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February 3, 1994

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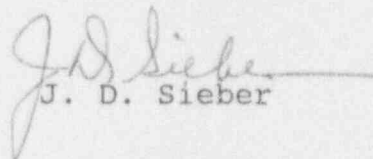
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

**Subject: Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
Reactor Containment Building Integrated
Leakage Rate Test**

Enclosed is the 1993 Beaver Valley Unit No. 2 Reactor Containment Building Integrated Leakage Rate Test Report submitted in accordance with Appendix J of 10 CFR Part 50. The report provides a summary of the Integrated Leakage Rate Test conducted at BVPS Unit No. 2 during the fourth refueling outage.

Also submitted with this report is a summary of results for all local leakage rate tests performed since the previous Integrated Leakage Rate Test.

Sincerely,


J. D. Sieber

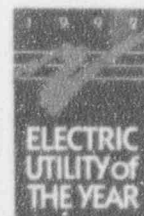
Attachment

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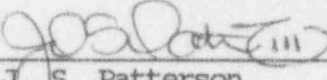
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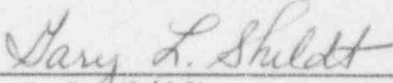


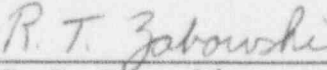
REACTOR CONTAINMENT BUILDING
INTEGRATED LEAKAGE RATE TEST

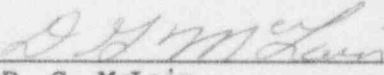
DUQUESNE LIGHT COMPANY
BEAVER VALLEY POWER STATION UNIT NO. 2

NOVEMBER 1993

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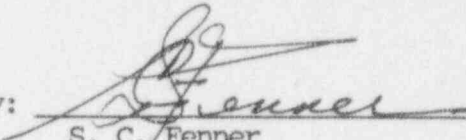
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TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	TABLE OF CONTENTS	ii
	LIST OF ATTACHMENTS	iii
	REFERENCES	iv
1	PURPOSE	1-1
2	SUMMARY	
	2.1 TYPE A ILRT	2.1-1
	2.1.1. Test Summary	2.1-1
	2.2 LOCAL LEAKAGE RATE TESTS (TYPES B & C)	2.2-1
3	INTEGRATED LEAKAGE RATE TEST	
	3.1 EDITED LOG OF EVENTS	3.1-1
	3.2 GENERAL TEST DESCRIPTION	3.2-1
	3.2.1 Prerequisites	3.2-1
	3.2.2 Equipment and Instrumentation	3.2-1
	3.2.3 Data Acquisition	3.2-2
	3.2.4 Data Resolution System	3.2-2
	3.3 TEST RESULTS	3.3-1
	3.3.1 Presentation of Test Results	3.3-1
	3.3.2 59.4 PSIA ILRT Results	3.3-2
	3.3.2.1 ILRT Results - Mass Point Analysis	3.3-2
	3.3.2.2 Supplemental Test Results	3.3-3
	3.3.2.3 Leakage Penalties Added to ILRT Leakage	3.3-4
	3.3.2.4 As Found Containment Condition - LLRT Improvements	3.3-6
	3.3.3 Conclusion	3.3-7
4	LOCAL LEAKAGE RATE TESTS (TYPES B AND C)	4-1

LIST OF ATTACHMENTS

<u>ATTACHMENT</u>	<u>TITLE</u>
3.2A	Instrumentation List
3.2B	Instrumentation Selection Guide
3.3A	ILRT Reduced Input Variables
3.3B	ILRT Absolute Test Method - Mass Point Analysis Test Results
3.3C	Containment Air Mass vs. Time
3.3D	Leakage Rate and UCL vs. Time, Mass Point Analysis
3.3E	Superimposed Leakage Verification Test Reduced Input Variables
3.3F	Superimposed Leakage Verification Test, Absolute Test Method - Mass Point Analysis
4.1A	Third Refueling Local Leakage Rate Test Data
4.1B	Third Refueling Local Leakage Rate Repairs
4.1C	Fourth Refueling Local Leakage Rate Test Data
4.1D	Fourth Refueling Local Leakage Rate Repairs
4.1E	Third and Fourth Fuel Cycle Local Leakage Rate Data

REFERENCES

1. 10CFR50, Appendix J, Primary Reactor Containment Leakage Testing For Water-Cooled Power Reactors, January 1, 1993.
2. 2BVT 1.47.2, Containment Type A Leak Test, Beaver Valley Power Station Unit No. 2, Issue 2, Revision 1, September 13, 1993
3. ANSI N45.4, American National Standard, Leakage - Rate Testing of Containment Structures for Nuclear Reactors, March 16, 1972.
4. ANSI/ANS-56.8, Containment System Leakage Testing Requirements, January 20, 1987.

SECTION 1

PURPOSE

The purpose of this report is to present a description and analysis of the November 1993 Type A Containment Integrated Leakage Rate Test (ILRT), and a summary of Type B and C Local Leakage Rate Tests (LLRT's) performed since the last periodic ILRT (November 1990) at Duquesne Light Company's Beaver Valley Power Station Unit No. 2 (BVPS 2).

Stone & Webster Engineering Corporation (SWEC) provided test engineering consultation services to Duquesne Light Company during the performance of the 1993 ILRT.

This report is submitted as required by 10CFR50, Appendix J, Paragraph V.B.

SECTION 2

SUMMARY

2.1 TYPE A ILRT

2.1.1 Test Summary

Upon completion of all ILRT prerequisites and initial conditions, containment pressurization started at 2215 hours on November 7, 1993 at a fairly constant pressurization rate of 3.0 psi per hour. The compressors were secured at 1357 hours on November 8, 1993 with a peak instantaneous pressure of 61.1759 PSIA.

At 1800 hours on November 8, 1993, the temperature stabilization criteria (<0.5 °R over last two hours) was satisfied, however, containment temperature was still trending downward indicating temperature was not stable. The mass trend, which was being influenced by temperature, was also trending downward. Penetration area leakage investigations identified no significant leakage.

At 1800 hours on November 9, 1993, the ILRT was started based on the improved stability of containment temperature. Initial mass trends indicated an acceptable leakage rate of approximately 9.5 lkm/hr.

The ILRT was completed at 1800 hours on November 10, 1993 with a Mass Point Upper Confidence Level of 0.04011 %/day (see Section 3.3, Test Results). This leakage rate is below the 0.75 La Acceptance Criteria of 0.075 %/day.

The Superimposed Leakage Verification Test was started at 1900 hours on November 10, 1993 when the stability of all the containment parameter trends had recovered from the imposed leakage rate perturbation. The Superimposed Leakage Verification Test was successfully completed at 2300 hours on November 10, 1993 (See Section 3.3, Test Results).

After review of all ILRT test data, containment depressurization started at 0117 hours and was completed at 0934 hours on November 11, 1993.

2.2 LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

The Local Leakage Rate Tests (LLRT's) of the containment isolation valves and other containment penetrations were conducted as described in the Beaver Valley Power Station Unit No. 2 surveillance test procedures for Type B and C tests.

In accordance with Appendix J to 10CFR50, Paragraph V.B, data for the Local Leakage Rate Tests are summarized in Section 4 of this report.

SECTION 3

INTEGRATED LEAKAGE RATE TEST

3.1 EDITED LOG OF EVENTS

This log was edited from information contained in the ILRT Test Log.

November 7, 1993

- 1955 Prerequisites and Initial Conditions for ILRT completed.
- 2025 Containment Purge Supply Isolation Valve [2HVR*MOD25B] will not open from the Control Room to allow ILRT pressurization to commence. Electrical Maintenance is notified of problem.
- 2130 Containment Purge Supply Isolation Valve [2HVR*MOD25B] opened electrically by resetting the line starter. Decision was later made to leave [2HVR*MOD25B] open during the duration of the ILRT and rely on [2HVR*MOD25A] to isolate the penetration. [2HVR*MOD25B] was repaired following completion of the ILRT per previously written MWR 24637 (See Attachment 4.1D for Penetration No. 91).
- 2215 Commenced ILRT pressurization.

November 8, 1993

- 0855 Containment pressure at approximately 45.0 psia. Completed walkdown of all penetration areas with the following deficiencies noted:
- * Slight amount of water leaking from Recirculation Spray Pump [2RSS*P21A] Seal Area (Approximately 2 drops per minute).
 - * Slight amount of water leaking from Recirculation Spray Pump [2RSS*P21D] Seal Area (unmeasurable amount).
 - * Slight amount of Air Leaking From Recirculation Spray System Demin Water Fill Header Vent [2RSS*101].
- 1357 Secured containment pressurization with a peak instantaneous pressure of 61.1759 psia.
- 1400 Commenced ILRT stabilization period.
- 1702 Completed walkdown of all penetration areas with no new significant leakage noted.
- 1800 Temperature stabilization criteria satisfied (<0.5 °R over last two hours), however, containment temperature is still trending downward. Will wait until containment temperature stabilizes before ILRT is started.

November 9, 1993

- 0030 Completed walkdown of all penetration areas with no significant leakage noted.
- 0807 Quantified leakage from Recirculation Spray System Demin Water Fill Header Vent [2RSS*101] to be approximately 0.45 SCF/M (Vent Valve 2RSS*101 was the vent path for ten upstream Recirc Spray System Valves, associated with all four Recirc Spray Pumps). No measurable leakage detected from any of the four Recirculation Spray Pump Seals.
- 0845 Containment temperature is still trending down.
- 1622 Refueling canal is filled with water, just above the fuel transfer tube, to allow for leakage investigation. No leakage is detected.
- 1745 Containment temperature appears to be stable. Decision made to start the ILRT at 1800 hours.
- 1800 Declared start of ILRT.

November 10, 1993

- 0030 From the data collected, it has been determined that a short duration test using the Total Time Analysis will not be possible, therefore, a 24 hour ILRT will be performed using the Mass Point Analysis method. Mass trend is acceptable at approximately 9.5 lbm/hr. Mass Point Upper Confidence Level of 0.064 percent/day.
- 1400 Containment Mass Point Leak Rate is 0.042 percent/day with a Mass Point Upper Confidence Level of 0.043 percent/day.
- 1800 Completed ILRT with a Mass Point Upper Confidence Level of 0.040 percent/day.
- 1809 Established a 4.9 SCF/M leakage flow for the Superimposed Leakage Verification Test.
- 1900 Commenced the Superimposed Leakage Verification Test.
- 2300 Completed the Superimposed Leakage Verification Test with acceptable data obtained.

November 11, 1993

- 0117 Commenced containment depressurization.
- 0934 Completed containment depressurization.

3.2 GENERAL TEST DESCRIPTION

3.2.1 Prerequisites

In accordance with Beaver Valley Power Station Unit 2 ILRT Test Procedure 2BVT 1.47.2, the following is a listing of the pertinent prerequisites completed and documented prior to containment pressurization:

- a. All Type B and C Local Leakage Rate Testing completed.
- b. All test instrumentation calibrated or functionally verified within 6 months of ILRT.
- c. All penetration valve alignments completed.
- d. All ILRT computer software used for data acquisition, and data analysis, tested and operational.
- e. Temporary air compressors and auxiliary equipment checked out and available for pressurization.
- f. All equipment that could be damaged by test pressure, removed or protected.
- g. Portable pressure containing equipment removed from containment.
- h. Depressurized and vented pressure vessels located inside containment.
- i. Completed structural integrity inspection of containment.

3.2.2 Equipment and Instrumentation

Pressurization of the containment was achieved by the utilization of a temporary system consisting of seven diesel driven oil free air compressors, a water cooled aftercooler, and a refrigerant air dryer. The system included adequate instrumentation and valving to maintain proper monitoring and control of the compressed air quality throughout the pressurization sequence. The total capacity of the pressurization system was 9000 SCFM. Air was supplied to containment through the Containment Purge System.

The various containment parameters required to calculate containment leakage were monitored using instrumentation which consisted of 18 resistance temperature detectors, 5 dewpoint detectors, and 2 absolute pressure quartz manometers. Pertinent data for the test instrumentation is listed in Attachment 3.2A.

A test panel consisting of a rotameter, pressure gauge, and a thermometer was used to perform the Superimposed Leakage Verification Test.

3.2.3 Data Acquisition System

The data acquisition system used for ILRT was a computer controlled logging system which provided instantaneous raw sensor data.

For the ILRT, the Data Acquisition System monitored the following instrumentation:

<u>Type</u>	<u>No. of Sensors</u>
Temperature Detectors	18
Dewpoint Sensors	5
Quartz Manometer	2

Instantaneous readings for each sensor were collected and printed at 15 minute intervals. Input to the data analysis program was based on these collections. Each data set was time stamped.

3.2.4 Data Resolution System

The recorded data was inputted to Stone & Webster Engineering Corporation's computer program for data reduction and leakage rate calculations. The Mass Point Analysis Method was used to determine the containment leakage rate.

Absolute Method of Mass Point Analysis

The Absolute Method of Mass Point Analysis consists of calculating the air mass within the containment structure, over the test period, using pressure, temperature, and dewpoint data obtained during the ILRT. The air mass is computed using the ideal gas law as follows:

$$M = \frac{144V(P-P_v)}{RT}$$

Where:

- M = air mass, lhm
- P = total pressure, psia
- P_v = average vapor pressure, psia
- R = 53.35 ft-lbm/lhm °R (for air)
- T = average containment temperature, °R
- V = containment free volume, 1,716,633 cu. ft.

The leakage rate is then determined by plotting air mass as a function of time, using a least-squares fit to determine the slope, $A = dM/dT$. The leakage rate is expressed as a percentage of the air mass lost in 24 hours or symbolically:

$$\text{Leakage Rate} = A/B(-2400)$$

Where A is the slope of the least-squares curve and B is the y-intercept. The sign convention is such that the leakage out of containment is positive, and the units are in percent/day.

The air mass is calculated and the result is correlated as a function of time by means of a least-squares curve fit of the form:

$$M = At + B$$

A confidence interval is calculated using a Student's T distribution. The sum of the leakage rate and confidence is the Upper Confidence Level.

3.3 TEST RESULTS

3.3.1 Presentation of Test Results

The test data for the November 1993 ILRT is based on an 24 hour test period starting at 1800 hours on November 9, 1993. The final test results were determined using Stone & Webster Engineering Corporation's ILRT computer program. The Reduced Input Data, Mass Point Analysis Test Results, Superimposed Leakage Verification Test Results, and representative graphs are contained in Attachment 3.3A through 3.3F.

The Mass Point Analysis Test Results for the ILRT satisfied the procedural acceptance criteria.

The ILRT instrumentation was verified by the Superimposed Leakage Verification Test Method. The Mass Point Analysis Test Results for the Superimposed Leakage Verification Test satisfied the procedural acceptance criteria.

3.3.2 59.4 PSIA ILRT Results

The ILRT was conducted in accordance with Beaver Valley Power Station Unit No. 2 test procedure 2BVT 1.47.2. The results for the ILRT and for the Supplemental Test are shown below:

3.3.2.1 ILRT Results - Mass Point Analysis

<u>Item</u>	<u>(Percent/Day)</u>
1. Lam, Leakage Rate Calculated	0.038918
2. Confidence Level	0.001192
3. UCL, Lam Leakage Rate plus Confidence Level	0.040110
4. Corrections for: (See Section 3.3.2.3)	
i. Type B Penalties	0.000123
ii. Type C Penalties	0.000742
iii. Water Levels	0.000000
iv. Total Corrections	0.000865
5. Total Reported ILRT Leakage Rate (Items 3 - 4)	0.040975

Results were within the acceptable limits of $< 0.75 \text{ La}$ or $< 0.075 \text{ Percent/Day}$

3.3.2.2 Supplemental Test Results

The Supplemental Verification Test was performed using the Superimposed Leakage Verification Test Method in accordance with test procedure 2BVT 1.47.2. The results for the Superimposed Leakage Verification Test are shown below.

1. The Superimposed Leakage Verification Test is acceptable provided L_c falls within the following range:

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

Where: L_{am} = Type A calculated leakage (computer)
= 0.038918 Percent/Day

L_o = Superimposed leakage rate developed from rotameter
= 0.10193 Percent/Day

L_c = Composite leakage (computer)
= 0.116522

a. Mass Point

$$(0.038918 + 0.10193 - 0.025) \leq 0.116522 \leq (0.038918 + 0.101193 + 0.025) \\ (0.115848) \leq 0.116522 \leq (0.165848)$$

The Superimposed Leakage Verification Test was within the allowable limits.

3.3.2.3 Leakage Penalties Added to ILRT Leakage

Penetration leakage to be added since these penetrations were isolated or could not be vented and drained during the ILRT. The leakage assigned is the recorded value for minimum pathway leakage.

<u>i. Type B Penalties</u>	<u>Description</u>	<u>Leakage (SCF/D)</u>
Electrical Penetrations	O-Rings	8.55

Total Type B Leakage = 8.55 SCF/D
 Total Type B Leakage = 0.000123 Percent/Day

<u>ii. Type C Penalties</u>	<u>Description</u>	<u>Leakage (SCF/D)</u>
Pent #1	Component Cooling Water System	9.71
Pent #2	Component Cooling Water System	17.96
Pent #4	Component Cooling Water System	6.30
Pent #5	Component Cooling Water System	11.66
Pent #14	Chilled Water System	0.48
Pent #21	Chilled Water System	0.49
Pent #24	RHS System to RWST	0.49
Pent #25	Chilled Water System	0.48
Pent #27	Chilled Water System	0.49
Pent #28	RCS Letdown	0.48
Pent #56-2	RCS Sample System	0.49
Pent #97-1	RHS Sample System	0.49
Pent #99	Fire Protection	0.49
Pent #101	Fire Protection	0.49
Pent #116	Fire Protection	0.49
Pent #117	Fire Protection	0.49

Total Type C Leakage = 51.48 SCF/D
 Total Type C Leakage = 0.000742 Percent/Day

iii. Water Level Corrections

Description

Leakage (SCF/D)

Rx Vessel
Crmt Sump

0.0
0.0

Total Water Level Corrections = 0.0 SCF/D
Total Water Level Corrections = 0.0 Percent/Day

3.3.2.4 As Found Containment Condition - LLRT Improvements

In order to account for the affect of Local Leakage Rate Test (LLRT) repairs (made prior to the ILRT) on the "as found" condition of containment, an analysis of LLRT results was performed.

The "as found" minimum pathway leakage rate is reviewed against the "as left" minimum pathway leakage rate for each LLRT penetration. If the penetration minimum pathway leakage rate is reduced because of repairs, maintenance, design changes, etc., then the leakage rate improvement is noted. The total of all these leakage rate improvements is the adjustment to the "as found" containment condition.

The minimum pathway leakage rate for the following LLRT penetrations was reduced as a result of repairs:

<u>PENT NO.</u>	<u>AS FOUND MINIMUM PATHWAY LEAKAGE (SCF/D)</u>	<u>AS LEFT MINIMUM PATHWAY LEAKAGE (SCF/D)</u>	<u>LEAKAGE DIFFERENCE (SCF/D)</u>
# 11	0.97	0.49	0.48
# 38	1.46	0.49	0.97
# 87	10.10	9.27	0.83
#106	0.50	0.49	0.01

Total Minimum Pathway Leakage Rate Improvement = 2.29 SCF/D

Total Minimum Pathway Leakage Rate Improvement = 0.000033 Percent/Day

Adding this "as found" containment adjustment to the reported ILRT results yields the following results:

<u>Item</u>	<u>(Percent/Day)</u>
1. Total Reported ILRT Leakage Rate (See Section 3.3.2.1)	0.040975
2. As Found Containment Adjustment	0.000033
3. Total Containment Leakage Rate	0.041008

3.3.3 Conclusion

No significant leakage paths were identified during the performance of the ILRT. Containment temperature stabilization significantly influenced the mass trend, which directly affected the containment leakage and the test duration. At the start of the test, it appeared that the containment steel liner and concrete shell were at a lower temperature than the containment atmosphere. Therefore, during the performance of the test, the liner and shell absorbed heat from the containment atmosphere until the difference in temperature was minimal. Without the assistance of forced ventilation, the temperature stabilization took much longer than previously assumed. No ventilation equipment was operated during the BVPS #2 November ILRT.

Consideration for future ILRT's will be given to use forced ventilation in containment prior to the start of the ILRT. One possibility might involve operation of one or more Containment Air Recirculation Fans for at least 48 hours prior to the start of pressurization, in an attempt to equalize the liner and shell temperature with the containment atmosphere. Also, the pressurization air temperature should be maintained as close as possible to the containment atmosphere temperature, even if the pressurization rate must be decreased.

ATTACHMENT 3.2A

INSTRUMENTATION LIST

<u>Instrument</u>	<u>Weight Factor</u>	<u>Range</u>	<u>Zone</u>	<u>Elevation</u>
A. <u>Temperature</u>				
2IMS-TE100-1	0.05810	60 - 100 °F	II	781'
2IMS-TE100-2	0.06915	60 - 100 °F	III	801' 6"
2IMS-TE100-3	0.05550	60 - 100 °F	V	701' 6"
2IMS-TE100-4	0.03610	60 - 100 °F	IV	745' 6"
2IMS-TE100-5	0.07440	60 - 100 °F	I	865'
2IMS-TE100-6	0.06915	60 - 100 °F	III	791'
2IMS-TE100-7	0.05810	60 - 100 °F	II	781'
2IMS-TE100-8	0.02340	60 - 100 °F	IV	743'
2IMS-TE100-9	0.03880	60 - 100 °F	V	701' 6"
2IMS-TE100-10	0.07440	60 - 100 °F	I	865'
2IMS-TE100-11	0.02730	60 - 100 °F	IV	730'
2IMS-TE100-12	0.06915	60 - 100 °F	III	794'
2IMS-TE100-13	0.06915	60 - 100 °F	III	802'
2IMS-TE100-14	0.06680	60 - 100 °F	V	701' 6"
2IMS-TE100-15	0.05810	60 - 100 °F	II	777' 4"
2IMS-TE100-16	0.03880	60 - 100 °F	V	701' 6"
2IMS-TE100-17	0.07440	60 - 100 °F	I	865'
2IMS-TE100-18	0.03920	60 - 100 °F	IV	726' 6"
2IMS-TE100-19	0.00000	60 - 100 °F	N/A	741'
2IMS-TE100-20	0.00000	60 - 100 °F	N/A	727'

ATTACHMENT 3.2A (continued)

INSTRUMENTATION LIST

<u>Instrument</u>	<u>Weight Factor</u>	<u>Range</u>	<u>Zone</u>	<u>Elevation</u>
B. <u>Dewpoint</u>				
2IMS-ME100-1	0.111624	-58-122°F	I	848'
2IMS-ME100-2	0.111624	-58-122°F	I	848'
2IMS-ME100-3	0.258917	-58-122°F	II	701'
2IMS-ME100-4	0.258917	-58-122°F	II	701'
2IMS-ME100-5	0.258918	-58-122°F	II	701'
C. <u>Pressure</u>				
I-I-2.3299	0.500000	0-100 PSIA		
I-I-2.6116	0.500000	0-100 PSIA		
D. <u>Superimposed Leakage Verification Test Flow Instrument</u>				
I-A-1.553.2 (FI-SL-1)	0.000000	0-8 SCFM		
I-A-1.553.3 (FI-SL-2)	1.000000	0-8 SCFM		

ATTACHMENT 3.2B

INSTRUMENTATION SELECTION GUIDE

The Instrumentation Selection Guide (ISG) formula is used to determine the ability of an instrumentation system to measure the integrated leakage of the reactor containment system. Instrumentation errors are combined using a root-sum-square formula. The ISG is not added to the value of the calculated leakage rate, but is used for instrument selection and loss of sensor criteria only. Measurement system sensitivity values are used in the ISG formula since it is the change in the containment air mass, not the absolute value in mass, that is used to compute leakage. The following is the information used to calculate the ISG.

	<u>Quartz Manometer</u>	<u>Chilled Motor Hygrometer</u>	<u>100 OHM Platinum RTD</u>
Sensor Manufacturer	D.H. Instruments	General Eastern	PYCO
Number of Sensors (n)	2	5	18
Parameter Measured	Total Pressure, PSIA (p)	Dew Point, °F (pv)	Temperature °R (T)
Absolute Value	59.4 PSIA	60 °F	530 °R

ATTACHMENT 3.2B (continued)

INSTRUMENTATION SELECTION GUIDE

NOTE: From the Steam Tables, at a dew point temperature of 60 °F the equivalent water vapor pressure gradient is 0.0092 PSIA/°F. Sensor Sensitivity (E), and Repeatability and Resolution (C) for the Hygrometer's were converted to PSIA prior to calculating the total system error (e).

	Quartz Manometer	Chilled Mirror Hygrometer	Platinum RTD
Sensor Sensitivity (E)	0.001	0.11	0.1
Repeatability and Resolution of System Excluding Sensor (C)	0	0.1	0.05
Total System Error (e)	0.001	* 6.1164E-04	0.02635

$$e = [(E^2 + C^2)/n]^{1/2}$$

The following equation was used to calculate the ISG:

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

where:

- t = test duration, Hours
- e_p = system error for pressure, PSIA
- e_{pv} = system error for dewpoint, PSIA
- e_T = system error for temperature, °R

* This number was converted to equivalent water vapor pressure.

ATTACHMENT 3.2B (continued)

INSTRUMENTATION SELECTION GUIDE

The ISG (24 Hrs) was calculated as follows:

$$ISG = \frac{2400}{24} \left[2 \left[\frac{0.001}{59.4} \right]^2 + 2 \left[\frac{6.1164E-04}{59.4} \right]^2 + 2 \left[\frac{0.02635}{530} \right]^2 \right]^{1/2}$$

$$ISG = \frac{2400}{24} \left[5.6684E-10 + 2.1206E-10 + 4.9436E-09 \right]^{1/2}$$

$$ISG = 0.00756 \text{ Pct/Day (Maximum allowable ISG = 0.025 Pct/Day)}$$

Time (t) at the maximum ISG was calculated as follows:

$$t = \frac{2400}{0.025} \left[5.6684E-10 + 2.1206E-10 + 4.9436E-09 \right]^{1/2}$$

$$t = 7.26 \text{ Hours}$$

ATTACHMENT 3.3A
INTEGRATED LEAKAGE RATE TEST
FROM 1800 HOURS ON 11/9/93 TO 1800 HOURS ON 11/10/93
REDUCED INPUT VARIABLES

Time (hh:mm)	Press. (PSIA)	V.P. (PSI)	Temp. (R)	Dewpoint (F)	Mass (LbM)
18:00	60.707	0.2463	531.851	58.902	526732.27
18:15	60.706	0.2461	531.845	58.887	526733.65
18:30	60.705	0.2467	531.836	58.949	526726.91
18:45	60.705	0.2463	531.820	58.905	526740.92
19:00	60.704	0.2457	531.807	58.839	526753.50
19:15	60.703	0.2458	531.821	58.853	526730.66
19:30	60.702	0.2460	531.805	58.870	526734.04
19:45	60.701	0.2464	531.805	58.921	526722.82
20:00	60.700	0.2467	531.811	58.947	526708.50
20:15	60.699	0.2466	531.799	58.936	526712.80
20:30	60.698	0.2468	531.778	58.959	526721.03
20:45	60.697	0.2467	531.786	58.946	526708.50
21:00	60.697	0.2468	531.792	58.959	526695.99
21:15	60.696	0.2470	531.784	58.982	526694.34
21:30	60.694	0.2466	531.772	58.936	526698.11
21:45	60.694	0.2472	531.771	59.005	526689.32
22:00	60.693	0.2472	531.765	59.010	526686.35
22:15	60.692	0.2470	531.768	58.987	526674.45
22:30	60.691	0.2473	531.756	59.016	526677.46
22:45	60.691	0.2473	531.749	59.016	526683.89
23:00	60.690	0.2463	531.755	58.902	526681.04
23:15	60.690	0.2469	531.736	58.975	526689.92
23:30	60.689	0.2466	531.728	58.941	526692.06
23:45	60.688	0.2472	531.732	59.006	526675.18
00:00	60.687	0.2490	531.719	59.210	526663.16
00:15	60.686	0.2469	531.731	58.973	526664.81
00:30	60.685	0.2471	531.731	58.993	526654.28
00:45	60.685	0.2468	531.717	58.957	526666.06
01:00	60.684	0.2467	531.721	58.949	526659.27
01:15	60.683	0.2470	531.712	58.979	526657.79
01:30	60.683	0.2472	531.714	59.005	526649.70
01:45	60.682	0.2473	531.702	59.021	526651.29
02:00	60.681	0.2473	531.692	59.023	526654.11
02:15	60.681	0.2476	531.706	59.053	526632.98
02:30	60.680	0.2478	531.696	59.080	526636.30
02:45	60.680	0.2477	531.688	59.064	526640.49
03:00	60.679	0.2478	531.689	59.074	526633.07
03:15	60.678	0.2478	531.697	59.077	526617.46
03:30	60.677	0.2480	531.674	59.097	526633.14
03:45	60.677	0.2479	531.677	59.090	526625.94
04:00	60.677	0.2480	531.672	59.093	526629.93
04:15	60.676	0.2477	531.674	59.064	526621.37
04:30	60.675	0.2480	531.672	59.103	526613.66
04:45	60.675	0.2477	531.661	59.059	526624.17
05:00	60.674	0.2475	531.656	59.042	526627.21
05:15	60.673	0.2476	531.654	59.049	526621.70
05:30	60.673	0.2471	531.652	59.001	526621.69
05:45	60.672	0.2475	531.636	59.043	526628.10

ATTACHMENT 3.3A
INTEGRATED LEAKAGE RATE TEST
FROM 1800 HOURS ON 11/9/93 TO 1800 HOURS ON 11/10/93
REDUCED INPUT VARIABLES
(continued)

Time (hh:mm)	Press. (PSIA)	V.P. (PSI)	Temp. (R)	Dewpoint (F)	Mass (LbM)
06:00	60.671	0.2476	531.634	59.049	526624.16
06:15	60.671	0.2468	531.639	58.959	526620.57
06:30	60.670	0.2476	531.640	59.049	526604.75
06:45	60.669	0.2477	531.637	59.059	526604.13
07:00	60.668	0.2477	531.623	59.062	526605.77
07:15	60.668	0.2476	531.629	59.053	526598.08
07:30	60.668	0.2478	531.611	59.077	526611.74
07:45	60.666	0.2479	531.612	59.087	526600.27
08:00	60.666	0.2479	531.610	59.087	526597.84
08:15	60.665	0.2478	531.602	59.076	526600.16
08:30	60.664	0.2482	531.599	59.118	526592.52
08:45	60.664	0.2481	531.594	59.113	526594.82
09:00	60.663	0.2482	531.579	59.118	526599.99
09:15	60.662	0.2481	531.583	59.112	526587.34
09:30	60.661	0.2481	531.579	59.105	526585.81
09:45	60.661	0.2484	531.576	59.141	526581.97
10:00	60.660	0.2485	531.582	59.158	526569.24
10:15	60.659	0.2486	531.570	59.166	526574.51
10:30	60.659	0.2484	531.562	59.146	526582.17
10:45	60.658	0.2478	531.557	59.074	526583.74
11:00	60.658	0.2480	531.554	59.100	526579.08
11:15	60.656	0.2481	531.549	59.106	526571.96
11:30	60.656	0.2483	531.536	59.126	526580.97
11:45	60.655	0.2470	531.537	58.986	526580.40
12:00	60.654	0.2479	531.534	59.087	526570.69
12:15	60.653	0.2478	531.535	59.079	526563.30
12:30	60.653	0.2482	531.528	59.120	526568.34
12:45	60.653	0.2480	531.531	59.097	526559.78
13:00	60.652	0.2484	531.515	59.141	526566.88
13:15	60.651	0.2483	531.521	59.134	526553.36
13:30	60.651	0.2484	531.511	59.141	526559.72
13:45	60.650	0.2486	531.511	59.164	526549.55
14:00	60.649	0.2486	531.495	59.164	526561.91
14:15	60.649	0.2487	531.493	59.179	526556.78
14:30	60.648	0.2488	531.492	59.189	526548.25
14:45	60.647	0.2487	531.480	59.177	526557.93
15:00	60.647	0.2487	531.475	59.179	526562.23
15:15	60.646	0.2490	531.482	59.213	526541.53
15:30	60.645	0.2488	531.473	59.185	526547.58
15:45	60.645	0.2491	531.471	59.219	526545.21
16:00	60.645	0.2491	531.462	59.223	526546.75
16:15	60.644	0.2488	531.467	59.191	526536.64
16:30	60.643	0.2471	531.467	58.998	526543.25
16:45	60.642	0.2489	531.463	59.200	526526.00
17:00	60.642	0.2491	531.459	59.221	526528.73
17:15	60.641	0.2483	531.442	59.131	526545.25
17:30	60.641	0.2487	531.445	59.177	526534.55
17:45	60.640	0.2486	531.435	59.164	526541.45
18:00	60.639	0.2487	531.440	59.179	526527.67

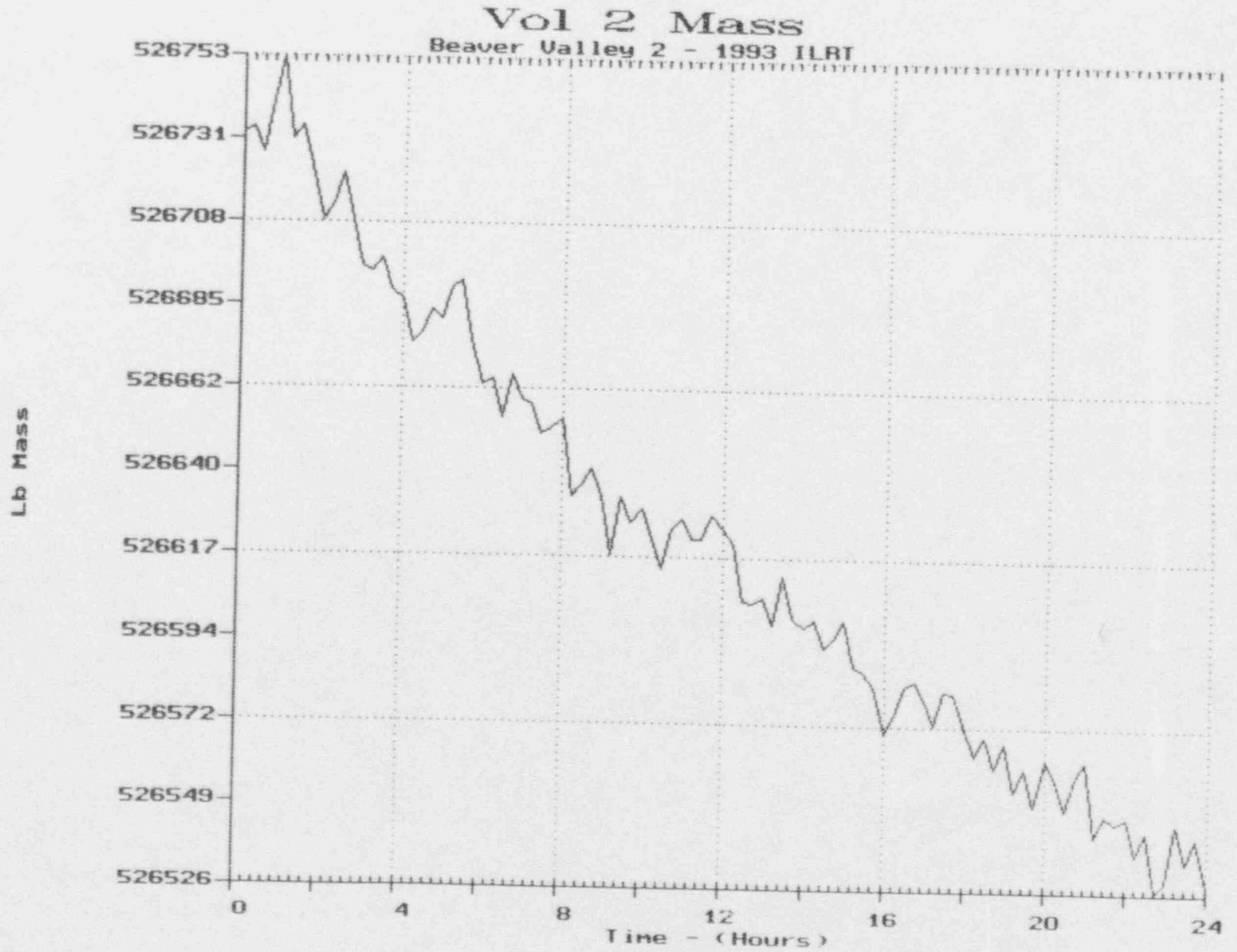
ATTACHMENT 3.3B
 INTEGRATED LEAKAGE RATE TEST
 FROM 1800 HOURS ON 11/9/93 TO 1800 HOURS ON 11/10/93
 ABSOLUTE TEST METHOD, MASS POINT ANALYSIS TEST METHOD

Time (hr:mm)	Mass (LbM)	Leakage (PCT./DAY)	Confidence (PCT./DAY)	UCL (PCT./DAY)
18:00	526732.27	0.000000	0.000000	0.000000
18:15	526733.65	0.000000	0.000000	0.000000
18:30	526726.91	0.048834	0.365898	0.414732
18:45	526740.92	-0.034991	0.153108	0.118118
19:00	526753.50	-0.090615	0.103547	0.012932
19:15	526730.66	-0.034100	0.092763	0.058664
19:30	526734.04	-0.016868	0.065159	0.048291
19:45	526722.82	0.008761	0.054957	0.063718
20:00	526708.50	0.037535	0.052090	0.089625
20:15	526712.80	0.045858	0.041753	0.087611
20:30	526721.03	0.041501	0.033921	0.075423
20:45	526708.50	0.046169	0.028330	0.074499
21:00	526695.99	0.054987	0.025425	0.080412
21:15	526694.34	0.059817	0.022172	0.081990
21:30	526698.11	0.059744	0.019080	0.078824
21:45	526689.32	0.061911	0.016740	0.078651
22:00	526686.35	0.063246	0.014756	0.078001
22:15	526674.45	0.066878	0.013561	0.080438
22:30	526677.46	0.067555	0.012104	0.079659
22:45	526683.89	0.065410	0.011067	0.076476
23:00	526681.04	0.063646	0.010136	0.073782
23:15	526689.92	0.059649	0.010014	0.069663
23:30	526692.06	0.055535	0.009994	0.065529
23:45	526675.18	0.054888	0.009163	0.064051
00:00	526663.16	0.055900	0.008472	0.064372
00:15	526664.81	0.055961	0.007806	0.063767
00:30	526654.28	0.057088	0.007301	0.064389
00:45	526666.06	0.055982	0.006856	0.062838
01:00	526659.27	0.055557	0.006387	0.061945
01:15	526657.79	0.055028	0.005976	0.061004
01:30	526649.70	0.055153	0.005585	0.060738
01:45	526651.29	0.054778	0.005243	0.060021
02:00	526654.11	0.053900	0.004994	0.058894
02:15	526632.98	0.054837	0.004784	0.059622
02:30	526636.30	0.055074	0.004512	0.059586
02:45	526640.49	0.054681	0.004275	0.058956
03:00	526633.07	0.054692	0.004041	0.058733
03:15	526617.46	0.055632	0.003933	0.059565
03:30	526633.14	0.055121	0.003762	0.058883
03:45	526625.94	0.054962	0.003574	0.058536
04:00	526629.93	0.054380	0.003445	0.057825
04:15	526621.37	0.054215	0.003282	0.057498
04:30	526613.66	0.054346	0.003130	0.057476
04:45	526624.17	0.053714	0.003049	0.056763
05:00	526627.21	0.052847	0.003031	0.055878
05:15	526621.70	0.052220	0.002961	0.055181
05:30	526621.69	0.051531	0.002911	0.054442
05:45	526628.10	0.050496	0.002963	0.053460

ATTACHMENT 3.3B
INTEGRATED LEAKAGE RATE TEST
FROM 1800 HOURS ON 11/9/93 TO 1800 HOURS ON 11/10/93
ABSOLUTE TEST METHOD, MASS POINT ANALYSIS TEST METHOD
(continued)

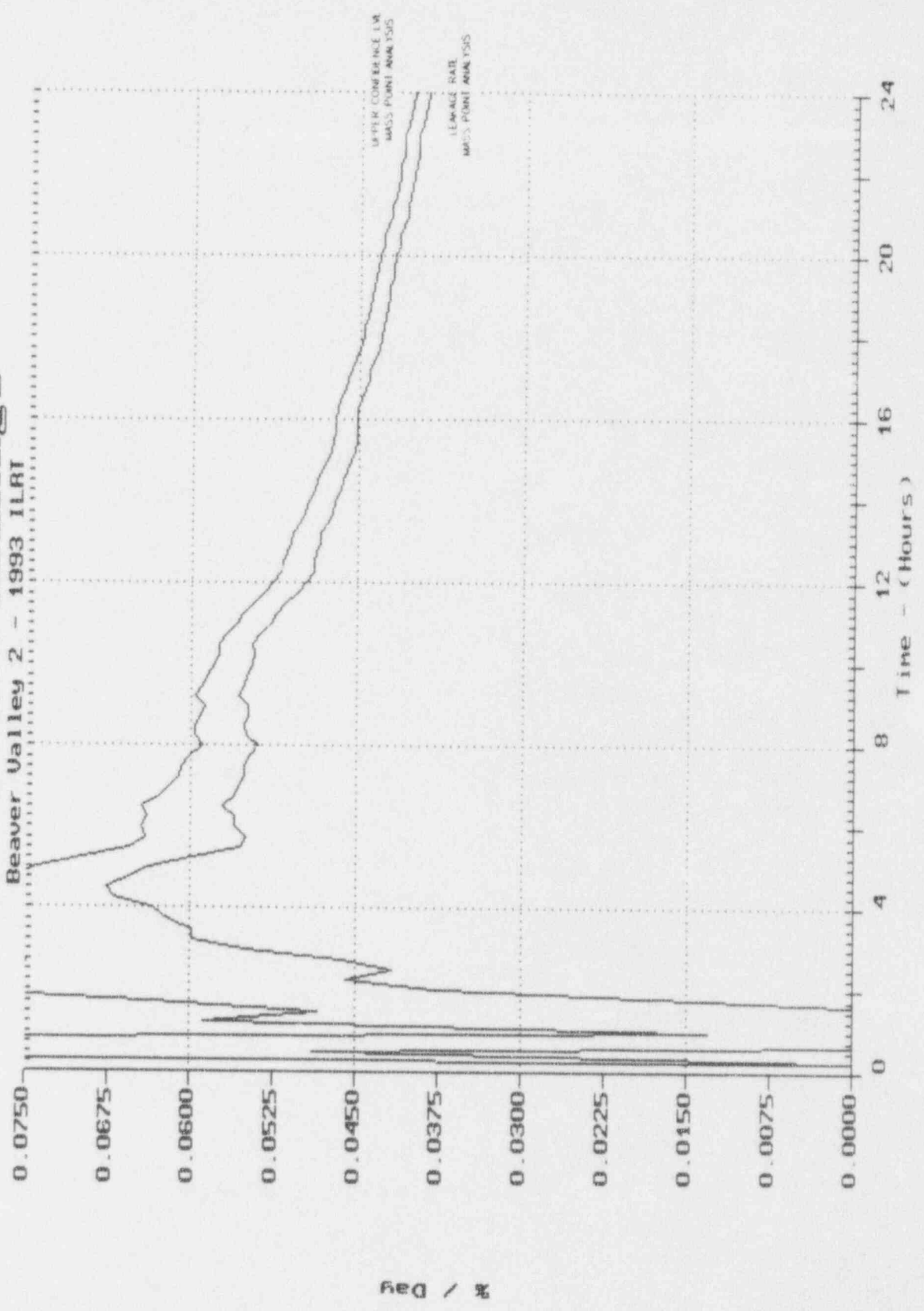
Time (hh:mm)	Mass (LbM)	Leakage (PCT./DAY)	Confidence (PCT./DAY)	UCL (PCT./DAY)
06:00	526624.16	0.049635	0.002961	0.052596
06:15	526620.57	0.048910	0.002927	0.051837
06:30	526604.75	0.048808	0.002813	0.051621
06:45	526604.13	0.048636	0.002709	0.051345
07:00	526605.77	0.048319	0.002623	0.050942
07:15	526598.08	0.048221	0.002527	0.050748
07:30	526611.74	0.047554	0.002518	0.050072
07:45	526600.27	0.047259	0.002444	0.049703
08:00	526597.84	0.046990	0.002372	0.049362
08:15	526600.16	0.046590	0.002322	0.048912
08:30	526592.52	0.046387	0.002251	0.048638
08:45	526594.82	0.046059	0.002198	0.048257
09:00	526599.99	0.045540	0.002184	0.047724
09:15	526587.34	0.045353	0.002120	0.047474
09:30	526585.81	0.045158	0.002061	0.047219
09:45	526581.97	0.045016	0.002001	0.047017
10:00	526569.24	0.045149	0.001943	0.047092
10:15	526574.51	0.045078	0.001885	0.046963
10:30	526582.17	0.044770	0.001852	0.046622
10:45	526583.74	0.044394	0.001833	0.046228
11:00	526579.08	0.044101	0.001802	0.045903
11:15	526571.96	0.043936	0.001757	0.045693
11:30	526580.97	0.043540	0.001750	0.045289
11:45	526580.40	0.043138	0.001744	0.044882
12:00	526570.69	0.042917	0.001709	0.044626
12:15	526563.30	0.042812	0.001666	0.044478
12:30	526568.34	0.042574	0.001637	0.044211
12:45	526559.78	0.042471	0.001597	0.044068
13:00	526566.88	0.042204	0.001576	0.043780
13:15	526553.36	0.042155	0.001536	0.043691
13:30	526559.72	0.041960	0.001509	0.043469
13:45	526549.55	0.041912	0.001472	0.043384
14:00	526561.91	0.041627	0.001461	0.043088
14:15	526556.78	0.041407	0.001441	0.042848
14:30	526548.25	0.041301	0.001409	0.042711
14:45	526557.93	0.041020	0.001402	0.042422
15:00	526562.23	0.040660	0.001412	0.042072
15:15	526541.53	0.040594	0.001380	0.041974
15:30	526547.58	0.040415	0.001359	0.041774
15:45	526545.21	0.040249	0.001338	0.041587
16:00	526546.75	0.040044	0.001322	0.041366
16:15	526536.64	0.039957	0.001295	0.041252
16:30	526543.25	0.039761	0.001281	0.041042
16:45	526526.00	0.039770	0.001253	0.041023
17:00	526528.73	0.039717	0.001227	0.040944
17:15	526545.25	0.039439	0.001230	0.040669
17:30	526534.55	0.039280	0.001213	0.040493
17:45	526541.45	0.039024	0.001213	0.040237
18:00	526527.67	0.038918	0.001192	0.040110

BEAVER VALLEY POWER STATION UNIT NO. 2
INTEGRATED LEAKAGE RATE TEST
ATTACHMENT 3.3C - CNMT AIR MASS vs TIME



BEAVER VALLEY POWER STATION UNIT NO. 2
INTEGRATED LEAKAGE RATE TEST
ATTACHMENT 3.3D - CNMT LEAKAGE RATE VS TIME

Mass Point Leakage Beaver Valley 2 - 1993 ILRI



ATTACHMENT 3.3E
 SUPERIMPOSED LEAKAGE VERIFICATION TEST
 FROM 1900 HOURS ON 11/10/93 TO 2300 HOURS ON 11/10/93
 REDUCED INPUT VARIABLES

Time (hh:mm)	Press. (PSIA)	V.P. (PSI)	Temp. (R)	Dewpoint (F)	Mass (LbM)
19:00	60.635	0.2489	531.422	59.195	526506.22
19:15	60.633	0.2491	531.423	59.225	526488.44
19:30	60.633	0.2489	531.426	59.196	526482.66
19:45	60.632	0.2491	531.409	59.222	526486.16
20:00	60.630	0.2493	531.409	59.248	526470.62
20:15	60.629	0.2492	531.412	59.228	526463.95
20:30	60.628	0.2494	531.399	59.256	526462.47
20:45	60.627	0.2493	531.390	59.244	526465.73
21:00	60.626	0.2495	531.389	59.269	526456.01
21:15	60.625	0.2496	531.403	59.279	526431.03
21:30	60.624	0.2493	531.391	59.246	526435.46
21:45	60.623	0.2497	531.385	59.289	526428.43
22:00	60.622	0.2495	531.392	59.266	526413.27
22:15	60.621	0.2493	531.384	59.246	526413.70
22:30	60.619	0.2493	531.380	59.246	526404.77
22:45	60.619	0.2485	531.377	59.157	526410.16
23:00	60.617	0.2488	531.369	59.186	526405.60

ATTACHMENT 3.3F
 SUPERIMPOSED LEAKAGE VERIFICATION TEST
 FROM 1900 HOURS ON 11/10/93 TO 2300 HOURS ON 11/10/93
 ABSOLUTE TEST METHOD, MASS POINT ANALYSIS TEST METHOD

Time (hh:mm)	Mass (LbM)	Leakage (PCT./DAY)	Confidence (PCT./DAY)	UCL (PCT./DAY)
19:00	526506.22	0.000000	0.000000	0.000000
19:15	526488.44	0.000000	0.000000	0.000000
19:30	526482.66	0.214841	0.540810	0.755651
19:45	526486.16	0.120268	0.180906	0.301174
20:00	526470.62	0.133982	0.085638	0.219620
20:15	526463.95	0.136141	0.050829	0.186970
20:30	526462.47	0.125207	0.036275	0.161483
20:45	526465.73	0.105264	0.034359	0.139622
21:00	526456.01	0.100762	0.026412	0.127174
21:15	526431.03	0.117819	0.027624	0.145443
21:30	526435.46	0.118091	0.022236	0.140327
21:45	526428.43	0.118635	0.018302	0.136937
22:00	526413.27	0.124166	0.016364	0.140530
22:15	526413.70	0.123872	0.013911	0.137783
22:30	526404.77	0.124655	0.011997	0.136652
22:45	526410.16	0.120264	0.011350	0.131613
23:00	526405.60	0.116522	0.010658	0.127180

SECTION 4

LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

Local Leak Rate Testing (LLRT) of containment penetrations is performed on a periodic basis (normally each refueling, but not exceeding 24 months), in accordance with 10 CFR 50 Appendix J and Beaver Valley Power Station #2 Technical Specifications. These LLRT's are performed by pressurizing the required penetrations with air or nitrogen and either measuring leakage across the containment isolation valves boundary (Type C), or across the resilient seals (Type B). The combined leakage rate of containment penetrations subject to LLRT's shall be less than 60 percent La, at a minimum test pressure of Pa.

Additionally LLRT's (Total Volume Type B) are performed for each containment airlock at 6 month intervals in accordance with 10 CFR 50 Appendix J, and Beaver Valley Power Station #2 Technical Specifications.

The Attachments for this section are:

<u>Attachment No.</u>	<u>Title</u>
4.1A	Third Refueling (3/92 - 4/92) LLRT Data
4.1B	Third Refueling (3/92 - 4/92) LLRT Repairs
4.1C	Fourth Refueling (9/93 - 11/93) LLRT Data
4.1D	Fourth Refueling (9/93 - 11/93) LLRT Repairs
4.1E	Third and Fourth Fuel Cycle LLRT Data

ATTACHMENT 4.1A

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
1	2CCP*MOV157-2	X		04-04-92	13.23	29.40	33.30
	2CCP*MOV157-1		X	04-04-92	12.74	33.30	
	2CCP*RV105	X		PARALLEL WITH 2CCP*MOV157-1			
2	2CCP*MOV150-2	X		04-06-92	88.03	88.03	88.03
	2CCP*MOV150-1		X	04-06-92	78.25	78.25	
	2CCP*RV105	X		PARALLEL WITH 2CCP*MOV150-1			
4	2CCP*MOV151-2	X		04-05-92	14.70	29.30	29.30
	2CCP*MOV151-1		X	04-05-92	14.70	0.49	
	2CCP*RV103	X		PARALLEL WITH 2CCP*MOV151-1			
5	2CCP*MOV156-2	X		04-06-92	14.20	14.20	14.20
	2CCP*MOV156-1		X	04-06-92	2.45	2.45	
	2CCP*RV104	X		PARALLEL WITH 2CCP*MOV156-1			
11	2IAC*MOV133	X		04-18-92	5.90	4.90	4.90
	2IAC*MOV134		X	04-18-92	0.49	0.49	
14	2SWS*MOV153-2	X		03-20-92	1.95	1.95	2.92
	2SWS*MOV153-1		X	03-20-92	2.92	2.92	
	2SWS*RV153		X	PARALLEL WITH 2SWS*MOV153-1			
19	2CHS*MOV378	X		03-30-92	0.49	0.49	0.49
	2CHS*473	X		PARALLEL WITH 2CHS*MOV378			
	2CHS*MOV381		X	04-14-92	9.80	0.49	
20	2SIS*42	X		04-15-92	0.49	0.49	0.50
	2SIS*41		X	04-26-92	0.49	0.50	
	2SIS*RV130		X	PARALLEL WITH 2SIS*41			
TOTAL PENETRATION LEAKAGE FOR PAGE 2 (SCF/D)							173.64

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
21	2SWS*MOV155-2	X		04-13-92	0.49	0.49	0.49
	2SWS*MOV155-1		X	04-13-92	0.49	0.49	
	2SWS*RV155		X	PARALLEL WITH 2SWS*MOV155-1			
24	2RHS*107	X		04-04-92	0.49	0.49	0.49
	2RHS*15		X	04-04-92	0.49	0.49	
	2RHS*RV100		X	PARALLEL WITH 2RHS*15			
25	2SWS*MOV154-2	X		03-20-92	0.49	0.49	0.49
	2SWS*MOV154-1		X	03-28-92	0.49	0.49	
	2SWS*RV154		X	PARALLEL WITH 2SWS*MOV154-1			
27	2SWS*MOV152-2	X		04-13-92	0.49	0.49	0.49
	2SWS*MOV152-1		X	04-13-92	0.49	0.49	
	2SWS*RV152	X		PARALLEL WITH 2SWS*MOV152-1			
28	2CHS*AOV200A	X		03-30-92	0.50	0.50	1.48
	2CHS*AOV200B	X		PARALLEL WITH 2CHS*AOV200A			
	2CHS*AOV200C	X		PARALLEL WITH 2CHS*AOV200A			
	2CHS*HCV142	X		03-30-92	0.49	0.49	
	2CHS*RV203	X		04-08-92	0.49	0.49	
	2CHS*AOV204		X	03-30-92	0.49	0.49	
29	2DGS*AOV108A	X		04-03-92	0.49	0.49	0.49
	2DGS*AOV108B		X	04-03-92	0.49	0.49	
	2DGS*RV115		X	PARALLEL WITH 2DGS*AOV108B			
TOTAL PENETRATION LEAKAGE FOR PAGE 3 (SCF/D)							3.93

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
38	2DAS*AOV100A	X		04-24-92	1.27	0.49	0.68
	2DAS*AOV100B		X	04-18-92	0.68	0.68	
	2DAS*RV110		X	PARALLEL WITH 2DAS*AOV100B			
42	2SAS*15	X		03-17-92	59.07	1.23	1.23
	2SAS*14		X	03-17-92	167.53	0.49	
43	2CVS*93	X		04-07-92	587.50	5.87	5.87
	2CVS*SOV102		X	04-01-92	0.49	0.49	
44	2CVS*SOV153B	X		04-01-92	2.94	2.94	4.15
	2CVS*SOV153A		X	04-17-92	318.20	4.15	
45	2RCS*72	X		03-18-92	0.49	0.49	0.49
	2RCS*AOV519		X	03-18-92	0.49	0.49	
	2RCS*RV100		X	PARALLEL WITH 2RCS*AOV519			
48	2VRS*AOV109A2	X		03-26-92	0.49	0.49	0.49
	2VRS*AOV109A1		X	03-26-92	0.49	0.49	
49	2RCS*68	X		04-03-92	3.91	3.91	3.91
	2RCS*AOV101		X	04-03-92	3.42	3.42	
53	2GNS*AOV101-2	X		04-15-92	32.30	32.30	32.30
	2GNS*AOV101-1		X	04-15-92	0.50	0.50	
55-1	2SSR*AOV109A1	X		04-03-92	0.49	0.49	0.49
	2SSR*AOV109A2		X	04-03-92	0.49	0.49	
	2SSR*RV117		X	PARALLEL WITH 2SSR*AOV109A2			
TOTAL PENETRATION LEAKAGE FOR PAGE 4 (SCF/D)							49.61

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
55-2	2SSR*SOV130A1	X		04-20-92	0.49	0.49	0.49
	2SSR*SOV130A2		X	04-20-92	0.49	0.49	
55-3	2HCS*SOV136A	X		03-23-92	0.49	0.49	0.49
	2HCS*SOV136B		X	04-06-92	0.49	0.49	
56-1	2SSR*AOV102A1	X		04-16-92	0.49	0.49	0.49
	2SSR*AOV102A2		X	04-16-92	0.49	0.49	
	2SSR*RV118		X	PARALLEL WITH 2SSR*AOV102A2			
56-2	2SSR*AOV128A1	X		03-21-92	4.39	4.39	24.39
	2SSR*AOV128A2		X	03-21-92	24.39	24.39	
	2SSR*RV120		X	PARALLEL WITH 2SSR*AOV128A2			
56-3	2SSR*AOV100A1	X		03-21-92	0.49	0.49	0.49
	2SSR*AOV100A2		X	04-01-92	0.49	0.49	
	2SSR*RV119		X	PARALLEL WITH 2SSR*AOV100A2			
57-1	2SSR*AOV112A1	X		04-03-92	0.49	0.49	9.79
	2SSR*AOV112A2		X	04-03-92	9.79	9.79	
	2SSR*RV121		X	PARALLEL WITH 2SSR*AOV112A2			
57-2	2HCS*SOV135A	X		03-23-92	0.98	0.98	0.98
	2HCS*SOV135B		X	03-23-92	0.98	0.98	
59	2IAC*22		X	03-19-92	0.49	0.49	0.98
	2IAC*MOV130		X	04-07-92	0.49	0.98	
TOTAL PENETRATION LEAKAGE FOR PAGE 5 (SCF/D)							38.10

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
63	2QSS*4	X		04-18-92	0.49	0.49	7.83
	2QSS*MOV101A		X	04-14-92	0.49	7.83	
	2QSS*RV101A		X	PARALLEL WITH 2QSS*MOV101A			
64	2QSS*3	X		04-20-92	19.60	1.95	3.41
	2QSS*MOV101B		X	04-20-92	0.49	3.41	
	2QSS*RV101B		X	PARALLEL WITH 2QSS*MOV101B			
87	2HCS*111		X	03-17-92	10.34	10.34	10.34
	2HCS*MOV117		X	03-17-92	10.34	10.34	
88	2HCS*110		X	03-17-92	0.49	0.49	0.49
	2HCS*MOV116		X	03-17-92	0.49	0.49	
90	2HVR*MOD23B	X		04-04-92	195.10	142.00	142.00
	2HVR*MOD23A		X				
91	2HVR*MOD25B	X		04-04-92	536.50	102.80	102.80
	2HVR*MOD25A		X				
	2HVR*DMP206		X				
92	2HCS*SOV114B		X	03-31-92	0.98	0.98	18.60
	2HCS*SOV115B		X	03-31-92	0.98	0.98	
	2CVS*SOV151B		X	03-31-92	0.98	0.98	
	2CVS*SOV152B		X	03-31-92	17.62	17.62	
93	2HCS*SOV114A		X	03-31-92	14.70	14.70	29.88
	2HCS*SOV115A		X	03-31-92	13.72	13.72	
	2CVS*SOV151A		X	03-31-92	15.18	15.18	
	2CVS*SOV152A		X	03-31-92	10.29	10.29	
TOTAL PENETRATION LEAKAGE FOR PAGE 6 (SCF/D)							315.35

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
94	2CVS*151	X		03-16-92	5.91	5.91	5.91
	2CVS*151-1		X	03-16-92	0.49	0.49	
97-1	2SSR*AOV129A1	X		03-21-92	29.26	29.26	29.26
	2SSR*AOV129A2		X	04-20-92	0.49	0.49	
	2SSR*RV122		X	PARALLEL WITH 2SSR*AOV129A2			
97-2	2HCS*SOV133B	X		03-23-92	0.49	0.49	0.49
	2HCS*SOV134B		X	03-23-92	0.49	0.49	
99	2FPW*761	X		04-15-92	0.49	0.49	1.71
	2FPW*AOV206		X	04-02-92	1.71	1.71	
101	2FPW*753	X		04-01-92	0.49	0.49	1.47
	2FPW*AOV205		X	04-01-92	1.47	1.47	
103	2FNC*121	X		04-03-92	0.49	0.49	0.49
	2FNC*38		X	04-03-92	0.49	0.49	
104	2FNC*122	X		04-03-92	0.49	0.49	0.49
	2FNC*9		X	04-03-92	0.49	0.49	
105-1	2HCS*SOV133A	X		03-23-92	3.75	3.75	3.75
	2HCS*SOV134A		X	03-23-92	0.49	0.49	
105-2	2PAS*SOV105A1	X		04-19-92	0.98	0.98	1.17
	2PAS*SOV105A2		X	04-19-92	1.17	1.17	
105-3	2LMS*51		X	03-22-92	0.49	0.49	0.49
	2LMS*52		X	03-22-92	0.49	0.49	
TOTAL PENETRATION LEAKAGE FOR PAGE 7 (SCF/D)							45.23

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
106	2SIS*MOV842	X		03-20-92	0.50	0.50	0.50
	2SIS*AOV889		X	03-23-92	0.50	0.49	
	2SIS*RV175		X	PARALLEL WITH 2SIS*AOV889			
116	2FPW*388	X		04-06-92	0.49	0.49	0.49
	2FPW*AOV221		X	03-28-92	0.49	0.49	
117	2FPW*382	X		04-07-92	9.79	0.49	14.69
	2FPW*AOV204		X	03-28-92	14.69	14.69	
118	2QSS*267	X		04-18-92	0.49	0.49	8.84
	2QSS*SOV100A		X	04-13-92	8.84	8.84	
	2QSS*SOV100B		X	PARALLEL WITH 2QSS*SOV100A			
TOTAL PENETRATION LEAKAGE FOR PAGE 8 (SCF/D)							24.52

TOTAL PENETRATION LEAKAGE PAGE 2 OF	(SCF/D)	173.64
TOTAL PENETRATION LEAKAGE PAGE 3 OF	(SCF/D)	3.93
TOTAL PENETRATION LEAKAGE PAGE 4 OF	(SCF/D)	49.61
TOTAL PENETRATION LEAKAGE PAGE 5 OF	(SCF/D)	38.10
TOTAL PENETRATION LEAKAGE PAGE 6 OF	(SCF/D)	315.35
TOTAL PENETRATION LEAKAGE PAGE 7 OF	(SCF/D)	45.23
TOTAL PENETRATION LEAKAGE PAGE 8 OF	(SCF/D)	24.52
TOTAL CONTAINMENT TYPE C LEAKAGE - SUM OF PAGES 2 THRU 8	(SCF/D)	650.38

ATTACHMENT 4.1A (continued)

THIRD REFUELING TYPE B AND C TEST RESULTS

PENERTATION (TEST PROCEDURE)	DATE TESTED	"AS-FOUND" PENETRATION LEAKAGE (SCF/D)	"AS-LEFT" PENETRATION LEAKAGE (SCF/D)
ELECTRICAL PENETRATIONS (2BVT 1.47.4)	03-15-92	8.55	8.55
FUEL TRANSFER TUBE FLG. (2BVT 1.47.9)	04-23-92	0.49	0.49
EQUIPMENT HATCH (2BVT 1.47.9)	04-25-92	0.48	0.50
EQUIP. HATCH INNER FLG. (2BVT 1.47.9)	04-26-92	0.48	0.51
PERSONNEL AIRLOCK (2BVT 1.47.8)	04-24-92	48.54	0.49
EMERGENCY AIRLOCK (2BVT 1.47.10)	04-26-92	8.01	13.03
TOTAL PENETRATION LEAKAGE FOR PAGE 9		(SCF/D)	23.57

TOTAL CONTAINMENT TYPE C LEAKAGE - SUM OF PAGES 2 THRU 8	650.38 SCF/D
TOTAL CONTAINMENT TYPE B LEAKAGE - SUM OF PAGE 9	23.57 SCF/D
TOTAL CONTAINMENT TYPE B & C LEAKAGE - SUM OF PAGES 2 THRU 9	673.95 SCF/D

ATTACHMENT 4.1B

THIRD REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 1

The "As-Found" leak test was performed on March 29, 1992. Static MOVATS Testing was performed on valves 2CCP*MOV157-1 per MWR 6280 and 2CCP*MOV157-2 per MWR 6281. Relief valve 2CCP*RV105 was removed for In-Service Testing per MWR 2011. Following completion of the MOVATS testing and reinstallation of the relief valve, the "As-Left" leak test was performed on April 4, 1992 with acceptable leakage rates measured.

Penetration No. 4

The "As-Found" leak test was performed March 29, 1992. Static MOVATS Testing was performed on valves 2CCP*MOV151-1 per MWR 6278 and 2CCP*MOV151-2 per MWR 6279. Also the inlet and outlet mounting flange gaskets were replaced for valve 2CCP*MOV151-2 per MWR 906868. Following completion of the MOVATS testing and replacement of the mounting flange gaskets a retest was performed on April 4, 1992. Leakage was detected at the mounting flange gaskets for valve 2CCP*MOV151-2. The gaskets were retorqued and the "As-Left" leak test was performed on April 5, 1992 with acceptable leakage rates measured.

Penetration No. 11

The "As-Found" leak test was performed March 18, 1992. Static MOVATS Testing was performed on valve 2IAC*MOV134 per MWR 6269. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on April 18, 1992 with an acceptable leakage rate measured.

Penetration No. 19

The "As-Found" leak test was performed on March 30, 1992. Static MOVATS Testing was performed on valve 2CHS*MOV381 per MWR 6282. Following completion of the MOVATS testing, the "As-Left" leak test was performed on April 14, 1992 with an acceptable leakage rate measured.

Penetration No. 20

The "As-Found" leak test was performed on April 15, 1992. After returning Penetration No. 20 back to service, leakage was detected from relief valve 2SIS*RV130. MWR 9195 was written to remove and repair the relief valve. Following reinstallation, the "As-Left" leak test was performed on April 26, 1992 with an acceptable leakage rate measured.

Penetration No. 24

The "As-Found" leak test was performed March 31, 1992. Relief valve 2RHS*RV100 was removed for In-Service Testing per MWR 2002 and the packing was adjusted for valve 2RHS*107 per MWR 7983. Following completion of the packing adjustment and reinstallation of the relief valve, the "As-Left" leak test was performed on April 4, 1992 with acceptable leakage rates measured.

ATTACHMENT 4.1B (continued)

THIRD REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 25

The "As-Found" leak test was performed on March 20, 1992. Relief valve 2SWS*RV154 was removed for In-Service Testing per MWR 2015. Following reinstallation of the relief valve, the "As-Left" leak test was performed on March 28, 1992 with an acceptable leakage rate measured.

Penetration No. 28

The "As-Found" leak test was performed on March 30, 1992. Relief valve 2CHS*RV203 was removed for In-Service Testing per MWR 1999. Following reinstallation of the relief valve, the "As-Left" leak test was performed on April 8, 1992 with an acceptable leakage rate measured.

Penetration No. 38

The "As-Found" leak test was performed on April 18, 1992. The actuator diaphragm for valve 2DAS*AOV100A was replaced for preventive maintenance per MWR 8860. Following the repair, the "As-Left" leak test was performed on April 24, 1992 with an acceptable leakage rate measured.

Penetration No. 42

The "As-Found" leak test was performed on March 16, 1992. Due to excessive seat leakage MWR's 7869 and 7870 were written for valves 2SAS*14 and 2SAS*15. The valve seating surfaces were cleaned for valve 2SAS*14 and the disc was replaced for valve 2SAS*15. Following these repairs, the "As-Left" leak test was performed on March 17, 1992 with acceptable leakage rates measured.

Penetration No. 43

The "As-Found" leak test was performed on April 1, 1992. Due to excessive seat leakage, MWR 8434 was written for valve 2CVS*93. The valve seat and plug were lapped. Following this repair, the "As-Left" leak test was performed on April 7, 1992 with an acceptable leakage rate measured.

Penetration No. 44

The "As-Found" leak test was performed April 1, 1992. Due to excessive seat leakage MWRs 8435 was written for valve 2CVS*SOV153A. The valve soft seat was replaced. Following this repair, the "As-Left" leak test was performed on April 17, 1992 with an acceptable leakage rate measured.

ATTACHMENT 4.1B (continued)

THIRD REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 56-3

The "As-Found" leak test was performed on March 21, 1992. Relief valve 2SSR*RV119 was removed for In-Service Testing per MWR 2009. Following reinstallation of the relief valve, the "As-Left" leak test was performed on April 1, 1992 with an acceptable leakage rate measured.

Penetration No. 59

The "As-Found" leak test was performed on March 19, 1992. Static MOVATS Testing was performed on valve 2IAC*MOV130 per MWR 6268. Following completion of the MOVATS testing, the "As-Left" leak test was performed on April 7, 1992 with an acceptable leakage rate measured.

Penetration No. 63

The "As-Found" leak test was performed on March 18, 1992. MWR 0751 was written prior to 3R for valve 2QSS*MOV101A due to a body to bonnet leak, also MWR 7986 was written for check valve 2QSS*4 due to its weight arms binding when the valve was fully opened. The body to bonnet gasket was replaced for valve 2QSS*MOV101A and the shaft o-rings were replaced for check valve 2QSS*4. A retest of both valves was performed on April 7, 1992 with acceptable leakage rates measured; however, during the performance of 2EVT 1.47.3, "Check Valve Lift Test", leakage was detected at the body to bonnet gasket for valve 2QSS*MOV101A. MWR 8315 was written to repair the leak. The bonnet bolts were retorqued to a higher value; however, leakage was still detected. The body to bonnet gasket was replaced for a second time per MWR 8721 and the "As-Left" leak test was successfully performed on April 14, 1992; however, check valve 2QSS*4 failed 2EVT 1.47.3 by lifting at a lower than acceptable pressure. MWR 8389 was written to repair the check valve. The spherical washer that held the disc to the disc arm was machined to allow the disc to seat properly. The "As-Left" leak test and the "Check Valve Lift Test" were performed on April 18, 1992 with acceptable results obtained.

Penetration No. 64

The "As-Found" leak test was performed on March 18, 1992. Relief valve 2QSS*RV101B was removed to repair the inlet threaded connection per MWR 2201, the torque switch for valve 2QSS*MOV101B was replaced for 10CFR Part 50 concerns on the roll pin shearing per MWR 7278, and the shaft o-rings were replaced for check valve 2QSS*3 per MWR 7888 due to the weight arms binding when the valve was fully opened. Following completion of all the MWRs, the "As-Left" leak test was performed on April 20, 1992 with acceptable leakage rates measured.

ATTACHMENT 4.1B (continued)

THIRD REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 90

The "As-Found" leak test was performed on March 19, 1992. Due to excessive packing leakage MWR 8066 was written for motor operated damper 2HVR*MOD23A. Paint was removed from the valve follower and the packing was adjusted. Following this repair, the "As-Left" leak test was performed on April 4, 1992 with an acceptable leakage rate measured.

Penetration No. 91

The "As-Found" leak test was performed on March 19, 1992. Due to excessive seat leakage MWR 8466 was written for motor operated damper 2HVR*MOD25A. The close limit switch was adjusted to allow the valve to close further. Following this repair, the "As-Left" leak test was performed on April 4, 1992 with an acceptable leakage rate measured.

Penetration No. 97-1

The "As-Found" leak test was performed March 21, 1992. Relief valve 2SSR*RV122 was removed for In-Service Testing per MWR 2010. Following reinstallation of the relief valve, the "As-Left" leak test was performed on April 20, 1992 with an acceptable leakage rate measured.

Penetration No. 99

The "As-Found" leak test was performed April 2, 1992 with acceptable leakage rates measured; however, during the performance of 2BVT 1.47.3, "Check Valve Lift Test", check valve 2FPW*761 lifting at a lower than acceptable pressure. MWR 8487 was written to repair the valve. The valve disc was lapped to remove any imperfections. The "As-Left" leak test and the "Check Valve Lift Test" were performed on April 15, 1992 with acceptable results obtained.

Penetration No. 106

The "As-Found" leak test was performed March 20, 1992. Relief valve 2SIS*RV175 was removed for In-Service Testing per MWR 2003. Following reinstallation of the relief valve, the "As-Left" leak test was performed on March 23, 1992 with an acceptable leakage rate measured.

Penetration No. 116

The "As-Found" leak test was performed March 28, 1992 with acceptable leakage rates measured; however, during the performance of 2BVT 1.47.3 "Check Valve Lift Test", the weight arms for check valve 2FPW*388 were binding when fully opened. MWR 8343 was written to repair the valve. The shaft plug seat was found not centered over the valve body causing the binding. A 1/8" spacer was installed to center the plug. The "As-Left" leak test and the "Check Valve Lift Test" were performed on April 6, 1992 with acceptable results obtained.

ATTACHMENT 4.1B (continued)

THIRD REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 117

The "As-Found" leak test was performed March 28, 1992 with acceptable leakage rates measured; however, during the performance of 2BVT 1.47.3 "Check Valve Lift Test", check valve 2FPW*382 lifting at a lower than acceptable pressure. MWR 8344 was written to repair the valve. The valve disc plug shaft was found to be installed backwards causing the weight arms not to lower to their optimum position. The disc plug shaft was installed correctly and a retest was performed on April 6, 1992. An acceptable leakage rate was measured for check valve 2FPW*382; however, it still lifted at a lower than acceptable pressure. The disc seat was then replaced per the same MWR. The "As-Left" leak test and the "Check Valve Lift Test" were performed on April 7, 1992 with acceptable results obtained.

Penetration No. 118

The "As-Found" leak test was performed April 13, 1992 with acceptable leakage rates measured; however, during the performance of 2BVT 1.47.3 "Check Valve Lift Test", check valve 2QSS*267 lifting at a lower than acceptable pressure. MWR 8866 was written to repair the valve. The valve disc and disc arm were replaced. The "As-Left" leak test and the "Check Valve Lift Test" were performed on April 18, 1992 with acceptable results obtained.

ATTACHMENT 4.1C

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
1	2CCP*MOV157-2	X		10-09-93	9.71	9.71	14.56
	2CCP*MOV157-1		X	10-09-93	14.56	14.56	
	2CCP*RV105	X		PARALLEL WITH 2CCP*MOV157-1			
2	2CCP*MOV150-2	X		10-21-93	11.19	17.96	17.96
	2CCP*MOV150-1		X	10-21-93	11.19	17.96	
	2CCP*RV102	X		PARALLEL WITH 2CCP*MOV150-1			
4	2CCP*MOV151-2	X		10-09-93	6.30	6.30	8.76
	2CCP*MOV151-1		X	10-15-93	5.33	8.76	
	2CCP*RV103	X		PARALLEL WITH 2CCP*MOV151-1			
5	2CCP*MOV156-2	X		10-21-93	11.19	11.66	12.63
	2CCP*MOV156-1		X	10-21-93	11.19	12.63	
	2CCP*RV104	X		PARALLEL WITH 2CCP*MOV156-1			
11	2IAC*MOV133	X		11-01-93	1.26	0.49	0.49
	2IAC*MOV134		X	11-01-93	0.97	0.49	
14	2SWS*MOV153-2	X		09-24-93	0.48	0.48	0.49
	2SWS*MOV153-1		X	10-19-93	0.48	0.49	
	2SWS*RV153		X	PARALLEL WITH 2SWS*MOV153-1			
19	2CHS*MOV378	X		10-18-93	1.70	0.49	0.49
	2CHS*473	X		PARALLEL WITH 2CHS*MOV378			
	2CHS*MOV381		X	10-18-93	0.49	0.49	
20	2SIS*42	X		10-30-93	0.49	0.49	0.49
	2SIS*41		X	10-20-93	0.49	0.49	
	2SIS*RV130		X	PARALLEL WITH 2SIS*41			
TOTAL PENETRATION LEAKAGE FOR PAGE 2 (SCF/D)							5.00

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
21	2SWS*MOV155-2	X		10-07-93	0.48	0.49	1.46
	2SWS*MOV155-1		X	10-07-93	0.48	1.46	
	2SWS*RV155		X	PARALLEL WITH 2SWS*MOV155-1			
24	2RHS*107	X		10-13-93	0.49	0.49	0.49
	2RHS*15		X	10-13-93	0.49	0.49	
	2RHS*RV100		X	PARALLEL WITH 2RHS*15			
25	2SWS*MOV154-2	X		09-24-93	0.48	0.48	0.49
	2SWS*MOV154-1		X	10-18-93	0.48	0.49	
	2SWS*RV154		X	PARALLEL WITH 2SWS*MOV154-1			
27	2SWS*MOV152-2	X		10-07-93	0.48	0.49	0.49
	2SWS*MOV152-1		X	10-07-93	0.48	0.49	
	2SWS*RV152	X		PARALLEL WITH 2SWS*MOV152-1			
28	2CHS*AOV200A	X		10-19-93	0.49	0.49	1.94
	2CHS*AOV200B	X		PARALLEL WITH 2CHS*AOV200A			
	2CHS*AOV200C	X		PARALLEL WITH 2CHS*AOV200A			
	2CHS*HCV142	X		10-19-93	0.49	0.97	
	2CHS*RV203	X		10-08-93	0.48	0.48	
	2CHS*AOV204		X	10-08-93	0.48	0.48	
29	2DGS*AOV108A	X		09-30-93	0.49	0.49	0.49
	2DGS*AOV108B		X	09-30-93	0.49	0.49	
	2DGS*RV115		X	PARALLEL WITH 2DGS*AOV108B			
TOTAL PENETRATION LEAKAGE FOR PAGE 3 (SCF/D)							5.36

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
38	2DAS*AOV100A	X		11-01-93	2433.90	0.49	0.49
	2DAS*AOV100B		X	11-01-93	1.46	0.49	
	2DAS*RV110		X	PARALLEL WITH 2DAS*AOV100B			
42	2SAS*15	X		09-20-93	1.96	1.96	39.38
	2SAS*14		X	09-25-93	147.00	39.38	
43	2CVS*93	X		09-24-93	0.49	0.49	0.49
	2CVS*SOV102		X	09-24-93	0.49	0.49	
44	2CVS*SOV153B	X		09-24-93	3.18	3.18	4.89
	2CVS*SOV153A		X	09-24-93	4.89	4.89	
45	2RCS*72	X		10-23-93	2412.00	0.73	0.73
	2RCS*AOV519		X	11-11-93	0.48	0.49	
	2RCS*RV100		Y	PARALLEL WITH 2RCS*AOV519			
48	2VRS*AOV109A2	X		09-29-93	0.48	0.48	1.21
	2VRS*AOV109A1		X	09-29-93	1.21	1.21	
49	2RCS*68	X		09-25-93	6.30	6.30	6.30
	2RCS*AOV101		X	10-31-93	5.82	5.87	
53	2GNS*AOV101-2	X		10-01-93	10.40	10.40	10.90
	2GNS*AOV101-1		X	10-01-93	10.90	10.90	
55-1	2SSR*AOV109A1	X		09-28-93	0.49	0.49	0.49
	2SSR*AOV109A2		X	10-18-93	0.49	0.49	
	2SSR*RV117		X	PARALLEL WITH 2SSR*AOV109A2			
TOTAL PENETRATION LEAKAGE FOR PAGE 4 (SCF/D)							64.88

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
55-2	2SSR*SOV130A1	X		10-15-93	1.95	1.95	4.86
	2SSR*SOV130A2		X	10-15-93	4.86	4.86	
55-3	2HCS*SOV136A	X		09-30-93	4.93	4.93	4.93
	2HCS*SOV136B		X	09-30-93	4.93	4.93	
56-1	2SSR*AOV102A1	X		11-05-93	0.49	0.49	0.49
	2SSR*AOV102A2		X	11-05-93	0.49	0.49	
	2SSR*RV118		X	PARALLEL WITH 2SSR*AOV102A2			
56-2	2SSR*AOV128A1	X		11-14-93	0.49	0.49	0.49
	2SSR*AOV128A2		X	11-14-93	68.10	0.49	
	2SSR*RV120		X	PARALLEL WITH 2SSR*AOV128A2			
56-3	2SSR*AOV100A1	X		09-28-93	0.49	0.49	0.49
	2SSR*AOV100A2		X	10-29-93	0.49	0.49	
	2SSR*RV119		X	PARALLEL WITH 2SSR*AOV100A2			
57-1	2SSR*AOV112A1	X		09-28-93	0.49	0.49	2.43
	2SSR*AOV112A2		X	10-29-93	0.49	2.43	
	2SSR*RV121		X	PARALLEL WITH 2SSR*AOV112A2			
57-2	2HCS*SOV135A	X		09-30-93	0.74	0.74	0.74
	2HCS*SOV135B		X	09-30-93	0.74	0.74	
59	2IAC*22		X	10-14-93	0.49	0.49	0.49
	2IAC*MOV130		X	10-14-93	0.49	0.49	
TOTAL PENETRATION LEAKAGE FOR PAGE 5 (SCF/D)							14.92

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
63	2QSS*4	X		09-22-93	0.48	0.48	16.11
	2QSS*MOV101A		X	11-12-93	0.96	16.11	
	2QSS*RV101A		X	PARALLEL WITH 2QSS*MOV101A			
64	2QSS*3	X		09-25-93	3.87	3.87	14.63
	2QSS*MOV101B		X	10-15-93	0.48	14.63	
	2QSS*RV101B		X	PARALLEL WITH 2QSS*MOV101B			
87	2HCS*111		X	09-22-93	10.10	10.10	10.10
	2HCS*MOV117		X	11-06-93	10.10	9.27	
88	2HCS*110		X	09-22-93	0.48	0.48	0.49
	2HCS*MOV116		X	11-06-93	0.48	0.49	
90	2HVR*MOD23B	X		10-02-93	159.00	262.40	262.40
	2HVR*MOD23A		X				
91	2HVR*MOD25B	X		11-12-93	347.90	186.56	186.56
	2HVR*MOD25A		X				
	2HVR*DMP206		X				
92	2HCS*SOV114B		X	09-22-93	1.20	1.20	28.70
	2HCS*SOV115B		X	09-22-93	1.20	1.20	
	2CVS*SOV151B		X	09-22-93	1.06	1.06	
	2CVS*SOV152B		X	09-22-93	27.50	27.50	
93	2HCS*SOV114A		X	09-23-93	11.60	11.60	24.16
	2HCS*SOV115A		X	09-23-93	7.73	7.73	
	2CVS*SOV151A		X	09-23-93	12.56	12.56	
	2CVS*SOV152A		X	09-23-93	5.31	5.31	
TOTAL PENETRATION LEAKAGE FOR PAGE 6 (SCF/D)							543.15

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
94	2CVS*151	X		09-28-93	1.94	1.94	2.04
	2CVS*151-1		X	10-11-93	2327.00	2.04	
97-1	2SSR*AOV129A1	X		11-14-93	30.70	0.49	0.49
	2SSR*AOV129A2		X	11-14-93	0.49	0.49	
	2SSR*RV122		X	PARALLEL WITH 2SSR*AOV129A2			
97-2	2HCS*SOV133B	X		09-30-93	0.49	0.49	0.49
	2HCS*SOV134B		X	09-30-93	0.49	0.49	
99	2FPW*761	X		10-11-93	0.49	0.49	0.49
	2FPW*AOV206		X	10-14-93	0.73	0.49	
101	2FPW*753	X		10-18-93	0.49	0.49	0.49
	2FPW*AOV205		X	10-12-93	0.49	0.49	
103	2FNC*121	X		09-23-93	26.60	26.60	26.60
	2FNC*38		X	09-23-93	17.41	17.41	
104	2FNC*122	X		09-27-93	20.44	20.44	20.44
	2FNC*9		X	09-27-93	20.44	20.44	
105-1	2HCS*SOV133A	X		09-30-93	3.74	3.74	3.74
	2HCS*SOV134A		X	09-30-93	3.10	3.10	
105-2	2PAS*SOV105A1	X		09-29-93	0.49	0.49	0.49
	2PAS*SOV105A2		X	09-29-93	0.49	0.49	
105-3	2LMS*51		X	09-23-93	0.48	0.48	0.48
	2LMS*52		X	09-23-93	0.48	0.48	
TOTAL PENETRATION LEAKAGE FOR PAGE 7 (SCF/D)							55.75

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE C TEST RESULTS

PENT NO.	VALVE MARK NO.	CONTAINMENT		DATE TESTED	AS FOUND VALVE LEAKAGE (SCF/D)	AS LEFT VALVE LEAKAGE (SCF/D)	ASSIGNED PENETRATION LEAKAGE (SCF/D)
		IN	OUT				
106	2SIS*MOV842	X		09-29-93	0.50	0.49	0.50
	2SIS*AOV889		X	09-20-93	0.50	0.50	
	2SIS*RV175		X	PARALLEL WITH 2SIS*AOV889			
116	2FPW*388	X		10-22-93	0.49	0.49	0.49
	2FPW*AOV221		X	10-02-93	0.49	0.49	
117	2FPW*382	X		10-02-93	0.49	0.49	36.93
	2FPW*AOV204		X	10-02-93	36.93	36.93	
118	2QSS*267	X		10-28-93	0.49	0.49	0.49
	2QSS*SOV100A		X	10-28-93	0.49	0.49	
	2QSS*SOV100B		X	PARALLEL WITH 2QSS*SOV100A			
TOTAL PENETRATION LEAKAGE FOR PAGE 8 (SCF/D)							38.41

TOTAL PENETRATION LEAKAGE PAGE 2 OF	(SCF/D)	55.87
TOTAL PENETRATION LEAKAGE PAGE 3 OF	(SCF/D)	5.36
TOTAL PENETRATION LEAKAGE PAGE 4 OF	(SCF/D)	64.88
TOTAL PENETRATION LEAKAGE PAGE 5 OF	(SCF/D)	14.92
TOTAL PENETRATION LEAKAGE PAGE 6 OF	(SCF/D)	543.15
TOTAL PENETRATION LEAKAGE PAGE 7 OF	(SCF/D)	55.75
TOTAL PENETRATION LEAKAGE PAGE 8 OF	(SCF/D)	38.41
TOTAL CONTAINMENT TYPE C LEAKAGE - SUM OF PAGES 2 THRU 8	(SCF/D)	778.34

ATTACHMENT 4.1C (continued)

FOURTH REFUELING TYPE B AND C TEST RESULTS

PENERTATION (TEST PROCEDURE)	DATE TESTED	"AS-FOUND" PENETRATION LEAKAGE (SCF/D)	"AS-LEFT" PENETRATION LEAKAGE (SCF/D)
ELECTRICAL PENETRATIONS (2BVT 1.47.4)	09-19-93	8.55	8.55
FUEL TRANSFER TUBE FLG. (2BVT 1.47.9)	11-04-93	0.49	0.49
EQUIPMENT HATCH (2BVT 1.47.9)	11-05-93	0.50	0.49
EQUIP. HATCH INNER FLG. (2BVT 1.47.9)	11-06-93	0.50	0.50
PERSONNEL AIRLOCK (2BVT 1.47.8)	11-15-93	36.93	136.68
EMERGENCY AIRLOCK (2BVT 1.47.10)	11-13-93	3.79	15.17
TOTAL PENETRATION LEAKAGE FOR PAGE 9		(SCF/D)	161.88

TOTAL CONTAINMENT TYPE C LEAKAGE - SUM OF PAGES 2 THRU 8	778.34 SCF/D
TOTAL CONTAINMENT TYPE B LEAKAGE - SUM OF PAGE 9	161.88 SCF/D
TOTAL CONTAINMENT TYPE B & C LEAKAGE - SUM OF PAGES 2 THRU 9	940.22 SCF/D

ATTACHMENT 4.1D

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 2

The "As-Found" leak test was performed on October 16, 1993. Static MOVATS Testing was performed on valves 2CCP*MOV150-1 per MWR 22014 and 2CCP*MOV150-2 per MWR 22015. Relief valve 2CCP*RV102 was removed for In-Service Testing per MWR 17350. Following completion of the MOVATS Testing and reinstallation of the relief valve, the "As-Left" leak test was performed on October 21, 1993 with acceptable leakage rates measured.

Penetration No. 4

The "As-Found" leak test was performed on October 9, 1993. Valve 2CCP*MOV151-1 was replaced due to previous Dynamic MOVATS Testing results per MWR 9853. Static MOVATS Testing was performed following replacement of the valve per MWR 14163. Following completion of the MOVATS testing the "As-Left" leak test was performed on October 15, 1993 with an acceptable leakage rate measured.

Penetration No. 5

The "As-Found" leak test was performed on October 16, 1993. Static MOVATS Testing was performed on valves 2CCP*MOV156-1 per MWR 22103 and 2CCP*MOV156-2 per MWR 22017. Relief valve 2CCP*RV104 was removed for In-Service Testing per MWR 17351. Following completion of the MOVATS Testing and reinstallation of the relief valve, the "As-Left" leak test was performed on October 21, 1993 with acceptable leakage rates measured.

Penetration No. 11

The "As-Found" leak test was performed on October 22, 1993. Static MOVATS Testing was performed on valve 2IAC*MOV133 per MWR 22032. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on November 1, 1993 with an acceptable leakage rate measured.

Penetration No. 14

The "As-Found" leak test was performed on September 24, 1993. Relief valve 2SWS*RV153 was removed for In-Service Testing per MWR 23615. Following reinstallation of the relief valve, the "As-Left" leak test was performed on October 19, 1993 with an acceptable leakage rate measured.

Penetration No. 19

The "As-Found" leak test was performed September 27, 1993. Static MOVATS Testing was performed on valves 2CHS*MOV378 per MWR 21970 and 2CHS*MOV381 per MWR 21971. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on October 18, 1993 with acceptable leakage rates measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIR

Penetration No. 20

The "As-Found" leak test was performed October 20, 1993. During the performance of 2BVT 1.147.3 "Check Valve Lift Test", Check Valve 2SIS*42 lifted at 0.8 psid which was less than the Acceptance Criteria. MWR 24274 was written to repair the valve. The soft seat on the valve disc was found to be worn allowing the air to leak by the disc rather than lift the disc. Following the replacement of the soft seat, the "As-Left" leak test was performed on October 30, 1993 with an acceptable leakage rate measured.

Penetration No. 21

The "As-Found" leak test was performed September 21, 1993. Static MOVATS Testing was performed on valves 2SWS*MOV155-1 per MWR 22030 and 2SWS*MOV155-2 per MWR 22031. Relief valve 2SWS*RV155 was removed for In-Service Testing per MWR 23539. Following completion of the MOVATS Testing and reinstallation of the relief valve, the "As-Left" leak test was performed on October 7, 1993 with acceptable leakage rates measured.

Penetration No. 25

The "As-Found" leak test was performed September 24, 1993. Relief valve 2SWS*RV154 was removed for In-Service Testing per MWR 23616. Following reinstallation of the relief valve, the "As-Left" leak test was performed on October 18, 1993 with an acceptable leakage rate measured.

Penetration No. 27

The "As-Found" leak test was performed September 21, 1993. Static MOVATS Testing was performed on valves 2SWS*MOV152-1 per MWR 21427 and 2SWS*MOV152-2 per MWR 22029. Relief valve 2SWS*RV152 was removed for In-Service Testing per MWR 17354. Following completion of the MOVATS Testing and reinstallation of the relief valve, the "As-Left" leak test was performed on October 7, 1993 with acceptable leakage rates measured.

Penetration No. 28

The "As-Found" leak test was performed October 8, 1993. Due to body to bonnet leakage detected during plant operation, the body to bonnet gaskets were replaced for valves 2CHS*AOV200A per MWR 9680, 2CHS*AOV200B per MWR 10162, 2CHS*AOV200C per MWR 9682, and 2CHS*HCV142 per MWR 23747. Following replacement of the body to bonnet gaskets, the "As-Left" leak test was performed on October 19, 1993 with acceptable leakage rates measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 38

The "As-Found" leak test was performed October 29, 1993. Due to excessive leakage, MWR 24502 was written for valve 2DAS*AOV100A. Debris had damaged the plug stem. The debris was removed and the plug stem was replaced. Relief Valve 2DAS*RV110 was removed for In-Service Testing per MWR 17339. Following completion of the repair of 2DAS*AOV100A and reinstallation of relief valve 2DAS*RV110, the "As-Left" leak test was performed on November 1, 1993 with acceptable leakage rates measured.

Penetration No. 42

The "As-Found" leak test was performed October 29, 1993. Due to excessive leakage, MWR 24502 was written for valve 2DAS*AOV100A. Debris had damaged the plug stem. The debris was removed and the plug stem was replaced. Relief Valve 2DAS*RV110 was removed for In-Service Testing per MWR 17339. Following completion of the repair of 2DAS*AOV100A and reinstallation of relief valve 2DAS*RV110, the "As-Left" leak test was performed on November 1, 1993 with acceptable leakage rate measured.

Penetration No. 42

The "As-Found" leak test was performed September 20, 1993. Due to excessive leakage, MWR 23335 was written for valve 2SAS*14. The valve seating surfaces were cleaned and the "As-Left" leak test was performed on September 25, 1993 with an acceptable leakage rate measured.

Penetration No. 45

The "As-Found" leak test was performed September 20, 1993. Due to excessive leakage, MWR 23423 was written for check valve 2RCS*72. The soft seat on the valve disc was found to be damaged and was replaced. Check Valve 2RCS*72 was repaired three additional times during the outage (MWR's 23643, 23706, 24255) since during the performance of 2BVT 1.47.3 "Check Valve Lift Test", 2RCS*72 lifted at a pressure less than the Acceptance Criteria. The diaphragm for valve 2RCS*AOV519 was replaced for preventive maintenance per MWR 16867. Relief Valve 2RCS*RV100 was removed for In-Service Testing per MWR 17332. Relief Valve 2RCS*RV100 was later removed and repaired per MWR 23644 since during the outage excessive leakage was detected during use of the penetration. Following all these repairs, the "As-Left" leak test was performed on October 23, 1993 for 2RCS*72 and on November 11, 1993 for 2RCS*AOV519 and 2RCS*RV100 with acceptable leakage rates measured.

Penetration No. 49

The "As-Found" leak test was performed September 25, 1993. The diaphragm for valve 2RCS*AOV101 was replaced for preventive maintenance per MWR 16866. Following the replacement of the diaphragm and several adjustments to the valve actuator, the "As-Left" leak test was performed on October 31, 1993 with an acceptable leakage rate measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 55-1

The "As-Found" leak test was performed September 28, 1993. Relief Valve 2SSR*RV117 was removed for In-Service Testing per MWR 17347. Following reinstallation of the relief valve, the "As-Left" leak test was performed on October 18, 1993 with an acceptable leakage rate measured.

Penetration No. 56-1

The "As-Found" leak test was performed September 28, 1993. Air leaks were repaired on the actuator for valve 2SSR*AOV102A-1 and 2SSR*AOV102A-2 per MWR's 15899 and 15900 due to stroke times trending upward. Following completion of these repairs, the "As-Left" leak test was performed on November 5, 1993 with acceptable leakage rates measured.

Penetration No. 56-2

The "As-Found" leak test was performed October 14, 1993. Due to excessive leakage, MWR 24006 was written for valve 2SSR*SOV128A-2. Nicks were found in the valve disc and seat. The disc was replaced and the seat was lapped to remove the nicks. Relief Valve 2SSR*RV120 was removed for In-Service Testing per MWR 17348. New terminal boards, rectifier, and cover gasket were installed in valve 2SSR*SOV128A-1 for EQ requirements per MWR 18190. Following completion of the repair of 2SSR*SOV128A-1 & 2 and reinstallation of relief valve 2SSR*RV120, the "As-Left" leak test was performed on November 14, 1993 with acceptable leakage rates measured.

Penetration No. 56-3

The "As-Found" leak test was performed September 28, 1993. Due to excessive packing leakage, MWR 20715 was written for valve 2SSR*AOV100A-2. Relief Valve 2SSR*RV119 was removed for In-Service Testing per MWR 24217. Following completion of the repack of 2SSR*AOV100A-2 and reinstallation of relief valve 2SSR*RV119, the "As-Left" leak test was performed on October 29, 1993 with acceptable leakage rates measured.

Penetration No. 57-1

The "As-Found" leak test was performed September 28, 1993. Relief Valve 2SSR*RV121 was removed for In-Service Testing per MWR 24288. Following reinstallation of the relief valve, the "As-Left" leak test was performed on October 29, 1993 with an acceptable leakage rate measured.

Penetration No. 63

The "As-Found" leak test was performed September 22, 1993. Static MOVATS Testing was performed on valve 2QSS*MOV101A per MWR 22003. Relief valve 2QSS*RV101A was removed for In-Service Testing per MWR 17345. Following completion of the MOVATS Testing and reinstallation of the relief valve, the "As-Left" leak test was performed on November 12, 1993 with acceptable leakage rates measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 64

The "As-Found" leak test was performed September 25, 1993. Limit and torque switch adjustments were made to valve 2QSS*MOV101B in accordance with DCP 2034 per MWR 14034. Following completion of the limit and torque switch adjustments, the "As-Left" leak test was performed on October 15, 1993 with an acceptable leakage rate measured.

Penetration No. 87

The "As-Found" leak test was performed September 22, 1993. Static MOVATS Testing was performed on valve 2HCS*MOV117 per MWR 22042. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on November 6, 1993 with an acceptable leakage rate measured.

Penetration No. 88

The "As-Found" leak test was performed September 22, 1993. Static MOVATS Testing was performed on valve 2HCS*MOV116 per MWR 22041. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on November 6, 1993 with an acceptable leakage rate measured.

Penetration No. 90

The "As-Found" leak test was performed September 20, 1993. Due to excessive packing leakage, MWR 23425 was written for valve 2HVR*MOD23A. The packing was replaced and valves 2HVR*MOD23A and 2HVR*MOD23B were BARTS Tested per MWR's 22035 and 22036. Following completion of the repack and BARTS Testing, the "As-Left" leak test was performed on October 2, 1993 with an acceptable leakage rate measured.

Penetration No. 91

The "As-Found" leak test was performed September 21, 1993. BARTS Testing was performed on valves 2HVR*MOD25A and 2HVR*MOD25B per MWR's 22037 and 22038. Following completion of the BARTS Testing the valves were retested, however due to excessive packing leakage MWR 23655 was written for valve 2HVR*MOD25A. The packing was replaced. Following completion of the repack the valves were retested, however due to excessive seat leakage MWR 24637 was written for valve 2HVR*MOD25B. The valve seal ring was replaced. A fourth retest was performed on November 12, 1993 with an acceptable leakage rate measured.

Penetration No. 94

The "As-Found" leak test was performed September 28, 1993. Due to excessive leakage, MWR 23624 was written for valve 2CVS*151-1. The valve seat was replaced and the "As-Left" leak test was performed on October 11, 1993 with an acceptable leakage rate measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 97-1

The "As-Found" leak test was performed October 14, 1993. Due to low flow suspected through valve 2SSR*SOV129A-1, MWR 23319 was written to inspect the valve. It was found that a soft seated disc was installed in the valve which was not suitable for the valve's application. The seat disc was replaced with a hard seated disc. Relief Valve 2SSR*RV122 was removed for In-Service Testing per MWR 24220. New terminal boards, rectifier, and cover gasket were installed in valve 2SSR*SOV129A-1 for EQ requirements per MWR 18162. Following completion of the repair of 2SSR*SOV129A-1 & 2 and reinstallation of relief valve 2SSR*RV122, the "As-Left" leak test was performed on November 14, 1993 with acceptable leakage rates measured.

Penetration No. 99

The "As-Found" leak test was performed October 11, 1993. During inspection of the Containment Hose Reels it was discovered that the Containment Fire Protection Hose Reel Header would not depressurize even with valve 2FPW*AOV206 closed. MWR 23922 was written to inspect the preload on the actuator for 2FPW*AOV206. The preload was found to be set too low to hold the valve closed against the Containment Hose Reel Header Pressure. Following the adjustment of the preload, the "As-Left" leak test was performed on October 14, 1993 with an acceptable leakage rate measured.

Penetration No. 101

The "As-Found" leak test was performed October 12, 1993. During the performance of 2BVT 1.47.3 "Check Valve Lift Test", Check Valve 2FPW*753 lifted at 0.2 psid which was less than the Acceptance Criteria. MWR 16929 was previously written to inspect the valve for routine maintenance. The soft seat on the valve disc was found to be worn allowing the air to leak by the disc rather than lift the disc. Following the replacement of the soft seat, the "As-Left" leak test was performed on October 18, 1993 with an acceptable leakage rate measured.

Penetration No. 106

The "As-Found" leak test was performed September 20, 1993. Static MOVATS Testing was performed on valve 2SIS*MOV842 per MWR 22098. Following completion of the MOVATS Testing, the "As-Left" leak test was performed on September 29, 1993 with an acceptable leakage rate measured.

ATTACHMENT 4.1D (continued)

FOURTH REFUELING LOCAL LEAKAGE RATE TEST REPAIRS

Penetration No. 116

The "As-Found" leak test was performed October 2, 1993. During the performance of 2BVT 1.47.3 "Check Valve Lift Test", Check Valve 2FPW*388 lifted at 0.3 psid which was less than the Acceptance Criteria. MWR 23707 was written to repair the valve. Imperfections were found in the valve seating area allowing the air to leak by the disc rather than lift the disc. The imperfections were removed and a second lift test was performed with an unacceptable lift pressure measured. MWR 23898 was written to repair the valve. Numerous repair attempts and retests were performed until the vendor discovered that the valve disc was not centered on the valve seat. Shims were installed on the valve swing arms to center the disc. Following this repair, an acceptable lift test was performed and the "As-Left" leak test was performed on October 22, 1993 with an acceptable leakage rate also measured.

ATTACHMENT 4.1E

THIRD AND FOURTH FUEL CYCLE LOCAL LEAKAGE RATE TEST DATA

I. Third Fuel Cycle LLRT Data

A. Type B Tests

1. Airlock Total Volume Type B Tests

- a. Personnel Airlock [2PHS*PAL1]] (4-2-91) ----- 96.90 SCF/D
Corrective Action(s) Inner door o-ring was replaced per
Maintenance Work Request 910468.
- b. Equipment Hatch Airlock [2PHS*EAL1] (4-3-91) --- 0.51 SCF/D
Corrective Action(s) None
- c. Personnel Airlock [2PHS*PAL1] (9-24-91) ----- 48.54 SCF/D
Corrective Action(s) None
- d. Equipment Hatch Airlock [2PHS*EAL1] (9-26-91) -- 8.01 SCF/D
Corrective Action(s) None

B. Type C Tests

1. Penetration No. 97-1 [2SSR*RV122] (11-27-90) ----- 0.49 SCF/D
Corrective Action(s) Relief valve was leaking by. The
relief valve was replaced with a new
relief valve per Maintenance Work
Request 906593.
2. Penetration No. 55-1 [2SSR*RV117] (5-21-91) ----- 0.48 SCF/D
Corrective Action(s) Relief Valve was leaking by. The
relief valve was repaired per
Maintenance Work Request 0913.
3. Penetration No. 56-2 [2SSR*RV120] (10-9-91) ----- 0.49 SCF/D
Corrective Action(s) Relief valve was leaking by. The
Relief Valve was repaired per
Maintenance Work Request 2730.

ATTACHMENT 4.1E (continued)

THIRD AND FOURTH FUEL CYCLE LOCAL LEAKAGE RATE TEST DATA

II. Fourth Fuel Cycle LLRT Data

A. Type B Tests

1. Airlock Total Volume Type B Tests

- a. Personnel Airlock [2PHS*PAL1] (10-20-92) ----- 8.73 SCF/D
Corrective Action(s) None
- b. Equipment Hatch Airlock [2PHS*EAL1] (10-21-92) --- 0.50 SCF/D
Corrective Action(s) None
- c. Personnel Airlock [2PHS*PAL1] (3-24-93) ----- 36.93 SCF/D
Corrective Action(s) None
- d. Equipment Hatch Airlock [2PHS*EAL1] (3-25-93) ----- 3.79 SCF/D
Corrective Action(s) None

B. Type C Tests

- 1. Penetration No. 56-1 [2SSR*RV118] (2-19-93) ----- 0.49 SCF/D
Corrective Action(s) Relief valve was leaking by. The relief valve was replaced with a new relief valve per Maintenance Work Request 10907.
- 2. Penetration No. 56-1 [2SSR*RV118] (6-18-93) ----- 0.49 SCF/D
Corrective Action(s) Relief valve was leaking by. The relief valve was replaced with a new relief valve per Maintenance Work Request 20672.

NOTE: BVPS #2 Technical Specifications limit Type B leakage of each airlock to 5% La (347 SCF/D). Total Type B and C leakage (excluding airlocks) is administratively limited to 50% La to account for airlock retests.