

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

Sixth Periodic Test

November 1993

Omaha Public Power District
Fort Calhoun Station Unit No. 1

Issued by

Omaha Public Power District
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1.0 INTRODUCTION

The Containment Integrated Leakage Rate Test (CILRT or Type A test) is performed to verify that leakage rates through the primary reactor containment building, and systems and components penetrating it, do not exceed the leakage rate limits specified in the Fort Calhoun Station No. 1 Technical Specifications.

A successful periodic CILRT was performed in accordance with 10 CFR 50 Appendix J and the Fort Calhoun Station No. 1 Technical Specifications. The Type A test method used was the Absolute Method described in ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." The leakage rate was calculated using the Mass Point Analysis Technique as described in ANSI/ANS 56.8-1987 and the Total Time Analysis Technique as described in ANSI N45.4-1972.

Testing was performed by the Omaha Public Power District with technical assistance and data analysis provided by TER Services, Inc. TER Services' PC-based CILRT data analysis computer code ATEST is described in Appendix-A.

2.0 SUMMARY

Between November 9, 1993, and November 12, 1993, a periodic Containment Integrated Leakage Rate Test (CILRT) was performed on the Fort Calhoun Station Unit No. 1 containment building. The test was completed at 2300 CST November 11, 1993, after 24 hours of data collection in accordance with ANSI/ANS 56.8-1987. The Mass Point Analysis yielded a least squares fit (LSF) leakage rate (L_{um}) of 0.04161%/day with a 95% upper confidence limit (UCL) of 0.04257%/day. The Total Time Analysis yielded a LSF leakage rate of 0.03862%/day with a 95% UCL of 0.04526%/day.

The as-found Type B and C penalties of 0.00012%/day and leakage savings due to maintenance of 0.00306%/day are added to make the combined total as-found 95% UCL Type A leakage rate to equal 0.04575%/day. The "as left" Type B and C penalties are 0.00527%/day, which make the total as-left integrated leakage rate to equal 0.04784 %/day. Both the combined as-found and the combined as-left 95% UCL Type A leakage rates are below the acceptance limit of 0.075%/day.

The verification test using superimposed leakage was performed on November 12, 1993. A leakage rate (L_0) of 0.1000%/day was imposed at 0145. The verification test was completed at 0545. The composite leakage rate (L_c) of 0.1267%/day was within the upper acceptance limit of 0.1666%/day, and the lower acceptance limit of 0.1166%/day.

3.0 TEST SYNOPSIS

Valve alignments were conducted on most systems which penetrate containment to establish post-accident conditions. However, 15 Type C and one Type B penetrations were not put into post-accident conditions. These include six Component Cooling Water penetrations, two Hydrogen Purge penetrations, five penetrations which are not vented for Nuclear or industrial safety reasons, and two penetrations used to conduct the test. The details are presented in section 5.0 Test Data Summary.

The inspection of the containment's accessible interior and exterior surfaces was performed under SE-ST-CONT-0001 prior to pressurization. No evidence of structural deterioration was noted which would have affected containment integrity or leak tightness.

Containment pressurization started at 1730 November 9, 1993. It was stopped at 0836 November 10, 1993 at a pressure of 60.83 psig. The pressurization line was vented. Containment cooler fans were stopped at 0940. The stabilization period was about 13 hours to allow for in-gassing effects and find any perceivable leaks. The Personnel Air Lock (PAL) became pressurized to test pressure, indicating that the inner barrier did not hold, but the outer barriers remained intact. Investigations after test completion discovered the Inner PAL Door's Equalizing Valve O-rings had become partially dislodged. This allowed the PAL to pressurize and equalized about 6 hours after pressurization. Further analysis indicated that a combination of concrete in-gassing, venting into or filling of the Safety Injection Tanks (SIT's), and gradual decrease in temperature attributed to a longer than anticipated stabilization period.

The Type A test was started at 2300 November 10, 1993. The test was complete at 2300, November 11, 1993. The leakage rate for the 24 hour period using the Mass Point Data Analysis technique is 0.04161%/day with a 95% UCL of 0.04257%/day. The Total Time Analysis technique yields 0.03862%/day with a 95% UCL of 0.04526%/day. Both techniques yield results which are within the acceptance limit of less than 0.075%/day.

Verification Test flow of 3.63 scfm (0.1000%/day) was imposed at 0135 on November 12, 1993. A four hour verification test was performed from 0145 to 0545. The composite leakage rate (L_c) of 0.1267%/day was within the acceptable range between 0.1166%/day and 0.1666%/day.

Containment depressurization commenced at 0910 on November 12, 1993, and completed at 2045 on November 12, 1993.

4.0 ADJUSTMENTS

Three containment penetrations were adjusted prior to the CILRT to an extent that affected the minimum pathway leakage rate (MNPLR) for the respective penetrations.

The MNPLR for Penetration M-87 changed from an as-found value of 750 sccm to the as-left value 0.0 sccm. No maintenance was performed on the valves; they just closed tighter the last time they were operated.

The as-found MNPLR for electrical penetration C-4 was 300 sccm. The fittings, test valve and pressure gauge were replaced under MWO 920452. Penetration C-4 retested at 0.0 sccm.

During this 1993 outage the PAL handwheel and interlock shaft seals were replaced under ECN93-237. The Teflon packing was replaced with brass cartridge/O-ring assemblies. Prior to shutting down for the outage, the Outer PAL Door's packing assemblies were replaced. As-found and as-left Type B LLRTs were performed before and after replacing the Outer PAL Door's packing assemblies. The as-found MXPLR was 4300 sccm. The retest result after all sets of packing were replaced was 0.0 sccm.

Tank level changes were negligible; therefore there is no need to correct for test volume changes.

5.0 TEST DATA SUMMARY

5.1 Plant Information:

Owner:	Omaha Public Power District
Plant:	Fort Calhoun Station, Unit 1
Location:	Fort Calhoun, Nebraska
Containment Type:	Post-tensioned, PWR
Date Test Completed:	November 12, 1993
Docket Number:	50-285

5.2 Technical Data:

Containment Net Free Air Volume:	1,050,000 ft ³
Design Pressure:	60 psig
Design Temperature:	305°F
Calculated Peak Accident Pressure P _a :	59.7 psig
Containment ILRT Average Temperature Limits:	50-95°F

5.3 Test Results - Type A Test:

Test Method:	Absolute
Data Analysis Technique:	Mass Point - ANSI/ANS 56.8-1987 Total Time - ANSI N45.4-1972
Test Pressure:	60.0 psig (60.0 to 61.0)
Maximum Allowable Leakage Rate, L _a :	0.10000%/day
75% of L _a :	0.07500%/day
Mass Point LSF:	0.04161%/day
Mass Point 95% UCL:	0.04257%/day
Total Time LSF:	0.03862%/day
Total Time 95% UCL:	0.04526%/day

5.4 Test Results - Verification Test

Superimposed Leakage Rate, L ₀ :	3.63 scfm 0.1000%/day
Verification Test Results	
Mass Point Result, L _c :	0.1267%/day
Lower Limit:	0.1166%/day
Upper Limit:	0.1666%/day
Total Time Result, L _c :	0.1245%/day
Lower Limit:	0.1136%/day
Upper Limit:	0.1636%/day

5.5 Tables and Graphs

Temperature stabilization data and an average drybulb temperature graph are presented in Appendix B. Printouts of calculated results and graphs of both environmental and calculated results for the Type A test and the verification test data are presented in Appendices C and D, respectively.

5.6 ILRT Instrumentation System

5.6.1. The table below lists the instruments used to perform the CILRT.

No.	Description	Data
Pressure, Temperature, Relative Humidity, & Flow Sensors		
3	Precision pressure sensor Paroscientific, Inc. Model 760-100A	Range: 0-100 psia Accuracy: ± 0.01 psi Sensitivity: ± 0.0001 psi Repeatability: ± 0.0001 psi Resolution: ± 0.0001 psi Calibration: 06-22-93, 09-16-93, 09-21-93
1	Precision Barometer Paroscientific, Inc. Model 760-16B	Range: 0 to 16.0 psia Accuracy: ± 0.001 psi Sensitivity: ± 0.0001 psi Repeatability: ± 0.0001 psi Resolution: ± 0.0001 psi Calibration: 09-21-93
33	Smart Temperature Sensors; Graftel, Inc. Hermetically sealed 2252 Ohm Thermistors Model G-9202	Range: 32 to 130°F Accuracy: $\pm 0.10^\circ\text{F}$ Sensitivity: $\pm 0.10^\circ\text{F}$ Repeatability: $\pm 0.01^\circ\text{F}$ Resolution: $\pm 0.01^\circ\text{F}$ Calibration: 09-18-93
9	Smart RH Sensors Graftel, Inc. Model G-9203D	Range: 30 to 80%RH Accuracy: $\pm 2.0\%RH$ Sensitivity: $\pm 0.2\%RH$ Repeatability: $\pm 0.5\%RH$ Resolution: $\pm 0.01\%RH$ Calibration: 10-12-93
1	Mass Flow Meter Teledyne Hastings-Raydist SN 087615588	Range: 0.00 to 10.0 scfm Accuracy: $\pm 1.0\%$ FS Calibration: 10-01-93 Post Test Cal: 12-17-93

Data Acquisition and Analysis System

2	Microcomputers CPU: IBM Model:	Intel 80486 DX-33 Valuepoint 433DL
1	Repeater/Converters Graftel, Inc. Model No:	G-9211
1	Logical Switch Black Box Model No:	COS-4

5.6 ILRT Instrumentation System

5.6.2. Overall Instrument Selection Guide (ISG)

The calculation of the ISG per ANSI/ANS 56.8 1987 is provided in Appendix E.

5.6.3. Drybulb and Dewpoint Temperature Sensor Locations and Volume Fractions

Sensor locations and volume fractions are provided in Table 1. Maps which show the locations are included in Appendix E.

5.7 Type "B" and Type "C" Test Results:

5.7.1. Type B & C LLRT reports for the refueling outages since the previous CILRT (March 1990) are in Appendix F.

5.7.2. The minimum pathway leakage rates for those penetrations not in post-LOCA lineup during the ILRT are listed in Table 2.

6.0 ANALYSIS AND INTERPRETATION

The calculated leakage rate at the 95% UCL is 0.04257%/day. The as-found minimum pathway local leakage rate for the penetrations not in post-LOCA lineup is 0.00012%/day, and leakage savings due to valve maintenance is 0.00306%/day. The as-left Type B and C penalties are 0.00527%/day. The penalty for volume change is insignificant. Therefore, the as-found integrated leakage rate is 0.04575%/day and the as-left value is 0.04784%/day. Both the as-found and as-left values are within the acceptance limit of 0.075%/day.

Verification Test flow of 3.63 scfm (0.1000%/day) was imposed at 0135 on November 12, 1993. The four hour verification test was performed from 0145 to 0545. The composite leakage rate (L_c) of 0.1267%/day was within the acceptable range between 0.1166%/day and 0.1666%/day.

Therefore, the sixth periodic Type A integrated leakage rate test has acceptably demonstrated the integrity of the Port Calhoun Station Unit No. 1 Reactor Containment Building. The seventh periodic Type A integrated leakage rate test is currently scheduled to be performed during the 1996 Refueling Outage.

7.0 REFERENCES

- 7.1. Fort Calhoun Station Unit 1 Technical Specifications 3.5(3), 3.5(4), and 3.5(5).
- 7.2. Surveillance Test Procedures
 - 7.2.1. SS-ST-ILRT-0001, *Containment Integrated Leakage Rate Test (CILRT)*, 1993 Performance.
 - 7.2.2. IC-ST-AE-0001, *Containment Personnel Air Lock Leakage Rate Test*, and its predecessor ST-CONT-2-F2, All performances between March 2, 1990, and December 2, 1993.
 - 7.2.3. IC-ST-AE-0002, *Containment Equipment Hatch O-Ring Type B Leakage Rate Test*, and its predecessor ST-CONT-2-F3, All performances between March 2, 1990, and November 16, 1993.
 - 7.2.4. IC-ST-AE-0003, *Fuel Transfer Tube Flange O-Ring Type B Leakage Rate Test*, and its predecessor ST-CONT-2-F4, All performances between March 2, 1990, and November 6, 1993.
 - 7.2.5. IC-ST-AE-0004, *Containment Electrical Penetration Type B Leak Rate Test*, and its predecessor ST-CONT-2-F5, All performances between March 2, 1990, and November 16, 1993.
 - 7.2.6. IC-ST-AE-0005, *Containment Mechanical Penetration Seal Type B Leak Rate Test*, and its predecessor ST-CONT-2-F6, All performances between March 2, 1990, and November 16, 1993.
 - 7.2.7. IC-ST-AE-0006, *Containment Personnel Air Lock Reactor PAL Door Equalizing Valve Type B Leak Rate Test*, All performances between December 7, 1991 and December 2, 1993.
 - 7.2.8. IC-ST-AE-3100 Series of Type C Local Leakage Rate Test Procedures, and their predecessors IC-ST-CONT-3001, IC-ST-CONT-3002, ST-CONT-3-F1, and ST-CONT-3-F4. All performances between March 2, 1990, and November 16, 1993.
 - 7.2.9. SS-ST-CONT-0002, *Compilation and Evaluation of Type B and Type C Local Leakage Rate Test Results*, Initial performances during 1993 Refueling Outage.

- 7.3 10 CFR 50 Appendix J, *Reactor Containment Leakage Testing for Water Cooled Power Reactors*, U. S. Code of Federal Regulations, U. S. Nuclear Regulatory Commission.
- 7.4 ANSI N45.4-1972, *Leakage Rate Testing of Containment Structures for Nuclear Reactors*, American Nuclear Society.
- 7.5 ANSI/ANS 56.8-1987, *Containment System Leakage Testing Requirements*, American Nuclear Society.
- 7.6 BN-TOP-1, Revision 1, *Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants*, Bechtel Corporation, San Francisco, California.

TABLE 1

ILRT SENSOR LOCATIONS & VOLUME FRACTIONS

INSTRUMENT LABEL	FCS #	RH-TEMP DP CALC	ZONE	ELEV-AZ	WEIGHT FACTOR
PRESS 1	P1	-	-	-	.3335
PRESS 2	P2	-	-	-	.3335
PRESS 3	P3	-	-	-	.333
AVERAGE PRESS	-	-	-	-	-
PRESS 4 (AMBIENT)	P4	-	-	-	-
RTD 1	1	-	1-1	1115-315	.0484
RTD 2	U	-	1-1	1115-135	.0484
RTD 3	2	-	1-1	1103-315	.0484
RTD 4	V	-	1-1	1103-135	.0484
RTD 5	3	-	1-2	1093-315	.0331
RTD 6	W	-	1-2	1093-135	.0331
RTD 7	4	-	1-2	1083-315	.0331
RTD 8	X	-	1-2	1083-135	.0331
RTD 9	5	-	1-2	1073-315	.0331
RTD 10	Y	-	1-2	1073-135	.0331
RTD 11	Q	-	1-2	1063-110	.0331
RTD 12	T	-	1-2	1059-320	.0331
RTD 13	P	-	1-2	1048-315	.0331
RTD 14	O	-	1-2	1048-045	.0331
RTD 15	N	-	1-2	1046-120	.0331
RTD 16	S	-	2-3	1055-340	.0219
RTD 17	R	-	2-3	1055-200	.0219
RTD 18	M	-	1-2	1048-225	.0331
RTD 19	6	-	1-2	1033-315	.0331
RTD 20	Z	-	1-2	1023-270	.0331
RTD 21	H	-	2-3	1013-180	.0219
RTD 22	G	-	3-4	1020-180	.0293

TABLE 1

ILRT SENSOR LOCATIONS & VOLUME FRACTIONS

INSTRUMENT LABEL	FCS #	RH-TEMP DP CALC	ZONE	ELEV-AZ	WEIGHT FACTOR
RTD 23	F	-	3-4	1029-210	.0293
RTD 24	I	-	3-4	1030-080	.0293
RTD 25	J	-	2-3	1015-000	.0219
RTD 26	K	-	3-4	1029-340	.0293
RTD 27	L	-	3-4	1020-300	.0293
RTD 28	A	-	3-5	1010-240	.0174
RTD 29	B	-	3-5	1010-150	.0174
RTD 30	C	-	3-5	1000-095	.0174
RTD 31	D	-	3-5	1010-030	.0174
RTD 32	E	-	3-5	1000-300	.0174
RTD 33	7	-	2-3	985-090	.0219
AVERAGE RTD	-	-	-	-	-
RH 1	c	-	1-1	1110-135	0
RH 2	h	-	1-2	1083-315	0
RH 3	d	-	2-3	1060-320	0
RH 4	b	-	1-2	1048-315	0
RH 5	e	-	1-2	1048-120	0
RH 6	i	-	1-2	1035-315	0
RH 7	f	-	3-4	1020-300	0
RH 8	a	-	3-4	1030-085	0
RH 9	g	-	3-5	998-090	0
DC 1	-	STS-U	1-1	-	.1942
DC 2	-	STS-4	1-2	-	.1157
DC 3	-	STS-S	2-3	-	.1157
DC 4	-	STS-P	1-2	-	.1157
DC 5	-	STS-M	1-2	-	.1157
DC 6	-	STS-6	1-2	-	.1097

TABLE 1

ILRT SENSOR LOCATIONS & VOLUME FRACTIONS

INSTRUMENT LABEL	FCS #	RH-TEMP DP CALC	ZONE	ELEV-AZ	WEIGHT FACTOR
DC 7	-	STS-L	3-4	-	.0732
DC 8	-	STS-I	3-4	-	.0732
DC 9	-	STS-C	3-5	-	.0869
AVERAGE DC	-	-	-	-	-
FLOW 1	-	-	-	-	1.0
FLOW AVERAGE	-	-	-	-	-

Note A: ATEST, Stream, and Channel/Field # are internal to the ATEST program.

Note B: Containment digital instrumentation electrical circuits connected to penetration D4:

String -- Sensor Address Summary

String #1--U, c, V, W, X, Y, Z
 String #2--1, 2, 3, 4, h, 5, 6, i
 String #3--Q, R, S, d, T
 String #4--M, N, e, O, P, b
 String #5--H, G, F, I, a, J, K, L, f
 String #6--A, B, C, g, 7, D, E

TABLE 2
ILRT TYPE B & TYPE C PENALTIES

Penetration	As-Found MNPLR sccm	As-Left MNPLR sccm
M-2	0.0	0.0
M-7	60.0	60.0
M-8	0.0	0.0
M-11	0.0	0.0
M-15	23.5	23.5
M-18	0.0	0.0
M-19	0.0	0.0
M-30	42.5	42.5
M-39	0.0	0.0
M-52	0.0	0.0
M-53	0.0	0.0
M-69	0.0	0.0
M-72	0.0	0.0
M-HCV-383-3	0.0	2900.0
M-HCV-383-4	0.0	2500.0
Total Type B & Type C Penalty	127.00	5,527.00
Converted to % per day	0.00012	0.00527

APPENDIX A

ATEST ILRT Data Analysis Computer Program Summary

ATEST SOFTWARE SUMMARY

1.0 INTRODUCTION

The Type A test is an integrated leakage rate test (ILRT) designed to verify the leak tightness of the entire containment building. This test is performed at approximately three-year intervals as required by Appendix J of 10 CFR 50. It is performed in accordance with the American National Standard "Containment System Leakage Testing Requirements," (ANSI/ANS-56.8-1987), American National Standard "Leakage Rate Testing of Primary Containment for Nuclear Power Plants," (ANSI N45.4-1972), and the Bechtel Topical Report "Testing Criteria for Integrated Leakage Rate Testing of Nuclear Power Plants," (BN-TOP-1, Rev. 1-1972).

The ATEST program computes total time leakage rates, mass point leakage rates, least squares fit (LSF) leakage rates, and 95% upper confidence level (UCL) leakage rates during the course of the test from input measured values of containment pressure, temperature and dew point.

The ATEST program is also capable of performing the verification phase and will generate specific verification test features to aid in verifying the Type A test.

The program is designed to automate the task of sampling and reducing the data to a usable form in accordance with the above documents. This greatly limits the possibility of human error and provides intermediate results after a short delay. This makes it possible to monitor the progress of the test very closely in approximately real time. For each of the two test periods, the ATEST program samples the containment's environment and calculates the values needed to assess the status of the test. Interim results are provided as desired and the program checks to see if the acceptance criteria have been satisfied for the two test periods. The program also produces a printout of all data gathered as well as a record of its calculations. In addition, the data is stored on hard or floppy computer disks for future reference. The program can recover from a power failure or any other accidental interruptions of the program's execution by reloading the old data and restarting the data sampling routine at the proper location. Lastly, should one of the instruments fail during the test, it is possible to suppress any failed sensors or instruments from the entire series of calculations.

ATEST is written in a high level language (QuickBASIC) and is designed for use on a micro-computer with direct data input from the data acquisition system. Brief descriptions of program use, formulae used for leakage rate computations, and program logic are provided in the following sections.

2.0 EXPLANATION OF PROGRAM

The ATEST computer program is written for use by experienced ILRT personnel, to determine containment integrated leakage rates based on the Absolute Method described in ANSI N45.4-1972, ANSI/ANS 56.8-1987, and BN-TOP-1. Information loaded into the program prior to or at the start of the test:

- Number of containment atmosphere drybulb temperature sensors, dew point temperature (water vapor pressure) sensors and pressure gages to be used in leakage rate computations for the specific test.
- Volume fractions assigned to each of the above sensors.

- Calibration data for above sensors.
- Test title.
- Test pressure.
- Maximum available leakage rate at test pressure.

Data recorded from the data acquisition system during the test, and used to compute leakage rates:

- Time and date.
- Containment atmosphere drybulb temperatures.
- Containment atmosphere pressure(s).
- Containment atmosphere dew point temperatures.
- Containment free air volume.

If an instrument or sensor should fail during the test, the data from the sensor is not used. The volume fractions for the remaining sensors are recomputed and reloaded into the program for use in ensuing leakage rate computations.

3.0 PROGRAM LOGIC AND OPERATION SUMMARY

The ATEST computer program user logic flow is controlled by a set of user options (see chart). These options (shown on the screen) and a brief description of their associated function are presented below:

- | | |
|--------------------|---|
| LOG ON/OFF | Allows for the use of the data acquisition system for electronic entry and permanent recording of data. Conversely, this toggle can suspend the entry/recording process. |
| AUTO/MANUAL | This key (de)activates the automatic data entry and allows manual entry. |
| MAINT | Provides for maintenance of the data, calibration, and weight factor files. Its features include defining weight factors, changing the time increment of logging data, deleting a file record, displaying a record's average environmental contents, and changes the individual record's content (see second screen). This key has several sub-tiers. |
| INPUT | Provides for either a pre-arranged manual entry(s) or in the MANUAL mode, the method to input the recorded data. |
| REPORTS | This key performs the calculations of program and prints the results. This key has several sub-tiers. |
| PLOTS | This function implements the graphics portion of the program. Any channel or leakage rate can be plotted. This key has several sub-tiers. |
| END JOB | This key will properly terminate the program. |

4.0 COMPUTER REPORTS AND PLOTS

4.1 Reports

REPORTS - Does the analysis of the data accumulated by the ILRT system and then prints out a report of the results. The types of analysis performed are: mass point, total time, environmental averages, mass loss, temperature stabilization, and data rejection. All results from the analysis are printed off a thermal printer. The sub-program REPORTS requires the user to select a valid time window or record window as listed below as a prerequisite for doing analysis.

SENSOR LIST - This report outputs all the sensor data for the selected records.

MASS LOSS - The mass loss analysis is based on the ANSI/ANS 56.8-1987 Standard acceptance criteria and calculations.

TEMP STAB - The temperature stabilization analysis is based on the Bechtel Topical Report (BN-TOP-1) and the ANSI/ANS 56.8-1987 Standard with their respective acceptance criteria and calculations. The harmonic weighted average method is used.

TOTAL TIME - The total time analysis is based on the Bechtel Topical Report (BN-TOP-1) and its acceptance criteria and calculations.

MASS POINT - The mass point analysis is based on the ANSI/ANS 56.8-1987 Standard acceptance criteria and calculations.

ENVIRONMENT - The environment analysis is based on the Bechtel Topical Report (BN-TOP-1) and the ANSI/ANS 56.8-1987 Standard with their respective acceptance criteria and calculations.

POINT TO POINT - The point to point analysis is based on the ANSI N45.4-1972 Standard and its acceptance criteria and calculations.

4.2 Plots

The Graphics sub-program allows the user to plot the mass point analysis, total time analysis, and displayed channels. Further, plots can be made in a batch mode by instrument type to a printer or a plotter. PLOTS performs autoranging on the data being plotted for axes values. PLOTS requires the user to select any valid time window or record window as a prerequisite for doing plotting.

APPENDIX B

Temperature Stabilization Period Data
1130 to 2245 on November 10, 1993

Tables

- 1. Temperature Stabilization Report B-1
- 2. Mass Stabilization Report B-2

Graph

- 1. Average Drybulb Temperature B-3

TEMPERATURE STABILIZATION

DATE - 12-30-1993

TIME - 11:40:05

TIME (DELTA) (HOURS)	TEMP	TEMP DIFF INCR	TEMP AVG (1 HR)	BN-TOP-1 AVG (2 HR)	BN-TOP-1 RATE (2 HR)	TEMP AVG (4 HR)	ANSI CRIT
0.00	537.044	0.000	0.000	0.000	0.000	0.000	0.000
0.25	536.991	-0.053	0.000	0.000	0.000	0.000	0.000
0.50	536.930	-0.061	0.000	0.000	0.000	0.000	0.000
0.75	536.878	-0.052	0.000	0.000	0.000	0.000	0.000
1.00	536.833	-0.045	0.000	0.000	0.000	0.000	0.000
1.25	536.783	-0.049	536.914	0.000	0.000	0.000	0.000
1.50	536.749	-0.034	536.870	0.000	0.000	0.000	0.000
1.75	536.705	-0.044	536.818	0.000	0.000	0.000	0.000
2.00	536.670	-0.035	536.774	0.000	0.000	0.000	0.000
2.25	536.627	-0.043	536.730	-0.208	0.208	0.000	0.000
2.50	536.595	-0.032	536.689	-0.198	0.198	0.000	0.000
2.75	536.564	-0.032	536.656	-0.183	0.183	0.000	0.000
3.00	536.531	-0.033	536.618	-0.174	0.174	0.000	0.000
3.25	536.499	-0.032	536.585	-0.167	0.167	0.000	0.000
3.50	536.478	-0.021	536.553	-0.153	0.153	0.000	0.000
3.75	536.449	-0.029	536.522	-0.150	0.150	0.000	0.000
4.00	536.426	-0.023	536.495	-0.140	0.140	0.000	0.000
4.25	536.390	-0.036	536.460	-0.140	0.140	-0.164	0.023
4.50	536.367	-0.023	536.433	-0.130	0.130	-0.156	0.024
4.75	536.346	-0.020	536.412	-0.125	0.125	-0.146	0.014
5.00	536.319	-0.027	536.384	-0.122	0.122	-0.140	0.010
5.25	536.294	-0.025	536.360	-0.118	0.118	-0.135	0.003
5.50	536.267	-0.027	536.328	-0.116	0.116	-0.129	0.007
5.75	536.252	-0.016	536.309	-0.113	0.113	-0.124	0.010
6.00	536.226	-0.025	536.286	-0.111	0.111	-0.120	-0.000
6.25	536.207	-0.019	536.263	-0.109	0.109	-0.116	0.004
6.50	536.191	-0.016	536.243	-0.099	0.099	-0.109	0.006
6.75	536.164	-0.027	536.216	-0.101	0.101	-0.108	0.005
7.00	536.147	-0.017	536.200	-0.099	0.099	-0.104	-0.000
7.25	536.133	-0.014	536.180	-0.093	0.093	-0.099	0.006
7.50	536.119	-0.014	536.163	-0.088	0.088	-0.095	0.006
8.50	536.062	-0.057	536.097	-0.073	0.073	-0.082	0.011
8.75	536.041	-0.021	536.080	-0.075	0.075	-0.081	0.004
9.00	536.024	-0.016	536.071	-0.070	0.070	-0.080	-0.014
9.25	536.012	-0.012	536.065	-0.068	0.068	-0.077	-0.030

DATE - 12-30-1993

TIME - 11:40:07

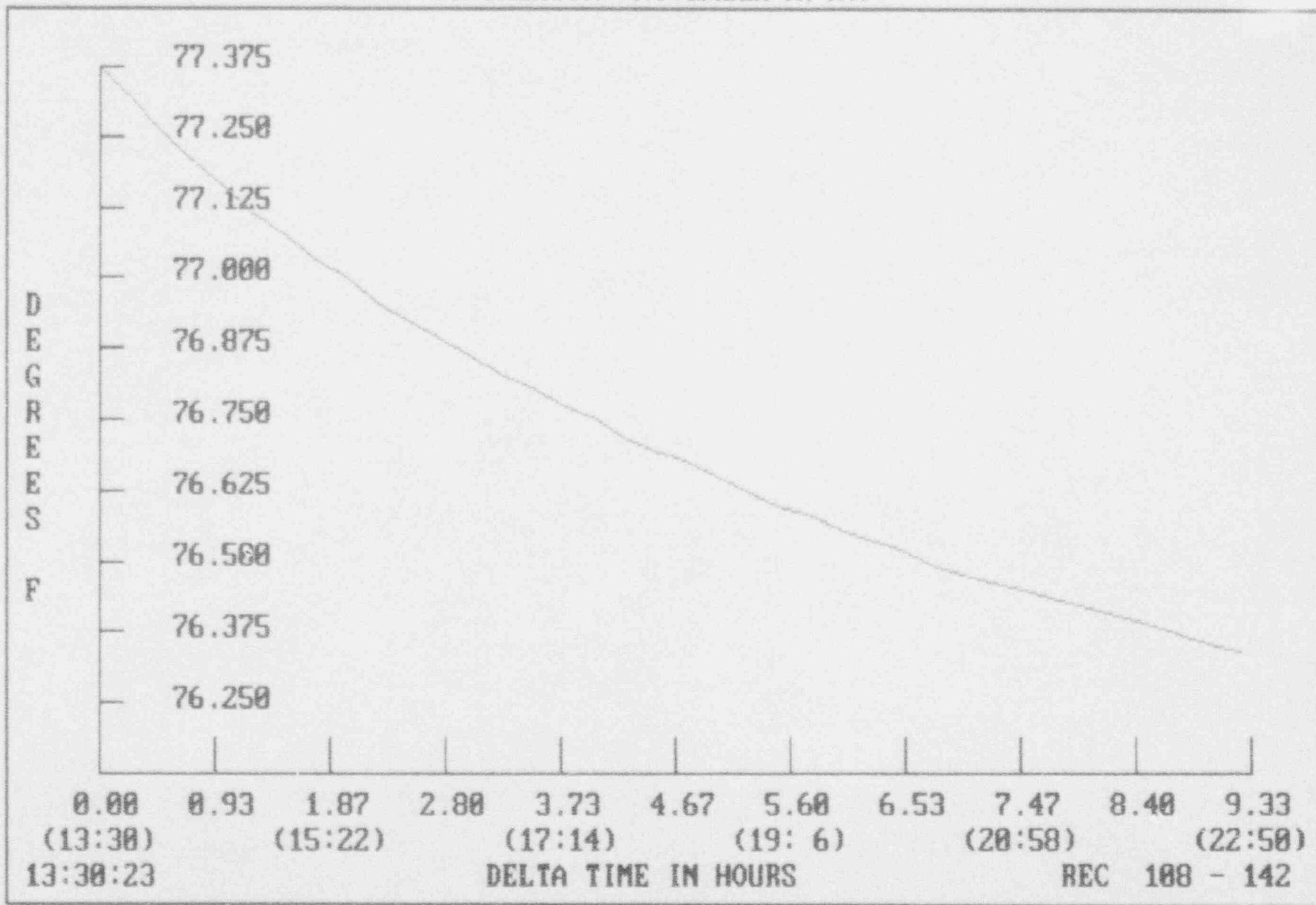
TIME	DELTA TIME	CONT AIR MASS	1Hr LSF LEAK RATE	2Hr LSF LEAK RATE	2Hr - 1Hr LEAK RATE
1130	0.00	393597			
1145	0.25	393592			
1200	0.50	393590			
1215	0.75	393582			
1230	1.00	393575	0.13580		
1245	1.25	393566	0.16395		
1300	1.50	393557	0.19915		
1315	1.75	393543	0.23544		
1330	2.00	393539	0.23303	0.18919	0.04384
1345	2.25	393527	0.24040	0.20893	0.03146
1400	2.50	393525	0.19938	0.21372	0.01434
1415	2.75	393519	0.14771	0.20332	0.05561
1430	3.00	393511	0.15113	0.19349	0.04237
1445	3.25	393508	0.12276	0.17589	0.05312
1500	3.50	393495	0.17416	0.16957	0.00459
1515	3.75	393491	0.17856	0.15798	0.02058
1530	4.00	393481	0.18862	0.16591	0.02271
1545	4.25	393482	0.15899	0.15496	0.00404
1600	4.50	393474	0.12369	0.15957	0.03588
1615	4.75	393466	0.14282	0.15990	0.01708
1630	5.00	393460	0.14589	0.15666	0.01077
1645	5.25	393457	0.15562	0.14892	0.00670
1700	5.50	393445	0.16058	0.14632	0.01425
1715	5.75	393441	0.15812	0.15253	0.00559
1730	6.00	393433	0.17054	0.15583	0.01471
1745	6.25	393435	0.13626	0.15208	0.01582
1800	6.50	393429	0.09113	0.13838	0.04725
1815	6.75	393421	0.10600	0.13291	0.02690
1830	7.00	393419	0.10226	0.12508	0.02282
1845	7.25	393416	0.11956	0.11683	0.00273
1900	7.50	393417	0.07208	0.09337	0.02129
1915	7.75	393407	0.07367	0.09413	0.02046
1930	8.00	393406	0.08679	0.09081	0.00402
1945	8.25	393401	0.09625	0.09579	0.00047
2000	8.50	393394	0.12475	0.09491	0.02984
2015	8.75	393397	0.07717	0.08544	0.00826
2030	9.00	393395	0.06460	0.08350	0.01890
2045	9.25	393390	0.05545	0.08200	0.02655
2100	9.50	393383	0.07215	0.08681	0.01466
2200	10.50	393369	0.10143	0.08425	0.01718
2215	10.75	393370	0.08729	0.08134	0.00596
2230	11.00	393368	0.07387	0.07699	0.00312
2245	11.25	393361	0.07014	0.07919	0.00904

MAX ALLOWABLE LEAK RATE : .1

AVERAGE TEMPERATURE - TEMPERATURE STABILIZATION

FT. CALHOUN - NOVEMBER 10, 1993

B-3



APPENDIX C

ILRT Tables and Graphs

2300 on November 10, 1993, to 2300 on November 11, 1993

Tables

1.	Mass Point Report	C-1
2.	Total Time Report	C-4
3.	Mass Loss Report	C-7
4.	Environmental Report	C-13

Graphs

1.	Mass Point	C-3
2.	Total Time	C-6
3.	Measured Mass	C-9
4.	Average Pressure	C-10
5.	Average Drybulb Temperature	C-11
6.	Average Vapor Pressure	C-12

MASS POINT

DATE - 12-30-1993

TIME - 11:42:45

TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	CONT AIR MASS	LSF LEAK RATE	UPPER CONF LEVEL
2300	536.001	0.1486	45.204	74.393	393354.72	0.00000	0.00000
2315	535.981	0.1487	45.215	74.391	393356.72	0.00000	0.00000
2330	535.971	0.1488	45.230	74.387	393342.22	0.15253	0.00000
2345	535.964	0.1488	45.229	74.384	393335.88	0.17341	0.33047
0	535.956	0.1489	45.248	74.382	393331.22	0.16563	0.23896
15	535.936	0.1490	45.268	74.380	393334.63	0.12786	0.19150
30	535.923	0.1490	45.276	74.380	393343.13	0.07845	0.14997
45	535.915	0.1489	45.262	74.378	393338.28	0.06117	0.11611
100	535.908	0.1490	45.279	74.376	393333.53	0.05676	0.09853
115	535.898	0.1490	45.272	74.374	393331.13	0.05463	0.08741
130	535.888	0.1491	45.284	74.372	393327.72	0.05476	0.08115
145	535.875	0.1492	45.312	74.370	393327.72	0.05273	0.07454
200	535.867	0.1492	45.314	74.369	393325.81	0.05130	0.06963
215	535.861	0.1494	45.336	74.367	393321.09	0.05223	0.06783
230	535.856	0.1494	45.346	74.365	393315.34	0.05503	0.06876
245	535.842	0.1494	45.343	74.364	393317.47	0.05455	0.06650
300	535.827	0.1494	45.346	74.362	393320.13	0.05188	0.06271
315	535.818	0.1495	45.361	74.361	393317.66	0.05015	0.05990
330	535.819	0.1495	45.363	74.359	393308.09	0.05181	0.06065
345	535.817	0.1496	45.381	74.358	393302.19	0.05434	0.06266
400	535.799	0.1496	45.378	74.356	393308.00	0.05366	0.06120
415	535.793	0.1497	45.394	74.355	393306.19	0.05304	0.05990
430	535.787	0.1497	45.402	74.353	393301.41	0.05326	0.05951
445	535.779	0.1498	45.414	74.352	393299.19	0.05344	0.05916
500	535.769	0.1499	45.427	74.350	393299.50	0.05302	0.05829
515	535.766	0.1499	45.429	74.350	393296.66	0.05282	0.05768
530	535.754	0.1498	45.421	74.348	393297.50	0.05209	0.05664
545	535.751	0.1499	45.434	74.347	393293.28	0.05187	0.05610
600	535.746	0.1500	45.449	74.346	393290.41	0.05183	0.05575
615	535.741	0.1499	45.435	74.345	393289.22	0.05164	0.05531
630	535.733	0.1500	45.442	74.343	393287.75	0.05140	0.05483
645	535.727	0.1501	45.467	74.342	393286.38	0.05109	0.05432
700	535.723	0.1501	45.473	74.341	393282.41	0.05108	0.05411
715	535.712	0.1502	45.482	74.340	393286.09	0.05037	0.05330
730	535.704	0.1501	45.472	74.339	393284.59	0.04970	0.05254
745	535.707	0.1502	45.485	74.337	393275.63	0.04990	0.05259
800	535.704	0.1502	45.483	74.336	393272.78	0.05015	0.05270
815	535.696	0.1502	45.491	74.335	393273.41	0.05010	0.05251
830	535.694	0.1502	45.489	74.334	393270.00	0.05018	0.05247
845	535.683	0.1504	45.515	74.333	393272.63	0.04983	0.05203
900	535.682	0.1503	45.506	74.333	393269.22	0.04964	0.05174
915	535.673	0.1503	45.504	74.331	393269.41	0.04930	0.05133
930	535.677	0.1505	45.536	74.330	393260.16	0.04957	0.05151
945	535.666	0.1504	45.519	74.329	393263.97	0.04936	0.05123
1000	535.663	0.1504	45.521	74.328	393260.13	0.04932	0.05110
1015	535.659	0.1505	45.531	74.327	393257.78	0.04930	0.05100
1030	535.652	0.1504	45.528	74.326	393258.31	0.04911	0.05076
1045	535.652	0.1504	45.524	74.325	393253.53	0.04913	0.05070
1100	535.649	0.1504	45.527	74.324	393248.81	0.04930	0.05082

MASS POINT

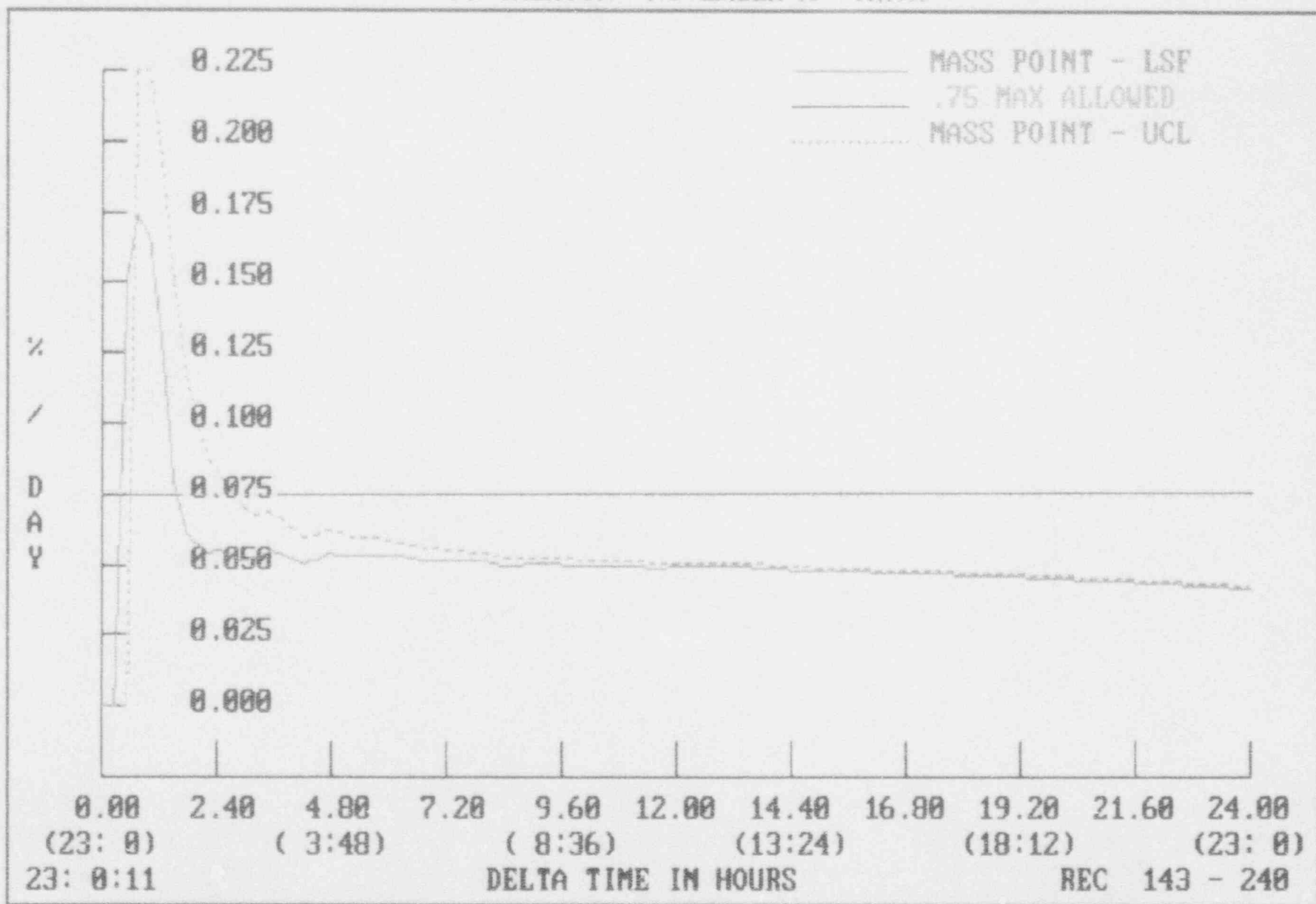
DATE - 12-30-1993

TIME - 11:42:47

TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	CONT AIR MASS	LSF LEAK RATE	UPPER CONF LEVEL
1115	535.639	0.1505	45.543	74.323	393251.25	0.04920	0.05065
1130	535.645	0.1506	45.547	74.323	393243.41	0.04943	0.05084
1145	535.635	0.1506	45.550	74.322	393245.59	0.04941	0.05077
1200	535.626	0.1506	45.560	74.321	393246.19	0.04926	0.05057
1215	535.630	0.1506	45.561	74.320	393239.56	0.04935	0.05062
1230	535.619	0.1506	45.555	74.319	393241.28	0.04925	0.05048
1245	535.612	0.1506	45.558	74.318	393243.78	0.04896	0.05018
1300	535.611	0.1506	45.553	74.317	393240.31	0.04876	0.04995
1315	535.599	0.1506	45.553	74.317	393244.91	0.04830	0.04953
1330	535.599	0.1507	45.565	74.316	393239.25	0.04804	0.04926
1345	535.606	0.1507	45.573	74.315	393231.66	0.04803	0.04920
1400	535.599	0.1506	45.562	74.314	393232.28	0.04791	0.04906
1415	535.590	0.1507	45.574	74.313	393235.00	0.04764	0.04878
1430	535.597	0.1508	45.586	74.312	393224.22	0.04771	0.04881
1445	535.590	0.1507	45.579	74.312	393226.88	0.04761	0.04868
1500	535.585	0.1508	45.583	74.311	393228.25	0.04741	0.04846
1515	535.580	0.1508	45.588	74.311	393229.06	0.04713	0.04819
1530	535.584	0.1508	45.586	74.310	393221.97	0.04704	0.04807
1545	535.581	0.1508	45.584	74.309	393220.16	0.04696	0.04796
1600	535.574	0.1507	45.578	74.309	393221.97	0.04677	0.04776
1615	535.580	0.1508	45.587	74.308	393215.56	0.04673	0.04769
1630	535.572	0.1507	45.579	74.308	393218.22	0.04656	0.04751
1645	535.577	0.1508	45.597	74.307	393212.19	0.04652	0.04744
1700	535.565	0.1507	45.580	74.307	393216.97	0.04630	0.04722
1715	535.568	0.1508	45.587	74.306	393211.34	0.04620	0.04710
1730	535.572	0.1509	45.599	74.306	393206.31	0.04618	0.04706
1745	535.567	0.1508	45.593	74.305	393206.88	0.04611	0.04697
1800	535.553	0.1508	45.584	74.304	393213.88	0.04583	0.04671
1815	535.558	0.1508	45.592	74.304	393207.78	0.04566	0.04653
1830	535.553	0.1509	45.601	74.303	393208.81	0.04544	0.04632
1845	535.560	0.1508	45.598	74.303	393201.00	0.04537	0.04623
1900	535.553	0.1509	45.612	74.302	393202.88	0.04523	0.04608
1915	535.545	0.1510	45.617	74.302	393205.88	0.04499	0.04585
1930	535.540	0.1508	45.593	74.302	393209.28	0.04466	0.04555
1945	535.547	0.1508	45.589	74.301	393201.56	0.04447	0.04536
2000	535.547	0.1509	45.606	74.301	393198.72	0.04431	0.04520
2015	535.540	0.1509	45.613	74.300	393202.28	0.04406	0.04496
2030	535.542	0.1510	45.617	74.300	393197.69	0.04388	0.04477
2045	535.541	0.1509	45.605	74.300	393198.06	0.04367	0.04457
2100	535.539	0.1510	45.620	74.299	393196.72	0.04347	0.04437
2115	535.538	0.1510	45.625	74.299	393196.34	0.04326	0.04416
2130	535.537	0.1509	45.612	74.299	393194.66	0.04305	0.04395
2145	535.538	0.1509	45.611	74.299	393195.28	0.04282	0.04373
2200	535.530	0.1509	45.606	74.298	393198.56	0.04252	0.04346
2215	535.530	0.1509	45.610	74.298	393196.44	0.04225	0.04320
2230	535.538	0.1509	45.608	74.298	393189.88	0.04207	0.04302
2245	535.532	0.1509	45.611	74.297	393191.19	0.04185	0.04280
2300	535.529	0.1510	45.625	74.297	393191.53	0.04161	0.04257

MASS POINT - TYPE A TEST

FT. CALHOUN - NOVEMBER 10 - 11, 1993



 DATE - 12-30-1993

TOTAL TIME CALCULATION RESULTS

 TIME - 11:43:11

TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	LSF LEAK RATE	UPPER CONF LEVEL	MEASURED LEAK RATE
2300	536.001	0.1486	45.204	74.393	0.0000	0.00000	0.00000
2315	535.981	0.1487	45.215	74.391	0.0000	0.00000	-0.04910
2330	535.971	0.1488	45.230	74.387	0.1526	0.00000	0.15258
2345	535.964	0.1488	45.229	74.384	0.1868	0.87848	0.15329
0	535.956	0.1489	45.248	74.382	0.1868	0.39914	0.14344
15	535.936	0.1490	45.268	74.380	0.1568	0.32331	0.09819
30	535.923	0.1490	45.276	74.380	0.1130	0.25726	0.04724
45	535.915	0.1489	45.262	74.378	0.0919	0.20524	0.05739
100	505.908	0.1490	45.279	74.376	0.0817	0.17562	0.06465
115	535.898	0.1490	45.272	74.374	0.0747	0.15543	0.06400
130	535.888	0.1491	45.284	74.372	0.0706	0.14141	0.06591
145	535.875	0.1492	45.312	74.370	0.0658	0.12903	0.05991
200	535.867	0.1492	45.314	74.369	0.0620	0.11912	0.05884
215	535.861	0.1494	45.336	74.367	0.0604	0.11252	0.06317
230	535.856	0.1494	45.346	74.365	0.0607	0.10869	0.06866
245	535.842	0.1494	45.343	74.364	0.0590	0.10341	0.06065
300	535.827	0.1494	45.346	74.362	0.0560	0.09728	0.05277
315	535.818	0.1495	45.361	74.361	0.0536	0.09227	0.05322
330	535.819	0.1495	45.363	74.359	0.0538	0.09023	0.06326
345	535.817	0.1496	45.381	74.358	0.0549	0.08932	0.06750
400	535.799	0.1496	45.378	74.356	0.0538	0.08636	0.05702
415	535.793	0.1497	45.394	74.355	0.0529	0.08375	0.05643
430	535.787	0.1497	45.402	74.353	0.0526	0.08198	0.05918
445	535.779	0.1498	45.414	74.352	0.0523	0.08036	0.05894
500	535.769	0.1499	45.427	74.350	0.0517	0.07848	0.05616
515	535.766	0.1499	45.429	74.350	0.0512	0.07691	0.05671
530	535.754	0.1498	45.421	74.348	0.0504	0.07506	0.05373
545	535.751	0.1499	45.434	74.347	0.0500	0.07369	0.05555
600	535.746	0.1500	45.449	74.346	0.0497	0.07254	0.05607
615	535.741	0.1499	45.435	74.345	0.0493	0.07137	0.05515
630	535.733	0.1500	45.442	74.340	0.0490	0.07023	0.05449
645	535.727	0.1501	45.467	74.342	0.0486	0.06912	0.05383
700	535.723	0.1501	45.473	74.341	0.0484	0.06829	0.05517
715	535.712	0.1502	45.482	74.340	0.0477	0.06699	0.05078
730	535.704	0.1501	45.472	74.339	0.0471	0.06578	0.05035
745	535.707	0.1502	45.485	74.337	0.0471	0.06523	0.05518
800	535.704	0.1502	45.483	74.336	0.0471	0.06476	0.05557
815	535.696	0.1502	45.491	74.335	0.0469	0.06410	0.05361
830	535.694	0.1502	45.489	74.334	0.0469	0.06359	0.05438
845	535.683	0.1504	45.515	74.333	0.0465	0.06280	0.05135
900	535.682	0.1503	45.506	74.333	0.0463	0.06216	0.05214
915	535.673	0.1503	45.504	74.331	0.0460	0.06144	0.05076
930	535.677	0.1505	45.536	74.330	0.0461	0.06118	0.05492
945	535.666	0.1504	45.519	74.329	0.0458	0.06059	0.05148
1000	535.663	0.1504	45.521	74.328	0.0457	0.06015	0.05246
1015	535.659	0.1505	45.531	74.327	0.0456	0.05975	0.05256
1030	535.652	0.1504	45.528	74.326	0.0455	0.05925	0.05113
1045	535.652	0.1504	45.524	74.325	0.0454	0.05890	0.05253
1100	535.649	0.1504	45.527	74.324	0.0455	0.05869	0.05384

DATE - 12-30-1993

TOTAL TIME CALCULATION RESULTS

TIME - 11:43:13

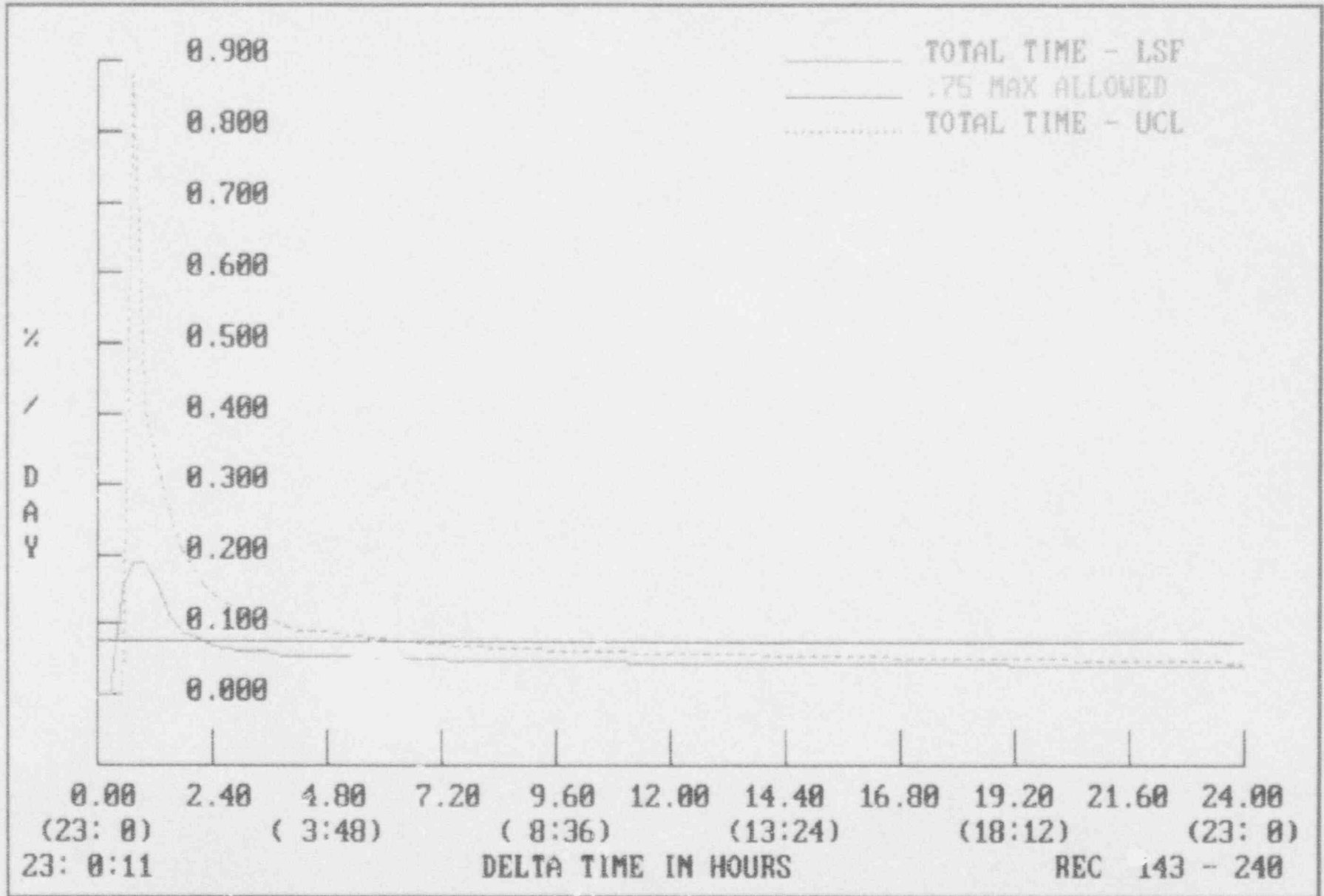
TIME	TEMP	VAPOR PRESS	DEW POINT	CORR. AIR PRESS	LSF LEAK RATE	UPPER CONF LEVEL	MEASURED LEAK RATE
1115	535.639	0.1505	45.543	74.323	0.0453	0.05830	0.05151
1130	535.645	0.1506	45.547	74.323	0.0455	0.05817	0.05431
1145	535.635	0.1506	45.550	74.322	0.0454	0.05786	0.05220
1200	535.626	0.1506	45.560	74.321	0.0453	0.05748	0.05092
1215	535.630	0.1506	45.561	74.320	0.0453	0.05729	0.05302
1230	535.619	0.1506	45.555	74.319	0.0452	0.05697	0.05126
1245	535.612	0.1506	45.558	74.318	0.0450	0.05652	0.04922
1300	535.611	0.1506	45.553	74.317	0.0448	0.05615	0.04985
1315	535.599	0.1506	45.553	74.317	0.0445	0.05560	0.04700
1330	535.599	0.1507	45.565	74.316	0.0442	0.05519	0.04858
1345	535.606	0.1507	45.573	74.315	0.0442	0.05497	0.05090
1400	535.599	0.1506	45.562	74.314	0.0441	0.05468	0.04979
1415	535.590	0.1507	45.574	74.313	0.0439	0.05428	0.04789
1430	535.597	0.1508	45.586	74.312	0.0439	0.05414	0.05136
1445	535.590	0.1507	45.579	74.312	0.0438	0.05387	0.04952
1500	535.585	0.1508	45.583	74.311	0.0436	0.05354	0.04822
1515	535.580	0.1508	45.588	74.311	0.0434	0.05317	0.04718
1530	535.584	0.1508	45.586	74.310	0.0433	0.05293	0.04909
1545	535.581	0.1508	45.584	74.309	0.0432	0.05270	0.04901
1600	535.574	0.1507	45.578	74.309	0.0431	0.05240	0.04764
1615	535.580	0.1508	45.587	74.308	0.0430	0.05221	0.04922
1630	535.572	0.1507	45.579	74.308	0.0428	0.05193	0.04759
1645	535.577	0.1508	45.597	74.307	0.0428	0.05175	0.04898
1700	535.565	0.1507	45.580	74.307	0.0426	0.05145	0.04669
1715	535.568	0.1508	45.587	74.306	0.0425	0.05123	0.04793
1730	535.572	0.1509	45.599	74.306	0.0425	0.05108	0.04894
1745	535.567	0.1508	45.593	74.305	0.0424	0.05089	0.04810
1800	535.553	0.1508	45.584	74.304	0.0422	0.05055	0.04523
1815	535.558	0.1508	45.592	74.304	0.0420	0.05030	0.04657
1830	535.553	0.1509	45.601	74.303	0.0419	0.05002	0.04565
1845	535.560	0.1508	45.598	74.303	0.0418	0.04984	0.04749
1900	535.553	0.1509	45.612	74.302	0.0417	0.04962	0.04632
1915	535.545	0.1510	45.617	74.302	0.0415	0.04932	0.04485
1930	535.540	0.1508	45.593	74.302	0.0412	0.04897	0.04328
1945	535.547	0.1508	45.589	74.301	0.0410	0.04872	0.04504
2000	535.547	0.1509	45.606	74.301	0.0409	0.04849	0.04532
2015	535.540	0.1509	45.613	74.300	0.0407	0.04819	0.04376
2030	535.542	0.1510	45.617	74.300	0.0405	0.04795	0.04457
2045	535.541	0.1509	45.605	74.300	0.0404	0.04769	0.04395
2100	535.539	0.1510	45.620	74.299	0.0402	0.04743	0.04382
2115	535.538	0.1510	45.625	74.299	0.0400	0.04717	0.04343
2130	535.537	0.1509	45.612	74.299	0.0398	0.04692	0.04340
2145	535.538	0.1509	45.611	74.299	0.0396	0.04664	0.04276
2200	535.530	0.1509	45.606	74.298	0.0394	0.04632	0.04142
2215	535.530	0.1509	45.610	74.298	0.0392	0.04602	0.04153
2230	535.538	0.1509	45.608	74.298	0.0390	0.04579	0.04280
2245	535.532	0.1509	45.611	74.297	0.0388	0.04553	0.04201
2300	535.529	0.1510	45.625	74.297	0.0386	0.04526	0.04149

MEASURED LEAK RATE USING TOTAL TIME: 0.038623

THE MEAN TOTAL TIME RATE OF 0.044159
IS LESS THAN ALLOWABLE MAXIMUM RATE OF .1

TOTAL TIME - TYPE A TEST

FT. CALHOUN - NOVEMBER 10 - 11, 1993



 DATE - 12-30-1993

MASS LOSS

**

 TIME - 11:44:11

REC NUM	TIME DELTA (HOURS)	CONT AIR MASS	MASS LOSS INCR	MASS LOSS (1 HR)	MASS LOSS (x 24)
143	0.00	393354.719	0.000	0.000	0.000
144	0.25	393356.719	2.000	0.000	0.000
145	0.50	393342.219	-14.500	0.000	0.000
146	0.75	393335.875	-6.344	0.000	0.000
147	1.00	393331.219	-4.656	0.000	0.000
148	1.25	393334.625	3.406	22.094	530.250
149	1.50	393343.125	8.500	-0.906	-21.750
150	1.75	393338.281	-4.844	-2.406	-57.750
151	2.00	393333.531	-4.750	-2.313	-55.500
152	2.25	393331.125	-2.406	3.500	84.000
153	2.50	393327.719	-3.406	15.406	369.750
154	2.75	393327.719	0.000	10.563	253.500
155	3.00	393325.813	-1.906	7.719	185.250
156	3.25	393321.094	-4.719	10.031	240.750
157	3.50	393315.344	-5.750	12.375	297.000
158	3.75	393317.469	2.125	10.250	246.000
159	4.00	393320.125	2.656	5.688	136.500
160	4.25	393317.656	-2.469	3.438	82.500
161	4.50	393308.094	-9.563	7.250	174.000
162	4.75	393302.188	-5.906	15.281	366.750
163	5.00	393308.000	5.813	12.125	291.000
164	5.25	393306.188	-1.813	11.469	275.250
165	5.50	393301.406	-4.781	6.688	160.500
166	5.75	393299.188	-2.219	5.000	72.000
167	6.00	393299.500	0.313	8.500	204.000
168	6.25	393296.656	-2.844	9.531	228.750
169	6.50	393297.500	0.844	3.906	93.750
170	6.75	393293.281	-4.219	5.906	141.750
171	7.00	393290.406	-2.875	9.094	218.250
172	7.25	393289.219	-1.188	7.438	178.500
173	7.50	393287.750	-1.469	9.750	234.000
174	7.75	393286.375	-1.375	6.906	165.750
175	8.00	393282.406	-3.969	8.000	192.000
176	8.25	393286.094	3.688	3.125	75.000
177	8.50	393284.594	-1.500	3.156	75.750
178	8.75	393275.625	-8.969	10.750	258.000
179	9.00	393272.781	-2.844	9.625	231.000
180	9.26	393273.406	0.625	12.688	304.500
181	9.51	393270.000	-3.406	14.594	350.250
182	9.76	393272.625	2.625	3.000	72.000
183	10.00	393269.219	-3.406	3.563	85.500
184	10.25	393269.406	0.188	4.000	96.000
185	10.50	393260.156	-9.250	9.844	236.250
186	10.75	393263.969	3.813	8.656	207.750
187	11.00	393260.125	-3.844	9.094	218.250
188	11.25	393257.781	-2.344	11.625	279.000
189	11.50	393258.313	0.531	1.844	44.250
190	11.75	393253.531	-4.781	10.438	250.500
191	12.00	393248.813	-4.719	11.313	271.500
192	12.25	393251.250	2.438	6.531	156.750

 DATE - 12-30-1993

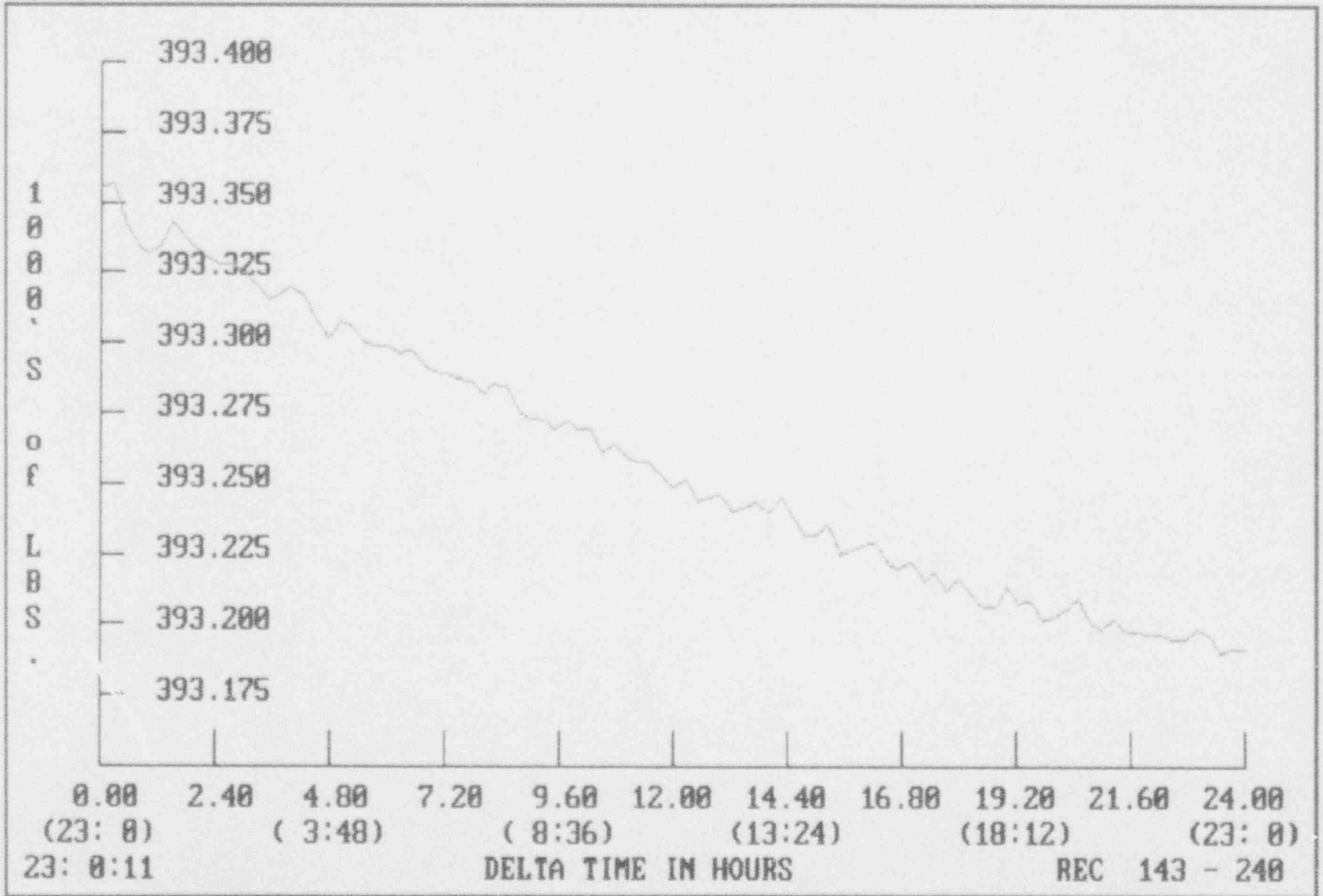
MASS LOSS

 TIME - 11:44:13

REC NUM	TIME DELTA (HOURS)	CONT AIR MASS	MASS LOSS INCR	MASS LOSS (1 HR)	MASS LOSS (x 24)
193	12.50	393243.406	-7.844	14.906	357.750
194	12.75	393245.594	2.188	7.938	190.500
195	13.00	393246.188	0.594	2.625	63.000
196	13.25	393239.563	-6.625	11.688	280.500
197	13.50	393241.281	1.719	2.125	51.000
198	13.75	393243.781	2.500	1.813	43.500
199	14.00	393240.313	-3.469	5.875	141.000
200	14.25	393244.906	4.594	-5.344	-128.250
201	14.50	393239.250	-5.656	2.031	48.750
202	14.75	393231.656	-7.594	12.125	291.000
203	15.00	393232.281	0.625	8.031	192.750
204	15.25	393235.000	2.719	9.906	237.750
205	15.50	393224.219	-10.781	15.031	360.750
206	15.75	393226.875	2.656	4.781	114.750
207	16.00	393228.250	1.375	4.031	96.750
208	16.25	393229.063	0.813	5.938	142.500
209	16.50	393221.969	-7.094	2.250	54.000
210	16.75	393220.156	-1.813	6.719	161.250
211	17.00	393221.969	1.813	6.281	150.750
212	17.25	393215.563	-6.406	13.500	324.000
213	17.50	393218.219	2.656	3.750	90.000
214	17.75	393212.188	-6.031	7.969	191.250
215	18.00	393216.969	4.781	5.000	120.000
216	18.25	393211.344	-5.625	4.219	101.250
217	18.50	393206.313	-5.031	11.906	285.750
218	18.75	393206.875	0.563	5.313	127.500
219	19.00	393213.875	7.000	3.094	74.250
220	19.25	393207.781	-6.094	3.563	85.500
221	19.50	393208.813	1.031	-2.500	-60.000
222	19.75	393201.000	-7.813	5.875	141.000
223	20.00	393202.875	1.875	11.000	264.000
224	20.25	393205.875	3.000	1.906	45.750
225	20.50	393209.281	3.406	-0.469	-11.250
226	20.75	393201.563	-7.719	-0.563	-13.500
227	21.00	393198.719	-2.844	4.156	99.750
228	21.25	393202.281	3.563	3.594	86.250
229	21.50	393197.688	-4.594	11.594	278.250
230	21.75	393198.063	0.375	3.500	84.000
231	22.00	393196.719	-1.344	2.300	48.000
232	22.25	393196.344	-0.375	5.938	142.500
233	22.50	393194.656	-1.688	3.031	72.750
234	22.75	393195.281	0.625	2.781	66.750
235	23.00	393198.563	3.281	-1.844	-44.250
236	23.25	393196.438	-2.125	-0.094	-2.250
237	23.50	393189.875	-6.563	4.781	114.750
238	23.75	393191.188	1.313	4.094	98.250
239	24.00	393191.531	0.344	7.031	168.750

MEASURED MASS - TYPE A TEST

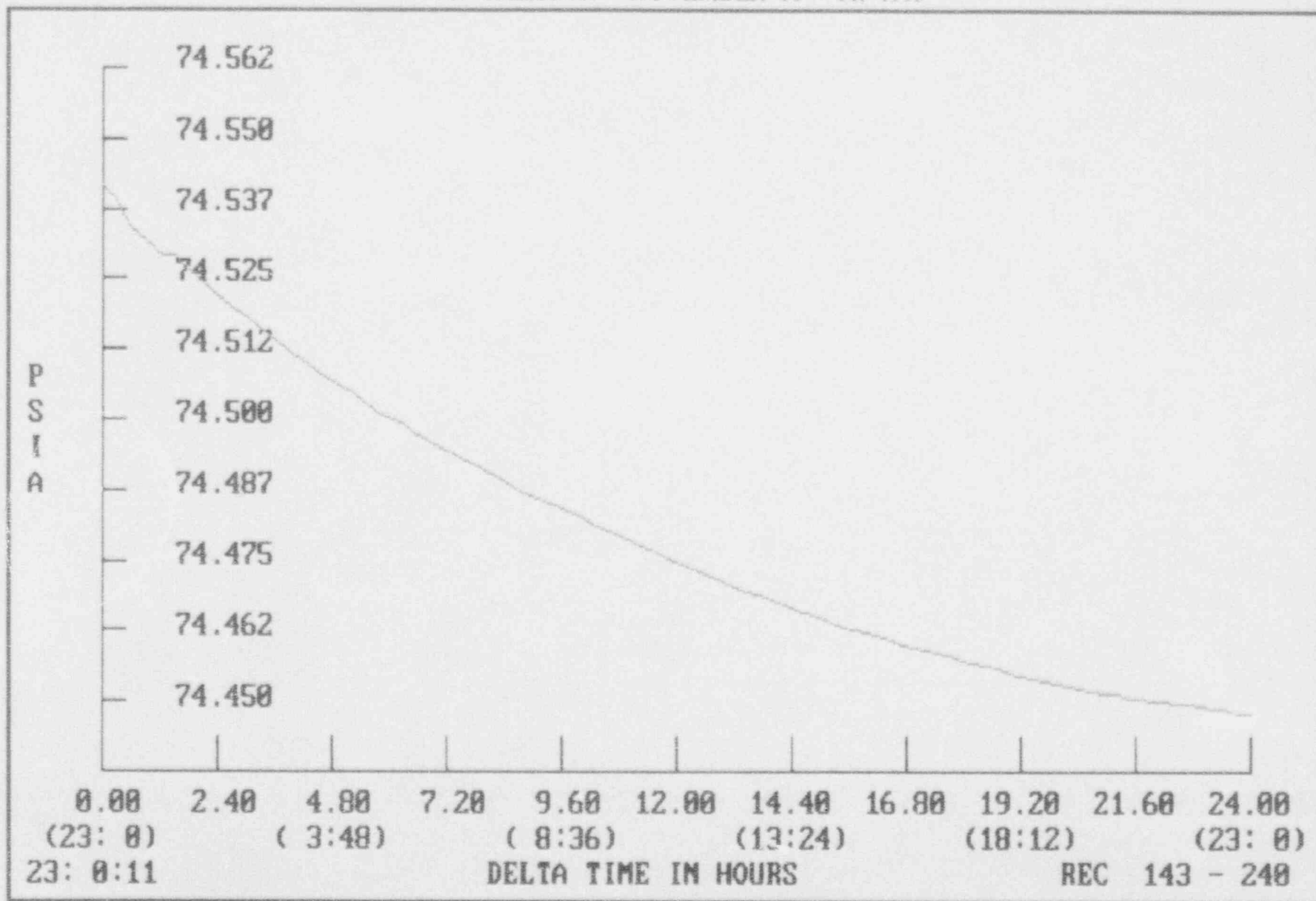
FT. CALHOUN - NOVEMBER 10 - 11, 1993



AVERAGE PRESSURE - TYPE A TEST

FT. CALHOUN - NOVEMBER 10 - 11, 1993

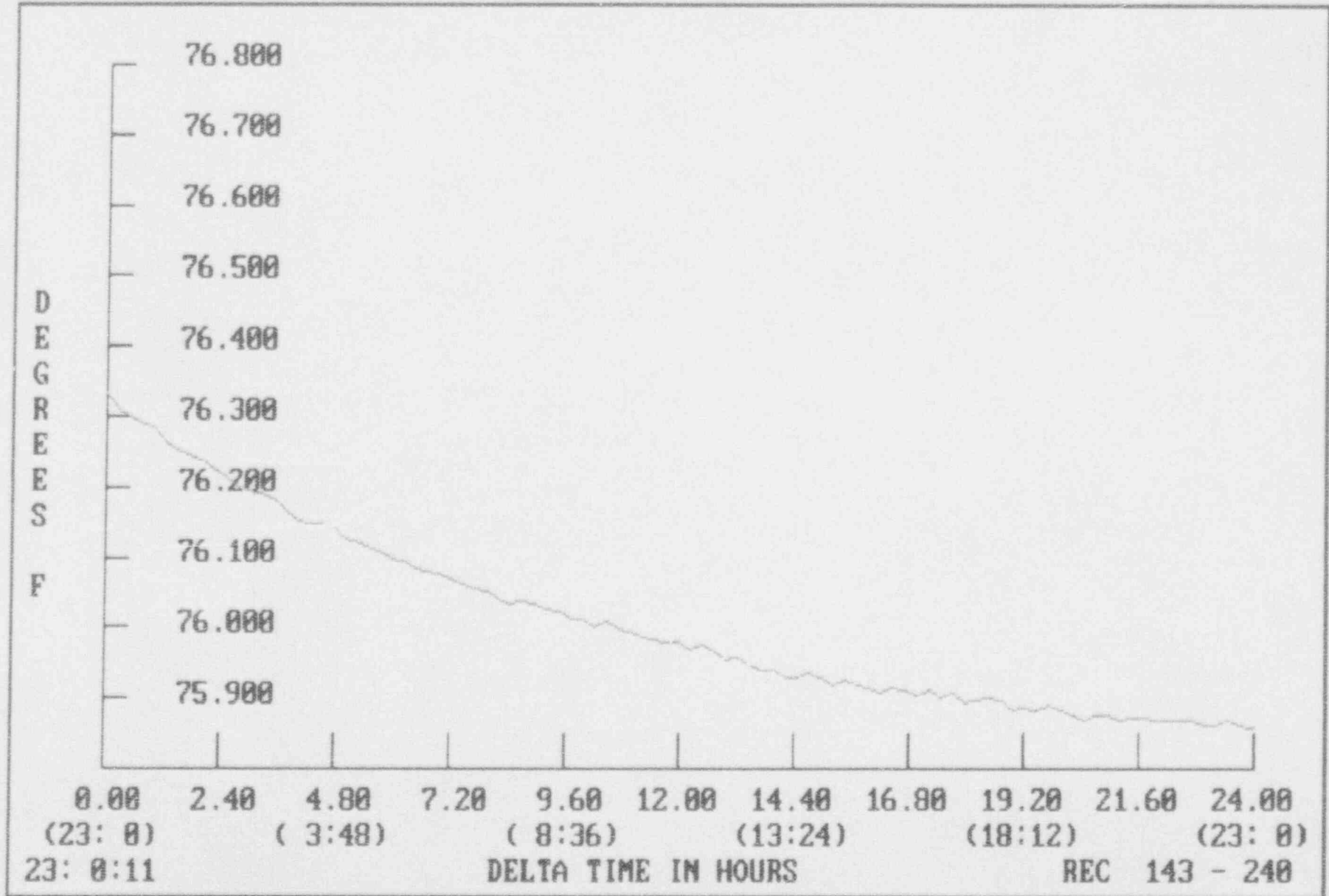
C10



0.00 2.40 4.80 7.20 9.60 12.00 14.40 16.80 19.20 21.60 24.00
(23: 0) (3:48) (8:36) (13:24) (18:12) (23: 0)
23: 0:11 DELTA TIME IN HOURS REC 143 - 240

AVERAGE TEMPERATURE - TYPE A TEST

FT. CALHOUN - NOVEMBER 10 - 11, 1993

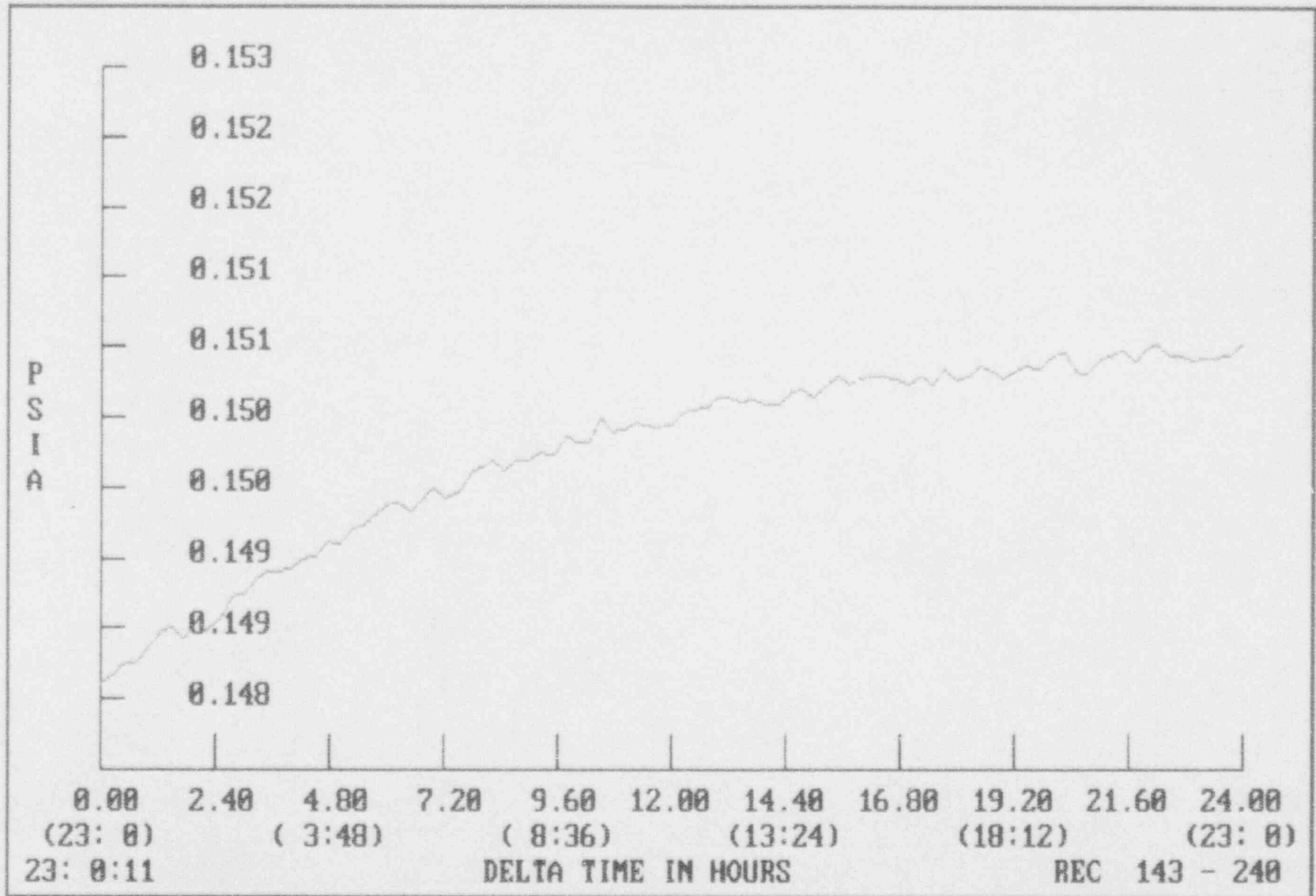


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11
4

AVERAGE VAPOR PRESSURE - TYPE A TEST

FT. CALHOUN - NOVEMBER 10 - 11, 1993

C-12



0.00 (23: 0) 23: 0:11
2.40 (3:48)
4.80 (8:36)
7.20 (13:24)
9.60 (18:12)
12.00 (23: 0)
14.40
16.80
19.20
21.60
24.00 (23: 0)
DELTA TIME IN HOURS REC 143 - 240

DATE - 12-30-1993

ENVIRONMENT LISTING

TIME - 11:49:04

REC NUM	DATE	TIME	TEMP	VAPOR PRESSURE	CORRECT. PRESSURE	RELATIVE HUMIDITY	AIR DENSITY	PSIA/HR VARIANCE
143	1110	2300	536.001	0.1486	74.3931	33.08	0.3746	0.00000
144	1110	2315	535.981	0.1487	74.3908	33.11	0.3746	-0.00919
145	1110	2330	535.971	0.1488	74.3865	33.14	0.3746	-0.01688
146	1110	2345	535.964	0.1488	74.3844	33.15	0.3746	-0.00849
148	1111	15	535.936	0.1490	74.3802	33.23	0.3746	-0.00882
149	1111	30	535.923	0.1490	74.3800	33.25	0.3746	-0.00086
150	1111	45	535.915	0.1489	74.3780	33.25	0.3746	-0.00793
151	1111	100	535.908	0.1490	74.3762	33.28	0.3746	-0.00720
152	1111	115	535.898	0.1490	74.3744	33.28	0.3746	-0.00745
153	1111	130	535.888	0.1491	74.3724	33.30	0.3746	-0.00800
154	1111	145	535.875	0.1492	74.3704	33.35	0.3746	-0.00769
155	1111	200	535.867	0.1492	74.3691	33.36	0.3746	-0.00553
156	1111	215	535.861	0.1494	74.3672	33.40	0.3746	-0.00729
157	1111	230	535.856	0.1494	74.3655	33.42	0.3746	-0.00705
158	1111	245	535.842	0.1494	74.3639	33.43	0.3746	-0.00620
159	1111	300	535.827	0.1494	74.3624	33.45	0.3746	-0.00607
160	1111	315	535.818	0.1495	74.3607	33.48	0.3746	-0.00699
161	1111	330	535.819	0.1495	74.3590	33.48	0.3746	-0.00684
162	1111	345	535.817	0.1496	74.3576	33.51	0.3746	-0.00537
163	1111	400	535.799	0.1496	74.3562	33.52	0.3746	-0.00549
164	1111	415	535.793	0.1497	74.3551	33.55	0.3746	-0.00467
165	1111	430	535.787	0.1497	74.3534	33.57	0.3746	-0.00684
166	1111	445	535.779	0.1498	74.3518	33.59	0.3746	-0.00641
167	1111	500	535.769	0.1499	74.3504	33.62	0.3746	-0.00525
168	1111	515	535.766	0.1499	74.3495	33.62	0.3746	-0.00375
169	1111	530	535.754	0.1498	74.3480	33.63	0.3746	-0.00610
170	1111	545	535.751	0.1499	74.3467	33.65	0.3746	-0.00494
171	1111	600	535.746	0.1500	74.3455	33.67	0.3746	-0.00486
172	1111	615	535.741	0.1499	74.3447	33.66	0.3746	-0.00345
173	1111	630	535.733	0.1500	74.3432	33.68	0.3746	-0.00574
174	1111	645	535.727	0.1501	74.3421	33.72	0.3746	-0.00458
175	1111	700	535.723	0.1501	74.3408	33.73	0.3746	-0.00510
176	1111	715	535.712	0.1502	74.3400	33.75	0.3746	-0.00311
177	1111	730	535.704	0.1501	74.3386	33.75	0.3746	-0.00580
178	1111	745	535.707	0.1502	74.3374	33.76	0.3745	-0.00479
179	1111	800	535.704	0.1502	74.3364	33.76	0.3745	-0.00385
180	1111	815	535.696	0.1502	74.3354	33.78	0.3745	-0.00393
181	1111	830	535.694	0.1502	74.3345	33.78	0.3745	-0.00369
182	1111	845	535.683	0.1504	74.3334	33.83	0.3745	-0.00446
183	1111	900	535.682	0.1503	74.3327	33.82	0.3745	-0.00284
184	1111	915	535.673	0.1503	74.3314	33.82	0.3745	-0.00491
185	1111	930	535.677	0.1505	74.3303	33.86	0.3745	-0.00458
186	1111	945	535.666	0.1504	74.3295	33.85	0.3745	-0.00336
187	1111	1000	535.663	0.1504	74.3283	33.86	0.3745	-0.00455
188	1111	1015	535.659	0.1505	74.3273	33.87	0.3745	-0.00427
189	1111	1030	535.652	0.1504	74.3265	33.88	0.3745	-0.00312
190	1111	1045	535.652	0.1504	74.3255	33.87	0.3745	-0.00403
192	1111	1100	535.649	0.1504	74.3243	33.88	0.3745	6.19154
193	1111	1115	535.639	0.1505	74.3234	33.91	0.3745	-0.00370
194	1111	1130	535.645	0.1506	74.3226	33.91	0.3745	-0.00302

DATE - 12-30-1993

ENVIRONMENT LISTING

TIME - 11:49:06

REC NUM	DATE	TIME	TEMP	VAPOR PRESSURE	CORRECT. PRESSURE	RELATIVE HUMIDITY	AIR DENSITY	PSIA/HR VARIANCE
195	1111	1145	535.635	0.1506	74.3217	33.93	0.3745	-0.00366
196	1111	1200	535.626	0.1506	74.3205	33.95	0.3745	-0.00464
197	1111	1215	535.630	0.1506	74.3198	33.95	0.3745	-0.00305
198	1111	1230	535.619	0.1506	74.3187	33.95	0.3745	-0.00443
199	1111	1245	535.612	0.1506	74.3181	33.96	0.3745	-0.00208
200	1111	1300	535.611	0.1506	74.3173	33.96	0.3745	-0.00333
201	1111	1315	535.599	0.1506	74.3166	33.97	0.3745	-0.00299
202	1111	1330	535.599	0.1507	74.3155	33.99	0.3745	-0.00421
203	1111	1345	535.606	0.1507	74.3150	33.99	0.3745	-0.00192
204	1111	1400	535.599	0.1506	74.3141	33.98	0.3745	-0.00351
205	1111	1415	535.590	0.1507	74.3134	34.01	0.3745	-0.00293
206	1111	1430	535.597	0.1508	74.3124	34.01	0.3745	-0.00416
207	1111	1445	535.590	0.1507	74.3118	34.01	0.3745	-0.00223
208	1111	1500	535.585	0.1508	74.3114	34.02	0.3745	-0.00171
209	1111	1515	535.580	0.1508	74.3109	34.04	0.3745	-0.00211
210	1111	1530	535.584	0.1508	74.3101	34.03	0.3745	-0.00302
211	1111	1545	535.581	0.1508	74.3094	34.03	0.3745	-0.00302
212	1111	1600	535.574	0.1507	74.3088	34.03	0.3745	-0.00226
213	1111	1615	535.580	0.1508	74.3083	34.04	0.3745	-0.00183
214	1111	1630	535.572	0.1507	74.3078	34.03	0.3745	-0.00220
215	1111	1645	535.577	0.1508	74.3072	34.05	0.3745	-0.00217
216	1111	1700	535.565	0.1507	74.3065	34.04	0.3745	-0.00293
217	1111	1715	535.568	0.1508	74.3059	34.05	0.3745	-0.00229
218	1111	1730	535.572	0.1509	74.3055	34.06	0.3745	-0.00174
219	1111	1745	535.567	0.1508	74.3049	34.06	0.3745	-0.00238
220	1111	1800	535.553	0.1508	74.3043	34.06	0.3745	-0.00244
221	1111	1815	535.558	0.1508	74.3038	34.07	0.3745	-0.00199
222	1111	1830	535.553	0.1509	74.3033	34.08	0.3745	-0.00201
223	1111	1845	535.560	0.1508	74.3028	34.07	0.3745	-0.00208
224	1111	1900	535.553	0.1509	74.3022	34.10	0.3745	-0.00220
225	1111	1915	535.545	0.1510	74.3017	34.11	0.3745	-0.00199
226	1111	1930	535.540	0.1508	74.3016	34.09	0.3745	-0.00049
227	1111	1945	535.547	0.1508	74.3011	34.08	0.3745	-0.00192
228	1111	2000	535.547	0.1509	74.3006	34.10	0.3745	-0.00214
229	1111	2015	535.540	0.1509	74.3003	34.11	0.3745	-0.00110
230	1111	2030	535.542	0.1510	74.2997	34.12	0.3745	-0.00247
231	1111	2045	535.541	0.1509	74.2997	34.10	0.3745	-0.00012
232	1111	2100	535.539	0.1510	74.2990	34.13	0.3745	-0.00250
233	1111	2115	535.538	0.1510	74.2989	34.13	0.3745	-0.00049
234	1111	2130	535.537	0.1509	74.2985	34.12	0.3745	-0.00171
235	1111	2145	535.538	0.1509	74.2986	34.11	0.3745	0.00055
236	1111	2200	535.530	0.1509	74.2982	34.12	0.3745	-0.00162
237	1111	2215	535.530	0.1509	74.2978	34.12	0.3745	-0.00171
238	1111	2230	535.538	0.1509	74.2977	34.11	0.3745	-0.00049
239	1111	2245	535.532	0.1509	74.2971	34.12	0.3745	-0.00220
240	1111	2300	535.529	0.1510	74.2968	34.14	0.3745	-0.00141

APPENDIX D

Verification Test Data
0145 to 0545 on November 12, 1993

Tables

1.	Mass Point Report	D-1
2.	Total Time Report	D-3
3.	Mass Loss Report	D-5

Graphs

1.	Mass Point	D-2
2.	Total Time	D-4
3.	Measured Mass	D-6
4.	Average Pressure	D-7
5.	Average Drybulb Temperature	D-8
6.	Average Vapor Pressure	D-9

DATE - 12-30-1993

MASS POINT WITH VERIFICATION TEST

TIME - 11:51:11

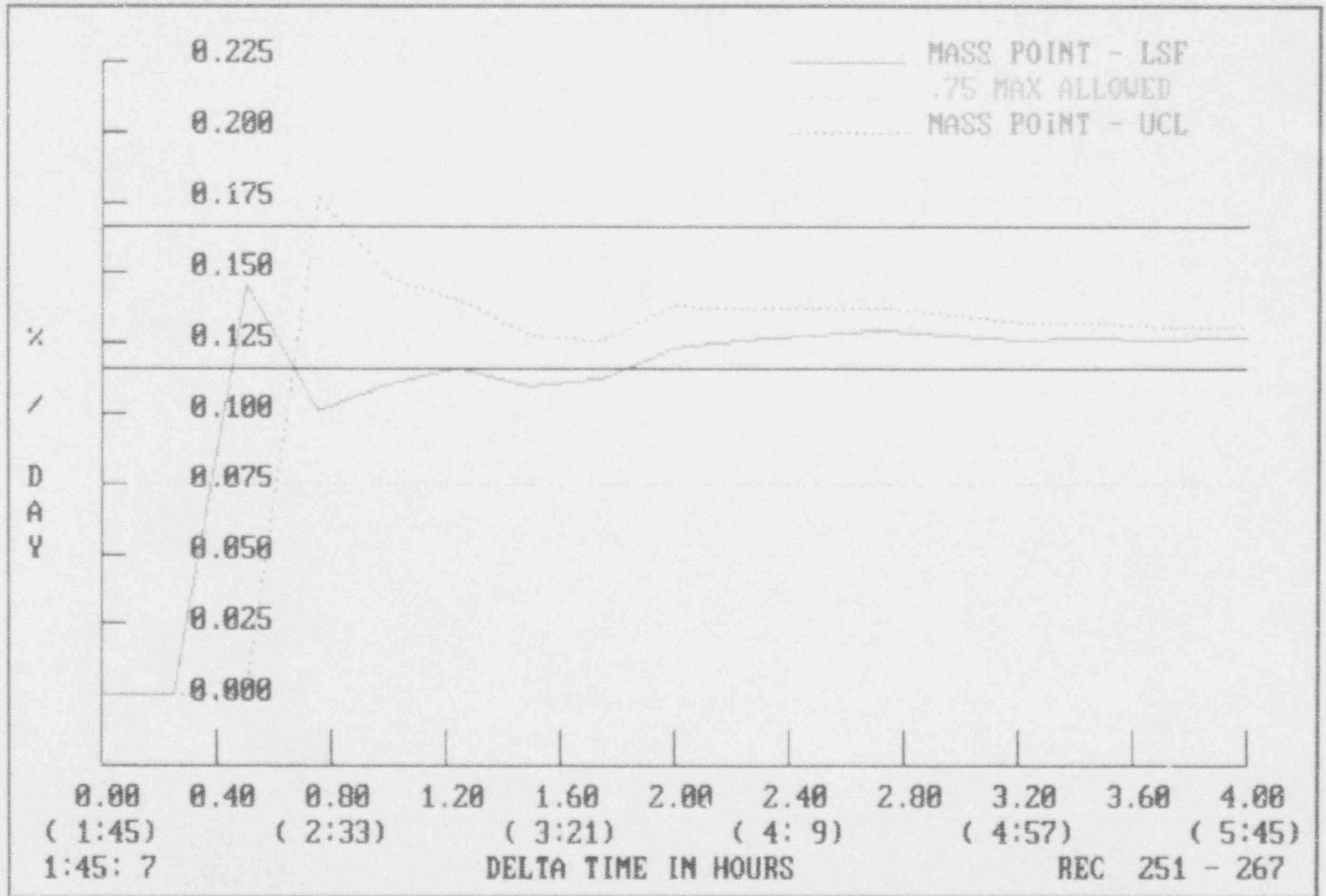
TIME	MASS	MASS POINT		SCFM	VERIFICATION	
		GROSS LSF	GROSS 95% UCL		NET LSF	NET 95 UCL
145	393159.6	0.0000	0.0000	3.630	-0.0999	-0.0999
200	393153.7	0.0000	0.0000	3.630	-0.0999	-0.0999
215	393147.6	0.1458	0.0000	3.630	0.0459	-0.0999
230	393147.8	0.1008	0.1773	3.630	0.0008	0.0774
245	393139.8	0.1108	0.1488	3.630	0.0109	0.0488
300	393134.4	0.1166	0.1402	3.630	0.0167	0.0403
315	393133.0	0.1101	0.1276	3.630	0.0101	0.0276
330	393125.8	0.1128	0.1257	3.630	0.0128	0.0258
345	393115.5	0.1233	0.1384	3.630	0.0234	0.0385
400	393112.5	0.1259	0.1381	3.630	0.0260	0.0381
415	393107.7	0.1276	0.1376	3.530	0.0277	0.0377
430	393101.1	0.1293	0.1377	3.630	0.0294	0.0378
445	393099.1	0.1277	0.1349	3.630	0.0278	0.0350
500	393094.8	0.1260	0.1324	3.630	0.0261	0.0325
515	393087.0	0.1266	0.1321	3.630	0.0266	0.0321
530	393083.3	0.1261	0.1309	3.630	0.0262	0.0310
545	393076.3	0.1267	0.1309	3.630	0.0267	0.0310

(Lo + Lam - .25 La) <= Lc <= (Lo + Lam + .25 La)
0.1166 <= 0.1267 <= 0.1666

MASS POINT - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993

D-2



 DATE - 12-30-1993

TOTAL TIME WITH VERIFICATION TEST

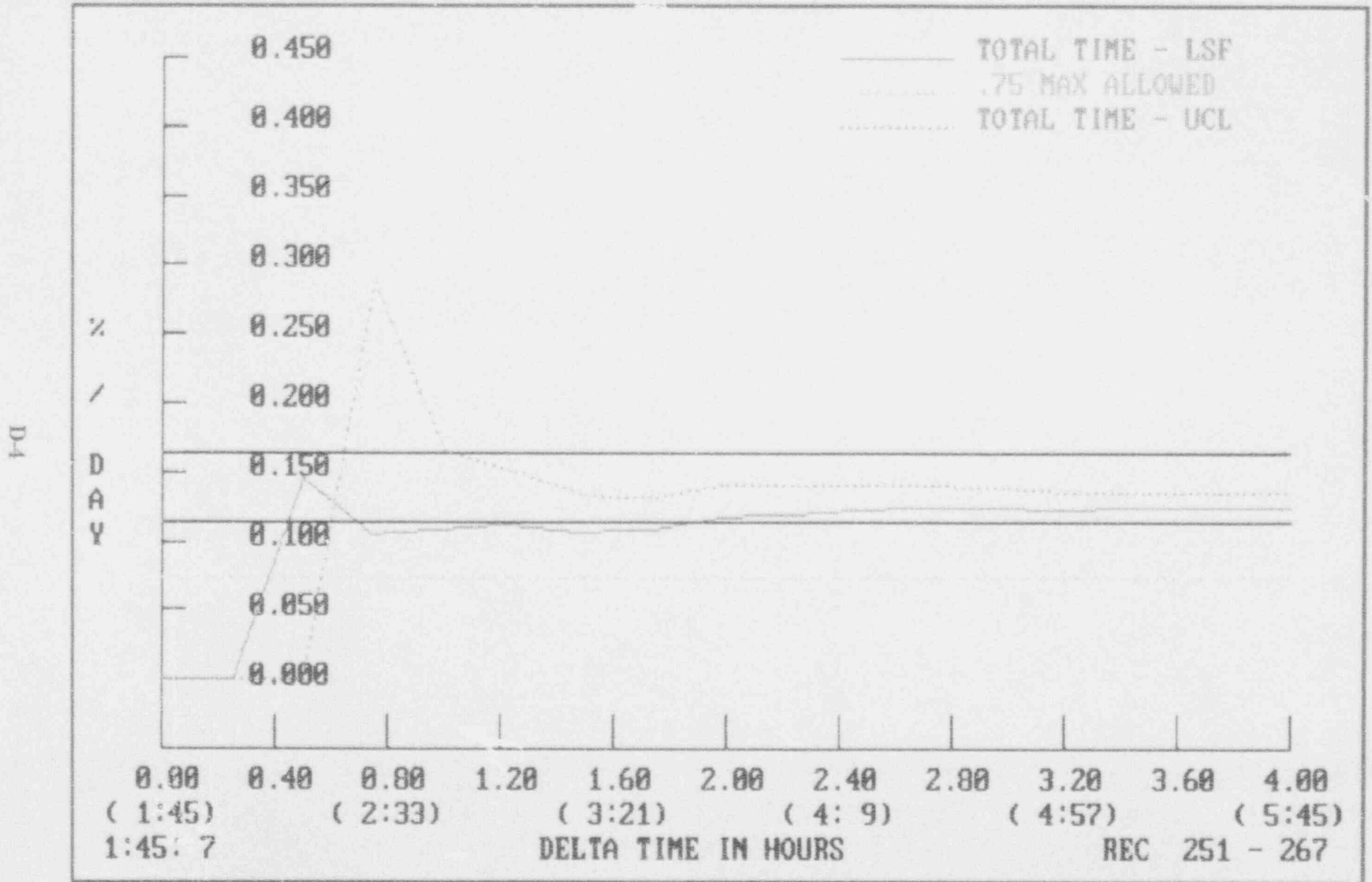
 TIME - 11:51:24

TIME	MASS	TOTAL TIME		SCFM	VERIFICATION	
		GROSS LSF	GROSS 95% UCL		NET LSF	NET 95% UCL
200	393154	0.0000	0.0000	3.630	-0.0999	-0.0999
215	393148	0.1458	0.0000	3.630	0.0458	-0.0999
230	393148	0.1043	0.2882	3.630	0.0043	0.1883
245	393140	0.1086	0.1663	3.630	0.0087	0.0663
300	393134	0.1124	0.1507	3.630	0.0124	0.0507
315	393133	0.1071	0.1341	3.630	0.0072	0.0342
330	393126	0.1088	0.1323	3.630	0.0089	0.0323
345	393115	0.1170	0.1411	3.630	0.0171	0.0412
400	393113	0.1199	0.1399	3.630	0.0200	0.0400
415	393107	0.1221	0.1398	3.630	0.0222	0.0399
430	393101	0.1242	0.1402	3.630	0.0243	0.0402
445	393099	0.1238	0.1381	3.630	0.0238	0.0381
500	393095	0.1231	0.1361	3.630	0.0231	0.0362
515	393087	0.1238	0.1359	3.630	0.0239	0.0359
530	393083	0.1238	0.1349	3.630	0.0238	0.0350
545	393076	0.1245	0.1349	3.630	0.0245	0.0349

LEAK RATE < MAX AND > MIN ALLOWED
 (Lo + Lam - .25 La) <= Lc <= (Lo + Lam + .25 La)
 0.1136 <= 0.1245 <= 0.1636

TOTAL TIME - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993



DATE - 12-30-1993

MASS LOSS

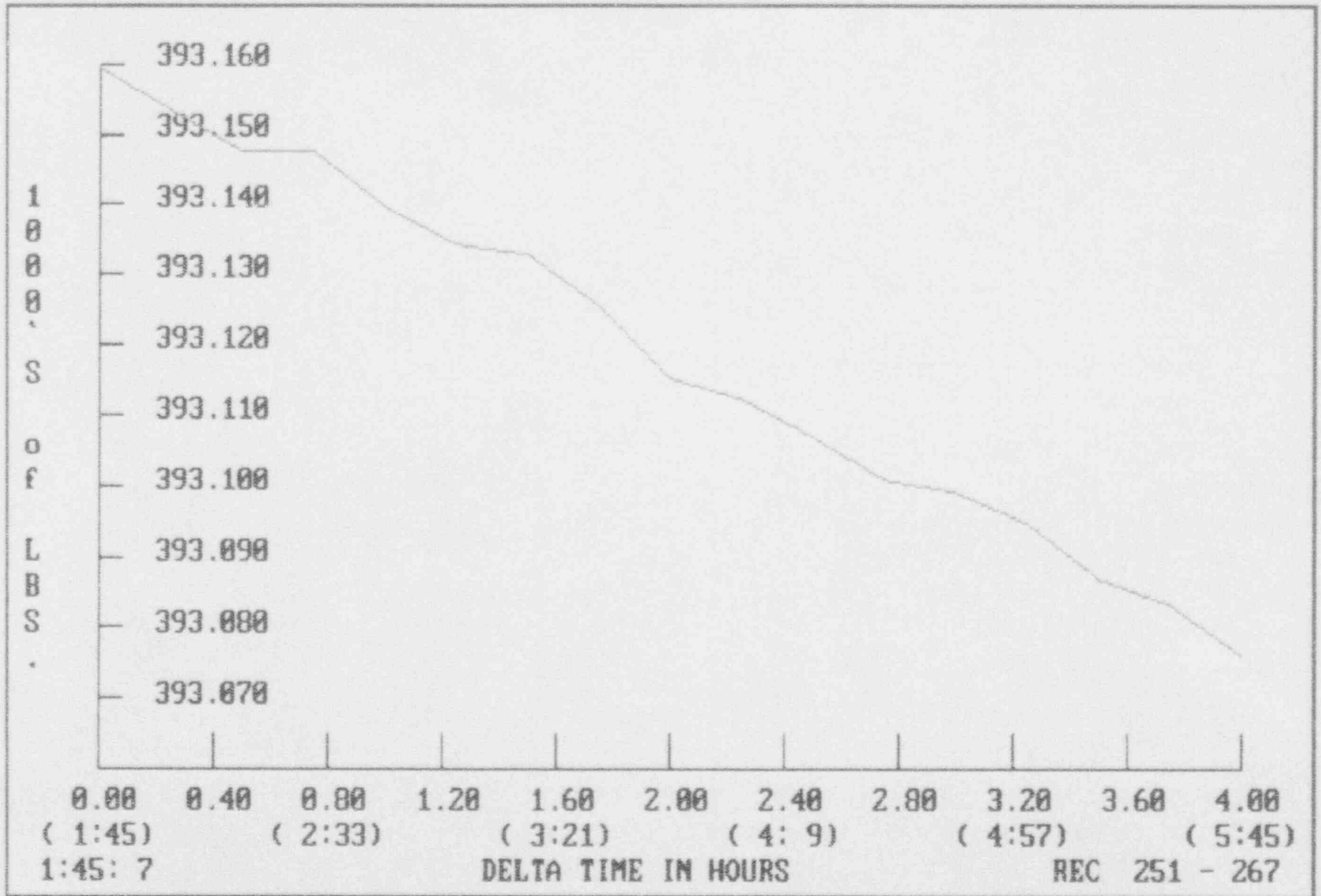
TIME - 11:51:48

REC NUM	TIME DELTA (HOURS)	CONT AIR MASS	MASS LOSS INCR	MASS LOSS (1 HR)	MASS LOSS (x 24)
251	0.00	393159.563	0.000	0.000	0.000
252	0.25	393153.719	-5.844	0.000	0.000
253	0.50	393147.625	-6.094	0.000	0.000
254	0.75	393147.844	0.219	0.000	0.000
255	1.00	393139.813	-8.031	0.000	0.000
256	1.25	393134.438	-5.375	19.281	462.750
257	1.50	393132.969	-1.469	14.656	351.750
258	1.75	393125.781	-7.188	22.063	529.500
259	2.00	393115.469	-10.313	24.344	584.250
260	2.25	393112.500	-2.969	21.938	526.500
261	2.50	393107.063	-5.438	25.906	621.750
262	2.75	393101.094	-5.969	24.688	592.500
263	3.00	393099.094	-2.000	16.375	393.000
264	3.25	393094.781	-4.313	17.719	425.250
265	3.50	393086.969	-7.813	20.094	482.250
266	3.75	393083.313	-3.656	17.781	426.750
267	4.00	393076.344	-6.969	22.750	546.000

MEASURED MASS - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993

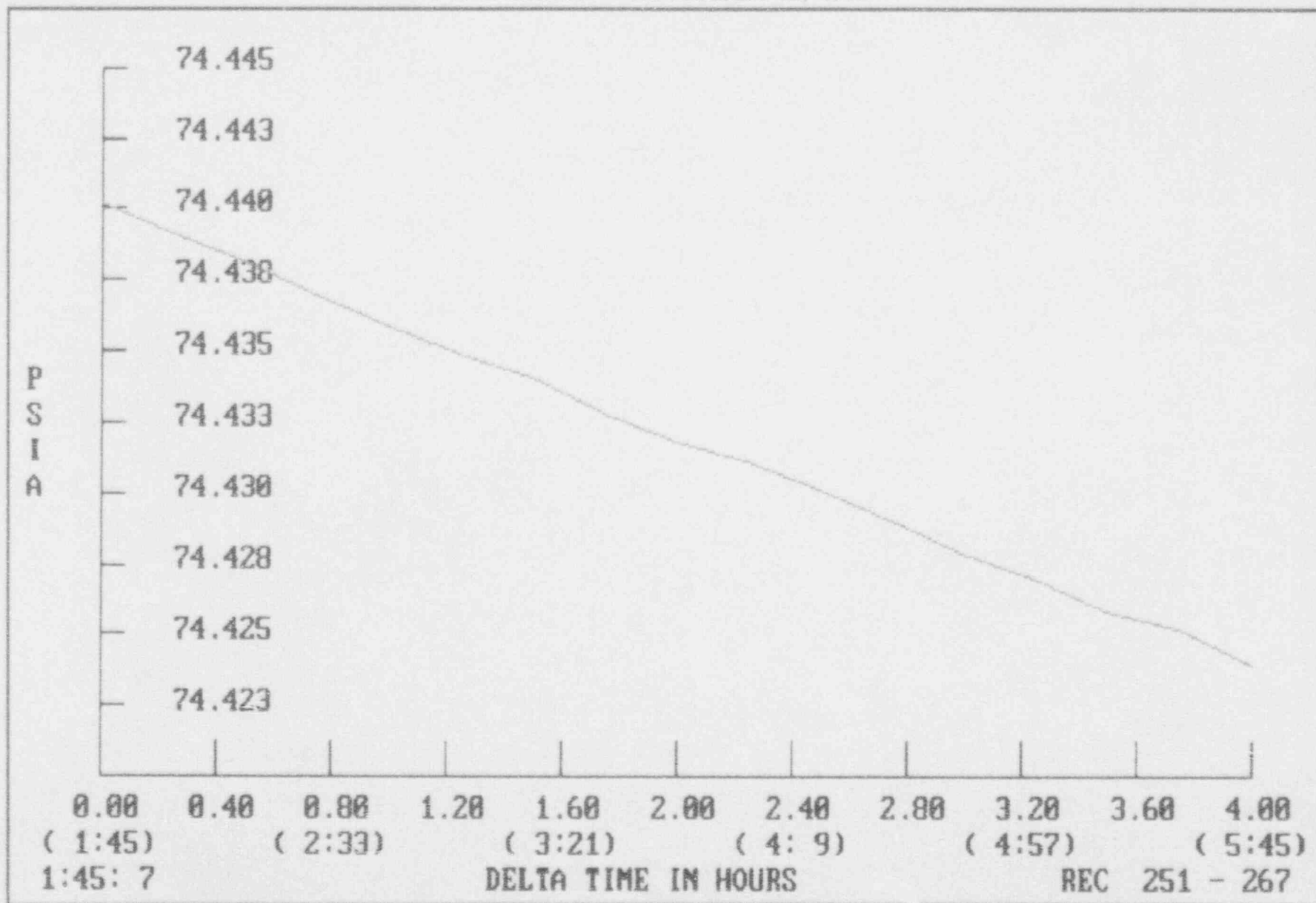
D-6



AVERAGE PRESSURE - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993

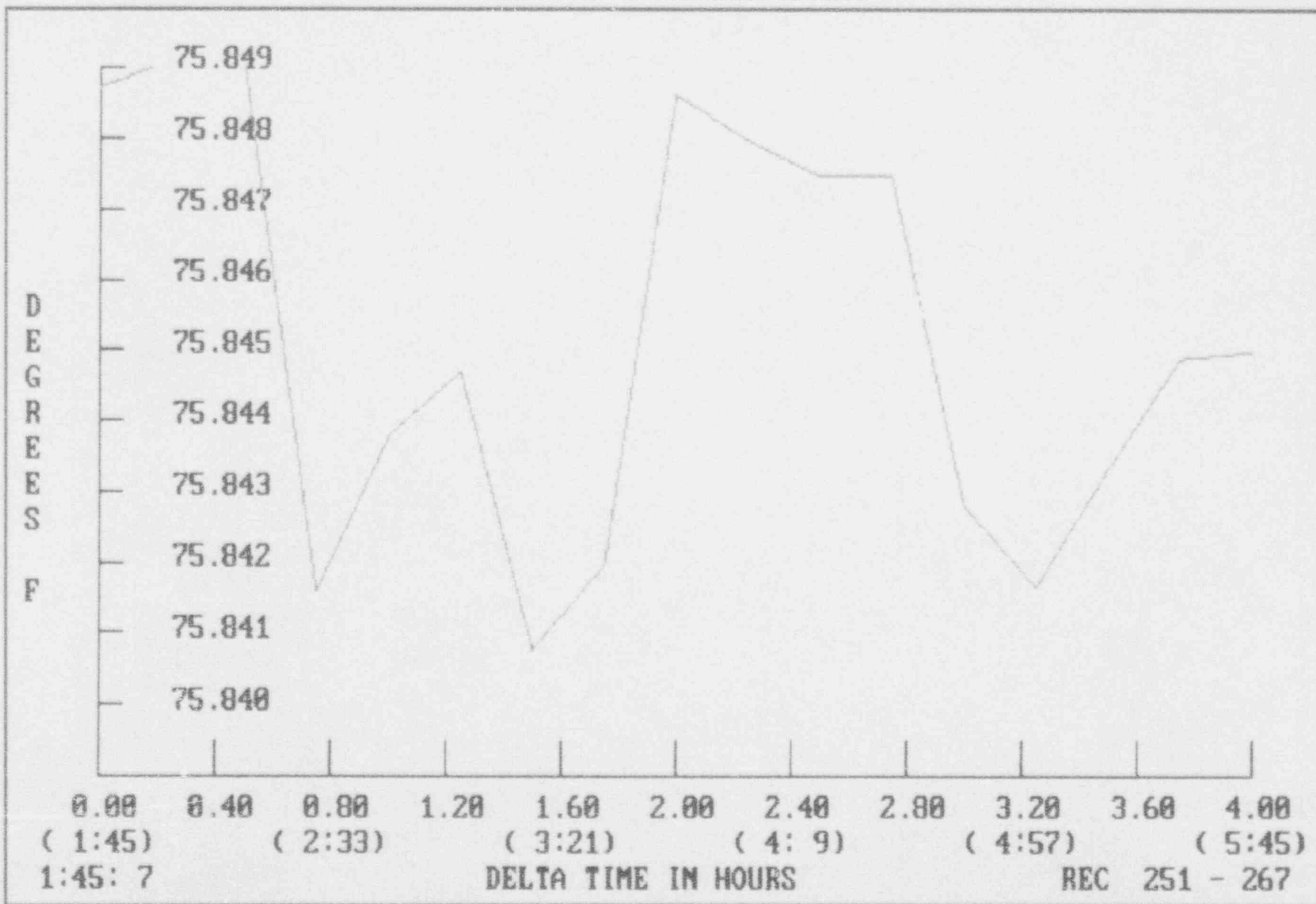
D-7



AVERAGE TEMPERATURE - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993

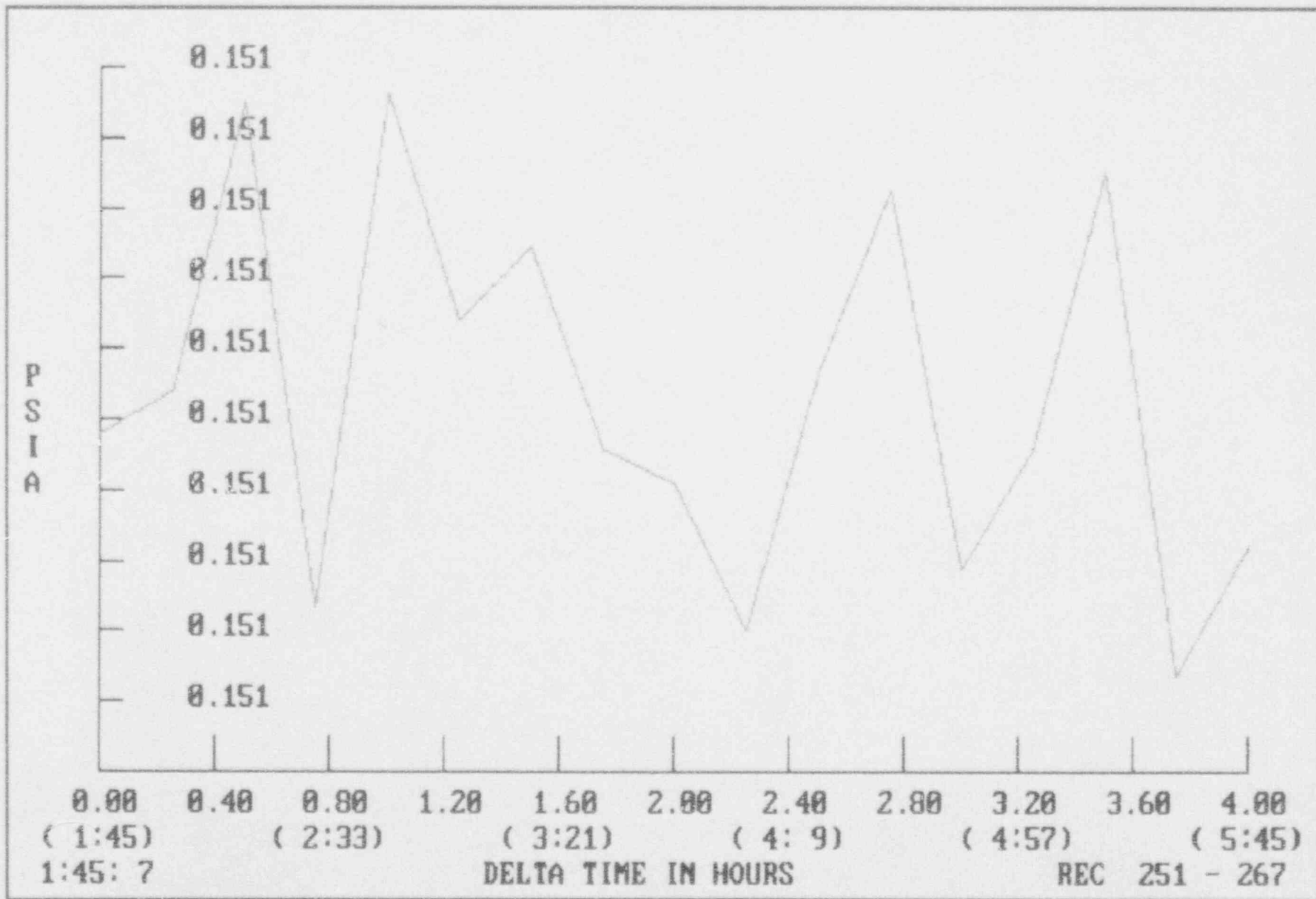
D-8



AVERAGE VAPOR PRESSURE - VERIFICATION TEST

FT. CALHOUN - NOVEMBER 12, 1993

D-9



APPENDIX E

ISG and Instrument Location Maps

Table

1. ISG Calculation E-1

Maps

1. Containment Instrument Location - Primary Plant Section E-4
(11405-A-14) Looking North

2. Containment Instrument Location - Primary Plant Section E-5
(11405-A-13) Looking East

3. Containment Instrument Location E-6
(11405-A-5) Elevation 984' to 1010'

4. Containment Instrument Location E-7
(11405-A-6) Elevation 1013' to 1030'

5. Containment Instrument Location E-8
(11405-A-8) Elevation 1045' to 1048'

6. Containment Instrument Location E-9
(11405-A-9) Elevation 1060' to 1113'

APPENDIX E

INSTRUMENT SELECTION GUIDE CALCULATION

A. TEST PARAMETERS

- ISG - instrument selection guide
- L_a - leakage rate, percent per day
- t - test duration, hours
- P - containment atmosphere total absolute pressure
- P_v - containment atmosphere partial pressure of water vapor
- T - containment atmosphere weighted average absolute drybulb temperature
- e - error associated with measurement of change in a given parameter
- E - error associated with sensor (sensitivity)
- ϵ - error associated with measurement system (excluding sensor)
- L_a - 0.1 %/day
- P_a - 74.297 psia
- T - 535.529°R drybulb
- T_{dp} - 45.625°F dewpoint
- t - 24 hours
- N_p - Number of Pressure Sensors
- N_T - Number of Temperature Sensors
- N_{RH} - Number of Relative Humidity Sensors

B. INSTRUMENT PARAMETERS

1. Total absolute pressure error (e_p)
 - No. of sensors: Paroscientific 3
 - Range: 0-100 psia
 - Pressure sensor sensitivity error (E_p): ± 0.0001 psia
 - Pressure measurement system error (ϵ_p): ± 0.0001 psia

$$e_p = \pm \left[\frac{(E_p^2 + \epsilon_p^2)}{N_p} \right]^{\frac{1}{2}}$$

$$e_p = \pm \left[\frac{(0.0001^2 + 0.0001^2)}{3} \right]^{\frac{1}{2}}$$

$$e_p = \pm 8.164966D-05$$

APPENDIX E

INSTRUMENT SELECTION GUIDE CALCULATION

B. INSTRUMENT PARAMETERS

2.	Water vapor pressure error (e_{PV})	
	No. of sensors: Graftel G-9203Ds	9
	Range:	30-80°F
	Vapor pressure sensor sensitivity error (E_{PV}):	±0.2°F
	Vapor pressure measurement system error (ϵ_{PV}):	±0.02°F

$$e_{PV} = \pm \left[\frac{(E_{PV}^2 + \epsilon_{PV}^2)}{N_{PV}} \right]^{\frac{1}{2}} \times \frac{\Delta PV}{\Delta^\circ F}$$

$$e_P = \pm \left[\frac{(0.2^2 + 0.02^2)}{9} \right]^{\frac{1}{2}} \times 0.0057$$

$$e_P = \pm 3.818953D-04$$

The water vapor pressure change between dew points 45°F & 46°F is 0.0057 psia/°F (from ASME Steam Tables, Fifth Edition).

3.	Temperature error (e_T)	
	No. of sensors: Graftel G-9202s	33
	Range:	32-130°F
	Temperature sensor sensitivity error (E_T):	±0.1°F
	Temperature measurement system error (ϵ_T):	±0.02°F

$$e_T = \pm \left[\frac{(E_T^2 + \epsilon_T^2)}{N_T} \right]^{\frac{1}{2}}$$

$$e_P = \pm \left[\frac{(0.1^2 + 0.02^2)}{33} \right]^{\frac{1}{2}}$$

$$e_P = \pm 1.775251D-02$$

APPENDIX E

INSTRUMENT SELECTION GUIDE CALCULATION

C. INSTRUMENT SELECTION GUIDE RESULTS

$$ISG = \pm \frac{2400}{t} \left[2 \left(\frac{e_P}{P} \right)^2 + 2 \left(\frac{e_{PV}}{PV} \right)^2 + 2 \left(\frac{e_T}{T} \right)^2 \right]^{\frac{1}{2}}$$

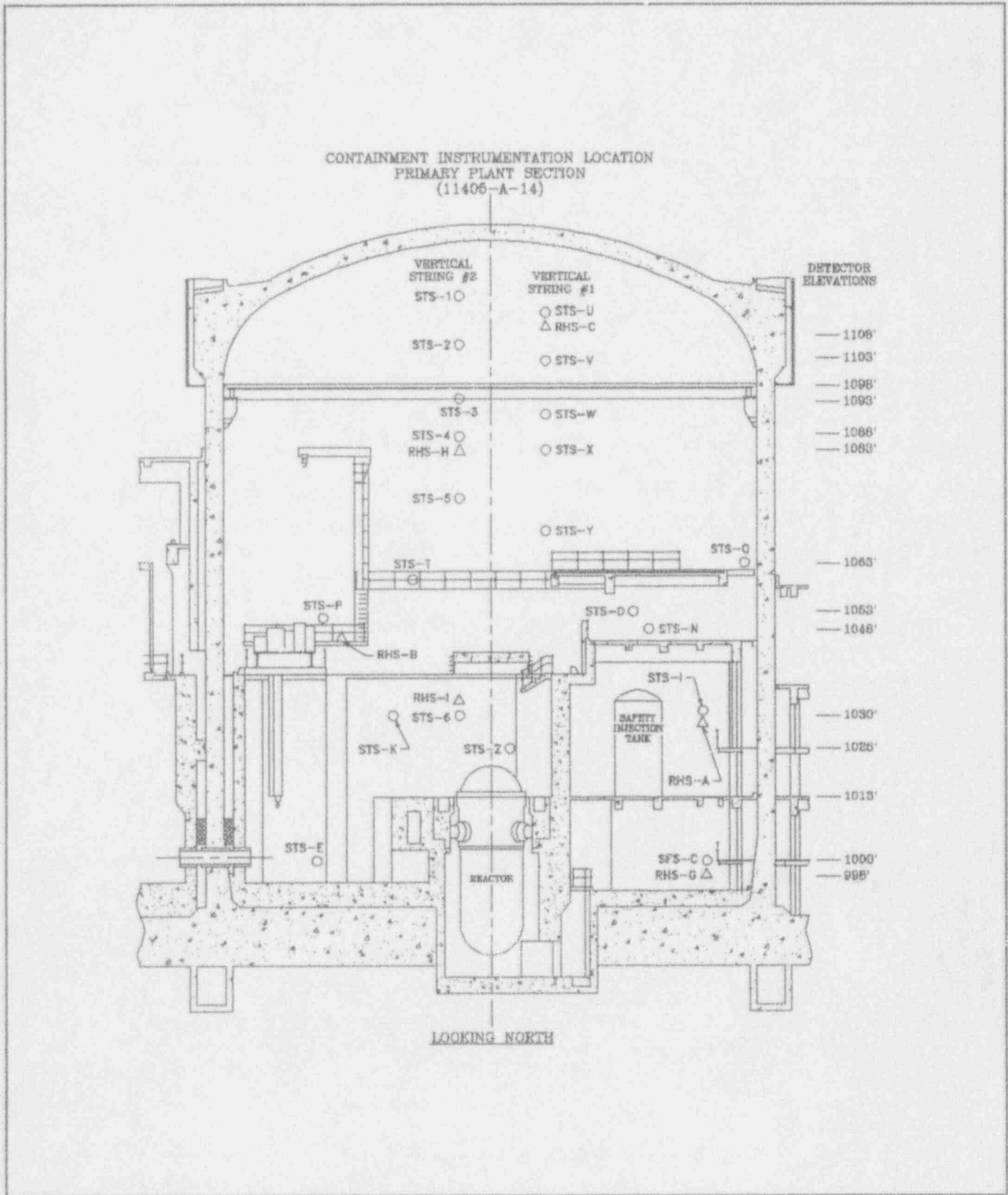
$$ISG = \pm \frac{2400}{24} \left[2 \left(\frac{8.164966D-05}{74.297} \right)^2 + 2 \left(\frac{3.818953D-04}{74.297} \right)^2 + 2 \left(\frac{1.775251D-02}{535.529} \right)^2 \right]^{\frac{1}{2}}$$

$$ISG = \pm 0.0017238\%/day$$

The ISG formula does not exceed 0.25 L_a (0.025%/day) and was acceptable for use in determining the reactor containment integrated leakage rate.

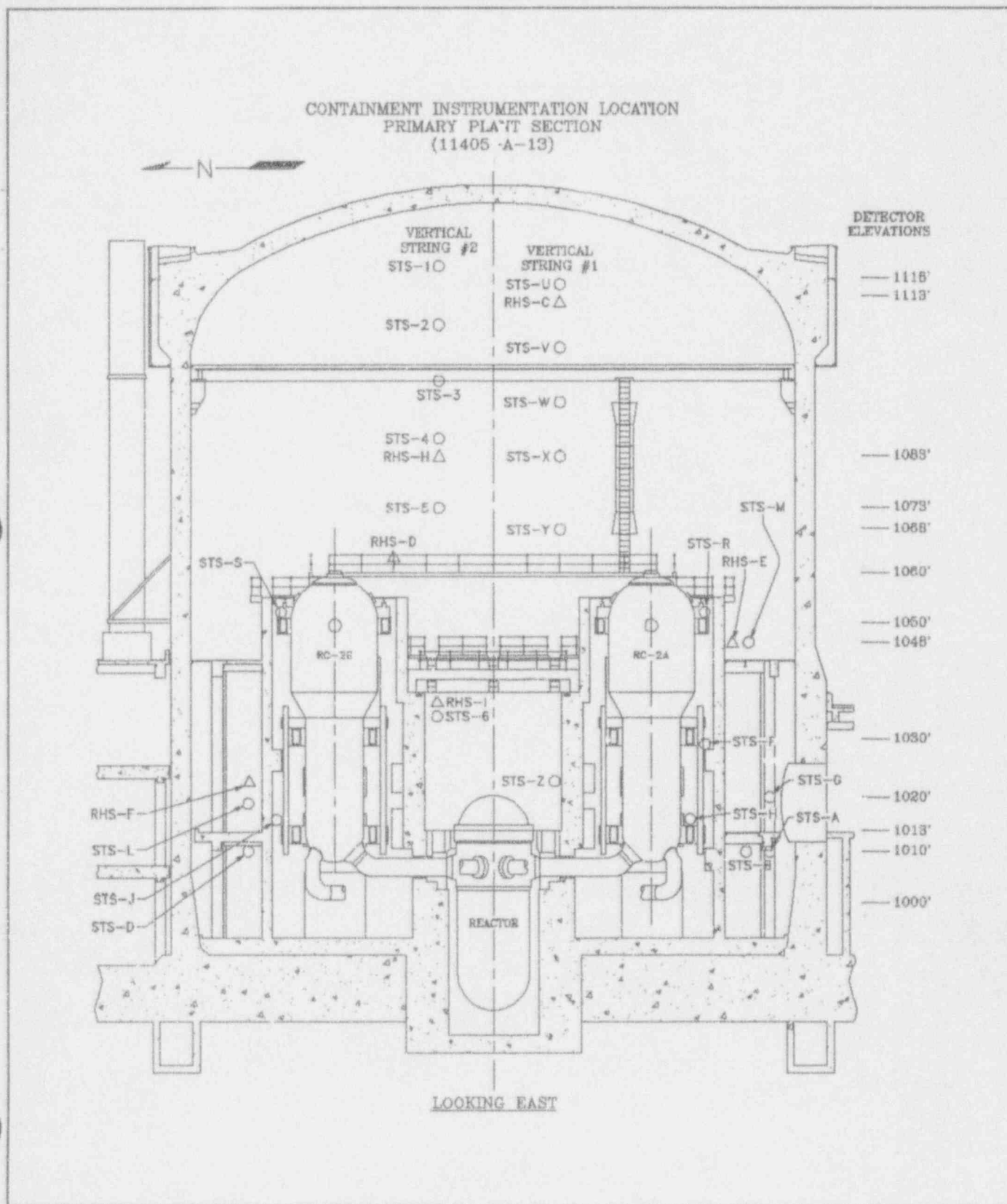
APPENDIX E

ILRT Instrument Locations
Sectional View



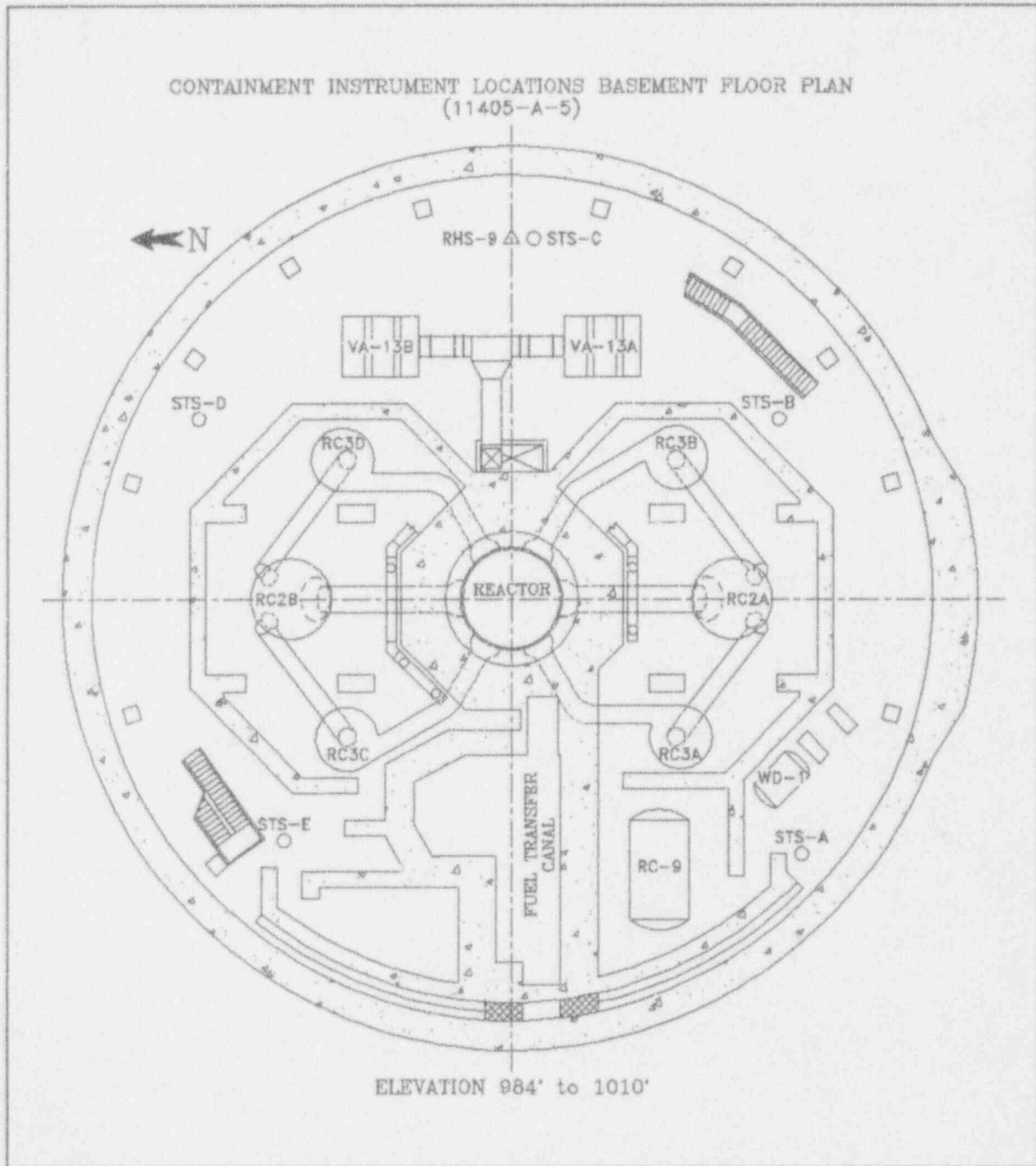
APPENDIX E

ILRT Instrument Locations
Sectional View



APPENDIX E

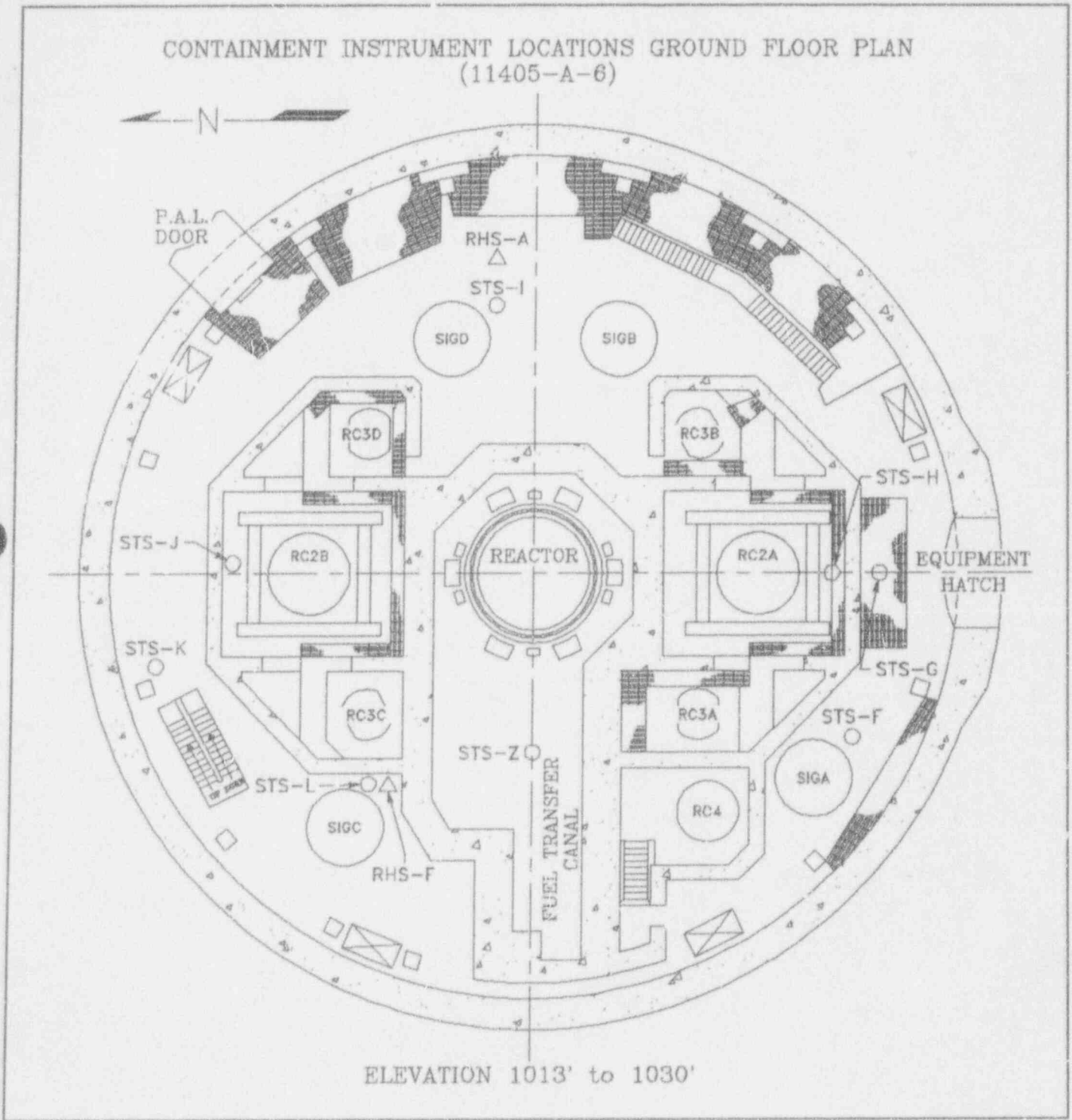
Containment ILRT Instrument Locations
Elevation 984 to 1010 ft



APPENDIX E

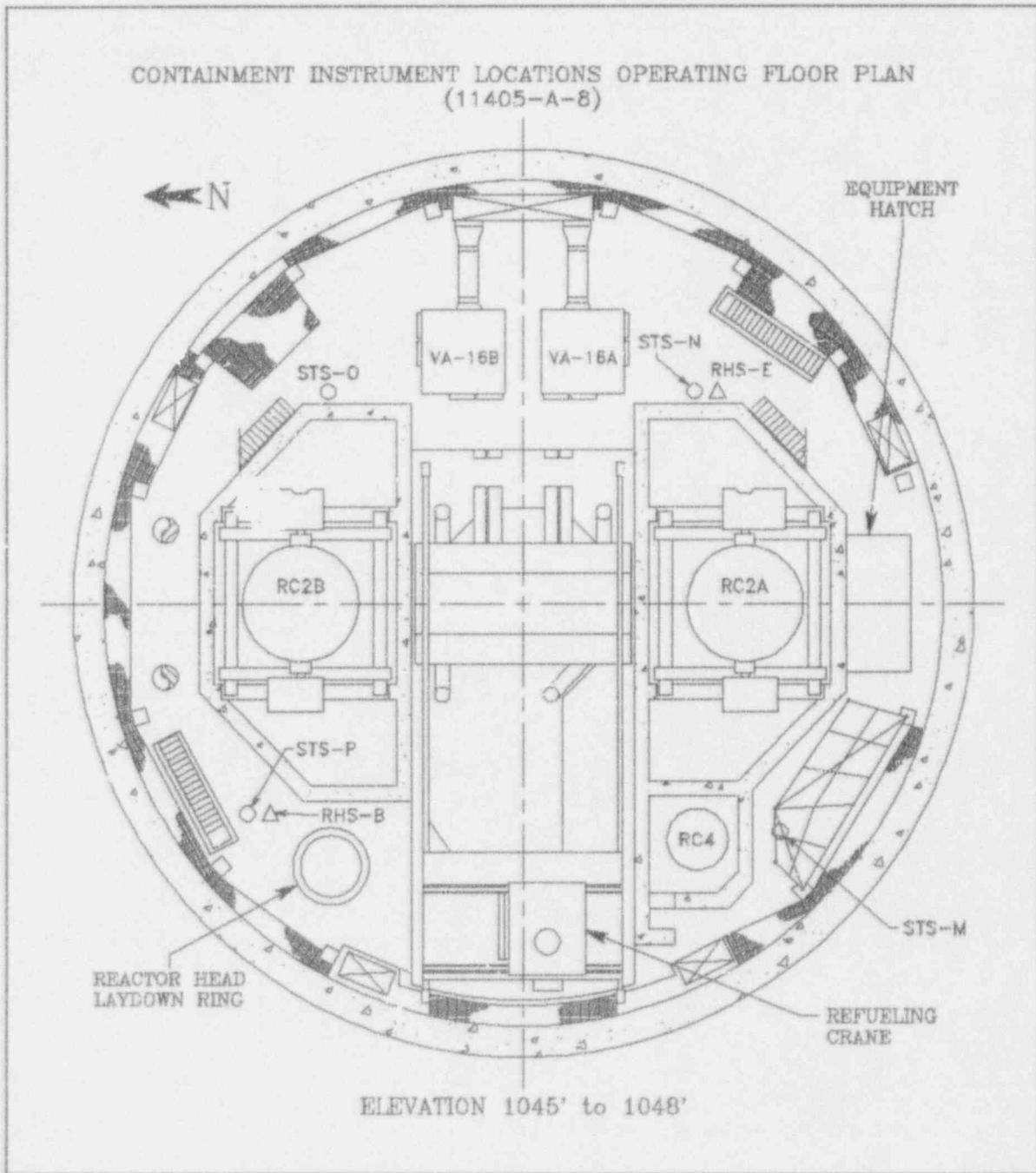
ILRT Instrument Locations at
Elevations 1013 to 1030 ft

CONTAINMENT INSTRUMENT LOCATIONS GROUND FLOOR PLAN
(11405-A-6)



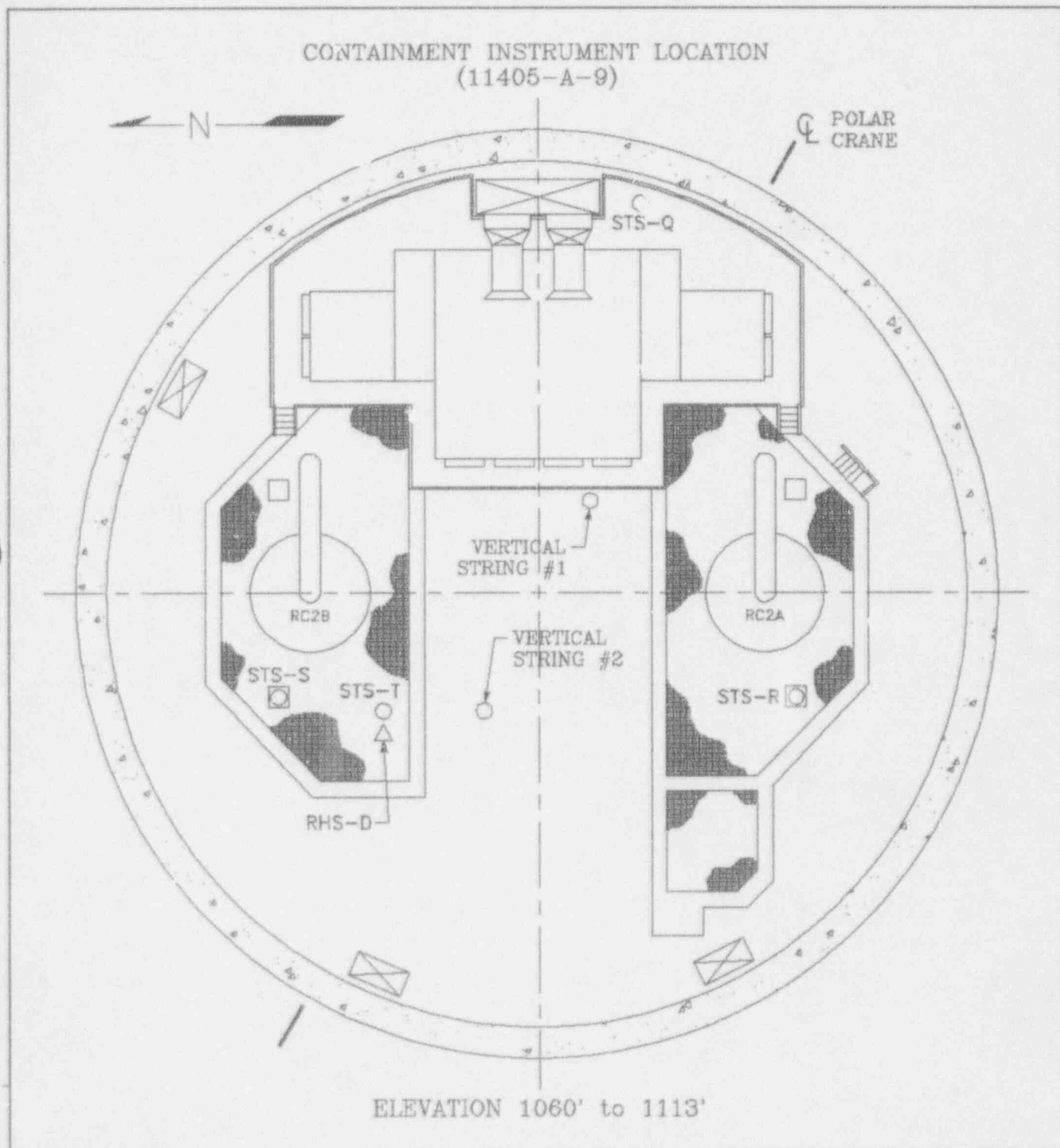
APPENDIX E

ILRT Instrument Locations at
Elevations 1045 to 1048 ft



APPENDIX E

ILRT Instrument Locations at
Elevations 1060 to 1113 ft



APPENDIX F

Local Leakage Rate Test Reports

1. 1990 Refueling Outage Type B and Type C Local Leakage Rate Test Report . . . F-1
2. 1992 Refueling Outage Type B and Type C Local Leakage Rate Test Report . . . F-17
3. 1993 Refueling Outage Type B and Type C Local Leakage Rate Test Report . . . F-39

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

SUMMARY

Local leakage rate tests were performed on the reactor containment building penetrations as part of the 1990 refueling outage. These tests were conducted in accordance with Fort Calhoun Station Technical Specifications (Section 3.5) and 10 CFR Part 50, Appendix J. The testing is performed to identify, measure, and if required, initiate maintenance on potential reactor containment leakage pathways. The maximum containment leakage rate according to Technical Specification 3.5, L_a , equals 0.1% wt per day or 104,918 sccm. For the maximum pathway leakage rate (MXPLR) determined from the Type B and Type C local leakage rate test (LLRT) results shall be less than or equal to 0.6 L_a , or 62,951 sccm.

The total as-found Type B & C MXPLR for the 1990 refueling outage equals 645,513.84 sccm. Excessive leakage rates were observed on Penetrations M-7, M-39, and M-50. An explanation of the significant leakage rates is included in the applicable test sections. The individual leakage rates for each penetration are tabulated in Table I through Table VII. Penetration M-7, M-39, and M-50 MXPLR vs. minimum pathway leakage rate (MNPLR) is tabulated in Table VII. The MNPLR leakage rate equals 11,834.0 sccm. A summary of the test results is given in Table VIII. All of the tables are attached.

TYPE B Tests

Type B LLRTs are conducted as part of the Fort Calhoun Station surveillance test program. These tests measure leakage rates of mechanical sleeves, electrical penetration seals, and penetrations with resilient seals. To perform these tests each penetration is pressurized with air or nitrogen to 60 psig. The make-up flow rate of air or nitrogen to maintain test volume at test pressure is the penetration's leakage rate. The leakage rate measurement system uses a series of calibrated rotameters and a bubbler to measure leakage rate.

- a. Personnel air lock (PAL) door seals are tested in accordance with Technical Specification 3.5(3)d.(ii) using ST-CONT-2, F.1. These tests do not contribute to the total Type B & C leakage rate. These test procedures are on file at the Fort Calhoun Station. The whole PAL is tested once each six months and within two weeks of achieving a operational mode requiring containment integrity using ST-CONT-2, F.2. The results tabulated in Table I contribute to the total Type B & C leakage rate. The results recorded in Table I indicate a trend of increasing leakage from the PAL. The PAL Door seals are scheduled to be replaced during the next refueling outage.
- b. Equipment hatch LLRT is performed using ST-CONT-2, F.3. This test is performed prior to initial hatch removal and following each replacement. The results tabulated in Table II contribute to the total Type B & C leakage rate.
- c. Fuel transfer tube LLRT is performed using ST-CONT-2, F.4. The results are tabulated in Table III contribute to the total Type B & C leakage rate.

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

- d. Electrical penetration LLRTs are performed using ST-CONT-2, F.5. The results are tabulated in Table IV and contribute to the total Type B & C leakage rate. The only leakage that was found was located in penetration A-4 and measured as 1,500 sccm. A second test was conducted on A-4 after the isolation/test valve was replaced by MWO 900663. The retest result was 0.0 sccm. The total leakage after maintenance for the electrical penetrations is 0.0 sccm.
- e. Mechanical sleeve LLRTs are tested using ST-CONT-2, F.6. The results are tabulated in Table V and contribute to the total Type B & C leakage rate.

TYPE C Tests

Type C LLRTs are performed using ST-CONT-3. The results are tabulated in Table VI and contribute to the total Type B & C leakage rate. Maximum Pathway Leakage Rates in excess of the $0.6L_p$ criteria were found at penetrations M-7, M-39, and M-50. An explanation of actual penetration leakages is provided below:

- a. Penetration M-7 (RC Pump Bleedoff) would not hold pressure when it was first tested. HCV-206, the outside containment isolation valve for M-7, was found to be leaking at a rate of 169,920 sccm. Manual valve CH-275, located downstream of HCV-206 was closed and penetration M-7 was retested. The subsequent leakage rate for HCV-241, inside containment isolation valve for penetration M-7, was 0.21 sccm. Therefore, the as-found minimum pathway leakage rate (MNPLR) for penetration M-7 is listed as 0.21 sccm. HCV-206 was repaired under MWO 900758 and penetration M-7 was retested. The retest result was 0.0 sccm.
- b. Penetration M-39 (CCW to SI Injection cooler) did not hold pressure when it was first tested. HCV-425B was observed to be leaking through at a rate of 356,832.00 sccm. HCV-425B was repaired under MWO 901404 and the penetration M-39 was retested without performing any work on the inside containment isolation valve HCV-425A. Following repairs on HCV-425B, penetration M-39 leakage was recorded at 560 sccm. The MNPLR for M-39 is listed as 560 sccm.

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

- c. Two LLRTs are performed on Penetration M-50. Penetration M-50 is one of four containment pressure sensing penetrations. It is categorized as a containment atmosphere exposed system and has only one containment isolation valve (B/HCV-742). Test M-50 Test 1 recorded leakage at a rate of 107,616 sccm. Test M-50 Test 1 pressurizes the penetration against a closed B/HCV-742 and measures the leakage across the valve seat to a vent downstream of B/HCV-742. Test M-50 Test 1 does not measure atmospheric leakage from penetration M-50. This test is not representative of the accident position of this valve (open) and does not account for the pressure retaining components in the system (tubing, couplings or instrumentation). Test M-50 Test 2 pressurizes M-50 with B/HCV-742 open and against the pressure retaining components and would measure atmospheric leakage from penetration M-50. Only M-50 Test 2 is included in the total Type B & C leakage rate. The as-found LLRT result using test M-50 Test 2 is 128 sccm. Therefore, the actual as found leakage for M-50 is listed as 128 sccm. (as listed in Test M-50 Test 2). The diaphragm of B/HCV-742 was replaced under MWO 900760. The retest following maintenance yielded results of 0.0 sccm for tests M-50 Test 1 and M-50 Test 2. The diaphragms of the other containment pressure sensing line isolation valves of penetrations (M-38, M-51, and M-52) were also replaced.
- d. An unusually high leakage rate of 4400 sccm was measured on PCV-742E of penetration M-46. MWO 900831 was written to repair PCV-742E. Penetration M-46 was repaired and retested at 0.66 sccm.

CONCLUSION

The results of the Type B and C Leakage Rates are given in Table VIII. The initial as-found maximum path way leakage rate from Type B and Type C leakage rate tests was 645,513.84 sccm. The as found reportable leakage rates exceeded the $0.6L_a$ (62,951 sccm) limit specified by the Technical Specifications. However, the as-found MNPLR, 11,834.05 sccm, is well within the $0.6L_a$ criteria. Containment integrity was maintained throughout the testing program. After maintenance, the total as left leakage was 7,755.09 sccm.

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE I

TYPE B TEST

Personnel Air Lock Leak Rate Test
ST-CONT-2, F.2

<u>Test Date</u>	<u>Leakage Rate (sccm)</u>
05/24/89	1,400
11/07/89	2,250
05/30/90	4,200

NOTE: The PAL Door Seals will be replaced next outage.

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE II

TYPE B TEST

Equipment Hatch "O Ring Seal" Test
ST-CONT-2, F.3

<u>Test Date</u>	<u>Leakage Rate (sccm)</u>
02/21/90	0.77
02/27/90	0.00
03/08/90	6.70
03/13/90	0.00
04/10/90	0.00
04/20/90	3.21
04/25/90	3,600.00
05/12/90	1.29

1990 REFUELING OUTAGE TYPE L AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE III

TYPE B TEST

Fuel Transfer Tube Leak Rate Test
ST-CONT-2, F.4

<u>Test Date</u>	<u>Leakage Rate (sccm)</u>
02/23/90	2.96
05/05/90	2.80

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE IV

TYPE B TEST

Electrical Penetrations
ST-CONT-2, F.5

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
A-1	0.00	0.00
A-2	0.00	0.00
A-4	1500.00	0.00
A-5	0.00	0.00
A-6	0.00	0.00
A-7	0.00	0.00
A-8	0.00	0.00
A-9	0.00	0.00
A-10	0.00	0.00
A-11	0.00	0.00
B-1	0.00	0.00
B-2	0.00	0.00
B-4	0.00	0.00
B-5	0.00	0.00
B-6	0.00	0.00
B-7	0.00	0.00
B-8	0.00	0.00
B-9	0.00	0.00
B-10	0.00	0.00
B-11	0.00	0.00
C-1	0.00	0.00
C-2	0.00	0.00
C-4	0.00	0.00
C-5	0.00	0.00
C-6	0.00	0.00
C-7	0.00	0.00
C-8	0.00	0.00
C-9	0.00	0.00
C-10	0.00	0.00
C-11	0.00	0.00
D-1	0.00	0.00
D-2	0.00	0.00
D-4	0.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE IV
TYPE B TEST

Electrical Penetrations
ST-CONT-2, F.5

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
D-5	0.00	0.00
D-6	0.00	0.00
D-7	0.00	0.00
D-8	0.00	0.00
D-9	0.00	0.00
D-10	0.00	0.00
D-11	0.00	0.00
E-1	0.00	0.00
E-2	0.00	0.00
E-4	0.00	0.00
E-5	0.00	0.00
E-6	0.00	0.00
E-7	0.00	0.00
E-8	0.00	0.00
E-9	0.00	0.00
E-10	0.00	0.00
E-11	0.00	0.00
F	0.00	0.00
F-1	0.00	0.00
F-4	0.00	0.00
F-5	0.00	0.00
F-6	0.00	0.00
F-7	0.00	0.00
F-8	0.00	0.00
F-9	0.00	0.00
F-10	0.00	0.00
F-11	0.00	0.00
G-1	0.00	0.00
G-2	0.00	0.00
G-3	0.00	0.00
G-4	0.00	0.00
H-1	0.00	0.00
H-2	0.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE IV

TYPE B TEST

Electrical Penetrations
ST-CONT-2, F.5

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
H-3	0.00	0.00
H-4	0.00	0.00
E-HCV-383-3A	0.00	0.00
E-HCV-383-3B	0.00	0.00
E-HCV-383-4A	0.00	0.00
E-HCV-383-4B	0.00	0.00
TOTALS	<u>1,500.00</u>	<u>0.00</u>

Mechanical Sleeve Leak Rate
ST-CONT-2, F.6

M-1	0.00	0.00
M-2	0.00	0.00
M-4	0.00	0.00
M-5	0.00	0.00
M-6	0.00	0.00
M-7	0.00	0.00
M-8	0.00	0.00
M-9	0.00	0.00
M-10	0.00	0.00
M-11	0.00	0.00
M-12	0.00	0.00
M-13	0.00	0.00
M-14	0.00	0.00
M-15	0.00	0.00
M-16	0.00	0.00
M-17	0.00	0.00
M-18	0.00	0.00
M-19	0.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE V
TYPE B TEST

Mechanical Sleeve Leak Rate
SY-CONT-2, F.6

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-20	0.00	0.00
M-21	0.00	0.00
M-22	0.00	0.00
M-23	0.00	0.00
M-24	0.00	0.00
M-25	0.00	0.00
M-26	0.00	0.00
M-27	0.00	0.00
M-28	0.00	0.00
M-29	0.00	0.00
M-30	0.00	0.00
M-31	0.00	0.00
M-32	0.00	0.00
M-33	0.00	0.00
M-34	0.00	0.00
M-35	0.00	0.00
M-36	0.00	0.00
M-37	0.00	0.00
M-38	0.00	0.00
M-39	0.00	0.00
M-40	0.00	0.00
M-41	0.00	0.00
M-42	0.00	0.00
M-43	0.00	0.00
M-44	0.29	0.29
M-45	0.00	0.00
M-46	0.00	0.00
M-47	0.00	0.00
M-48	5.66	5.66
M-49	0.00	0.00
M-50	0.00	0.00
M-51	0.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE V

TYPE B TEST

Mechanical Sleeve Leak Rate
ST-CONT-2, F.6

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-52	63.41	63.41
M-53	0.00	0.00
M-54	0.00	0.00
M-55	0.00	0.00
M-56	0.00	0.00
M-57	0.00	0.00
M-58	0.00	0.00
M-59	0.00	0.00
M-60	0.00	0.00
M-61	0.00	0.00
M-62	0.00	0.00
M-63	0.00	0.00
M-64	0.00	0.00
M-65	0.00	0.00
M-66	0.00	0.00
M-67	0.00	0.00
M-68	0.00	0.00
M-69	0.00	0.00
M-70	0.00	0.00
M-71	0.00	0.00
M-72	0.00	0.00
M-73	0.00	0.00
M-74	0.00	0.00
M-75	0.00	0.00
M-76	0.00	0.00
M-77	0.00	0.00
M-78	0.00	0.00
M-79	0.00	0.00
M-80	0.00	0.00
M-81	0.00	0.00
M-82	4.26	4.26
M-83	0.00	0.00
M-84	0.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE V

TYPE B TEST

Mechanical Sleeve Leak Rate
ST-CONT-2, F.6

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-85	4.26	4.26
M-86	0.00	0.00
M-87	0.00	0.00
M-88	0.00	0.00
M-89	0.00	0.00
M-90	0.00	0.00
M-91	0.00	0.00
M-92	0.00	0.00
M-93	0.00	0.00
M-94	0.00	0.00
M-95	0.00	0.00
M-96	0.00	0.00
M-97	0.00	0.00
M-98	0.00	0.00
M-99	0.00	0.00
<hr/> TOTAL	<hr/> 77.90	<hr/> 77.90

1990 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

TABLE VI

TYPE C TEST

Containment Isolation Valves
 ST-CONT-3, F.1

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-2	36.43	36.43
M-7	169,920.00 (See Table VII)	0.00
M-8	0.00	0.00
M-11	0.00	0.00
M-14	0.00	0.00
M-15	100.00	100.00
M-18	0.00	0.00
M-19	0.00	0.00
M-20	0.00	0.00
M-22	0.00	0.00
M-24	2.15	2.15
M-25	0.62	0.62
M-30	50.78	50.78
M-31 Test 1	0.56	0.56
M-31 Test 2	1.11	1.11
M-38 Test 1	0.00	0.00
M-38 Test 2	0.00	0.00
M-39	356,832.00 (See Table VII)	560.00
M-40 Test 1	0.00	0.00
M-40 Test 2	0.00	0.00
M-42	0.00	0.00
M-43	5.71	5.71
M-44	0.00	0.00
M-45	0.00	0.00
M-46 Test 1	4,400.00	0.66
M-46 Test 2	0.00	0.00
M-47 Test 1	0.00	0.00
M-47 Test 2	0.43	0.43
M-48 Test 1	250.00	250.00
M-48 Test 2	0.00	0.00
M-50 Test 1	107,616.00 (See Table VII)	0.00
M-50 Test 2	128.00	0.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE VI

TYPE C TEST

Containment Isolation Valves
ST-CONT-3, F.1

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-51 Test 1	0.00	0.00
M-51 Test 2	8.88	0.00
M-52 Test 1	110.00	0.00
M-52 Test 2	110.00	0.00
M-53	0.00	0.00
M-57 Test 1	400.00	5.90
M-57 Test 2	500.00	0.00
M-58 Test 1	0.00	0.00
M-58 Test 2	0.00	0.00
M-69	0.00	0.00
M-73	0.00	0.00
M-79	0.00	0.00
M-80	0.00	0.00
M-87	0.00	0.00
M-88	1,200.00	2,500.00
HCV-383-3	0.00	0.00
HCV-383-4	0.00	0.00
<hr/> TOTAL	<hr/> 641,682.00	<hr/> 3,473.11

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE VII

COMPARISON OF MXPLR vs MNPLR
PENETRATIONS M-7, M-39 and M-50

<u>Penetration</u>	<u>Maximum Pathway Leakage Rate (sccm)</u>	<u>Minimum Pathway Leakage Rate (sccm)</u>
M-7	169,920.00	0.21
M-39	356,832.00	560.00
M-50	107,616.00	128.00

1990 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

TABLE VIII

SUMMARY OF TYPE B and TYPE C LEAK RATE TEST RESULTS

<u>Type B Tests</u>	<u>AS-FOUND LEAKAGE RATE SCCM</u>	<u>AS-LEFT LEAKAGE RATE SCCM</u>
Personnel Air Lock	2,250.00	4,200.00
Fuel Transfer Tube	2.96	2.80
Equipment Hatch	0.77	1.29
Electrical Penetrations	1,500.00	0.00
Mechanical Sleeves	77.90	77.90
 <u>Type C Tests</u>		
Maximum Pathway Leakage Rate	641,682.21	3,473.11
Minimum Pathway Leakage Rate	8,002.42	
 <u>Type B & Type C LLRT Totals</u>		
Maximum Pathway Leakage Rate	645,513.84	7,755.09
Minimum Pathway Leakage Rate	11,834.05	

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

SUMMARY

Local leakage rate tests were performed on the reactor containment building penetrations as part of the 1992 refueling outage. These tests were conducted in accordance with Fort Calhoun Station Technical Specifications (Section 3.5) and 10 CFR Part 50, Appendix J. The testing is performed to identify, measure, and if required, initiate maintenance on potential reactor containment leakage pathways. The maximum containment leakage rate according to Technical Specification 3.5, L_a , equals 0.1% wt per day or 104,918 sccm. For the maximum pathway leakage rate (MXPLR) determined from the Type B and Type C local leakage rate test (LLRT) results shall be less than or equal to 0.6 L_a , or 62,951 sccm.

The as-found maximum pathway leakage rate (MXPLR) was 33,036.6 sccm. Excessive leakage rates were observed on Penetrations M-46, M-48, and the PAL. Analyses of the significant leakage rates and corrective actions are included in the respective sections of this report. The individual leakage rates for each penetration are tabulated in Table I through Table X. A summary of the As Found test results is given in Table VII, and a summary of the As Left test results is given in Table X. All of the tables are attached. The as-left MXPLR is 10,891.4 sccm.

TYPE B Tests

Type B LLRTs are conducted as part of the Fort Calhoun Station surveillance test program. These tests measure leakage rates of mechanical sleeves, electrical penetration seals, and penetrations with resilient seals. To perform these tests each penetration is pressurized with air or nitrogen to 60 psig. The make-up flow rate of air or nitrogen to maintain test volume at test pressure is the penetration's leakage rate. The leakage rate measurement system uses a series of calibrated rotameters and a bubbler to measure leakage rate.

- a. The Personnel Air Lock seals are tested daily under OP-ST-AE-0001 when containment integrity is required. The Personnel Air Lock (PAL) is also tested once each six months and after each cold shutdown, under IC-ST-AE-0001. The PAL Door seals were replaced during this refueling outage. Also, during the outage the PAL was painted. The hand closure assemblies were dismantled and cleaned of sandblasting residue. The packing was reused since there was no replacement backing on site. The PAL was not retested until the normal test at two weeks after declaring Containment Integrity. At first the PAL leaked 67,960 sccm. After the Outer PAL Door latch packing was retightened the leakage re-stabilized at 4500 sccm. These results are tabulated in Table I and contribute to the Type B and Type C total leakage rate. The results recorded in Table I indicate a trend of increasing leakage for the PAL Door.
- b. On December 2, 1991 it was discovered that the Inner PAL Door equalizing valve had not had a valid LLRT performed on it since 1974. LER-91-029 was issued to report this to the NRC. Surveillance test procedure IC-ST-AE-0006 was written to perform a valid LLRT on the Inner PAL Door equalizing valve. These results are tabulated in Table II.
- c. The equipment hatch was leakage rate tested in accordance with surveillance test IC-ST-AE-0002. Tests were performed prior to its initial removal and following each replacement. The results are tabulated in Table III.

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

- d. The fuel transfer tube was leakage rate tested in accordance with surveillance test IC-ST-AE-0003. The results are tabulated in Table IV.
- e. The electrical penetrations were leakage rate tested in accordance with surveillance test IC-ST-AE-0074. The As Found results are tabulated in Table V and the As Left results are tabulated in Table VIII.
- f. The mechanical penetrations were leakage rate tested in accordance with surveillance test IC-ST-AE-0005. The As Found results are tabulated in Table V and the As Left results are tabulated in Table VIII.

TYPE C Tests

The Type C LLRTs were performed on the containment isolation valves in accordance with IC-ST-CONT-3001, IC-ST-CONT-3002, and IC-ST-AE-3003 using air as the test medium. The As Found results are tabulated in Table VI and the As Left results are tabulated in Table IX. The as found LLRT on penetration M-46 exceeded its AMSE Section XI Maximum Leakage Rate. The as found LLRT on penetration M-48 exceeded its AMSE Section XI Evaluation Level Leakage Rate, and due to poor replacement parts a leakage rate greater than the AMSE Section XI Maximum Leakage Rate was accepted to enable unit startup.

M-46 The as-found LLRT M-46 Test #2 of PCV-742E yielded a test result of 0.0 sccm as verified by use of the bubbler. However, on M-46 Test #1 a leak of 1.0 scfm (28,316.8 sccm) was found to be leaking from the back side of PCV-742E's diaphragm. The diaphragms of PCV-742E and PCV-742F were replaced under MWOs 904171 and 9104272, respectively. Both retests yielded a result of 0.0 sccm.

M-48 The as-found LLRT M-48 Test #1 of HCV-746B yielded a test result of 340 sccm which is greater than AMSE Section XI Evaluation Level Leakage Rate or 300 sccm. MWO 921053 was written to repair HCV-746B. After the valve internals were replaced the valve retested at 2800 sccm. This is greater than the AMSE Section XI Maximum Leakage Rate. But this result was accepted to enable unit startup since the original internals had been discarded and there were not any other new parts in the warehouse.

On December 16, 1991 Design Engineering - Nuclear determined that the copper tubing, brass fittings and valves of the PAL door seal test rig which penetrate the PAL outer bulkhead were untested and unqualified containment boundaries (PED-FC-91-198). NCR-19-105 was initiated to replace the unqualified tubing with qualified stainless steel tubing, fittings, and valves. Three new containment isolation valves were installed. IC-ST-AE-3003 was written to perform LLRTs on the new valves.

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table I

TYPE B TESTS

Personnel Air Lock Leakage Rate Test
IC-ST-AE-0001

<u>Test Date</u>	<u>Leakage Rate</u>
09/07/90	0.0
01/14/91	2,800
07/15/91	3,200
10/10/91	3,500
05/08/92	67,960
05/09/92	4,500

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table II

TYPE B TESTS

Inner PAL Door Equalizing Valve Leakage Rate Test
IC-ST-AE-0006

<u>Test Date</u>	<u>Leakage Rate</u>
12/07/91	0.0
12/28/91	0.0
04/24/92	0.0
05/07/92	0.0

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table III

TYPE B TESTS

Equipment Hatch "O Ring Seal" Test
IC-ST-AE-0002

<u>Test Date</u>	<u>Leakage Rate</u>
12/26/90	0.0
02/07/92	0.0
02/12/92	0.0
03/27/92	25.0
04/07/92	0.0
04/13/92	0.0
04/23/92	0.0

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table IV

TYPE B TESTS

Fuel Transfer Tube Leakage Rate Test
IC-ST-AE-0003

<u>Test Date</u>	<u>Leakage Rate</u>
02/07/92	16.2
05/23/92	0.0

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
 TYPE B TESTS

Electrical Penetration Leakage Rate Tests
 IC-ST-AE-0004

Penetration	Date	Leak Rate	Instrument
A-1	14-Feb-92	0.0	Bubbler
A-2	14-Feb-92	0.0	Bubbler
A-4	20-Jan-92	0.0	Bubbler
A-5	05-Feb-92	0.0	Bubbler
A-6	08-Feb-92	0.0	Bubbler
A-7	08-Feb-92	0.0	Bubbler
A-8	08-Feb-92	0.0	Bubbler
A-9	08-Feb-92	0.0	Bubbler
A-10	20-Jan-92	0.0	Bubbler
A-11	20-Jan-92	0.0	Bubbler
B-1	24-Feb-92	0.0	Bubbler
B-2	20-Jan-92	0.0	Bubbler
B-4	20-Jan-92	0.0	Bubbler
B-5	20-Jan-92	0.0	Bubbler
B-6	08-Feb-92	0.0	Bubbler
B-7	08-Feb-92	0.0	Bubbler
B-8	08-Feb-92	0.0	Bubbler
B-9	08-Feb-92	0.0	Bubbler
B-10	20-Jan-92	0.0	Bubbler
B-11	20-Jan-92	0.0	Bubbler
C-1	13-Jan-92	0.0	Bubbler
C-2	04-Feb-92	0.0	Bubbler
C-4	13-Jan-92	230.0	F
C-5	14-Jan-92	0.0	Bubbler
C-6	25-Feb-92	0.0	Bubbler
C-7	14-Feb-92	0.0	Bubbler
C-8	14-Jan-92	0.0	Bubbler
C-9	14-Jan-92	0.0	Bubbler
C-10	14-Jan-92	0.0	Bubbler
C-11	14-Jan-92	0.0	Bubbler
D-1	25-Feb-92	0.0	Bubbler
D-2	13-Feb-92	0.0	Bubbler
D-4	14-Jan-92	0.0	Bubbler
D-5	14-Jan-92	0.0	Bubbler
D-6	15-Feb-92	0.0	Bubbler
D-7	13-Feb-92	0.0	Bubbler
D-8	04-Feb-92	0.0	Bubbler
D-9	04-Feb-92	0.0	Bubbler
D-10	14-Jan-92	0.0	Bubbler
D-11	08-Feb-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Electrical Penetration Leakage Rate Tests
IC-ST-AE-0004

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
E-1	13-Feb-92	0.0	Bubbler
E-2	14-Jan-92	0.0	Bubbler
E-4	14-Jan-92	0.0	Bubbler
E-5	14-Jan-92	0.0	Bubbler
E-6	24-Feb-92	0.0	Bubbler
E-7	04-Feb-92	0.0	Bubbler
E-8	14-Jan-92	0.0	Bubbler
E-9	14-Jan-92	0.0	Bubbler
E-10	14-Jan-92	0.0	Bubbler
E-11	04-Feb-92	0.0	Bubbler
F-1	15-Jan-92	0.0	Bubbler
F-2	05-Feb-92	0.0	Bubbler
F-4	15-Jan-92	0.0	Bubbler
F-5	15-Jan-92	0.0	Bubbler
F-6	15-Jan-92	0.0	Bubbler
F-7	15-Jan-92	0.0	Bubbler
F-8	15-Jan-92	0.0	Bubbler
F-9	15-Jan-92	0.0	Bubbler
F-10	15-Jan-92	0.0	Bubbler
F-11	15-Jan-92	0.0	Bubbler
G-1	08-Feb-92	0.0	Bubbler
G-2	13-Feb-92	0.0	Bubbler
G-3	08-Feb-92	0.0	Bubbler
G-4	12-Feb-92	0.0	Bubbler
H-1	08-Feb-92	0.0	Bubbler
H-2	13-Feb-92	0.0	Bubbler
H-3	08-Feb-92	0.0	Bubbler
H-4	12-Feb-92	0.0	Bubbler
E-HCV-383-3A	06-Feb-92	0.0	Bubbler
E-HCV-383-3B	06-Feb-92	0.0	Bubbler
E-HCV-383-4A	07-Feb-92	0.0	Bubbler
E-HCV-383-4B	07-Feb-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

Penetration	Date	Leak Rate	Instrument
M-HCV-383-3	04-Feb-92	127.0	112391/14
M-HCV-383-4	01-Feb-92	0.0	Bubbler
M-1	23-Jan-92	0.0	Bubbler
M-2	10-Feb-92	0.0	Bubbler
M-3	23-Jan-92	0.0	Bubbler
M-4	23-Jan-92	0.0	Bubbler
M-5	23-Jan-92	0.0	Bubbler
M-6	23-Jan-92	0.0	Bubbler
M-7	23-Jan-92	0.0	Bubbler
M-8	23-Jan-92	0.0	Bubbler
M-9	08-Feb-92	0.0	Bubbler
M-10	08-Feb-92	0.0	Bubbler
M-11	23-Jan-92	0.0	Bubbler
M-12	08-Feb-92	0.0	Bubbler
M-13	08-Feb-92	16.2	112391/4
M-14	22-Jan-92	0.0	Bubbler
M-15	22-Jan-92	0.0	Bubbler
M-16	23-Jan-92	0.0	Bubbler
M-17	23-Jan-92	0.0	Bubbler
M-18	23-Jan-92	0.0	Bubbler
M-19	23-Jan-92	0.0	Bubbler
M-20	23-Jan-92	0.0	Bubbler
M-21	23-Jan-92	0.0	Bubbler
M-22	22-Jan-92	0.0	Bubbler
M-23	22-Jan-92	0.0	Bubbler
M-24	22-Jan-92	0.0	Bubbler
M-25	22-Jan-92	0.0	Bubbler
M-26	23-Jan-92	0.0	Bubbler
M-27	16-Jan-92	0.0	Bubbler
M-28	16-Jan-92	0.0	Bubbler
M-29	16-Jan-92	0.0	Bubbler
M-30	16-Jan-92	0.0	Bubbler
M-31	14-Jan-92	21.0	112391/2
M-32	14-Jan-92	0.0	Bubbler
M-33	14-Jan-92	0.0	Bubbler
M-34	14-Jan-92	0.0	Bubbler
M-35	14-Jan-92	0.0	Bubbler
M-36	17-Jan-92	0.0	Bubbler
M-37	17-Jan-92	0.0	Bubbler
M-38	16-Jan-92	0.0	Bubbler
M-39	17-Jan-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-40	15-Jan-92	21.0	112391/2
M-41	15-Jan-92	0.0	Bubbler
M-42	16-Jan-92	0.0	Bubbler
M-43	16-Jan-92	0.0	Bubbler
M-44	20-Jan-92	0.0	Bubbler
M-45	10-Feb-92	0.0	Bubbler
M-46	24-Jan-92	0.0	Bubbler
M-47	24-Jan-92	0.0	Bubbler
M-48	24-Jan-92	16.2	112391/4
M-49	10-Feb-92	0.0	Bubbler
M-50	17-Jan-92	0.0	Bubbler
M-51	17-Jan-92	0.0	Bubbler
M-52	17-Jan-92	72.0	112391/2
M-53	17-Jan-92	0.0	Bubbler
M-54	15-Jan-92	0.0	Bubbler
M-55	15-Jan-92	0.0	Bubbler
M-56	15-Jan-92	0.0	Bubbler
M-57	17-Jan-92	0.0	Bubbler
M-58	15-Jan-92	21.0	112391/2
M-59	24-Jan-92	0.0	Bubbler
M-60	24-Jan-92	0.0	Bubbler
M-61	24-Jan-92	0.0	Bubbler
M-62	24-Jan-92	6.0	Bubbler
M-63	10-Feb-92	0.0	Bubbler
M-64	17-Jan-92	0.0	Bubbler
M-65	17-Jan-92	0.0	Bubbler
M-66	17-Jan-92	0.0	Bubbler
M-67	17-Jan-92	0.0	Bubbler
M-68	16-Jan-92	0.0	Bubbler
M-69	15-Jan-92	0.0	Bubbler
M-70	15-Jan-92	0.0	Bubbler
M-71	15-Jan-92	0.0	Bubbler
M-72	20-Jan-92	0.0	Bubbler
M-73	20-Jan-92	0.0	Bubbler
M-74	20-Jan-92	18.0	112391/2
M-75	20-Jan-92	0.0	Bubbler
M-76	20-Jan-92	0.0	Bubbler
M-77	20-Jan-92	0.0	Bubbler
M-78	20-Jan-92	0.0	Bubbler
M-79	20-Jan-92	18.0	112391/2
M-80	20-Jan-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
 TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
 IC-ST-AE-0005

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-81	20-Jan-92	0.0	Bubbler
M-82	20-Jan-92	0.0	Bubbler
M-83	20-Jan-92	0.0	Bubbler
M-84	21-Jan-92	0.0	Bubbler
M-85	21-Jan-92	17.0	112391/2
M-86	21-Jan-92	0.0	Bubbler
M-87	21-Jan-92	0.0	Bubbler
M-88	21-Jan-92	0.0	Bubbler
M-89	21-Jan-92	0.0	Bubbler
M-90	14-Jan-92	0.0	Bubbler
M-91	13-Jan-92	0.0	Bubbler
M-92	14-Jan-92	0.0	Bubbler
M-93	07-Feb-92	0.0	Bubbler
M-94	07-Feb-92	0.0	Bubbler
M-95	07-Feb-92	0.0	Bubbler
M-96	07-Feb-92	0.0	Bubbler
M-97	13-Jan-92	0.0	Bubbler
M-98	14-Jan-92	0.0	Bubbler
M-99	14-Jan-92	0.0	Bubbler

Other Type B Tests

Fuel Tube	13-Feb-92	16.2	112391/4
Eq Hatch	07-Feb-92	0.0	Bubbler
PAL	10-Oct-91	3500.0	F2
Eq Valve	28-Dec-91	0.0	Bubbler

Type B Sub Total		4099.6 sccm	
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1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VI

AS FOUND
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-HCV-383-3	02-Mar-92	0.0	Bubbler
M-HCV-383-4	03-Mar-92	0.0	Bubbler
M-2	27-Mar-92	62.0	112391/1
M-7	29-Feb-92	0.0	Bubbler
M-8	07-Mar-92	0.0	Bubbler
M-11	06-Mar-92	0.0	Bubbler
M-14	07-Mar-92	16.6	112391/1
M-15	06-Mar-92	16.4	112391/15
M-18	08-Mar-92	0.0	Bubbler
M-19	08-Mar-92	0.0	Bubbler
M-20	05-Mar-92	0.0	Bubbler
M-22	14-Apr-92	16.6	112391/1
M-24	05-Mar-92	16.6	112391/1
M-25	09-Mar-92	0.6	Bubbler
M-30	28-Feb-92	16.9	112391/2
M-31 Test 1	28-Feb-92	0.0	Bubbler
M-31 Test 2	29-Feb-92	0.0	Bubbler
M-38 Test 2	06-Mar-92	0.0	Bubbler
M-39	06-Mar-92	0.0	Bubbler
M-40 Test 1	29-Feb-92	0.0	Bubbler
M-40 Test 2	29-Feb-92	0.0	Bubbler
M-42	29-Feb-92	16.9	112391/2
M-43	29-Feb-92	17.0	112391/2
M-44	29-Feb-92	0.0	Bubbler
M-45	18-Apr-92	0.0	Bubbler
M-46 Test 1	04-Mar-92	28316.8	MT-04203
M-46 Test 2	04-Mar-92	0.0	Bubbler
M-47 Test 1	04-Mar-92	52.0	112391/14
M-47 Test 2	04-Mar-92	0.0	Bubbler
M-48 Test 1	04-Mar-92	340.0	7806A0077A5
M-48 Test 2	04-Mar-92	0.0	Bubbler
M-50 Test 2	05-Mar-92	0.0	Bubbler
M-51 Test 2	04-Mar-92	0.0	Bubbler
M-52 Test 2	05-Mar-92	0.0	Bubbler
M-53	06-Mar-92	0.0	Bubbler
M-57 Test 1	29-Feb-92	16.9	112391/14
M-57 Test 2	02-Mar-92	0.0	Bubbler
M-58 Test 1	29-Feb-92	16.9	112391/14
M-58 Test 2	02-Mar-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VI

AS FOUND
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001, IC-ST-CONT-3002, and IC-ST-AE-3003

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-69	02-Mar-92	0.0	Bubbler
M-73	27-Mar-92	0.0	Bubbler
M-74	26-Mar-92	0.0	Bubbler
M-79	07-Mar-92	0.0	Bubbler
M-80	23-Mar-92	0.0	Bubbler
M-87	01-Feb-92	0.0	Bubbler
M-88	01-Feb-92	14.8	112391/3
IA-3092	02-Feb-92	0.0	Bubbler
IA-3093	02-Feb-92	0.0	Bubbler
IA-3094	02-Feb-92	0.0	Bubbler
<u>Type C Sub Total</u>		<u>28,937.0</u>	

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VII

AS FOUND
TYPE B & TYPE C
ACCEPTANCE EVALUATION

Type C Sub Total	28,937.0
Type B Sub Total	<u>4,099.6</u>
Total Type B & C MXPLR	<u>33,036.6</u>
Acceptance Criterion ($< 0.5 L_a$)	$< 62,951.0$
L_a	$\approx 104,918.3$

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Electrical Penetration Leakage Rate Tests
 IC-ST-AE-0004

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
A-1	14-Feb-92	0.0	Bubbler
A-2	14-Feb-92	0.0	Bubbler
A-4	20-Jan-92	0.0	Bubbler
A-5	05-Feb-92	0.0	Bubbler
A-6	08-Feb-92	0.0	Bubbler
A-7	08-Feb-92	0.0	Bubbler
A-8	08-Feb-92	0.0	Bubbler
A-9	08-Feb-92	0.0	Bubbler
A-10	20-Jan-92	0.0	Bubbler
A-11	20-Jan-92	0.0	Bubbler
B-1	24-Feb-92	0.0	Bubbler
B-2	20-Jan-92	0.0	Bubbler
B-4	20-Jan-92	0.0	Bubbler
B-5	20-Jan-92	0.0	Bubbler
B-6	08-Feb-92	0.0	Bubbler
B-7	08-Feb-92	0.0	Bubbler
B-8	08-Feb-92	0.0	Bubbler
B-9	08-Feb-92	0.0	Bubbler
B-10	20-Jan-92	0.0	Bubbler
B-11	20-Jan-92	0.0	Bubbler
C-1	13-Jan-92	0.0	Bubbler
C-2	04-Feb-92	0.0	Bubbler
C-4	13-Jan-92	230.0	F
C-5	14-Jan-92	0.0	Bubbler
C-6	25-Feb-92	0.0	Bubbler
C-7	14-Feb-92	0.0	Bubbler
C-8	14-Jan-92	0.0	Bubbler
C-9	14-Jan-92	0.0	Bubbler
C-10	14-Jan-92	0.0	Bubbler
C-11	14-Jan-92	0.0	Bubbler
D-1	25-Feb-92	0.0	Bubbler
D-2	13-Feb-92	0.0	Bubbler
D-4	14-Jan-92	0.0	Bubbler
D-5	14-Jan-92	0.0	Bubbler
D-6	15-Feb-92	0.0	Bubbler
D-7	13-Feb-92	0.0	Bubbler
D-8	04-Feb-92	0.0	Bubbler
D-9	04-Feb-92	0.0	Bubbler
D-10	14-Jan-92	0.0	Bubbler
D-11	08-Feb-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Electrical Penetration Leakage Rate Tests
 IC-ST-AE-0004

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
E-1	13-Feb-92	0.0	Bubbler
E-2	14-Jan-92	0.0	Bubbler
E-4	14-Jan-92	0.0	Bubbler
E-5	14-Jan-92	0.0	Bubbler
E-6	24-Feb-92	0.0	Bubbler
E-7	04-Feb-92	0.0	Bubbler
E-8	14-Jan-92	0.0	Bubbler
E-9	14-Jan-92	0.0	Bubbler
E-10	14-Jan-92	0.0	Bubbler
E-11	23-Mar-92	0.0	Bubbler
F-1	15-Jan-92	0.0	Bubbler
F-2	05-Feb-92	0.0	Bubbler
F-4	15-Jan-92	0.0	Bubbler
F-5	15-Jan-92	0.0	Bubbler
F-6	15-Jan-92	0.0	Bubbler
F-7	15-Jan-92	0.0	Bubbler
F-8	15-Jan-92	0.0	Bubbler
F-9	15-Jan-92	0.0	Bubbler
F-10	15-Jan-92	0.0	Bubbler
F-11	15-Jan-92	0.0	Bubbler
G-1	08-Feb-92	0.0	Bubbler
G-2	13-Feb-92	0.0	Bubbler
G-3	08-Feb-92	0.0	Bubbler
G-4	12-Feb-92	0.0	Bubbler
H-1	08-Feb-92	0.0	Bubbler
H-2	13-Feb-92	0.0	Bubbler
H-3	08-Feb-92	0.0	Bubbler
H-4	12-Feb-92	0.0	Bubbler
E-HCV-383-3A	06-Feb-92	0.0	Bubbler
E-HCV-383-3B	06-Feb-92	0.0	Bubbler
E-HCV-383-4A	07-Feb-92	0.0	Bubbler
E-HCV-383-4B	07-Feb-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-HCV-383-3	03-Apr-92	0.0	Bubbler
M-HCV-383-4	03-Apr-92	0.0	Bubbler
M-1	23-Jan-92	0.0	Bubbler
M-2	10-Feb-92	0.0	Bubbler
M-3	23-Jan-92	0.0	Bubbler
M-4	23-Jan-92	0.0	Bubbler
M-5	23-Jan-92	0.0	Bubbler
M-6	23-Jan-92	0.0	Bubbler
M-7	23-Jan-92	0.0	Bubbler
M-8	23-Jan-92	0.0	Bubbler
M-9	08-Feb-92	0.0	Bubbler
M-10	08-Feb-92	0.0	Bubbler
M-11	23-Jan-92	0.0	Bubbler
M-12	08-Feb-92	0.0	Bubbler
M-13	08-Feb-92	16.2	112391/4
M-14	22-Jan-92	0.0	Bubbler
M-15	22-Jan-92	0.0	Bubbler
M-16	23-Jan-92	0.0	Bubbler
M-17	23-Jan-92	0.0	Bubbler
M-18	23-Jan-92	0.0	Bubbler
M-19	23-Jan-92	0.0	Bubbler
M-20	23-Jan-92	0.0	Bubbler
M-21	23-Jan-92	0.0	Bubbler
M-22	22-Jan-92	0.0	Bubbler
M-23	22-Jan-92	0.0	Bubbler
M-24	22-Jan-92	0.0	Bubbler
M-25	22-Jan-92	0.0	Bubbler
M-26	23-Jan-92	0.0	Bubbler
M-27	16-Jan-92	0.0	Bubbler
M-28	16-Jan-92	0.0	Bubbler
M-29	16-Jan-92	0.0	Bubbler
M-30	16-Jan-92	0.0	Bubbler
M-31	14-Jan-92	21.0	112391/2
M-32	14-Jan-92	0.0	Bubbler
M-33	14-Jan-92	0.0	Bubbler
M-34	14-Jan-92	0.0	Bubbler
M-35	14-Jan-92	0.0	Bubbler
M-36	17-Jan-92	0.0	Bubbler
M-37	17-Jan-92	0.0	Bubbler
M-38	16-Jan-92	0.0	Bubbler
M-39	17-Jan-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
 IC-ST-AE-0005

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-40	15-Jan-92	21.0	112391/2
M-41	15-Jan-92	0.0	Bubbler
M-42	16-Jan-92	0.0	Bubbler
M-43	16-Jan-92	0.0	Bubbler
M-44	20-Jan-92	0.0	Bubbler
M-45	10-Feb-92	0.0	Bubbler
M-46	24-Jan-92	0.0	Bubbler
M-47	24-Jan-92	0.0	Bubbler
M-48	24-Jan-92	16.2	112391/4
M-49	10-Feb-92	0.0	Bubbler
M-50	17-Jan-92	0.0	Bubbler
M-51	17-Jan-92	0.0	Bubbler
M-52	17-Jan-92	72.0	112391/2
M-53	17-Jan-92	0.0	Bubbler
M-54	15-Jan-92	0.0	Bubbler
M-55	15-Jan-92	0.0	Bubbler
M-56	15-Jan-92	0.0	Bubbler
M-57	17-Jan-92	0.0	Bubbler
M-58	15-Jan-92	21.0	112391/2
M-59	24-Jan-92	0.0	Bubbler
M-60	24-Jan-92	0.0	Bubbler
M-61	24-Jan-92	0.0	Bubbler
M-62	24-Jan-92	6.0	Bubbler
M-63	10-Feb-92	0.0	Bubbler
M-64	17-Jan-92	0.0	Bubbler
M-65	17-Jan-92	0.0	Bubbler
M-66	17-Jan-92	0.0	Bubbler
M-67	17-Jan-92	0.0	Bubbler
M-68	16-Jan-92	0.0	Bubbler
M-69	15-Jan-92	0.0	Bubbler
M-70	15-Jan-92	0.0	Bubbler
M-71	15-Jan-92	0.0	Bubbler
M-72	20-Jan-92	0.0	Bubbler
M-73	20-Jan-92	0.0	Bubbler
M-74	20-Jan-92	18.0	112391/2
M-75	20-Jan-92	0.0	Bubbler
M-76	20-Jan-92	0.0	Bubbler
M-77	20-Jan-92	0.0	Bubbler
M-78	20-Jan-92	0.0	Bubbler
M-79	20-Jan-92	18.0	112391/2
M-80	20-Jan-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
 IC-ST-AE-0005

Penetration	Date	Leak Rate	Instrument
M-81	20-Jan-92	0.0	Bubbler
M-82	20-Jan-92	0.0	Bubbler
M-83	20-Jan-92	0.0	Bubbler
M-84	21-Jan-92	0.0	Bubbler
M-85	21-Jan-92	17.0	112391/2
M-86	21-Jan-92	0.0	Bubbler
M-87	21-Jan-92	0.0	Bubbler
M-88	21-Jan-92	0.0	Bubbler
M-89	21-Jan-92	0.0	Bubbler
M-90	14-Jan-92	0.0	Bubbler
M-91	13-Jan-92	0.0	Bubbler
M-92	14-Jan-92	0.0	Bubbler
M-93	07-Feb-92	0.0	Bubbler
M-94	07-Feb-92	0.0	Bubbler
M-95	07-Feb-92	0.0	Bubbler
M-96	07-Feb-92	0.0	Bubbler
M-97	13-Jan-92	0.0	Bubbler
M-98	14-Jan-92	0.0	Bubbler
M-99	14-Jan-92	0.0	Bubbler

Other Type B Tests

Fuel Tube	11-Apr-92	0.0	Bubbler
Eq Hatch	23-Apr-92	0.0	Bubbler
PAL	09-May-92	4500.0	A1
Eq Valve	07-May-92	0.0	Bubbler
Type B Sub Total		4956.4	

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table IX

AS LEFT
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-HCV-383-3	01-Apr-92	0.0	Bubbler
M-HCV-383-4	02-Apr-92	0.0	Bubbler
M-2	22-Apr-92	16.6	112391/1
M-7	29-Feb-92	0.0	Bubbler
M-8	07-Mar-92	0.0	Bubbler
M-11	21-Mar-92	0.0	Bubbler
M-14	09-Apr-92	0.0	Bubbler
M-15	21-Mar-92	0.0	Bubbler
M-16	21-Mar-92	0.0	Bubbler
M-19	21-Mar-92	0.0	Bubbler
M-20	05-Mar-92	0.0	Bubbler
M-22	14-Apr-92	16.6	112391/1
M-24	05-Mar-92	16.6	112391/1
M-25	09-Mar-92	0.6	Bubbler
M-30	28-Feb-92	16.9	112391/2
M-31 Test 1	28-Feb-92	0.0	Bubbler
M-31 Test 2	29-Feb-92	0.0	Bubbler
M-38 Test 2	06-Mar-92	0.0	Bubbler
M-39	21-Mar-92	0.0	Bubbler
M-40 Test 1	29-Feb-92	0.0	Bubbler
M-40 Test 2	29-Feb-92	0.0	Bubbler
M-42	29-Feb-92	16.9	112391/2
M-43	29-Feb-92	17.0	112391/2
M-44	29-Feb-92	0.0	Bubbler
M-45	18-Apr-92	0.0	Bubbler
M-46 Test 1	18-Mar-92	0.0	Bubbler
M-46 Test 2	18-Mar-92	0.0	Bubbler
M-47 Test 1	18-Mar-92	0.0	Bubbler
M-47 Test 2	18-Mar-92	0.0	Bubbler
M-48 Test 1	22-Apr-92	2800.0	A2
M-48 Test 2	04-Mar-92	0.0	Bubbler
M-50 Test 2	05-Mar-92	0.0	Bubbler
M-51 Test 2	04-Mar-92	0.0	Bubbler
M-52 Test 2	05-Mar-92	0.0	Bubbler
M-53	21-Mar-92	0.0	Bubbler
M-57 Test 1	29-Feb-92	16.9	112391/14
M-57 Test 2	02-Mar-92	0.0	Bubbler
M-58 Test 1	29-Feb-92	16.9	112391/14
M-58 Test 2	02-Mar-92	0.0	Bubbler

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table IX

AS LEFT
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001, IC-ST-CONT-3002, and IC-ST-AE-3003

<u>Penetration</u>	<u>Date</u>	<u>Leak Rate</u>	<u>Instrument</u>
M-69	02-Mar-92	0.0	Bubbler
M-73	27-Mar-92	0.0	Bubbler
M-74	21-Apr-92	0.0	Bubbler
M-79	21-Apr-92	0.0	Bubbler
M-80	25-Mar-92	0.0	Bubbler
M-87	24-Apr-92	0.0	Bubbler
M-88	24-Apr-92	3000.0	A2
IA-3092	02-Feb-92	0.0	Bubbler
IA-3093	02-Feb-92	0.0	Bubbler
IA-3094	02-Feb-92	0.0	Bubbler
<u>Type C Sub Total</u>		<u>5935.0</u>	

1992 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table X

AS LEFT
TYPE B & TYPE C
ACCEPTANCE EVALUATION

Type C Sub Total	5,935.0
Type B Sub Total	<u>4,956.4</u>
Total Type B & C MXPLR	<u>10,891.4</u>
Acceptance Criterion ($< 0.6 L_a$)	$< 62,951.0$
L_a	$= 104,918.3$

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

SUMMARY

Local leakage rate tests were performed on the reactor containment building penetrations as part of the 1993 refueling outage. These tests were conducted in accordance with Fort Calhoun Station Technical Specifications (Section 3.5) and 10 CFR Part 50, Appendix J. The testing is performed to identify, measure, and if required, initiate maintenance on potential reactor containment leakage pathways. The maximum containment leakage rate according to Technical Specification 3.5, L_a , equals 0.1% wt per day or 104,918 sccm. For the maximum pathway leakage rate (MXPLR) determined from the Type B and Type C local leakage rate test (LLRT) results shall be less than or equal to 0.6 L_a , or 62,951 sccm.

The as-found total maximum pathway leakage rate (MXPLR) was 19,013.3 sccm. Excessive leakage rates were observed on Penetrations M-20, M-25, M-48, and the PAL. Analyses of the significant leakage rates and corrective actions are included in the respective sections of this report. The individual leakage rates for each penetration are tabulated in Table I through Table X. A summary of the As Found test results is given in Table VII, and a summary of the as-left test results is given in Table X. All of the tables are attached. The as-left MXPLR is 11,073.7 sccm.

TYPE B Tests

The Type B tests are conducted as part of the Fort Calhoun Station surveillance test program. These tests measure the leakage through the containment mechanical and electrical penetration seals, and containment building resilient sealed penetrations. The tests are conducted by pressurizing the local containment penetration boundaries with air for the mechanical penetrations and nitrogen for the electrical penetrations to a test pressure of 60 psig as specified in Technical Specification 3.5(2).

The make-up flow rate required to maintain the test volume at 60 psig is measured and assumed to be the local containment leakage rate. The local leakage rate measurement system uses calibrated rotameters and a bubbler in parallel to determine the leakage rate. All tests by which the following leakage rate data were obtained are filed at the Fort Calhoun Station in accordance with Technical Specification 5.10.1.d.

- a. The Personnel Air Lock (PAL) seals are tested daily under OP-ST-AE-0001 whenever the PAL is opened with containment integrity being required. The PAL is also tested once each six months and after each cold shutdown, under IC-ST-AE-0001. During the 1993 outage the PAL handwheel and interlock shaft seals were replaced under ECN93-237. The Teflon packing was replaced with brass cartridge/O-ring assemblies. Prior to shutting down for the outage, the Outer PAL Door's packing assemblies were replaced. As-found and as-left Type B LLRTs were performed before and after replacing the Outer Pal Door's packing assemblies. These results are tabulated in Table I and contribute to the Type B and Type C total leakage rate. The results recorded in Table I indicate the trend of increasing leakage rate for the PAL was fixed by replacing the packing.

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

- b. The equipment hatch is leakage rate tested each refueling outage under surveillance test IC-ST-AE-0002. Tests are performed prior to its initial removal and following each replacement. The results are tabulated in Table III.
- c. The fuel transfer tube is leakage rate tested each refueling outage under surveillance test IC-ST-AE-0003. The results are tabulated in Table IV.
- d. The electrical penetrations are leakage rate tested under surveillance test IC-ST-AE-0004. The As Found results are tabulated in Table V and the As Left results are tabulated in Table VIII.
- e. The mechanical penetrations are leakage rate tested under surveillance test IC-ST-AE-0005. The As Found results are tabulated in Table V and the As Left results are tabulated in Table VIII.

TYPE C Tests

Surveillance test procedures IC-ST-CONT-3001, IC-ST-CONT-3002, and IC-ST-AE-3003 were separated into 37 penetration specific procedures. Type C LLRTs were performed on the containment isolation valves in accordance with these 37 Type C procedures using air as the test medium. The As Found results are tabulated in Table VI and the As Left results are tabulated in Table IX. The as-found LLRTs on penetrations M-20, M-25, and M-48 exceeded their respective AMSE Section XI Maximum Leakage Rate. The as found LLRT on penetration M-48 exceeded its AMSE Section XI Evaluation Level Leakage Rate, and due to poor replacement parts a leakage rate greater than the AMSE Section XI Maximum Leakage Rate was accepted to enable unit startup.

M-20 The as-found LLRT M-20 Test #1 of HCV-500B yielded a test result of 0.0 sccm as verified by use of the bubbler. However, on M-20 Test #2 on HCV-500A a leakage rate of 4000 sccm was measured. This is greater than the AMSE Section XI Maximum Leakage Rate of 1200 sccm. The diaphragms of HCV-500A and HCV-500B were replaced under PMO 9302240. Both retests yielded a result of 0.0 sccm.

M-25 The as-found LLRT M-25 Test #1 of HCV-508A yielded a test result of 0.0 sccm as verified by use of the bubbler. However, on M-20 Test #2 on HCV-508B a leakage rate of 5000 sccm was measured. This is greater than the AMSE Section XI Maximum Leakage Rate of 200 sccm. The diaphragms of HCV-508A and HCV-508B were replaced under PMO 9302243. Both retests yielded a result of 0.0 sccm.

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

M-48 The as-found LLRT M-48 Test #2 of HCV-746B yielded a test result of 2500 sccm which is greater than AMSE Section XI Maximum Leakage Rate of 600 sccm. This was expected since this valve was accepted last outage with an as-left leakage rate of 2800 sccm. HCV-746B was rebuilt under MWO 922480. After the valve internals were replaced, the valve retested at 3150 sccm. This is greater than the AMSE Section XI Maximum Leakage Rate. This result was accepted under QP31-93-042 to enable unit startup. HCV-746A & B are Fisher Controls Design A Control Valves which, according to Fisher, were not designed to be leak tight. Therefore, Modification Request FC-93-022 was written to replace HCV-746A & B with valves which were designed to be leak tight.

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

M-48 The as-found LLRT M-48 Test #2 of HCV-746B yielded a test result of 2500 sccm which is greater than AMSE Section XI Maximum Leakage Rate of 600 sccm. This was expected since this valve was accepted last outage with an as-left leakage rate of 2800 sccm. HCV-746B was rebuilt under MWO 922480. After the valve internals were replaced the valve retested at 3150 sccm. This is greater than the AMSE Section XI Maximum Leakage Rate. This result was accepted under QP31-93-042 to enable unit startup. HCV-746A & B are Fisher Controls Design A Control Valves which, according to Fisher, were not designed to be leak tight. Therefore, Modification Request FC-93-022 was written to replace HCV-746A & B with valves which were designed to be leak tight.

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table I

TYPE B TESTS

Personnel Air Lock Leakage Rate Test
IC-ST-AE-0001

<u>Test Date</u>	<u>Leakage Rate</u>
05/09/92	4,500
07/28/92	4,000
09/10/92	3,700
04/24/93	5,000
09/14/93	4,300
09/15/93	0.0
11/15/93	0.0
12/02/93	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table II

TYPE B TESTS

Inner PAL Door Equalizing Valve Leakage Rate Test
IC-ST-AE-0006

<u>Test Date</u>	<u>Leakage Rate</u>
05/07/92	0.0
07/27/92	0.0
09/08/92	0.0
03/11/93	0.0
09/13/93	0.0
11/14/93	0.0
12/02/93	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table III

TYPE B TESTS

Equipment Hatch "O Ring Seal" Test
IC-ST-AE-0002

<u>Test Date</u>	<u>Leakage Rate</u>
09/26/93	16.9
10/01/93	15.1
10/24/93	0.0
10/30/93	0.0
11/09/93	0.0
11/15/93	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table IV

TYPE B TESTS

Fuel Transfer Tube Leakage Rate Test
IC-ST-AE-0003

<u>Test Date</u>	<u>Leakage Rate</u>
10/02/93	14.9
11/06/93	16.9

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Electrical Penetration Leakage Rate Tests
IC-ST-AE-0004

Penetration	Date	Instrument Used	MXPLR
A-1	18-Oct-93	50107 Bubbler	0.0
A-2	04-Oct-93	50107 Bubbler	0.0
A-4	24-Aug-93	50107 Bubbler	0.0
A-5	24-Aug-93	50107 Bubbler	0.0
A-6	28-Sep-93	50107 Bubbler	0.0
A-7	28-Sep-93	50107 Bubbler	0.0
A-8	28-Sep-93	50107 Bubbler	0.0
A-9	28-Sep-93	50107 Bubbler	0.0
A-10	24-Aug-93	50107 Bubbler	0.0
A-11	24-Aug-93	50107 Bubbler	0.0
B-1	18-Oct-93	50107 Bubbler	0.0
B-2	24-Aug-93	50107 Bubbler	0.0
B-4	24-Aug-93	50107 Bubbler	0.0
B-5	24-Aug-93	50107 Bubbler	0.0
B-6	28-Sep-93	50107 Bubbler	0.0
B-7	28-Sep-93	50107 Bubbler	0.0
B-8	28-Sep-93	50107 Bubbler	0.0
B-9	28-Sep-93	50107 Bubbler	0.0
B-10	24-Aug-93	50107 Bubbler	0.0
B-11	24-Aug-93	50107 Bubbler	0.0
C-1	23-Aug-93	50107 Bubbler	0.0
C-2	23-Aug-93	50107 Bubbler	0.0
C-4	23-Aug-93	50107 F3	600.0
C-5	23-Aug-93	50107 Bubbler	0.0
C-6	12-Oct-93	50107 Bubbler	0.0
C-7	26-Sep-93	50107 Bubbler	0.0
C-8	23-Aug-93	50107 Bubbler	0.0
C-9	23-Aug-93	50107 Bubbler	0.0
C-10	23-Aug-93	50107 Bubbler	0.0
C-11	24-Aug-93	50107 Bubbler	0.0
D-1	15-Oct-93	50107 Bubbler	0.0
D-2	04-Oct-93	50107 Bubbler	0.0
D-4	23-Aug-93	50107 Bubbler	0.0
D-5	23-Aug-93	50107 Bubbler	0.0
D-6	28-Sep-93	50107 Bubbler	0.0
D-7	23-Sep-93	50107 Bubbler	0.0
D-8	23-Aug-93	50107 Bubbler	0.0
D-9	23-Aug-93	50107 Bubbler	0.0
D-10	24-Aug-93	50107 Bubbler	0.0
D-11	28-Sep-93	50107 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
 TYPE B TESTS

Penetration	Date	Instrument Used	MXPLR
E-1	30-Sep-93	50107 Bubbler	0.0
E-2	20-Aug-93	50107 Bubbler	0.0
E-4	23-Aug-93	50107 Bubbler	0.0
E-5	23-Aug-93	50107 Bubbler	0.0
E-6	23-Aug-93	50107 Bubbler	0.0
E-7	23-Aug-93	50107 Bubbler	0.0
E-8	23-Aug-93	50107 Bubbler	0.0
E-9	23-Aug-93	50107 Bubbler	0.0
E-10	23-Aug-93	50107 Bubbler	0.0
E-11	23-Aug-93	50107 Bubbler	0.0
F-1	20-Aug-93	50107 Bubbler	0.0
F-2	20-Aug-93	50107 Bubbler	0.0
F-4	20-Aug-93	50107 Bubbler	0.0
F-5	20-Aug-93	50107 Bubbler	0.0
F-6	20-Aug-93	50107 Bubbler	0.0
F-7	23-Aug-93	50107 Bubbler	0.0
F-8	23-Aug-93	50107 Bubbler	0.0
F-9	23-Aug-93	50107 Bubbler	0.0
F-10	23-Aug-93	50107 Bubbler	0.0
F-11	23-Aug-93	50107 Bubbler	0.0
G-1	30-Sep-93	50104 F1	16.8
G-2	30-Sep-93	50104 Bubbler	0.0
G-3	17-Oct-93	50104 Bubbler	0.0
G-4	17-Oct-93	50104 Bubbler	0.0
H-1	30-Sep-93	50104 Bubbler	0.0
H-2	30-Sep-93	50104 Bubbler	0.0
H-3	17-Oct-93	50104 Bubbler	0.0
H-4	17-Oct-93	50104 Bubbler	0.0
E-HCV-383-3A	29-Sep-93	50108 F1	15.6
E-HCV-383-3B	29-Sep-93	50108 Bubbler	0.0
E-HCV-383-4A	29-Sep-93	50108 Bubbler	0.0
E-HCV-383-4B	29-Sep-93	50108 F1	15.6

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

Penetration	Date	Instrument Used	MXPLR
M-HCV-383-3	27-Sep-93	50104 Bubbler	0.0
M-HCV-383-4	27-Sep-93	50104 Bubbler	0.0
M-1	27-Sep-93	50101 F1	68.0
M-2	01-Oct-93	50101 F1	20.6
M-3	01-Oct-93	50101 F1	48.0
M-4	01-Oct-93	50101 Bubbler	0.0
M-5	27-Sep-93	50101 F1	83.0
M-6	01-Oct-93	50101 F1	48.0
M-7	24-Sep-93	50101 F1	20.6
M-8	23-Sep-93	50108 Bubbler	0.0
M-9	17-Sep-93	50108 Bubbler	0.0
M-10	17-Sep-93	50108 Bubbler	0.0
M-11	23-Sep-93	50108 F1	15.6
M-12	23-Sep-93	50108 Bubbler	0.0
M-13	01-Oct-93	50101 Bubbler	0.0
M-14	23-Sep-93	50108 Bubbler	0.0
M-15	23-Sep-93	50108 Bubbler	0.0
M-16	27-Sep-93	50101 F1	47.0
M-17	01-Oct-93	50101 Bubbler	0.0
M-18	23-Sep-93	50108 Bubbler	0.0
M-19	23-Sep-93	50108 F1	15.6
M-20	17-Sep-93	50108 Bubbler	0.0
M-21	17-Sep-93	50108 Bubbler	0.0
M-22	23-Sep-93	50108 F1	15.6
M-23	23-Sep-93	50108 Bubbler	0.0
M-24	23-Sep-93	50108 Bubbler	0.0
M-25	23-Sep-93	50108 Bubbler	0.0
M-26	23-Sep-93	50108 Bubbler	0.0
M-27	11-Aug-93	50108 Bubbler	0.0
M-28	11-Aug-93	50108 Bubbler	0.0
M-29	11-Aug-93	50108 Bubbler	0.0
M-30	05-Aug-93	50108 Bubbler	0.0
M-31	11-Aug-93	50108 Bubbler	0.0
M-32	11-Aug-93	50108 Bubbler	0.0
M-33	13-Aug-93	50102 Bubbler	0.0
M-34	13-Aug-93	50102 Bubbler	0.0
M-35	13-Aug-93	50102 Bubbler	0.0
M-36	15-Sep-93	50110 Bubbler	0.0
M-37	15-Sep-93	50110 Bubbler	0.0
M-38	15-Sep-93	50110 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Penetration	Date	Instrument Used	MXPLR
M-39	15-Sep-93	50110 Bubbler	0.0
M-40	15-Sep-93	50110 Bubbler	0.0
M-41	13-Aug-93	50102 Bubbler	0.0
M-42	15-Sep-93	50110 Bubbler	0.0
M-43	13-Aug-93	50102 Bubbler	0.0
M-44	13-Aug-93	50102 Bubbler	0.0
M-45	13-Aug-93	50108 Bubbler	0.0
M-46	13-Aug-93	50108 Bubbler	0.0
M-47	13-Aug-93	50108 Bubbler	0.0
M-48	13-Aug-93	50108 F1	23.0
M-49	13-Aug-93	50108 Bubbler	0.0
M-50	16-Sep-93	50110 Bubbler	0.0
M-51	16-Sep-93	50110 Bubbler	0.0
M-52	16-Sep-93	50110 Bubbler	0.0
M-53	15-Sep-93	50110 Bubbler	0.0
M-54	15-Sep-93	50110 Bubbler	0.0
M-55	15-Sep-93	50110 Bubbler	0.0
M-56	15-Sep-93	50110 Bubbler	0.0
M-57	13-Aug-93	50102 Bubbler	0.0
M-58	13-Aug-93	50102 Bubbler	0.0
M-59	13-Aug-93	50108 F1	216.0
M-60	13-Aug-93	50108 Bubbler	0.0
M-61	13-Aug-93	50108 Bubbler	0.0
M-62	13-Aug-93	50108 Bubbler	0.0
M-63	13-Aug-93	50108 Bubbler	0.0
M-64	16-Sep-93	50110 Bubbler	0.0
M-65	16-Sep-93	50110 Bubbler	0.0
M-66	16-Sep-93	50110 Bubbler	0.0
M-67	02-Sep-93	50102 Bubbler	0.0
M-68	16-Sep-93	50110 Bubbler	0.0
M-69	16-Sep-93	50110 Bubbler	0.0
M-70	16-Sep-93	50110 Bubbler	0.0
M-71	16-Sep-93	50110 Bubbler	0.0
M-72	16-Sep-93	50110 Bubbler	0.0
M-73	24-Sep-93	50108 Bubbler	0.0
M-74	19-Aug-93	50103 Bubbler	0.0
M-75	19-Aug-93	50103 Bubbler	0.0
M-76	19-Aug-93	50103 Bubbler	0.0
M-77	19-Aug-93	50103 Bubbler	0.0
M-78	19-Aug-93	50103 Bubbler	0.0
M-79	24-Sep-93	50110 Bubbler	0.0
M-80	06-Aug-93	50108 Bubbler	0.0
M-81	19-Aug-93	50103 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table V

AS FOUND
TYPE B TESTS

Penetration	Date	Instrument Used	MKPLR
M-82	19-Aug-93	50103 Bubbler	0.0
M-83	19-Aug-93	50103 Bubbler	0.0
M-84	19-Aug-93	50103 Bubbler	0.0
M-85	19-Aug-93	50103 F1	17.0
M-86	19-Aug-93	50103 Bubbler	0.0
M-87	21-Sep-93	50108 Bubbler	0.0
M-88	21-Sep-93	50108 Bubbler	0.0
M-89	26-Aug-93	50103 Bubbler	0.0
M-90	24-Sep-93	50108 Bubbler	0.0
M-91	29-Sep-93	50104 Bubbler	0.0
M-92	24-Sep-93	50104 Bubbler	0.0
M-93	29-Sep-93	50104 Bubbler	0.0
M-94	29-Sep-93	50104 Bubbler	0.0
M-95	29-Sep-93	50104 Bubbler	0.0
M-96	28-Sep-93	50104 Bubbler	0.0
M-97	28-Sep-93	50104 Bubbler	0.0
M-98	24-Sep-93	50104 Bubbler	0.0
M-99	24-Sep-93	50104 Bubbler	0.0
Fuel Tube	02-Oct-93	50110 F1	14.9
Eq Hatch	29-Sep-93	50105 Bubbler	0.0
PAL	14-Sep-93	50108 F3	4300.0
Eq Valve	14-Sep-93	50108 Bubbler	0.0
<u>Type B Sub Total</u>			<u>5600.9</u>

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VI

AS FOUND
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001

Penetration	Date	Leak Rate sccm	Instrument Used	MXPLR
M-HCV-383-3	16-Oct-93	0.0	50105 Bubbler	0.0
M-HCV-383-4	16-Oct-93	0.0	50105 Bubbler	0.0
M-2	09-Oct-93	0.0	50101 Bubbler	0.0
M-7	22-Oct-93	120.0	50108 F1	120.0
M-8 Test 1	22-Oct-93	0.0	50110 Bubbler	0.0
M-8 Test 2	22-Oct-93	0.0	50110 Bubbler	0.0
M-11	20-Oct-93	0.0	50108 Bubbler	0.0
M-14 Test 1	13-Oct-93	17.5	50108 F1	17.5
M-14 Test 2	13-Oct-93	17.5	50108 F1	---
M-15	20-Oct-93	47.0	50108 F1	47.0
M-18	23-Oct-93	0.0	50108 Bubbler	0.0
M-19	23-Oct-93	0.0	50108 Bubbler	0.0
M-20 Test 1	22-Oct-93	0.0	50110 Bubbler	---
M-20 Test 2	22-Oct-93	4000.0	50110 F3	4000.0
M-22	22-Oct-93	0.0	50108 Bubbler	0.0
M-24 Test 1	06-Oct-93	0.0	50101 Bubbler	0.0
M-24 Test 2	06-Oct-93	0.0	50101 Bubbler	0.0
M-25 Test 1	19-Oct-93	0.0	50105 Bubbler	---
M-25 Test 2	19-Oct-93	5000.0	50101 F3	5000.0
M-30	30-Sep-93	85.0	50102 F1	85.0
M-31 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-31 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-38 Test 2	01-Oct-93	0.0	50110 Bubbler	0.0
M-39	22-Oct-93	0.0	50104 Bubbler	0.0
M-40 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-40 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-42	04-Oct-93	0.0	50102 Bubbler	0.0
M-43	04-Oct-93	21.0	50102 F1	21.0
M-44	22-Oct-93	0.0	50102 Bubbler	0.0
M-45	06-Oct-93	20.0	50108 F1	20.0
M-46 Test 1	14-Oct-93	0.0	50110 Bubbler	0.0
M-46 Test 2	14-Oct-93	0.0	50110 Bubbler	---
M-47 Test 1	14-Oct-93	0.0	50110 Bubbler	0.0
M-47 Test 2	14-Oct-93	0.0	50110 Bubbler	---
M-48 Test 1	05-Oct-93	0.0	50110 Bubbler	---
M-48 Test 2	05-Oct-93	2500.0	50110 F3	2500.0
M-50 Test 2	01-Oct-93	0.0	50110 Bubbler	0.0
M-51 Test 2	01-Oct-93	15.1	50110 F1	15.1
M-52 Test 2	02-Oct-93	0.0	50110 Bubbler	0.0
M-53	22-Oct-93	0.0	50104 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VI

AS FOUND
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001

Penetration	Date	Leak Rate sccm	Instrument Used	MXPLR
M-57 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-57 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-58 Test 1	30-Sep-93	25.0	50110 F1	25.0
M-58 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-69	30-Sep-93	0.0	50102 Bubbler	0.0
M-73 Test 1	15-Oct-93	0.0	50110 Bubbler	0.0
M-73 Test 2	15-Oct-93	0.0	50110 Bubbler	---
M-74	25-Sep-93	0.0	50103 Bubbler	0.0
M-79 Test 1	09-Nov-93	0.0	50103 Bubbler	0.0
M-79 Test 2	09-Nov-93	0.0	50103 Bubbler	---
M-80 Test 1	04-Oct-93	0.0	50103 Bubbler	---
M-80 Test 2	04-Oct-93	15.1	50103 F1	15.1
M-87	21-Sep-93	1500.0	50108 F3	1500.0
M-88	21-Sep-93	15.6	50108 F1	15.6
IA-3092	11-Oct-93	0.0	50105 Bubbler	0.0
IA-3093	11-Oct-93	0.0	50105 Bubbler	0.0
IA-3094	11-Oct-93	0.0	50105 Bubbler	0.0
Type C Sub Total				13,381.3

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VII

AS FOUND
TYPE B & TYPE C
ACCEPTANCE EVALUATION

	SCCM
Type C Sub Total	13,381.3
Type B Sub Total	<u>5,600.9</u>
Total Type B & C MXPLK	<u>18,982.2</u>
Acceptance Criterion ($< 0.6 L_a$)	$< 62,951.0$
L_a	$= 104,918.3$

1993 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Electrical Penetration Leakage Rate Tests
 IC-ST-AE-0004

Penetration	Date	Instrument Used	MXPLR
A-1	18-Oct-93	50107 Bubbler	0.0
A-2	04-Oct-93	50107 Bubbler	0.0
A-4	24-Aug-93	50107 Bubbler	0.0
A-5	24-Aug-93	50107 Bubbler	0.0
A-6	28-Sep-93	50107 Bubbler	0.0
A-7	28-Sep-93	50107 Bubbler	0.0
A-8	02-Nov-93	50107 Bubbler	0.0
A-9	28-Sep-93	50107 Bubbler	0.0
A-10	24-Aug-93	50107 Bubbler	0.0
A-11	14-Oct-93	50107 Bubbler	0.0
B-1	18-Oct-93	50107 Bubbler	0.0
B-2	24-Aug-93	50107 Bubbler	0.0
B-4	24-Aug-93	50107 Bubbler	0.0
B-5	24-Aug-93	50107 Bubbler	0.0
B-6	28-Sep-93	50107 Bubbler	0.0
B-7	28-Sep-93	50107 Bubbler	0.0
B-8	28-Sep-93	50107 Bubbler	0.0
B-9	28-Sep-93	50107 Bubbler	0.0
B-10	24-Aug-93	50107 Bubbler	0.0
B-11	24-Aug-93	50107 Bubbler	0.0
C-1	23-Aug-93	50107 Bubbler	0.0
C-2	23-Aug-93	50107 Bubbler	0.0
C-4	02-Nov-93	50107 Bubbler	0.0
C-5	23-Aug-93	50107 Bubbler	0.0
C-6	12-Oct-93	50107 Bubbler	0.0
C-7	26-Sep-93	50107 Bubbler	0.0
C-8	23-Aug-93	50107 Bubbler	0.0
C-9	23-Aug-93	50107 Bubbler	0.0
C-10	23-Aug-93	50107 Bubbler	0.0
C-11	24-Aug-93	50107 Bubbler	0.0
D-1	15-Oct-93	50107 Bubbler	0.0
D-2	04-Oct-93	50107 Bubbler	0.0
D-4	23-Aug-93	50107 Bubbler	0.0
D-5	23-Aug-93	50107 Bubbler	0.0
D-6	28-Sep-93	50107 Bubbler	0.0
D-7	26-Oct-93	50107 Bubbler	0.0
D-8	23-Aug-93	50107 Bubbler	0.0
D-9	23-Aug-93	50107 Bubbler	0.0
D-10	24-Aug-93	50107 Bubbler	0.0
D-11	28-Sep-93	50107 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
 TYPE B TESTS

Electrical Penetration Leakage Rate Tests
 IC-ST-AE-0004

Penetration	Date	Instrument Used	MXPLR
E-1	30-Sep-93	50107 Bubbler	0.0
E-2	20-Aug-93	50107 Bubbler	0.0
E-4	23-Aug-93	50107 Bubbler	0.0
E-5	23-Aug-93	50107 Bubbler	0.0
E-6	23-Aug-93	50107 Bubbler	0.0
E-7	23-Aug-93	50107 Bubbler	0.0
E-8	23-Aug-93	50107 Bubbler	0.0
E-9	23-Aug-93	50107 Bubbler	0.0
E-10	23-Aug-93	50107 Bubbler	0.0
E-11	02-Nov-93	50107 Bubbler	0.0
F-1	20-Aug-93	50107 Bubbler	0.0
F-2	20-Aug-93	50107 Bubbler	0.0
F-4	20-Aug-93	50107 Bubbler	0.0
F-5	20-Aug-93	50107 Bubbler	0.0
F-6	20-Aug-93	50107 Bubbler	0.0
F-7	23-Aug-93	50107 Bubbler	0.0
F-8	23-Aug-93	50107 Bubbler	0.0
F-9	23-Aug-93	50107 Bubbler	0.0
F-10	23-Aug-93	50107 Bubbler	0.0
F-11	23-Aug-93	50107 Bubbler	0.0
G-1	30-Sep-93	50104 F1	16.8
G-2	30-Sep-93	50104 Bubbler	0.0
G-3	17-Oct-93	50104 Bubbler	0.0
G-4	17-Oct-93	50104 Bubbler	0.0
H-1	30-Sep-93	50104 Bubbler	0.0
H-2	30-Sep-93	50104 Bubbler	0.0
H-3	17-Oct-93	50104 Bubbler	0.0
H-4	17-Oct-93	50104 Bubbler	0.0
E-HCV-383-3A	24-Oct-93	50108 Bubbler	0.0
E-HCV-383-3B	24-Oct-93	50108 Bubbler	0.0
E-HCV-383-4A	24-Oct-93	50108 Bubbler	0.0
E-HCV-383-4B	24-Oct-93	50108 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

Penetration	Date	Instrument Used	MKPLR
M-HCV-383-3	27-Sep-93	50104 Bubbler	0.0
M-HCV-383-4	15-Nov-93	50104 F3	1500.0
M-1	27-Sep-93	50101 F1	68.0
M-2	01-Oct-93	50101 F1	20.6
M-3	01-Oct-93	50101 F1	48.0
M-4	01-Oct-93	50101 Bubbler	0.0
M-5	27-Sep-93	50101 F1	83.0
M-6	01-Oct-93	50101 F1	48.0
M-7	24-Sep-93	50101 F1	20.6
M-8	23-Sep-93	50108 Bubbler	0.0
M-9	17-Sep-93	50108 Bubbler	0.0
M-10	17-Sep-93	50108 Bubbler	0.0
M-11	23-Sep-93	50108 F1	15.6
M-12	23-Sep-93	50108 Bubbler	0.0
M-13	01-Oct-93	50101 Bubbler	0.0
M-14	23-Sep-93	50108 Bubbler	0.0
M-15	23-Sep-93	50108 Bubbler	0.0
M-16	27-Sep-93	50101 F1	47.0
M-17	01-Oct-93	50101 Bubbler	0.0
M-18	23-Sep-93	50108 Bubbler	0.0
M-19	23-Sep-93	50108 F1	15.6
M-20	17-Sep-93	50108 Bubbler	0.0
M-21	17-Sep-93	50108 Bubbler	0.0
M-22	23-Sep-93	50108 F1	15.6
M-23	23-Sep-93	50108 Bubbler	0.0
M-24	23-Sep-93	50108 Bubbler	0.0
M-25	23-Sep-93	50108 Bubbler	0.0
M-26	23-Sep-93	50108 Bubbler	0.0
M-27	11-Aug-93	50108 Bubbler	0.0
M-28	11-Aug-93	50108 Bubbler	0.0
M-29	11-Aug-93	50108 Bubbler	0.0
M-30	05-Aug-93	50108 Bubbler	0.0
M-31	11-Aug-93	50108 Bubbler	0.0
M-32	11-Aug-93	50108 Bubbler	0.0
M-33	13-Aug-93	50102 Bubbler	0.0
M-34	13-Aug-93	50102 Bubbler	0.0
M-35	13-Aug-93	50102 Bubbler	0.0
M-36	15-Sep-93	50110 Bubbler	0.0
M-37	15-Sep-93	50110 Bubbler	0.0
M-38	15-Sep-93	50110 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

Penetration	Date	Instrument Used	MXPLR
M-39	15-Sep-93	50110 Bubbler	0.0
M-40	15-Sep-93	50110 Bubbler	0.0
M-41	13-Aug-93	50102 Bubbler	0.0
M-42	15-Sep-93	50110 Bubbler	0.0
M-43	13-Aug-93	50102 Bubbler	0.0
M-44	13-Aug-93	50102 Bubbler	0.0
M-45	13-Aug-93	50108 Bubbler	0.0
M-46	13-Aug-93	50108 Bubbler	0.0
M-47	13-Aug-93	50108 Bubbler	0.0
M-48	13-Aug-93	50108 F1	23.0
M-49	13-Aug-93	50108 Bubbler	0.0
M-50	16-Sep-93	50110 Bubbler	0.0
M-51	16-Sep-93	50110 Bubbler	0.0
M-52	16-Sep-93	50110 Bubbler	0.0
M-53	15-Sep-93	50110 Bubbler	0.0
M-54	15-Sep-93	50110 Bubbler	0.0
M-55	15-Sep-93	50110 Bubbler	0.0
M-56	15-Sep-93	50110 Bubbler	0.0
M-57	13-Aug-93	50102 Bubbler	0.0
M-58	13-Aug-93	50102 Bubbler	0.0
M-59	13-Aug-93	50108 F1	216.0
M-60	13-Aug-93	50108 Bubbler	0.0
M-61	13-Aug-93	50108 Bubbler	0.0
M-62	13-Aug-93	50108 Bubbler	0.0
M-63	13-Aug-93	50108 Bubbler	0.0
M-64	16-Sep-93	50110 Bubbler	0.0
M-65	16-Sep-93	50110 Bubbler	0.0
M-66	16-Sep-93	50110 Bubbler	0.0
M-67	02-Sep-93	50102 Bubbler	0.0
M-68	16-Sep-93	50110 Bubbler	0.0
M-69	16-Sep-93	50110 Bubbler	0.0
M-70	16-Sep-93	50110 Bubbler	0.0
M-71	16-Sep-93	50110 Bubbler	0.0
M-72	14-Nov-93	50102 Bubbler	0.0
M-73	24-Sep-93	50108 Bubbler	0.0
M-74	19-Aug-93	50103 Bubbler	0.0
M-75	19-Aug-93	50103 Bubbler	0.0
M-76	19-Aug-93	50103 Bubbler	0.0
M-77	19-Aug-93	50103 Bubbler	0.0
M-78	19-Aug-93	50103 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table VIII

AS LEFT
TYPE B TESTS

Mechanical Penetration Seal Leakage Rate Tests
IC-ST-AE-0005

Penetration	Date	Instrument Used	MCPLR
M-79	24-Sep-93	50110 Bubbler	0.0
M-80	06-Aug-93	50108 Bubbler	0.0
M-81	19-Aug-93	50103 Bubbler	0.0
M-82	19-Aug-93	50103 Bubbler	0.0
M-83	19-Aug-93	50103 Bubbler	0.0
M-84	19-Aug-93	50103 Bubbler	0.0
M-85	19-Aug-93	50103 F1	17.0
M-86	19-Aug-93	50103 Bubbler	0.0
M-87	21-Sep-93	50108 Bubbler	0.0
M-88	21-Sep-93	50108 Bubbler	0.0
M-89	26-Aug-93	50103 Bubbler	0.0
M-90	24-Sep-93	50108 Bubbler	0.0
M-91	29-Sep-93	50104 Bubbler	0.0
M-92	24-Sep-93	50104 Bubbler	0.0
M-93	29-Sep-93	50104 Bubbler	0.0
M-94	29-Sep-93	50104 Bubbler	0.0
M-95	29-Sep-93	50104 Bubbler	0.0
M-96	28-Sep-93	50104 Bubbler	0.0
M-97	28-Sep-93	50104 Bubbler	0.0
M-98	24-Sep-93	50104 Bubbler	0.0
M-99	24-Sep-93	50104 Bubbler	0.0
Fuel Tube	06-Nov-93	50105 F1	16.9
Eq Hatch	15-Nov-93	50105 Bubbler	0.0
PAL	15-Nov-93	50108 Bubbler	0.0
Eq Valve	14-Nov-93	50108 Bubbler	0.0
Type B Sub Total			2171.7

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table IX

AS LEFT
TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
IC-ST-CONT-3001

Penetration	Date	Leak Rate sccm	Instrument Used	MXPLR
M-HCV-383-3	09-Nov-93	2900.0	50110 F3	2900.0
M-HCV-383-4	07-Nov-93	2500.0	50110 F3	2500.0
M-2	09-Oct-93	0.0	50101 Bubbler	0.0
M-7	22-Oct-93	120.0	50108 F1	120.0
M-8 Test 1	01-Nov-93	0.0	50110 Bubbler	0.0
M-8 Test 2	01-Nov-93	0.0	50110 Bubbler	---
M-11	20-Oct-93	0.0	50108 Bubbler	0.0
M-14 Test 1	13-Oct-93	17.5	50108 F1	17.5
M-14 Test 2	13-Oct-93	17.5	50108 F1	---
M-15	20-Oct-93	47.0	50108 F1	47.0
M-18	23-Oct-93	0.0	50108 Bubbler	0.0
M-19	23-Oct-93	0.0	50108 Bubbler	0.0
M-20 Test 1	03-Nov-93	0.0	50110 Bubbler	0.0
M-20 Test 2	03-Nov-93	0.0	50110 Bubbler	---
M-22	22-Oct-93	0.0	50108 Bubbler	0.0
M-24 Test 1	28-Oct-93	0.0	50101 Bubbler	0.0
M-24 Test 2	28-Oct-93	0.0	50101 Bubbler	---
M-25 Test 1	01-Nov-93	0.0	50104 Bubbler	0.0
M-25 Test 2	01-Nov-93	0.0	50104 Bubbler	---
M-30	30-Sep-93	85.0	50102 F1	85.0
M-31 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-31 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-38 Test 2	01-Oct-93	0.0	50110 Bubbler	0.0
M-39	22-Oct-93	0.0	50104 Bubbler	0.0
M-40 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-40 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-42	04-Oct-93	0.0	50102 Bubbler	0.0
M-43	04-Oct-93	21.0	50102 F1	21.0
M-44	22-Oct-93	0.0	50102 Bubbler	0.0
M-45	06-Oct-93	20.0	50108 F1	20.0
M-46 Test 1	14-Oct-93	0.0	50110 Bubbler	0.0
M-46 Test 2	14-Oct-93	0.0	50110 Bubbler	---
M-47 Test 1	14-Oct-93	0.0	50110 Bubbler	0.0
M-47 Test 2	14-Oct-93	0.0	50110 Bubbler	---
M-48 Test 1	04-Nov-93	0.0	50105 Bubbler	---
M-48 Test 2	04-Nov-93	3150.0	50105 F3	3150.0
M-50 Test 2	01-Oct-93	0.0	50110 Bubbler	0.0
M-51 Test 2	01-Oct-93	15.1	50110 F1	15.1
M-52 Test 2	02-Oct-93	0.0	50110 Bubbler	0.0
M-53	22-Oct-93	0.0	50104 Bubbler	0.0

1993 REFUELING OUTAGE TYPE B AND TYPE C
 LOCAL LEAKAGE RATE TEST REPORT

Table IX

AS LEFT
 TYPE C TESTS

Containment Isolation Valve Leakage Rate Tests
 IC-ST-CONT-3001

Penetration	Date	Leak Rate sccm	Instrument Used	MXPLR
M-57 Test 1	30-Sep-93	0.0	50110 Bubbler	0.0
M-57 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-58 Test 1	30-Sep-93	25.0	50110 F1	25.0
M-58 Test 2	30-Sep-93	0.0	50110 Bubbler	---
M-69	30-Sep-93	0.0	50102 Bubbler	0.0
M-73 Test 1	15-Oct-93	0.0	50110 Bubbler	0.0
M-73 Test 2	15-Oct-93	0.0	50110 Bubbler	---
M-74	11-Oct-93	0.0	50103 Bubbler	0.0
M-79 Test 1	09-Nov-93	0.0	50103 Bubbler	0.0
M-79 Test 2	09-Nov-93	0.0	50103 Bubbler	---
M-80 Test 1	04-Oct-93	0.0	50103 Bubbler	---
M-80 Test 2	04-Oct-93	15.1	50103 F1	15.1
M-87	16-Nov-93	0.0	50103 Bubbler	0.0
M-88	16-Nov-93	0.0	50103 Bubbler	0.0
IA-3092	11-Oct-93	0.0	50105 Bubbler	0.0
IA-3093	11-Oct-93	0.0	50105 Bubbler	0.0
IA-3094	11-Oct-93	0.0	50105 Bubbler	0.0
Type C Sub Total				8,895.7

1993 REFUELING OUTAGE TYPE B AND TYPE C
LOCAL LEAKAGE RATE TEST REPORT

Table X

AS LEFT
TYPE B & TYPE C
ACCEPTANCE EVALUATION

	SCCM
Type C Sub Total	8,895.7
Type B Sub Total	<u>2,171.7</u>
Total Type B & C MXPLR	<u>11,067.4</u>
Acceptance Criterion ($< 0.6 L_a$)	$< 62,951.0$
L_a	$= 104,918.3$