	74874.0	119.573	0.1480	0.1591
16-Apr-92	19:14:09.6	74879.1	119.588	0.1458	0.1569
16-Apr-92	19:24:09.6	74871.8	119.580	0.1447	0.1556
16-Apr-92	19:34:09.6	74878.6	119.580	0.1426	0.1534
16-Apr-92	19:44:09.6	74881.6	119.580	0.1401	0.1509
16-Apr-92	19:54:09.6	74873.9	119.565	0.1387	0.1493
16-Apr-92	20:04:09.6	74881.9	119.580	0.1362	0.1469
16-Apr-92	20:14:09.6	74882.2	119.573	0.1337	0.1445
16-Apr-92	20:24:09.6	74880.7	119.573	0.1315	0.1422
16-Apr-92	20:34:09.6	74871.4	119.565	0.1306	0.1411
16-Apr-92	20:44:09.6	74862.4	119.550	0.1307	0.1410
16-Apr-92	20:54:09.6	74860.1	119.542	0.1311	0.1411

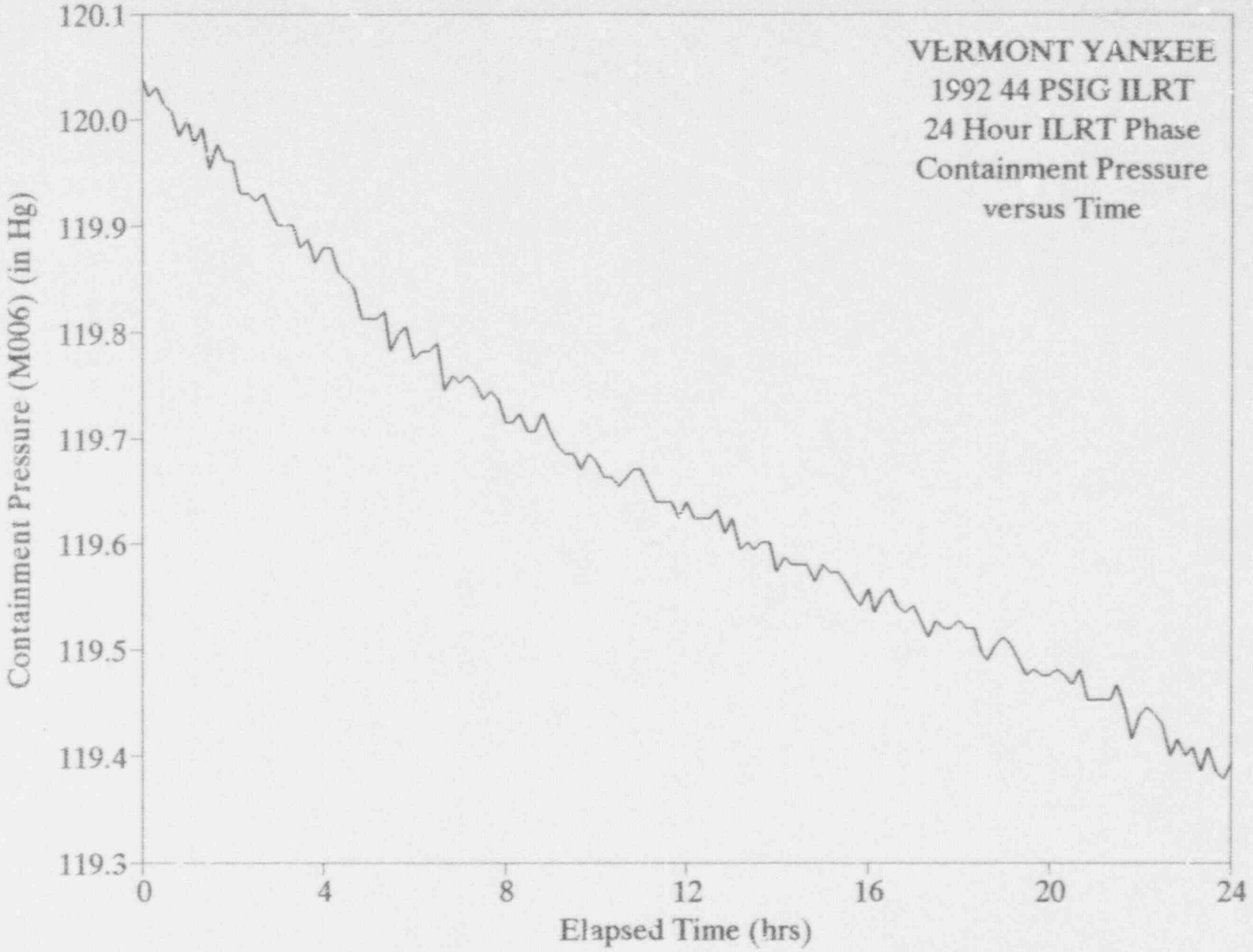
1992 Primary Containment Leakage Rate Data Sheet (24 Hour Test Phase)

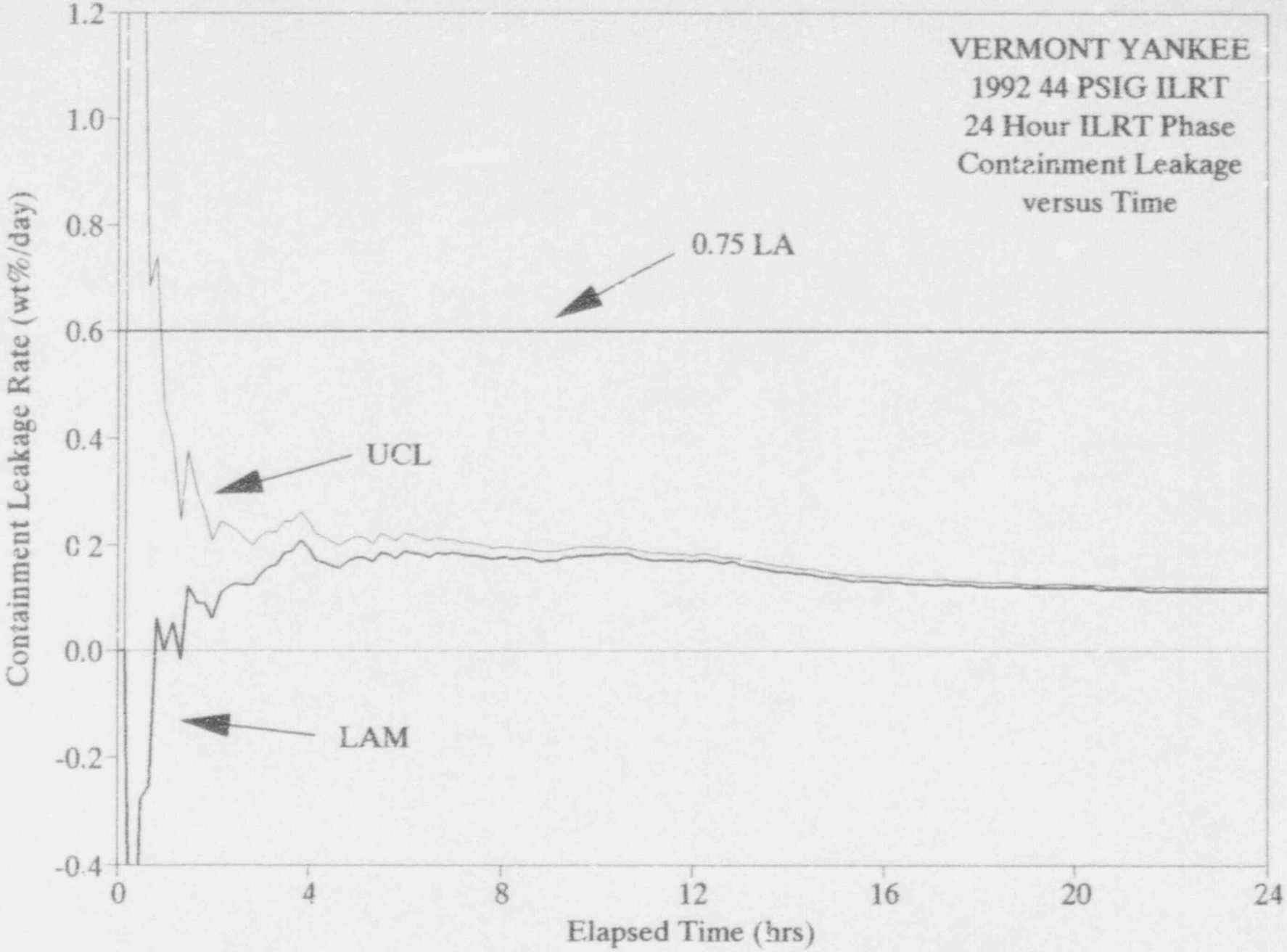
Date	Time	Containment Mass (lbm) CMASS	Containment Pressure (in. Hg.) M006	Regression Line Leakage Rate (wt%/day) LAM	95% Upper Confidence Limit (wt%/day) UCL
16-Apr-92	21:04:09.6	74874.6	119.558	0.1295	0.1395
16-Apr-92	21:14:09.6	74865.5	119.535	0.1291	0.1389
16-Apr-92	21:24:09.6	74870.9	119.550	0.1280	0.1377
16-Apr-92	21:34:09.6	74873.1	119.558	0.1266	0.1362
16-Apr-92	21:44:09.6	74866.6	119.542	0.1260	0.1354
16-Apr-92	21:54:09.6	74862.1	119.535	0.1258	0.1350
16-Apr-92	22:04:09.6	74868.8	119.542	0.1249	0.1339
16-Apr-92	22:14:09.6	74860.0	119.527	0.1248	0.1337
16-Apr-92	22:24:09.6	74853.9	119.512	0.1253	0.1341
16-Apr-92	22:34:09.6	74867.8	119.527	0.1244	0.1330
16-Apr-92	22:44:09.6	74867.4	119.520	0.1234	0.1319
16-Apr-92	22:54:09.6	74865.5	119.520	0.1226	0.1310
16-Apr-92	23:04:09.6	74869.4	119.527	0.1215	0.1297
16-Apr-92	23:14:09.6	74866.1	119.520	0.1206	0.1288
16-Apr-92	23:24:09.6	74866.1	119.520	0.1197	0.1278
16-Apr-92	23:34:09.6	74854.5	119.497	0.1199	0.1278
16-Apr-92	23:44:09.6	74853.3	119.490	0.1201	0.1279
16-Apr-92	23:54:09.6	74863.6	119.505	0.1194	0.1270
17-Apr-92	00:04:09.6	74866.5	119.512	0.1183	0.1260
17-Apr-92	00:14:09.6	74867.6	119.505	0.1172	0.1248
17-Apr-92	00:24:10.0	74853.2	119.490	0.1173	0.1247
17-Apr-92	00:34:09.6	74844.2	119.475	0.1181	0.1254
17-Apr-92	00:44:09.6	74855.8	119.482	0.1178	0.1251
17-Apr-92	00:54:09.6	74849.6	119.475	0.1180	0.1252
17-Apr-92	01:04:10.3	74854.7	119.475	0.1178	0.1248
17-Apr-92	01:14:09.6	74859.9	119.482	0.1171	0.1240
17-Apr-92	01:24:09.6	74857.5	119.475	0.1166	0.1234
17-Apr-92	01:34:09.6	74856.3	119.467	0.1162	0.1229
17-Apr-92	01:44:09.6	74867.6	119.482	0.1149	0.1216
17-Apr-92	01:54:09.6	74850.2	119.452	0.1148	0.1215
17-Apr-92	02:04:09.6	74850.7	119.452	0.1147	0.1212
17-Apr-92	02:14:09.6	74853.9	119.452	0.1144	0.1208

1992 Primary Containment Leakage Rate Data Sheet (24 Hour Test Phase)

Date	Time	Containment Mass (lbm) CMASS	Containment Pressure (in. Hg.) M006	Regression Line Leakage Rate (wt%/day) LAM	95% Upper Confidence Limit (wt%/day) UCL
17-Apr-92	02:24:09.6	74853.7	119.452	0.1140	0.1203
17-Apr-92	02:34:09.6	74863.0	119.467	0.1130	0.1193
17-Apr-92	02:44:09.6	74851.6	119.445	0.1127	0.1189
17-Apr-92	02:54:09.6	74833.7	119.415	0.1136	0.1198
17-Apr-92	03:04:09.6	74857.6	119.438	0.1129	0.1190
17-Apr-92	03:14:09.6	74857.0	119.445	0.1122	0.1182
17-Apr-92	03:24:09.6	74858.2	119.438	0.1114	0.1174
17-Apr-92	03:34:09.6	74851.6	119.430	0.1110	0.1170
17-Apr-92	03:44:09.6	74835.1	119.400	0.1116	0.1175
17-Apr-92	03:54:09.6	74852.3	119.415	0.1111	0.1170
17-Apr-92	04:04:09.6	74838.4	119.400	0.1115	0.1172
17-Apr-92	04:14:09.6	74847.0	119.408	0.1112	0.1169
17-Apr-92	04:24:09.6	74834.2	119.385	0.1117	0.1173
17-Apr-92	04:34:09.6	74849.1	119.408	0.1113	0.1169
17-Apr-92	04:44:09.6	74839.2	119.385	0.1114	0.1169
17-Apr-92	04:54:09.6	74833.6	119.378	0.1118	0.1173
17-Apr-92	05:04:09.6	74842.9	119.393	0.1117	0.1170
17-Apr-92	05:14:09.6	74835.3	119.378	0.1119	0.1172


VERMONT YANKEE
1992 44 PSIG ILRT
24 Hour ILRT Phase
Containment Mass
versus Time
Containment Mass (CMASS) (lbm)
(Thousands)
75.10
75.05
75.00
74.95
74.90
74.85
74.80
74.75
74.70
0
4
8
12
16
20
24
Elapsed Time (hrs)


VERMONT YANKEE
1992 44 PSIG ILRT
24 Hour ILRT Phase
Containment Pressure
versus Time
Containment Pressure (M006) (in Hg)
120.1
120.0
119.9
119.8
119.7
119.6
119.5
119.4
119.3
0
4
8
12
16
20
24
Elapsed Time (hrs)


VERMONT YANKEE
1992 44 PSIG ILRT
24 Hour ILRT Phase
Containment Leakage
versus Time
0.75 LA
UCL
LAM
Containment Leakage Rate (wt%/day)
Elapsed Time (hrs)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
0
4
8
12
16
20
24

APPENDIX C

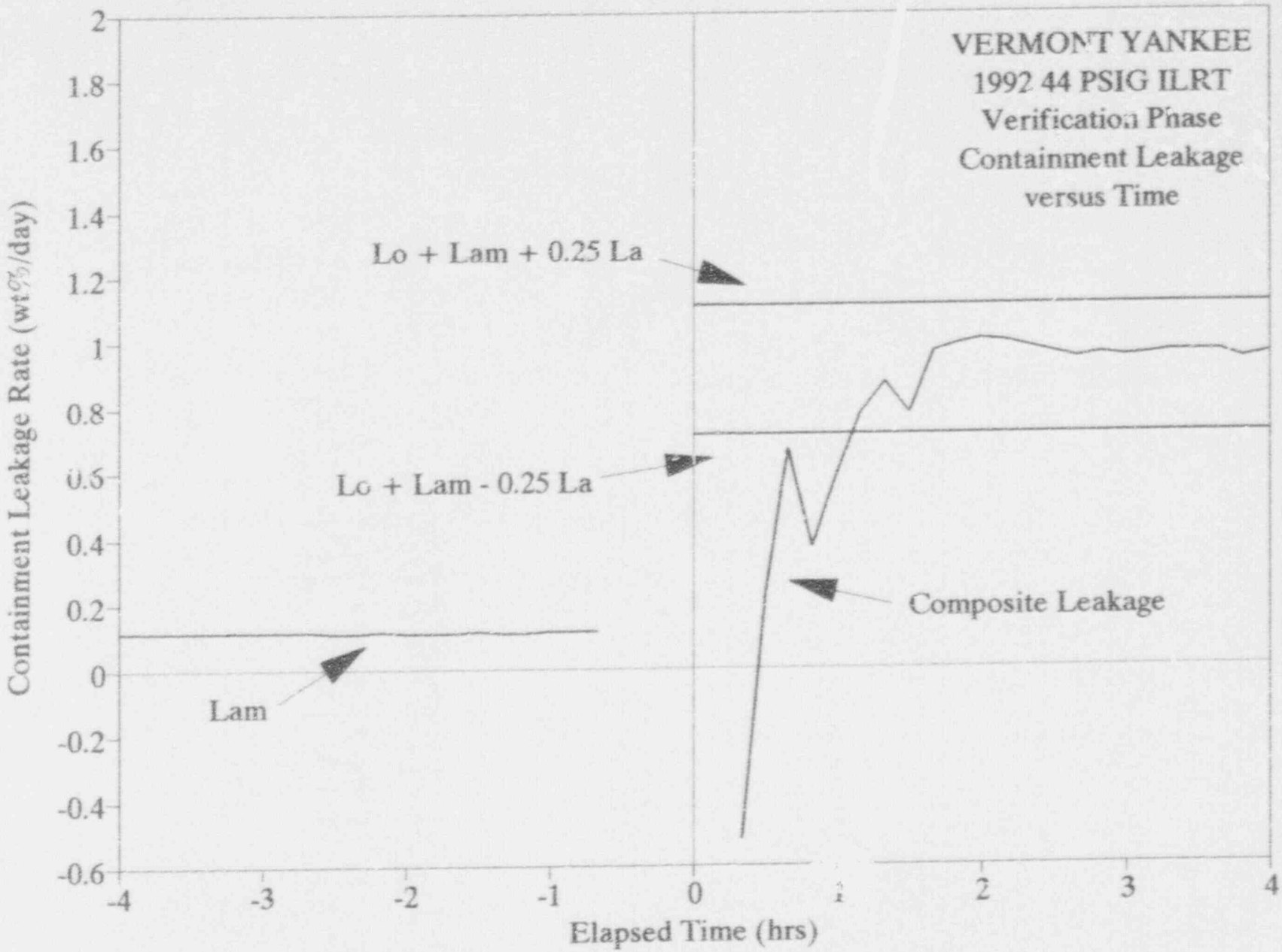
VERIFICATION PHASE DATA AND PLOTS

1992 Primary Containment Leakage Rate Data Sheet (Verification Phase)

Date	Time	Containment Leakage (wt%/day) LAM	Containment Mass (lbm) CMASS
17-Apr-92	01:54:09.6	0.1148	74850.2
17-Apr-92	02:04:09.6	0.1147	74850.7
17-Apr-92	02:14:09.6	0.1144	74853.9
17-Apr-92	02:24:09.6	0.1140	74853.7
17-Apr-92	02:34:09.6	0.1130	74863.0
17-Apr-92	02:44:09.6	0.1127	74851.6
17-Apr-92	02:54:09.6	0.1136	74833.7
17-Apr-92	03:04:09.6	0.1129	74857.6
17-Apr-92	03:14:09.6	0.1122	74857.0
17-Apr-92	03:24:09.6	0.1114	74858.2
17-Apr-92	03:34:09.6	0.1110	74851.6
17-Apr-92	03:44:09.6	0.1116	74835.1
17-Apr-92	03:54:09.6	0.1111	74852.3
17-Apr-92	04:04:09.6	0.1115	74838.4
17-Apr-92	04:14:09.6	0.1112	74847.0
17-Apr-92	04:24:09.6	0.1117	74834.2
17-Apr-92	04:34:09.6	0.1113	74849.1
17-Apr-92	04:44:09.6	0.1114	74839.2
17-Apr-92	04:54:09.6	0.1118	74833.6
17-Apr-92	05:04:09.6	0.1117	74842.9
17-Apr-92	05:14:09.6	0.1119	74835.3
17-Apr-92	05:24:09.6		
17-Apr-92	05:34:09.6		
17-Apr-92	05:44:09.6		

1992 Primary Containment Leakage Rate Data Sheet (Verification Phase)

Date	Time	Containment Leakage (wt%/day) LAM	Containment Mass (lbm) CMASS
17-Apr-92	05:55:03.3		74819.0
17-Apr-92	06:05:02.3		74811.3
17-Apr-92	06:15:02.3	-0.5197	74824.4
17-Apr-92	06:25:02.3	0.2271	74810.7
17-Apr-92	06:35:02.3	0.6659	74802.0
17-Apr-92	06:45:02.3	0.3690	74813.9
17-Apr-92	06:55:02.3	0.5843	74796.4
17-Apr-92	07:05:02.3	0.7760	74787.0
17-Apr-92	07:15:02.3	0.8715	74782.5
17-Apr-92	07:25:02.3	0.7771	74791.6
17-Apr-92	07:35:02.3	0.9605	74760.7
17-Apr-92	07:45:02.3	0.9865	74766.5
17-Apr-92	07:55:02.3	0.9982	74762.0
17-Apr-92	08:05:02.3	0.9935	74759.0
17-Apr-92	08:15:02.3	0.9743	74757.2
17-Apr-92	08:25:02.3	0.9574	74753.1
17-Apr-92	08:35:02.3	0.9402	74749.6
17-Apr-92	08:45:02.3	0.9522	74737.6
17-Apr-92	08:55:02.3	0.9463	74737.4
17-Apr-92	09:05:02.3	0.9469	74730.7
17-Apr-92	09:15:02.3	0.9593	74721.0
17-Apr-92	09:25:02.3	0.9589	74720.3
17-Apr-92	09:35:02.3	0.9569	74716.1
17-Apr-92	09:45:02.3	0.9364	74721.0
17-Apr-92	09:55:02.3	0.9508	74699.0
17-Apr-92	10:05:02.3	0.9574	74697.0


VERMONT YANKEE
1992 44 PSIG ILRT
Verification Phase
Containment Leakage
versus Time
Lo + Lam + 0.25 La
Lo + Lam - 0.25 La
Composite Leakage
Lam
Containment Leakage Rate (wt%/day)
Elapsed Time (hrs)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-4
-3
-2
-1
0
1
2
3
4

APPENDIX D

TYPE B TEST RESULTS

APPENDIX D

Summary Test Results for Type B Testing

PENETRATION NUMBER	DESCRIPTION	LEAKAGE (LBM/HR)			
		1990		1992	
		INITIAL	RETEST	INITIAL	RETEST
X-2	Personnel Lock	0.962	1.790	1.560	1.100
	Bellows Seals				
X-7A	Main Steam Line A	0.000		(1)	
X-7B	Main Steam Line B	0.000		(1)	
X-7C	Main Steam Line C	0.000		(1)	
X-7D	Main Steam Line D	0.000		(1)	
X-9A	Feedwater A	0.000		(1)	
X-9B	Feedwater B	0.000		(1)	
X-11	HPCI Steam Line	0.000		(1)	
X-12	RHR Suction	0.000		(1)	
X-13A	RHR Return A	0.000		(1)	
X-13B	RHR Return B	0.000		(1)	
X-14	Cleanup Suction	0.000		(1)	
X-16A	Core Spray A	0.000		(1)	
X-16B	Core Spray B	0.000		(1)	
	Electrical Penetrations				
100A	Electrical Penetration	0.001		0.001	
100B	Electrical Penetration	0.007		0.037	
100C	Electrical Penetration	0.001		0.000	
100D	Electrical Penetration	0.002		0.016	
101A	Electrical Penetration	0.001		0.035	
101C	Electrical Penetration	0.000		0.010	

APPENDIX D

Summary Test Results for Type B Testing

PENETRATION NUMBER	DESCRIPTION	LEAKAGE (LBM/HR)			
		1990		1992	
		INITIAL	RETEST	INITIAL	RETEST
101D	Electrical Penetration	0.000		0.001	
102	Electrical Penetration	0.011		0.029	
103	Electrical Penetration	0.002		0.002	
104A	Electrical Penetration	0.001		0.036	
104B	Electrical Penetration	0.001		0.000	
104C	Electrical Penetration	0.001		0.026	
105A	Electrical Penetration	0.003		0.039	
105B	Electrical Penetration	0.000		0.000	
105C	Electrical Penetration	0.002		0.001	
105D	Electrical Penetration	0.008		0.012	
214	Electrical Penetration	0.000		0.000	
	Double Gasketed Seals				
X-1	Equipment Hatch	0.001		0.001	0.000
X-3	Drywell Head Flange	0.013	0.003	0.008	
X-4	Drywell Head Access Hatch	0.000	0.000	0.000	0.001
X-6	Control Rod Drive Removal	0.000	0.000	0.000	0.000
X-35A	TIP Penetration Flange	0.000		0.000	
X-35B	TIP Penetration Flange	0.000		0.000	
X-35C	TIP Penetration flange	0.000		0.000	
X-35E	TIP Penetration Flange	0.000		0.000	
X-200A	Torus Access Hatch	0.000	0.000	0.000	0.000

APPENDIX D

Summary Test Results for Type B Testing

PENETRATION NUMBER	DESCRIPTION	LEAKAGE (LBM/HR)			
		1990		1992	
		INITIAL	RETEST	INITIAL	RETEST
X-200B	Torus Access Hatch	0.000	0.000	0.000	0.000
VBC-A	Vacuum Breaker Access Cover	0.000		0.000	
VBC-B	Vacuum Breaker Access Cover	0.000		0.000	
VBC-C	Vacuum Breaker Access Cover	0.000	0.000	0.000	
VBC-D	Vacuum Breaker Access Cover	0.000	0.000	0.000	
VBC-E	Vacuum Breaker Access Cover	0.000		0.000	0.000
VBC-F	Vacuum Breaker Access Cover	0.000		0.000	0.000
VBC-G	Vacuum Breaker Access Cover	0.000		0.000	
VBC-H	Vacuum Breaker Access Cover	0.000		0.000	
VBC-I	Vacuum Breaker Access Cover	0.000		0.000	
VBC-J	Vacuum Breaker Access Cover	0.000		0.000	
VBSL-A	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-A	Vacuum Breaker Shaft Right	0.000		0.000	
VBSL-B	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-B	Vacuum Breaker Shaft Right	0.000		0.000	
VBSL-C	Vacuum Breaker Shaft Left	0.000	0.000	0.000	

APPENDIX D

Summary Test Results for Type B Testing

PENETRATION NUMBER	DESCRIPTION	LEAKAGE (LBM/HR)			
		1990		1992	
		INITIAL	RETEST	INITIAL	RETEST
VBSR-C	Vacuum Breaker Shaft Right	0.000	0.000	0.000	
VBSL-D	Vacuum Breaker Shaft Left	0.000	0.000	0.000	
VBSR-D	Vacuum Breaker Shaft Right	0.000	0.000	0.000	
VBSL-E	Vacuum Breaker Shaft Left	0.000		0.000	0.000
VBSR-E	Vacuum Breaker Shaft Right	0.000		0.000	0.000
VBSL-F	Vacuum Breaker Shaft Left	0.000		0.000	0.000
VBSR-F	Vacuum Breaker Shaft Right	0.000		0.000	0.000
VBSL-G	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-G	Vacuum Breaker Shaft Right	0.000		0.000	
VBSL-H	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-H	Vacuum Breaker Shaft Right	0.000		0.000	
VBSL-I	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-I	Vacuum Breaker Shaft Right	0.000		0.000	

APPENDIX D

Summary Test Results for Type B Testing

PENETRATION NUMBER	DESCRIPTION	LEAKAGE (LBM/HR)			
		1990		1992	
		INITIAL	RETEST	INITIAL	RETEST
VBSL-J	Vacuum Breaker Shaft Left	0.000		0.000	
VBSR-J	Vacuum Breaker Shaft Right	0.000		0.000	
SLH-A	Shear Lug Access Cover	0.000		0.000	
SLH-B	Shear Lug Access Cover	0.000		0.000	
SLH-C	Shear Lug Access Cover	0.000		0.000	
SLH-D	Shear Lug Access Cover	0.000		0.000	
SLH-E	Shear Lug Access Cover	0.001		0.004	
SLH-F	Shear Lug Access Cover	0.000		0.000	
SLH-G	Shear Lug Access Cover	0.004		0.004	
SLH-H	Shear Lug Access Cover	0.000		0.000	
X-213A	Torus Drain	0.000		0.000	
X-213B	Torus Drain	0.000		0.000	

NOTES:

(1) Snoop checked during Type A ILRT. No significant leakage noted.

APPENDIX E

TYPE C TEST RESULTS

APPENDIX E

Summary Test Results for Type C Testing

PENETRATION NUMBER	VALVE TESTED	DESCRIPTION	LEAKAGE (LBM/HR)			
			1990		1992	
			INITIAL	RETEST	INITIAL	RETEST
X-7A	MS80A	A Main Steam Line	0.000		0.235	
	MS86A	A Main Steam Line	0.738		0.715	
X-7B	MS80B	B Main Steam Line	0.103		0.202	
	MS86B	B Main Steam Line	0.347		0.452	
X-7C	MS80C	C Main Steam Line	0.000		0.001	
	MS86C	C Main Steam Line	0.347		0.393	
X-7D	MS80D	D Main Steam Line	0.000		0.001	
	MS86D	D Main Steam Line	0.365		0.483	
X-8	MS-74	Main Steam Drain	0.000		0.007	
	MS-77	Main Steam Drain	0.077		0.182	0.282
X-9A	FDW27A	Feedwater Check Valve	0.237	0.001	0.024	0.378
	FDW28A	Feedwater Check Valve		0.078	0.185	0.007
X-9B	FDW28B	Feedwater Check Valve		0.011	>14.75	0.015
	FDW96A	Feedwater Check Valve	>14.75	0.278	0.001	0.096
X-10	RCIC-15	RCIC Steam Supply	0.186	0.027	0.000	0.000
	RCIC-16	RCIC Steam Supply	0.313		0.002	0.002
X-11	HPCI-15	HPCI Steam Supply	0.000		0.046	0.000
	HPCI-16	Reactor Cleanup	0.077	0.077	0.328	0.002
X-14	RCU-15	Reactor Cleanup	0.048	0.003	0.007	0.025
	RCU-18	Reactor Cleanup	0.011		0.015	0.002

APPENDIX E

Summary Test Results for Type C Testing

PENETRATION NUMBER	VALVE TESTED	DESCRIPTION	LEAKAGE (LBM/HR)			
			1990		1992	
			INITIAL	RETEST	INITIAL	RETEST
X-16A	CS-12A	Core Spray Injection	0.015	0.012	0.002	
	CS-11A	Core Spray Injection	0.015	0.012	0.036	
X-16B	CS-12B	Core Spray Injection	0.034	0.001	0.008	
	CS-11B	Core Spray Injection	0.034	0.001	0.024	
X-18	LRW-82	Drywell Floor Drain	0.369	0.275	0.400	0.011
	LRW-83	Drywell Floor Drain	0.043	0.181	0.990	0.007
X-19	LRW-94	Drywell Equipment Drain	0.235		0.210	0.002
	LRW-95	Drywell Equipment Drain	0.052		0.079	0.002
X-22	CA-89C	Cont. Air Compressor	0.001		0.007	0.005
	CA-89B	Cont. Air Compressor	0.001		0.024	
	IA-103	Instrument Air Valve	0.043		0.024	
X-25	SB-6, 7, 6A, 6B, 7A, and 7B	Containment Exhaust	0.016 (Per valve)	0.049 (Per valve)	0.138 (Per valve)	0.159 (Per valve)
X-25	VG-9A	CAD Vent	0.001		0.024	0.002
	VG-22A	CAD Vent	0.151		0.044	
X-26	XB-8,9,10, and 23	Containment Purge	0.000 (Per valve)		0.146 (Per valve)	0.104 (Per valve)
X-26	SB-22B	Containment Purge Makeup	0.002		0.002	
	SB-20	Containment Purge Makeup	0.002		0.002	
X-26	NG 13A & 13B	CAD Injection	0.0025		0.0015	0.002
	NG 11A & 11B	CAD Injection	0.0015		0.0015	0.002

APPENDIX E

Summary Test Results for Type C Testing

PENETRATION NUMBER	VALVE TESTED	DESCRIPTION	LEAKAGE (LBM/HR)			
			1990		1992	
			INITIAL	RETEST	INITIAL	RETEST
X-26	SB-51	PCAC	0.001		0.002	
	SB-52	PCAC	0.001		0.001	
X-31F	CRD-413A	Recirc Pump Seal Purge	0.152		0.788	0.125
	CRD-412A	Recirc Pump Seal Purge	0.002		0.351	
X-32F	CRD-413B	Recirc Pump Seal Purge	0.124		0.873	0.404
	CRD-413B	Recirc Pump Seal Purge	0.005		0.228	
X-35A	N/A	Tip Purge PNL Check	0.001		0.154	
	N/A	Tip Purge Check Valve	0.018		0.002	
X-35C	N/A	Tip Ball Valve #1	0.090		0.068	
X-35D	N/A	Tip Ball Valve #2	0.487		0.234	
X-35E	N/A	Tip Ball Valve #3	0.068		0.035	
X-41	RV-39	Recirc Sample	0.001		0.034	
	RV-40	Recirc Sample	0.001		0.034	
X-47	CA-38A	Cont. Air Compressor	0.001		0.002	
	CA-35	Cont. Air Compressor	0.262		0.238	
X-205	NG 12A & 12B	CAD Injection	0.0005		0.002	0.002
	NG 11A & 11B	CAD Injection	Note (1) Page 4/4		Note (1) Page 4/4	0.002
X-205	SB-11A & 12A	Vacuum Relief	0.024 (Total)		0.150 (Total)	0.623 (Total)
	SB-11B & 12B	Vacuum Relief	0.030 (Total)		0.352 (Total)	0.750 (Total)

APPENDIX F

Summary Test Results for Type C Testing

PENETRATION NUMBER	VALVE TESTED	DESCRIPTION	LEAKAGE (LBM/HR)			
			1990		1992	
			INITIAL	RETEST	INITIAL	RETEST
X-205	SB-22A	Containment Purge Makeup	0.002		0.002	
	SB-20	Containment Purge Makeup	(1)		(1)	
	SB-22B	Containment Purge Makeup	(1)		(1)	
X-216	VG-76A	Rad. Mon. Return	0.003		0.002	
	VG-76B	Rad. Mon. Return	0.001		0.002	
X-218	VG-9B	CAD Vent	0.006		0.062	
	VG-22B	CAD Vent	0.001		0.143	
X-220	VG-26	CAD Rad. Mon. Supply	0.014		0.001	
	VG-23	CAD Rad. Mon. Supply	0.015		0.017	

Notes:

(1) Reported Under X-26

(2) Could Not Pressurize Valve/Valve Group Utilizing Existing Equipment