

FLORIDA POWER CORPORATION  
Crystal River Unit 3 Nuclear Power Plant

REACTOR CONTAINMENT BUILDING INTEGRATED  
LEAKAGE RATE TEST REPORT

November 7, 1991

## TABLE OF CONTENTS

- I. INTRODUCTION
- II. TEST SYNOPSIS
- III. TEST DATA SUMMARY
  - A. Plant Information
  - B. Technical Data
  - C. Type A Test Results
  - D. Type B and C Test Results
  - E. Integrated Leakage Rate Measurement System
  - F. Information Retained at Plant
- IV. ANALYSIS AND INTERPRETATION
- V. REFERENCES
- VI. APPENDICES
  - A. Stabilization Phase Data
  - B. ILRT Test Data and Plots
  - C. Verification Phase Data and Plots
  - D. Instrument Selection Guide Calculations
  - E. Description of General Physics ILRT Computer Program
  - F. Local Leakage Rate Test Summaries
  - G. Sensor Locations and Volume Fractions

## I. INTRODUCTION

The Reactor Building Integrated Leakage Rate "Type A" Test is performed to demonstrate that leakage through the primary reactor containment systems and components penetrating primary reactor containment do not exceed the allowable leakage rates specified in the Plant Technical Specifications.

The purpose of this report is to provide information pertinent to the activities related to the preparation, test performance, and reporting of the Crystal River Unit 3 Nuclear Power Plant Integrated Leakage Rate Test (ILRT).

Highlights of activities and events which occurred prior to and during the ILRT are presented in Section II, Test Synopsis.

Section III, Test Data Summary, contains data and results necessary to demonstrate containment atmosphere stabilization, acceptable leakage rate, and successful verification test. In addition, plots provided in Appendices B and C supply a visual history of containment atmospheric conditions beginning with the 24 hour ILRT test period and ending with the verification test.

Information in Section IV, Analysis and Interpretation, supplies the technical details associated with the ILRT computer program and its associated hardware as well as the instrumentation used during the ILRT.

Section V, References, lists the documents used for the conduct of the ILRT.

The successful periodic Type A and verification test were performed according to the requirements of the Crystal River Unit 3 Technical Specifications and 10CFR50, Appendix J. The test method used was the Absolute Method, as described in ANSI/ANS 56.8-1987, "Containment System Leakage Testing Requirements".

Leakage rates were calculated using the mass point analysis technique described in ANSI/ANS 56.8-1987. Total Time Analysis equations from ANSI N45.4-1972, "Leakage-Rate Testing of Containment Structures for Nuclear Reactors" were run concurrently for informational purposes. The test results are reported in accordance with the requirements of 10CFR50, Appendix J, Section V.B.3.



## II. TEST SYNOPSIS

Prior to containment pressurization on November 4, 1991, site personnel were engaged in prerequisite activities for the conduct of the ILRT. The ILRT was conducted at the end of the 8M midcycle outage. The following discussion highlights some of the activities that were essential to the successful and timely completion of the ILRT. These items are presented in chronological order.

### A. Pre-pressurization Activities

These activities included: local leakage rate testing of penetrations which were to be isolated during the ILRT, "as found" and "as left" local leakage rate testing of penetrations which were scheduled for maintenance prior to the ILRT, ILRT procedure review and finalization, ILRT computer program check out and linkup to the Fluke 2285B Data Acquisition System, ILRT instrumentation installation and operability checks, and containment subvolume weighting factor and sensor failure analysis calculation.

The ILRT test procedure was reviewed against the requirements of the Plant Technical Specifications; 10CFR50, Appendix J; and ANSI/ANS 56.8-1987.

The ILRT instrumentation was calibrated prior to the ILRT as recommended by ANSI N45.4-1972, Sections 6.2 and 6.3. Final ILRT instrumentation operability checks and in-situ checks, as specified in ANSI/ANS 56.8-1987, Section 4.2.3.1, were performed to ensure that all instrumentation was operating correctly. Calibration records for the ILRT instrumentation system components are retained at the plant.

B. Test Summary Time-Line

| <u>Phase</u>      | <u>Time Frame</u>                                | <u>Duration</u> |
|-------------------|--|-----------------|
| Pressurization    | From: 22:50 on 11/04/91<br>To: 23:40 on 11/05/91 | 24.83 hours     |
| Stabilization     | From: 23:45 on 11/05/91<br>To: 05:30 on 11/06/91 | 5.75 hours      |
| ILRT Test         | From: 05:30 on 11/06/91<br>To: 05:30 on 11/07/91 | 24.00 hours     |
| Verification Test | From: 05:30 on 11/07/91<br>To: 09:45 on 11/07/91 | 4.25 hours      |

C. Containment Pressurization

Containment pressurization started at 22:50 on November 4, 1991 using six 1500 cfm diesel-driven 100% oil-free air compressors. The pressurization rate was maintained at approximately 3.6 psi per hour until containment pressure reached 48 psig. At this time, the pressurization rate was gradually reduced by reducing the number of operating compressors and increasing backpressure with LRV-24. All compressors were stopped when the containment pressure reached 54.5 psig. at 23:40 on November 5, 1991. This was within the procedural limits of  $53.9 \pm 1.0$  psig.

During pressurization an external containment walkdown was performed to identify potential leakage. During the walkdown a pressure buildup approximating building pressure was noted on the personnel airlock seals. Pressurization was stopped at 7 psig and the seals were inspected. The door seals were found to be in good condition and pressurization was resumed. No measurable leakage was observed from any other penetration in the test lineup. Pressurization was conducted with the use of the reactor building recirculation fans in slow speed. The fans were stopped at a pressure of 48.7 psig and were not used during the ILRT or verification test. Very little temperature stratification was observed.

#### D. Containment Atmospheric Stabilization

The stabilization phase was started at 23:45 on November 5, 1991. By 03:45 on November 6, 1991, the temperature stabilization criteria of ANSI/ANS 56.8-1987 had been met. The containment was declared stable at 05:30 of November 6, 1991 and the ILRT test period was begun.

#### E. ILRT Test Period

The ILRT was officially started after the 05:15 data point with the next data point at 05:30 on November 6, 1991 and was successfully completed at 05:30 on November 7, 1991. The maximum allowable leakage rate ( $L_a$ ) for the containment is 0.25 % wt. per day with a test acceptance limit of 0.1875 % wt. per day ( $0.75 L_a$ ). The Total Time and Mass Point Analyses were run concurrently on the General Physics ILRT Computer Program. The leakage rate results are as follows:

|   | Total Time<br>Analysis<br><u>% wt./day</u> | Mass Point<br>Analysis<br><u>% wt./day</u> |
|---|--|--|
| Calculated Leakage Rate   | 0.0871 *                                   | 0.0962 *                                   |
| 95 % Upper Confidence<br>Leakage rate   | 0.0958 *                                   | 0.0968 *                                   |
| * Does not include penalties for nonstandard alignments and water level changes |  |  |

#### F. Verification Test

A successful verification test was conducted following the ILRT. At 05:30 on November 7, 1991, a leakage rate of 15.15 scfm leakage imposed on the primary containment. The 15.15 scfm leakage imposed ( $L_a$ ) on the existing containment leakage was slightly less than  $L_a$  (0.25 % wt./day) at 0.2383 % wt. per day. The verification phase was completed at 09:45 of the same day.

As a twenty four hour test was performed, the mass point verification test results are presented below:

|   | Mass Point<br>Analysis<br><u>% wt./day</u> |
|---|--|
| Leakage Rate ( $L_{am}$ )                 | 0.0962                                     |
| Imposed Leak ( $L_o$ )                    | 0.2383                                     |
| Lower Limit:<br>$L_o + L_{am} - 0.25 L_a$ | 0.2720                                     |
| Composite Leakage ( $L_c$ )               | 0.2810                                     |
| Upper Limit:<br>$L_o + L_{am} + 0.25 L_a$ | 0.3970                                     |

#### G. Local Leakage Rate Testing

Prior to the start of the ILRT, "as found" local leakage rate testing (LLRT) was performed as required by 10CFR50, Appendix J. Results from this testing were required for those penetrations not exposed to the ILRT pressure to complete the analysis of the "as found" ILRT results. The "as found" local leakage rate testing was completed on October 26, 1991.

### III. TEST DATA SUMMARY

#### A. Plant Information

|                     |   |
|---------------------|---|
| Owner               | Florida Power Corporation   |
| Plant               | Crystal River Unit 3 Nuclear Power Plant  |
| Location            | Approx. 5 miles north of Crystal River, FL  |
| Docket No.          | 50-302  |
| Containment Type    | Reinforced concrete structure composed of cylindrical walls (prestressed with a post-tensioning tendon system in the vertical and horizontal directions), with a flat foundation mat (conventional reinforcing) and a shallow dome roof (prestressed utilizing a three-way post tensioning tendon system). The inside surface is lined with a carbon steel liner. |
| NSSS Supplier, Type | Babcock & Wilcox PWR  |
| Date Test Completed | November 7, 1991.   |

#### B. Technical Data

|                                      |                      |
|--------------------------------------|----------------------|
| Containment Net Free Volume          | 2,000,000 cubic feet |
| Design Pressure                      | 55 psig              |
| Design Temperature                   | 281° F               |
| Calculated Peak Accident Pressure    | 53.9 psig            |
| Calculated Peak Accident Temperature | 278° F               |

#### C. Test Results - Type A

|               |           |
|---------------|-----------|
| Test Method   | Absolute  |
| Test Pressure | 54.5 psig |

Integrated Leakage Rate Total Time Analysis Test Results (Presented for information only):

|  |                  |
|--|------------------|
| Calculated Leakage Rate, $L_{am}$        | 0.0871 % wt./day |
| 95 % Upper Confidence Limit Leakage Rate | 0.0958 % wt./day |

Integrated Leakage Rate Mass Point Analysis Test Results:

|   |                                |
|---|--------------------------------|
| Calculated Leakage Rate, $L_{am}$             | 0.0962 % wt./day               |
| 95 % Upper Confidence Limit Leakage Rate      | 0.0986 % wt./day               |
| Maximum Allowable Leakage Rate, $L_a$         | 0.25 % wt./day                 |
| ILRT Acceptance Criteria, $0.75 L_a$          | 0.1875 % wt./day               |
| Verification Test Imposed Leakage Rate, $L_o$ | 15.15 scfm or 0.2383 % wt./day |

Verification Test Mass Point Analysis Results and Limits:

|   |                  |
|---|------------------|
| Upper Limit<br>( $L_o + L_{a,n} + 0.25 L_a$ ) | 0.3970 % wt./day |
| Calculated Composite Leakage Rate, $L_c$      | 0.2810 % wt./day |
| Lower Limit<br>( $L_o + L_{am} - 0.25 L_a$ )  | 0.2720 % wt./day |

Report Printouts

The report printouts of the ILRT and verification test calculations for the Total Time and Mass Point Analyses are provided in Appendices B and C. Stabilization data is provided in Appendix A.

D. Test Results - Type B and C Tests

A summary of local leakage rate test results since the ILRT in November 1987 are included in Appendix F.

E. Integrated Leakage Rate Measurement System

1. Absolute Pressure

|               |                      |
|---------------|----------------------|
| Quantity      | 2                    |
| Manufacturer  | Paroscientific       |
| Type          | DigiQuartz Model 740 |
| Range         | 0 - 100 psia         |
| Accuracy      | $\pm 0.01$ % F.S.    |
| Sensitivity   | $\pm 0.005$ psia     |
| Repeatability | $\pm 0.005$ psia     |
| Resolution    | $\pm 0.0001$ psia    |

2. Dry-Bulb Temperature

|                   |  |
|-------------------|--|
| Quantity          | 24   |
| Manufacturer      | Rosemount  |
| Type              | 78N01N00N120 100 ohm platinum resistance temperature detectors (RTD) |
| Range, calibrated | 75 - 125 ° F   |
| Accuracy          | $\pm 0.5$ ° F  |
| Sensitivity       | $\pm 0.01$ ° F   |

3. Water Vapor Pressure

|              |  |
|--------------|--|
| Quantity     | 10   |
| Manufacturer | Phys-Chem Scientific   |
| Type         | Humitemp-5 Precision Relative Humidity-Temperature Monitor, Model 2150 with PCRC-11 HPB probes |



|    |                   |  |
|----|-------------------|--|
|    | Range             | 0 - 100% RH                                |
|    | Accuracy          | $\pm 1.8^{\circ}$ F (Dewpoint Temperature) |
|    | Sensitivity       | $\pm 0.1^{\circ}$ F (Dewpoint Temperature) |
| 4. | Verification Flow |  |
|    | Quantity          | 2  |
|    | Manufacturer      | Brooks                                     |
|    | Type              | Model 1110-08 Rotometer                    |
|    | Range             | .76-7.6scfm @ 14.7 psig and 70° F          |
|    | Accuracy          | $\pm 2\%$ F.S.                             |
| 5. | Readout Device    |  |
|    | Quantity          | 1  |
|    | Manufacturer      | Fluke                                      |
|    | Type              | Model 2285B                                |
|    | Repeatability     |  |
|    | Drybulb Temp      | $\pm 0.054^{\circ}$ F                      |
|    | Dewpoint Temp     | $\pm 0.04^{\circ}$ F                       |
|    | Resolution        | $\pm 0.01^{\circ}$ F                       |

The instrumentation Selection Guide (ISG) value from ANSI/ANS 56.8-1987 based on a 24 hour test and the above ILRT instrumentation configuration is 0.0108 % wt./day (Refer to Appendix D for calculations). The sensor locations and volume fractions as installed for the ILRT are shown in Appendix G.

G. Information Retained at Plant

The following information is available for review at Crystal River Unit 3 Nuclear Power Plant site:

1. A listing of all containment penetrations including the total number, size, and function.
2. A listing of normal operating instrumentation used for the leakage test.
3. A system lineup (at time of test) showing required valve positions and status of piping systems.
4. A continuous, sequential log of events from the initial survey of containment to restoration of tested systems.
5. Documentation of instrumentation calibrations and standards, including a sensor failure analysis.
6. Data to verify temperature stabilization criteria as established by test procedure (Appendix A).
7. The working copy of the test procedure that includes signature sign-offs of procedural steps.
8. The procedure and data that verifies completion of penetration and valve testing including as-found leak rates, corrective action, and final leak rates.
9. Computer printouts of ILRT data and automated data acquisition printouts along with a summary description of the computer program.
10. A review of confidence limits of test results with accompanying computer printouts.

11. Description of the method of leakage rate verification.
12. ILRT data plots obtained during the test.
13. The P&IDs of pertinent systems.

#### IV. ANALYSIS AND INTERPRETATION

The upper 95% confidence limit (UCL) Total Time and Mass Point leakage rates calculated during the ILRT were less than the test acceptance criteria of 0.75 L<sub>a</sub> (0.1875% wt/day). Additions to the calculated leakage rates must be made to account for penetration paths not exposed to the ILRT pressure and for changes in the net free containment volume due to changes to containment water levels. These additions are discussed below.

##### A. Type C Penalties

Penetration paths not exposed to the ILRT pressure and the corresponding minimum pathway leakage rates are as follows:

| <u>Per No.</u> | <u>System</u> | <u>Leakage Rate (sccm)</u> |
|----------------|---------------|----------------------------|
| 116            | RB Leak Rate  | 41                         |
| 122            | RB Leak Rate  | 15                         |
| 202            | RB Leak Rate  | 69.6                       |
| 314            | Main Steam    | 420                        |
| 316            | Main Steam    | 1030                       |
| 318            | Main Steam    | 20                         |
| 320            | Main Steam    | 20                         |
| 427            | Main Steam    | 605                        |
| 428            | Main Steam    | 1255                       |

The total applicable local leakage rate Type C penalty addition is 3,475.6 sccm which is equivalent to 0.0019% wt. per day.

## B. Volume Change Corrections

The following volumes were monitored for liquid level changes which would affect the containment net free volume:

| <u>Volume Monitored</u> | <u>Level Change</u> | <u>Volume Change</u> |
|-------------------------|---------------------|----------------------|
| Pressurizer             | -10 inches          | +30.8 cu. ft.        |
| Reactor Building Sump   | + 3 inches          | -9.48 cu. ft.        |

Conservatively, level decreases can be disregarded since their effect is already included in the measured leakage rate. The increase in reactor building sump resulted in a decrease of 9.48 cubic feet in the containment net free volume. This is equivalent to a leakage rate of 0.0005 % wt. per day.

## C. As Left ILRT Results

The as left ILRT leakage rate including the required additions is as follows:

|                                  | <u>Total Time<br/>Analysis<br/>(% wt./day)</u> | <u>Mass Point<br/>Analysis<br/>(% wt./day)</u> |
|----------------------------------|--|--|
| 95 % UCL Leakage Rate            | 0.0958   | 0.0986   |
| Type C Penalties                 | 0.0019   | 0.0019   |
| Volume Change                    | 0.0005   | 0.0005   |
| As Left 95 % UCL<br>Leakage Rate | 0.0982   | 0.1010   |

The as left Total Time and Mass Point 95 % UCL leakage rates are less than the maximum allowable leakage rate value stated in the technical specifications of  $0.75 L_a$  (0.1875 % wt./day).

D. As Found ILRT Results

Repairs or adjustments were made to the following penetrations which would require correction to the as left ILRT result.

| <u>Penetration</u> | <u>Leakage Savings(ccm)</u> |
|--------------------|-----------------------------|
| 113                | 595                         |
| 439                | 105.7                       |

The total leakage savings is 700.7 sccm based on minimum pathway analysis. This is equivalent to 0.0004 % wt. per day. The as found ILRT leakage is determined as follows:

|                                | <u>Total Time Analysis (% wt./day)</u> | <u>Mass Point Analysis (% wt./day)</u> |
|--------------------------------|--|--|
| As Left 95 % UCL Leakage Rate  | 0.0982                                 | 0.1010                                 |
| Leakage Savings                | 0.0004                                 | 0.0004                                 |
| As Found 95 % UCL Leakage Rate | 0.0986                                 | 0.1014                                 |

V. REFERENCES

- A. Crystal River Unit 3 Nuclear Power Plant Surveillance Procedure SP-178 Rev. 17, Reactor Containment Building Integrated Leakage Rate Test.
- B. Crystal River Unit 3 Nuclear Power Plant Technical Specifications.
- C. Crystal River Unit 3 Nuclear Power Plant Updated Final Safety Analysis Report.
- D. Code of Federal Regulations, Title 10, Part 50, Appendix J, Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors.
- E. ANSI N45.4-1972, Leakage-Rate Testing of Containment Structures for Nuclear Reactors.
- F. ANSI/ANS 56.8-1987, Containment System Leakage Testing Requirements.



## VI APPENDICES

APPENDIX A  
STABILIZATION PHASE DATA

STABLIZATION MODE  
OPTIONS

TIME : 0515  
MODE SUMMARY

- 1 - MANUAL DATA ENTRY
- 2 - PARAMATER GRAPHS
- 3 - SENSOR PLOTS
- 4 - SENSOR DIFFERENTIALS
- 5 - ANSI STABILIZATION CRITERIA
- 6 - BN-TOP-1 STAB.CRITERIA
- 7 - ANSI CRITERIA PRINTOUT
- 8 - BN-TOP-1 CRITERIA PRINTOUT
- 9 - REPRINT CURRENT DATA POINT
- P - PASS WORD MENU
- 0 - FLASH OFF

# OF DATA POINTS = 23  
MODE DURATION (IN HRS) = 5.5  
TOT TIME MEASURED LEAK = 0.2696  
TOT TIME CALCULATED LEAK = 0.1632  
TOT TIME 95% UCL = 0.5072  
MASS PT LEAK = 0.2415  
MASS PT 95% UCL = 0.2551

ANSI TEMPERATURE STABLIZATION CRITERIA MET  
BN-TOP TEMPERATURE STABLIZATION CRITERIA MET

POINT SUMMARY: CURRENT VALUE/DIFFERENCE FROM PREVIOUS POINT

AVG TEMP: 78.610/ -0.029  
MASS: 688156.50/ -10.000

AVG PRESS: 68.618/ -0.005  
AVG DEW PRESS: 0.4208/-0.0013  
TOTAL PRESS: 69.039/ -0.006

## LEAK RATE ANALYSIS UNIT # 3

TOTAL TIME

MASS POINT

MEASURED

CALCULATED

UCL

CALC.

L95

LEAK  
RATELEAK  
RATELEAK  
RATE

|     |      |        |        |        |        |        |
|-----|------|--------|--------|--------|--------|--------|
| 309 | 0.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 310 | 0.25 | 1.2029 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 310 | 0.50 | 0.7145 | 0.7145 | 0.0000 | 0.7157 | 3.1000 |
| 310 | 0.75 | 0.5437 | 0.4908 | 1.7472 | 0.5124 | 1.0186 |
| 310 | 1.00 | 0.4529 | 0.3654 | 1.0963 | 0.4060 | 0.6812 |
| 310 | 1.25 | 0.4143 | 0.2979 | 0.9158 | 0.3532 | 0.5281 |
| 310 | 1.50 | 0.4468 | 0.2884 | 0.8933 | 0.3625 | 0.4799 |
| 310 | 1.75 | 0.3699 | 0.2532 | 0.7948 | 0.3286 | 0.4213 |
| 310 | 2.00 | 0.3604 | 0.2319 | 0.7374 | 0.3098 | 0.3826 |
| 310 | 2.25 | 0.3403 | 0.2140 | 0.6911 | 0.2937 | 0.3533 |
| 310 | 2.50 | 0.3785 | 0.2177 | 0.6873 | 0.3046 | 0.3538 |
| 310 | 2.75 | 0.3194 | 0.2039 | 0.6508 | 0.2886 | 0.3325 |
| 310 | 3.00 | 0.3181 | 0.1953 | 0.6256 | 0.2798 | 0.3178 |
| 310 | 3.25 | 0.3186 | 0.1905 | 0.6082 | 0.2751 | 0.3077 |
| 310 | 3.50 | 0.2990 | 0.1831 | 0.5876 | 0.2664 | 0.2959 |
| 310 | 3.75 | 0.2963 | 0.1778 | 0.5715 | 0.2608 | 0.2871 |
| 310 | 4.00 | 0.2941 | 0.1741 | 0.5586 | 0.2563 | 0.2797 |
| 310 | 4.25 | 0.3017 | 0.1737 | 0.5513 | 0.2504 | 0.2772 |
| 310 | 4.50 | 0.2895 | 0.1715 | 0.5416 | 0.2534 | 0.2721 |
| 310 | 4.75 | 0.2837 | 0.1693 | 0.5322 | 0.2507 | 0.2677 |
| 310 | 5.00 | 0.2789 | 0.1671 | 0.5234 | 0.2475 | 0.2631 |
| 310 | 5.25 | 0.2758 | 0.1653 | 0.5153 | 0.2446 | 0.2591 |
| 310 | 5.50 | 0.2696 | 0.1632 | 0.5072 | 0.2415 | 0.2551 |

AVG. DATA VALUES UNIT # 3

| DATE | TIME | T(I)   | P(I)   | DT(I) | VP(I) | MASS(I)   |
|------|------|--------|--------|-------|-------|-----------|
| 309  | 0.00 | 80.498 | 68.901 | 0.000 | 0.425 | 688582.00 |
| 310  | 0.25 | 80.245 | 68.830 | 0.000 | 0.424 | 688495.69 |
| 310  | 0.50 | 80.030 | 68.831 | 0.000 | 0.423 | 688479.50 |
| 310  | 0.75 | 79.858 | 68.808 | 0.000 | 0.423 | 688465.00 |
| 310  | 1.00 | 79.719 | 68.789 | 0.000 | 0.423 | 688452.00 |
| 310  | 1.25 | 79.601 | 68.772 | 0.000 | 0.423 | 688433.38 |
| 310  | 1.50 | 79.502 | 68.755 | 0.000 | 0.425 | 688389.69 |
| 310  | 1.75 | 79.401 | 68.743 | 0.000 | 0.424 | 688396.31 |
| 310  | 2.00 | 79.320 | 68.730 | 0.000 | 0.424 | 688375.19 |
| 310  | 2.25 | 79.241 | 68.719 | 0.000 | 0.423 | 688362.31 |
| 310  | 2.50 | 79.174 | 68.705 | 0.000 | 0.426 | 688310.50 |
| 310  | 2.75 | 79.102 | 68.698 | 0.000 | 0.423 | 688329.88 |
| 310  | 3.00 | 79.046 | 68.689 | 0.000 | 0.423 | 688308.13 |
| 310  | 3.25 | 78.997 | 68.680 | 0.000 | 0.423 | 688284.88 |
| 310  | 3.50 | 78.937 | 68.672 | 0.000 | 0.422 | 688281.69 |
| 310  | 3.75 | 78.889 | 68.664 | 0.000 | 0.422 | 688263.13 |
| 310  | 4.00 | 78.847 | 68.657 | 0.000 | 0.421 | 688244.38 |
| 310  | 4.25 | 78.801 | 68.648 | 0.000 | 0.423 | 688214.00 |
| 310  | 4.50 | 78.758 | 68.642 | 0.000 | 0.422 | 688208.19 |
| 310  | 4.75 | 78.716 | 68.635 | 0.000 | 0.422 | 688195.38 |
| 310  | 5.00 | 78.680 | 68.629 | 0.000 | 0.422 | 688181.88 |
| 310  | 5.25 | 78.640 | 68.623 | 0.000 | 0.422 | 688166.50 |
| 310  | 5.50 | 78.610 | 68.618 | 0.000 | 0.421 | 688156.7  |

80.498

UNIT 3

TEMPERATURE

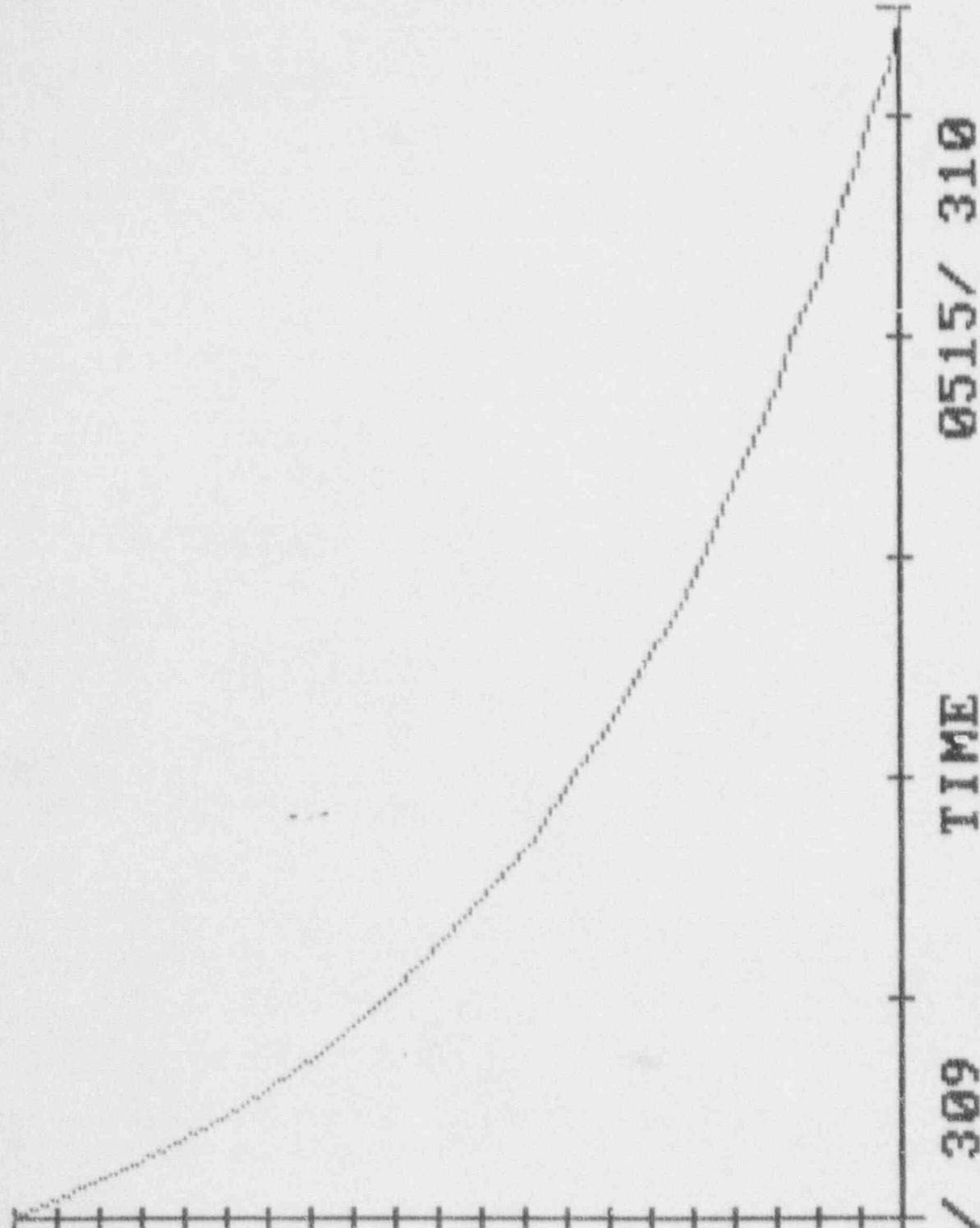
F

78.610

2345/ 309

TIME

0515/ 310



## BN-10P-1 STABILIZATION CRITERIA

| TIME | TEMP    | BN<br>dT | BN<br>dT2 |
|------|---------|----------|-----------|
| 5.50 | 78.6103 | -0.1634  | 0.0606    |
| 5.25 | 78.6396 | -0.1785  | 0.0183    |
| 5.00 | 78.6803 | -0.1831  | 0.0399    |
| 4.75 | 78.7162 | -0.1931  | 0.0600    |
| 4.50 | 78.7579 | -0.2081  | 0.0492    |
| 4.25 | 78.8005 | -0.2204  | 0.0643    |
| 4.00 | 78.8474 | -0.2365  | 0.0781    |
| 3.75 | 78.8893 | -0.2560  | 0.1061    |
| 3.50 | 78.9370 | -0.2825  | 0.0791    |
| 3.25 | 78.9966 | -0.3023  | 0.1353    |
| 3.00 | 79.0465 | -0.3361  | 0.1672    |
| 2.75 | 79.1023 | -0.3779  | 0.1995    |
| 2.50 | 79.1741 | -0.4278  | 0.2957    |
| 2.25 | 79.2413 | -0.5017  | 0.3430    |
| 2.00 | 79.3203 | -0.5890  | 0.0000    |
| 1.75 | 79.4013 | 0.0000   | 0.0000    |
| 1.50 | 79.5021 | 0.0000   | 0.0000    |
| 1.25 | 79.6012 | 0.0000   | 0.0000    |
| 1.00 | 79.7187 | 0.0000   | 0.0000    |
| 0.75 | 79.8582 | 0.0000   | 0.0000    |
| 0.50 | 80.0297 | 0.0000   | 0.0000    |
| 0.25 | 80.2447 | 0.0000   | 0.0000    |
| 0.00 | 80.4983 | 0.0000   | 0.0000    |



## STABILIZATION ANSI56.8

| TIME | TEMP   | 56.8<br>1 HR<br>F/HR | 56.8<br>4 HR<br>F/HR | 4-1<br>HR |
|------|--------|----------------------|----------------------|-----------|
| 5.50 | 78.610 | 0.148                | 0.223                | 0.075     |
| 5.25 | 78.840 | 0.161                | 0.240                | 0.079     |
| 5.00 | 78.680 | 0.167                | 0.260                | 0.093     |
| 4.75 | 78.716 | 0.173                | 0.285                | 0.112     |
| 4.50 | 78.758 | 0.179                | 0.318                | 0.139     |
| 4.25 | 78.801 | 0.196                | 0.361                | 0.165     |
| 4.00 | 78.847 | 0.199                | 0.413                | 0.214     |
| 3.75 | 78.889 | 0.213                | 0.000                | -0.211    |
| 3.50 | 78.937 | 0.237                | 0.000                | -0.211    |
| 3.25 | 78.997 | 0.245                | 0.000                | -0.245    |
| 3.00 | 79.046 | 0.274                | 0.000                | -0.274    |
| 2.75 | 79.102 | 0.299                | 0.000                | -0.299    |
| 2.50 | 79.174 | 0.328                | 0.000                | -0.328    |
| 2.25 | 79.241 | 0.360                | 0.000                | -0.360    |
| 2.00 | 79.320 | 0.398                | 0.000                | -0.398    |
| 1.75 | 79.401 | 0.457                | 0.000                | -0.457    |
| 1.50 | 79.502 | 0.528                | 0.000                | -0.528    |
| 1.25 | 79.601 | 0.644                | 0.000                | -0.644    |
| 1.00 | 79.719 | 0.780                | 0.000                | -0.780    |
| 0.75 | 79.858 | 0.000                | 0.000                | 0.000     |
| 0.50 | 80.030 | 0.000                | 0.000                | 0.000     |
| 0.25 | 80.245 | 0.000                | 0.000                | 0.000     |

## APPENDIX B

### ILRT TEST DATA AND PLOTS

# TEST MODE

PLEASE SELECT THE OPTION  
YOU WISH TO USE:

- 1 - MANUAL DATA ENTRY
- 2 - PARAMETER GRAPHS
- 3 - SENSOR PLOTS
- 4 - TREND ANALYSIS
- 5 - REPRINT CURRENT DATA PT
- 6 - SENSOR DIFFERENTIALS

P - PASS WORD MENU

SELECTED OPTION=

TEST DATA 0530

|                          |   |           |
|--------------------------|---|-----------|
| # OF DATA POINTS         | = | 97        |
| MODE DURATION (IN HOURS) | = | 24        |
| TOT TIME MEASURED LEAK   | = | 0.00968   |
| TOT TIME CALCULATED LEAK | = | 0.00871   |
| TOT TIME 95% UCL         | = | 0.00555   |
| MASS POINT LEAK          | = | 0.00490   |
| MASS POINT 95% UCL       | = | 0.00318   |
| MASS                     | = | 687461.19 |

POINT SUMMARY: CURRENT VALUE/DIFFERENCE FROM PREVIOUS POINT

|           |                    |                |                  |
|-----------|--------------------|----------------|------------------|
| AVG TEMP: | 77.069 / -0.014    | AVG PRESS:     | 68.352 / -0.001  |
| MASS:     | 687461.19 / +4.375 | AVG DEW PRESS: | 0.4010 / -0.0003 |
|           |                    | TOTAL PRESS:   | 68.753 / -0.002  |

0.2597

UNIT 3

MASS  
ANAL.

WT%/  
DAY

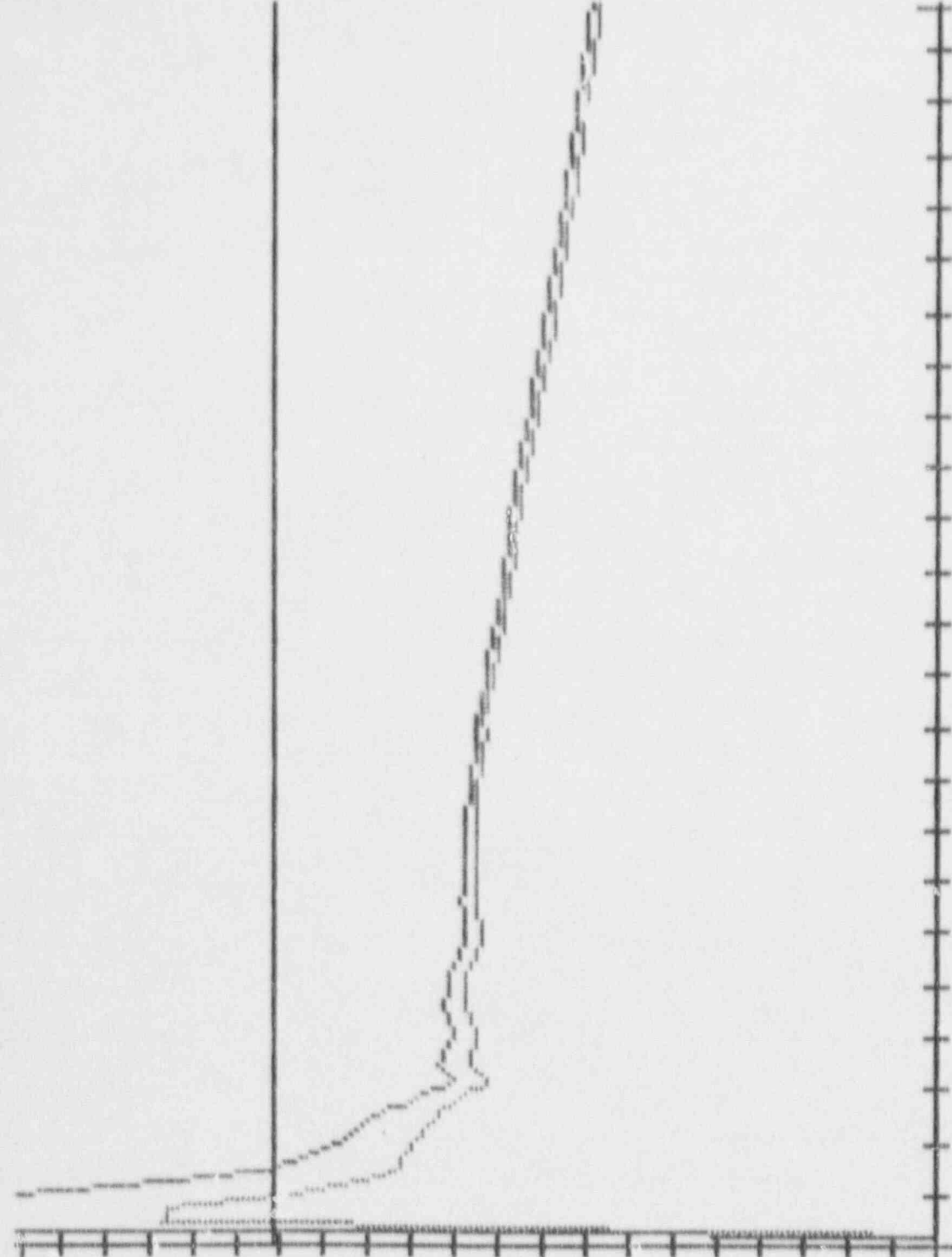
LEGEND  
= L

0.0000

0530/ 310

TIME

0530/ 311



0.3932

UNIT 3

TOT.  
TIME  
ANAL.

WT%/  
DAY

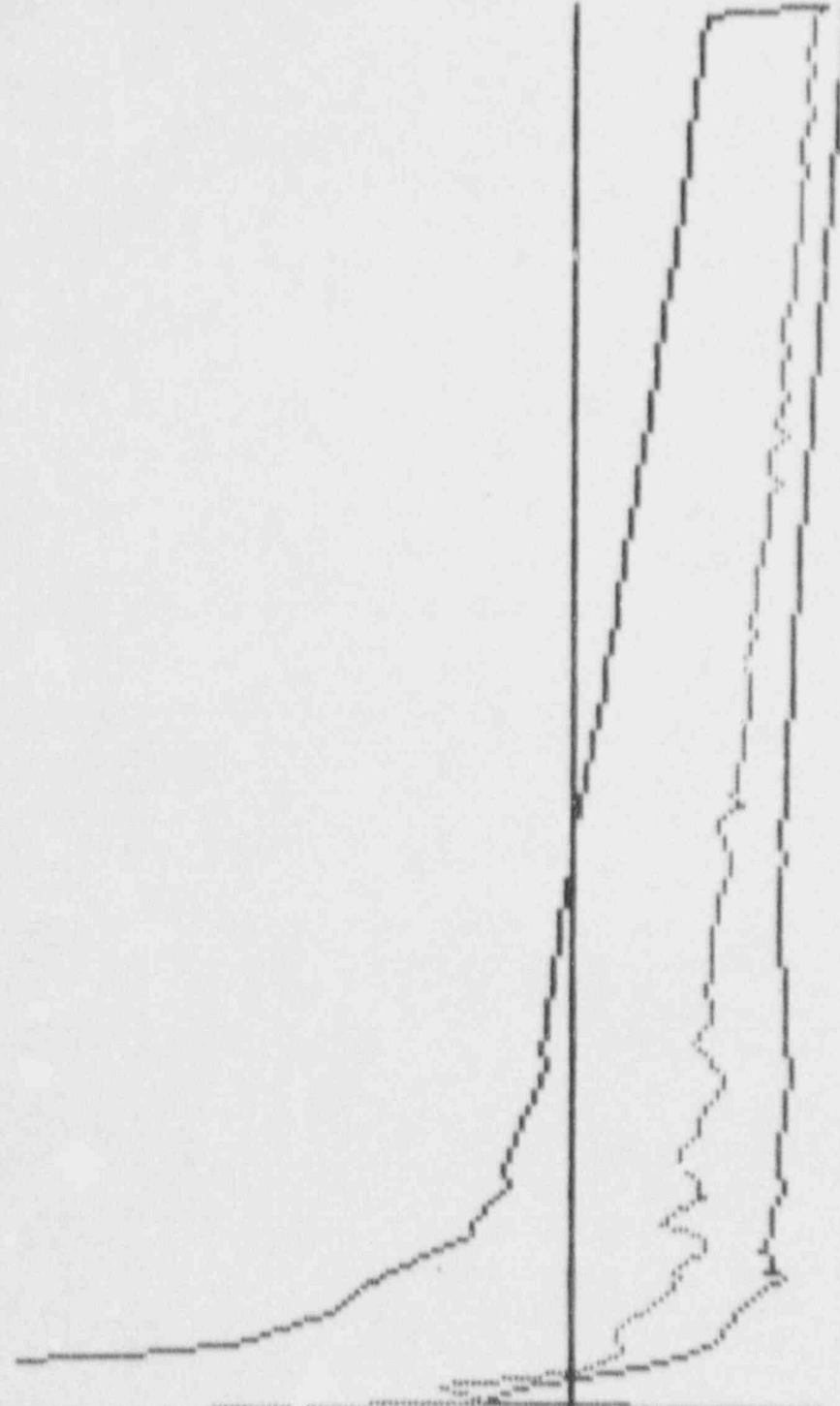
LEGEND  
= L

0.0000

0530/ 310

TIME

0530/ 311



## TOTAL TIME/MASS POINT UNIT # 3

| DATE | TIME | ATLM   | LMCALC | SL     | LAM    | L95    |
|------|------|--------|--------|--------|--------|--------|
| 3/1  | 0.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3/1  | 0.25 | 0.3932 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 310  | 0.50 | 0.2223 | 0.2223 | 0.0000 | 0.2209 | 1.0630 |
| 310  | 0.75 | 0.2380 | 0.2069 | 0.9452 | 0.2190 | 0.3486 |
| 310  | 1.00 | 0.1867 | 0.1695 | 0.4623 | 0.1808 | 0.2597 |
| 310  | 1.25 | 0.1725 | 0.1471 | 0.3523 | 0.1610 | 0.2140 |
| 310  | 1.50 | 0.1707 | 0.1367 | 0.3120 | 0.1537 | 0.1901 |
| 310  | 1.75 | 0.1713 | 0.1327 | 0.2935 | 0.1528 | 0.1790 |
| 310  | 2.00 | 0.1631 | 0.1280 | 0.2762 | 0.1496 | 0.1698 |
| 310  | 2.38 | 0.1498 | 0.1086 | 0.2581 | 0.1408 | 0.1570 |
| 310  | 2.75 | 0.1505 | 0.1161 | 0.2536 | 0.1383 | 0.1514 |
| 310  | 3.00 | 0.1417 | 0.1134 | 0.2421 | 0.1329 | 0.1447 |
| 310  | 3.05 | 0.1393 | 0.1178 | 0.2365 | 0.1295 | 0.1403 |
| 310  | 3.25 | 0.1404 | 0.1148 | 0.2279 | 0.1277 | 0.1373 |
| 310  | 3.53 | 0.1549 | 0.1132 | 0.2253 | 0.1314 | 0.1408 |
| 310  | 3.75 | 0.1467 | 0.1129 | 0.2221 | 0.1321 | 0.1403 |
| 310  | 4.00 | 0.1399 | 0.1104 | 0.2167 | 0.1307 | 0.1381 |
| 310  | 4.27 | 0.1419 | 0.1088 | 0.2130 | 0.1305 | 0.1371 |
| 310  | 4.50 | 0.1492 | 0.1100 | 0.2131 | 0.1326 | 0.1389 |
| 310  | 4.75 | 0.1483 | 0.1107 | 0.2126 | 0.1341 | 0.1399 |
| 310  | 5.00 | 0.1408 | 0.1102 | 0.2102 | 0.1336 | 0.1389 |
| 310  | 5.25 | 0.1409 | 0.1099 | 0.2082 | 0.1330 | 0.1379 |
| 310  | 5.50 | 0.1384 | 0.1094 | 0.2060 | 0.1324 | 0.1369 |
| 310  | 5.75 | 0.1336 | 0.1084 | 0.2030 | 0.1308 | 0.1353 |
| 310  | 6.00 | 0.1328 | 0.1075 | 0.2004 | 0.1293 | 0.1336 |
| 310  | 6.25 | 0.1362 | 0.1073 | 0.1989 | 0.1291 | 0.1331 |

## TOTAL TIME/MASS POINT UNIT # 3

| DATE | TIME  | TTLM   | LMCALC | SL     | LAM    | L95    |
|------|-------|--------|--------|--------|--------|--------|
| 310  | 6.50  | 0.1429 | 0.1082 | 0.1991 | 0.1302 | 0.1341 |
| 310  | 6.75  | 0.1416 | 0.1090 | 0.1989 | 0.1311 | 0.1347 |
| 310  | 7.00  | 0.1366 | 0.1090 | 0.1973 | 0.1308 | 0.1342 |
| 310  | 7.25  | 0.1366 | 0.1091 | 0.1968 | 0.1305 | 0.1337 |
| 310  | 7.50  | 0.1403 | 0.1097 | 0.1966 | 0.1312 | 0.1342 |
| 310  | 7.75  | 0.1367 | 0.1099 | 0.1957 | 0.1312 | 0.1340 |
| 310  | 8.00  | 0.1362 | 0.1100 | 0.1949 | 0.1309 | 0.1336 |
| 310  | 8.25  | 0.1362 | 0.1102 | 0.1941 | 0.1308 | 0.1333 |
| 310  | 8.50  | 0.1368 | 0.1105 | 0.1935 | 0.1308 | 0.1332 |
| 310  | 8.75  | 0.1336 | 0.1104 | 0.1925 | 0.1302 | 0.1325 |
| 310  | 9.00  | 0.1357 | 0.1106 | 0.1919 | 0.1303 | 0.1324 |
| 310  | 9.25  | 0.1331 | 0.1105 | 0.1909 | 0.1298 | 0.1319 |
| 310  | 9.50  | 0.1288 | 0.1101 | 0.1895 | 0.1290 | 0.1312 |
| 310  | 9.75  | 0.1310 | 0.1099 | 0.1885 | 0.1284 | 0.1305 |
| 310  | 10.00 | 0.1331 | 0.1100 | 0.1878 | 0.1282 | 0.1302 |
| 310  | 10.25 | 0.1347 | 0.1103 | 0.1874 | 0.1283 | 0.1302 |
| 310  | 10.50 | 0.1257 | 0.1097 | 0.1860 | 0.1272 | 0.1293 |
| 310  | 10.75 | 0.1307 | 0.1096 | 0.1852 | 0.1268 | 0.1289 |
| 310  | 11.00 | 0.1274 | 0.1093 | 0.1841 | 0.1262 | 0.1283 |
| 310  | 11.25 | 0.1273 | 0.1090 | 0.1831 | 0.1256 | 0.1277 |
| 310  | 11.50 | 0.1250 | 0.1086 | 0.1819 | 0.1249 | 0.1270 |
| 310  | 11.75 | 0.1262 | 0.1083 | 0.1809 | 0.1244 | 0.1265 |
| 310  | 12.00 | 0.1242 | 0.1079 | 0.1798 | 0.1236 | 0.1257 |
| 310  | 12.25 | 0.1228 | 0.1074 | 0.1786 | 0.1228 | 0.1250 |
| 310  | 12.50 | 0.1240 | 0.1071 | 0.1777 | 0.1224 | 0.1245 |
| 310  | 12.75 | 0.1218 | 0.1066 | 0.1766 | 0.1214 | 0.1236 |



## TOTAL TIME/MASS POINT UNIT # 3

| DATE | TIME  | TTLM   | LMCALC | SL     | LAM    | L95    |
|------|-------|--------|--------|--------|--------|--------|
| 310  | 13.00 | 0.1241 | 0.1064 | 0.1757 | 0.1209 | 0.1231 |
| 310  | 13.25 | 0.1238 | 0.1062 | 0.1750 | 0.1206 | 0.1227 |
| 310  | 13.50 | 0.1208 | 0.1057 | 0.1739 | 0.1199 | 0.1220 |
| 310  | 13.75 | 0.1228 | 0.1055 | 0.1732 | 0.1195 | 0.1216 |
| 310  | 14.00 | 0.1209 | 0.1052 | 0.1723 | 0.1191 | 0.1211 |
| 310  | 14.25 | 0.1211 | 0.1049 | 0.1715 | 0.1187 | 0.1207 |
| 310  | 14.50 | 0.1205 | 0.1045 | 0.1707 | 0.1181 | 0.1201 |
| 310  | 14.75 | 0.1187 | 0.1041 | 0.1697 | 0.1176 | 0.1196 |
| 310  | 15.00 | 0.1187 | 0.1038 | 0.1689 | 0.1170 | 0.1191 |
| 310  | 15.25 | 0.1166 | 0.1033 | 0.1679 | 0.1164 | 0.1184 |
| 310  | 15.50 | 0.1159 | 0.1028 | 0.1670 | 0.1156 | 0.1177 |
| 310  | 15.75 | 0.1162 | 0.1024 | 0.1661 | 0.1151 | 0.1173 |
| 310  | 16.00 | 0.1118 | 0.1018 | 0.1649 | 0.1142 | 0.1165 |
| 310  | 16.25 | 0.1158 | 0.1014 | 0.1641 | 0.1137 | 0.1159 |
| 310  | 16.50 | 0.1153 | 0.1010 | 0.1633 | 0.1131 | 0.1154 |
| 310  | 16.75 | 0.1096 | 0.1003 | 0.1622 | 0.1122 | 0.1146 |
| 310  | 17.00 | 0.1137 | 0.0999 | 0.1613 | 0.1117 | 0.1140 |
| 310  | 17.25 | 0.1107 | 0.0994 | 0.1604 | 0.1110 | 0.1134 |
| 310  | 17.50 | 0.1100 | 0.0988 | 0.1594 | 0.1103 | 0.1127 |
| 310  | 17.75 | 0.1111 | 0.0984 | 0.1586 | 0.1096 | 0.1120 |
| 310  | 18.00 | 0.1118 | 0.0980 | 0.1578 | 0.1092 | 0.1116 |
| 310  | 18.25 | 0.1097 | 0.0975 | 0.1570 | 0.1086 | 0.1109 |
| 311  | 18.50 | 0.1101 | 0.0971 | 0.1562 | 0.1081 | 0.1105 |
| 311  | 18.75 | 0.1103 | 0.0967 | 0.1554 | 0.1077 | 0.1100 |
| 311  | 19.00 | 0.1084 | 0.0963 | 0.1546 | 0.1070 | 0.1094 |
| 311  | 19.25 | 0.1069 | 0.0958 | 0.1538 | 0.1064 | 0.1086 |

## TOTAL TIME/MASS POINT UNIT # 3

| DATE | TIME  | TTLM   | LMCALC | SL     | LAM    | L95    |
|------|-------|--------|--------|--------|--------|--------|
| 311  | 19.50 | 0.1057 | 0.0952 | 0.1529 | 0.1057 | 0.1081 |
| 311  | 19.75 | 0.1068 | 0.0948 | 0.1521 | 0.1052 | 0.1076 |
| 311  | 20.00 | 0.1061 | 0.0943 | 0.1513 | 0.1046 | 0.1070 |
| 311  | 20.25 | 0.1045 | 0.0938 | 0.1505 | 0.1040 | 0.1064 |
| 311  | 20.50 | 0.1035 | 0.0933 | 0.1496 | 0.1033 | 0.1058 |
| 311  | 20.75 | 0.1050 | 0.0928 | 0.1489 | 0.1029 | 0.1053 |
| 311  | 21.00 | 0.1040 | 0.0924 | 0.1481 | 0.1024 | 0.1048 |
| 311  | 21.25 | 0.1026 | 0.0919 | 0.1473 | 0.1018 | 0.1042 |
| 311  | 21.50 | 0.1031 | 0.0914 | 0.1466 | 0.1012 | 0.1037 |
| 311  | 21.75 | 0.1043 | 0.0911 | 0.1459 | 0.1008 | 0.1032 |
| 311  | 22.00 | 0.1026 | 0.0906 | 0.1452 | 0.1003 | 0.1027 |
| 311  | 22.25 | 0.1005 | 0.0901 | 0.1444 | 0.0998 | 0.1022 |
| 311  | 22.50 | 0.1016 | 0.0897 | 0.1437 | 0.0993 | 0.1017 |
| 311  | 22.75 | 0.1008 | 0.0893 | 0.1430 | 0.0988 | 0.1012 |
| 311  | 23.00 | 0.1004 | 0.0888 | 0.1423 | 0.0983 | 0.1007 |
| 311  | 23.25 | 0.1009 | 0.0885 | 0.1417 | 0.0979 | 0.1002 |
| 311  | 23.50 | 0.0994 | 0.0880 | 0.1410 | 0.0973 | 0.0997 |
| 311  | 23.75 | 0.0985 | 0.0876 | 0.1403 | 0.0968 | 0.0992 |
| 311  | 24.00 | 0.0968 | 0.0871 | 0.0958 | 0.0962 | 0.0986 |

[illegible]

[illegible]

68.611

UNIT 3

PRESSURE

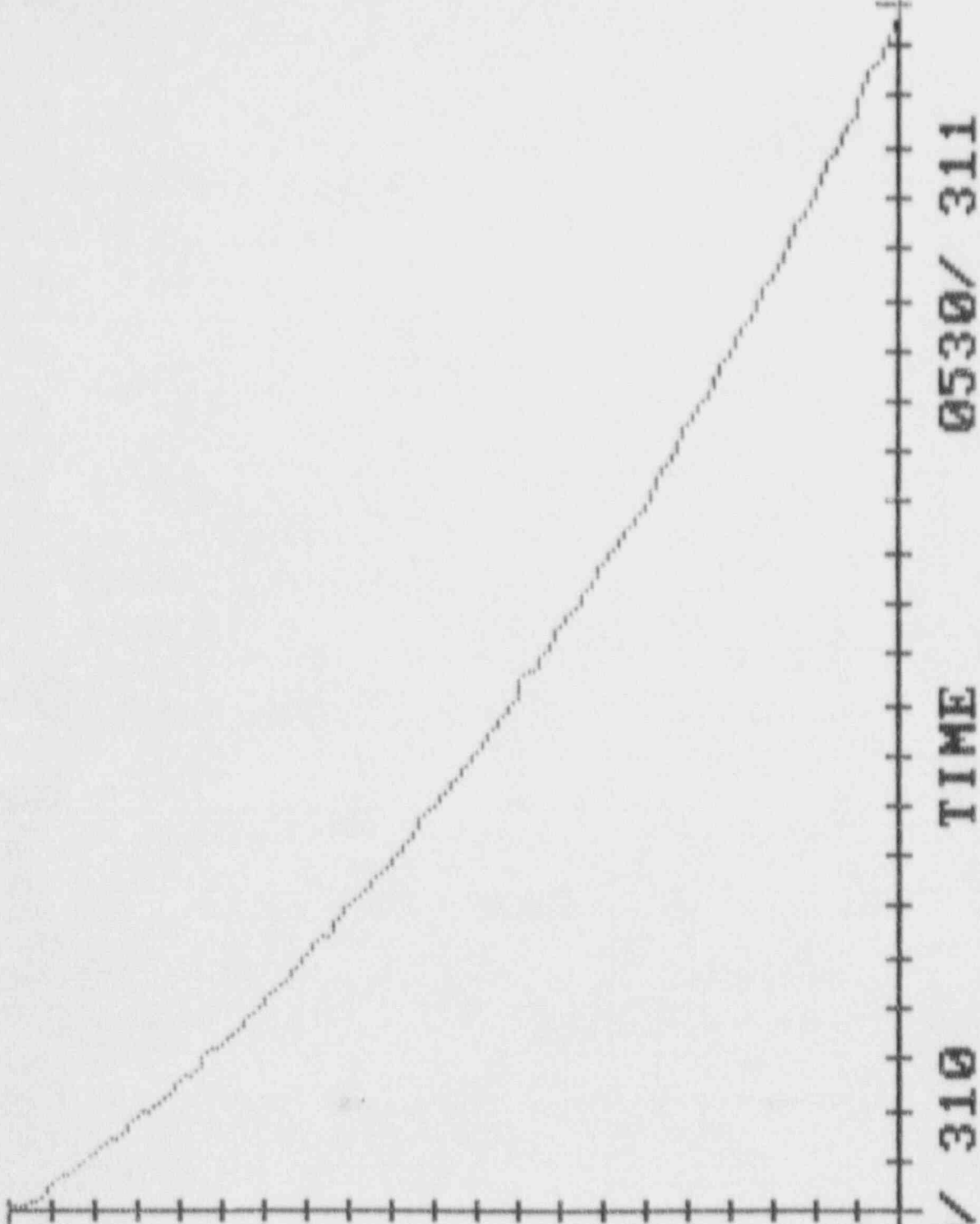
PSIA

68.352

0530/ 310

TIME

0530/ 311



0.423

UNIT 3

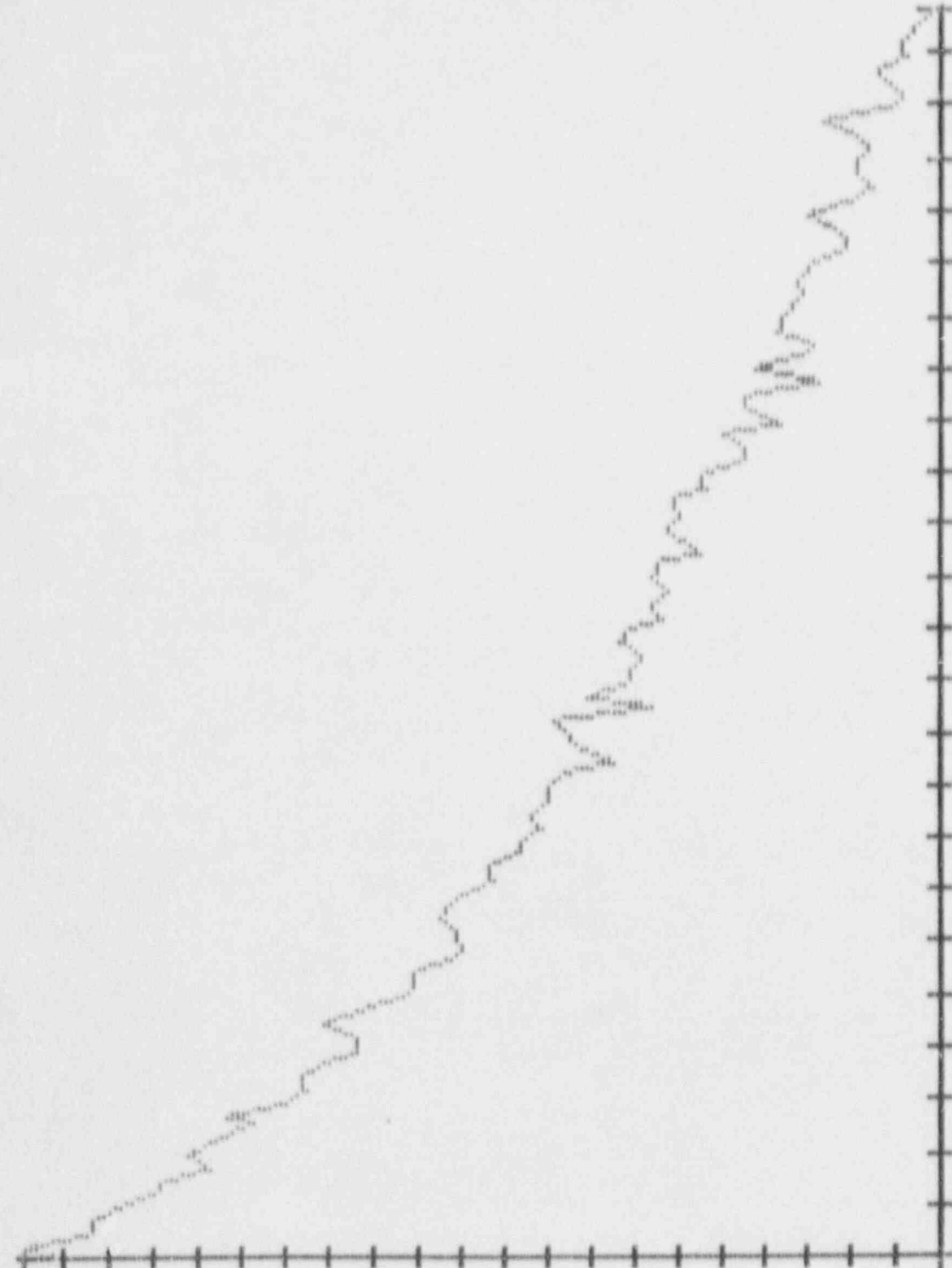
AUG UPR PRESS

0.401

0530/ 310

TIME

0530/ 311



78.575

UNIT 3

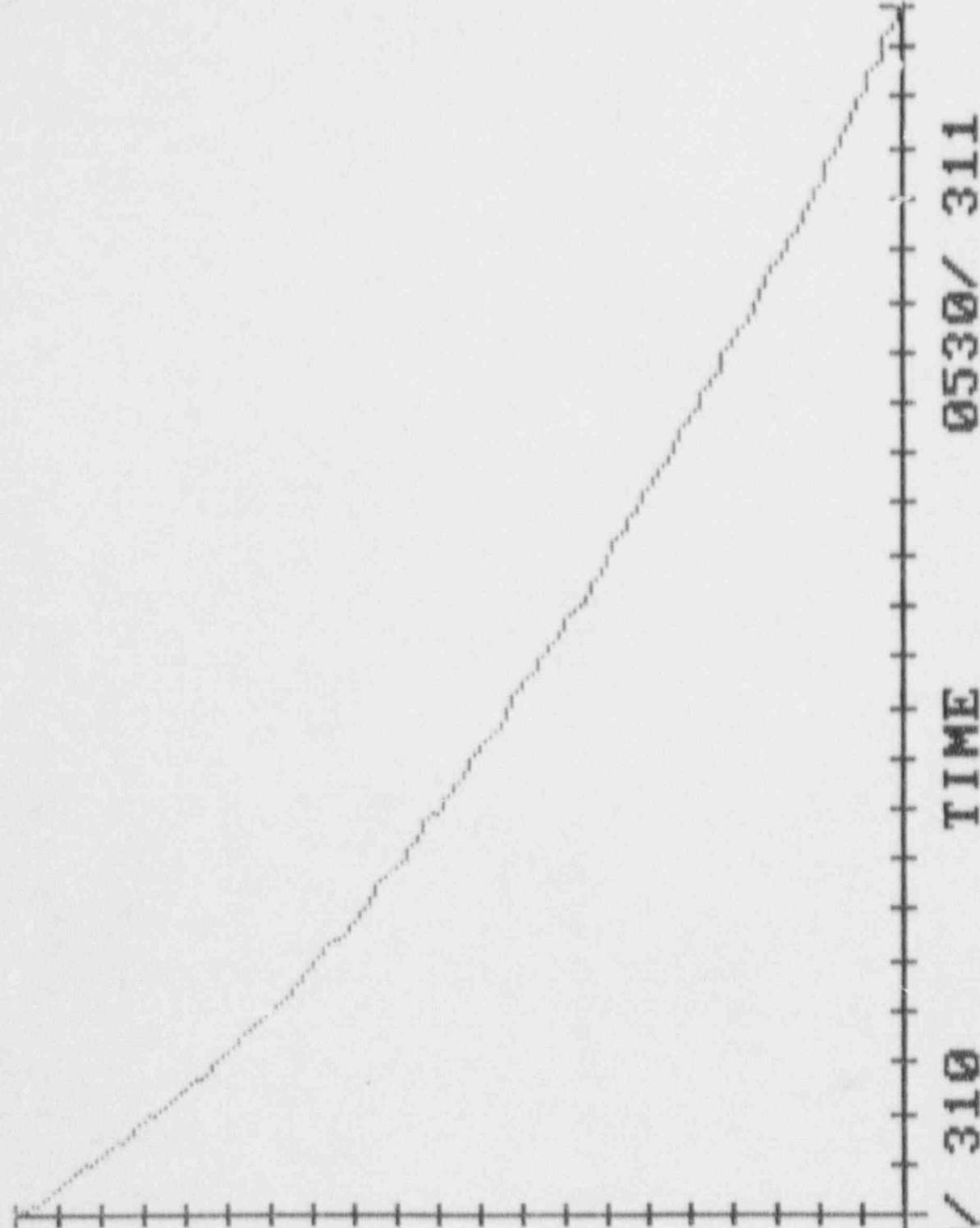
TEMPERATURE . F

77.069

0530/ 310

TIME

0530/ 311





6.88131

UNIT 3

MASS

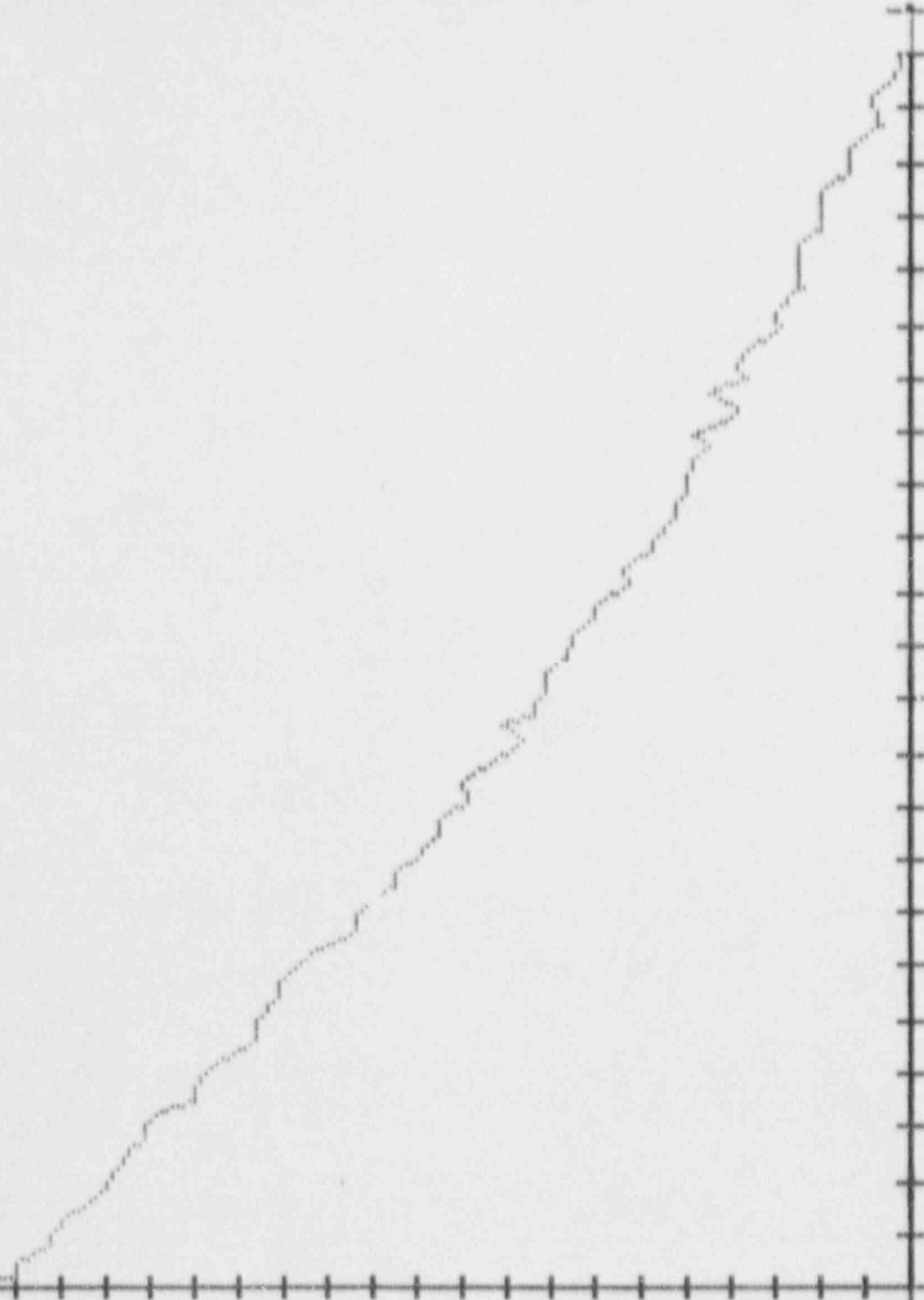
LBM  
 $\times 10^5$

6.8745

0530/ 310

TIME

0530/ 311



## APPENDIX C

### VERIFICATION TEST DATA AND PLOTS

VERIFICATION MODE  
OPTIONS:

TIME= 0945  
TEST SUMMARY

- 1 - MANUAL DATA ENTRY
- 2 - PARAMETER GRAPHS
- 3 - SENSOR PLOTS
- 4 - TREND ANALYSIS
- 5 - REPRINT CURRENT DATA PT
- 6 - SENSOR DIFFERENTIALS
  
- P - PASS WORD MENU

SELECTED OPTION =

# OF DATA POINTS = 19  
MODE DURATION (IN HOURS) = 4.25  
TOT TIME MEASURED LEAK = 0.2937  
TOT TIME CALCULATED LEAK = 0.2620  
MASS PT LEAK = 0.2810  
IMPOSED LEAK = 0.2383  
TOT TIME UPPER LIMIT = 0.3879  
TOT TIME LOWER LIMIT = 0.2620  
MASS PT UPPER LIMIT = 0.3970  
MASS PT LOWER LIMIT = 0.2720

TOT TIME VERIFICATION CRITERIA HAS NOT BEEN MET

MASS PT VERIFICATION CRITERIA HAS BEEN MET

POINT SUMMARY: CLARENT VALUE/DIFFERENCE FROM PREVIOUS POINT

|           |                    |                |                 |
|-----------|--------------------|----------------|-----------------|
| AVG TEMP: | 78.913/ -0.007     | AVG PRESS:     | 68.297 / -0.003 |
| MASS:     | 687103.63/ -21.750 | AVG DEW PRESS: | 0.4000/ -0.0002 |
|           |                    | TOTAL PRESS:   | 68.697 / -0.003 |

0.5970

UNIT 3

MASS  
ANAL.

WT%/  
DAY

LEGEND  
= L

0.0000

0530/ 311

TIME

0945/ 311



77.069

UNIT 3

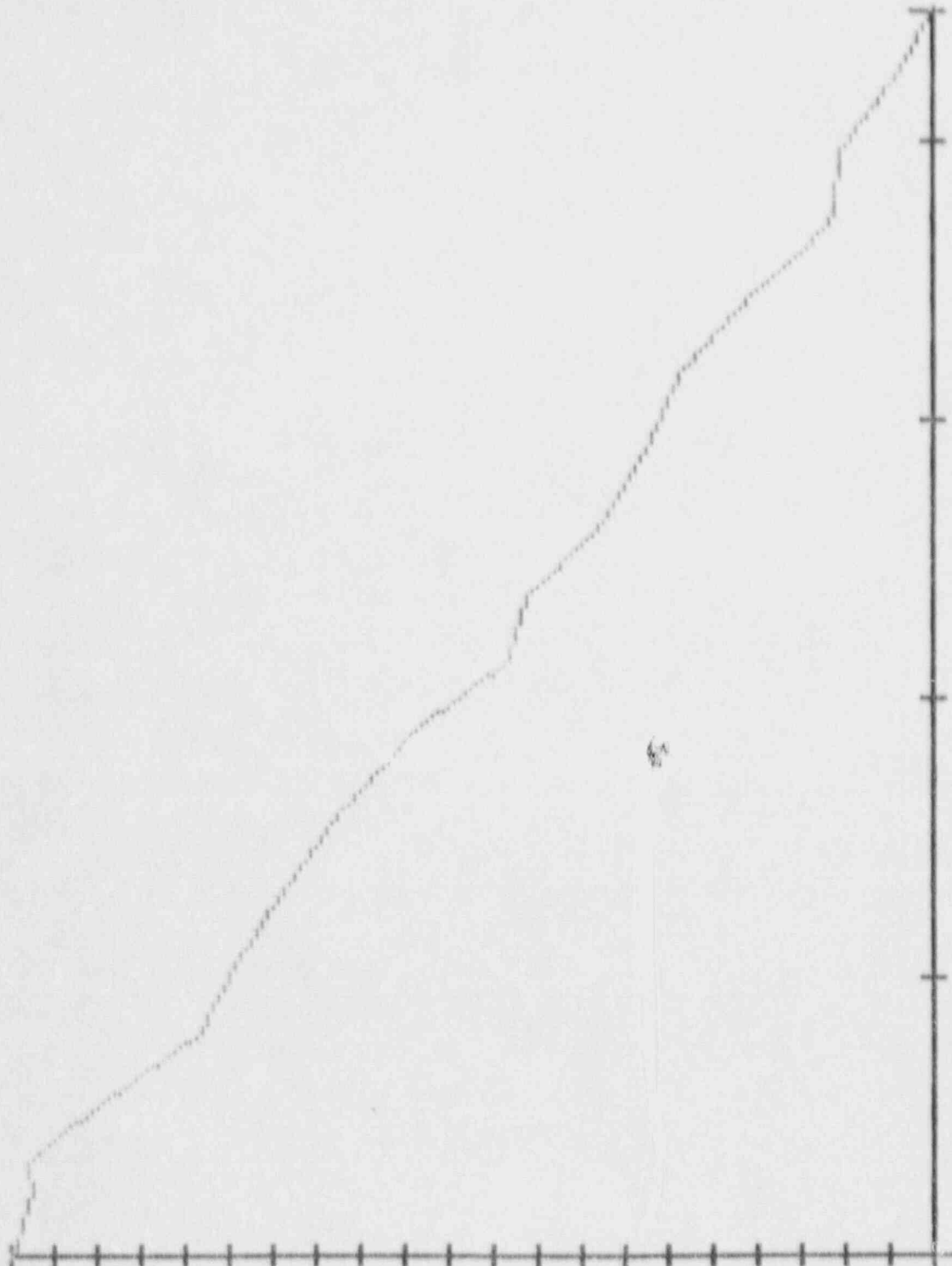
TEMPERATURE . F

76.913

0530/ 311

TIME

0945/ 311

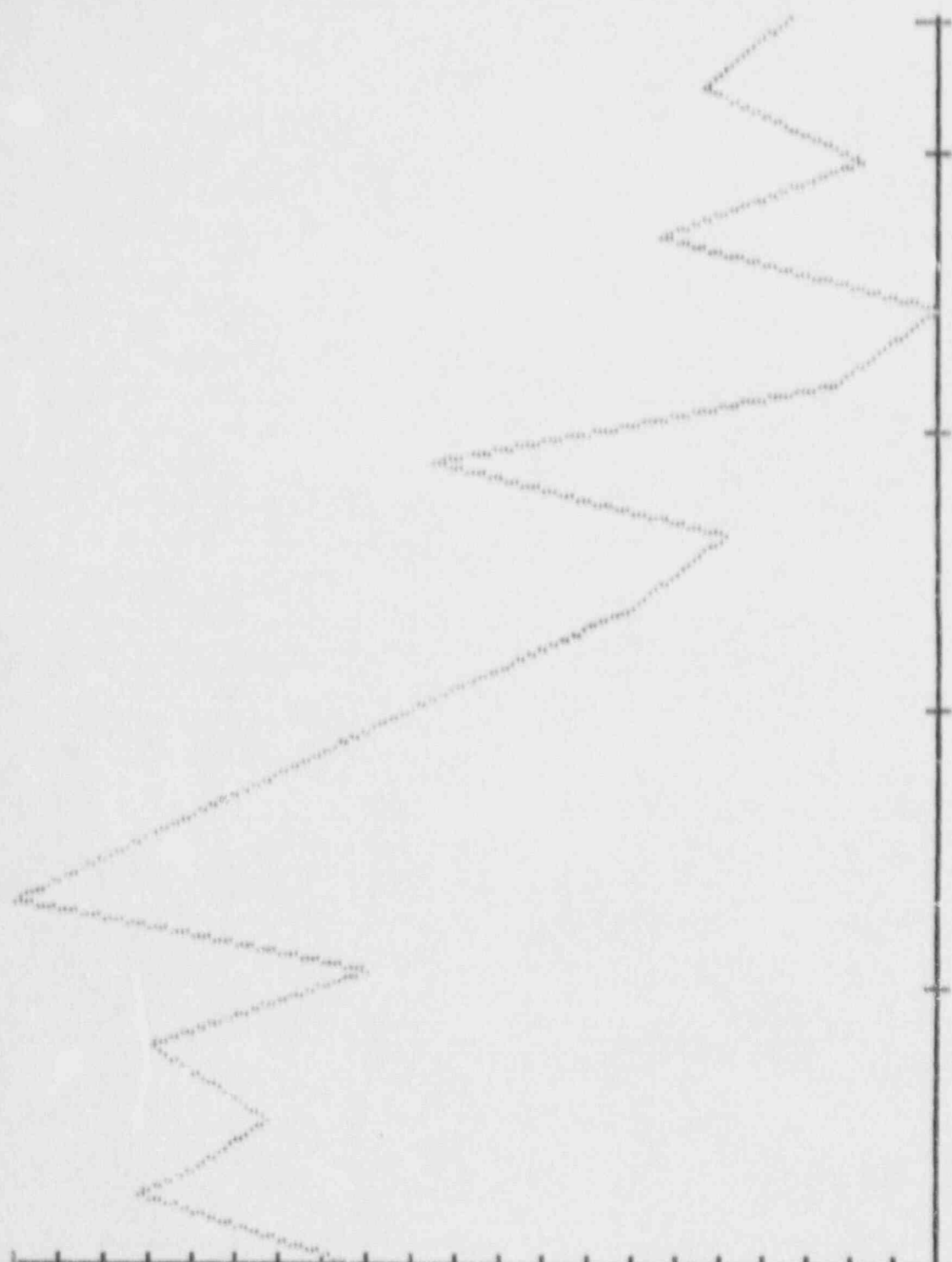


0.402

UNIT 3

AUG UPR PRESS

0.400



0530/ 311

TIME

0945/ 311

311

68.753

UNIT 3

PRESSURE

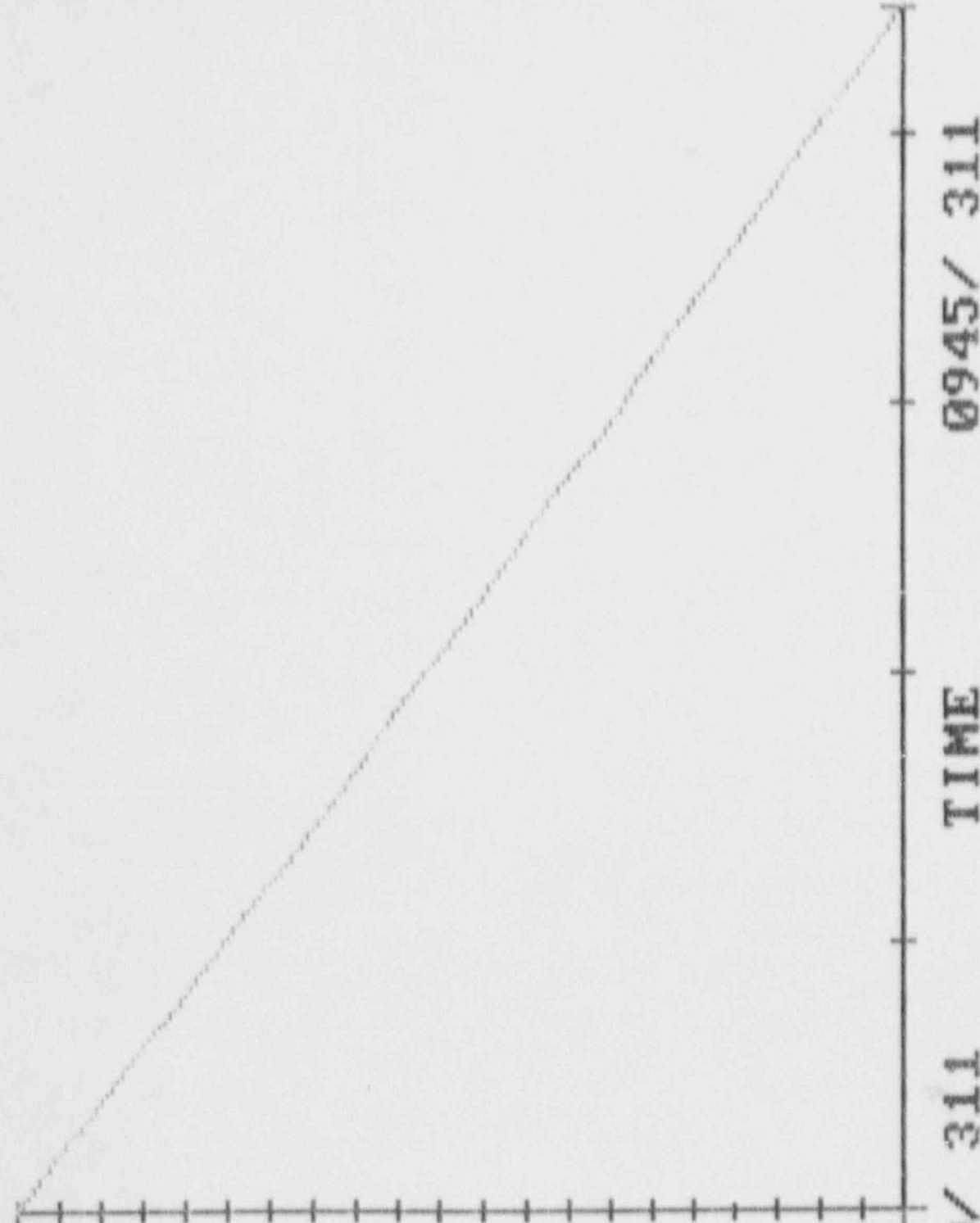
PSIA

68.697

0530/ 311

TIME

0945/ 311





6.8746

UNIT 3

MASS

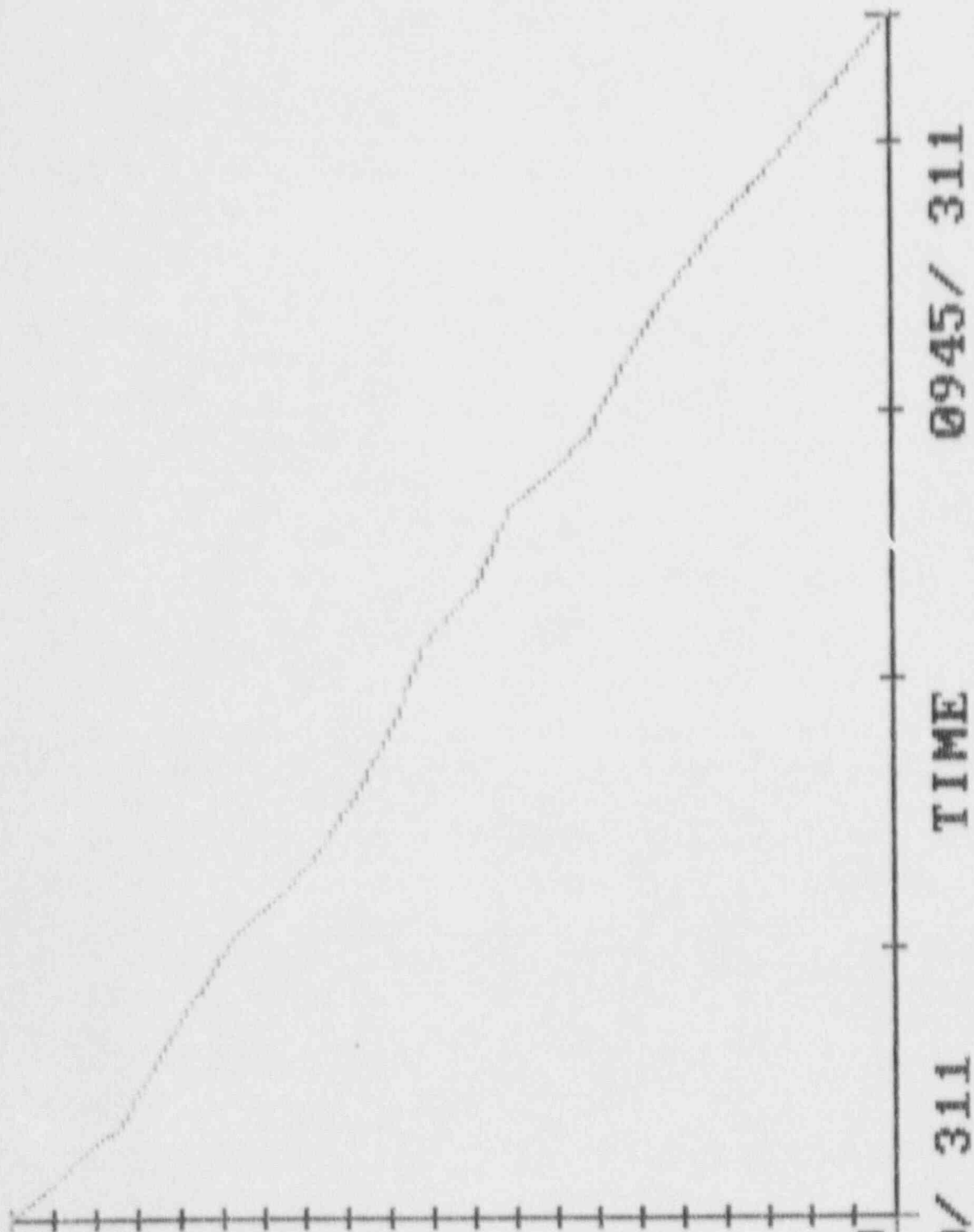
LBM  
 $\times 10^5$

6.8710

0530/ 311

TIME

0945/ 311



| DATE | TIME | T(I)   | P(I)   | DT(I) | VP(I) | MASS(I)   |
|------|------|--------|--------|-------|-------|-----------|
| 311  | 0.00 | 77.069 | 68.352 | 0.000 | 0.401 | 687461.19 |
| 311  | 0.25 | 77.066 | 68.349 | 0.000 | 0.401 | 687432.38 |
| 311  | 0.32 | 77.067 | 68.348 | 0.000 | 0.401 | 687420.19 |
| 311  | 0.50 | 77.056 | 68.346 | 0.000 | 0.401 | 687410.06 |
| 311  | 0.75 | 77.038 | 68.342 | 0.000 | 0.401 | 687392.56 |
| 311  | 1.00 | 77.031 | 68.339 | 0.000 | 0.401 | 687372.06 |
| 311  | 1.25 | 77.023 | 68.334 | 0.000 | 0.402 | 687340.75 |
| 311  | 1.50 | 77.014 | 68.331 | 0.000 | 0.401 | 687321.38 |
| 311  | 1.75 | 77.003 | 68.329 | 0.000 | 0.401 | 687306.63 |
| 311  | 2.00 | 76.986 | 68.325 | 0.000 | 0.401 | 687296.94 |
| 311  | 2.25 | 76.982 | 68.323 | 0.000 | 0.400 | 687273.81 |
| 311  | 2.50 | 76.969 | 68.320 | 0.000 | 0.400 | 687260.56 |
| 311  | 2.75 | 76.962 | 68.316 | 0.000 | 0.401 | 687228.25 |
| 311  | 3.00 | 76.956 | 68.313 | 0.000 | 0.400 | 687213.06 |
| 311  | 3.25 | 76.945 | 68.310 | 0.000 | 0.400 | 687195.94 |
| 311  | 3.50 | 76.931 | 68.306 | 0.000 | 0.400 | 687174.75 |
| 311  | 3.75 | 76.929 | 68.304 | 0.000 | 0.400 | 687149.81 |
| 311  | 4.00 | 76.920 | 68.300 | 0.000 | 0.400 | 687125.38 |
| 311  | 4.25 | 76.913 | 68.297 | 0.000 | 0.400 | 687103.63 |

## MASS POINT      UNIT # 3

| DATE | TIME | LAM    | L95    |
|------|------|--------|--------|
| 311  | 0.00 | 0.0000 | 0.0000 |
| 311  | 0.25 | 0.0000 | 0.0000 |
| 311  | 0.32 | 0.4384 | 0.7872 |
| 311  | 0.50 | 0.3672 | 0.5085 |
| 311  | 0.75 | 0.3145 | 0.3987 |
| 311  | 1.00 | 0.2967 | 0.3458 |
| 311  | 1.25 | 0.3115 | 0.3460 |
| 311  | 1.50 | 0.3132 | 0.3370 |
| 311  | 1.75 | 0.3048 | 0.3240 |
| 311  | 2.00 | 0.2903 | 0.3111 |
| 311  | 2.25 | 0.2844 | 0.3018 |
| 311  | 2.50 | 0.2772 | 0.2932 |
| 311  | 2.75 | 0.2788 | 0.2922 |
| 311  | 3.00 | 0.2779 | 0.2892 |
| 311  | 3.25 | 0.2764 | 0.2862 |
| 311  | 3.50 | 0.2760 | 0.2845 |
| 311  | 3.75 | 0.2770 | 0.2845 |
| 311  | 4.00 | 0.2789 | 0.2857 |
| 311  | 4.25 | 0.2810 | 0.2873 |

## APPENDIX D

### INSTRUMENT SELECTION GUIDE CALCULATION

# INSTRUMENT SELECTION GUIDE CALCULATION

Page 1 of 2

## A. TEST PARAMETERS

$$L_a = 0.25\%/day$$

$$P = 68.6 \text{ psia}$$

$$T = 538^\circ \text{ R}$$

$$T_{dp} = 74.4^\circ \text{ F}$$

$$t = 24 \text{ hours}$$

## B. INSTRUMENT PARAMETERS

### 1. Total Absolute Pressure

$$\text{No. of Sensors} = 2$$

$$\text{Range: } 0 - 100 \text{ psia}$$

$$\text{Sensor sensitivity error (E): } 0.005 \text{ psia}$$

$$\text{Measurement system error (e):}$$

$$\text{Resolution: } 0.0001 \text{ psia}$$

$$\text{Repeatability: } 0.005 \text{ psia}$$

$$e = \pm \sqrt{((0.0001)^2 + (0.005)^2)^{1/2}}$$

$$e = \pm 0.005001 \text{ psia}$$

$$e_p = \pm \sqrt{((0.005)^2 + (0.005001)^2)^{1/2}} / (2)^{1/2}$$

$$e_p = \pm 0.005001 \text{ psia}$$

### 2. Water Vapor Pressure

$$\text{No. of Sensors} = 10$$

$$\text{Sensor sensitivity error (E): } 0.1^\circ \text{ F}$$

$$\text{Measurement system error (e):}$$

$$\text{Resolution: } 0.01^\circ \text{ F}$$

$$\text{Repeatability: } 0.04^\circ \text{ F}$$

$$e = \pm \sqrt{((0.01)^2 + (0.04)^2)^{1/2}}$$

$$e = \pm 0.041^\circ \text{ F}$$

At a dewpoint of  $74.4^\circ \text{ F}$ , the equivalent water vapor pressure change (as determined from steam tables, is  $0.0142 \text{ psia}/^\circ \text{ F}$ .

$$E = +/- 0.1^{\circ} \text{ F } (0.0142 \text{ psia}/^{\circ} \text{ F})$$

$$E = +/- 0.00142 \text{ psia}$$

$$e = +/- 0.041^{\circ} \text{ F } (0.0142 \text{ psia}/^{\circ} \text{ F})$$

$$e = +/- 0.00058 \text{ psia}$$

$$e_{pw} = +/- ((0.00142)^2 + (0.00058)^2)^{1/2} / (10)^{1/2}$$

$$e_{pw} = +/- 0.00048 \text{ psia}$$

### 3. Temperature

$$\text{No. of Sensors} = 24$$

$$\text{Sensor sensitivity error (E):} \quad 0.01^{\circ} \text{ F}$$

$$\text{Measurement system error (e):}$$

$$\text{Resolution:} \quad 0.01^{\circ} \text{ F}$$

$$\text{Repeatability:} \quad 0.054^{\circ} \text{ F}$$

$$e = +/- ((0.01)^2 + (0.054)^2)^{1/2}$$

$$e = +/- 0.055^{\circ} \text{ F} = +/- 0.055^{\circ} \text{ R}$$

$$e_T = +/- ((0.01)^2 + (0.055)^2)^{1/2} / (24)^{1/2}$$

$$e_T = +/- 0.011^{\circ} \text{ R}$$

### 4. Instrumentation Selection Guide Formula

$$\text{ISG} = +/- 2400/t (2(e_p/P)^2 + 2(e_{pw}/P)^2 + 2(e_T/T)^2)^{1/2}$$

$$\text{ISG} = +/- (2400/24) (2(0.005001/68.6)^2 + 2(0.00048/68.6)^2 + 2(0.011/538)^2)^{1/2}$$

$$\text{ISG} = +/- 0.0108 \%/\text{day}$$

APPENDIX E  
GENERAL PHYSICS ILRT COMPUTER PROGRAM DESCRIPTION

## DESCRIPTION OF GENERAL PHYSICS ILRT COMPUTER PROGRAM

The following paragraphs describe the various features and attributes of the General Physics ILRT Computer Program and the process used to certify it for each application.

### REDUNDANCY

The General Physics ILRT team was equipped with two fully operational IBM compatible microcomputers during the ILRT and for on site data reduction and analysis. The computer software and hardware interfaced directly with the ILRT Measurement System Data Acquisition System (Fluke 2285B).

Two computers were brought on site for 100% redundancy, as each computer and its software is capable of independently performing the ILRT. The General Physics ILRT Computer Software is also capable of accepting manual input of raw sensor data and performing all required sensor data conversions if the data logger should cease to function. Each computer was equipped with back-up disks in the unlikely event of a disk "crash."



## SECURITY

The General Physics ILRT Computer Program is written in QUICK BASIC. QUICK BASIC is a high level programming language which combines programming ease with user oriented command functions to create an easy to use and understand program. In order to increase speed of operation the program was then compiled into an executable command file. Compiling was accomplished using the Quick Basic Compiler. In addition to execution speed, this had the added benefit of making the program more secure as compiled programs cannot be edited or changed. The program requires a password to change modes of operation, start times, or enter the data editing routine to safeguard the integrity of the raw data files.

## FEATURES

The program itself is designed to be a menu driven program consisting of five separate, menu driven operating modes. These are the:

- |                        |                          |
|------------------------|--------------------------|
| 1. Pressurization Mode | 4. Verification Mode     |
| 2. Stabilization Mode  | 5. Depressurization Mode |
| 3. Test Mode           |                          |

These modes also correspond to the phases of the ILRT. Menu driven means that the user is presented with a list of options that the program can perform and from which the user can choose. It allows for interactive information exchange between the user and the computer and prevents invalid information or user mistakes from crashing the program. Program organization consists of a master menu which controls access to the seven operating modes chained to the individual menus which control these modes. The data processing, information display capabilities and function of each mode is as follows:

1. Pressurization Mode: All data reduction, graphic displays of average temperature, dewpoint, and corrected pressure.
2. Stabilization Mode: All data reduction, automatic comparison of data against ANSI 56.8 and BN-TOP-1 temperature stabilization criteria, notification when criteria is met, graphic displays of average temperature, dewpoint, and corrected pressure.
3. Test Mode: All data reduction, calculation of leakage rates using mass point, total time and point-to-point analysis techniques, display of trend report information required by BN-TOP-1, graphic display of average temperature, dewpoint, pressure and mass, as well as graphic display of mass point measured leakage, 95% UCL; total time measured and calculated leakage and the total time leakage rate at the 95% UCL (as calculated by BN-TOP-1), including a superimposed acceptance criteria line).
4. Verification Test Mode: With input of imposed leakage in SCFM automatically calculates and displays on graph and trend report the acceptance criteria band, plus all graphics displays available in test mode.
5. Depressurization Mode: All data and graphics capabilities of Pressurization Mode.

Other reduction and analysis capabilities of the General Physics ILRT computer program include:

1. Containment total pressure conversion from counts to psia (if required), and averaging.
2. Containment drybulb temperature weighted averaging and conversion to absolute units.
3. Containment dewpoint temperature weighted averaging (conversion from Foxboro dewcell element temperature to dewpoint temperature if required) and conversion to partial pressure of water vapor (psia).
4. Data storage of ILRT measurement system inputs for each data point.
5. Weight (mass) point calculations using the ideal gas law.
6. Automated Data Acquisition and/or Manual Data Entry.
7. Sensor performance and deviation information for sensor failure criteria, graphic display of individual sensor performance for selected operating mode.
8. Calculation of ISG formula at beginning of test; acceptance criteria based on number of sensors remaining and actual test duration.
9. Computer System Error Functions automatically checks for error in incoming data, printer or disk drive faults.

The computer program used by General Physics has been previously certified for six tests at the San Onofre Nuclear Generating Station and over a dozen other ILRTs. The initial certification required verification of the program through hand calculations and an independent review by Bechtel Power Corporation.

After modification for the Crystal River Unit 3 ILRT was completed, a calibration set of raw data was used to verify the program calculations prior to usage. Additionally, once the computer was linked to the data acquisition system and a complete data stream was available, the input function of each mode of the program was verified by comparing the data acquisition system output to the computer printout data point summary. A data set of known values were manually entered to verify proper calculation of average temperatures and relative humidities using the installed volume weighting fractions.

APPENDIX F

LOCAL LEAKAGE RATE TEST SUMMARIES

| LEAK RATE TESTING SUMMARY |  |   |  |
|---------------------------|--|---|--|
| DATE                      | DESCRIPTION  | AS FOUND TOTAL<br>OF TYPE B & C<br>(sccm) | AS LEFT TOTAL<br>OF TYPE B & C<br>(sccm) |
| 10/30/87                  | RF 6 "As Left"   | -----                                     | 26,930.1                                 |
| 5/26/89                   | RCP Outage   | 58,290.8                                  | 40,076.7                                 |
| 6/13/89                   | Purge Valve Testing  | 40,076.7                                  | 37,583.7                                 |
| 6/30/89                   | As Found Purge Valve<br>Testing  | 36,962.6                                  | -----                                    |
| 7/10/89                   | As Left Purge Valve<br>Testing   | -----                                     | 37,417.7                                 |
| 8/28/89                   | As Found Purge Valve<br>Testing  | 37,628.7                                  | -----                                    |
| 10/2/89                   | As Left Purge Valve<br>Testing   | -----                                     | 37,672.7                                 |
| 11/16/89                  | Personnel Air Lock<br>Testing  | 35,112.7                                  | 35,112.7                                 |
| 2/21/90                   | As Found & As Left<br>Purge Valve Testing                              | 36,176.7                                  | 35,348.7                                 |
| 6/14/90                   | RF 7 Testing   | 50,839.94                                 | 38,998.46                                |
| 10/19/90                  | As Found & As Left<br>Purge Valve Testing                              | 38,920.46                                 | 39,204.46                                |
| 12/17/90                  | As Found & As Left<br>Purge Valve and<br>Personnel Air Lock<br>Testing | 27,681.46                                 | 28,071.46                                |
| 1/28/91                   | Update Total for<br>Addition of Electrical<br>Penetrations             | 28,464.43                                 | 28,464.43                                |
| 6/10/91                   | Personnel Air Lock<br>Testing  | 28,822.43                                 | 28,822.43                                |
| 11/15/91                  | 8M Outage Testing  | 45,699.57                                 | 46,958.27                                |
| 11/19/91                  | Post Maintenance<br>Testing of Personnel<br>Air Lock                   | 46,958.27                                 | 46,348.27                                |

Note:  $0.60 L_a = 265,286 \text{ sccm}$



LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

| TYPE C LLRT (valves, flanges) |                | INBOARD ISOLATION VALVES (Leakage in sccm) |          |                 |              |        |         | OUTBOARD ISOLATION VALVES (Leakage in sccm) |                 |              |        |                |               | PENETRATION PATH LEAKAGE (sccm) |  | ACTUAL DATE |
|-------------------------------|----------------|--|----------|-----------------|--------------|--------|---------|---|-----------------|--------------|--------|----------------|---------------|---------------------------------|--|-------------|
|                               |                | VALVE #                                    | AS FOUND | LEAKAGE / L.F.T | ACTION VALUE | STATUS | VALVE # | AC FOUND                                    | LEAKAGE / L.F.T | ACTION VALUE | STATUS | AS FOUND VALUE | AS LEFT VALUE |                                 |  |             |
| 0305                          | RB LEAK RATE   | LRV-73                                     | 30.0     | 30.0            | 9576         | PASS   | LRV-72  | 35.0  | 35.0            | 9576         | PASS   | 35             | 35            |                                 |  | 3/27/90     |
| 0306L                         | RB LEAK RATE   | LRV-70                                     | 57.7     | 57.7            | 9576         | PASS   | LRV-71  | 59.8  | 59.8            | 9576         | PASS   | 60             | 60            |                                 |  | 3/25/90     |
| 110                           | STATION AIR    | SAV-24                                     | 98.9     | 98.9            | 4788         | PASS   | SAV-122 | 1701.1                                      | 1701.1          | 4788         | PASS   | 1701           | 1701          |                                 |  | 3/17/90     |
| 110                           | STATION AIR    | SAV-24                                     | 1442.0   | 1442.0          | 4788         | PASS   | SAV-122 | 6300.0                                      | 471.0           | 4788         | FAIL   | 6300           | 1442          |                                 |  | 5/5/89      |
| 111                           | INSTRUMENT AIR |  |          |                 |              |        | IAV-28  | 20.0  | 20.0            | 3192         | PASS   | 20             | 20            |                                 |  | 3/17/90     |
| 111                           | INSTRUMENT AIR |  |          |                 |              |        | IAV-28  | 20.0  | 20.0            | 3192         | PASS   | 20             | 20            |                                 |  | 3/17/89     |
| 112                           | INSTRUMENT AIR |  |          |                 |              |        | IAV-29  | 49.2  | 49.2            | 3192         | PASS   | 49             | 49            |                                 |  | 3/7/90      |
| 112                           | INSTRUMENT AIR |  |          |                 |              |        | IAV-29  | 43.8  | 43.8            | 3192         | PASS   | 44             | 44            |                                 |  | 2/26/89     |
| 113                           | AIR HANDLING   | AHV-1C                                     | 590.0    | 1002.0          | 2500         | PASS   | AHV-1D  |   |                 |              |        | 590            | 1002          |                                 |  | 11/12/91    |
| 113                           | AIR HANDLING   | AHV-1C                                     | 1185.0   | 590.0           | 2500         | PASS   | AHV-1D  |   |                 |              |        | 1185           | 590           |                                 |  | 11/02/91    |
| 113                           | AIR HANDLING   | AHV-1C                                     |          | 912             | 2500         | PASS   | AHV-1D  |   |                 |              |        |                | 912           |                                 |  | 12/16/90    |
| 113                           | AIR HANDLING   | AHV-1C                                     | 925.0    |                 | 2500         | PASS   | AHV-1D  |   |                 |              |        | 925            |               |                                 |  | 12/12/90    |
| 113                           | AIR HANDLING   | AHV-1C                                     | 657.0    | 913.0           | 2500         | PASS   | AHV-1D  |   |                 |              |        | 657            | 913           |                                 |  | 10/12/90    |
| 113                           | AIR HANDLING   | AHV-1C                                     | 891.0    | 888.0           | 2500         | PASS   | AHV-1D  |   |                 |              |        | 891            | 888           |                                 |  | 6/11/90     |
| 113                           | AIR HANDLING   | AHV-1C                                     | 988.0    | 1759.0          | 2500         | PASS   | AHV-1D  |   |                 |              |        | 988            | 1059          |                                 |  | 9/29/89     |
| 113                           | AIR HANDLING   | AHV-1C                                     |          | 988.0           | 2500         | PASS   | AHV-1D  |   |                 |              |        |                | 988           |                                 |  | 9/2/89      |
| 113                           | AIR HANDLING   | AHV-1C                                     | 993.0    |                 | 2500         | PASS   | AHV-1D  |   |                 |              |        | 993            |               |                                 |  | 8/27/89     |
| 113                           | AIR HANDLING   | AHV-1C                                     |          | 1008.0          | 2500         | PASS   | AHV-1D  |   |                 |              |        |                | 1008          |                                 |  | 7/3/89      |
| 113                           | AIR HANDLING   | AHV-1C                                     | 972.0    |                 | 2500         | PASS   | AHV-1D  |   |                 |              |        | 972            |               |                                 |  | 6/29/89     |
| 113                           | AIR HANDLING   | AHV-1C                                     | 2250.0   | 829.0           | 2500         | PASS   | AHV-1D  |   |                 |              |        | 2250           | 829           |                                 |  | 6/12/89     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 2

TYPE C LLRT (valves, flanges)

|             |              | INBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------|--------------|--|----------|---------|--------------|--------|---|----------|---------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION | SYSTEM       | VALVE #                                    | AS FOUND | AS LEFT | ACTION VALUE | STATUS | VALVE #                                     | AS FOUND | AS LEFT | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
| 113         | AIR HANDLING | AHV-1C                                     |          | 2250.0  | 2500         | PASS   | AHV-1D                                      |          |         |              |        |                                 | 2250          | 5/25/89     |
| 113         | AIR HANDLING | AHV-1C                                     | 1400.0   |         | 2500         | PASS   | AHV-1D                                      |          |         |              |        | 1460                            |               | 2/27/89     |
| 116         | RB LEAK RATE | LRV-45                                     | 41.0     | 41.0    | 3192         | PASS   | LRV-46                                      | 221.0    | 221.0   | 1596         | PASS   | 221                             | 221           | 10/26/91    |
| 116         | RB LEAK RATE | LRV-45                                     | 2.0      | 2.0     | 3192         | PASS   | LRV-46                                      | 69.4     | 69.4    | 1596         | PASS   | 69                              | 69            | 3/27/90     |
| 116         | RB LEAK RATE | LRV-45                                     | 20.0     | 20.0    | 3192         | PASS   | LRV-46                                      | 295.0    | 295.0   | 1596         | PASS   | 295                             | 295           | 3/15/89     |
| 117         | DEMIN WATER  | DWV-162                                    |          |         | 4788         | PASS   | DWV-160                                     | 258.0    | 700.0   | 4788         | PASS   | 258                             | 700           | 11/1/91     |
| 117         | DEMIN WATER  | DWV-162                                    | 2.0      | 2.0     | 4788         | PASS   | DWV-160                                     | 188.2    | 188.2   | 4788         | PASS   | 188                             | 188           | 4/3/90      |
| 117         | DEMIN WATER  | DWV-162                                    | 6570.0   | 2190.0  | 4788         | FAIL   | DWV-160                                     | 537.0    | 281.0   | 4788         | PASS   | 6570                            | 2190          | 3/30/89     |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-50                                      | 331.0    | 331.0   | 12768        | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-36                                      | 324.0    | 324.0   | 12768        | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-90                                      | 128.7    | 128.7   | 4788         | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-89                                      | 124.1    | 124.1   | 4788         | PASS   | 460                             | 460           | 3/27/90     |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-50                                      | 116.0    | 116.0   | 12768        | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-36                                      | 134.9    | 134.9   | 12768        | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-90                                      | 117.6    | 117.6   | 4788         | PASS   |                                 |               |             |
| 121         | RB LEAK RATE |  |          |         |              |        | LRV-89                                      | 118.6    | 118.6   | 4788         | PASS   | 254                             | 254           | 3/15/89     |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-88                                      |          |         | 4788         | PASS   |                                 |               |             |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-87                                      | 15.0     | 117.6   | 4788         | PASS   | 15                              | 118           | 11/11/91    |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-88                                      | 20.0     | 20.0    | 4788         | PASS   |                                 |               |             |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-87                                      | 20.0     | 20.0    | 4788         | PASS   | 20                              | 20            | 3/26/90     |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-88                                      | 42.6     | 42.6    | 4788         | PASS   |                                 |               |             |
| 122         | RB LEAK RATE |  |          |         |              |        | LRV-87                                      | 51.6     | 51.6    | 4788         | PASS   | 52                              | 52            | 3/15/89     |
| 123         | CORE FLOOD   | CFV-20                                     | 3820.0   | 374.0   | 1596         | FAIL   | CFV-28                                      | 13.0     | 13.0    | 1596         | PASS   | 3820                            | 374           | 3/21/90     |
| 123         | CORE FLOOD   | CFV-20                                     | 1587.0   | 1587.0  | 1596         | PASS   | CFV-28                                      | 41.4     | 41.4    | 1596         | PASS   | 1587                            | 1587          | 3/14/89     |
| 124         | CORE FLOOD   | CFV-17                                     | 336.0    | 189.0   | 1596         | PASS   | CFV-27                                      | 20.0     | 20.0    | 1596         | PASS   | 336                             | 189           | 3/21/90     |



LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 3

TYPE C LLRT (valves, flanges)

|             |                 | INBOARD ISOLATION VALVES (Leakage in sccm) |                               |       |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |                               |        |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------|-----------------|--|-------------------------------|-------|--------------|--------|---|-------------------------------|--------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION | SYSTEM          | VALVE #                                    | LEAKAGE<br>AS FOUND / AS LEFT |       | ACTION VALUE | STATUS | VALVE #                                     | LEAKAGE<br>AS FOUND / AS LEFT |        | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
| 124         | CORE FLOOD      | CFV-17                                     | 202.0                         | 202.0 | 1596         | PASS   | CFV-27                                      | 20.0                          | 20.0   | 1596         | PASS   | 202                             | 202           | 3/14/89     |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-94                                      | 665.0                         | 665.0  | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-93                                      | 655.0                         | 655.0  | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-92                                      | 87.0                          | 87.0   | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-91                                      | 65.0                          | 65.0   | 4788         | PASS   | 752                             | 752           | 3/28/90     |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-94                                      | 1536.0                        | 1536.0 | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-93                                      | 1575.0                        | 1575.0 | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-92                                      | 286.0                         | 286.0  | 4788         | PASS   |                                 |               |             |
| 125         | RB LEAK RATE    |  |                               |       |              |        | LRV-91                                      | 285.0                         | 285.0  | 4788         | PASS   | 1861                            | 1861          | 3/15/89     |
| 202         | RB LEAK RATE    |  |                               |       |              |        | LRV-44                                      | 69.6                          | 1089.0 | 3192         | PASS   | 70                              | 1089          | 11/11/91    |
| 202         | RB LEAK RATE    |  |                               |       |              |        | LRV-44                                      | 20.2                          | 20.2   | 3192         | PASS   | 20                              | 20            | 3/24/90     |
| 202         | RB LEAK RATE    |  |                               |       |              |        | LRV-44                                      | 20.0                          | 20.0   | 3192         | PASS   | 20                              | 20            | 3/15/89     |
| 206         | INDUST. COOLING |  |                               |       |              |        | CIV-41                                      | 82.0                          | 82.0   | 3990         | PASS   | 82                              | 82            | 3/23/90     |
| 206         | INDUST. COOLING |  |                               |       |              |        | CIV-41                                      | 300.0                         | 300.0  | 3990         | PASS   | 300                             | 300           | 3/1/89      |
| 207         | INDUST. COOLING |  |                               |       |              |        | CIV-40                                      | 15.0                          | 15.0   | 3990         | PASS   | 15                              | 15            | 3/27/90     |
| 207         | INDUST. COOLING |  |                               |       |              |        | CIV-40                                      | 20.0                          | 20.0   | 3990         | PASS   | 20                              | 20            | 3/1/89      |
| 305         | RB LEAK RATE    | LRV-70                                     | 20.6                          | 20.6  | 9576         | PASS   | LRV-72                                      | 27.7                          | 27.7   | 9576         | PASS   | 26                              | 26            | 3/29/89     |
| 306L        | RB LEAK RATE    | LRV-73                                     | 47.5                          | 47.5  | 9576         | PASS   | LRV-71                                      | 52.5                          | 52.5   | 9576         | PASS   | 52                              | 52            | 3/30/89     |
| 306W        | CONT MONITORING | WSV-32                                     | 21.0                          | 21.0  | 798          | PASS   | WSV-33                                      | 19.4                          | 19.4   | 798          | PASS   |                                 |               |             |
| 306W        | CONT MONITORING | WSV-28                                     | 18.3                          | 18.3  | 798          | PASS   | WSV-29                                      | 14.5                          | 14.5   | 798          | PASS   |                                 |               |             |
| 306W        | CONT MONITORING | WSV-26                                     | 14.9                          | 14.9  | 798          | PASS   | WSV-27                                      | 14.8                          | 14.8   | 798          | PASS   | 54                              | 54            | 3/28/90     |
| 306W        | CONT MONITORING | WSV-32                                     | 20.0                          | 20.0  | 798          | PASS   | WSV-33                                      | 20.0                          | 20.0   | 798          | PASS   |                                 |               |             |
| 306W        | CONT MONITORING | WSV-28                                     | 20.0                          | 20.0  | 798          | PASS   | WSV-29                                      | 20.0                          | 20.0   | 798          | PASS   |                                 |               |             |
| 306W        | CONT MONITORING | WSV-26                                     | 20.0                          | 20.0  | 798          | PASS   | WSV-27                                      | 20.0                          | 20.0   | 798          | PASS   | 60                              | 60            | 3/17/89     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 4

| TYPE C LLRT (valves, flanges) |                 | INBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------------------------|-----------------|--|----------|---------|--------------|--------|---|----------|---------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION                   | SYSTEM          | VALVE #                                    | LEAKAGE  |         | ACTION VALUE | STATUS | VALVE #                                     | LEAKAGE  |         | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
|                               |                 |  | AS FOUND | AS LEFT |              |        |   | AS FOUND | AS LEFT |              |        |                                 |               |             |
| 314                           | MAIN STEAM      |  |          |         |              |        | MSV-146                                     | 420.0    | 420.0   | 6384         | PASS   | 420                             | 420           | 10/19/91    |
| 314                           | MAIN STEAM      |  |          |         |              |        | MSV-146                                     | 12050.0  | 2100.0  | 6384         | FAIL   | 12050                           | 2100          | 3/21/90     |
| 314                           | MAIN STEAM      |  |          |         |              |        | MSV-146                                     | 1606.0   | 1606.0  | 6384         | PASS   | 1606                            | 1606          | 3/10/89     |
| 315                           | CONT MONITORING | WSV-3                                      | 91.3     | 91.3    | 1596         | PASS   | WSV-4                                       | 73.3     | 73.3    | 1596         | PASS   | 91                              | 91            | 4/5/90      |
| 315                           | CONT MONITORING | WSV-3                                      | 20.0     | 20.0    | 1596         | PASS   | WSV-4                                       | 20.0     | 20.0    | 1596         | PASS   | 20                              | 20            | 3/17/89     |
| 316                           | MAIN STEAM      |  |          |         |              |        | MSV-114                                     | 1030.0   | 1030.0  | 2394         | PASS   | 1030                            | 1030          | 10/18/91    |
| 316                           | MAIN STEAM      |  |          |         |              |        | MSV-114                                     | 5.0      | 5.0     | 2394         | PASS   | 5                               | 5             | 3/22/90     |
| 316                           | MAIN STEAM      |  |          |         |              |        | MSV-114                                     | 20.0     | 20.0    | 2394         | PASS   | 20                              | 20            | 3/9/89      |
| 317                           | NITROGEN        |  |          |         |              |        | NGV-81                                      | 750.0    | 750.0   | 2394         | PASS   | 750                             | 750           | 3/20/90     |
| 317                           | NITROGEN        |  |          |         |              |        | NGV-81                                      | 362.0    | 362.0   | 2394         | PASS   | 362                             | 362           | 3/17/89     |
| 318                           | MAIN STEAM      |  |          |         |              |        | MSV-128                                     | 20.0     | 20.0    | 6384         | PASS   | 20                              | 20            | 10/19/91    |
| 318                           | MAIN STEAM      |  |          |         |              |        | MSV-128                                     | 20.0     | 20.0    | 6384         | PASS   | 20                              | 20            | 3/20/90     |
| 318                           | MAIN STEAM      |  |          |         |              |        | MSV-128                                     | 20.0     | 20.0    | 6384         | PASS   | 20                              | 20            | 3/10/89     |
| 320                           | MAIN STEAM      |  |          |         |              |        | MSV-132                                     | 20.0     | 20.0    | 2394         | PASS   | 20                              | 20            | 10/18/91    |
| 320                           | MAIN STEAM      |  |          |         |              |        | MSV-132                                     | 1015.0   | 1015.0  | 2394         | PASS   | 1015                            | 1015          | 3/23/90     |
| 320                           | MAIN STEAM      |  |          |         |              |        | MSV-132                                     | 312.0    | 312.0   | 2394         | PASS   | 312                             | 312           | 3/9/89      |
| 329                           | DECAY HEAT      | DHV-93                                     |          |         | 3192         | PASS   | DHV-91                                      | 649.0    | 790.0   | 3192         | PASS   | 649                             | 790           | 11/1/91     |
| 329                           | DECAY HEAT      | DHV-93                                     | 20.0     | 20.0    | 3192         | PASS   | DHV-91                                      | 20.0     | 20.0    | 3192         | PASS   | 20                              | 20            | 3/22/90     |
| 329                           | DECAY HEAT      | DHV-93                                     | 20.0     | 20.0    | 3192         | PASS   | DHV-91                                      | 2.0      | 20.0    | 3192         | PASS   | 20                              | 20            | 4/3/89      |
| 332                           | CONT MONITORING | WSV-5                                      | 7.8      | 7.8     | 1596         | PASS   | WSV-6                                       | 23.9     | 23.9    | 1596         | PASS   | 24                              | 24            | 4/5/90      |
| 332                           | CONT MONITORING | WSV-5                                      | 20.0     | 20.0    | 1596         | PASS   | WSV-6                                       | 20.0     | 20.0    | 1596         | PASS   | 20                              | 20            | 3/17/89     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 5

TYPE C LLRT (valves, flanges)

|             |                | INBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------|----------------|--|----------|---------|--------------|--------|---|----------|---------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION | SYSTEM         | VALVE #                                    | AS FOUND | AS LEFT | ACTION VALUE | STATUS | VALVE #                                     | AS FOUND | AS LEFT | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
| 333         | MAKE UP        | MUV-40                                     | 220.0    | 20.0    | 3900         | PASS   | MUV-49                                      | 1976.0   | 1976.0  | 3990         | PASS   |                                 |               |             |
| 333         | MAKE UP        | MUV-41                                     | 2340.0   | 1860.0  | 3990         | PASS   |   |          |         |              |        |                                 |               |             |
| 333         | MAKE UP        | MUV-505                                    | 353.0    | 23.8    | 4788         | PASS   |   |          |         |              |        | 2913                            | 1976          | 5/24/90     |
| 333         | MAKE UP        | MUV-40                                     | 160.0    | 175.3   | 3900         | PASS   | MUV-49                                      | 274.0    | 90.2    | 3990         | PASS   |                                 |               |             |
| 333         | MAKE UP        | MUV-41                                     | 100.0    | 256.0   | 3990         | PASS   |   |          |         |              |        |                                 |               |             |
| 333         | MAKE UP        | MUV-505                                    | 1857.0   | 1857.0  | 4788         | PASS   |   |          |         |              |        | 2117                            | 2288          | 5/10/89     |
| 339         | WASTE DISPOSAL | WDV-3                                      | 1825.0   | 1178.0  | 6384         | PASS   | WDV-4                                       | 152.4    | 152.4   | 6384         | PASS   | 1825                            | 1178          | 6/7/90      |
| 339         | WASTE DISPOSAL | WDV-3                                      | 2190.0   | 2190.0  | 6384         | PASS   | WDV-4                                       | 680.0    | 680.0   | 6384         | PASS   | 2190                            | 2190          | 3/21/89     |
| 347         | SPENT FUEL     | SFV-18                                     |          |         | 15960        | PASS   | SFV-19                                      | 13.6     | 13.6    | 15960        | PASS   | 14                              | 14            | 3/28/90     |
| 347         | SPENT FUEL     | SFV-18                                     | 62.7     | 62.7    | 15960        | PASS   | SFV-19                                      | 83.7     | 83.7    | 15960        | PASS   | 84                              | 84            | 3/11/89     |
| 349         | WASTE DISPOSAL | WDV-60                                     | 227.0    | 1083.0  | 3192         | PASS   | WDV-61                                      | 234.0    | 234.0   | 3192         | PASS   | 234                             | 1083          | 5/9/90      |
| 349         | WASTE DISPOSAL | WDV-60                                     | 20.0     | 20.0    | 3192         | PASS   | WDV-61                                      | 20.0     | 20.0    | 3192         | PASS   | 20                              | 20            | 3/21/89     |
| 350         | CORE FLOOD     | CFV-18                                     | 275.0    | 325.0   | 1596         | PASS   | CFV-26                                      | 172.0    | 172.0   | 1596         | PASS   | 275                             | 325           | 3/21/90     |
| 350         | CORE FLOOD     | CFV-18                                     | 649.0    | 649.0   | 1596         | PASS   | CFV-26                                      | 176.2    | 176.2   | 1596         | PASS   | 649                             | 649           | 3/14/89     |
| 351         | CORE FLOOD     | CFV-15                                     | 413.0    | 548.0   | 1596         | PASS   | CFV-29                                      | 431.0    | 431.0   | 2394         | PASS   |                                 |               |             |
| 351         | CORE FLOOD     | CFV-16                                     | 145.3    | 70.6    | 1596         | PASS   |   |          |         |              |        | 558                             | 619           | 3/21/90     |
| 351         | CORE FLOOD     | CFV-15                                     | 20.0     | 20.0    | 1596         | PASS   | CFV-29                                      | 20.0     | 20.0    | 2394         | PASS   |                                 |               |             |
| 351         | CORE FLOOD     | CFV-16                                     | 20.0     | 20.0    | 1596         | PASS   |   |          |         |              |        | 40                              | 40            | 3/11/89     |
| 352         | CORE FLOOD     | CFV-11                                     | 435.0    | 20.0    | 1596         | PASS   | CFV-42                                      | 640.0    | 20.0    | 1596         | PASS   |                                 |               |             |
| 352         | CORE FLOOD     | CFV-12                                     | 740.0    | 20.0    | 1596         | PASS   |   |          |         |              |        | 1175                            | 40            | 3/20/90     |
| 352         | CORE FLOOD     | CFV-11                                     | 20.0     | 20.0    | 1596         | PASS   | CFV-42                                      | 20.0     | 20.0    | 1596         | PASS   |                                 |               |             |
| 352         | CORE FLOOD     | CFV-12                                     | 20.0     | 20.0    | 1596         | PASS   |   |          |         |              |        | 40                              | 40            | 3/11/89     |
| 354         | WASTE DISPOSAL | WDV-406                                    | 1130.0   | 237.0   | 2394         | PASS   | WDV-405                                     | 1172.0   | 227.0   | 2394         | PASS   | 1172                            | 237           | 5/25/90     |
| 354         | WASTE DISPOSAL | WDV-406                                    | 1574.0   | 1574.0  | 2394         | PASS   | WDV-405                                     | 749.0    | 749.0   | 2394         | PASS   | 1574                            | 1574          | 3/20/89     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 6

TYPE C LLRT (valves, flanges)

|             |                 | INBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------|-----------------|--|----------|---------|--------------|--------|---|----------|---------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION | SYSTEM          | VALVE #                                    | AS FOUND | AS LEFT | ACTION VALUE | STATUS | VALVE #                                     | AS FOUND | AS LEFT | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
| 355         | NITROGEN        |  |          |         |              |        | NGV-62                                      | 1670.0   | 1670.0  | 2394         | PASS   | 1670                            | 1670          | 3/20/90     |
| 355         | NITROGEN        |  |          |         |              |        | NGV-62                                      | 877.0    | 877.0   | 2394         | PASS   | 877                             | 877           | 3/17/89     |
| 356         | CONT MONITORING | WSV-1                                      | 16.0     | 16.0    | 1596         | PASS   | WSV-2                                       | 15.4     | 15.4    | 1596         | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-34                                     | 16.1     | 16.1    | 798          | PASS   | WSV-35                                      | 15.7     | 15.7    | 798          | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-30                                     | 16.0     | 16.0    | 798          | PASS   | WSV-31                                      | 15.6     | 15.6    | 798          | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-38                                     | 15.7     | 15.7    | 798          | PASS   | WSV-39                                      | 15.8     | 15.8    | 798          | PASS   | 64                              | 64            | 3/28/90     |
| 356         | CONT MONITORING | WSV-1                                      | 20.0     | 20.0    | 1596         | PASS   | WSV-2                                       | 20.0     | 20.0    | 1596         | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-34                                     | 20.0     | 20.0    | 798          | PASS   | WSV-35                                      | 20.0     | 20.0    | 798          | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-30                                     | 20.0     | 20.0    | 798          | PASS   | WSV-31                                      | 20.0     | 20.0    | 798          | PASS   |                                 |               |             |
| 356         | CONT MONITORING | WSV-38                                     | 20.0     | 20.0    | 798          | PASS   | WSV-39                                      | 20.0     | 20.0    | 798          | PASS   | 80                              | 80            | 3/16/89     |
| 357         | AIR HANDLING    | AHV-1B                                     | 978.0    | 710.0   | 2550         | PASS   | AHV-1A                                      |          |         |              |        | 978                             | 710           | 11/13/91    |
| 357         | AIR HANDLING    | AHV-1B                                     | 866.0    | 978.0   | 2550         | PASS   | AHV-1A                                      |          |         |              |        | 866                             | 978           | 11/04/91    |
| 357         | AIR HANDLING    | AHV-1B                                     |          | 1317.0  | 2550         | PASS   | AHV-1A                                      |          |         |              |        |                                 | 1317          | 12/16/90    |
| 357         | AIR HANDLING    | AHV-1B                                     | 914.0    |         | 2550         | PASS   | AHV-1A                                      |          |         |              |        | 914                             |               | 12/12/90    |
| 357         | AIR HANDLING    | AHV-1B                                     | 1003.0   | 1031.0  | 2550         | PASS   | AHV-1A                                      |          |         |              |        | 1003                            | 1031          | 10/12/90    |
| 357         | AIR HANDLING    | AHV-1B                                     | 775.0    | 850.0   | 2550         | PASS   | AHV-1A                                      |          |         |              |        | 775                             | 850           | 6/10/90     |
| 357         | AIR HANDLING    | AHV-1B                                     | 819.0    | 797.0   | 2500         | PASS   | AHV-1A                                      |          |         |              |        | 819                             | 797           | 9/29/89     |
| 357         | AIR HANDLING    | AHV-1B                                     |          | 1143.0  | 2500         | PASS   | AHV-1A                                      |          |         |              |        |                                 | 1143          | 9/2/89      |
| 357         | AIR HANDLING    | AHV-1B                                     | 819.0    |         | 2500         | PASS   | AHV-1A                                      |          |         |              |        | 819                             |               | 8/27/89     |
| 357         | AIR HANDLING    | AHV-1B                                     |          | 593.0   | 2500         | PASS   | AHV-1A                                      |          |         |              |        |                                 | 593           | 7/3/89      |
| 357         | AIR HANDLING    | AHV-1B                                     | 173.9    |         | 2500         | PASS   | AHV-1A                                      |          |         |              |        | 174                             |               | 6/29/89     |
| 357         | AIR HANDLING    | AHV-1B                                     | 2010.0   | 938.0   | 2500         | PASS   | AHV-1A                                      |          |         |              |        | 2010                            | 938           | 6/12/89     |
| 357         | AIR HANDLING    | AHV-1B                                     |          | 2010.0  | 2500         | PASS   | AHV-1A                                      |          |         |              |        |                                 | 2010          | 5/25/89     |
| 357         | AIR HANDLING    | AHV-1B                                     | 1017.0   |         | 2500         | PASS   | AHV-1A                                      |          |         |              |        | 1017                            |               | 2/27/89     |



LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 7

TYPE C LLRT (valves, flanges)

|             |                 | INBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |          |         |              |        | PENETRATION PATH LEAKAGE (sccm) |               | ACTUAL DATE |
|-------------|-----------------|--|----------|---------|--------------|--------|---|----------|---------|--------------|--------|---------------------------------|---------------|-------------|
| PENETRATION | SYSTEM          | VALVE #                                    | AS FOUND | AS LEFT | ACTION VALUE | STATUS | VALVE #                                     | AS FOUND | AS LEFT | ACTION VALUE | STATUS | AS FOUND VALUE                  | AS LEFT VALUE |             |
| 366         | INDUST. COOLING |  |          |         |              |        | CV-34                                       | 15.0     | 15.0    | 3990         | PASS   | 15                              | 15            | 3/23/90     |
| 366         | INDUST. COOLING |  |          |         |              |        | CV-34                                       | 100.0    | 100.0   | 3990         | PASS   | 100                             | 100           | 3/2/89      |
| 367         | INDUST. COOLING |  |          |         |              |        | CV-35                                       | 650.0    | 650.0   | 3990         | PASS   | 650                             | 650           | 3/23/90     |
| 367         | INDUST. COOLING |  |          |         |              |        | CV-35                                       | 326.0    | 326.0   | 3990         | PASS   | 326                             | 326           | 3/2/89      |
| 372         | NITROGEN        |  |          |         |              |        | NGV-82                                      | 37.0     | 37.0    | 1596         | PASS   | 37                              | 37            | 3/20/90     |
| 372         | NITROGEN        |  |          |         |              |        | NGV-82                                      | 167.4    | 167.4   | 2394         | PASS   | 167                             | 167           | 3/17/89     |
| 373         | CORE FLOOD      | CFV-19                                     | 1472.0   | 236.0   | 1596         | PASS   | CFV-25                                      | 190.4    | 190.4   | 1596         | PASS   | 1472                            | 236           | 3/21/90     |
| 373         | CORE FLOOD      | CFV-19                                     | 312.0    | 312.0   | 1596         | PASS   | CFV-25                                      | 470.0    | 470.0   | 1596         | PASS   | 470                             | 470           | 3/14/89     |
| 374         | WASTE DISPOSAL  | WDV-94                                     | 20.0     | 885.0   | 4788         | PASS   | WDV-62                                      | 20.0     | 20.0    | 4788         | PASS   | 20                              | 885           | 3/26/90     |
| 374         | WASTE DISPOSAL  | WDV-94                                     | 20.0     | 20.0    | 4788         | PASS   | WDV-62                                      | 255.0    | 255.0   | 4788         | PASS   | 255                             | 255           | 3/18/89     |
| 376         | CONT MONITORING | WSV-41                                     | 7.3      | 7.3     | 796          | PASS   | WSV-40                                      | 8.1      | 8.1     | 796          | PASS   |                                 |               |             |
| 376         | CONT MONITORING | WSV-42                                     | 5.2      | 5.2     | 796          | PASS   | WSV-43                                      | 7.0      | 7.0     | 796          | PASS   | 15                              | 15            | 3/28/90     |
| 376         | CONT MONITORING | WSV-41                                     | 20.0     | 20.0    | 796          | PASS   | WSV-40                                      | 20.0     | 20.0    | 796          | PASS   |                                 |               |             |
| 376         | CONT MONITORING | WSV-42                                     | 20.0     | 20.0    | 796          | PASS   | WSV-43                                      | 20.0     | 20.0    | 796          | PASS   | 40                              | 40            | 3/17/89     |
| 377         | MAKE UP         | MUV-260                                    |          |         | 1596         | PASS   | MUV-253                                     | 20.0     | 20.0    | 1596         | PASS   |                                 |               |             |
| 377         | MAKE UP         | MUV-261                                    |          |         | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-259                                    |          |         | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-258                                    |          |         | 1596         | PASS   |   |          |         |              |        | 1451                            | 1451          | 10/14/91    |
| 377         | MAKE UP         | MUV-260                                    | 146.7    | 1088.0  | 1596         | PASS   | MUV-253                                     | 564.0    | 564.0   | 1596         | PASS   |                                 |               |             |
| 377         | MAKE UP         | MUV-261                                    | 20.0     | 194.7   | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-259                                    | 2.0      | 20.0    | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-258                                    | 122.4    | 147.8   | 1596         | PASS   |   |          |         |              |        | 564                             | 1451          | 5/4/90      |
| 377         | MAKE UP         | MUV-260                                    | 65.2     | 20.0    | 1596         | PASS   | MUV-253                                     | 126.0    | 126.0   | 1596         | PASS   |                                 |               |             |
| 377         | MAKE UP         | MUV-261                                    | 20.0     | 20.0    | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-259                                    | 22.4     | 22.4    | 1596         | PASS   |   |          |         |              |        |                                 |               |             |
| 377         | MAKE UP         | MUV-258                                    | 411.0    | 411.0   | 1596         | PASS   |   |          |         |              |        | 519                             | 473           | 3/30/89     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 8

TYPE C LLRT (valves, flanges)

|             |                | INBOARD ISOLATION VALVES (Leakage in sccm) |                        |            |                 |        | OUTBOARD ISOLATION VALVES (Leakage in sccm) |                        |            |                 |        | PENETRATION PATH LEAKAGE (sccm) |                     | ACTUAL DATE |
|-------------|----------------|--|------------------------|------------|-----------------|--------|---|------------------------|------------|-----------------|--------|---------------------------------|---------------------|-------------|
| PENETRATION | SYSTEM         | VALVE #                                    | LEAKAGE<br>AS<br>FOUND | AS<br>LEFT | ACTION<br>VALUE | STATUS | VALVE #                                     | LEAKAGE<br>AS<br>FOUND | AS<br>LEFT | ACTION<br>VALUE | STATUS | AS<br>FOUND<br>VALUE            | AS<br>LEFT<br>VALUE |             |
| 425         | CHEM. ADDITION | CAV-433                                    | 32.0                   | 32.0       | 598             | PASS   | CAV-435                                     | 30.0                   | 30.0       | 598             | PASS   |                                 |                     |             |
| 425         | CHEM. ADDITION | CAV-434                                    | 250.0                  | 250.0      | 598             | PASS   | CAV-436                                     | 250.0                  | 250.0      | 598             | PASS   | 282                             | 282                 | 3/22/90     |
| 425         | CHEM. ADDITION | CAV-433                                    | 108.6                  | 108.6      | 598             | PASS   | CAV-435                                     | 106.8                  | 106.8      | 598             | PASS   |                                 |                     |             |
| 425         | CHEM. ADDITION | CAV-434                                    | 109.9                  | 109.9      | 598             | PASS   | CAV-436                                     | 109.2                  | 109.2      | 598             | PASS   | 219                             | 219                 | 3/8/89      |
| 427         | MAIN STEAM     |  |                        |            |                 |        | MSV-130                                     | 605.0                  | 605.0      | 4788            | PASS   | 605                             | 605                 | 1C/17/91    |
| 427         | MAIN STEAM     |  |                        |            |                 |        | MSV-130                                     | 200.0                  | 200.0      | 4788            | PASS   | 200                             | 200                 | 3/19/90     |
| 427         | MAIN STEAM     |  |                        |            |                 |        | MSV-130                                     | 106.2                  | 106.2      | 4788            | PASS   | 106                             | 106                 | 3/6/89      |
| 428         | MAIN STEAM     |  |                        |            |                 |        | MSV-148                                     | 1255.0                 | 1255.0     | 4788            | PASS   | 1255                            | 1255                | 10/17/91    |
| 428         | MAIN STEAM     |  |                        |            |                 |        | MSV-148                                     | 345.0                  | 345.0      | 4788            | PASS   | 345                             | 345                 | 3/19/90     |
| 428         | MAIN STEAM     |  |                        |            |                 |        | MSV-148                                     | 882.0                  | 882.0      | 4788            | PASS   | 882                             | 882                 | 3/6/89      |
| 430         | FIRE SERVICE   | FSV-262                                    | 1400.0                 | 1400.0     | 6384            | PASS   | FSV-261                                     | 1850.0                 | 1850.0     | 6384            | PASS   | 1850                            | 1850                | 3/19/90     |
| 430         | FIRE SERVICE   | FSV-262                                    | 25.4                   | 25.4       | 6384            | PASS   | FSV-261                                     | 40.5                   | 40.5       | 6384            | PASS   | 40                              | 40                  | 3/25/89     |
| 439         | CHEM. ADDITION | CAV-126                                    |                        |            | 598             | PASS   | CAV-2                                       | 760.0                  | 210.0      | 1596            | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-1                                      |                        |            | 598             | PASS   | CAV-431                                     | 20.0                   | 20.0       | 598             | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-3                                      |                        |            | 598             | PASS   | CAV-432                                     | 20.0                   | 20.0       | 598             | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-429                                    | 129.0                  | 129.0      | 598             | PASS   |   |                        |            |                 |        |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-430                                    | 14.0                   | 14.0       | 598             | PASS   |   |                        |            |                 |        | 800                             | 356                 | 10/17/91    |
| 439         | CHEM. ADDITION | CAV-126                                    | 20.0                   | 47.4       | 598             | PASS   | CAV-2                                       | 20.0                   | 20.0       | 1596            | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-1                                      | 20.0                   | 96.4       | 598             | PASS   | CAV-431                                     | 20.0                   | 20.0       | 598             | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-3                                      | 20.0                   | 68.9       | 598             | PASS   | CAV-432                                     | 20.0                   | 20.0       | 598             | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-429                                    | 48.0                   | 48.0       | 598             | PASS   |   |                        |            |                 |        |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-430                                    | 260.0                  | 260.0      | 598             | PASS   |   |                        |            |                 |        | 368                             | 521                 | 4/4/90      |
| 439         | CHEM. ADDITION | CAV-126                                    | 100.0                  | 20.0       | 598             | PASS   | CAV-2                                       | 412.0                  | 412.0      | 1596            | PASS   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-1                                      | 1678.0                 | 20.0       | 598             | FAIL   | CAV-431                                     | 1194.0                 | 580.0      | 598             | FAIL   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-3                                      | 2670.0                 | 190.0      | 598             | FAIL   | CAV-432                                     | 10200.0                | 136.0      | 598             | FAIL   |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-429                                    | 100.0                  | 100.0      | 598             | PASS   |   |                        |            |                 |        |                                 |                     |             |
| 439         | CHEM. ADDITION | CAV-430                                    | 100.0                  | 100.0      | 598             | PASS   |   |                        |            |                 |        | 11806                           | 1128                | 4/23/89     |



LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 1

TYPE B LLRT (Resilient seals, gaskets, sealant compounds, expandable bellows and flexible seal assemblies)

| PENETRATION | DESCRIPTION                            | MEASURED VALUES |        |         |        | TEST TYPE | ACCEPTANCE CRITERIA<br>ACTION VALUE (sccm) | ACTUAL DATE |
|-------------|--|-----------------|--------|---------|--------|-----------|--|-------------|
|             |  | AS FOUND        | STATUS | AS-LEFT | STATUS |           |  |             |
| 348         | FUEL TRANSFER TUBE GASKET - 3B         | 20              | PASS   | 20      | PASS   | INLK      | 100  | 3/1/89      |
| 436         | FUEL TRANSFER TUBE GASKET - 3A         | 20              | PASS   | 20      | PASS   | INLK      | 100  | 3/1/89      |
| 120         | SG CHEMICAL CLEANING GASKETS           | 48              | PASS   | 48      | PASS   | INLK      | 100  | 3/1/89      |
| 119         | SG CHEMICAL CLEANING GASKETS           | 20              | PASS   | 20      | PASS   | INLK      | 100  | 3/28/89     |
| EHR8        | EQUIPMENT HATCH RESILIENT SEALS        | 212             | PASS   | 5       | PASS   | INLK      | 500  | 5/23/89     |
| RAX-2       | EQUIPMENT HATCH                        | 10240           | PASS   | 10240   | PASS   | INLK      | 10721                                      | 5/24/89     |
| RAX-1       | PERSONNEL HATCH                        | 1940            | PASS   | 1940    | PASS   | INLK      | 10721                                      | 5/26/89     |
| RAX-1       | PERSONNEL HATCH                        | 8500            | PASS   | 8500    | PASS   | INLK      | 20721                                      | 11/15/89    |
| RAX-2       | EQUIPMENT HATCH                        | 1120            | PASS   | 1120    | PASS   | INLK      | 20721                                      | 11/16/89    |
| 134         | LOW VOLTAGE DC INSTRUMENT CONTROL RODS | 2               | PASS   | 2       | PASS   | INLK      | 100  | 4/18/90     |
| 135         | RB LIGHTS SMALL AC-DC MOTORS           | 2               | PASS   | 2       | PASS   | INLK      | 100  | 4/18/90     |
| 301         | CRD POWER SUPPLY                       | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/18/90     |
| 302         | CRD POWER SUPPLY                       | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/18/90     |
| 303         | CRD POWER SUPPLY                       | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/18/90     |
| 309         | VENT FAN 3C                            | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/18/90     |
| 127         | CRANE/ELEVATOR POWER SUPPLY            | 6               | PASS   | 6       | PASS   | INLK      | 100  | 4/19/90     |
| 130         | MISC. INSTRUMENTATION                  | 6               | PASS   | 6       | PASS   | INLK      | 100  | 4/19/90     |
| 133         | MISC. INSTRUMENTATION                  | 5               | PASS   | 5       | PASS   | INLK      | 100  | 4/19/90     |
| 208         | RCP-3B1 POWER SUPPLY                   | 2               | PASS   | 2       | PASS   | INLK      | 100  | 4/19/90     |
| 209         | RCP-3B1 POWER SUPPLY                   | 4               | PASS   | 4       | PASS   | INLK      | 100  | 4/19/90     |
| 210         | RCP-3B2 POWER SUPPLY                   | 4               | PASS   | 4       | PASS   | INLK      | 100  | 4/19/90     |
| 211         | RCP-3B2 POWER SUPPLY                   | 4               | PASS   | 4       | PASS   | INLK      | 100  | 4/19/90     |



LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 2

TYPE B LLRT (Resilient seals, gaskets, sealant compounds, expandable bellows and flexible seal assemblies)

| PENETRATION | DESCRIPTION                            | MEASURED VALUES |        |         |        | TEST TYPE | ACCEPTANCE CRITERIA<br>ACTION VALUE (ccm) | ACTUAL DATE |
|-------------|--|-----------------|--------|---------|--------|-----------|---|-------------|
|             |  | AS FOUND        | STATUS | AS-LEFT | STATUS |           |   |             |
| 212         | LOW VOLTAGE DC INSTRUMENT CONTROL RODS | 4               | PASS   | 4       | PASS   | INLK      | 100                                       | 4/19/90     |
| 213         | LOW VOLTAGE DC INSTRUMENT CONTROL RODS | 4               | PASS   | 4       | PASS   | INLK      | 100                                       | 4/19/90     |
| 214         | LOW VOLTAGE DC INSTRUMENT CONTROL RODS | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/19/90     |
| 215         | LOW VOLTAGE DC INSTRUMENT CONTROL RODS | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/19/90     |
| 307         | CRD POWER SUPPLY                       | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/19/90     |
| 308         | ES A-B CONTROL CIRCUIT                 | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/19/90     |
| 101         | PZR. HEATER POWER SUPPLY               | 6               | PASS   | 6       | PASS   | INLK      | 100                                       | 4/20/90     |
| 102         | PZR. HEATER POWER SUPPLY               | 5               | PASS   | 5       | PASS   | INLK      | 100                                       | 4/20/90     |
| 103         | PZR. HEATER POWER SUPPLY               | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/20/90     |
| 104         | E.S. "B" CONTROL CIRCUITS              | 4               | PASS   | 4       | PASS   | INLK      | 100                                       | 4/20/90     |
| 126         | VENT FAN 3B                            | 3               | PASS   | 3       | PASS   | INLK      | 100                                       | 4/20/90     |
| 126         | THERMOCOUPLES                          | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/20/90     |
| 129         | MISC. INSTRUMENTATION                  | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/20/90     |
| 132         | MISC. INSTRUMENTATION                  | 5               | PASS   | 5       | PASS   | INLK      | 100                                       | 4/20/90     |
| 401         | RCP-3A2 POWER SUPPLY                   | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/20/90     |
| 402         | RCP-3A2 POWER SUPPLY                   | 4               | PASS   | 4       | PASS   | INLK      | 100                                       | 4/20/90     |
| 403         | RCP-3A1 POWER SUPPLY                   | 6               | PASS   | 6       | PASS   | INLK      | 100                                       | 4/20/90     |
| 404         | RCP-3A1 POWER SUPPLY                   | 2               | PASS   | 2       | PASS   | INLK      | 100                                       | 4/20/90     |
| 405         | INCORE INSTRUMENTATION                 | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/20/90     |
| 407         | INCORE & OUT OR CORE INSTRUMENTATION   | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/20/90     |
| 408         | IN-CORE COAX CABLES                    | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/20/90     |
| 409         | THERMOCOUPLES                          | 20              | PASS   | 20      | PASS   | INLK      | 100                                       | 4/20/90     |

LEAK RATE TESTING TRENDING PROGRAM  
FOR FLORIDA POWER CORPORATION - CRYSTAL RIVER UNIT 3  
(2ND INTERVAL)

Page 3

TYPE B LLRT (Resilient seals, gaskets, sealant compounds, expandable bellows and flexible seal assemblies)

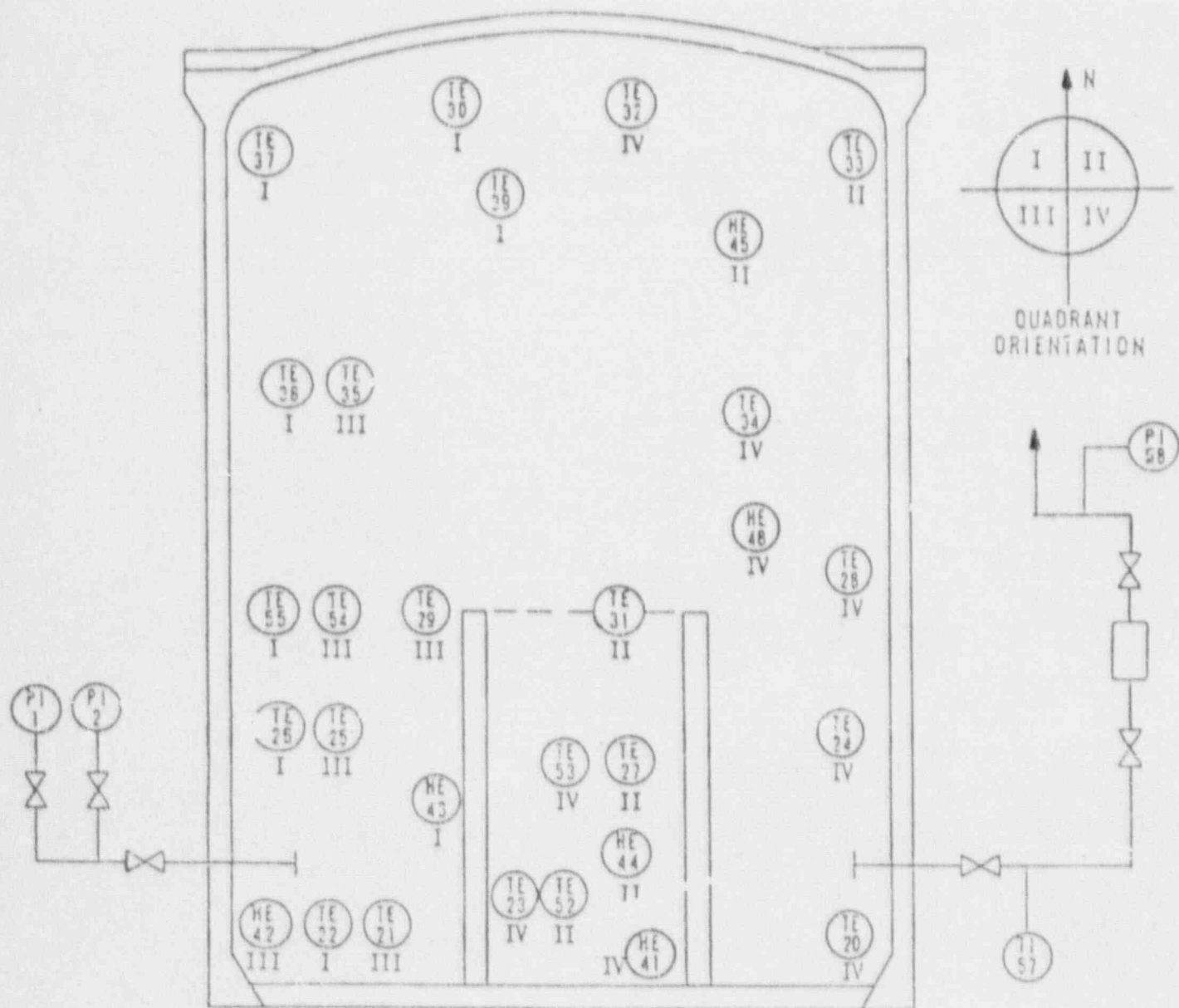
|             |                                 | MEASURED VALUES |        |         |        |           |  |             |
|-------------|---------------------------------|-----------------|--------|---------|--------|-----------|--|-------------|
| PENETRATION | DESCRIPTION                     | AS FOUND        | STATUS | AS-LEFT | STATUS | TEST TYPE | ACCEPTANCE CRITERIA<br>ACTION VALUE (sccm) | ACTUAL DATE |
| 410         | ES 'A' CONTROL CIRCUITS         | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/20/90     |
| 411         | ES 'A' CONTROL CIRCUITS         | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/20/90     |
| 412         | VENT FAN 3A                     | 20              | PASS   | 20      | PASS   | INLK      | 100  | 4/20/90     |
| 406         | ELECTRICAL PENETRATION          | 40              | PASS   | 40      | PASS   | INLK      | 100  | 4/25/90     |
| 413         | THERMOCOUPLES                   | 2               | PASS   | 2       | PASS   | INLK      | 100  | 4/25/90     |
| RAX-1       | PERSONNEL HATCH                 | 8500            | PASS   | 1042    | PASS   | INLK      | 20721                                      | 6/12/90     |
| RAX-2       | EQUIPMENT HATCH                 | 1120            | PASS   | 12380   | PASS   | INLK      | 20721                                      | 6/13/90     |
| 119         | SG CHEMICAL CLEANING GASKETS    | 62              | PASS   | 20      | PASS   | INLK      | 100  | 6/1/90      |
| 120         | SG CHEMICAL CLEANING GASKETS    | 87              | PASS   | 27      | PASS   | INLK      | 100  | 6/4/90      |
| 348         | FUEL TRANSFER TUBE GASKET - 3B  | 15              | PASS   | 20      | PASS   | INLK      | 100  | 6/8/90      |
| 436         | FUEL TRANSFER TUBE GASKET - 3A  | 7               | PASS   | 20      | PASS   | INLK      | 100  | 6/8/90      |
| EHR5        | EQUIPMENT HATCH RESILIENT SEALS | 20              | PASS   | 20      | PASS   | INLK      | 500  | 6/12/90     |
| RAX-2       | EQUIPMENT HATCH                 | 982             | PASS   | 982     | PASS   | INLK      | 20721                                      | 12/10/90    |
| RAX-1       | PERSONNEL HATCH                 | 1022            | PASS   | 1022    | PASS   | INLK      | 20721                                      | 12/11/90    |
| RAX-1       | PERSONNEL HATCH                 | 1404            | PASS   | 1404    | PASS   | INLK      | 20721                                      | 6/5/91      |
| RAX-2       | EQUIPMENT HATCH                 | 958             | PASS   | 958     | PASS   | INLK      | 20721                                      | 6/6/91      |
| EHR5        | EQUIPMENT HATCH RESILIENT SEALS | 20              | PASS   | 170     | PASS   | INLK      | 500  | 11/4/91     |
| 348         | FUEL TRANSFER TUBE GASKET - 3B  | 20              | PASS   | 20      | PASS   | INLK      | 100  | 10/13/91    |
| 436         | FUEL TRANSFER TUBE GASKET - 3A  | 20              | PASS   | 20      | PASS   | INLK      | 100  | 10/13/91    |
| 119         | SG CHEMICAL CLEANING GASKETS    | 20              | PASS   | 20      | PASS   | INLK      | 100  | 10/13/91    |
| 120         | SG CHEMICAL CLEANING GASKETS    | 20              | PASS   | 20      | PASS   | INLK      | 100  | 10/13/91    |
| EHR5        | EQUIPMENT HATCH RESILIENT SEALS | 170             | PASS   | 362     | PASS   | INLK      | 500  | 11/13/91    |



## APPENDIX C

### SENSOR LOCATIONS AND VOLUME FRACTIONS

# APPENDIX A SCHEMATIC ARRANGEMENT OF TEST INSTRUMENTATION



# INSTALLED CONSTANTS

## RTD WEIGHT FACTORS

|        |               |            |
|--------|---------------|------------|
| RTD 1  | WEIGHT FACTOR | = 0.036800 |
| RTD 2  | WEIGHT FACTOR | = 0.036800 |
| RTD 3  | WEIGHT FACTOR | = 0.036700 |
| RTD 4  | WEIGHT FACTOR | = 0.013500 |
| RTD 5  | WEIGHT FACTOR | = 0.058800 |
| RTD 6  | WEIGHT FACTOR | = 0.058800 |
| RTD 7  | WEIGHT FACTOR | = 0.058800 |
| RTD 8  | WEIGHT FACTOR | = 0.016500 |
| RTD 9  | WEIGHT FACTOR | = 0.054700 |
| RTD 10 | WEIGHT FACTOR | = 0.054700 |
| RTD 11 | WEIGHT FACTOR | = 0.063800 |
| RTD 12 | WEIGHT FACTOR | = 0.054700 |
| RTD 13 | WEIGHT FACTOR | = 0.063700 |
| RTD 14 | WEIGHT FACTOR | = 0.036100 |
| RTD 15 | WEIGHT FACTOR | = 0.036100 |
| RTD 16 | WEIGHT FACTOR | = 0.036100 |
| RTD 17 | WEIGHT FACTOR | = 0.036100 |
| RTD 18 | WEIGHT FACTOR | = 0.036100 |
| RTD 19 | WEIGHT FACTOR | = 0.036000 |
| RTD 20 | WEIGHT FACTOR | = 0.036000 |
| RTD 21 | WEIGHT FACTOR | = 0.016500 |
| RTD 22 | WEIGHT FACTOR | = 0.013500 |
| RTD 23 | WEIGHT FACTOR | = 0.054600 |
| RTD 24 | WEIGHT FACTOR | = 0.054600 |

RTD WEIGHTING FACTOR SUM = 1.000000

## PRESSURE GAUGE WEIGHT FACTORS

|                                   |               |          |
|-----------------------------------|---------------|----------|
| PRESS. GAUGE # 1                  | WEIGHT FACTOR | = 0.5000 |
| PRESS. GAUGE # 2                  | WEIGHT FACTOR | = 0.5000 |
|                                   |               | -----    |
| PRESS. GAUGE WEIGHTING FACTOR SUM |               | = 1.0000 |

## DEW CELL WEIGHT FACTORS

|             |               |            |
|-------------|---------------|------------|
| DEW CELL 1  | WEIGHT FACTOR | = 0.027000 |
| DEW CELL 2  | WEIGHT FACTOR | = 0.110300 |
| DEW CELL 3  | WEIGHT FACTOR | = 0.176400 |
| DEW CELL 4  | WEIGHT FACTOR | = 0.033000 |
| DEW CELL 5  | WEIGHT FACTOR | = 0.126700 |
| DEW CELL 6  | WEIGHT FACTOR | = 0.126700 |
| DEW CELL 7  | WEIGHT FACTOR | = 0.126600 |
| DEW CELL 8  | WEIGHT FACTOR | = 0.091100 |
| DEW CELL 9  | WEIGHT FACTOR | = 0.091100 |
| DEW CELL 10 | WEIGHT FACTOR | = 0.091100 |

DEW CELL WEIGHTING FACTOR SUM = 1.000000

|                    |           |
|--------------------|-----------|
| CONTAINMENT VOLUME | = 2000000 |
| LA                 | = 0.25    |