ALABAMA POWER COMPANY

J. M. FARLEY NUCLEAR PLANT
UNIT 1

SECOND PERIODIC
REACTOR CONTAINMENT BUILDING
INTEGRATED LEAKAGE RATE TEST

APRIL 1984

FINAL REPORT

BECHTEL POWER CORPORATION

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1.0 INTRODUCTION

The primary reactor containment building second periodic Integrated Leakage Rate Test (Type A) was performed to demonstrate that leakage through the primary containment and penetrations does not exceed the allowable leakage rate values as specified in the Farley Nuclear Plant (FNP) FSAR and FNP Unit 1 Technical Specifications.

This report describes how the periodic Integrated Leakage Rate Test (ILRT) at the Farley Nuclear Plant, Unit 1, was conducted in accordance with the requirements of the ILRT Procedure FNP-1-STP-117.0, revision 3, Appendix J to 10CFR50, ANSI N45.4-1972, Bechtel Topical Report BN-TOP-1, and ANSI/ANS 56.8-1981. The periodic ILRT was successfully completed on April 14, 1984. The test was conducted at peak pressure for a duration of 24 hours followed by a 4-hour verification test.

Acceptance criteria for ANSI/ANS 56.8-1981 "Containment System Leakage Testing Requirements" were met for a 24-hour ILRT. Calculations were performed using the ANSI/ANS 56.8-1981 "Mass Point Analysis Method." The test results are reported in accordance with the requirements of ANSI/ANS 56.8-1981, Section 5.8 and 10CFR50, Appendix J. Section V.B.3.

Calculations were performed also in accordance with NRC approved Bechtel Topical Report BN-TOP-1 and the results were calculated per ANSI N45.4-1972 using the "Total Time Analysis Technique." For purposes of evaluating test results, the Total Time Analysis method should be considered more conservative than the Mass Point Analysis method.

2.0 TEST SYNOPSIS

The primary containment building Integrated Leakage Rate Test (ILRT) was successfully completed meeting all acceptance criteria set forth in the governing documents listed in Section 1.0. The test results are reported in accordance with the requirements of 10CFR50, Appendix J, Section V.B.3. Containment inspection required by 10CFR50, Appendix J, Section III.A.1(a) and V.A. was conducted before the ILRT. Since no evidence of degradation was found, the Type A test was conducted. The Containment Inspection Report is on file at FNP as a part of the official test copy of the procedure.

The calculated leakage rate, using the Mass Point Analysis technique, was 0.086 wt% per day, with a 95% upper confidence limit (UCL) of 0.087 wt% per day. The acceptance criterion, 75% of La, is 0.1125 wt% per day. And the Total Time Analysis technique was 0.082 wt% per day with a 95% UCL of 0.085 wt% per day.

Following completion of the ILRT, a successful 4-hour verification test was performed. The Mass Point calculated leakage rate was 0.214 wt% per day with a lower acceptance limit of 0.197 wt% per day and upper acceptance limit of 0.272 wt% per day. The Total Time calculated leakage rate was 0.193 wt% with a lower acceptance limit of 0.193 wt% per day and upper acceptance limit of 0.268 wt% per day.

Pressurization for ILRT started on April 12, 1984 at 0410 with a pressurization rate of approximately 4.8 psig per hour. The peak test pressure Pa of 48 (+3, -0) psig was reached at 1615 on April 12, 1984. All containment fans were turned off and secured for the temperature stabilization. Stabilization criteria were satisfied after 4 hours of stabilization. The ILRT began at 2200 on April 12, 1984. After 9 hours of test duration, the acceptance criteria were satisfied per ILRT procedure FNP-1-STP-117.0, Revision 3. The Total Time calculated leakage rate was 0.090 wt% per day, and the 95% UCL was 0.110 wt % per day. The Mass Point calculated leakage rate was 0.093 wt % per day and the 95% UCL was 0.096 wt% per day. The ILRT was continued until 2200 hours on April 13, 1984 with a Mass Point calculated leakage rate of 0.086 wt% per day, and a UCL of 0.087 wt% per day and a Total Time calculated leakage rate of 0.082 wt% per day, and a UCL of 0.085 wt% per day. Following the ILRT a 4-hour verification test was conducted and completed at 0215 on April 14, 1984.

The Local Leakage Rate Tests (Type B & C tests) were completed prior to the ILRT. The total of the local leakage rates is below the 0.6 La allowable limit, and the summary of the LLRT results are included in Appendix H.

3.0 TEST DATA SUMMARY

A. Plant Information

Owner	Alabama Power Company
Plant	Farley Nuclear Plant, Unit 1
Location	Ashford, Alabama
Containment Type	Post-tensioned Concrete PWR
Date Test Completed	April 14, 1984

B. Technical Data

1. Containment Net Free Air volume	2,000,000 cu. ft.
2. Design Pressure, Pd	54 psig
3. Containment ILRT Average Temperature Limits	40 - 120°F

C. Test Results - type A Test

1. Test Method	Absolute
2. Data Analysis Technique	Mass Point Leakage Rate per ANSI/ANS 56.8-1981 Total Time Leakage Rate per ANSI/N45.4-1972 and BN-TOP-1
3. Peak Test Pressure, Pa	48 (+3,-0) psig
4. Maximum Allowable Leakage Rate, La	0.15 wt% per day
5. 75% of La	0.1125 wt% per day

6. Integrated Leakage Rate Test Result

	Calculated Leakage Rate, wt%/day	
	Lam	At 95% UCL
Mass Point Analysis	0.086	0.087
Total Time Analysis	0.082	0.085

7. Imposed Verification Flow	9.1 scfm
8. Verification Test Imposed Leakage Rate, Li	0.149 wt%/day

9. Verification Test Results

	Leakage Rate, wt%/day
Mass Point Analysis	0.214
Total Time Analysis	0.193

10. Verification Test Limits

	Mass Point Analysis wt%/day	Total Time Analysis wt%/day
Upper Limit (Li + Lam + .25 La)	0.272	0.268
Lower Limit (Li + Lam - .25La)	0.197	0.193

D. LLRT Adjustments and Other Penalties:

a. Total Penalty to be added:

Pen. 61A	Pressure Sensing Line	30.00 sccm
Pen. 71	Pressurization Line	57.60 sccm
Pen. 72	Pressurization Line	31.50 sccm
	Total	119.0 sccm = 0.000303 wt% per day

Containment Sump Increased 149.6 Gal./32 hrs = 0.00075 wt%/day

Total Penalty: 0.001 wt% per day

b. ILRT Results Corrected by Adding 0.001 wt% per day

	Leakage Rate, wt%/day Ltm	At 95% UCL
Mass Point Analysis	0.087	0.088
Total Time Analysis	0.083	0.086

4.0 DISCUSSION

The pressurization system consisted of Atlas - Copco, diesel driven oil free air compressors, moisture separators and refrigerated air dryers. Pressurization rate was about 4.8 psig/hr.

All containment isolation valves were lined up in post-LOCA condition in accordance with the ILRT procedure. Since no repairs or adjustments were required to be made, no corrective actions were necessary.

When the containment was pressurized to 50 psig (test pressure equals 48, +3, -0 psig), the compressors were stopped. All containment fans were turned off and the service water supply to the containment coolers was isolated at the beginning of stabilization period. After stabilization was achieved a 24-hour ILRT was performed. The resulting leakage rates were within the allowable limits.

The successful periodic Type A and supplemental verification test were performed according to the requirements of the Farley Nuclar Plant Unit 1 Technical Specifications and 10CFR50, Appendix J. The Type A test method used is the absolute method described in ANSI/N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors and ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements." The leakage rate was calculated using formulas from the above ANSI Standards and BN-TOP-1, Rev 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants." Type A and verification test durations were performed in accordance with BN-TOP-1 criteria.

The test results are reported in accordance with the requirements of 10CFR50, Appendix J, Section V.

The containment leakage rate testing method applied is the Absolute Method as described in References 5 and 6. This is a direct application of the ideals gas l w: PV = WRT. Two data analysis techniques were used:

(1) The Mass Point Analysis Technique (Reference 5)

This technique calculates the containment air mass at each time interval. A straight line least-squares analysis is used, and the slope of the regression line represents the rate of change of air mass with respect to time, which corresponds to the leakage rate.

(2) The Total Time Analysis Technique (Reference 6)

This technique measures leakage rate based on the most recent data point and the data point taken at the start of the test. The overall calculated leakage rate is determined by applying linear regression analysis to all measured leakage rate data at the end of the test period.

Ninety-five percent upper confidence levels were calculated for leakage rate data as required by References 5 and 6. This is to ensure a 95% probability that the calculated leakage rate value is within the acceptance limits. All calculations were done with Bechtel's ILRT computer program described in Appendix A. The temperature, pressure, and containment air mass history are plotted by the computer program. The plots are in Appendix E.

The overall Instrumentation Selection Guide (ISG) value was calculated (see Appendix G) in accordance with ANSI/ANS 56.8-1981 based on above instrumentation and on a 24-hour test duration. The calculated ISG = 0.0023 wt% per day < 0.0375 wt% per day = 0.25 La. There was no instrument failure; therefore, post-ILRT ISG calculation was not required.

The ILRT data collection system consisted of drybulb and dewpoint temperature sensors, precision pressure gauges, and flow meters. All sensors were connected to the Data Acquisition System (DAS) for data acquisition scanning, collecting, and storing data in 15 minute intervals.

4.1 TEST SEQUENCE

Containment pressurization started on April 12, 1984 at 0410 with all compressors running. The test pressure was reached at 1615 the same day.

The Test Phases were as follows:

Test Phase	Time	Duration	Date
Pressurization	0410 - 1615	12:05 hrs	April 12
Stabilization	1630 - 2030	4:00 hrs	April 12
ILRT	2200 - 2200	24:00 hrs	April 12-13
Verification Test	2215 - 0215	4:00 hrs	April 13-14
Depressurization start - end	0215-1115	9:00 hrs	April 14

5.0 INSTRUMENTATION AND DATA ACQUISITION

The following instrumentation system was used:

Number Reqd.	Description	Data	
Absolute Pressure			
2	Precision Pressure Gauge Texas Instrument (TI) Model 145-02	Range: Accuracy: Sensitivity: Repeatability: Resolution: Calibr. Date:	0-100 psia +/-0.015 of reading 0.001 psia 0.0005% FS 0.001% FS 3/1/84
Drybulb Temperature			
18	Resistance Temperature Detectors, Platinum 100 ohm RTDs	Range: Accuracy: Sensitivity: Repeatability: Calibr. Date:	0-150°F +/-0.1°F 0.01°F 0.01°F 3/13/84
Dewpoint Temperature			
6	Dewpoint Detectors, Chilled Mirror EG&G Model 660-CI	Range: Accuracy: Sensitivity: Repeatability: Calibr. Date:	40-212°F +/-0.54°F 0.10°F 0.10°F 2/23/84
Flow Meters			
1	Brooks Rotameter Model 1110	Range: Accuracy: Calibr. Date:	0-10 scfm +/-1.0% FS 3/6/84

The Bechtel DAS was utilized for data acquisition. All instruments were directly connected to the computer. The data was acquired and printed from the DAS every 15 minutes. The computer used a direct data input from the DAS.

5.1 SENSOR LOCATIONS AND VOLUME FRACTIONS

RTD'S

Sensor No.	Elevation (ft)	Azimuth (Degree)	Distance From CTMT Center (ft)	Volume Fractions
TE-1	280	120	10	0.0586
TE-2	250	120	40	0.0586
TE-3	180	300	5	0.0586
TE-4	210	120	40	0.0586
TE-5	190	120	50	0.0586
TE-6	212	315	10	0.0586
TE-7	210	300	50	0.0586
TE-8	236	300	35	0.0586
TE-9	190	300	35	0.0586
TE-10	165	26	61	0.0563
TE-11	165	120	55	0.0563
TE-12	165	215	55	0.0563
TE-13	165	320	64	0.0563
TE-14	134	0	58	0.0637
TE-15	134	185	60	0.0637
TE-16	110	15	50	0.0400
TE-17	110	124	45	0.0400
TE-18	110	250	50	0.0400
				1.0000

DEWCELLS

ME-1	236	300	35	0.1758
ME-2	210	120	40	0.1758
ME-3	190	300	35	0.1758
ME-4	165	26	61	0.2252
ME-5	134	185	58	0.1274
ME-6	110	250	46	0.1200
				1.0000

6.0 REFERENCES

The following documents contain the test requirements and acceptance criteria for the ILRT:

1. Farley Nuclear Plant Unit 1 Technical Specifications 3/4.6.1.2

2. Farley Nuclear Plant Final Safety Analysis Report (FSAR)

3. 10CFR50, 50.54(0) and Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors."

4. Farley Nuclear Plant Procedure FNP-1-STP-117.0, Revision 3, "Containment Integrated Leakage Rate Test."

5. ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors" with guidance from ANSI/ANS 56.8-1981 - "Containment System Leakage Testing Requirements."

6. Bechtel Topical Report BN-TOP-1 Revision 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants."

APPENDIX A

Description of Bechtel ILRT Computer Program

APPENDIX A

DESCRIPTION OF BECHTEL ILRT COMPUTER PROGRAM

A. Program and Report Description

1. The Bechtel ILRT computer program is used to determine the integrated leakage rate of a nuclear primary containment structure. The program is used to compute leakage rate based on input values of time, free air volume, containment atmosphere total pressure, drybulb temperature, and dewpoint temperature (water vapor pressure). Leakage rate is computed using the Absolute Method as defined in ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements" and BN-TOP-1, Rev 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants". The program is designed to allow the user to evaluate containment leakage rate test results at the jobsite during containment leakage testing. Current leakage rate values may be obtained at any time during the testing period using one of two computational methods, yielding three different report printouts.

2. In the first printout, the Total Time Report, leakage rate is computed from initial values of free air volume, containment atmosphere drybulb temperature and partial pressure of dry air, the latest values of the same parameters, and elapsed time. These individually computed leakage rates are statistically averaged using linear regression by the method of least squares. The Total Time Method is the computational technique upon which the short duration test criteria of BN-TOP-1, Rev 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plant," are based.

3. The second printout is the Mass Point Report and is based on the Mass Point Analysis Technique described in ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements." The mass of dry air in the containment is computed at each data point (time) using the Equation of State, from current values of containment atmosphere drybulb temperature and partial pressure of dry air. Contained mass is "plotted" versus time and a regression line is fit to the data using the method of least squares. Leakage rate is determined from the statistically derived slope and intercept of the regression line.

4. The third printout, the Trend Report, is a summary of leakage rate values based on Total time and Mass Point computations presented as a function of number of data points and elapsed time (test duration). The Trend Report provides all leakage rate values required for comparision to the acceptance criteria of BN-TOP-1 for conduct of a short duration test.

5. The program generates a predictor report based on Reference 7. The "predictor" is an estimate of the upper bound on the change in mass point calculated leakage rate which will occur during the next four hours. The estimate is based on the mass point calculated leakage rates and 95% UCLs during the previous four hours.

6. The program is written in a high level language (FORTRAN) 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 paragraphs.

B. Explanation of Program

1. The Bechtel ILRT computer program is written, for use by experienced ILRT personnel, to determine containment integrated leakage rates based on the Absolute Method described in ANSI/ANS 56.8-1981 and BN-TOP-1.

2. Information loaded into the program prior to or at the start of the test:

   a. Number of containment atmosphere drybulb temperature sensors, dewpoint temperature (water vapor pressure) sensors and pressure gages to be used in leakage rate computations for the specific test

   b. Volume fractions assigned to each of the above sensors

   c. Calibration data for above sensors

   d. Test title

   e. Test pressure

   f. Maximum allowable leakage rate at test pressure

3. Data received from the data acquistion system during the test, and used to compute leakage rates:

   a. Time and date

   b. Containment atmosphere drybulb temperatures

   c. Containment atmosphere pressure(s)

   d. Containment atmosphere dewpoint temperatures

   e. Containment free air volume.

4. After all data at a given time are received , a Summary of Measured Data report (refer to "Program Logic," Paragraph D, "Data" option command) is printed.

5. If drybulb and dewpoint temperature sensors should fail during the test, the data from the sensor(s) are not used. The volume fractions for the remaining sensors are recomputed and reloaded into the program for use in ensuring leakage rate computations.

C. Leakage Rate Formulae

1. Computation Using the Total Time Method:

a. Measured leakage rate from data:

$$P_1 V_1 = W_1 R T_1 \quad (1)$$

$$P_i V_i = W_i R T_i \quad (2)$$

$$L_i = \frac{2400\,(W_1 - W_i)}{\Delta t_i\, W_1} \quad (3)$$

Solving for W_1 and W_i and substituting equations (1) and (2) into (3) yields:

$$L_i = \frac{2400}{\Delta t_i}\left(1 - \frac{T_1 P_i V_i}{T_i P_1 V_1}\right) \quad (4)$$

where

W_1, W_i = Weight of contained mass of dry air at times t_1 and t_i, respectively, lbm.

T_1, T_i = Containment atmosphere drybulb temperature at times t_1 and t_i, respectively, °R.

P_1, P_i = Partial pressure of the dry air component of the containment atmosphere at times t_1 and t_i, respectively, psia.

V_1, V_i = Containment free air volume at times t_1 and t_i, respectively (constant or variable during the test), ft^3.

t_1, t_i = Time at 1^{st} and i^{th} data points respectively, hr.

Δt_i = Elapsed time from t_1 to t_i, hr.

R = Specific gas constant for air = 53.35 ft.lbf/lbm.°R.

L_i = Measured leakage rate computed during time interval t_1 to t_i, wt.%/day.

To reduce truncation error, the computer program uses the following equivalent formulation:

$$L_i = \frac{-2400}{\Delta t_i}\left(\frac{\Delta W_i}{W_1}\right)$$

where

$$\frac{\Delta W_i}{W_1} = \frac{W_i - W_1}{W_1}$$

$$= \frac{\frac{\Delta P_i}{P_1} + \frac{\Delta V_i}{V_1} + \frac{\Delta P_i \Delta V_i}{P_i V_i} - \frac{\Delta T_i}{T_1}}{1 + \frac{\Delta T_i}{T_i}}$$

$$\Delta P_i = P_i - P_1$$
$$\Delta V_i = V_i - V_1$$
$$\Delta T_i = T_i - T_1$$

b. Calculated leakage rate from regression analysis:

$$\bar{L} = a + b \Delta t_N \quad (5)$$

where

$\bar{L}$ = Calculated leakage rate, wt.%/day, as determined from the regression line.

$$a = (\Sigma L_i - b \Sigma \Delta t_i)/N \quad (6)$$

$$b = \frac{N(\Sigma L_i \Delta t_i) - (\Sigma L_i)(\Sigma \Delta t_i)}{N(\Sigma \Delta t_i^2) - (\Sigma \Delta t_i)^2} \quad (7)$$

N = Number of data points

$$\Sigma = \sum_{i=1}^{N}$$

c. 95% upper confidence limit on the calculated leakage rate:

$$UCL = a + b \Delta t_N + S_{\bar{L}} \quad (8)$$

where

UCL = 95% upper confidence limit wt.%/day, at elapsed time Δt_N.

For $\Delta t_N < 24$

$$S_{\bar{L}} = t_{0.025;N-2} \left[(\Sigma L_i^2 - a\Sigma L_i - b\Sigma L_i \Delta t_i)/(N-2)\right]^{1/2} \times \left[1 + \frac{1}{N} + (\Delta t_N - \overline{\Delta t})^2 / (\Sigma \Delta t_i^2 - (\Sigma \Delta t_i)^2/N)\right]^{1/2} \quad (9a)$$

where $t_{0.025;N-2} = 1.95996 + \frac{2.37226}{N-2} + \frac{2.82250}{(N-2)^2}$;

For $\Delta t_N \geq 24$

$$S_{\bar{L}} = t_{0.025;N-2} \left[(\Sigma L_i^2 - a\Sigma L_i - b\Sigma L_i \Delta t_i)/(N-2)\right]^{1/2} \times \left[\frac{1}{N} + (\Delta t_N - \overline{\Delta t})^2 / (\Sigma \Delta t_i^2 - (\Sigma t_i)^2/N)\right]^{1/2} \quad (9b)$$

where $t_{0.025;N-2} = \dfrac{1.6449(N-2)^2 + 3.5283(N-2) + 0.85602}{(N-2)^2 + 1.2209(N-2) - 1.5162}$

$\bar{L}_i$ = Calculated leakage rate computed using equation (5) at total elapsed time Δt_i, %/day.

$$\overline{\Delta t} = \frac{\Sigma \Delta t_i}{N}$$

2. Computation using the Mass Point Method

a. Contained mass of dry air from data:

$$W_i = 144 \frac{P_i V_i}{R T_i} \quad (10)$$

where

All symbols as previously defined.

b. Calculated leakage rate from regression analysis, $W = a + b\,\Delta t$

$$\bar{L} = -2400 \frac{b}{a} \quad (11)$$

where

$\bar{L}$ = Calculated leakage rate, wt.%/day, as determined from the regression line.

$$a = (\Sigma W_i - b\Sigma \Delta t_i)/N \quad (12)$$

$$b = \frac{N(\Sigma W_i \Delta t_i) - (\Sigma W_i)(\Sigma \Delta t_i)}{N(\Sigma \Delta t_i^2) - (\Sigma \Delta t_i)^2} \quad (13)$$

Δt_i = Total elapsed time at time of i^{th} data point, hr

N = Number of data points

W_i = Contained mass of dry air at i^{th} data point, lbm, as computed from equation (10).

$$\Sigma = \sum_{i=1}^{N}$$

To reduce truncation error, the computer program uses the following equivalent formulation:

$$a = W_1 \left[1 + (\Sigma \frac{\Delta W_i}{W_1} - \frac{b}{W_1} \Sigma \Delta t_i)/N\right] \quad (14)$$

$$b = W_1 \left[\frac{N(\Sigma \frac{\Delta W_i}{W_i} \Delta t_i) - \Sigma \frac{\Delta W_i}{W_i} \Sigma \Delta t_i}{N(\Sigma \Delta t_i^2) - (\Sigma \Delta t_i)^2}\right] \quad (15)$$

where $\frac{\Delta W_i}{W_1}$ is as previously defined.

c. 95% upper confidence limit.

$$UCL = \frac{-2400}{a}(b - S_b) \quad (16)$$

where

UCL = 95% upper confidence limit, wt.%/day.

$$S_b = t_{0.025;N-2} \frac{S_N^{1/2}}{[N\Sigma\Delta t_i^2 - (\Sigma\Delta t_i)^2]^{1/2}} \quad (17)$$

where $t_{0.025;N-2} = \frac{1.6449(N-2)^2 + 3.5283\,(N-2)^2 + 0.85602}{(N-2)^2 + 1.2209\,(N-2) - 1.5162}$

$$S = \left[\frac{\Sigma[W_i - (a + b\,\Delta t_i)]^2}{N-2}\right]^{1/2}$$

$$= W_1 \left\{\frac{1}{N-2}\left[\Sigma(\Delta W_i/W_1)^2 - [\Sigma(\Delta W_i/W_1)]^2/N - \frac{[\Sigma(\Delta W_i/W_1)\,\Delta t_i - \Sigma(\Delta W_i/W_1)(\Sigma\Delta t_i)/N]^2}{\Sigma(\Delta t_i^2) - (\Sigma\,\Delta t_i)^2/N}\right]\right\}^{1/2} \quad (18)$$

d. Predictor:

$$\text{Predictor} = \frac{2[(UCL-L) + 4\,(|A| + 2\,S_A)]}{100\,La}$$

where

UCL = 95% upper confidence limit of mass point calculated leakage rate at end of test

Lm = mass point calculated leakage rate at end of test

A = value of linear regression analysis slope of mass point calculated leakage rate vs. time for last 4 hours of test data

S_A = linear regression analysis standard deviation of slope

La = allowable leakage rate

In terms of elasped time, Δt and mass point calculated leakage rate Lm_i calculated at the end of i^{th} time interval.

$$A = \frac{1}{M}\left[\sum_{4\ hr} Lm_i - B \sum_{4\ hr} \Delta t_i\right] \tag{19}$$

$$B = \frac{M \sum_{4\ hr} Lm_i \Delta t_i - \sum_{4\ hr} Lm_i \sum_{4\ hr} \Delta t_i}{M \sum_{4\ hr} \Delta t_i^2 - \sum_{4\ hr} \Delta t_i\ ^2} \tag{20}$$

$$S_A = \sqrt{\frac{\sum_{4\ hr} Lm_i - A \sum_{4\ hr} Lm_i - B \sum_{4\ hr} Lm_i \Delta t_i}{[M-2]\ [M \sum_{4\ hr} \Delta t_i - (\sum_{4\ hr} \Delta t_i)^2]}} \tag{21}$$

Lm_i = mass point calculated leakage rate evaluated using data up to time Δt_i.

$\sum_{4\ hr}$ = summation over last 4 hours of test data.

$$= \sum_{N-M+1}^{N}$$

M = number of data points for last 4 hours of test.

D. Program Logic

1. The Bechtel ILRT computer program logic flow is controlled by a set of user options. The user options and a brief description of their associated function are presented below.

OPTION COMMAND	FUNCTION
	After starting the program execution, the user either enters the name of the file containing previously entered data or initializes a new data file.
DATA	Enables user to enter raw data. When the system requests values of time, volume, temperature, pressure and vapor pressure, the user enters the appropriate data. After completing the data entry, a summary is printed out. The user then verifies that the data were entered correctly. If errors are detected, the user will then be given the opportunity to correct the errors. After the user verifies that the data were entered correctly, a Corrected Data Summary Report of time, data, average temperature, partial pressure of dry air, and water vapor pressure is printed.
TREND	A Trend Report is printed.
TOTAL	A Total Time Report is printed.
MASS	A Mass Point Report is printed.
TERM	Enables user to sign-off temporarily or permanently. All data is saved on a file for restarting.
CORR	Enables user to correct previously entered data.
LIST	A Summary Data Report is printed.
READ	Enable the computer to receive the next set of data from the data acquisition system directly.
PLOT	Enables user to plot summary data, individual sensor data or air mass versus time.
DELETE	Enables user to delete a data point.
INSERT	Enables user to reinstate a previously deleted data point.
VOLFRA	Enable user to change volume fractions.
PRED	A predictor report is printed.

OPTION COMMAND	FUNCTION
TIME	Enable the user to specify the time interval for a report or plot.
VERF	Enable the user to input imposed leakage rate and calcaluted ILRT leakage rates at start of verification test.

E. COMPUTER REPORT AND DATA PRINTOUT

MASS POINT REPORT

The Mass Point Report presents leakage rate data (wt%/day) as determined by the Mass Point Method. The "Calculated Leakage Rate" is the value determined from the regression analysis. The "Containment Air Mass" values are the masses of dry air in the containment (lbm). These air masses, determined from the Equation of State, are used in the regression analysis.

TOTAL TIME REPORT

The Total Time Report presents data leakage rate (wt%/day) as determined by the Total Time Method. The "Calculated Leakage Rate" is the value determined from the regression analysis. The "Measured Leakage Rates" are the leakage rate values determined using Total Time calculations. These values of leakage rate are used in the regression analysis.

TREND REPORT

The Trend Report presents leakage rates as determined by the Mass Point and Total Time methods in percent of the initial contained mass of dry air per day (wt%/day), versus elapsed time (hours) and number of data points.

PREDICTOR REPORT

The predictor reports presents a predicted upper bound on the change in calculated mass point leakage rate over the next four hours.

SUMMARY DATA REPORT

The Summary Data report presents the actual data used to calculate leakage rates by the various methods described in the "Computer Program" section of this report. The six column headings are TIME, DATE, TEMP, PRESSURE, VPRS, and VOLUME and contain data defined as follows:

1. TIME: Time in 24-hour notations (hours and minutes).

2. DATE: Calendar date (month and day).

3. TEMP: Containment weighted-average drybulb temperature in absolute units, degrees Rankine (°R).

4. PRESSURE: Partial pressure of the dry air component of the containment atmosphere in absolute units (psia).

5. VPRS: Partial pressure of water vapor of the containment atmosphere in absolute units (psia).

6. VOLUME: Containment free air volume (cu. ft.).

F. SUMMARY OF MEASURED DATA AND SUMMARY OF CORRECTED DATA

The Summary of Measured Data presents the individual containment atmosphere drybulb temperatures, dewpoint temperatures, absolute total pressure and free air volume measured at the time and date.

1. TEMP 1 through TEMP N are the drybulb temperatures, where N = No. of RTD's. The values in the right-hand column are temperatures (°F), multiplied by 100, as read from the data acquisition system (DAS). The values in the left-hand column are the corrected temperatures expressed in absolute units (°R).

2. PRES 1 through PRES N are the total pressures, absolute, were N = No. of pressure sensors. The right-hand value, in parentheses, is a number in counts as read from the DAS. This count value is converted to a value in psia by the computer via the instrument's calibration table, counts versus psia. The left-hand column is the absolute total pressure, psia.

3. VPRS 1 through VPRS N are the dewpoint temperatures (water vapor pressures), where N = No. of dewpoint sensors. The values in the right-hand column are temperatures (°F), multiplied by 100 as read from the DAS. The values in the left-hand column are the water vapor pressures (psia) from the steam tables for saturated steam corresponding to the dewpoint (saturation) temperatures in the center column.

The Summary of Corrected Data presents corrected temperature and pressure values and calculated air mass determined as follows:

1. TEMPERATURE (°R) is the volume weighted average containment atmosphere drybulb temperature derived from TEMP 1 through TEMP N.

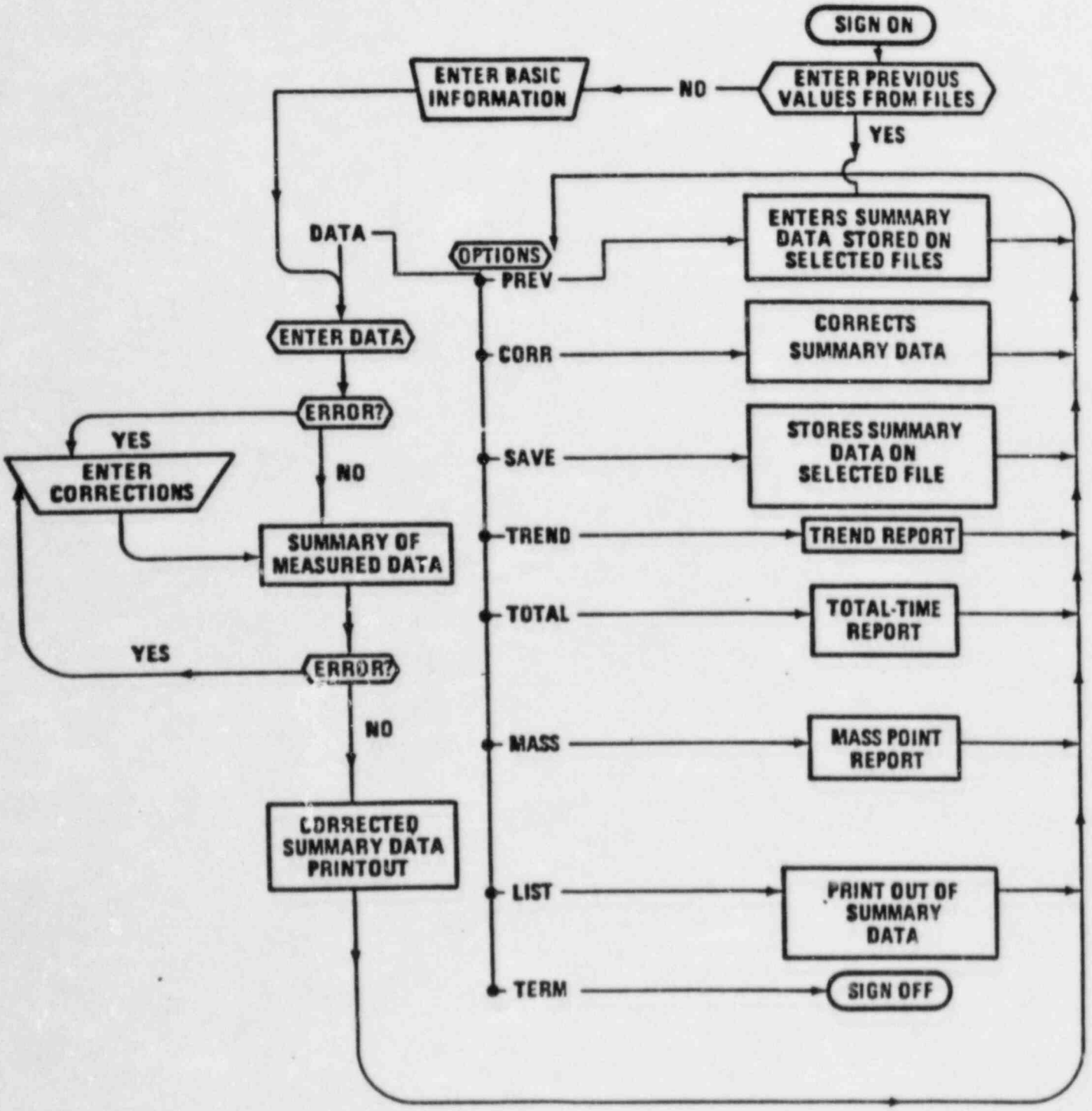
2. CORRECTED PRESSURE (psia) is the partial pressure of the dry air component of the containment atmosphere, absolute. The volume weighted average containment atmosphere water vapor pressure is subtracted from the volume weighted average total pressure, yielding the partial pressure of the dry air.

3. VAPOR PRESSURE (psia) is the volume weighted average containment atmosphere water vapor pressure, absolute derived from VPRS 1 through VPRS N.

4. VOLUME (cu. ft.) is the containment free air volume.

5. CONTAINMENT AIR MASS (lbm) is the calculated mass of dry air in the containment. The mass of dry air is calculated using the containment free air volume and the above TEMPERATURE and CORRRECTED PRESSURE of the dry air.

BECHTEL CONTAINMENT
INTEGRATED LEAKAGE RATE TEST
COMPUTER PROGRAM FLOW CHART



APPENDIX B

ILRT Stabilization Summary Data

APPENDIX B

FARLEY UNIT 1 ILRT
SUMMARY DATA

ALMAX = .150 VOLUME = 2000000.
VRATET = .231 VRATEM = .235

TIME	DATE	TEMP	PRESSURE	VPRS	VOLUME
1630	412	535.437	64.6892	.2782	2000000.
1645	412	535.118	64.6470	.2793	2000000.
1700	412	534.911	64.6193	.2790	2000000.
1715	412	534.786	64.5983	.2788	2000000.
1730	412	534.697	64.5821	.2791	2000000.
1745	412	534.613	64.5679	.2792	2000000.
1800	412	534.550	64.5568	.2792	2000000.
1815	412	534.493	64.5458	.2793	2000000.
1830	412	534.444	64.5351	.2799	2000000.
1845	412	534.411	64.5273	.2797	2000000.
1900	412	534.373	64.5195	.2799	2000000.
1915	412	534.329	64.5123	.2801	2000000.
1930	412	534.296	64.5047	.2807	2000000.
1945	412	534.276	64.4987	.2807	2000000.
2000	412	534.244	64.4933	.2806	2000000.
2015	412	534.222	64.4882	.2807	2000000.
2030	412	534.191	64.4832	.2807	2000000.

APPENDIX B

FARLEY UNIT 1 ILRT
TEMPERATURE STABILIZATION

FROM A STARTING TIME AND DATE OF: 1630 412 1984

TIME (HOURS)	TEMP (R)	ANSI AVE T (4HRS)	ANSI AVE T (1HR)	ANSI DIFF	BN-TOP-1 AVE T (2HRS)
.00	535.44				
.25	535.12				
.50	534.91				
.75	534.79				
1.00	534.70				
1.25	534.61				
1.50	534.55				
1.75	534.49				
2.00	534.44				-.496*
2.25	534.41				-.353*
2.50	534.37				-.269*
2.75	534.33				-.228*
3.00	534.30				-.201*
3.25	534.28				-.169*
3.50	534.24				-.153*
3.75	534.22				-.136*
4.00	534.19	-.311	-.105	-.21*	-.063*

* INDICATES TEMPERATURE STABILIZATION HAS BEEN SATISFIED

APPENDIX C

ILRT Trend Report

and

Summary Data

APPENDIX C

FARLEY UNIT 1 ILRT
TREND REPORT

TIME AND DATE AT START OF TEST: 2200 412 1984

NO. PTS	END TIME	TOTAL TIME ANALYSIS MEAS.	CALCULATED	UCL	MASS POINT ANALYSIS CALCULATED	UCL
4	2245	.125	.118	.282	.121	.147
5	2300	.132	.125	.200	.129	.144
6	2315	.160	.145	.216	.151	.181
7	2330	.135	.142	.198	.144	.165
8	2345	.123	.135	.186	.134	.153
9	0	.133	.134	.178	.133	.148
10	15	.109	.125	.169	.121	.139
11	30	.113	.120	.161	.116	.131
12	45	.105	.114	.152	.109	.124
13	100	.104	.109	.145	.105	.118
14	115	.110	.107	.141	.104	.115
15	130	.106	.105	.137	.103	.112
16	145	.107	.104	.134	.102	.110
17	200	.105	.102	.131	.101	.109
18	215	.107	.101	.129	.101	.108
19	230	.100	.099	.126	.099	.105
20	245	.100	.098	.123	.098	.103
21	300	.109	.098	.124	.099	.104
22	315	.106	.098	.123	.100	.104
23	330	.097	.096	.121	.098	.102
24	345	.105	.096	.120	.098	.103
25	400	.105	.096	.120	.099	.103
26	415	.104	.096	.120	.099	.103
27	430	.107	.096	.120	.100	.103
28	445	.092	.094	.118	.097	.101
29	500	.103	.094	.117	.097	.101
30	515	.095	.093	.116	.096	.100
31	530	.100	.093	.115	.096	.099
32	545	.096	.092	.114	.095	.098
33	600	.098	.092	.113	.095	.098
34	615	.099	.091	.113	.095	.098
35	630	.099	.091	.112	.095	.097
36	645	.098	.091	.112	.094	.097
37	700	.089	.090	.110	.093	.096
38	715	.095	.089	.110	.093	.095
39	730	.093	.089	.109	.092	.095
40	745	.096	.088	.109	.092	.094
41	800	.092	.088	.108	.091	.094
42	815	.096	.088	.108	.091	.094
43	830	.095	.087	.107	.091	.093
44	845	.098	.087	.107	.091	.094
45	900	.095	.087	.107	.091	.093
46	915	.095	.087	.107	.091	.093
47	930	.096	.087	.107	.091	.093

APPENDIX C

FARLEY UNIT 1 ILRT
TREND REPORT

TIME AND DATE AT START OF TEST: 2200 412 1984

NO.	END	TOTAL TIME ANALYSIS			MASS POINT ANALYSIS	
PTS	TIME	MEAS.	CALCULATED	UCL	CALCULATED	UCL
48	945	.095	.087	.107	.091	.093
49	1000	.095	.087	.106	.091	.093
50	1015	.091	.086	.106	.091	.093
51	1030	.097	.087	.106	.091	.093
52	1045	.093	.086	.106	.091	.092
53	1100	.095	.086	.106	.091	.092
54	1115	.094	.086	.105	.091	.092
55	1130	.094	.086	.105	.091	.092
56	1145	.096	.086	.105	.091	.092
57	1200	.097	.086	.105	.091	.092
58	1215	.096	.086	.105	.091	.093
59	1230	.094	.086	.105	.091	.092
60	1245	.095	.086	.105	.091	.092
61	1300	.095	.086	.105	.091	.092
62	1315	.094	.086	.105	.091	.092
63	1330	.095	.086	.105	.091	.092
64	1345	.096	.086	.105	.091	.093
65	1400	.093	.086	.105	.091	.092
66	1415	.094	.086	.105	.091	.092
67	1430	.094	.086	.105	.091	.092
68	1445	.093	.086	.105	.091	.092
69	1500	.095	.086	.105	.091	.092
70	1515	.094	.086	.105	.091	.092
71	1530	.096	.086	.105	.091	.092
72	1545	.092	.086	.105	.091	.092
73	1600	.095	.086	.105	.091	.092
74	1615	.092	.086	.105	.091	.092
75	1630	.090	.086	.104	.091	.092
76	1645	.089	.086	.104	.091	.092
77	1700	.090	.085	.104	.090	.091
78	1715	.090	.085	.103	.090	.091
79	1730	.090	.085	.103	.090	.091
80	1745	.090	.085	.103	.090	.091
81	1800	.091	.085	.103	.090	.090
82	1815	.091	.085	.103	.089	.090
83	1830	.090	.085	.102	.089	.090
84	1845	.089	.084	.102	.089	.090
85	1900	.089	.084	.102	.089	.090
86	1915	.088	.084	.102	.089	.089
87	1930	.089	.084	.101	.088	.089
88	1945	.086	.084	.101	.088	.089
89	2000	.087	.083	.101	.088	.089
90	2015	.087	.083	.100	.087	.088
91	2030	.087	.083	.100	.087	.088
92	2045	.087	.083	.100	.087	.088
93	2100	.086	.083	.100	.087	.088
94	2115	.086	.082	.099	.086	.087
95	2130	.087	.082	.099	.086	.087
96	2145	.086	.082	.099	.086	.087
97	2200	.086	.082	.085	.086	.087

APPENDIX C

FARLEY UNIT 1 ILRT
SUMMARY DATA

ALMAX = .150 VOLUME = 2000000.
VRATET = .231 VRATEM = .235

TIME	DATE	TEMP	PRESSURE	VPRS	VOLUME
2200	412	534.071	64.4611	.2807	2000000.
2215	412	534.056	64.4583	.2805	2000000.
2230	412	534.037	64.4554	.2804	2000000.
2245	412	534.018	64.4521	.2807	2000000.
2300	412	534.002	64.4492	.2805	2000000.
2315	412	533.997	64.4468	.2805	2000000.
2330	412	533.982	64.4449	.2803	2000000.
2345	412	533.968	64.4429	.2804	2000000.
0	413	533.964	64.4410	.2807	2000000.
15	413	533.944	64.4392	.2806	2000000.
30	413	533.936	64.4371	.2806	2000000.
45	413	533.930	64.4364	.2804	2000000.
100	413	533.924	64.4350	.2807	2000000.
115	413	533.920	64.4332	.2805	2000000.
130	413	533.913	64.4321	.2807	2000000.
145	413	533.905	64.4302	.2805	2000000.
200	413	533.903	64.4294	.2808	2000000.
215	413	533.901	64.4283	.2804	2000000.
230	413	533.893	64.4274	.2803	2000000.
245	413	533.888	64.4262	.2805	2000000.
300	413	533.895	64.4251	.2806	2000000.
315	413	533.890	64.4242	.2805	2000000.
330	413	533.874	64.4229	.2808	2000000.
345	413	533.888	64.4227	.2805	2000000.
400	413	533.883	64.4213	.2809	2000000.
415	413	533.881	64.4206	.2806	2000000.
430	413	533.887	64.4202	.2805	2000000.
445	413	533.870	64.4201	.2806	2000000.
500	413	533.880	64.4186	.2806	2000000.
515	413	533.877	64.4192	.2805	2000000.
530	413	533.881	64.4180	.2807	2000000.
545	413	533.881	64.4181	.2806	2000000.
600	413	533.881	64.4171	.2806	2000000.
615	413	533.888	64.4170	.2807	2000000.
630	413	533.883	64.4158	.2809	2000000.
645	413	533.885	64.4156	.2810	2000000.
700	413	533.877	64.4162	.2805	2000000.
715	413	533.888	64.4154	.2808	2000000.
730	413	533.887	64.4152	.2805	2000000.
745	413	533.888	64.4137	.2814	2000000.
800	413	533.887	64.4142	.2810	2000000.
815	413	533.903	64.4142	.2809	2000000.
830	413	533.898	64.4133	.2809	2000000.
845	413	533.908	64.4132	.2809	2000000.
900	413	533.908	64.4132	.2810	2000000.
915	413	533.914	64.4132	.2809	2000000.
930	413	533.919	64.4131	.2811	2000000.
945	413	533.919	64.4128	.2814	2000000.
1000	413	533.926	64.4128	.2813	2000000.

APPENDIX C

FARLEY UNIT 1 ILRT
SUMMARY DATA

ALMAX = .150 VOLUME = 2000000.
VRATET = .231 VRATEM = .235

TIME	DATE	TEMP	PRESSURE	VPRS	VOLUME
1015	413	533.922	64.4132	.2810	2000000.
1030	413	533.941	64.4129	.2813	2000000.
1045	413	533.935	64.4130	.2812	2000000.
1100	413	533.948	64.4129	.2812	2000000.
1115	413	533.948	64.4127	.2815	2000000.
1130	413	533.956	64.4132	.2815	2000000.
1145	413	533.969	64.4133	.2814	2000000.
1200	413	533.974	64.4128	.2814	2000000.
1215	413	533.980	64.4135	.2812	2000000.
1230	413	533.979	64.4134	.2812	2000000.
1245	413	533.991	64.4139	.2813	2000000.
1300	413	533.995	64.4137	.2814	2000000.
1315	413	534.001	64.4140	.2812	2000000.
1330	413	534.008	64.4139	.2813	2000000.
1345	413	534.018	64.4139	.2813	2000000.
1400	413	534.013	64.4143	.2814	2000000.
1415	413	534.026	64.4145	.2817	2000000.
1430	413	534.031	64.4147	.2815	2000000.
1445	413	534.036	64.4148	.2814	2000000.
1500	413	534.046	64.4145	.2822	2000000.
1515	413	534.052	64.4153	.2814	2000000.
1530	413	534.063	64.4148	.2819	2000000.
1545	413	534.063	64.4163	.2814	2000000.
1600	413	534.081	64.4163	.2814	2000000.
1615	413	534.080	64.4169	.2818	2000000.
1630	413	534.078	64.4171	.2816	2000000.
1645	413	534.078	64.4170	.2817	2000000.
1700	413	534.089	64.4174	.2817	2000000.
1715	413	534.103	64.4181	.2816	2000000.
1730	413	534.107	64.4183	.2819	2000000.
1745	413	534.114	64.4184	.2818	2000000.
1800	413	534.126	64.4190	.2817	2000000.
1815	413	534.126	64.4184	.2822	2000000.
1830	413	534.127	64.4182	.2820	2000000.
1845	413	534.130	64.4184	.2822	2000000.
1900	413	534.135	64.4188	.2819	2000000.
1915	413	534.136	64.4188	.2819	2000000.
1930	413	534.145	64.4185	.2822	2000000.
1945	413	534.134	64.4184	.2823	2000000.
2000	413	534.145	64.4185	.2822	2000000.
2015	413	534.150	64.4187	.2820	2000000.
2030	413	534.152	64.4185	.2822	2000000.
2045	413	534.158	64.4182	.2825	2000000.
2100	413	534.156	64.4181	.2826	2000000.
2115	413	534.161	64.4181	.2826	2000000.
2130	413	534.173	64.4183	.2824	2000000.
2145	413	534.173	64.4183	.2824	2000000.
2200	413	534.180	64.4186	.2826	2000000.

APPENDIX D

ILRT Mass Point Analysis

&

Total Time Analysis

FARLEY UNIT 1 ILRT
LEAKAGE RATE (WEIGHT PERCENT/DAY)
MASS POINT ANALYSIS

TIME AND DATE AT START OF TEST: 2200 412 1984
TEST DURATION: 24.00 HOURS

TIME	TEMP (R)	PRESSURE (PSIA)	CTMT. AIR MASS (LBM)	MASS LOSS (LBM)	AVERAGE MASS LOSS (LBM/HR)
2200	534.071	64.4611	651564.		
2215	534.056	64.4583	651554.	9.8	39.1
2230	534.037	64.4554	651549.	5.7	30.9
2245	534.018	64.4521	651539.	10.0	34.0
2300	534.002	64.4492	651528.	10.3	35.8
2315	533.997	64.4468	651510.	18.4	43.4
2330	533.982	64.4449	651509.	.7	36.6
2345	533.968	64.4429	651506.	3.5	33.4
0	533.964	64.4410	651492.	13.8	36.1
15	533.944	64.4392	651497.	-5.6	29.6
30	533.936	64.4371	651487.	10.2	30.8
45	533.930	64.4364	651486.	1.2	28.4
100	533.924	64.4350	651480.	6.2	28.1
115	533.920	64.4332	651467.	13.1	30.0
130	533.913	64.4321	651463.	3.4	28.8
145	533.905	64.4302	651455.	8.4	29.1
200	533.903	64.4294	651449.	5.3	28.6
215	533.901	64.4283	651440.	9.0	29.1
230	533.893	64.4274	651442.	-1.2	27.2
245	533.888	64.4262	651435.	7.0	27.2
300	533.895	64.4251	651416.	18.9	29.6
315	533.890	64.4242	651412.	3.4	28.9
330	533.874	64.4229	651419.	-6.8	26.3
345	533.888	64.4227	651399.	19.8	28.6
400	533.883	64.4213	651392.	7.2	28.6
415	533.881	64.4206	651387.	5.5	28.4
430	533.887	64.4202	651375.	11.2	29.0
445	533.870	64.4201	651396.	-20.5	24.9
500	533.880	64.4186	651368.	27.6	28.0
515	533.877	64.4192	651378.	-9.7	25.7
530	533.881	64.4180	651361.	17.3	27.1
545	533.881	64.4181	651362.	-1.0	26.1
600	533.881	64.4171	651351.	10.1	26.6
615	533.888	64.4170	651342.	9.7	26.9
630	533.883	64.4158	651336.	6.0	26.8
645	533.885	64.4156	651332.	4.1	26.5
700	533.877	64.4162	651347.	-15.2	24.1
715	533.888	64.4154	651325.	22.1	25.9
730	533.887	64.4152	651325.	-.2	25.2
745	533.888	64.4137	651309.	16.3	26.2
800	533.887	64.4142	651314.	-5.7	25.0
815	533.903	64.4142	651296.	18.7	26.2
830	533.898	64.4133	651293.	2.9	25.8
845	533.908	64.4132	651279.	13.4	26.5
900	533.908	64.4132	651279.	.3	25.9
915	533.914	64.4132	651272.	6.5	25.9
930	533.919	64.4131	651265.	7.6	26.0
945	533.919	64.4128	651262.	2.9	25.7
1000	533.926	64.4128	651254.	8.4	25.9

TIME	TEMP (R)	PRESSURE (PSIA)	CTMT. AIR MASS (LBM)	MASS LOSS (LBM)	AVERAGE MASS LOSS (LBM/HR)
1015	533.922	64.4132	651262.	-8.1	24.7
1030	533.941	64.4129	651235.	26.5	26.3
1045	533.935	64.4130	651243.	-8.2	25.1
1100	533.948	64.4129	651227.	16.1	25.9
1115	533.948	64.4127	651225.	2.3	25.6
1130	533.956	64.4132	651221.	4.3	25.4
1145	533.969	64.4133	651206.	14.9	26.1
1200	533.974	64.4128	651195.	10.8	26.4
1215	533.980	64.4135	651194.	.8	26.0
1230	533.979	64.4134	651195.	-.4	25.5
1245	533.991	64.4139	651185.	9.6	25.7
1300	533.995	64.4137	651178.	7.1	25.7
1315	534.001	64.4140	651174.	4.4	25.6
1330	534.008	64.4139	651165.	8.8	25.8
1345	534.018	64.4139	651152.	12.9	26.2
1400	534.013	64.4143	651162.	-10.1	25.1
1415	534.026	64.4145	651149.	13.4	25.6
1430	534.031	64.4147	651144.	4.9	25.5
1445	534.036	64.4148	651139.	4.8	25.3
1500	534.046	64.4145	651124.	15.2	25.9
1515	534.052	64.4153	651125.	-.4	25.5
1530	534.063	64.4148	651106.	18.5	26.2
1545	534.063	64.4163	651121.	-14.6	25.0
1600	534.081	64.4163	651099.	21.5	25.8
1615	534.080	64.4169	651107.	-8.0	25.0
1630	534.078	64.4171	651111.	-3.5	24.5
1645	534.078	64.4170	651109.	1.5	24.3
1700	534.089	64.4174	651102.	7.6	24.3
1715	534.103	64.4181	651092.	9.9	24.5
1730	534.107	64.4183	651088.	3.9	24.4
1745	534.114	64.4184	651081.	7.1	24.5
1800	534.126	64.4190	651072.	8.1	24.6
1815	534.126	64.4184	651066.	6.5	24.6
1830	534.127	64.4182	651062.	4.1	24.5
1845	534.130	64.4184	651061.	.7	24.2
1900	534.135	64.4188	651059.	2.2	24.0
1915	534.136	64.4188	651057.	2.2	23.9
1930	534.145	64.4185	651044.	13.3	24.2
1945	534.134	64.4184	651056.	-12.5	23.4
2000	534.145	64.4185	651044.	12.2	23.6
2015	534.150	64.4187	651040.	3.6	23.5
2030	534.152	64.4185	651035.	5.4	23.5
2045	534.158	64.4182	651025.	9.4	23.7
2100	534.156	64.4181	651026.	-.9	23.4
2115	534.161	64.4181	651021.	5.7	23.4
2130	534.173	64.4183	651008.	12.7	23.7
2145	534.173	64.4183	651008.	.1	23.4
2200	534.180	64.4186	651003.	5.1	23.4

FREE AIR VOLUME USED (CU. FT.) = 2000000.
REGRESSION LINE
  INTERCEPT (LBM) = 651540.
  SLOPE (LBM/HR) = -23.3
MAXIMUM ALLOWABLE LEAKAGE RATE = .150
75% OF MAXIMUM ALLOWABLE LEAKAGE RATE = .113
THE UPPER 95% CONFIDENCE LIMIT = .087
THE CALCULATED LEAKAGE RATE = .086

FARLEY UNIT 1 ILRT
LEAKAGE RATE (WEIGHT PERCENT/DAY)
TOTAL TIME ANALYSIS

TIME AND DATE AT START OF TEST: 2200 412 1984
TEST DURATION: 24.00 HOURS

TIME	TEMP (R)	PRESSURE (PSIA)	MEASURED LEAKAGE RATE
2200	534.071	64.4611	
2215	534.056	64.4583	.144
2230	534.037	64.4554	.114
2245	534.018	64.4521	.125
2300	534.002	64.4492	.132
2315	533.997	64.4468	.160
2330	533.982	64.4449	.135
2345	533.968	64.4429	.123
0	533.964	64.4410	.133
15	533.944	64.4392	.109
30	533.936	64.4371	.113
45	533.930	64.4364	.105
100	533.924	64.4350	.104
115	533.920	64.4332	.110
130	533.913	64.4321	.106
145	533.905	64.4302	.107
200	533.903	64.4294	.105
215	533.901	64.4283	.107
230	533.893	64.4274	.100
245	533.888	64.4262	.100
300	533.895	64.4251	.103
315	533.890	64.4242	.106
330	533.874	64.4229	.097
345	533.888	64.4227	.105
400	533.883	64.4213	.105
415	533.881	64.4206	.104
430	533.887	64.4202	.107
445	533.870	64.4201	.092
500	533.880	64.4186	.103
515	533.877	64.4192	.095
530	533.881	64.4180	.100
545	533.881	64.4181	.096
600	533.881	64.4171	.098
615	533.888	64.4170	.099
630	533.883	64.4158	.099
645	533.885	64.4156	.098
700	533.877	64.4162	.089
715	533.888	64.4154	.095
730	533.887	64.4152	.093
745	533.888	64.4137	.096
800	533.887	64.4142	.092
815	533.903	64.4142	.096
830	533.898	64.4133	.095
845	533.908	64.4132	.098
900	533.908	64.4132	.095
915	533.914	64.4132	.095
930	533.919	64.4131	.096
945	533.919	64.4128	.095
1000	533.926	64.4128	.095

TIME	TEMP (R)	PRESSURE (PSIA)	MEASURED LEAKAGE RATE
1015	533.922	64.4132	.091
1030	533.941	64.4129	.097
1045	533.935	64.4130	.093
1100	533.948	64.4129	.095
1115	533.948	64.4127	.094
1130	533.956	64.4132	.094
1145	533.969	64.4133	.096
1200	533.974	64.4128	.097
1215	533.980	64.4135	.096
1230	533.979	64.4134	.094
1245	533.991	64.4139	.095
1300	533.995	64.4137	.095
1315	534.001	64.4140	.094
1330	534.008	64.4139	.095
1345	534.018	64.4139	.096
1400	534.013	64.4143	.093
1415	534.026	64.4145	.094
1430	534.031	64.4147	.094
1445	534.036	64.4148	.093
1500	534.046	64.4145	.095
1515	534.052	64.4153	.094
1530	534.063	64.4148	.096
1545	534.063	64.4163	.092
1600	534.081	64.4163	.095
1615	534.080	64.4169	.092
1630	534.078	64.4171	.090
1645	534.078	64.4170	.089
1700	534.089	64.4174	.090
1715	534.103	64.4181	.090
1730	534.107	64.4183	.090
1745	534.114	64.4184	.090
1800	534.126	64.4190	.091
1815	534.126	64.4184	.091
1830	534.127	64.4182	.090
1845	534.130	64.4184	.089
1900	534.135	64.4188	.089
1915	534.136	64.4188	.088
1930	534.145	64.4185	.089
1945	534.134	64.4184	.086
2000	534.145	64.4185	.087
2015	534.150	64.4187	.087
2030	534.152	64.4185	.087
2045	534.158	64.4182	.087
2100	534.156	64.4181	.086
2115	534.161	64.4181	.086
2130	534.173	64.4183	.087
2145	534.173	64.4183	.086
2200	534.180	64.4186	.086

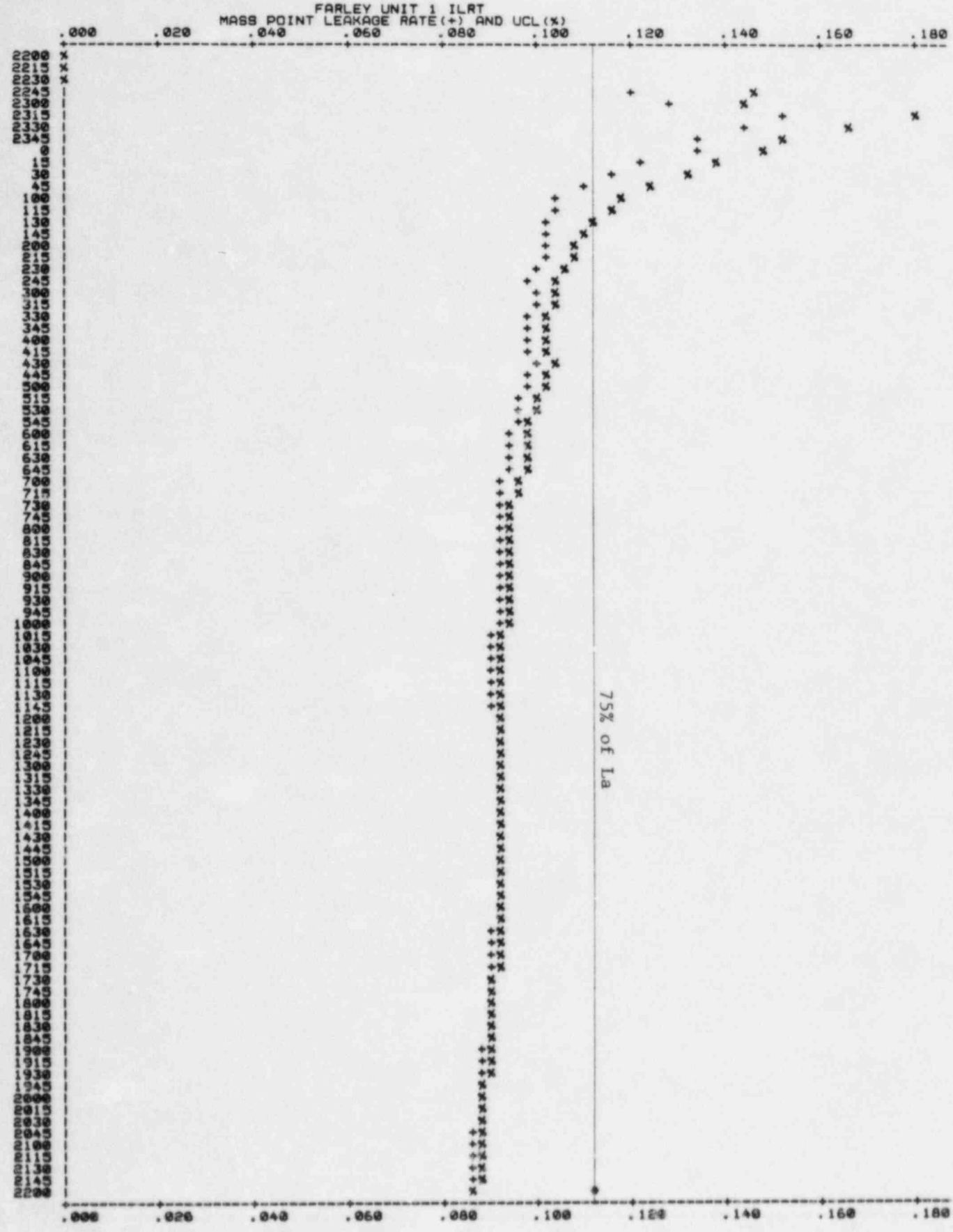
MEAN OF THE MEASURED LEAKAGE RATES	=	.099
MAXIMUM ALLOWABLE LEAKAGE RATE	=	.150
75% OF MAXIMUM ALLOWABLE LEAKAGE RATE	=	.113
THE UPPER 95% CONFIDENCE LIMIT	=	.085
THE CALCULATED LEAKAGE RATE	=	.082

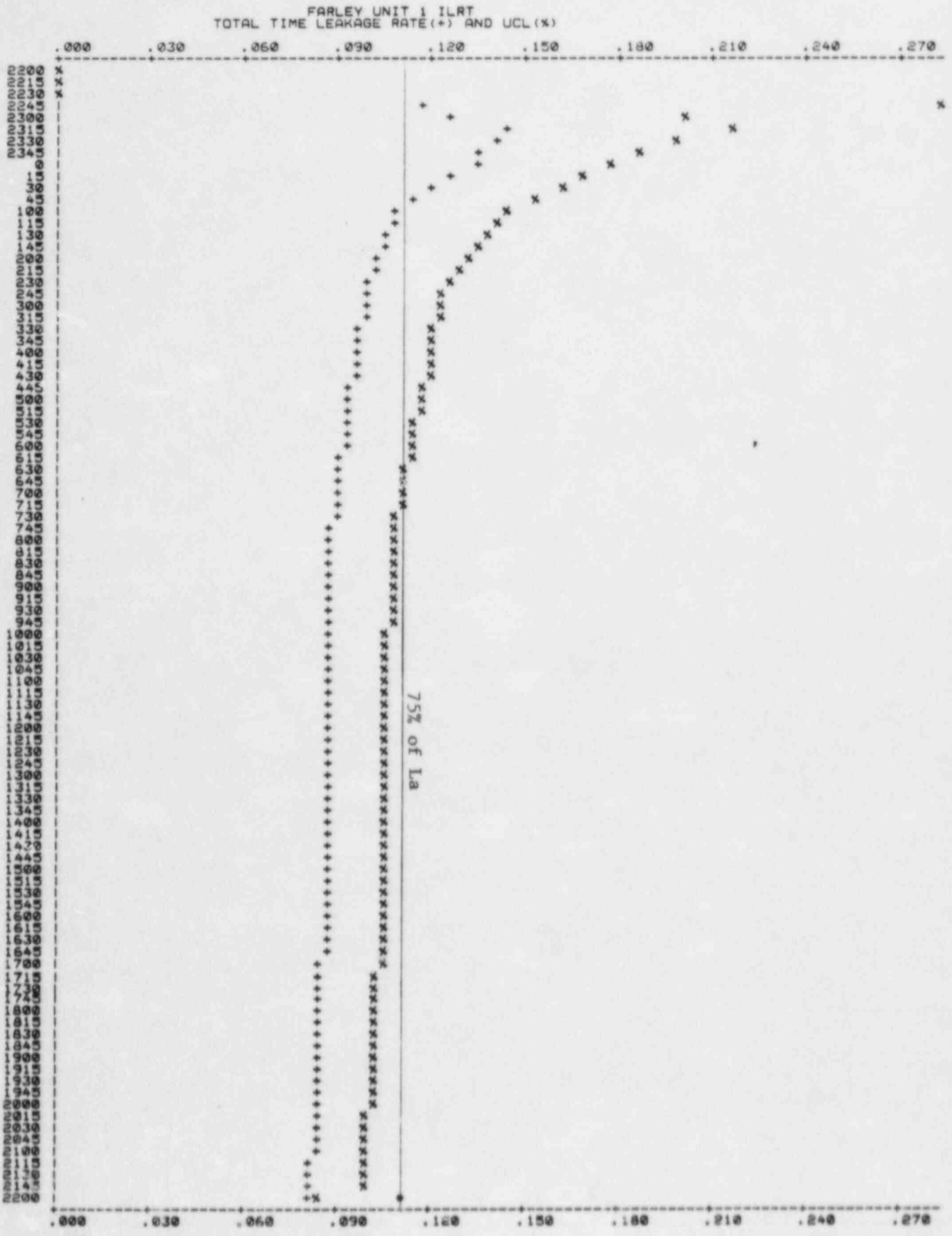
APPENDIX E

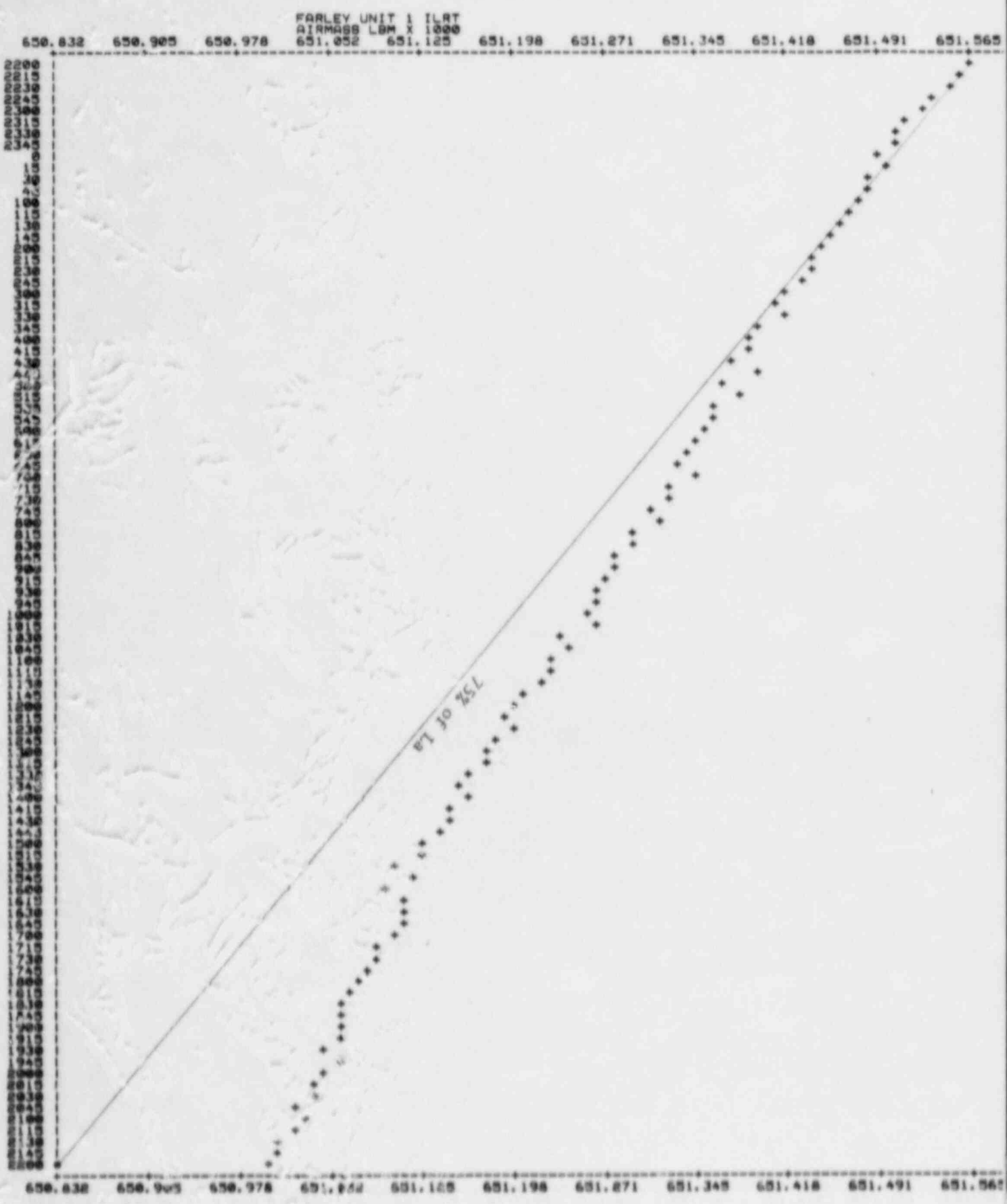
ILRT Plots:

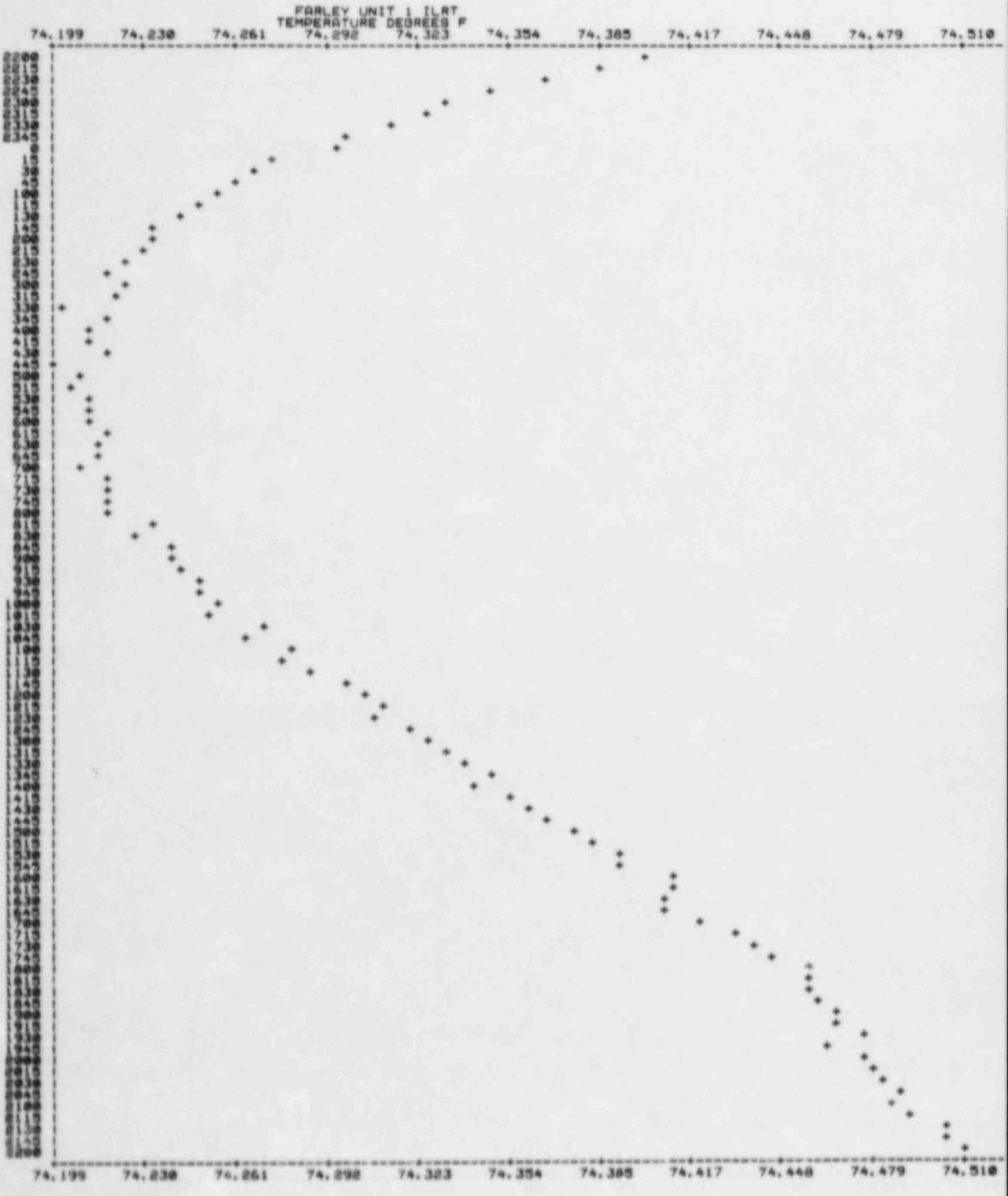
Mass Point, Total Time, Airmass, Temperature, Pressure and Vapor Pressure

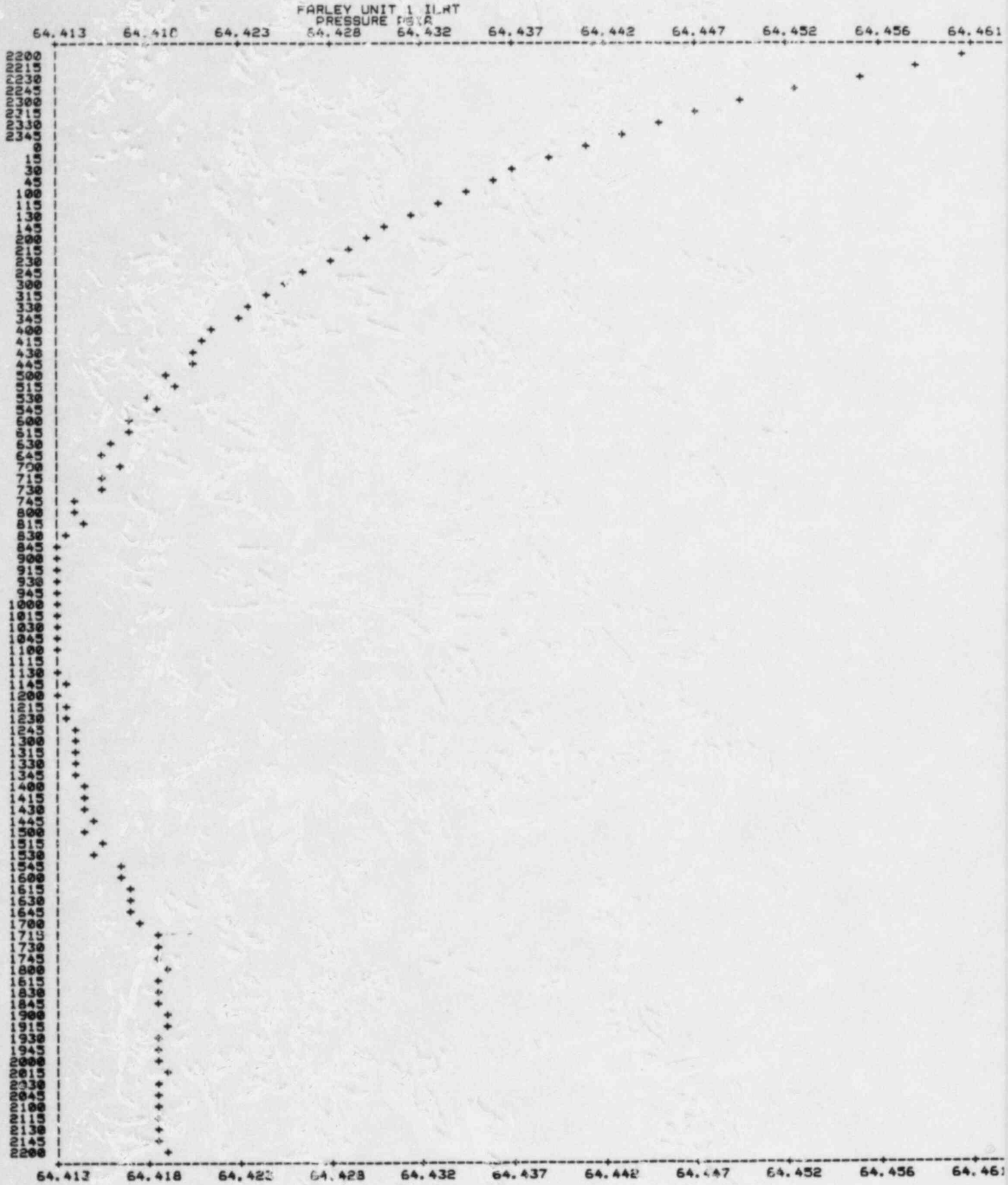
APPENDIX E

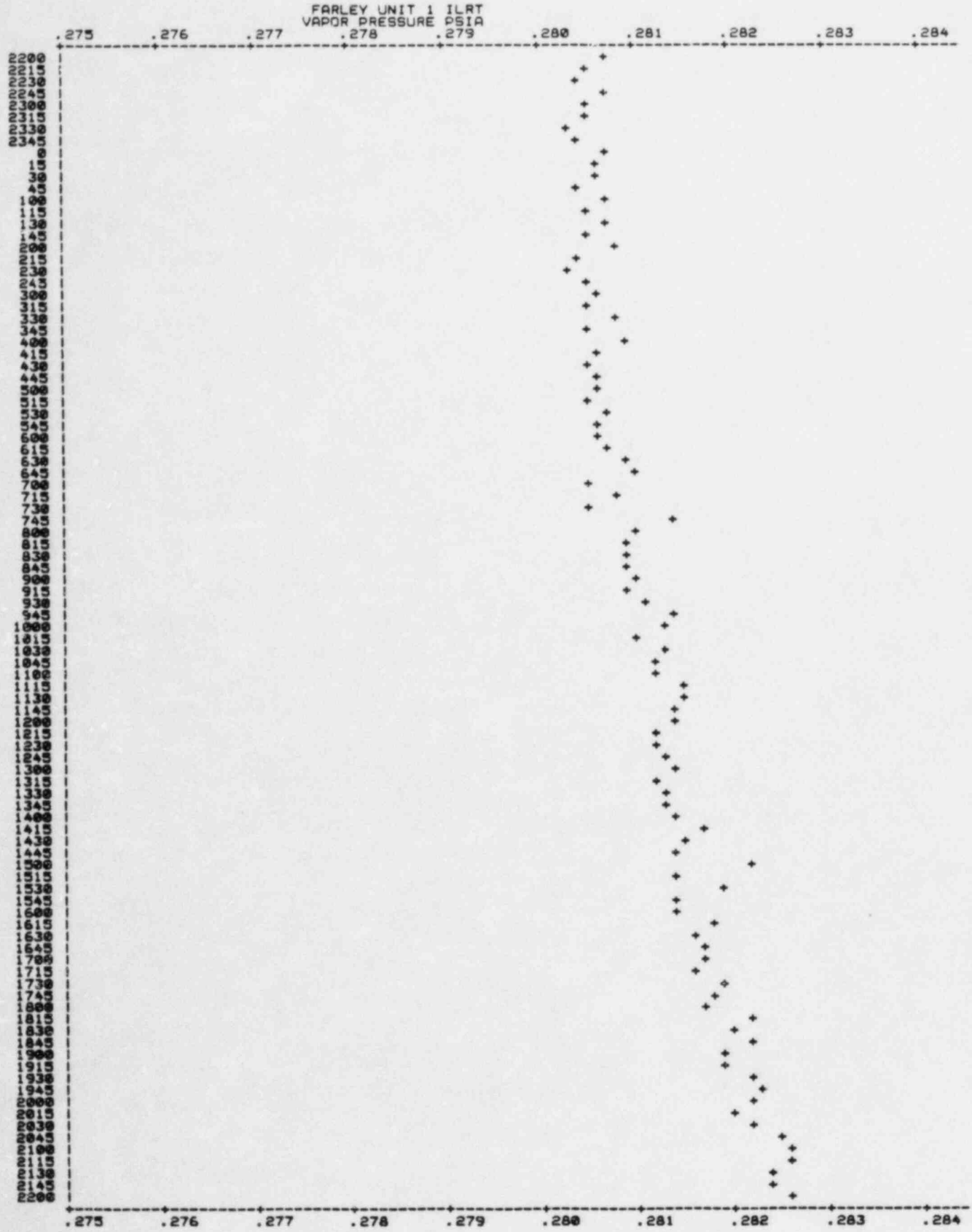

FARLEY UNIT 1 ILRT
MASS POINT LEAKAGE RATE(+) AND UCL(%)
.000
.020
.040
.060
.080
.100
.120
.140
.160
.180
75% of La


FARLEY UNIT 1 ILRT
TOTAL TIME LEAKAGE RATE(+) AND UCL(x)
.000
.030
.060
.090
.120
.150
.180
.210
.240
.270
75% of La


FARLEY UNIT 1 ILRT
AIRMASS LBM X 1000
650.832
650.905
650.978
651.052
651.125
651.198
651.271
651.345
651.418
651.491
651.565
75% of La


FARLEY UNIT 1 ILRT
TEMPERATURE DEGREES F
74.199
74.230
74.261
74.292
74.323
74.354
74.385
74.417
74.448
74.479
74.510


FARLEY UNIT 1 ILRT
PRESSURE PSIA
64.413
64.418
64.423
64.428
64.432
64.437
64.442
64.447
64.452
64.456
64.461


FARLEY UNIT 1 ILRT
VAPOR PRESSURE PSIA
.275
.276
.277
.278
.279
.280
.281
.282
.283
.284
2200
2215
2230
2245
2300
2315
2330
2345
0
15
30
45
100
115
130
145
200
215
230
245
300
315
330
345
400
415
430
445
500
515
530
545
600
615
630
645
700
715
730
745
800
815
830
845
900
915
930
945
1000
1015
1030
1045
1100
1115
1130
1145
1200
1215
1230
1245
1300
1315
1330
1345
1400
1415
1430
1445
1500
1515
1530
1545
1600
1615
1630
1645
1700
1715
1730
1745
1800
1815
1830
1845
1900
1915
1930
1945
2000
2015
2030
2045
2100
2115
2130
2145
2200

APPENDIX F

Verification Test Summary Data

APPENDIX F

FARLEY UNIT 1 ILRT
LEAKAGE RATE (WEIGHT PERCENT/DAY)
MASS POINT ANALYSIS

TIME AND DATE AT START OF TEST: 2215 413 1984
TEST DURATION: 4.00 HOURS

TIME	TEMP (R)	PRESSURE (PSIA)	CTMT. AIR MASS (LBM)	MASS LOSS (LBM)	AVERAGE MASS LOSS (LBM/HR)
2215	534.177	64.4182	651001.		
2230	534.190	64.4166	650969.	31.7	126.7
2245	534.189	64.4168	650973.	-3.4	56.5
2300	534.193	64.4153	650952.	20.8	65.5
2315	534.205	64.4145	650931.	21.4	70.5
2330	534.208	64.4139	650920.	10.6	64.9
2345	534.211	64.4137	650915.	5.1	57.5
0	534.217	64.4132	650902.	13.1	56.7
15	534.221	64.4118	650883.	19.2	59.2
30	534.234	64.4117	650866.	16.7	60.0
45	534.242	64.4105	650845.	21.0	62.4
100	534.248	64.4100	650832.	12.7	61.4
115	534.251	64.4091	650819.	13.4	60.7
130	534.250	64.4089	650819.	.2	56.1
145	534.268	64.4077	650784.	34.6	62.0
200	534.268	64.4071	650779.	5.2	59.2
215	534.283	64.4073	650763.	16.2	59.6

FREE AIR VOLUME USED (CU. FT.) =2000000.
REGRESSION LINE
INTERCEPT (LBM) = 650996.
SLOPE (LBM/HR) = -58.1
VERIFICATION TEST LEAKAGE RATE UPPER LIMIT = .272
VERIFICATION TEST LEAKAGE RATE LOWER LIMIT = .197
THE CALCULATED LEAKAGE RATE = .214

FARLEY UNIT 1 ILRT
LEAKAGE RATE (WEIGHT PERCENT/DAY)
TOTAL TIME ANALYSIS

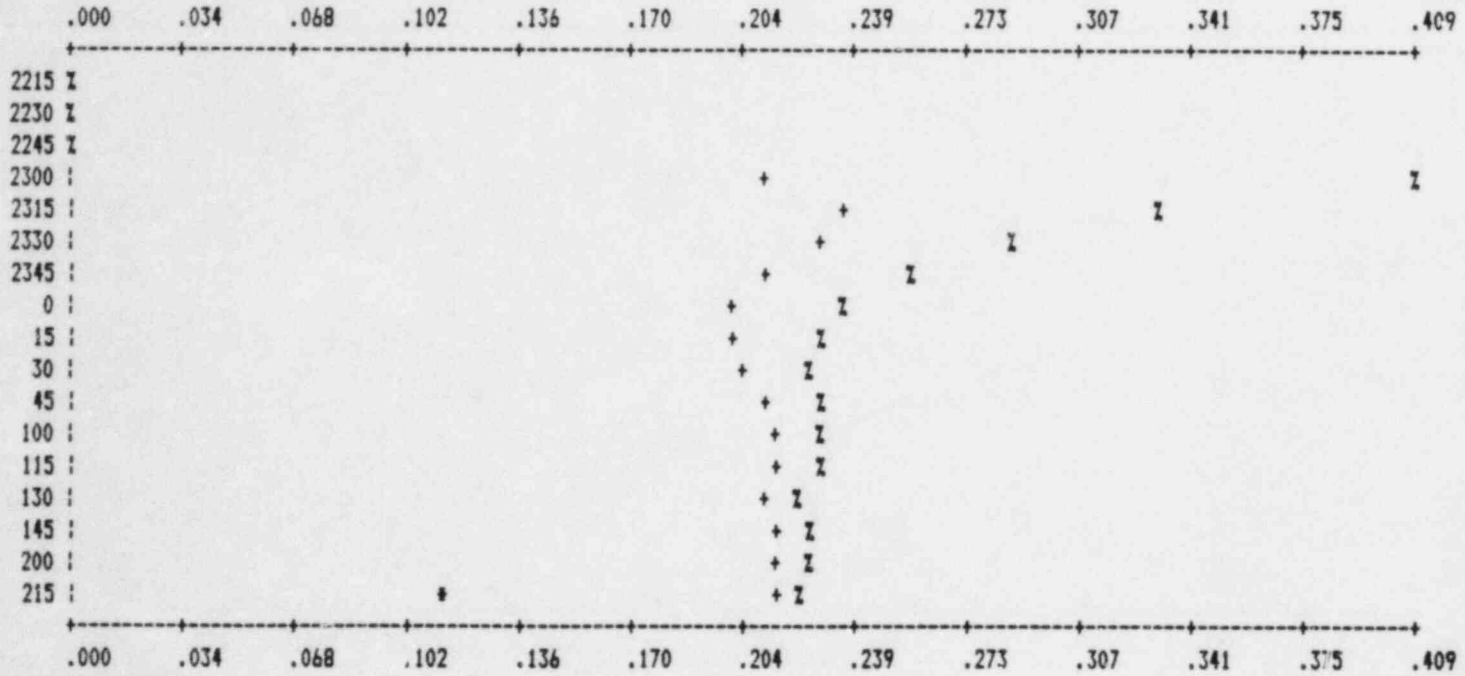
TIME AND DATE AT START OF TEST: 2215 413 1984
TEST DURATION: 4.00 HOURS

TIME	TEMP (R)	PRESSURE (PSIA)	MEASURED LEAKAGE RATE
2215	534.177	64.4182	
2230	534.190	64.4166	.467
2245	534.189	64.4168	.208
2300	534.193	64.4153	.241
2315	534.205	64.4145	.260
2330	534.208	64.4139	.239
2345	534.211	64.4137	.212
0	534.217	64.4132	.209
15	534.221	64.4118	.218
30	534.234	64.4117	.221
45	534.242	64.4105	.230
100	534.248	64.4100	.226
115	534.251	64.4091	.224
130	534.250	64.4089	.207
145	534.268	64.4077	.228
200	534.268	64.4071	.218
215	534.283	64.4073	.220

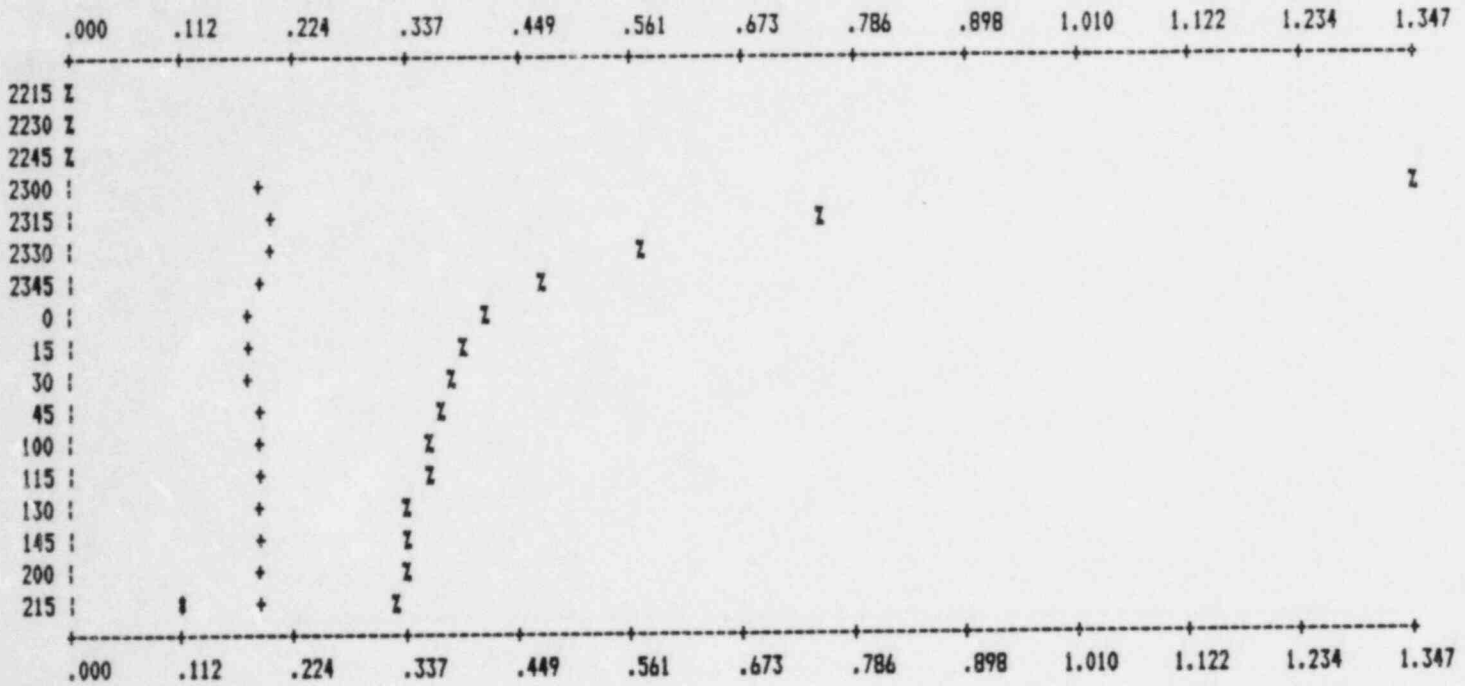
MEAN OF THE MEASURED LEAKAGE RATES	=	.239
VERIFICATION TEST LEAKAGE RATE UPPER LIMIT	=	.268
VERIFICATION TEST LEAKAGE RATE LOWER LIMIT	=	.193
THE CALCULATED LEAKAGE RATE	=	.193

APPENDIX F

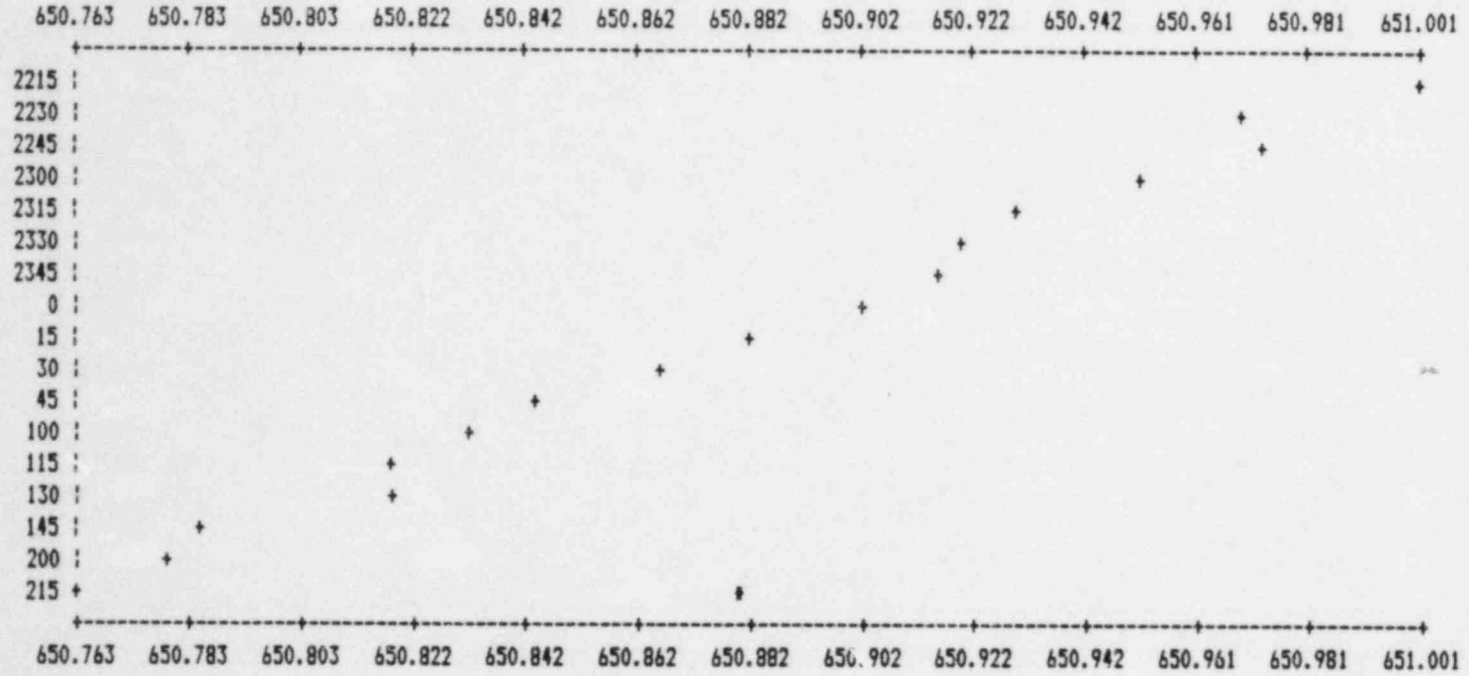
FARLEY UNIT 1 ILRT
MASS POINT LEAKAGE RATE(+) AND UCL(%)



FARLEY UNIT 1 ILRT
TOTAL TIME LEAKAGE RATE(+) AND UCL(%)



FARLEY UNIT 1 ILRT
AIRMASS LBM X 1000



APPENDIX F

FARLEY UNIT 1 ILRT
SUMMARY DATA

ALMAX = .150 VOLUME = 2000000.
VRATET = .231 VRATEM = .235

TIME	DATE	TEMP	PRESSURE	VPRS	VOLUME
2215	413	534.177	64.4182	.2825	2000000.
2230	413	534.190	64.4166	.2826	2000000.
2245	413	534.189	64.4168	.2824	2000000.
2300	413	534.193	64.4153	.2829	2000000.
2315	413	534.205	64.4145	.2827	2000000.
2330	413	534.208	64.4139	.2823	2000000.
2345	413	534.211	64.4137	.2825	2000000.
0	414	534.217	64.4132	.2825	2000000.
15	414	534.221	64.4118	.2829	2000000.
30	414	534.234	64.4117	.2825	2000000.
45	414	534.242	64.4105	.2827	2000000.
100	414	534.248	64.4100	.2826	2000000.
115	414	534.251	64.4091	.2831	2000000.
130	414	534.250	64.4089	.2827	2000000.
145	414	534.268	64.4077	.2830	2000000.
200	414	534.268	64.4071	.2831	2000000.
215	414	534.283	64.4073	.2829	2000000.

APPENDIX G

ISG CALCULATION

ISG CALCULATION

Reference ANSI/ANS-56.8-1981, Appendix G

A. Test Parameters

La	= 0.15 %/day	leakage rate
P	= 64.14 psia	containment pressure
T	= 534.17 °R	average drybulb temperature
Tdp	= 62°F	average dewpoint temperature
t	= 24 Hr.	test duration

B. Instrument Parameters

1. Total Absolute Pressure

No. of sensors:	2
Range:	0-100 psia
Sensitivity error (Ep):	.001 psia
Repeatability (ϵ_P):	0.05% of full scale

$$e_P = \pm \left[\frac{(E_P)^2 + (\epsilon_P)^2}{\text{No. of sensors}} \right]^{1/2} = \left[\frac{(0.001)^2 + (0.0005)^2}{2} \right]^{1/2}$$

$$= 7.91 \times 10^{-4} \text{ psia}$$

2. Water Vapor Pressure

No. of sensors:	6
Sensitivity error (E_{pv}):	$\pm$ .10°F
Repeatability (ϵ_{P_v}):	$\pm$ .10°F
Dewpoint temperature:	62°F
Vapor pressure change @ 62°F:	0.00986 psia/°F

$$e_{Pv} = \pm \left[\frac{(E_{Pv})^2 + (\epsilon_{Pv})^2}{\text{No. of sensors}} \right]^{1/2} = \pm \left[\frac{(0.01)^2 + (0.01)^2}{6} \right]^{1/2} \times 0.00986$$

$$= 5.6926. \times 10^{-4} \text{ psia}$$

3. Temperature

No. of Sensors: 18
Sensitivity error (E_T): 0.01°F
Repeatability error (ϵ_T): 0.01°F

$$e_T = \pm \left[\frac{E_T^2 + \epsilon_T^2}{\text{No. of sensor}}\right]^{1/2} = \pm \left[\frac{(0.01)^2 + (0.01)^2}{18}\right]^{1/2} = 3.333 \times 10^{-3}$$

C. Instrumentation Selection Guide (ISG)

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

$$= \pm \frac{2400}{24} \left[2\left(\frac{7.91\text{x}10^{-4}}{64.14}\right)^2 + 2\left(\frac{5.6926\text{x}10^{-4}}{64.14}\right)^2 + 2\left(\frac{3.333\text{x}10^{-3}}{534.17}\right)^2\right]^{1/2}$$

$ISG = \pm 0.00232$ wt%/day

.25 La = (0.25) (0.15) = 0.0375 > 0.00232

APPENDIX H

LLRT Summary

APPENDIX H

SUMMARY OF LOCAL LEAK RATE TEST RESULTS

Sum of measured leakages 10,751.67 sccm

Reported leakage rate = sum of measured leakages for penetrations

Acceptance criteria: Reported leakage .6 La

.6 La = 151,058.9 sccm

10,751.67 sccm < 151,058.9 sccm

Total local leak rate satisfies the acceptance criteria.

LLRT data taken since the First Periodic ILRT (second refueling outage) is enclosed.

LLRT SUMMARY FOR 5th REFUELING

DATE: 4/18/84

ELECTRICAL PENETRATION TOTAL	26.27
TYPE B TEST (LESS ELEC. PEN.) TOTAL	6618.7
TYPE C TEST TOTAL	4106.7
TOTAL LLRT LEAKAGE	10751.67

MAX. ALLOWABLE LEAKAGE (.6 La) = 151,058.9 SCCM.

$\frac{10751.67}{151,058.9} \times 100 = 7.12\%$ OF ALLOWABLE LEAKAGE

TYPE B TEST SUMMARY FOR 5th REFUELING

DATE: 3/16/84

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52A003-A	EA01	WA 31190	2/16/84	0.07
Q1T52A004-A	EA02	WA 31190	2/16/84	1.02
Q1T52B014-A	EA03	WA 31190	2/16/84	0.07
Q1T52B001-A	EA05	WA 31190	2/16/84	0
Q1T52B005-A	EA06	WA 31190	2/16/84	0
Q1T52B002-A	EA09	WA 31190	2/16/84	0
Q1T52A001-A	EA10	WA 31190	2/17/84	0.07
Q1T52A002-A	EA11	WA 31190	2/17/84	1.02
Q1T52B019-A	EB01	WA 31190	2/15/84	0
Q1T52B007-A	EB05	WA 31190	2/16/84	0
Q1T52B006-A	EB09	WA 31190	2/16/84	0
Q1T52B013-1	EC01	WA 31190	2/15/84	0.10
Q1T52B012-1	EC03	WA 31190	2/16/84	0.17
Q1T52B010-4	EC08	WA 31190	2/16/84	2.38
Q1T52B008-4	EC10	WA 31190	2/16/84	0
Q1T52B023-B	WA03	WA 31190	2/15/84	0
Q1T52B015-B	WA02	WA 31190	2/15/84	0
Q1T52B046-B	WA05	WA 31190	2/14/84	0.54
Q1T52B047-B	WA06	WA 31190	2/14/84	0
Q1T52A005-B	WA07	WA 31190	2/15/84	0.44
Q1T52A006-B	WA08	WA 31190	2/17/84	0.10
Q1T52B018-B	WA09	WA 31190	2/14/84	0

TYPE B TEST SUMMARY FOR 5th REFUELING

DATE: 3/16/84

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52B016-B	WA10	WA 31190	2/13/84	0
Q1T52B017-B	WA11	WA 31190	2/13/84	0.24
Q1T52B032-N	WA21	WA 31190	2/14/84	0
Q1T52B033-N	WA22	WA 31190	2/14/84	0.03
Q1T52B034-N	WA23	WA 31190	2/14/84	0
Q1T52B035-N	WA24	WA 31190	2/13/84	1.29
Q1T52B020-B	WB03	WA 31190	2/15/84	0
Q1T52B022-B	WB07	WA 31190	2/14/84	0
Q1T52B025-B	WB09	WA 31190	2/14/84	0.07
Q1T52B038-B	WB11	WA 31190	2/14/84	0.03
Q1T52B037-N	WB21	WA 31190	2/13/84	0.17
Q1T52B039-N	WB24	WA 31190	2/13/84	0.17
Q1T52B026-3	WC01	WA 31190	2/15/84	0.17
Q1T52B024-3	WC03	WA 31190	2/15/84	2.48
Q1T52B028-3	WC05	WA 31190	2/14/84	0.41
Q1T52B030-2	WC07	WA 31190	2/14/84	0
Q1T52B042-2	WC09	WA 31190	2/15/84	0
Q1T52B031-2	WC11	WA 31190	2/13/84	0
Q1T52B040-N	WC21	WA 31190	2/13/84	0.14
Q1T52B041-N	WC23	WA 31190	2/13/84	0.17
Q1T52B009-A	EC07	WA 31190	2/17/84	0
Q1T52B011-B	WC08	WA 31190	2/17/84	0

TYPE B TEST SUMMARY FOR 5th REFUELING

DATE: 3/26/84

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52B052-A	EB10	WA 31190	3/20/84	0.195
Q1T52B053-B	WC02	WA 31190	3/20/84	0.02
	EB02	WA 31190	3/26/84	0
	EC05	WA 31190	3/26/84	10.5
	EB04	WA 31190	3/26/84	4.2

TYPE B TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO	DESCRIPTION	MWR	DATE	LEAKAGE RATE IN SCCM
14	Fuel Transfer Tube - Flange Double "O" Ring	N/A	4/4/84	5.1 SCCM
14	Fuel Transfer Tube - Bellows	PCN 84-2598	4/11/84	29.1 SCCM
84	Equipment Hatch - Between "O" Rings	N/A	4/11/84	30.5 SCCM
86	Personnel Lock Outer Door - Between "O" Rings			0 SCCM
86	Personnel Lock - Volume Between Doors	MWR 81084	4/10/84	6200 SCCM
87	Auxiliary Access Lock Outer Door - Between "O" Rings			0 SCCM
87	Auxiliary Access Lock - Volume Between Doors	MWR 81049	4/10/84	354 SCCM

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
10	Q1E11V025A	WA 31137	3/5/18	229	
	Q1E11V026A	WA 31137	3/5/18	229	229
11	Q1E11V026B	WA 31138	2/26/84	3.8	
	Q1E11V025B	WA 31138	2/26/84	3.8	3.8
12	Q1P13V302	WA 31139	3/2/84	110	
	Q1P13V282	MWR 92800 WA 31139	3/2/84	110	
	Q1P13V301	MWR 90587 WA 31139	3/2/84	110	
	Q1P13V281	MWR 90586 WA 31139	3/2/84	110	110
13	Q1P13V304	WA 31140	3/2/84	438	
	Q1P13V283	MWR 90585 WA 31140	3/2/84	438	
	Q1P13V303	MWR 90588 WA 31140	3/2/84	438	
	Q1P13V284	MWR 92799 WA 31140	3/2/84	438	438
16	Q1E11V001A	WA 31141	3/5/84	74.7	74.7
18	Q1E11V001B	WA 31142	2/27/84	17.3	17.3
23	Q1E21V253A	WA 31143	3/5/84	5.3	
	Q1E21V253B	WA 31143	3/5/84	5.3	
	Q1E21V253C	WA 31143	3/5/84	5.3	
	Q1E21V254	WA 31143	3/5/84	21.3	21.3

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
24	Q1E21V257	WA 31144	2/29/84	66.4	
	Q1E21V258	WA 31144	2/29/84	59.3	
	Q1E21V119	WA 31144	2/29/84	61.4	66.4
25	Q1E21V115B	WA 31144	2/16/84	14.3	14.3
26	Q1E21V115C	WA 31146	2/16/84	20.1	20.1
27	Q1E21V115A	WA 31147	2/16/84	99.2	99.2
28	Q1E21V249A	WA 31148	2/16/84	21.6	
	Q1E21V213	WA 31148	2/16/84	21.6	
	Q1E21V249B	WA 31148	2/16/84	25.4	25.4
29	Q1E21V049	WA 31149	2/14/84	12.4	
	Q1E21V050	WA 31149	2/14/84	13.6	13.6
30	Q1B13V040	WA 31150	2/15/84	79.7	
	Q1B13V038	WA 31150	2/15/84	80.7	80.7
31	Q1G21V005	WA 31151	2/16/84	25.2	
	Q1G21V006	WA 31151	2/16/84	7.9	
	Q1G21V064	MWR 91057 WA 31151	2/16/84	16.6	25.2
32	Q1P16V072	WA 31152	2/16/84	194.3	
	Q1P16V081	WA 31152	2/16/84	194.3	194.3
33	Q1G21HV3380	WA 31153	3/31/84	6.8	
	Q1G21V204	WA 31153	4/3/84	293	293
42	Q1P17V083	WA 31154	2/26/84	117	
	Q1P17V082	WA 31154	2/26/84	6	117

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
43	Q1P17HV3045	MWR 91428 WA 31155	3/20/84	21.6	
	Q1P17HV3184	WA 31155	2/27/84	67	67
44	Q1P17V097	MWR 91768	2/26/84	29	
	Q1P17V099	WA 31157	2/26/84	29	29
45	Q1P17HV3095	MWR 91767 WA 31156	2/26/84	214	
	Q1P17V159	WA 31156	2/26/84	303.5	303.5
46	Q1P17HV3443	WA 31158	2/26/84	101.3	
	Q1P17HV3067	WA 31158	2/26/84	82.2	101.3
47	Q1P18V001	WA 31159	3/20/84	53.0	
	Q1P18V002	WA 31159	3/20/84	53.0	53.0
48	Q1P19HV3661	WA 31160	3/2/84	15	
	Q1P19V002	WA 31160	3/2/84	57.4	57.4
49	Q1E21V052	WA 31161	2/13/84	6.3	
	Q1E21V091	WA 31161	2/13/84	10.4	10.4
50	Q1P15HV3776	WA 31162	2/13/84	3.5	
	Q1P15HV3334	WA 31162	2/13/84	3.7	3.7
54	Q1E14V002	WA 31163	3/19/84	4.1	
	Q1E14HV3658	WA 31163	3/19/84	8.5	8.5
55	Q1E14HV3657	WA 31164	3/19/84	4	
	Q1E14V001	WA 31164	3/19/84	134.4	134.4

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
56	Q1P15HV3104	WA 31165	2/14/84	3.8	
	Q1P15HV3331	WA 31165	2/14/84	5.0	5.0
57	Q1P15HV3103	WA 31166	2/15/84	27.0	
	Q1P15HV3332	WA 31166	2/15/84	13.8	27.0
58	Q1P15HV3765	Wa 31167	2/18/84	14.2	
	Q1P15HV3333	Wa 31167	2/18/84	24.8	24.8
59	Q1E11V039B	WA 31168	3/8/84	3	
	Q1E11V039A	WA 31168	3/8/84	3	
	Q1E21V263A	WA 31168	3/8/84	3	
	Q1E21V263B	WA 31168	3/8/84	3	
	Q1B13V054	WA 31168	3/8/84	0.8	
	Q1E11V040	WA 31168	3/8/84	3	3
60	Q1P16V075	WA 31169	2/16/84	162.4	
	Q1P16V017	MWR 0-561 WA 31169	2/16/84	127.3	162.4
61A	Q1E23V022D	WA 31170	2/15/84	30.0	
	Q1E23V022C	WA 31170	2/15/84	30.0	
	Q1E23V023B	WA 31170	2/15/84	30.0	30.0
61B	Q1E23V024B	WA 31171	2/15/84	17.4	
	Q1E23V025B	WA 31171	2/15/84	17.4	17.4
62	Q1G21V082	WA 31172	2/17/84	19.3	
	Q1G21V001	WA 31172	2/17/84	19.6	19.6

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
63	Q1E21V058	MWR 80560 WA 31173	2/13/84	140	
	Q1E21V059	MWR 80559 WA 31173	2/13/84	170.2	170.2
64A	Q1B13V037	WA 31174	2/13/84	19.5	
	Q1B13hV039	WA 31174	2/13/84	37.5	37.5
64B	Q1B13V026A	WA 31175	2/13/84	7.6	
	Q1B13V026B	WA 31175	2/13/84	4.6	7.6
66	Q1E23V025A	WA 31176	2/15/84	11.3	
	Q1E23V024A	WA 31176	2/15/84	11.3	11.3
67	Q1E23V022B	WA 31177	2/15/84	22.9	
	Q1E23V022A	WA 31177	2/15/84	22.9	
	Q1E23V023A	WA 31177	2/15/84	22.9	22.9
70	Q1E14V004	WA 31178	2/18/84	26.1	
	Q1E14V003	WA 31178	2/18/84	15.3	26.1
71	Q1P23V022A	WA 21179	4/15/84	57.6	57.6
72	Q1P23V002B	WA 31180	4/17/84	31.5	31.5
78	Q1G21HV337	WA 31181	3/31/84	35.5	
	Q1G21V291	WA 31181	3/31/84	53	
	Q1G21HV3376	WA 31181	3/31/84	53	53
82	Q1P11V301	WA 31183	2/13/84	24.5	
	Q1P11V021	WA 31183	2/13/84	11.4	24.5

TYPE C TEST SUMMARY FOR 5th REFUELING

DATE: 4/18/84

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
93	Q1E13V003A	WA 31184	2/22/84	715.1	
	Q1E13V004A	WA 31184	2/22/84	715.1	715.1
94	Q1E13V004B	WA 31185	2/18/84	3.3	
	Q1E13V003B	WA 31185	2/18/84	3.3	3.3
95	Q1G31V012	WA 31186	2/13/84	15.5	
	Q1G31V013	WA 31186	2/13/84	13.3	15.5
97B	Q1P19V004	WA 31188	2/13/84	7.2	
	Q1P19HV2228	WA 31188	2/13/84	7.6	7.6
103	Q1E23V002	WA 31187	2/18/84	22.3	
	Q1E23V003	WA 31187	2/18/84	22.3	22.3

LLRT SUMMARY FOR 4th REFUELING

DATE: 3/21/83

ELECTRICAL PENETRATION TOTAL	12.43 SCCM
TYPE B TEST (LESS ELEC. PEN.) TOTAL	2000.7 SCCM
TYPE C TEST TOTAL	3140.91 SCCM
TOTAL LLRT LEAKAGE	5154.04

MAX. ALLOWABLE LEAKAGE (.6 La) = 151,058.9 SCCM.

$\frac{5154.04}{151,058.9} \times 100 = 3.4\%$ OF ALLOWABLE LEAKAGE

TYPE B TEST SUMMARY FOR 4th REFUELING

DATE: 3/21/83

PENE. NO	DESCRIPTION	MWR	DATE	LEAKAGE RATE IN SCCM
14	Fuel Transfer Tube - Flange Double "O" Ring	WA 6189	3/14/83	204 SCCM
14	Fuel Transfer Tube - Bellows	WA 6189	3/14/83	2.9 SCCM
84	Equipment Hatch - Between "O" Rings	WA 6189	3/17/83	1785 SCCM
86	Personnel Lock Outer Door - Between "O" Rings	N/A	3/18/83	0
86	Personnel Lock - Volume Between Doors	WA 22574	3/15/83	4.5 SCCM
87	Auxiliary Access Lock Outer Door - Between "O" Rings	N/A	3/18/83	0
87	Auxiliary Access Lock - Volume Between Doors	WA 22574	3/18/83	4.3 SCCM

TYPE B TEST SUMMARY FOR 4th REFUELING

DATE: 3/21/83

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52A003-A	EA01	WA 3188	1/12/83	0.204
Q1T52A004-A	EA02	WA 3188	1/12/83	0.238
Q1T52B014-A	EA03	WA 6188	1/12/83	0.714
Q1T52B001-A	EA05	WA 6188	1/12/83	0.17
Q1T52B005-A	EA06	WA 6188	1/12/83	0.27
Q1T52B002-A	EA09	WA 6188	1/12/83	0.238
Q1T52A001-A	EA10	WA 6188	1/12/83	0.27
Q1T52A002-A	EA11	WA 6188	1/12/83	0.306
Q1T52B019-A	EB01	WA 6188	1/12/83	0.034
Q1T52B007-A	EB05	WA 6188	1/12/83	0
Q1T52B006-A	EB09	WA 6188	1/12/83	1.70
Q1T52B013-1	EC01	WA 6188	1/11/83	0.034
Q1T52B012-1	EC03	WA 6188	1/12/83	0.068
Q1T52B010-4	EC08	WA 6188	1/12/83	0.17
Q1T52B008-4	EC10	WA 6188	1/12/83	0.17
Q1T52B023-B	WA03	WA 6188	1/11/83	0.034
Q1T52B015-B	WA02	WA 6188	1/11/83	0.068
Q1T52B046-B	WA05	WA 6188	1/11/83	0.17
Q1T52B047-B	WA 6	WA 6188	1/11/83	0.102
Q1T52A005-B	WA07	WA 6188	1/11/83	0.34
Q1T52A006-B	WA08	WA 6188	1/11/83	0.238
Q1T52B018-B	WA09	WA 6188	1/11/83	0.068

TYPE B TEST SUMMARY FOR 4th REFUELING

DATE: 3/21/83

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52B016-B	WA10	WA 6188	1/10/83	1.02
Q1T52B017-B	WA11	WA 6188	1/10/83	0.34
Q1T52B032-N	WA21	WA 6188	1/10/83	0
Q1T52B033-N	WA22	WA 6188	1/10/83	0.34
Q1T52B034-N	WA23	WA 6188	1/10/83	0.17
Q1T52B035-N	WA24	WA 6188	1/10/83	3.06
Q1T52B020-B	WB03	WA 6188	3/11/83	0.034
Q1T52B022-B	WB07	WA 6188	1/11/83	0.17
Q1T52B025-B	WB09	WA 6188	1/11/83	0.17
Q1T52B038-B	WB11	WA 6188	2/8/83	0
Q1T52B037-N	WB21	WA 6188	1/10/83	0.068
Q1T52B039-N	WB24	WA 6188	1/10/83	0
Q1T52B026-3	WC01	WA 6188	1/11/83	0.136
Q1T52B024-3	WC03	WA 6188	1/11/83	0.136
Q1T52B028-3	WC05	WA 6188	1/11/83	0.102
Q1T52B030-2	WC07	WA 6188	1/11/83	0.102
Q1T52B042-2	WC09	WA 6188	1/10/83	0.068
Q1T52B031-2	WC11	WA 6188	1/10/83	0.102
Q1T52B040-N	WC21	WA 6188	1/10/83	0.238
Q1T52B041-N	WC23	WA 6188	1/10/83	0.27
Q1T52B009-A	EC07	WA 6188	1/12/83	0.027
Q1T52B011-B	WC08	WA 6188	1/11/83	0

TYPE C TEST SUMMARY FOR 4th REFUELING

DATE: 3/22/83

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
10	Q1E11V025A	60538	2/3/83	49.1	
	Q1E11V026A	60538	2/3/83	49.1	49.1
11	Q1E11V026B	60539	1/25/83	4.0	
	Q1E11V025B	60539	1/25/83	4.0	4.0
12	Q1P13V290	60540	2/25/83	18.5	
	Q1P13V282	60540	2/25/83	18.5	
	Q1P13V289	60540	2/25/83	18.5	
	Q1P13V281	60540	2/25/83	18.5	18.5
13	Q1P13V292	60541	2.26.83	4.6	
	Q1P13V283	60541	2.26.83	4.6	
	Q1P13V291	60541	2.26.83	4.6	
	Q1P13V284	60541	2.26.83	4.6	4.6
16	Q1E11V001A	60542	2/2/83	4.5	4.5
18	Q1E11V001B	60543	1/25/83	14.2	14.2
23	Q1E21V253A	60544	1/25/83	22.5	
	Q1E21V253B	60544	1/25/83	22.5	
	Q1E21V253C	60544	1/25/83	22.5	
	Q1E21V254	60544	1/26/83	9.2	22.5
24	Q1E21V257	60545	3/9/83	5.0	
	Q1E21V258	60545	3/9/83	2.9	
	Q1E21V119	60545	3/9/83	3.5	5.0
25	Q1E21V115B	60546	1/25/83	13.2	13.2

TYPE C TEST SUMMARY FOR 4th REFUELING

DATE: 3/22/83

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
26	Q1E21V115C	60547	1/25/83	12.6	12.6
27	Q1E21V115A	60548	1/25/83	129.0	129.0
28	Q1E21V249A	60549	1/27/83	27.5	
	Q1E21V213	60549	1/27/83	27.5	
	Q1E21V249B	60549	1/27/83	42.6	42.6
29	Q1E21V049	60550	1/19/83	5.9	
	Q1E21V050	60550	1/19/83	9.2	9.2
30	Q1B13V040	60551	1/25/83	42.4	
	Q1B13V038	60551	1/25/83	71.8	71.8
31	Q1G21V005	60552	1/26/83	26.6	
	Q1G21V006	60552	1/26/83	35.6	
	Q1G21V064	60552	2/8/83	4.3	35.6
32	Q1P16V072	60553	1/25/83	209.0	
	Q1P16V081	60553	1/24/83	93.0	209.0
33	Q1G21HV3380	60554	2/16/83	8.5	
	Q1G21V204	60554	2/16/83	366.0	366.0
42	Q1P17V083	60555	1/22/83	107.5	
	Q1P17V082	60555	1/22/83	0.3	107.5
43	Q1P17HV3045	60556	1/25/83	32.2	
	Q1P17HV3184	60556	1/25/83	19.2	32.2
44	Q1P17V097	60557	1/22/83	31.3	
	Q1P17V099	60557	1/22/83	28.4	31.3

TYPE C TEST SUMMARY FOR 4th REFUELING

DATE: 3/22/83

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
45	Q1P17HV3095	60558	2/11/83	419.2	
	Q1P17V159	60558	1/25/83	90.0	419.2
46	Q1P17HV3443	60559	1/22/83	5.2	
	Q1P17HV3067	60559	1/22/83	61.4	61.4
47	Q1P18V001	60560	3/14/83	33.3	
	Q1P18V002	60560	3/14/83	33.3	33.3
48	Q1P19HV3611	60561	2/23/83	5.0	
	Q1P19V002	60561	2/25/83	21.5	21.5
49	Q1E21V052	60562	1/19/83	7.7	
	Q1E21V091	60562	1/19/83	7.1	7.7
50	Q1P15HV3766	60563	1/19/83	7.5	
	Q1P15HV3334	60563	1/19/83	6.4	7.5
54	Q1E14V002	60564	2/14/83	6.1	
	Q1E14HV3658	60564	2/15/83	69.6	69.6
55	Q1E14HV3657	60565	1/21/83	30.73	
	Q1E14V001	60565	2/2/83	44.6	44.6
56	Q1P15HV3104	60566	1/24/83	6.4	
	Q1P15HV3331	60566	1/24/83	18.4	18.4
57	Q1P15HV3103	60567	1/24/83	26.5	
	Q1P15HV3332	60567	1/24/83	17.9	26.5
58	Q1P15HV3765	60568	2/1/83	4.4	
	Q1P15HV3333	60567	2/1/83	5.2	5.2

TYPE C TEST SUMMARY FOR 4th REFUELING

DATE: 3/22/83

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
59	Q1E11V039B	60569	2/26/83	5.0	
	Q1E11V039A	60569	2/26/83	5.0	
	Q1E21V263A	60569	2/26/83	5.0	
	Q1E21V263B	60569	2/26/83	5.0	
	Q1B13V054	60569	2/25/83	11.4	
	Q1E11V040	60569	2/26/83	5.0	11.4
60	Q1P16V075	60570	1/24/83	153.0	
	Q1P16V017	60570	1/24/83	9.0	153.0
61A	Q1E23V022D	60571	1/31/83	7.4	
	Q1E23V022C	60571	1/31/83	7.4	
	Q1E23V023B	60571	1/31/83	7.4	7.4
61B	Q1E23V024B	60572	2/3/83	8.4	
	Q1E23V025B	60572	2/3/83	8.4	8.4
62	Q1G21V082	60573	1/24/83	4.5	
	Q1G21V001	60573	1/24/83	8.2	8.2
63	Q1E21V058	60574	1/22/83	39.0	
	Q1E21V059	60574	1/19/83	70.1	70.1
64A	Q1B13V037	60575	1/25/83	27.5	
	Q1B13 V039	60575	1/25/83	33.3	33.8
64B	Q1B13V026A	60576	1/22/83	3.5	
	Q1B13V026B	60576	1/22/83	4.7	4.7
66	Q1E23V025A	60577	1/19/83	6.4	
	Q1E23V024A	60577	1/19/83	6.4	6.4

TYPE C TEST SUMMARY FOR 4th REFUELING

DATE: 3/22/83

PENE. NO.	VALVE NO.	MWR/WA	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
67	Q1E23V022B	60578	1/18/83	14.3	
	Q1E23V022A	60578	1/18/83	14.3	
	Q1E23V023A	60578	1/18/83	14.3	14.3
70	Q1E14V004	60579	2/3/83	82.1	
	Q1E14V003	60579	1/19/83	0.8	82.1
71	Q1P23V022A	60580	2/16/83	39.2	39.2
72	Q1P23V002B	60580	2/16/83	10.6	10.6
78	Q1G21HV337	60582	3/12/83	4.2	
	Q1G21V291	60582	3/12/83	4.6	
	Q1G21HV3376	60582	3/12/83	4.6	4.6
82	Q1P11V301	60583	1/26/83	146.3	
	Q1P11V021	60583	1/26/83	12.4	146.3
93	Q1E13V003A	60584	1/22/83	598.0	
	Q1E13V004A	60584	1/22/83	598.0	598.0
94	Q1E13V004B	60585	1/22/83	0.8	
	Q1E13V003B	60585	1/22/83	0.8	0.8
95	Q1G31V012	60586	1/19/83	28.61	
	Q1G31V013	60586	1/19/83	13.2	28.61
97B	Q1P19V004	60588	1/18/83	9.2	
	Q1P19HV2228	60588	1/18/83	4.0	9.2
103	Q1E23V002	60587	1/19/83	6.5	
	Q1E23V003	60587	1/19/83	6.5	6.5

LLRT SUMMARY FOR 3rd REFUELING

DATE: 2/23/82

ELECTRICAL PENETRATION TOTAL	6.26
TYPE B TEST (LESS ELEC. PEN.) TOTAL	40.86
TYPE C TEST TOTAL	2078.17
TOTAL LLRT LEAKAGE	2125.29

MAX. ALLOWABLE LEAKAGE (.6 La) = 151,058.9 SCCM.

2125.29 SCCM = 1.41% OF ALLOWABLE LEAKAGE

TYPE B TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/MWR	DATE	LEAKAGE RATE IN SCCM
Q1T52A003-A	EA01	WA 11446	10/10/81	0.0
Q1T52A004-A	EA02	WA 11446	10/12/81	0.34
Q1T52B014-A	EA03	WA 1146	10/10/81	0.0
Q1T52B001-A	EA05	WA 11446	10/10/81	0.0
Q1T52B005-A	EA06	WR 27453	11/16/81	0.07
Q1T52B002-A	EA09	WA 11446	10/10/81	0.0
Q1T52A001-A	EA10	WA 11446	10/10/81	0.0
Q1T52A002-A	EA11	WA 11446	10/10/81	0.0
Q1T52B019-A	EB01	WA 11446	10/13/81	0.07
Q1T52B007-A	EB05	WA 11446	10/10/81	0.34
Q1T52B006-A	EB09	WA 11446	1/7/81	0.03
Q1T52B013-1	EC01	WA 11446	10/10/81	0.0
Q1T52B012-1	EC03	WA 11446	10/10/81	0.0
Q1T52B010-4	EC08	WA 11446	10/10/81	0.0
Q1T52B008-4	EC10	WA 11446	10/10/81	0.17
Q1T52B023-B	WA03	WA 11446	10/12/81	0.0
Q1T52B015-B	WA02	WA 11446	10/12/81	0.0
Q1T52B046-B	WA05	WA 11446	10/12/81	0.0
Q1T52B047-B	WA06	WA 11446	10/12/81	0.0
Q1T52A005-B	WA07	WA 11446	10/12/81	0.0
Q1T52A006-B	WA08	WA 11446	10/12/81	0.0
Q1T52B018-B	WA09	WA 11446	10/12/81	0.0

TYPE B TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

ELEC. PENE. TPNS NO.	NOZZLE LOCATION	WA/IWR	DATE	LEAKAGE RATE IN SCCM
Q1T52B016-B	WA10	WA 11446	10/12/81	0.0
Q1T52B017-B	WA11	WA 11446	10/12/81	0.0
Q1T52B032-N	WA21	WA 11446	10/12/81	0.07
Q1T52B033-N	WA22	WA 11446	10/12/81	0.0
Q1T52B034-N	WA23	WA 11446	10/12/81	0.03
Q1T52B035-N	WA24	WA 11446	10/12/81	3.40
Q1T52B020-B	WB03	WA 11446	11/13/81	0.0
Q1T52B022-B	WB07	WA 11446	10/12/81	0.0
Q1T52B025-B	WB09	WA 11446	10/12/81	0.0
Q1T52B038-B	WB11	WA 11446	12/2/81	0.10
Q1T52B037-N	WB21	WA 11446	10/12/81	0.07
Q1T52B039-N	WB24	WA 11446	10/12/81	0.17
Q1T52B026-3	WC01	WA 11446	10/12/81	0.0
Q1T52B024-3	WC03	WA 11446	10/12/81	0.0
Q1T52B028-3	WC05	WA 11446	10/12/81	0.17
Q1T52B030-2	WC07	WA 11446	10/12/81	0.0
Q1T52B042-2	WC09	WA 11446	10/12/81	0.14
Q1T52B031-2	WC11	WA 11446	10/12/81	0.10
Q1T52B040-N	WC21	WA 11446	10/12/81	0.0
Q1T52B041-N	WC23	WA 11446	10/12/81	0.0
Q1T52B009-A	EC07	WA 11446	10/12/81	0.0
Q1T52B011-B	WC08	WA 11446	10/12/81	0.99

TYPE C TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

PENE. NO.	VALVE NO.	MWR	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
10	Q1E11V025A	40975	10/3/81	191.7	191.7
	Q1E11V026A	40975	10/3/81	191.7	
11	Q1E11V026B	40976	10/4/81	28.9	28.9
	Q1E11V025B	40976	10/4/81	28.9	
12	Q1P13V290	40977	10/9/81	16.2	16.2
	Q1P13V282	40977	10/9/81	16.2	
	Q1P13V290	40977	10/9/81	16.2	
	Q1P13V281	40977	10/9/81	16.2	
13	Q1P13V292	40978	10/4/81	21.8	21.8
	Q1P13V283	40978	10/4/81	21.8	
	Q1P13V291	40978	10/4/81	21.8	
	Q1P13V284	40978	10/4/81	21.8	
16	Q1E11V001A	40979	10/8/81	2.6	2.6
18	Q1E11V001B	40980	10/6/81	25.4	25.4
23	Q1E21V253A	40981	10/6/81	1.9	1.9
	Q1E21V253B	40981	10/6/81	1.9	
	Q1E21V253C	40981	10/6/81	1.9	
	Q1E21V254	40981	10/6/81	1.9	
24	Q1E21V257	40982	11/13/81	1.0	1.6
	Q1E21V258	40982	11/13/81	1.6	
	Q1E21V119	40982	11/13/81	0.5	
25	Q1E21V115B	40983	10/14/81	2.2	2.2
26	Q1E21V115C	40984	10/6/81	1.9	1.9

TYPE C TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

PENE. NO.	VALVE NO.	MWR	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PEN...
27	Q1E21V115A	40985	12/16/81	0.5	0.5
28	Q1E21V249A	40986	10/7/81	2.5	2.5
	Q1E21V213	40986	10/7/81	2.5	
	Q1E21V249B	40986	10/7/81	2.4	
29	Q1E21V049	40974	10/3/81	0.6	0.6
	Q1E21V050	40974	10/3/81	0.0	
30	Q1B13V040	46502	10/3/81	7.9	7.9
	Q1B13V038	46502	10/3/81	7.5	
31	Q1G21V005	40988	10/5/81	8.9	189.0
	Q1G21V006	40988	10/5/81	189.0	
	Q1G21V064	40988	10/5/81	1.6	
32	Q1P16V072	40965	10/5/81	18.9	35.0
	Q1P16V081	40965	10/5/81	35.0	
33	Q1G21HV3380	40989	10/5/81	53.0	243.0
	Q1G21V204	40989	10/5/81	243.0	
42	Q1P17V083	40967	10/4/81	5.0	127.4
	Q1P17V082	40967	10/4/81	127.4	
43	Q1P17HV3045	40968	10/4/81	325.0	325.0
	Q1P17HV3184	40968	10/4/81	1.0	
44	Q1P17V097	40969	12/1/81	1.5	339.0
	Q1P17V099	40969	10/4/81	339.0	
45	Q1P17HV3095	40970	10/6/81	18.1	18.1
	Q1P17V159	40970	10/6/81	6.5	

TYPE C TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

PENE. NO.	VALVE NO.	MWR	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
46	Q1P17HV3443	40971	10/6/81	14.0	14.0
	Q1P17HV3067	40971	10/6/81	1.1	
47	Q1P18V001	40991	10/10/81	1.8	1.8
	Q1P18V002	40991	10/10/81	1.8	
48	Q1P19HV3661	40992	1/6/82	1.0	164.5
	Q1P19V002	40992	1/6/82	164.5	
49	Q1E21V052	40993	10/5/81	13.1	13.1
	Q1E21V091	40993	10/5/81	11.17	
50	Q1P15HV3770	40994	10/5/81	1.9	2.4
	Q1P15HV3334	40994	10/5/81	2.4	
54	Q1E14V002	40995	10/7/81	20.07	20.07
	Q1E14HV3658	40995	10/7/81	13.0	
55	Q1E14HV3657	40996	10/8/81	16.4	16.4
	Q1E14V001	40996	10/8/81	3.0	
56	Q1P15HV3104	40997	10/9/81	2.5	2.5
	Q1P15HV3331	40997	10/9/81	2.3	
57	Q1P15HV3103	40998	10/9/81	2.6	2.6
	Q1P15HV3332	40998	10/9/81	2.6	
58	Q1P15HV3765	40999	10/9/81	0.9	1.1
	Q1P15HV3333	40999	10/9/81	1.1	

TYPE C TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

PENE. NO.	VALVE NO.	MWR	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
59	Q1E11V039B	41000	11/4/81	48.5	48.5
	Q1E11V039A	41000	11/4/81	0.0	
	Q1E21V263A	41000	11/4/81	22.3	
	Q1E21V263B	41000	11/4/81	28.3	
	Q1B13V054	41000	11/4/81	0.0	
	Q1E11V040	41000	11/4/81	25.9	
60	Q1P16V075	40966	11/12/81	0.0	14.7
	Q1P16V017	40966	11/12/81	14.7	
61A	Q1E23V022D	41001	10/8/81	1.2	1.2
	Q1E23V022C	41001	10/8/81	1.2	
	Q1E23V023B	41001	10/8/81	1.2	
61B	Q1E23V024B	46112	10/8/81	2.0	2.0
	Q1E23V025B	46112	10/8/81	2.0	
62	Q1G21V082	46113	10/9/81	2.1	4.5
	Q1G21V001	46113	10/9/81	4.5	
63	Q1E21V058	46114	10/9/81	3.8	3.8
	Q1E21V059	46114	10/9/81	2.8	
64A	Q1B13V037	46115	10.9.81	0.9	1.4
	Q1B13hV039	46115	10.9.81	1.4	
64B	Q1B13V026A	46116	10.9.81	2.0	2.0
	Q1B13V026B	46116	10.9.81	1.9	

TYPE C TEST SUMMARY FOR 3rd REFUELING

DATE: 1/14/82

AS LEFT

PENE. NO.	VALVE NO.	MWR	DATE	LEAKAGE RATE IN SCCM	TOTAL LEAKAGE PER PENE.
66	Q1E23V025A	46117	10/8/81	14.1	14.1
	Q1E23V024A	46117	10/8/81	14.1	
67	Q1E23V022B	46118	10/8/81	2.0	2.0
	Q1E23V022A	46118	10/8/81	2.0	
	Q1E23V023A	46118	10/8/81	2.0	
70	Q1E14V004	46120	12/7/81	5.6	5.6
	Q1E14V003	46120	10/8/81	4.2	
71	Q1P23V022A	46121	10/3/81	21.6	21.6
72	Q1P23V002B	46121	10/3/81	60.9	60.9
78	Q1G21HV3377	46123	10/7/81	2.0	2.0
	Q1G21V291	46123	10/7/81	1.9	
	Q1G21HV3376	46123	10/7/81	1.9	
82	Q1P11V001	46124	10/7/81	19.3	19.3
	Q1P11V002	46124	10/7/81	3.9	
93	Q1E13V003A	40972	10/3/81	19.7	19.7
	Q1E13V004A	40972	10/3/81	19.7	
94	Q1E13V004B	40973	10/3/81	0.0	0.0
	Q1E13V003B	40973	10/3/81	0.0	
95	Q1G31V012	46125	10/7/81	22.0	22.0
	Q1G31V013	46125	10/7/81	4.5	
97B	Q1P19V004	46126	10/9/81	2.7	9.8
	Q1P19HV2228	46126	10/9/81	9.8	
103	Q1E23V002	41092	10/8/81	2.4	2.4
	Q1E23V003	41092	10/8/81	2.4	

TYPE B TEST SUMMARY FOR 3rd REFUELING

DATE: 2/23/82

AS LEFT

PENE. NO	DESCRIPTION	MWR	DATE	LEAKAGE RATE IN SCCM
14	Fuel Transfer Tube - Flange Double "O" Ring	48347	1/18/82	9.1
14	Fuel Transfer Tube - Bellows	48347	12/30/81	0.5
84	Equipment Hatch - Between "O" Rings	N/A	2/9/82	12.8
86	Personnel Lock Outer Door - Between "O" Rings	N/A	2/17/82	0.0
86	Personnel Lock - Volume Between Doors	47199	2/14/82	9.04
87	Auxiliary Access Lock Outer Door - Between "O" Rings	N/A	2/23/82	0.0
87	Auxiliary Access Lock - Volume Between Doors	41726	2/14/82	9.42

APPENDIX I

Modifications to Containment

APPENDIX I

Modifications to Containment:

Two electrical penetrations and three temporary flanges were added to the containment directly prior to performance of the ILRT so that the requirements of 10CFR50, Appendix J, section IV.A would be met. These penetrations and their local leak rate results are reported in Appendix H and are repeated here.

Elec. Pene. TPNS No.	Nozzle Location	WA/MWR	Date	Leakage Rate in SCCM
Q1T52B052-A	EB10	WA 31190	3/20/84	.195
Q1T52B053-B	WC02	WA 31190	3/20/84	.02
Q1T52B053-B	EB02*	WA 31190	3/26/84	0
Q1T52B053-B	EC05*	WA 31190	3/26/84	10.5
Q1T52B053-B	EB04*	WA 31190	3/26/84	4.2

* Temporary flanges added to the penetration nozzle