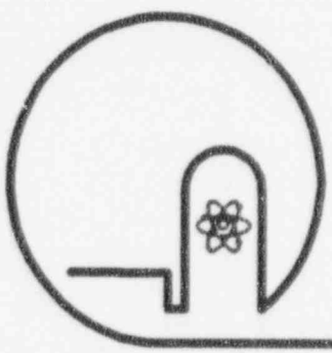
Illinois Power Company

Clinton Power Station Unit 1

Reactor Containment Building

Integrated Leak Rate Test

Final Report November 1993



NRC Docket No. 50-461

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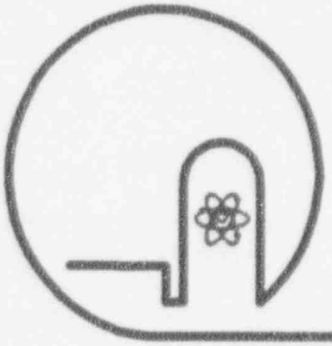

NRC Docket No. 50-461

ILLINOIS POWER COMPANY

CLINTON POWER STATION

UNIT 1

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

FINAL REPORT

NOVEMBER 23, 1993

NRC Docket No. 50-461

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ACRONYMS

ANS	American Nuclear Society
ANSI	American National Standard Institute
BWR	Boiling Water Reactor
CPS	Clinton Power Station
Cu. ft.	Cubic Foot (Feet)
DBLT	Drywell Bypass Leakage Rate Test
F.S.	Full Scale
FC	Fuel Pool Cooling System
FW	Feedwater System
HPCS	High Pressure Core Spray System
ILRT	Integrated Leakage Rate Test
ISG	Instrument Selection Guide
L_a	Containment Allowable Leakage
L_{am}	Containment Measured Leakage
lbm	Pounds Mass
LLRT	Local Leakage Rate Test
LOCA	Loss Of Coolant Accident
LPCS	Low Pressure Core Spray
MOVATS	Motor Operated Valve Analysis And Testing System
MSIV	Main Steam Isolation Valve
MWR	Maintenance Work Request
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
OPS	Operations
P&ID	Piping and Instrument Drawings
PCC	Post-Calibration Check
PMT	Post-Maintenance Test
PPM	Precision Pressure Monitor
psia	Pounds Per Square Inch Absolute
psig	Pounds Per Square Inch Gauge
RCIC	Reactor Core Injection Cooling
RF	Refuel Outage
RHR	Residual Heat Removal System
RPV	Reactor Pressure Vessel
RTD	Temperature Sensor
RWCU(RT)	Reactor Water Cleanup System
sccm	Standard Cubic Centimeters Per Minute
scfm	Standard Cubic Feet Per Minute
SRV	Safety Relief Valve
TPD	Temporary Procedure Deviation
UCL	Upper Confidence Limit
USAR	Updated Safety Analysis Report
°F	Degrees Fahrenheit

1.0 INTRODUCTION

On November 22 and 23, 1993, the Illinois Power Company (IPC) successfully completed the Integrated Leakage Rate Test (ILRT) and the Drywell Bypass Leakage Rate Test (DBLT) on its Clinton Power Station (CPS) Unit 1 reactor containment building. Both tests demonstrated that the measured leakage rates for the primary containment and drywell do no exceed the allowable values specified in the CPS Updated Safety Analysis Report (USAR) (Reference 1) and the Technical Specifications (Reference 2).

The ILRT and DBLT were conducted in accordance with the requirements of the ILRT procedure (Reference 3), Appendix J to 10CFR50 (Reference 4), ANSI/ANS 56.8 (Reference 5), BN-TOP-1 (Reference 6), and ANSI N45.4 (Reference 7). The nominal test pressures for the ILRT and DBLT were 9.0 psig and 3.0 psig, respectively. Leak rates were calculated using the absolute method, which uses a direct application of the ideal gas law (PV=mRT). The Total Time version described in ANSI/ANS 56.8 was employed to determine the leak rate and the 95% Upper Confidence Limit (UCL) for the ILRT. A similar method was used in determining the leak rate for the DBLT. The test duration was 8.5 hours for the ILRT and 4 hours for the DBLT.

Suppression pool and drywell sump level changes were monitored continuously throughout both tests to determine the real time free-air containment and drywell volumes. During the Verification Test, the suppression pool level monitor indicated a significant increase in pool level and, consequently, a corresponding increase in the leak rate was indicated. This monitor was determined to be unreliable after verifying that the level increase did not coincide with actual plant conditions. All data from this level monitor were subsequently rejected and initial and final suppression pool levels were obtained manually, consistent with previous ILRTs. The drywell sump level monitors were found to be reliable throughout the ILRT and DBLT and their data were used in calculating the free air volumes.

Due to an oversight in the revision to the Instrument Air (IA) test lineup, the Safety/Relief Valve (SRV) accumulators were not depressurized during the ILRT and DBLT. A conservative calculation was therefore performed to determine the maximum leakage from the accumulators into the drywell/containment that could have occurred during testing. This calculated leakage was added to the ILRT and DBLT leak rate results. A summary of the test results and the corresponding allowable values are provided below. The leakage rates reported below include minimum path leakage rate correction for those penetrations not lined-up for the test, corrections for water level changes during the tests, and corrections for the pressurized SRV accumulators. (See Section 4.0).

	Test Results	Allowable
ILRT Mass Point Leakage Rate	0.1294%/day	0.4875%/day
ILRT Mass Point UCL	0.1400%/day	0.4875%/day
ILRT Total Time Leakage Rate	0.1291%/day	0.4875%/day
ILRT Total Time UCL	0.2204%/day	0.4875%/day
Verification Mass Point Rate	0.7595%/day	0.5604-0.8854%/day
Verification Total Time Rate	0.7421%/day	0.5601-0.8851%/day
Drywell Bypass Leakage Rate	30.23 scfm	4312 scfm

A summary of the test events and test chronology is presented in Section 2.0, Test Synopsis. Plant information, technical data, test results, and test measurement system information are presented in Section 3.0, Test Data Summary. Test results are compared to the acceptance criteria in Section 4.0, Analysis and Interpretation. Referenced documents are listed in Section 5.0, References.

2.0 TEST SYNOPSIS

Prior to performing the ILRT and DBLT, all pressure, temperature, humidity, and flow sensors were calibrated to their specified accuracy. To ensure proper response of these sensors after their installation, an in-situ test was conducted as required by ANSI/ANS 56.8 - 1981. Table 1 of Section 3.0 tabulates the location of all temperature and humidity sensors installed inside the containment and drywell.

In accordance with 10CFR50, Appendix J, the containment was isolated by lining up systems penetrating containment in their post-accident configuration, except those systems listed in section 3.C.12 of this report. Also, prior to the ILRT, the containment and drywell liners were inspected to assess their pre-test condition. No abnormal degradation or change in appearance was noted during this inspection.

Pressurization of the containment for the ILRT commenced at 1840 hours on November 21, 1993, and was secured at 0130 hours on November 22, 1993 when test pressure was achieved. Temperature stabilization immediately followed and stabilization criteria were met 4 hours later (see Appendix B for temperature stabilization data.). The ILRT officially started at 0530 on November 22, 1993, and was conducted for a duration of 8.5 hours (see Appendix D for ILRT data). The Mass Point calculated leak rate was 0.0729%/day with an upper confidence limit of 0.0835%/day. The Total Time calculated leak rate was 0.0726%/day with an upper confidence limit of 0.1639%/day. Both upper confidence limits, after adding a leakage correction of 0.0565%/day, were below the allowable leakage rate of 0.4875%/day (75% of La). The Total Time calculations satisfied all short duration test requirements of BN-TOP-1, and the Mass Point calculations satisfied all short duration test requirements of ANSI/ANS 56.8-1981.

After pressurization for the ILRT, a walk down of the containment revealed water draining from the vent paths for penetrations 1MC-052 (FC Supply) and 1MC-064 (RWCU Return to FW A & B). Since a proper vent path could not be provided for these two penetrations as required by 10CFR50, Appendix J, the penetrations' minimum path leakage rates, measured prior to the ILRT, were added to the calculated leakage rate totals (see Section 4.0). Both penetrations were left in their normal test lineup throughout the ILRT.

The verification test commenced at 1400 hours on November 22, 1993. A superimposed leak rate approximately equal to La (13.08 scfm) was continuously vented from containment through a calibrated flow meter to validate the ILRT results. After a one hour stabilization period, the altered containment leakage rate was measured for a duration of 4.25 hours. The Mass Point and Total Time calculated leakage rates were 0.7595 %/day and 0.7421 %/day, respectively. Both leakage rates were within the calculated upper and lower limits (0.5604 to 0.8854 %/day -- Mass Point and 0.5601 to 0.8851 %/day -- Total Time).

Approximately midway into the verification test, the calculated leakage rate began to trend upward and ultimately exceeded the allowable upper limit. A review of the data revealed that suppression pool level indication had increased significantly (approximately one inch (5000 gallons) over two hours) over the same period of time. After confirming with the Main Control Room that water had not been added to the suppression pool during the test, the cause for this trend was attributed to erroneous level data from the suppression pool level monitor. Post-test calibration of this level monitor later confirmed that it was out-of-

calibration. Consequently, the on-line suppression pool level data for the ILRT and verification test were rejected and the suppression pool level was determined manually consistent with previous ILRTs. The two other similar level monitors used to measure the drywell floor and equipment drain sump levels functioned reliably and were used in the calculation of the containment and drywell free air volumes.

Data reduction and leakage rate calculations for the ILRT and verification tests were accomplished using the BCP Technical Services, Inc., ILRT Computer Program, Rev. 2. Prior to using this software, a Software Acceptance Test was conducted that validated its application for performing calculations required for the ILRT. A summary of this computer program is provided in Appendix A.

After the verification test, pressure was lowered to approximately 3 psig in the drywell and to atmospheric in the containment. The Drywell Bypass Leakage Rate Test commenced at 1115 hours on November 23, 1993, and continued for five hours with a one hour stabilization period. Using the absolute method, the leakage rate calculated for the DBLT was 29.33 scfm. This leakage, after adding a leakage correction of 0.90 scfm, was below the allowable leakage rate of 4,312 scfm. The test data and leakage rate calculations are presented in Appendix H. Following the DBLT, the drywell was depressurized and plant systems and equipment were restored.

During the restoration, it was discovered that none of the 16 Safety Relief Valve (SRV) accumulators had been depressurized prior to conducting the ILRT and DBLT. Consequently, any leakage from these accumulators would have masked leakage of the containment and drywell. Thus, a calculation was performed to determine the maximum amount of air that could have leaked from the accumulators during the testing. Using conservative assumptions of the initial and final accumulator pressures and in the calculation of the pressurized volume, the maximum total leakage rate from the SRV accumulators during the ILRT was calculated to be 0.90 scfm. The details of this calculation are contained in Section 4.0.

3.0 TEST DATA SUMMARY

A. Plant Information

Owner:	Illinois Power Company
Docket No.:	50-461
Plant:	Clinton Power Station, Unit 1
Location:	Clinton, IL
Containment Type:	Mark III
NSSS Supplier, Type:	General Electric, BWR
Date Test Completed:	November 23, 1993

B. Technical Data

1.	Containment Free Air Volume[1]		
	a.	Drywell Free Air Volume	246,500 cu. ft.
	b.	Containment Less Drywell Free Air Volume	1,550,800 cu. ft.
	c.	Total Free Air Volume	1,797,300 cu. ft.
	d.	Drywell Free Air Volume (At start of test)	245,438 cu. ft
	e.	Total Free Air Volume (At start of test)	1,781,444 cu. ft.
2.	Containment Design Pressure		15 psig
3.	Containment Design Temperature		185 °F
4.	Peak Accident Pressure		9 psig
5.	Containment II $\bar{R}T$ Average Temperature Limits		40 - 120 °F

C. Test Results - Type A Test

1.	Test Method	Absolute
2.	Data Analysis Techniques	Mass Point Leakage Rate per ANSI/ANS 56.8-1981; Total Time Leakage Rate per BN-TOP-1

[1] Normal free air volume is based on suppression pool water level elevation at 731' 5". The suppression pool water level elevation at the start of the test was 733' 9".

3.	Test Pressure	9.0 psig	
4.	Maximum Allowable Leakage Rate, L_a	0.65%/day	
5.	ILRT Acceptance Criteria (75% L_a)	0.4875%/day	
6.	Uncorrected ILRT Leakage Rate Results[2]	Leakage Rate, %/day	UCL, %/day
	Mass Point Analysis	0.0729	0.0835
	Total Time Analysis	0.0726	0.1639
7.	Verification Test Superimposed Leakage Rate	0.65%/day (13.08 scfm)	
8.	Verification Test Results	Leakage Rate, %/day	
	Mass Point Analysis	0.7595	
	Total Time Analysis	0.7421	
9.	Verification Test Criteria	Test Limits, %/day	
	Mass Point Analysis		
	Upper Limit ($L_o + L_{am} + 0.25\ L_a$)	0.8854	
	Lower Limit ($L_o + L_{am} - 0.25\ L_a$)	0.5604	
	Total Time Analysis		
	Upper Limit ($L_o + L_{am} + 0.25\ L_a$)	0.8851	
	Lower Limit ($L_o + L_{am} - 0.25\ L_a$)	0.5601	

10. Report Printouts

The report printouts and data plots for the ILRT and verification test calculations are provided in Appendices B through F.

[2] See Section 4.0 for corrections to the measured leakage rate. UCL is the 95 percentile upper confidence limit.

11. Containment Water Volume Changes During The ILRT

Containment floor and equipment drain sump pits were flooded prior to the test so that water drainage to these pits would overflow to the suppression pool. As previously discussed, suppression pool level was monitored manually due the unreliable data received from the digital level monitor. RPV and suppression pool level changes were determined to be negligible; therefore, corrections to the calculated leakage rates were not required.

The drywell floor and equipment drain sump levels were monitored continuously during the ILRT using the digital level monitors and were used in calculating the Total Time and Mass Point leakage rates. The changes in sump levels and in the corresponding containment free air volume are listed below.

	Volume	Level Change
Drywell Floor Drain Sump	+10.60 cu. ft.	+2.72"
Drywell Equipment Drain Sump	+ 6.66 cu. ft.	+3.94"

12. Penetrations not in Post-LOCA alignment for the ILRT as allowed by ANSI/ANS 56.8-1981.

a. The following penetrations were used in the conduct of the ILRT:

Penetration	System	Leakage Rate (Minimum Path)
1MC-067	Containment Pressurization	0 sccm
1MC-152(1)	ILRT Sensing Line	0 sccm
1MC-152(2)	ILRT Sensing Line	0 sccm
1MC-152(3)	ILRT Sensing Line	0 sccm

b. The following penetrations are associated with systems that are required either to maintain the plant in a safe condition during the test or to be operable under post-accident conditions:

Penetration	System	Leakage Rate (Minimum Path)
1MC-009	Feedwater "A"	110 sccm
1MC-010	Feedwater "B"	300 sccm
1MC-014	RHR Shutdown Cooling Suct.	600 sccm
1MC-015	RHR "A" Injection	1701 sccm
1MC-016	RHR "B" Injection	2786 sccm
1MC-017	RHR "C" Injection	20 sccm
1MC-035	HPCS Injection	20 sccm

1MC-036	LPCS Injection	20 sccm
1MC-042	RCIC Injection	20 sccm
1MC-063	Control Rod Drive	40 sccm

c. The following penetrations were not properly vented due to water leakage into the test boundary:

Penetration	System	Leakage Rate (Minimum Path)
1MC-052	FC Supply To Containment	350 sccm
1MC-064	RT to Feedwater Supply	10 sccm

13. The following leakage rates from pressurized vessels not vented prior to the test that were added to the UCL:

Pressurized Vessel	Leakage Rate (Calculated)
SRV Accumulators	25561 sccm
MSIV Dash Pot Accumulators	55 sccm

D. Test Results - Drywell Bypass Leakage Rate Test

1. Test Method: Absolute

2. Data Analysis Technique: Pressure Decay

3. Test Pressure

Drywell: 3.0 psig
Containment: Atmospheric

4. Maximum Allowable Bypass Leakage Rate: 4,312 scfm

5. Calculated Bypass Leakage Rate (uncorrected) 29.33 scfm

6. Calculated Bypass Leakage Rate (corrected) 30.23 scfm

7. Report Printouts

The report printouts for the Drywell Bypass Leakage Rate Test are provided in Appendix H.

E. Test Results - Type B and C

A summary of local leakage rate tests conducted since the last ILRT is provided in Appendix I.

F. Integrated Leakage Rate Test Measurement System Data

Instrument (# of Sensors)	Description	Data	
1. Absolute Pressure (2)	Volumetric PPM 1000	Range:	0-30 psia
		Accuracy:	0.005% F.S.
		Sensitivity:	0.001% F.S.
		Repeatability:	0.001 psia
		Calibration Date:	9/29/93[3]
2. Drybulb Temperature (25)	Volumetric 100 ohm, platinum RTD, Type A Model 385	Range:	60-100 °F
		Accuracy:	0.20 °F
		Sensitivity:	0.01 °F
		Repeatability:	0.01 °F
		Calibration Date:	10/13/93
3. Relative Humidity (9)	Phys. Chem. Research	Range:	10-100% RH
		Accuracy:	2 °F Dewpoint
		Sensitivity:	0.5 °F Dewpoint
		Repeatability:	0.01% RH
		Calibration Date:	9/23/93
4. Flow Meter (2)	Brooks Rotameter Model No. 316	Range:	0-17 scfm
		Accuracy:	1% Reading
		Sensitivity:	1% F.S.
		Repeatability:	1% F.S.
		Calibration Date:	10/12/93

Drybulb and dewpoint temperature sensor locations and volume fractions are shown in Table 1.

The calculated ISG for the test is 0.065%/day (See Appendix G).

[3] The backup absolute pressure gauge was calibrated on 11/3/93.

TABLE 1

Drybulb Temperature and Relative Humidity
Sensor Locations[4] and Volume Fractions

Drybulb Temperature Sensors

RTD Sensor	Elevation (Feet)	Azimuth (Degree)	Radius (Feet)	Volume Fraction
1	900	0	25	0.0714
2	900	180	25	0.0714
3	872	90	30	0.0714
4	872	270	30	0.0714
5	854	0	30	0.0472
6	854	180	30	0.0472
7	845	0	0	0.0472
8	837	90	40	0.0472
9	837	270	40	0.0472
10	816	5.5	45	0.0100
11	816	310	45	0.0448
12	816	120	45	0.0448
13	791	60	50	0.0356
14	791	225	50	0.0356
15	767	135	50	0.0356
16	767	315	50	0.0356
17	743	45	50	0.0426
18	743	225	50	0.0426
19	787	0	25	0.0326
20	769	123	25	0.0326
21	751	180	25	0.0326
22	732	270	24	0.0326
23	729	0	4	0.0041
24	818	0	9	0.0032
25	770	0	50	0.0135

Relative Humidity Sensors

Humidity Sensor	RTD Assignment	Elevation (Feet)	Azimuth (Degree)	Radius (Feet)	Volume Fraction
1	1,2,3,4	895	2.5	25	0.1427
2	1,2,3,4	867	95	31	0.1427
3	5,6,7,8,9	852	180	31	0.1180
4	5,6,7,8,9	838	272	44	0.1180
5	11,12	814	90	45	0.0995
6	13,14,15,16	789	225	54	0.1557
7	17,18	744	50	54	0.0852
8	19,20,21,22	785	0	26	0.0691
9	19,20,21,22	749	184	23	0.0691

[4] Dimensions are given to the nearest foot and azimuthal angles to the nearest degree. Sensor location tolerances are ± 3 feet and ± 5 degrees except in the containment dome where the tolerances are ± 5 feet and ± 5 degrees.

F. Information Available at the Plant

The following technical information is available for review at the facility upon request:

1. Access control procedures that were established to limit access to containment during testing.

2. A listing of all containment penetrations, including penetration size and function.

3. A listing of normal operating instrumentation monitored during the leakage rate tests.

4. A system line-up (at time of test) showing required valve positions and status of piping systems.

5. A chronological event log of test activities.

6. Documentation of instrument calibration and standards.

7. The working copies of the test procedure and associated documents.

8. Type B and C Local Leakage Rate Test (LLRT) procedures and results.

9. Computer printouts of the ILRT data.

10. The acceptance test procedure and results of the ILRT software.

11. Documentation of all test exceptions.

12. Description of sensor malfunctions.

13. Description of method of leakage rate verification of instrument measuring system (superimposed leakage), with calibration information on flow meters.

14. The P&IDs of systems penetrating containment or affected by the ILRT.

15. Drawings showing the location of all temperature and humidity sensors.

4.0 ANALYSIS AND INTERPRETATION

4.1 Systems/Penetrations Not Tested In The ILRT

The following penetrations were not in their post-LOCA alignment and, consequently, were not challenged in the ILRT. The Type C minimum path leakage rates for these penetrations are also given.

Penetration	System	Leakage Rate
1MC-009	Feedwater "A"	110 sccm
1MC-010	Feedwater "B"	300 sccm
1MC-014	RHR Shutdown Cooling Supply	600 sccm
1MC-015	RHR "A" Injection	1701 sccm
1MC-016	RHR "B" Injection	2786 sccm
1MC-017	RHR "C" Injection	20 sccm
1MC-035	HPCS Injection	20 sccm
1MC-036	LPCS Injection	20 sccm
1MC-042	RCIC Injection	20 sccm
1MC-052[5]	FC Supply to Containment	350 sccm
1MC-063	Control Rod Drive	40 sccm
1MC-064[5]	RT Injection to Feedwater	10 sccm
1MC-067	ILRT Containment Pressurization Line	0 sccm
1MC-152(1)	ILRT Sensing Line	0 sccm
1MC-152(2)	ILRT Sensing Line	0 sccm
1MC-152(3)	ILRT Sensing Line	0 sccm
	Total	5977 sccm (0.2111 scfm)

$$\text{ILRT Correction}^{6} = \frac{(5977 + 569)\ \text{sccm} * 60\ \text{mins/hr} * 24\ \text{hrs/day} * 100\% * 14.7\ \text{psia} * 534.99^{\circ}\text{R}}{1{,}781{,}444\ \text{cu. ft.} * 28{,}320\ \text{cc/cu. ft.} * 24.174\ \text{psia} * 528^{\circ}\text{R}}$$

$$= 0.0115\ \%/\text{day}$$

4.2 Pressurized Vessels in Containment Not Vented During The ILRT

a. MSIV Dash Pot Accumulators

The MSIV dash pots were not vented prior to the test, therefore, it was assumed that the dash pots were fully pressurized at the start of the ILRT and fully depressurized at the end of the ILRT. Based on a standard air volume equal to 1 cubic foot taken over the 8.5 hour test period, the amount of air in-leakage was calculated to be 55 sccm or 0.0001 %/day.

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[5] The minimum path leakage rates for penetrations 1MC-052 & 1MC-064 were added to the ILRT results due to their vent paths becoming filled with water during the ILRT.

[6] 569 sccm is added to the minimum path leakage rate calculation to account for instrument inaccuracies.

b. SRV Accumulators

Due to a procedural deficiency, the SRV ADS and non-ADS accumulators were not vented to atmosphere prior to the start of the ILRT. The maximum amount of air that could have leaked into containment during the ILRT was calculated to be 25561 sccm or 0.9026 scfm. Below are the assumptions made in calculating the maximum accumulator leakage. The leakage calculation can be found in Appendix D, ILRT Calculations.

1. The initial pressure of the accumulators was assumed to be 160 psig. This is highest pressure found during the accumulator check valve operability surveillance (CPS No. 9061.11) performed in RF-4.

2. The final accumulator pressure was either measured with a calibrated gauge (when the associated accumulator had not been recharged during test restoration) or it was assumed to be a containment pressure at the end of the ILRT (9.280 psig). Actual pressure was measured for nine of the 16 SRV accumulators.

3. Accumulators were assumed to be at full pressure at the start of the ILRT and leak at a constant rate until reaching their final pressures. The final pressure for accumulators that had been recharged was assumed to be reached at the end of the ILRT.

4. The volume of the accumulators and associated piping up to the check valve was determined by review of the isometric drawings. A 10% error in the volume of piping was utilized to account for minor construction differences, piping smaller than 1 1/4", and fittings (elbows, tees, valves, etc.).

5. Temperature was assumed to remain relatively constant during the pressure decay.

6. The accumulator leakage rate was calculated using the absolute method.

$$\text{ILRT Correction} = \frac{(25561 + 55\ \text{sccm}) * 60\ \text{mins/hr} * 24\ \text{hrs/day} * 100\ \% * 14.7\ \text{psia} * 534.99^{\circ}\text{R}}{1{,}781{,}444\ \text{cu. ft.} * 28{,}320\ \text{cc/cu. ft.} * 24.174\ \text{psia} * 528^{\circ}\text{R}}$$

$$= 0.0450\ \%/\text{day}$$

The total leakage rate for penetrations not in post-LOCA alignment and for pressurized vessels not vented in the ILRT is 0.0565 per above.

c. Drywell Sump Level Changes

Changes in drywell sump levels were automatically corrected for by the ILRT Computer Program and thus are reflected in the uncorrected ILRT leakage rate results.

The calculated leakage rates during the ILRT were 0.0729 %/day (mass point) and 0.0726 %/day (total time). The calculated 95 percentile upper confidence limits were 0.0835 %/day (mass point) and 0.1639 %/day (total time). The corrections to these leakage rates are summarized below:

Leakage rates, %/day

	Mass Point		Total Time	
	Leakage Rate	UCL	Leakage Rate	UCL
Calculated	0.0729	0.0835	0.0726	0.1639
Corrections	0.0565	0.0565	0.0565	0.0565
Corrected	0.1294	0.1400	0.1291	0.2204

The corrected 95% UCL for both the mass point and total time leakage rates are less than 0.75 La (0.4875%/day). Therefore, the leakage through the primary containment and the systems penetrating it does not exceed the allowable leakage rate specified in the Clinton Power Station Unit 1, USAR and Technical Specifications.

4.3 As-Found Additions

The "As-Found" Type B & C addition is 3225 sccm (0.114 scfm)

$$\text{As-Found Addition} = \frac{3225\ \text{sccm} * 60\ \text{mins/hr} * 24\ \text{hrs/day} * 100\ \% * 14.7\ \text{psia} * 534.99^{\circ}\text{R}}{1{,}781{,}444\ \text{cu. ft.} * 28{,}320\ \text{cc/cu. ft.} * 24.174\ \text{psia} * 528^{\circ}\text{R}}$$

As-Found Addition = 0.0057 %/day

This Type B & C addition consists of the difference between the as-found and as-left leakages for those penetrations which repairs or adjustments were performed during the refueling outage prior to the ILRT.

The As-Found leakage rates are as follows:

As-Found Leakage rates, %/day

	Mass Point		Total Time	
	Leakage Rate	UCL	Leakage Rate	UCL
Corrected	0.1294	0.1400	0.1291	0.2204
Addition	0.0057	0.0057	0.0057	0.0057
As - Found	0.1351	0.1457	0.1348	0.2261

The As-Found Mass Point and Total Time leakage rates and UCLs are less than 0.75 L_a (0.4875 %/day) as required by ANSI N56.8-1981.

5.0 REFERENCES

1. Clinton Power Station, Updated Safety Analysis Report (USAR).

2. Clinton Power Station, Technical Specifications.

3. Clinton Power Station Surveillance Test Procedure CPS 9861.01, "INTEGRATED LEAK RATE TEST," Revision 22.

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

5. ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements."

6. Bechtel Topical Report BN-TOP-1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants," Revision 1, 1972.

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

APPENDIX A

ILRT Computer Program Summary

BCP TECHNICAL SERVICES, INC.

USER'S-PROGRAMMER'S MANUAL

FOR

ILLINOIS POWER COMPANY'S CLINTON POWER STATION

ILRT PROGRAM

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1.0 PURPOSE

The purpose of this manual is to provide the users and programmers of the BCP Integrated Leakage Rate Testing program with an understanding of the program structure and coding methods. The level of detail provided is adequate for all required program modification and maintenance.

2.0 REFERENCES

a) BCP Quality Assurance Manual
b) Microsoft QuickBASIC, Version 4.5
c) 10 CFR 50, Appendix J
d) ANSI/ANS-56.8-1981
e) BN-TOP-1, Revision 1

3.0 DEFINITIONS

None.

4.0 PROGRAM DATA

4.1 User Information

4.1.1 Preliminary

Time is always entered as hhmm, or hmm for hour < 10, where

hh = hours (00-23)
mm = minutes (00-59)

Date is always entered as mmdd, or mdd for month < 10, where

mm = month (01-12)
dd = day (1 - number of days in month)

4.1.2 Starting the Program

The program is started by entering the command "ilrt". The program first displays a screen showing information about the program, including version number.

Note: In order to enable graphics output to the printer, \dos\graphics.com (or equivalent) must be executed before executing the ILRT program.

After pressing any key, the program displays this message:

Reload an existing data file (y/n)?

Press the [y] key if the data file for this test has already been created during a previous run and user wants to use or append to the existing data. Otherwise press the [n] key.

The program will now prompt the user for the data file name.
If user pressed [y] above, the program will ask:

Enter data file name ?

Or, if user pressed [n] above, the program will ask:

Enter new data file name ?

Enter the data file name in the format filename.extension, where, filename is 1 to 8 characters , and extension is 1 to 3 characters.

If the user is reloading an existing data file, the program will load the data from the file and then display the main menu.

If the user is starting a new data file the program will prompt the user for the following pre-data:

do you want to enter water levels (y/n)? - Press [y] if suppression pool, drywell equipment drain, and drywell floor drain water levels will be monitored and entered as data. Otherwise, press [n].

enter title (40 characters max.) - up to 40 characters which will be printed as a heading on reports and plots

leap year (y/n; default = n) - press [y] for yes, [n] for no

number of temperatures (1 - 40) - enter the number of temperature sensors

number of humidities (1 - 10) - enter the number of relative humidity sensors

number of pressures (1 - 2) - enter the number of pressure sensors

free air volume, cu.ft. - If water levels will be monitored, enter the containment free air volume with all water levels at the referenced levels.

If water level will <u>not</u> be monitored, enter the containment free air volume which will be used as the default value for all data sets. The program will prompt for the water surface areas (volume/depth) and reference water levels as follows:

S Pool
Surface area, sq. ft. ? Reference water level, in. ?

D E Drn
Surface area, sq. ft. ? Reference water level, in. ?

D F Drn
Surface area, sq. ft. ? Reference water level, in. ?

Since the lower portion of the suppression pool has a different surface area, the program prompts the following:

Lower S P
Surface area, sq. ft. ? Reference water level, in. ?

The reference water level for the lower S P should always be equal to the level which seperates it from the rest of the pool.

La, %/day - enter the allowable leakage rate.

The program will then prompt the user to enter the temperature, relative humidity, and pressure sensor volume fractions.

After prompting the user through a correction routine (see "cp" option), the pre-data is saved and the program prompts the user to enter the number of pressure calibration points and the pressure calibration table (see "pt" option).

The user is then prompted to enter the humidity sensor-rtd table. (See "rh" option).

The PROGRAM OPTIONS are then displayed:

```
PROGRAM OPTIONS

DATA INPUT/DELETION                REPORTS

   da = enter data set                li = list all data sets (reduced)
   de = delete a data set             dr = one data set (raw & reduced)
   un = undelete a data set        mp = mass point leak rate
   er = erase a deleted data set      tt = total time leak rate
                                      tr = trend (mp & tt)
CORRECTIONS                           dr = data rejection
                                      st = temperature stabilization
   cd = correct a data set
   cp = correct pre-data           PLOTS
   cv = correct verification pre-data
                                      pl = Plot Options
UTILITIES

   ti = change start/end time         ex = exit program
   bu = backup data file              bn = BNTOP1>=24hr(toggle on/off)
   do = branch to DOS
   ve = verification (toggle on/off, or enter verification pre-data)
   pt = review, print or edit pressure calibration table
   rh = review, print or edit humidity sensor-rtd table

Enter Option?
```

The desired option is selected by entering the two-letter code. If the "pl" option is selected, the PLOT OPTIONS are displayed. An explanation of each option follows.

Note : Reports and plots are generated in the range specified by the current start and end times. (See "ti" option).

4.1.3 Data Input and Deletion

The following commands are used to enter and delete information:

da - Enter a data set from the keyboard (i.e., time, date, free air volume, and sensor readings). After prompting the user though a correction routine (see "cd" option), a data set report is generated.

Note: The data set is automatically sorted into its correct chronological order.

de - The data set corresponding to the user input time and date is deleted from all leakage rate calculations. All reports will show that the data set has been deleted and the data point will not be plotted.

un - The data set corresponding to the user input time and date is restored (un-deleted).

er - Removes (erases) a deleted data. A removed data set does not show up on any reports or plots. Also, a removed data set cannot be recovered, except by editing the data file. (See iord%( ) variable in programmers manual.)

4.1.4 Reports

Generate reports using the following commands:

li - DATA SUMMARY REPORT. Displays data set number, time, date, temperature, pressure, vapor pressure, volume, and dry air mass for all data sets.

dr - DATA SET REPORT, for the data set with user input time and date. Displays data set number, time, date, sensor data (raw data and calibrated values), weighted average temperature, pressure and vapor pressure, and volume and dry air mass.

mp - MASS POINT LEAKAGE RATE REPORT (ANSI/ANS 56.8 - 1981). Displays data set number, time, date, elapsed time, dry air mass, mass point leakage rate and UCL for all data sets. Also displays allowable and 75% of allowable leakage rate (or upper and lower limits in verification mode).

tt - TOTAL TIME LEAKAGE RATE REPORT (BN-TOP-1, rev 1.). Displays data set number, time, date, elapsed time, dry air mass, total time measured leakage rate, leakage rate (calculated) and UCL for all data sets. Also displays allowable and 75% of allowable (or upper and lower limits in verification mode).

tr - TREND REPORT. Displays data set number, time, date, elapsed time, total time measured leakage rate, leakage rate (calculated) and UCL , and mass point leakage rate and UCL for all data sets.

rj - DATA REJECTION REPORT (ANSI/ANS 56.8 - 1981). Displays data set number, time, air mass, linear least square fit (air mass), residual from least square fit, standard error of residual and standardized residual for all data sets. Data sets rejectable at the 1% and/or 5% rejection levels are marked by asterick (*). Also displayed are the 1% and 5% rejection level values.

st - TEMPERATURE STABILIZATION REPORT (ANSI/ANS 56.8 - 1981 and BN-TOP-1, rev 1.). Displays start time and data, data set number, elapsed time, temperature, 1 hour and 4 hour average rates of temperature change and difference (ANSI criteria), and 2 hour average rate of temperature change and 2 hour average change in rate of temperature change, i.e., second derivative, (BN-TOP-1 criteria) for all data sets. Data points which satisfy temperature stabilization criteria are marked with an asterick (*).

4.1.5 Data Corrections

Use the following commands to correct the data set:

cd - Correct the data set with user entered time and date. Time, date, volume, sensor temperatures, and relative humidity and/or pressures can be changed for a data set. If time and/or date is changed, the data set will be re-sorted into its correct chronological order. Responses to the correction menu line are:

time - to change the time
date - to change date
volume or wl - to change free air volume

t - to change a sensor temperature
h - to change a sensor relative humidity
p - to change a sensor pressure

After entering "t", "h", or "p", the user is prompted for the sensor number and sensor value. After entering "wl" the user is prompted to enter 1, 2, or 3 for S Pool. D E Drn, or D F Drn, respectively, followed by a prompt to enter the water level.

cp - Correct pre-data. The following pre-data can be corrected: title, free air volume, water surface areas and reference levels (if applicable), allowable leakage rate (L_a), leap year (toggled on\off) and the sensor volume fractions. If the free air volume is changed, the user is asked if the volume should be changed for all existing data sets. The responses to the menu line are:

title - to change title
volume - to change free air volume.
water (if applicable) - to change surface areas and reference water levels. After entering "water", the user is prompted to enter 1, 2, 3, or 4 for S Pool. D E Drn, D F Drn, or Lower S P respectively, followed by a prompt to enter the corresponding surface area and reference water level.
la - to change allowable leakage rate.
leap - to toggle leap year yes/no
vf - to change a volume fraction; responses to next menu line are:

t - to change a temperature volume fraction
h - to change a relative humidity volume fraction
p - to change a pressure volume fraction

After entering "t", "h", or "p" the user is prompted for the sensor number and sensor volume fraction.

Note : The number of sensors cannot be changed. To delete a sensor, set its volume fraction to zero.

cv - Correct verification pre-data. The imposed leakage rate, the ILRT calculated mass point leakage rate and total time leakage rate can be changed. The responses to the menu line are:

lo - to change imposed leakage rate

lmp - to change mass point leakage rate
ltt - to change total time leakage rate

After entering "lo", "lmp", or "ltt", the user is prompted to enter the leakage rate.

4.1.6 Utilities

The following are the program's utility commands:

ti - Change the current start and end time. The start and end time defines the time interval for all reports and plots.

ve - Toggle the verification mode on/off. When toggled on, the user has the option to change the verification pre-data.

bu - Backs up the data file to a floppy disk in drive A: and to the default drive subdirectory, \BACKUP. [1]

do - Branches (shells) to DOS. The program is re-entered after the user types "exit" on the DOS command line. [1]

pt - Review, print or edit the pressure calibration table. The user is first asked to enter or verify the number of pressure calibration points (2-25) in the table. The pressure calibration table is then displayed. The displayed pressure calibration table is fixed at 2 sensors. If the number of pressure sensors is 1, only enter values for pressure sensor 1.

To edit the table, press "e"; values can then be changed in the displayed cells.

Note: The edit mode is automatically turned on for the initial entry of the table.

To print the table, press "p". To exit the option, press "x". The curser is moved around the table by using the direction keys. The table scrolls on the screen if the number of calibration points is greater than 19.

rh - Review, print or edit the relative humidity sensor-rtd table. The rtd numbers for a given humidity sensor are used to calculate the dry bulb temperature used

[1] Warning -Data transmitted from the data acquisition system via the RS-232 interface cannot be read by the program and will be lost when the "bu" and "do" options are invoked.

in the vapor pressure calculation.

To edit the table, press "e"; values can then be changed in the display cells.

Note: The edit mode is automatically turned on for the initial entry of the table.

To print the table, press "p". To exit the option, press "x". The curser is moved around the table by using the direction keys.

bn - Toggle on/off BNTOP1 95% UCL calculation for elapsed times greater than or equal to 24 hours.

OFF - Total time 95% UCL for elapsed times greater than or equal to 24 hours uses the formulation given in the Programmers Manual Total Time Leakage Rate. That is, the more conservative UCL calculation is turned off at 24 hours. (default = OFF)

ON - Total time 95% UCL for elapsed times greater than or equal to 24 hours uses the formulation given in the Programmers Manual Total Time Leakage Rate for elapsed times less than 24 hours. That is, the more conservative calculation is not turned on at 24 hours.

ex - Exit the program

4.1.7 Plots

The following are general guidelines for performing a plot:

pl - Displays the PLOT OPTIONS menu:

PLOT OPTIONS

AIR MASS / VOLUME

am = air mass
vo = volume
wl = water level*

TEMPERATURE

te = one temperature or average
at = all temperatures + one highlighted

PRESSURE

pr = one pressure or average
ap = all pressures + one highlighted

HUMIDITY/VAPOR PRESSURE

hu = one humidity or average vapor pressure
ah = all humidities + one highlighted

LEAK RATES

mp = mass point
tt = total time

OVERLAY

ov = overlay of leak rates, mass, temperature, pressure, and/or vapor pressure

UTILITIES

ti = change start/end time
ex = Program Options

Enter Option ?

* Displayed only if applicable.

The desired option is selected by entering the 2 letter code. An explanation of each option follows.

a) Air Mass / Volume

am - Plots the air mass (solid line), regression line (dotted line), and 75% La line (dashed line). In the verification mode the 75% La line is replaced by the upper and lower verification leakage rate limit lines.

vo - Plots containment free volume

wl - Plots S Pool, D E Drn, or D F Drn water levels

b) Leakage Rate

mp - Plots the mass point leakage rate, UCL and 75% La (dashed line). In the verification mode the UCL is not plotted and the 75% La line is replaced by the upper and lower verification leakage rate limit lines.

tt - Plots the total time leakage rate, UCL and 75% La (dashed line). In the verification mode the UCL is not plotted and the 75% La line is replaced by the upper and lower verification leakage rate limit lines.

c) Temperature

te - Plots the weighted average temperature or the temperature for one sensor.

at - Plots the temperature for all sensors and the weighted average (dotted lines) and one highlighted temperature (solid line). The sensor temperature which is highlighted can be selected by number or by using the up/down direction keys to cycle through the sensors.

d) Pressure

pr - Plots the weighted average pressure or the pressure for one sensor.

ap - Plots the pressure for all sensors and the weighted average (dotted lines) and one highlighted pressure (solid line). The sensor pressure which is highlighted can be selected by number or by using the up/down direction keys to cycle through the sensors.

e) Humidity/Vapor Pressure

hu - Plots the weighted average vapor pressure or the relative humidity for one sensor.

ah - Plots the relative humidity for all sensors and the weighted average (dotted lines) and one highlighted relative humidity (solid line). The sensor relative humidity which is highlighted can be selected by number or by using the up/down direction keys to cycle through the sensors.

f) Overlay

ov - The air mass, and/or mass point leakage rate and UCL, and/or total time leakage rate and UCL, and/or weighted average temperature, and/or weighted average pressure and/or weighted average vapor pressure can be plotted on the same frame.

The responses to the menu line are:

mp - to plot mass point leakage rate
tt - to plot total time leakage rate
m - to plot air mass
t - to plot temperature
p - to plot pressure
vp - to plot vapor pressure
c - to display title on menu line
x - to return to main plot menu

Note: The user can change the plot scale (i.e., minimum and maximum values) on all plots except the overlay plot. The overlay plot scales are fixed at the minimum and maximum values for air mass, temperature, and pressure. The vapor pressure scale is adjusted to conform to the pressure scale. Leakage rate plot scales for mass point and total time are the same and are determined by the minimum leakage and maximum UCL of the first leakage rate type plotted.

4.1.8 Plot Utilities

The following commands are used for peripheral plotting functions:

a) ti - Change start and end times.

b) ex - Return to the PROGRAM OPTION menu.

4.2 Programmer Information

4.2.1 Programming Language

The ILRT program is written in Microsoft QuickBASIC, Version 4.5, for IBM Personal Computers and Compatibles.

4.2.2 Mass Point Leakage Rate

Mass point leakage rate is calculated in accordance with ANSI/ANS-56.8-1981 as follows:

$L_{am} = -2400a/b$

$a = (n\Sigma Mt-\Sigma M\Sigma t)/(n\Sigma t^2-\Sigma^2 t)$

$b = (\Sigma M-a\Sigma t)/n$

n = number of data sets

t = elapsed time, hr

M = air mass, lbm

Σ = summation over all data sets

Mass point 95% UCL is calculated as follows:

$$UCL = L_{am} + 2400t_{95}Sa/b$$

t_{95} = student-t function

$$= (1.6449df+3.5283+.85602/df)/(df+1.2209-1.5163/df)$$

$df = n-2$

$S_a = \sqrt{[K^2n]}$

$K^2 = S^2/(n\Sigma t^2-\Sigma^2 t)$

$S^2 = (\Sigma M^2-b\Sigma M-a\Sigma Mt)/df$

4.2.3 Total Time Leakage Rate

Total time leakage rate, L_{tt} %/day, is calculated per BN-TOP-1, Revision 1 as follows:

$L_{tt} = at_m+b$

$a = (m\Sigma Lt-\Sigma L\Sigma t)/(m\Sigma t^2-\Sigma^2 t)$

$b = (\Sigma L-a\Sigma t)/m$

$L = -2400(M-M_1)/t/M_1$

m = number of L's calculated
$= n-1$

Total time 95% UCL is calculated as follows for $t_m < 24$ hr:

$UCL = L_{tt}+t_{95}\sqrt{[S^2f]}$

$t_{95} = 1.95996+2.37226/df+2.8225/df^2$

$$S^2 = (\Sigma L^2 - b\Sigma L - a\Sigma Lt)/df$$

$$df = m-2$$

$$f = 1+1/m+(t-\Sigma t/m)^2/(m\Sigma t^2-\Sigma^2 t)/m$$

Total time 95% UCL will be calculated as follows for $t_m >= 24$ hr:

$$UCL = Ltt+t_{95}\sqrt{[S^2 f]}$$

$$t_{95} = (1.6449df+3.5283+.85602/df)/(df+1.2209-1.5163/df)$$

$$S^2 = (\Sigma L_2 - b\Sigma L - a\Sigma Lt)/df$$

$$f = 1/m+(tm-\Sigma t/m)^2/(m\Sigma t^2-\Sigma^2 t)/m$$

4.2.4 Air Mass/Volume

4.2.4.1 Air Mass

For both mass point and total time, air mass, M lbm, is calculated as follows:

$$M = 144(P-P_v)V/(RT)$$

P = weighted average pressure, psia

P_v = weighted average vapor pressure, psia

Note: sensor vapor pressures is obtained from the sensor dew point temperatures using the K-Function per ASME Steam Tables, 3rd edition with k8 and k9 term neglected (see below)

V = containment free air volume, cu. ft.

T = weighted average temperature, deg. R

$R = 53.35$ ft-lbf/lbm/deg. R

Vapor pressure, P_v psia at dew point temperature, T_{dp} deg. F is calculated as follows:

$$P_v = p_{c1}e^z$$

$$z = \Sigma k_i(1-q)^i/q/(1+k_6(1-q)+k_7(1-q)^2$$

Σ = summation over i= 1 to 5

$$q = (5/9(T_{dp}-32)+273.15)/t_{c1}$$

$$p_{c1} = (2212)(1.45038)$$

$$t_{c1} = 647.3$$

$$k_1 = -7.691235$$

$$k_2 = -26.08024$$

$$k_3 = -168.1707$$

$$k_4 = 64.23286$$

$$k_5 = -118.9646$$

$$k_6 = 4.167117$$

$$k_7 = 20.97507$$

4.2.4.2 Volume

When water levels are monitored and entered as data, the containment free air volume is calculated as follows:

Case 1 - $wl_1 \geq rwl_4$; $rwl_1 \geq rwl_4$

$$v = v_0 - [wsa_1 (wl_1 - rwl_1) / 12] - [{}_2\Sigma^3\ wsa_i (wl_i - rwl_i)]\rangle$$

Case 2 - $wl_1 \rangle rwl_4 \rangle rwl_1$

$$v = v_0 - [wsa_1 (wl_1 - rwl_4) / 12] - [wsa_1 (rwl_4 - rwl_1) / 12] - [\Sigma^3_2\ wsa_i (wl_i - rwl_i)]$$

Case 3 - $rwl_1 \rangle rwl_4 \rangle wl_1$

$$v = v_0 + [wsa_1 (rwl_1 - rwl_4) / 12] + [wsa_4 (rwl_4 - rwl_1) / 12] - [\Sigma^3_2\ wsa_i (wl_i - rwl_i)]$$

Case 4 - $wl_1 \langle rwl_4$; $rwl_1 \langle rwl_4$

$$v = v_0 - [wsa_4 (wl_1 - rwl_1) / 12]$$

Where, wl_i = water level, inches, i = 1, S Pool
i = 2, DE Drn
i = 3, DF Drn

rwl_i = reference water level, inches

wsa_i = water surface area, sq. ft., i = 1, S Pool
i = 2, DE Drn
i = 3, DF Drn
i = 4, Lower S Pool

v_0 = Free air volume, cu. ft., when $wl_i = rwl_i$
i = 1, S Pool
i = 2, DE Drn
i = 3, DF Drn

v = free air volume, cu. ft.

Dewpoint temperature, T_{dp} deg. F, at relative humidity, % RH, is calculated as follows:

$$T_{sat} = (\Sigma T_i vf_i)/(\Sigma vf_i)$$

where Σ is over the RTD's assigned to the humidity sensor via the humiditry sensor - rtd table, T_i and vf_i are the temperature and volume fraction of the RTD.

P_{sat} = vapor pressure at dewpoint temperature T_{sat}.

$$T_{dp} = (\%\ RH)(P_{sat})$$

4.2.5 Data Rejection

Data rejection criteria are calculated in accordance with ANSI/ANS-56.8-1981 as follows:

The standardized residual, r_i, for the i_i data set is calculated as follows:

$$r_i = (M_i - at_i - b)/s_i$$

M_i = calculated air mass for i^{th} data set

a,b = regression constants for mass point leakage rate (see MASSPOINT LEAKAGE RATE)

t_i = elapsed time for i^{th} data set

$$s_i = S\sqrt{[1 - 1/n - (t_i - (\Sigma t)/n)/((n\Sigma t^2 - \Sigma t)/n)]}$$

n = number of data sets

$$S = \Sigma(M - at - b)^2/(n-2)$$

The critical values for the standardized residuals at the 1% and 5% rejection levels are given in Table D2 of ANSI/ANS-56.8-1981.

4.2.6 Verification Upper and Lower Limits

Upper and lower limits on the calculated mass point and total time leakage rates during the ILRT verification test (imposed leakage method) are calculated per ANSI/ANS-56.8-1981 as follows:

Lower Limit = $L+L_0-.25L_a$

Upper Limit = $L+L_0+.25L_a$

L = ILRT calculated leakage rate (total time or mass point)

L_0 = imposed leakage rate, %/day

L_a = allowable leakage rate, %/day

4.2.7 Temperature Stabilization

ANSI/ANS 56.8 - 1981 criteria

$dT4 - dT1 < .5$ deg. F

$dT4 = (T - T_4)/4$
$dT1 = (T - T_1)$
T = current temperature
T_4 = temperature 4 hours ago; interpolated between 2 adjacent points if necessary
T_1 = temperature 1 hour ago; interpolated between 2 adjacent points if necessary

BN-TOP-1, rev. 1 (first criteria)

$(T - T_2)/2 < 1$ deg. F

T_2 = temperature 2 hours ago; interpolated between 2 adjacent points if necessary

BN-TOP-1, rev. 1 (second criteria)

$(dT - dT_2)/2 < .5$ deg. F

dT = first derivative of T at current time = $(T - T_{.01}) /.01$

dT_2 = first derivation of T two hours ago = $(T_{1.99} - T_2) / .01$

$T_{.01}$ = temperature .01 hours ago; interpolated between 2 adjacent points

$T_{1.99}$ = temperature 1.99 hours ago; interpolated between 2 adjacent points

T_2 = temperature 2 hours ago; interpolated between 2 adjacent points if necessary

4.2.8 Global Variables

The following is a list of the program's global variables:

nt% - number of temperature sensors, 40 max
ndp% - number of dew-point sensors, 10 max
nd% - number of pressure sensors, 2 max
vol! - containment free air volume, default value for v!, cu. ft.
vft!(i) - temperature sensor i volume fraction
vfdp!(i) - humidity sensor i volume fraction
vfp!(i) - pressure sensor i volume fraction
title$ - title printed on reports and plots , 40 characters max
leap$ - y(es)/n(o) switch for leap year
La! - allowable leakage rate, %/day
Lo! - verification imposed leakage rate, %/day
Lmp! - mass point leakage rate calculated during ILRT, %/day
Ltt! - total time leakage rate calculated during ILRT, %/day
verify% - verification mode switch, = -1 if true
iord%(n) - = r for data sets not deleted or erased
= -r for deleted data sets
= 0 for erased data sets
n = internal data set number (chronologically sorted)
r = external data set number (not sorted)
time%(n) - time for data set n, hhmm
date%(n) - date for data set n, mmdd

temp!(i,n) - calibrated temperature of sensor i for data set n , deg. F
dewpt!(i,n) - calibrated relative humidity of sensor i for data set
n, deg. F
press!(i,n) - calibrated pressure of sensor i for data set n
rawt!(i) - raw data for temperature sensor i
rawdp!(i) - raw data for humidity sensor i
rawp!(i) - raw data for pressure sensor i
rsrawt!(i) - raw data for temperature sensor i (data input via RS232)
rsrawdp!(i) - raw data for humidity sensor i (data input via RS232)
rsrawp!(i) - raw data for pressure sensor i (data input via RS232)
h!(n) - elapsed time for data set n, hours
note : h! = 0 at 0000 hours on date%(1)
h#(n) - double precision value of h!(n)
t!(n) - weighted average temperature for data set n, deg. F
vp!(n) - weighted average vapor pressure for data set n, psia
dp!(n) - weighted average relative humidity for data set n, deg. F
p!(n) - weighted average total pressure for data set n, psia
m!(n) - air mass for data set n, lbm
m#(n) - double precision value of m!(n)
v!(n) - free air volume for data set n, cu. ft.
lr!(n) - mass point leakage rate calculated at data set n, %/day
ucl!(n) - mass point upper confidence level at data set n, %/day
lrttm!(n) - total time measured leakage rate at data set n, %/day
lrtt!(n) - total time calculated leakage rate at data set n, %/day
ucltt!(n) - total time upper confidence level at data set n, %/day
rsdata!() - data set values read from RS232
y!(),x!() - end point coordinates used to plot a straight line
pt!(,i) - pressure calibration table array for pressure sensor i
npoints% - number of pressure calibration points per sensor
rswait% - = -1 if a data set is waiting in the RS232 port buffer
rs232ok% - = -1 if program is ready to accept RS232 data
maxpts% - maximum number of data sets (=400)
pause% - = -1 to pause program while a message is being displayed
scrnmode$ - = "text" in screen text mode
= "graphics" in screen graphics mode
intable% - = -1 if pressure calibration table routine is executing
sort% - = -1 if data sets need to be resorted
bntop1% - = -1 if BNTOP1 > = 24 hr calculation is turned ON
fore%, back%, border% - foreground, background and border color in text
mode
traps$ = used to indicate which key was trapped

water% = -1 if water levels are entered, 0 if water levels are not entered
wl!(i,n) = water levels, in.
rawwl!(i) = raw data for water levels
rsrawwl!(i) = raw data for water levels (data input via RS232)
i = 1; S Pool
i = 2; D E Drn
i = 3; D F Drn
wsa!(i) = water surface area, sq. ft.
rwl!(i) = reference water level, in.
water$(i) = labels ("S Pool", "D E Drn", "D F Drn", "Lower S P")
i = 1; S Pool
i = 2; D E Drn
i = 3; D F Drn
i = 4; Lower SP

4.2.9 Passed Variables

The following variables have the same name throughout the program:

datafile$ - data file name
n% - data set currently being processed
nmax% - number of internal data sets
rmax% - number of data sets on data file
nfirst% - first data set used in calculations, reports and plots
nlast% - last data set used in calculations , reports and plots
a! - slope of regression line
b! - intercept of regression line
option$ - user selected option

4.2.10 Data Storage Structure

The data is stored in the random access file, datafile$. Each record having a fixed length of 102 bytes. The data items in each record are of variable length and separated by ","s. The record layouts are follows:

Record 1

nmax%, title$, rmax%, leap$, npoints%, water%

nmax% = number of unerased data sets
title$ = title (40 characters max.)
rmax% = number of data sets (erased and unerased)
leap$ = "y" for leap year, "n" for non leap year
npoints% = number of pressure calibration points
water% = -1 if water levels are entered
= 0 if water levels are not enetred

Record 2

vol!, nt%, ndp%, np%, La!, Lo!, Lmp!, Ltt!
vol! = default volume
nt% = number of temperature sensors
ndp% = number of humidity sensors
np% = numbew of pressure sensors
La! = allowable leakage rate
Lo! = imposed leakage rate (verification test)
Lmp! = ILRT calculated mass point leakage rate
Ltt! = ILRT calculated total time leakage rate

Record 3* wsa!(i), rwl!(i), ..., wsa!(4), rwl!(4)

Record 3 (or 4) through (nt%+ndp%+np%-1)\10 + 3 + 1*

vft!(1), ..., vft!(nt%), vfdp!(1), ..., vfdp!(ndp%), vfp!(1), ..., vfp!(np%)

10 values per record

vft!(i) = temperature sensor i volume fraction
vfdp!(i) = humidity sensor i volume fraction
vtp!(i) = pressure sensor i volume fraction

Records (nt%+dp%+np%-1)\10 + 4 through (nt%+dp%+np%-1)\10 + 13 + 1*

* only if water% = -1

pt!(1,1), pt!(1,2), pt!(1,3), pt!(1,4), pt!(2,1), ..., pt!(25,4)

pt!( ) = pressure sensor calibration table
pt!(i,1) = pressure sensor 1 reading, counts, i = 1 to 25
pt!(i,2) = pressure sensor 1 true pressure, psia

pt!(i,3) = pressure sensor 2 reading, counts
pt!(i,4) = pressure sensor 2 true pressure, psia

Note: pt!() = 0 for i > npoints%

10 values per record

Records (nt%+ndp%=np%-1)/10+13 +1 thru
(nt%+ndp%+np%-1)/10+13+ndp% +1*

rtd%(1,1) ....rtd%(1,5) = rtds assigned to humidity sensor 1

rtd%(2,1) ....rtd%(2,5) = rtds assigned to humidity sensor 2

. . . .

. . . .

rtd%(ndp%,1).....rtd%(ndp%,5) = rtds assigned to humidity sensor dp%

Data Set Records (one set for each data set, 1 through rmax%)

First record

iord%(n), time%(n), date%(n), v!(n)

iord%(n) = n for undeleted, unerased data set n
= -n for deleted data set
= 0 for erased data set; note: erased data sets are not read by the program
time%(n) = time
date%(n) = date
v!(n) = volume

Next (nt%+ndp%+np%)\10 records

rawt!(1), ..., rawt!(nt%), rawdp!(1), ..., rawdp!(ndp%), ...,
rawp!(1), ..., rawp!(np%) [rawwl!(1), rawwl!(2), rawwl!(3)]*

* only if water% = -1

10 values per record

rawt!(i) = raw temperature data
rawdp!(i) = raw relative humidity data
rawp!(i) = raw pressure data
rawwl!(i) = raw water level data

4.2.11 Compiling and Linking

The program is composed of the main module, ILRT.BAS, and 8 sub modules MOD1.BAS through MOD8.BAS. With quickBASIC in directory \qb45\ and the program in the default directory, and compile command for each module is: -

```
copy \qb45\qb.bi qb.bi
\qb45\bc/e/x/v/w/o/t/c:1024 ilrt;
\qb45\bc/v/w/o/t/c:1024 mod1;
\qb45\bc/v/w/o/t/c:1024 mod2;
\qb45\bc/v/w/o/t/c:1024 mod3;
\qb45\bc/v/w/o/t/c:1024 mod4;
\qb45\bc/v/w/o/t/c:1024 mod5;
\qb45\bc/v/w/o/t/c:1024 mod6;
\qb45\bc/v/w/o/t/c:1024 mod7;
\qb45\bc/v/w/o/t/c:1024 mod8;
```

The link command is:

```
\qb45\link    ilrt+mod1+mod2+mod3+mod4+mod5+mod6+mod7+mod8,,,
              \qb45\bcom45.lib+\q b45\qb.lib
```

5.0 Attachments

5.1 Program Verification Problems

Problem 1 - Air Mass hand calculation using data set 15 from data file CHECK24.

Problem 2 - 1 Hour Mass Point and Total Time leakage rates using data file CHECK24.

Problem 3 - 8 Hour Mass Point and Total Time leakage rates using data file CHECK24.

Problem 4 - 24 Hour Mass Point and Total Time leakage rates using data file CHECK24.

Problem 5 - Data Rejection Report uning data file REJECT.

Problem 6 - Temperature Stabilization Report using data file STABCHK.

Problem 7 - Air Mass hand calculation using data set 19 from data file ILRT.SAT.

Problem 8 - 24 Hour Mass Point and Total Time leakage rates using data file CHECK24, with BNTOP1 ON.

Problem 9 - Mass Point and Total Time leakage rates using data file CHECK.H2O which is the same as ILRT.SAT, except with water levels equal to the reference water levels.

Problem 10 - Volume hand calculation using data set from data file CHECK.WL

Problem 11 - Mass point ans Total Time leakage rates using CHECK.WL

Problem 12 - Mass Point and Total Time Leakage rates using CHECK.VV which is the same as CHECK.WL, except that the water levels are not entered and the volumes (variable) are the same as calculated for CHECK.WL.

5.2 Program Listing

APPENDIX B

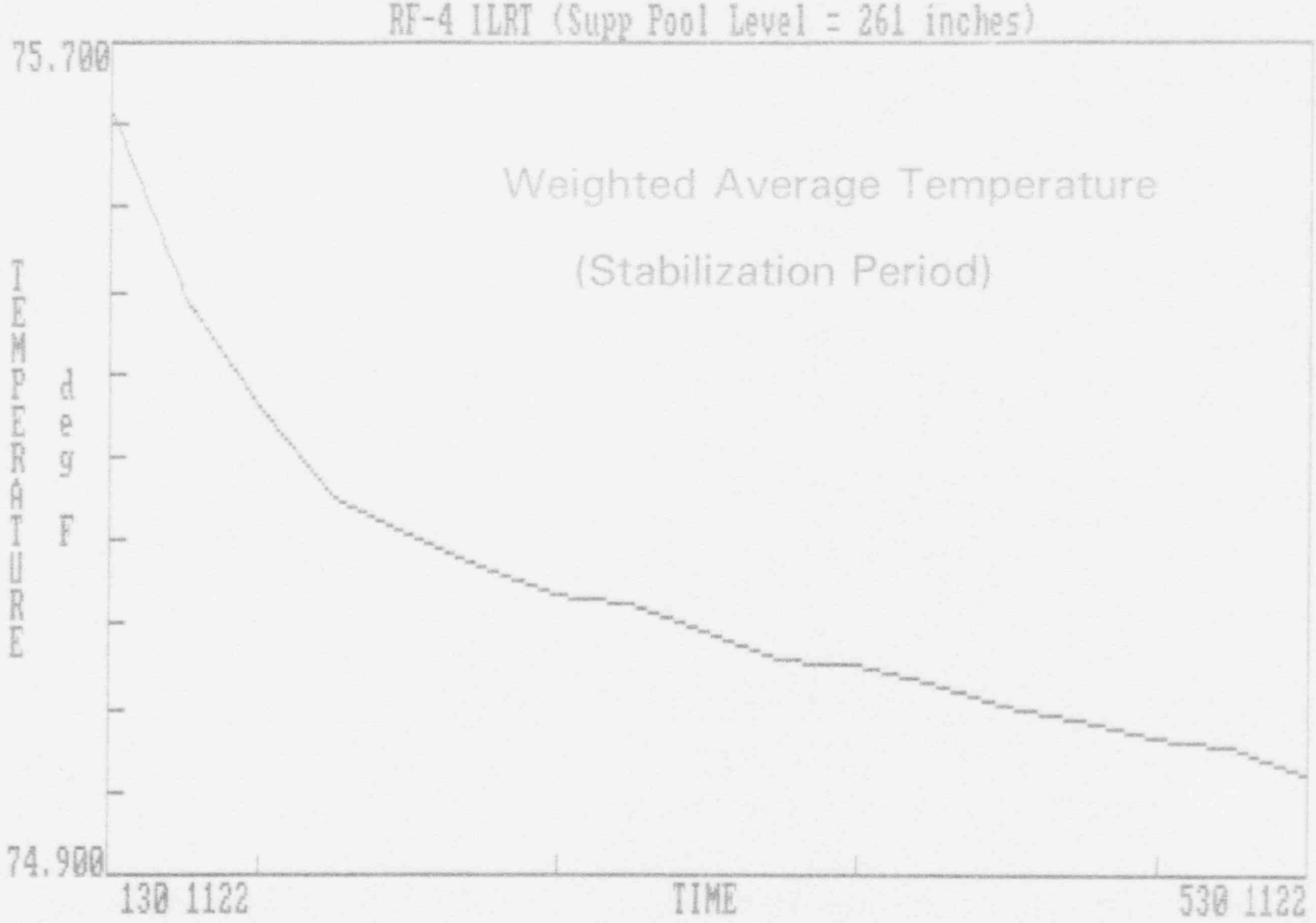
ILRT Stabilization Summary Data

- Temperature Stabilization Summary Report
- Weighted Average Temperature Plot

RF-4 ILRT (Supp Pool Level = 261 inches)

TEMPERATURE STABILIZATION REPORT
Start Time = 130 1122
* = stabilization criterion satisfied

ata set	elapsed time, hr	temperature T, deg F	dT1 avg dT (1 hr)	dT4 avg dT (4 hr)	- ANSI - dT1-dT4	--- BN-TOP-1 --- dT avg (2 hr)	or d(dT) avg (2 hr)
1	0.00	75.636					
2	0.25	75.455					
3	0.50	75.346					
4	0.75	75.261					
5	1.00	75.224	-0.412				
6	1.25	75.197	-0.258				
7	1.50	75.168	-0.178				
8	1.75	75.158	-0.103				
9	2.00	75.135	-0.089			-0.250*	0.315*
10	2.25	75.107	-0.090			-0.174*	0.161*
11	2.50	75.103	-0.065			-0.122*	0.162*
12	2.75	75.083	-0.075			-0.089*	0.036*
13	3.00	75.061	-0.074			-0.081*	0.010*
14	3.25	75.050	-0.057			-0.074*	0.035*
15	3.50	75.032	-0.071			-0.068*	-0.016*
16	3.75	75.025	-0.058			-0.067*	0.032*
17	4.00	74.995	-0.066	-0.160	0.094*	-0.070*	-0.003*


RF-4 ILRT (Supp Pool Level = 261 inches)
75.700
74.900
TEMPERATURE
deg F
Weighted Average Temperature
(Stabilization Period)
130 1122
TIME
530 1122

APPENDIX C

ILRT Summary Data

- Summary Data Report
- Instrumentation Schematic Arrangements

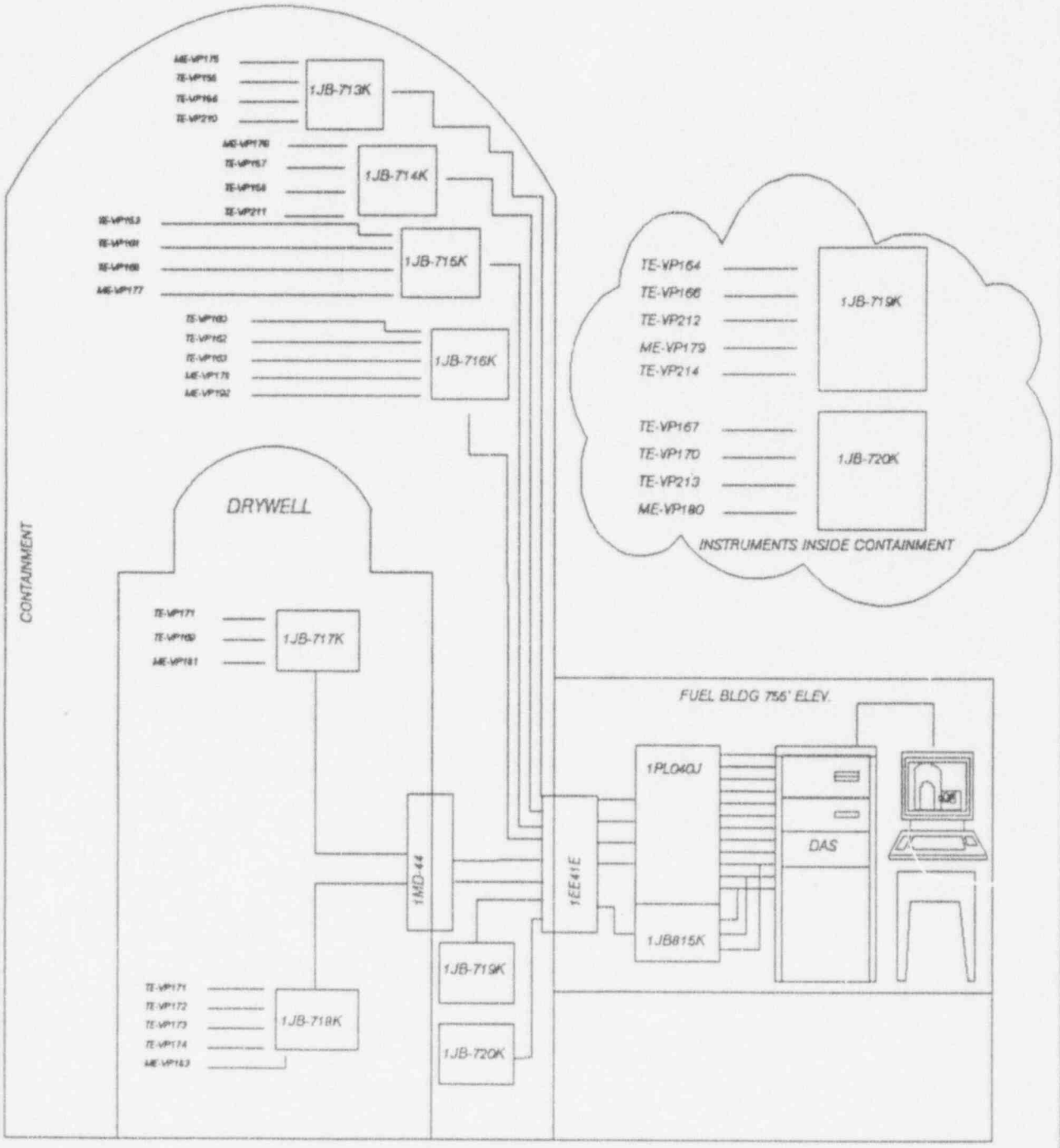
RF-4 ILRT (Supp Pool Level = 261 inches)

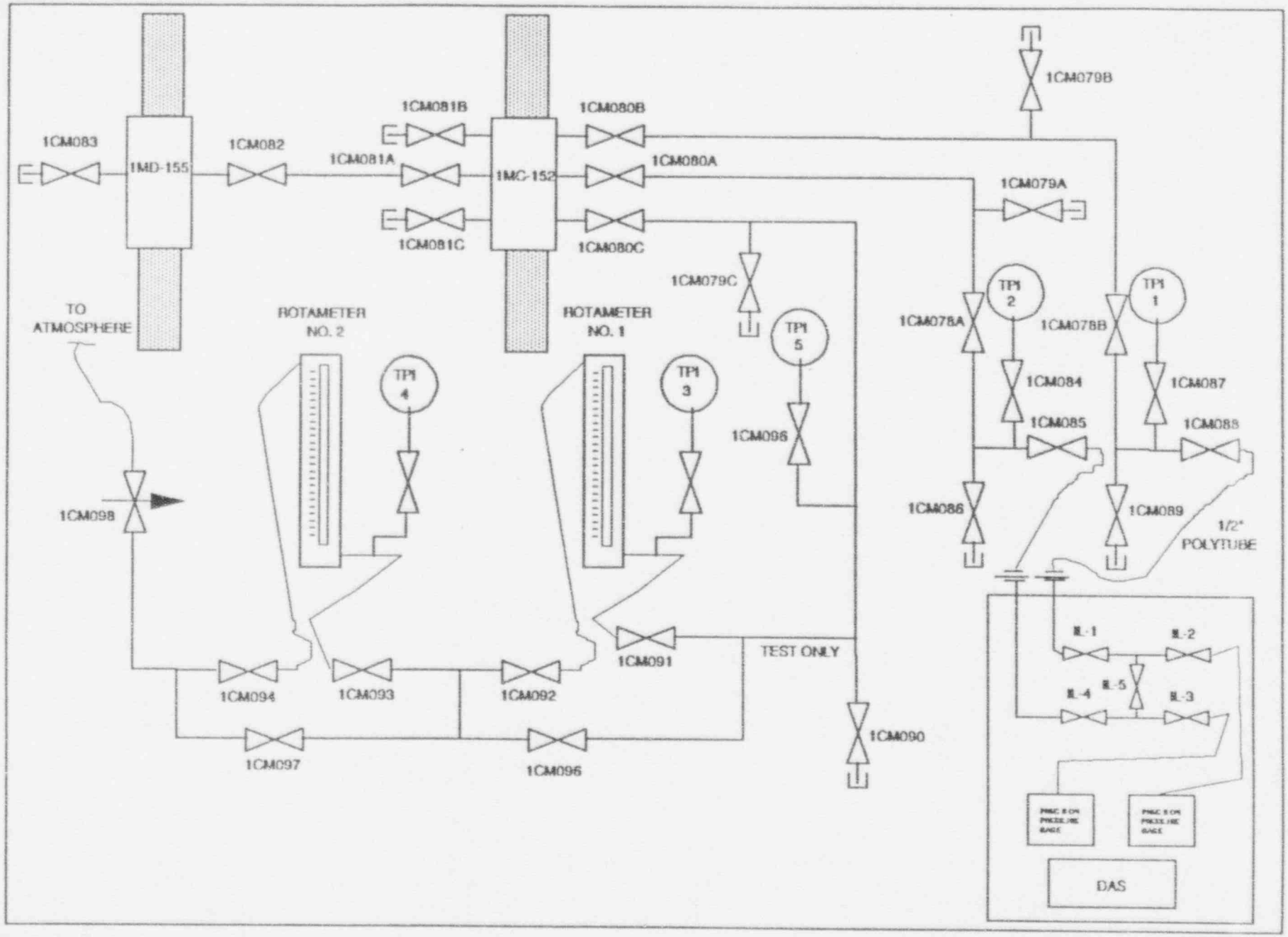
DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	volume cu ft	dry air mass lbm
1	130	1122	75.6359	24.1980	0.3362	1781258	214316.70
2	145	1122	75.4549	24.1905	0.3367	1781258	214317.49
3	200	1122	75.3462	24.1860	0.3376	1781257	214312.29
4	215	1122	75.2615	24.1830	0.3382	1781257	214313.37
5	230	1122	75.2236	24.1815	0.3391	1781256	214306.97
6	245	1122	75.1965	24.1800	0.3402	1781255	214295.15
7	300	1122	75.1679	24.1795	0.3409	1781255	214295.25
8	315	1122	75.1585	24.1785	0.3417	1781254	214282.46
9	330	1122	75.1351	24.1780	0.3422	1781254	214282.92
10	345	1122	75.1067	24.1775	0.3427	1781253	214285.18
11	400	1122	75.1029	24.1765	0.3433	1781252	214272.13
12	415	1122	75.0830	24.1765	0.3438	1781252	214276.17
13	430	1122	75.0608	24.1755	0.3444	1781251	214270.52
14	445	1122	75.0495	24.1750	0.3449	1781251	214266.03
15	500	1122	75.0320	24.1745	0.3453	1781250	214264.44
16	515	1122	75.0248	24.1735	0.3459	1781250	214252.72
17	530	1122	74.9948	24.1735	0.3464	1781250	214260.65
18	545	1122	74.9764	24.1725	0.3470	1781249	214253.66
19	600	1122	74.9475	24.1715	0.3472	1781249	214254.22
20	615	1122	74.9084	24.1705	0.3477	1781248	214256.64
21	630	1122	74.8823	24.1695	0.3482	1781247	214253.57
22	645	1122	74.8510	24.1685	0.3485	1781247	214254.01
23	700	1122	74.8219	24.1675	0.3489	1781246	214252.94
24	715	1122	74.8026	24.1665	0.3495	1781246	214246.26
25	730	1122	74.7716	24.1660	0.3498	1781245	214251.80
26	745	1122	74.7733	24.1655	0.3504	1781245	214240.69
27	800	1122	74.7613	24.1655	0.3510	1781244	214240.14
28	815	1122	74.7411	24.1645	0.3515	1781244	214235.12
29	830	1122	74.7397	24.1645	0.3522	1781243	214229.01
30	845	1122	74.7161	24.1640	0.3528	1781243	214228.87
31	900	1122	74.7083	24.1635	0.3534	1781243	214221.55
32	915	1122	74.7013	24.1635	0.3538	1781242	214221.01
33	930	1122	74.6766	24.1630	0.3543	1781242	214221.64
34	945	1122	74.6684	24.1625	0.3549	1781242	214215.51
35	1000	1122	74.6545	24.1625	0.3555	1781241	214215.43
36	1015	1122	74.6484	24.1620	0.3562	1781241	214206.89
37	1030	1122	74.6227	24.1615	0.3566	1781241	214209.21
38	1045	1122	74.5976	24.1610	0.3569	1781241	214212.06
39	1100	1122	74.5871	24.1610	0.3574	1781240	214211.10
40	1115	1122	74.5814	24.1610	0.3580	1781239	214208.10
41	1130	1122	74.5482	24.1610	0.3582	1781239	214219.30
42	1145	1122	74.5690	24.1610	0.3591	1781238	214203.33
43	1200	1122	74.5409	24.1610	0.3593	1781237	214212.79
44	1215	1122	74.5332	24.1610	0.3598	1781237	214211.54
45	1230	1122	74.5271	24.1615	0.3602	1781236	214214.16
46	1245	1122	74.5302	24.1615	0.3608	1781235	214207.84
47	1300	1122	74.5141	24.1610	0.3611	1781235	214207.27
48	1315	1122	74.5018	24.1615	0.3614	1781234	214213.83
49	1330	1122	74.5156	24.1620	0.3621	1781234	214205.82
50	1345	1122	74.5118	24.1630	0.3622	1781233	214215.48
51	1400	1122	74.5304	24.1645	0.3628	1781232	214216.19
52	1415	1122	74.5533	24.1640	0.3633	1781232	214197.91

53	1430	1122	74.5768	24.1635	0.3638	1781231	214179.45
54	1445	1122	74.5851	24.1630	0.3642	1781230	214168.28
55	1500	1122	74.5990	24.1620	0.3644	1781230	214151.72
56	1515	1122	74.6261	24.1610	0.3651	1781229	214125.00
57	1530	1122	74.6193	24.1600	0.3652	1781229	214117.84
58	1545	1122	74.6288	24.1590	0.3655	1781228	214102.19
59	1600	1122	74.6434	24.1560	0.3658	1781227	214066.44
60	1615	1122	74.6291	24.1550	0.3659	1781227	214062.80
61	1630	1122	74.6315	24.1530	0.3661	1781226	214041.89
62	1645	1122	74.6221	24.1510	0.3662	1781226	214026.19
63	1700	1122	74.6331	24.1490	0.3666	1781225	214000.16
64	1715	1122	74.6428	24.1470	0.3671	1781225	213974.24
65	1730	1122	74.6189	24.1455	0.3672	1781224	213969.28
66	1745	1122	74.6213	24.1440	0.3674	1781223	213952.76
67	1800	1122	74.5979	24.1420	0.3673	1781223	213945.09
68	1815	1122	74.5950	24.1400	0.3674	1781222	213926.92
69	1830	1122	74.5782	24.1380	0.3678	1781221	213912.17
70	1845	1122	74.5807	24.1360	0.3679	1781221	213892.21
71	1900	1122	74.5706	24.1340	0.3682	1781220	213875.95
72	1915	1122	74.5624	24.1320	0.3681	1781220	213861.42

ILRT RTD AND HUMIDITY SENSOR DIAGRAM




1CM083
1MD-155
1CM082
1CM081B
1CM081A
1CM081C
1MC-152
1CM080B
1CM080A
1CM080C
1CM079B
1CM079A
1CM079C
TO ATMOSPHERE
ROTAMETER NO. 2
ROTAMETER NO. 1
TPI 4
TPI 3
TPI 5
TPI 2
TPI 1
1CM078A
1CM078B
1CM084
1CM087
1CM085
1CM088
1CM086
1CM089
1/2" POLYTUBE
1CM098
1CM096
1CM094
1CM093
1CM092
1CM091
TEST ONLY
1CM097
1CM096
1CM090
IL-1
IL-2
IL-4
IL-5
IL-3
DAS

APPENDIX D

ILRT Calculations

- Summary Data Report
- Trend Report
- Mass Point Analysis
- Total Time Analysis
- SRV Accumulator Leakage Calculation

RF-4 ILRT (Supp Pool Level = 261 inches)

DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	volume cu ft	dry air mass lbm
17	530	1122	74.9948	24.1735	0.3464	1781250	214260.65
18	545	1122	74.9764	24.1725	0.3470	1781249	214253.66
19	600	1122	74.9475	24.1715	0.3472	1781249	214254.22
20	615	1122	74.9084	24.1705	0.3477	1781248	214256.64
21	630	1122	74.8823	24.1695	0.3482	1781247	214253.57
22	645	1122	74.8510	24.1685	0.3485	1781247	214254.01
23	700	1122	74.8219	24.1675	0.3489	1781246	214252.94
24	715	1122	74.8026	24.1665	0.3495	1781246	214246.26
25	730	1122	74.7716	24.1660	0.3498	1781245	214251.80
26	745	1122	74.7733	24.1655	0.3504	1781245	214240.69
27	800	1122	74.7613	24.1655	0.3510	1781244	214240.14
28	815	1122	74.7411	24.1645	0.3515	1781244	214235.12
29	830	1122	74.7397	24.1645	0.3522	1781243	214229.01
30	845	1122	74.7161	24.1640	0.3528	1781243	214228.87
31	900	1122	74.7083	24.1635	0.3534	1781243	214221.55
32	915	1122	74.7013	24.1635	0.3538	1781242	214221.01
33	930	1122	74.6766	24.1630	0.3543	1781242	214221.64
34	945	1122	74.6684	24.1625	0.3549	1781242	214215.51
35	1000	1122	74.6545	24.1625	0.3555	1781241	214215.43
36	1015	1122	74.6484	24.1620	0.3562	1781241	214206.89
37	1030	1122	74.6227	24.1615	0.3566	1781241	214209.21
38	1045	1122	74.5976	24.1610	0.3569	1781241	214212.06
39	1100	1122	74.5871	24.1610	0.3574	1781240	214211.10
40	1115	1122	74.5814	24.1610	0.3580	1781239	214208.10
41	1130	1122	74.5482	24.1610	0.3582	1781239	214219.30
42	1145	1122	74.5690	24.1610	0.3591	1781238	214203.33
43	1200	1122	74.5409	24.1610	0.3593	1781237	214212.79
44	1215	1122	74.5332	24.1610	0.3598	1781237	214211.54
45	1230	1122	74.5271	24.1615	0.3602	1781236	214214.16
46	1245	1122	74.5302	24.1615	0.3608	1781235	214207.84
47	1300	1122	74.5141	24.1610	0.3611	1781235	214207.27
48	1315	1122	74.5018	24.1615	0.3614	1781234	214213.83
49	1330	1122	74.5156	24.1620	0.3621	1781234	214205.82
50	1345	1122	74.5118	24.1630	0.3622	1781233	214215.48
51	1400	1122	74.5304	24.1645	0.3628	1781232	214216.19

RF-4 ILRT (Supp Pool Level = 261 inches)

TREND REPORT

data set	time	date	elapsed time (hrs)	measured rate (%/day)	leakage rates: total time leakage rate (%/day)	total time ucl rate (%/day)	mass point leakage rate (%/day)	mass point ucl rate (%/day)
17	530	1122	0.00	0.0000	0.0000	0.0000	0.0000	0.0000
18	545	1122	0.25	0.3134	0.3134	0.3134	0.3134	0.3134
19	600	1122	0.50	0.1441	0.1441	0.1441	0.1441	0.9804
20	615	1122	0.75	0.0599	0.0457	0.3821	0.0514	0.2547
21	630	1122	1.00	0.0793	0.0312	0.3665	0.0501	0.1440
22	645	1122	1.25	0.0595	0.0167	0.2767	0.0398	0.0969
23	700	1122	1.50	0.0576	0.0109	0.2374	0.0369	0.0753
24	715	1122	1.75	0.0921	0.0254	0.2493	0.0576	0.0936
25	730	1122	2.00	0.0496	0.0181	0.2162	0.0469	0.0765
26	745	1122	2.25	0.0994	0.0330	0.2290	0.0660	0.0970
27	800	1122	2.50	0.0919	0.0414	0.2279	0.0746	0.1011
28	815	1122	2.75	0.1040	0.0517	0.2311	0.0853	0.1098
29	830	1122	3.00	0.1181	0.0638	0.2379	0.0980	0.1224
30	845	1122	3.25	0.1095	0.0709	0.2371	0.1033	0.1248
31	900	1122	3.50	0.1252	0.0805	0.2412	0.1124	0.1331
32	915	1122	3.75	0.1184	0.0865	0.2406	0.1166	0.1350
33	930	1122	4.00	0.1092	0.0893	0.2367	0.1166	0.1328
34	945	1122	4.25	0.1190	0.0937	0.2356	0.1194	0.1340
35	1000	1122	4.50	0.1126	0.0961	0.2325	0.1195	0.1325
36	1015	1122	4.75	0.1268	0.1008	0.2330	0.1234	0.1357
37	1030	1122	5.00	0.1152	0.1027	0.2303	0.1233	0.1344
38	1045	1122	5.25	0.1037	0.1022	0.2255	0.1203	0.1308
39	1100	1122	5.50	0.1009	0.1013	0.2208	0.1171	0.1272
40	1115	1122	5.75	0.1024	0.1009	0.2167	0.1149	0.1243
41	1130	1122	6.00	0.0772	0.0965	0.2095	0.1074	0.1188
42	1145	1122	6.25	0.1027	0.0966	0.2066	0.1068	0.1173
43	1200	1122	6.50	0.0825	0.0938	0.2011	0.1020	0.1128
44	1215	1122	6.75	0.0815	0.0912	0.1960	0.0979	0.1087
45	1230	1122	7.00	0.0744	0.0879	0.1905	0.0931	0.1042
46	1245	1122	7.25	0.0816	0.0860	0.1863	0.0904	0.1011
47	1300	1122	7.50	0.0797	0.0841	0.1823	0.0878	0.0981
48	1315	1122	7.75	0.0677	0.0809	0.1772	0.0835	0.0940
49	1330	1122	8.00	0.0768	0.0792	0.1736	0.0814	0.0915
50	1345	1122	8.25	0.0613	0.0759	0.1687	0.0770	0.0874
51	1400	1122	8.50	0.0586	0.0726	0.1639	0.0729	0.0835

RF-4 ILRT (Supp Pool Level = 261 inches)

MASS POINT LEAKAGE RATE REPORT

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	leakage rate (%/day)	ucl rate (%/day)
17	530	1122	0.00	214260.65	0.0000	0.0000
18	545	1122	0.25	214253.66	0.3134	0.3134
19	600	1122	0.50	214254.22	0.1441	0.9804
20	615	1122	0.75	214256.64	0.0514	0.2547
21	630	1122	1.00	214253.57	0.0501	0.1440
22	645	1122	1.25	214254.01	0.0398	0.0969
23	700	1122	1.50	214252.94	0.0379	0.0753
24	715	1122	1.75	214246.26	0.0576	0.0936
25	730	1122	2.00	214251.80	0.0469	0.0765
26	745	1122	2.25	214240.69	0.0660	0.0970
27	800	1122	2.50	214240.14	0.0746	0.1011
28	815	1122	2.75	214235.12	0.0853	0.1098
29	830	1122	3.00	214229.01	0.0980	0.1224
30	845	1122	3.25	214228.87	0.1033	0.1248
31	900	1122	3.50	214221.55	0.1124	0.1331
32	915	1122	3.75	214221.01	0.1166	0.1350
33	930	1122	4.00	214221.64	0.1166	0.1328
34	945	1122	4.25	214215.51	0.1194	0.1340
35	1000	1122	4.50	214215.43	0.1195	0.1325
36	1015	1122	4.75	214206.89	0.1234	0.1357
37	1030	1122	5.00	214209.21	0.1233	0.1344
38	1045	1122	5.25	214212.06	0.1203	0.1308
39	1100	1122	5.50	214211.10	0.1171	0.1272
40	1115	1122	5.75	214208.10	0.1149	0.1243
41	1130	1122	6.00	214219.30	0.1074	0.1188
42	1145	1122	6.25	214203.33	0.1068	0.1173
43	1200	1122	6.50	214212.79	0.1020	0.1128
44	1215	1122	6.75	214211.54	0.0979	0.1087
45	1230	1122	7.00	214214.16	0.0931	0.1042
46	1245	1122	7.25	214207.84	0.0904	0.1011
47	1300	1122	7.50	214207.27	0.0878	0.0981
48	1315	1122	7.75	214213.83	0.0835	0.0940
49	1330	1122	8.00	214205.82	0.0814	0.0915
50	1345	1122	8.25	214215.48	0.0770	0.0874
51	1400	1122	8.50	214216.19	0.0729	0.0835

Allowable leakage rate, La = 0.6500 %/day
75% La = 0.4875 %/day
Mass point leakage rate = 0.0729 %/day
Mass point UCL = 0.0835 %/day

RF-4 ILRT (Supp Pool Level = 261 inches)

TOTAL TIME LEAKAGE RATE REPORT

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	measured rate (%/day)	leakage rate (%/day)	ucl rate (%/day)
17	530	1122	0.00	214260.65	0.0000	0.0000	0.0000
18	545	1122	0.25	214253.66	0.3134	0.3134	0.3134
19	600	1122	0.50	214254.22	0.1441	0.1441	0.1441
20	615	1122	0.75	214256.64	0.0599	0.0457	0.3821
21	630	1122	1.00	214253.57	0.0793	0.0312	0.3665
22	645	1122	1.25	214254.01	0.0595	0.0167	0.2767
23	700	1122	1.50	214252.94	0.0576	0.0109	0.2374
24	715	1122	1.75	214246.26	0.0921	0.0254	0.2493
25	730	1122	2.00	214251.80	0.0496	0.0181	0.2162
26	745	1122	2.25	214240.69	0.0994	0.0330	0.2290
27	800	1122	2.50	214240.14	0.0919	0.0414	0.2279
28	815	1122	2.75	214235.12	0.1040	0.0517	0.2311
29	830	1122	3.00	214229.01	0.1181	0.0638	0.2379
30	845	1122	3.25	214228.87	0.1095	0.0709	0.2371
31	900	1122	3.50	214221.55	0.1252	0.0805	0.2412
32	915	1122	3.75	214221.01	0.1184	0.0865	0.2406
33	930	1122	4.00	214221.64	0.1092	0.0893	0.2367
34	945	1122	4.25	214215.51	0.1190	0.0937	0.2356
35	1000	1122	4.50	214215.43	0.1126	0.0961	0.2325
36	1015	1122	4.75	214206.89	0.1268	0.1008	0.2330
37	1030	1122	5.00	214209.21	0.1152	0.1027	0.2303
38	1045	1122	5.25	214212.06	0.1037	0.1022	0.2255
39	1100	1122	5.50	214211.10	0.1009	0.1013	0.2208
40	1115	1122	5.75	214208.10	0.1024	0.1009	0.2167
41	1130	1122	6.00	214219.30	0.0772	0.0965	0.2095
42	1145	1122	6.25	214203.33	0.1027	0.0966	0.2066
43	1200	1122	6.50	214212.79	0.0825	0.0938	0.2011
44	1215	1122	6.75	214211.54	0.0815	0.0912	0.1960
45	1230	1122	7.00	214214.16	0.0744	0.0879	0.1905
46	1245	1122	7.25	214207.84	0.0816	0.0860	0.1863
47	1300	1122	7.50	214207.27	0.0797	0.0841	0.1823
48	1315	1122	7.75	214213.83	0.0677	0.0809	0.1772
49	1330	1122	8.00	214205.82	0.0768	0.0792	0.1736
50	1345	1122	8.25	214215.48	0.0613	0.0759	0.1687
51	1400	1122	8.50	214216.19	0.0586	0.0726	0.1639

Allowable leakage rate, La = 0.6500 %/day
75% La = 0.4875 %/day
Total time leakage rate = 0.0726 %/day
Total time UCL = 0.1639 %/day

SRV Accumulator Calculations.

ADS/Non-ADS SRV Volume Calculation

SRV/ADS EIN	Acc. EIN	Acc. Vol. ft3	2" pipe Lth.	10% Error	2" Flex pipe	10% Error	1 1/4" Pip Lth.	10% error	Total Pipe Vol. ft3
ADS-SRV's									
1B21F041B	1B21A003B	7.354	25.3	2.53	2.31	0.231	3	0.3	0.7420
1B21F041C	1B21A003C	7.354	26.2	2.62	2.31	0.231	2.5	0.25	0.7594
1B21F041D	1B21A003D	7.354	37.3	3.73	2.31	0.231	2.4	0.24	1.0427
1B21F041F	1B21A003E	7.354	26.1	2.61	2.31	0.231	4.5	0.45	0.7797
1B21F047A	1B21A003H	7.354	34.7	3.47	2.31	0.231	2.9	0.29	0.9818
1B21F047C	1B21A003K	7.354	26	2.6	2.31	0.231	1.9	0.19	0.7474
1B21F051G	1B21A003S	7.354	28.6	2.86	2.31	0.231	3.6	0.36	0.8335
								TOTAL	5.8864
Non-ADS									
1B21F041A	1B21A004A	2.139	36.5	3.65	2.31	0.231	2.3	0.23	1.0211
1B21F041G	1B21A004F	2.139	25.8	2.58	2.31	0.231	2.5	0.25	0.7491
1B21F041L	1B21A004G	2.139	24.2	2.42	2.31	0.231	4.4	0.44	0.7298
1B21F047B	1B21A004J	2.139	27.3	2.73	2.31	0.231	2.5	0.25	0.7876
1B21F047D	1B21A004L	2.139	32.4	3.24	2.31	0.231	2.4	0.24	0.9171
1B21F047F	1B21A004M	2.139	24.8	2.48	2.31	0.231	3.3	0.33	0.7326
1B21F051B	1B21A004N	2.139	25.5	2.55	2.31	0.231	2.5	0.25	0.7414
1B21F051C	1B21A004P	2.139	26.4	2.64	2.31	0.231	2.5	0.25	0.7645
1B21F051D	1B21A004R	2.139	31.1	3.11	2.31	0.231	2.7	0.27	0.8873
								TOTAL	7.3305

Air Volume Calculations

SRV/ADS EIN	Total Volume	Initial Pressure	Final Pressure	Decay Start Time*	Decay End Time**	Duration (Hrs.)	Leakage Rate		
ADS-SRV's									
1B21F041B	8.0960	160	126	1430	1330	71	0.0375		
1B21F041C	8.1134	160	143	1430	1355	71.42	0.0188		
1B21F041D	8.3967	160	23	1430	1340	71.17	0.1567		
1B21F041F	8.1337	160	136	1430	1335	71.08	0.0266		
1B21F047A	8.3358	160	141	1430	1447	72.28	0.0216		
1B21F047C	8.1014	160	15	1430	1453	72.38	0.1600		
1B21F051G	8.1875	160	124	1430	1442	72.2	0.0401		
ADS Total	57.3644					Total	0.4612		
Non ADS									
1B21F041A	3.1601	160	9.280	1430	1400	23.5	0.0649		
1B21F041G	2.8881	160	9.280	1430	1400	23.5	0.0593		
1B21F041L	2.8688	160	9.280	1430	1400	23.5	0.0589		
1B21F047B	2.9266	160	9.280	1430	1400	23.5	0.0601		
1B21F047D	3.0561	160	9.280	1430	1400	23.5	0.0627		
1B21F047F	2.8716	160	9.280	1430	1400	23.5	0.0589		
1B21F051B	2.8804	160	9.280	1430	1400	23.5	0.0591		
1B21F051C	2.9035	160	143	1430	1438	72.13	0.0067		
1B21F051D	3.0263	160	134	1430	1505	72.58	0.0107		
ADS Total	57.3644					Total	0.4414		
SRV Total	83.9459					Total	0.9026	SCFM	

* 1430 on 11/21/93 is the assumed start of pressure decay for the SRV accumulators.

** 1400 on 11/22/93 is the assumed end of pressure decay for the SRV accumulators not measured for final pressure. Otherwise, 11/24/93 is the date that accumulator pressure was measured.

Conversion to Wt % per Day

Eff. Vol.	1781444 FT^3 * 24.174 psia/14.7 psia *528 °R/ 534.995 °R =				2891204	FT^3	
SRV Acc.	0.9026	X 60 Min./Hr X 24Hr/Day X 100%/2891204 Ft3 =			0.0450	%/Day	

Total ILRT Correction : *0.0450 %/day*

APPENDIX E

Verification Test

- Summary Data Report
- Trend Report
- Mass Point Analysis
- Total Time Analysis

RF-4 ILRT (Supp Pool Level = 261 inches)

DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	volume cu ft	dry air mass lbm
51	1400	1122	74.5304	24.1645	0.3628	1781232	214216.19
52	1415	1122	74.5533	24.1640	0.3633	1781232	214197.91
53	1430	1122	74.5768	24.1635	0.3638	1781231	214179.45
54	1445	1122	74.5851	24.1630	0.3642	1781230	214168.28
55	1500	1122	74.5990	24.1620	0.3644	1781230	214151.72
56	1515	1122	74.6261	24.1610	0.3651	1781229	214125.00
57	1530	1122	74.6193	24.1600	0.3652	1781229	214117.84
58	1545	1122	74.6288	24.1590	0.3655	1781228	214102.19
59	1600	1122	74.6434	24.1560	0.3658	1781227	214066.44
60	1615	1122	74.6291	24.1550	0.3659	1781227	214062.80
61	1630	1122	74.6315	24.1530	0.3661	1781226	214041.89
62	1645	1122	74.6221	24.1510	0.3662	1781226	214026.19
63	1700	1122	74.6331	24.1490	0.3666	1781225	214000.16
64	1715	1122	74.6428	24.1470	0.3671	1781225	213974.24
65	1730	1122	74.6189	24.1455	0.3672	1781224	213969.28
66	1745	1122	74.6213	24.1440	0.3674	1781223	213952.76
67	1800	1122	74.5979	24.1420	0.3673	1781223	213945.09
68	1815	1122	74.5950	24.1400	0.3674	1781222	213926.92
69	1830	1122	74.5782	24.1380	0.3678	1781221	213912.17
70	1845	1122	74.5807	24.1360	0.3679	1781221	213892.21
71	1900	1122	74.5706	24.1340	0.3682	1781220	213875.95
72	1915	1122	74.5624	24.1320	0.3681	1781220	213861.42

RF-4 ILRT (Supp Pool Level = 261 inches)

TREND REPORT

data set	time	date	elapsed time (hrs)	measured leakage rate (%/day)	total time leakage rate (%/day)	leakage rates ucl rate (%/day)	mass point leakage rate (%/day)	mass point ucl rate (%/day)
55	1500	1122	0.00	0.0000	0.0000	0.0000	0.0000	0.0000
56	1515	1122	0.25	1.1977	1.1977	1.1977	1.1977	1.1977
57	1530	1122	0.50	0.7595	0.7595	0.7595	0.7595	2.9244
58	1545	1122	0.75	0.7401	0.6703	2.3263	0.6982	1.0470
59	1600	1122	1.00	0.9558	0.8015	1.9717	0.8669	1.1472
60	1615	1122	1.25	0.7972	0.7691	1.5133	0.8145	0.9927
61	1630	1122	1.50	0.8206	0.7673	1.3424	0.8090	0.9283
62	1645	1122	1.75	0.8039	0.7605	1.2381	0.7979	0.8845
63	1700	1122	2.00	0.8492	0.7766	1.2015	0.8173	0.8861
64	1715	1122	2.25	0.8840	0.8014	1.1927	0.8460	0.9081
65	1730	1122	2.50	0.8178	0.7962	1.1502	0.8333	0.8850
66	1745	1122	2.75	0.8108	0.7908	1.1158	0.8224	0.8665
67	1800	1122	3.00	0.7719	0.7758	1.0769	0.8001	0.8437
68	1815	1122	3.25	0.7752	0.7657	1.0474	0.7864	0.8260
69	1830	1122	3.50	0.7670	0.7563	1.0215	0.7744	0.8107
70	1845	1122	3.75	0.7756	0.7512	1.0031	0.7691	0.8010
71	1900	1122	4.00	0.7727	0.7469	0.9872	0.7646	0.7930
72	1915	1122	4.25	0.7655	0.7421	0.9723	0.7595	0.7852

RF-4 ILRT (Supp Pool Level = 261 inches)
MASS POINT LEAKAGE RATE REPORT

VERIFICATION

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	leakage rate (%/day)
55	1500	1122	0.00	214151.72	0.0000
56	1515	1122	0.25	214125.00	1.1977
57	1530	1122	0.50	214117.84	0.7595
58	1545	1122	0.75	214102.19	0.6982
59	1600	1122	1.00	214066.44	0.8669
60	1615	1122	1.25	214062.80	0.8145
61	1630	1122	1.50	214041.89	0.8090
62	1645	1122	1.75	214026.19	0.7979
63	1700	1122	2.00	214000.16	0.8173
64	1715	1122	2.25	213974.24	0.8460
65	1730	1122	2.50	213969.28	0.8333
66	1745	1122	2.75	213952.76	0.8224
67	1800	1122	3.00	213945.09	0.8001
68	1815	1122	3.25	213926.92	0.7864
69	1830	1122	3.50	213912.17	0.7744
70	1845	1122	3.75	213892.21	0.7691
71	1900	1122	4.00	213875.95	0.7646
72	1915	1122	4.25	213861.42	0.7595

Upper limit on leakage rate = 0.8854 %/day
Mass point leakage rate = 0.7595 %/day
Lower limit on leakage rate = 0.5604 %/day

RF-4 ILRT (Supp Pool Level = 261 inches)
TOTAL TIME LEAKAGE RATE REPORT

VERIFICATION

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	measured rate (%/day)	leakage rate (%/day)
55	1500	1122	0.00	214151.72	0.0000	0.0000
56	1515	1122	0.25	214125.00	1.1977	1.1977
57	1530	1122	0.50	214117.84	0.7595	0.7595
58	1545	1122	0.75	214102.19	0.7401	0.6703
59	1600	1122	1.00	214066.44	0.9558	0.8015
60	1615	1122	1.25	214062.80	0.7972	0.7691
61	1630	1122	1.50	214041.89	0.8206	0.7673
62	1645	1122	1.75	214026.19	0.8039	0.7605
63	1700	1122	2.00	214000.16	0.8492	0.7766
64	1715	1122	2.25	213974.24	0.8840	0.8014
65	1730	1122	2.50	213969.28	0.8178	0.7962
66	1745	1122	2.75	213952.76	0.8108	0.7908
67	1800	1122	3.00	213945.09	0.7719	0.7758
68	1815	1122	3.25	213926.92	0.7752	0.7657
69	1830	1122	3.50	213912.17	0.7670	0.7563
70	1845	1122	3.75	213892.21	0.7756	0.7512
71	1900	1122	4.00	213875.95	0.7727	0.7469
72	1915	1122	4.25	213861.42	0.7655	0.7421

Upper limit on leakage rate = 0.8851 %/day
Total time leakage rate = 0.7421 %/day
Lower limit on leakage rate = 0.5601 %/day

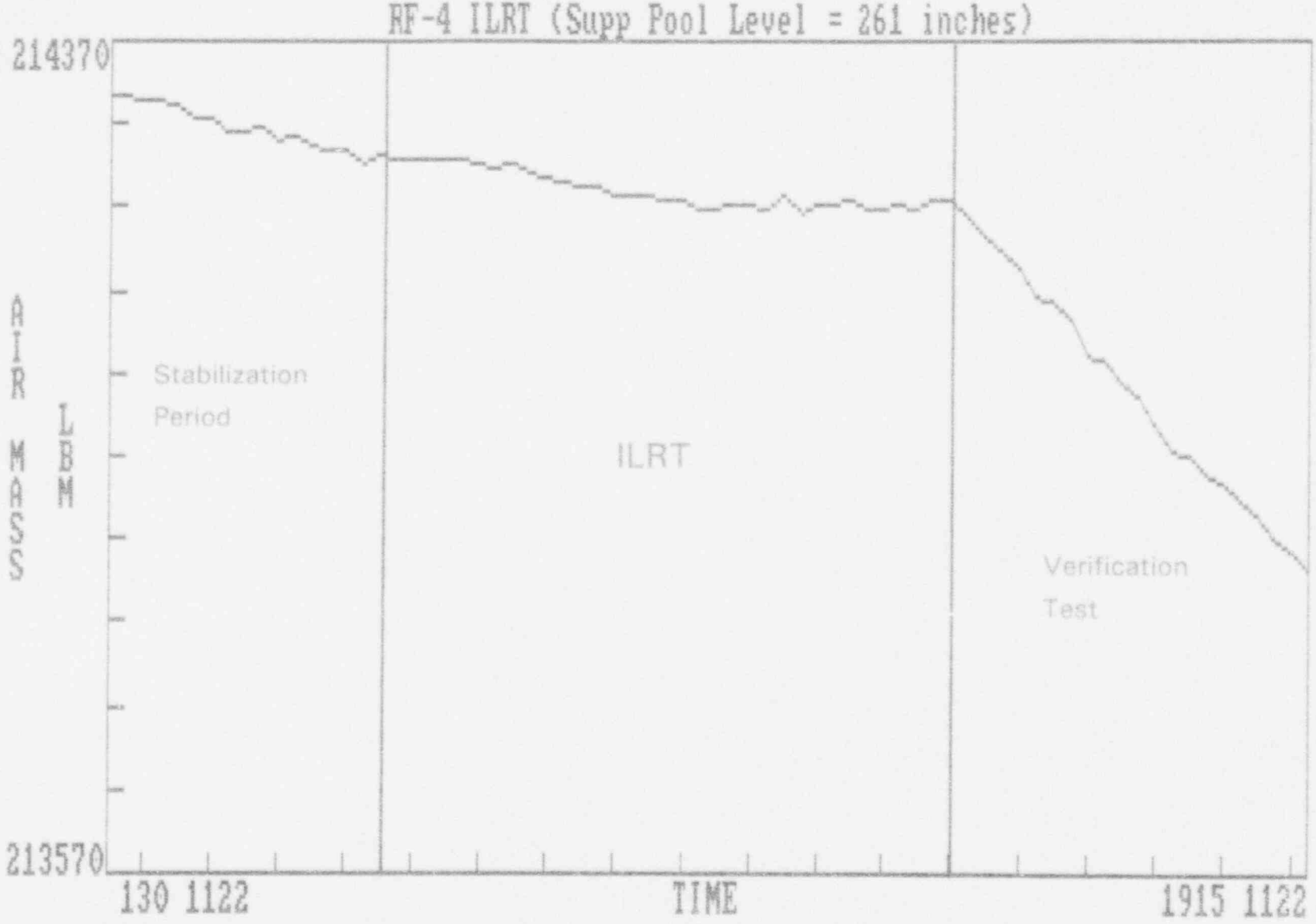
APPENDIX F

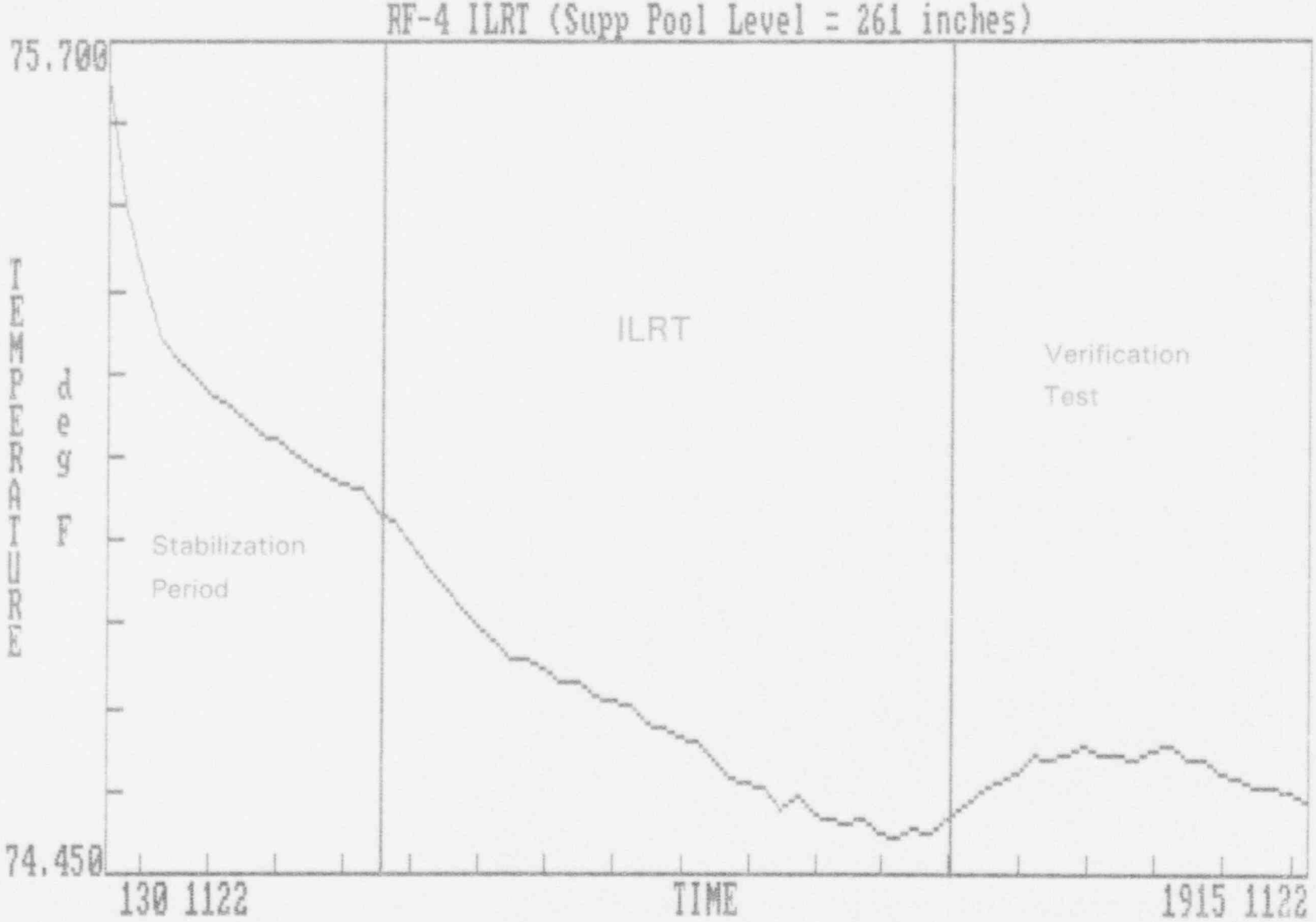
PLOTS

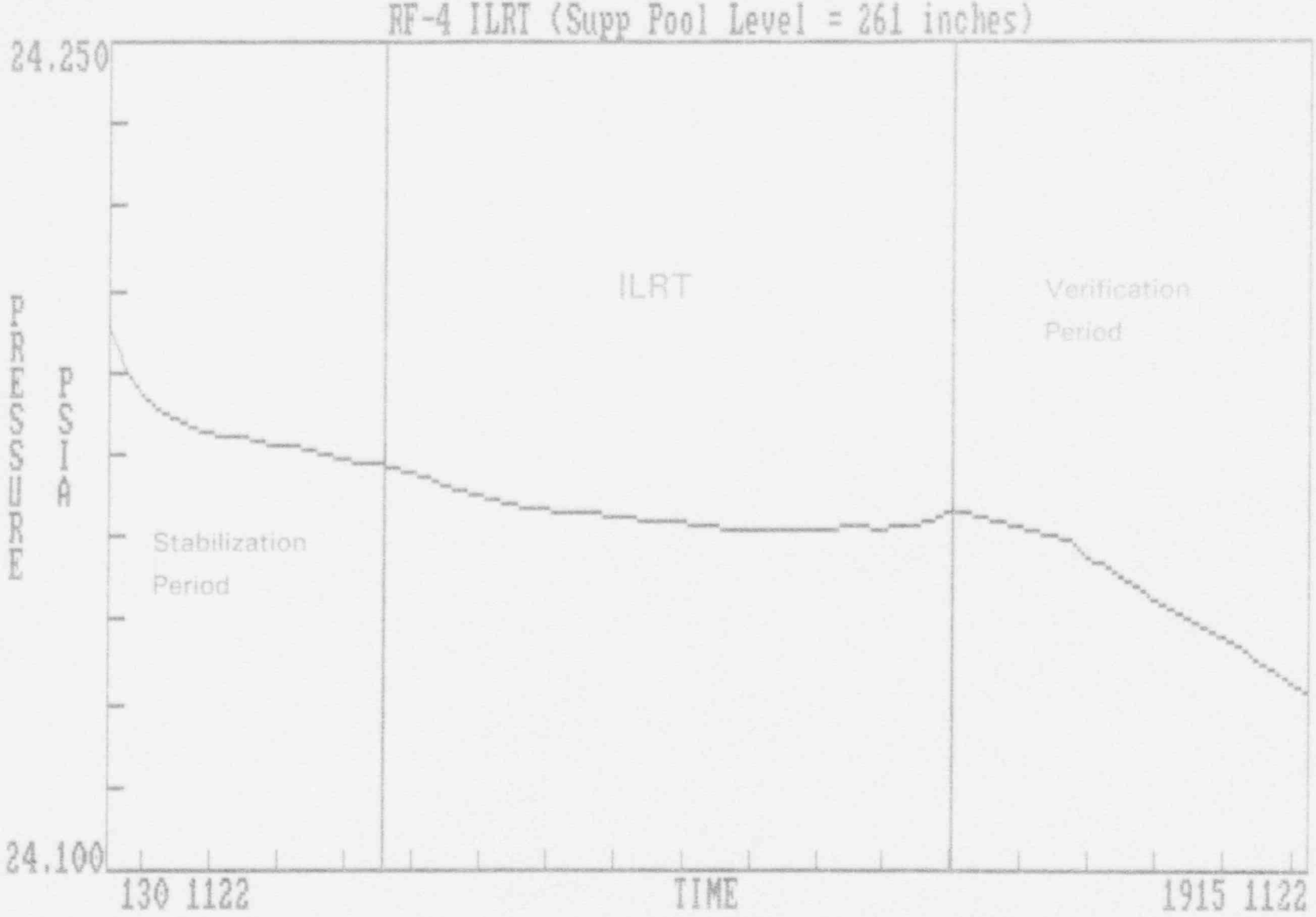
PLOTS - Entire Test

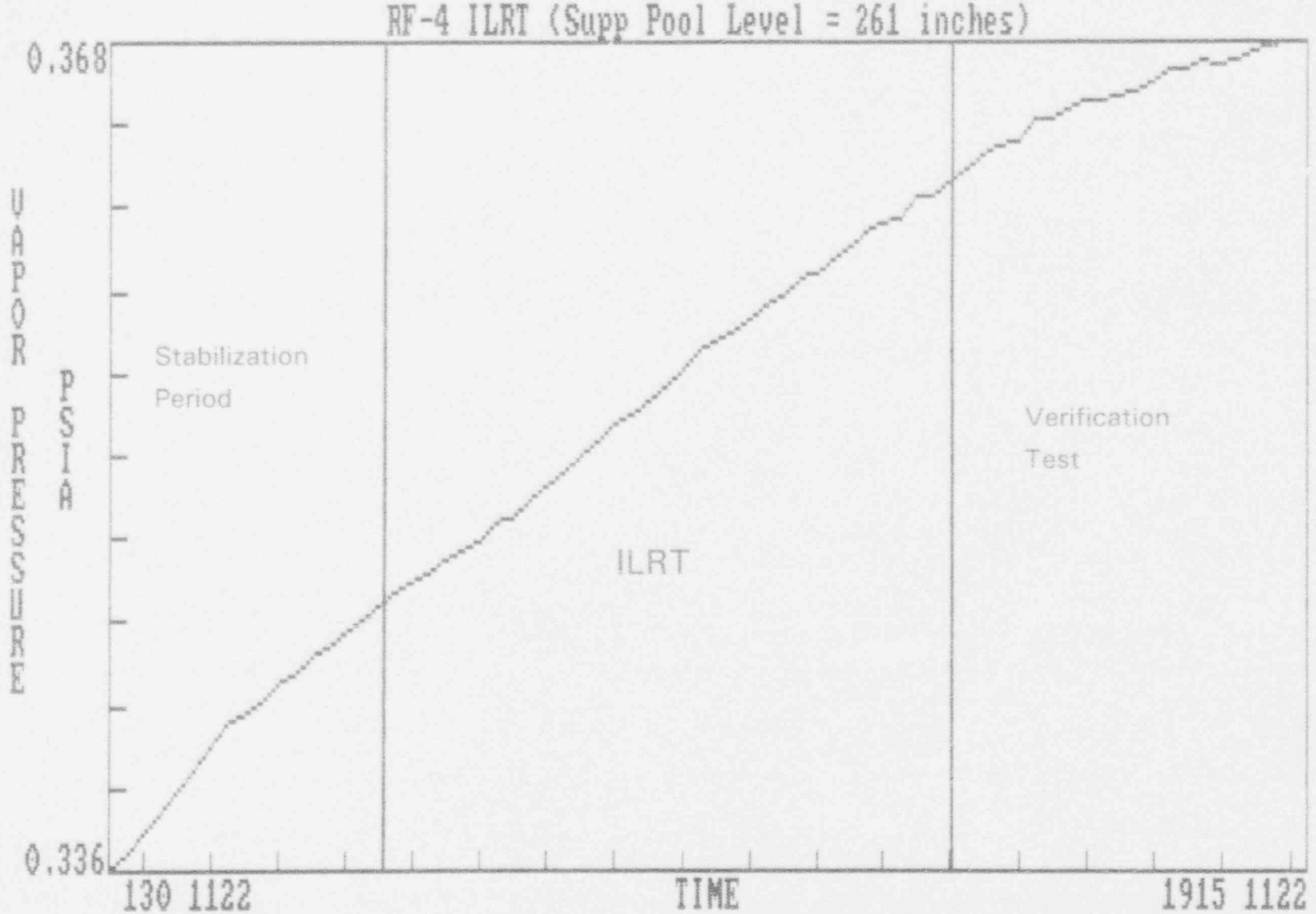
(Stabilization, ILRT, Verification)

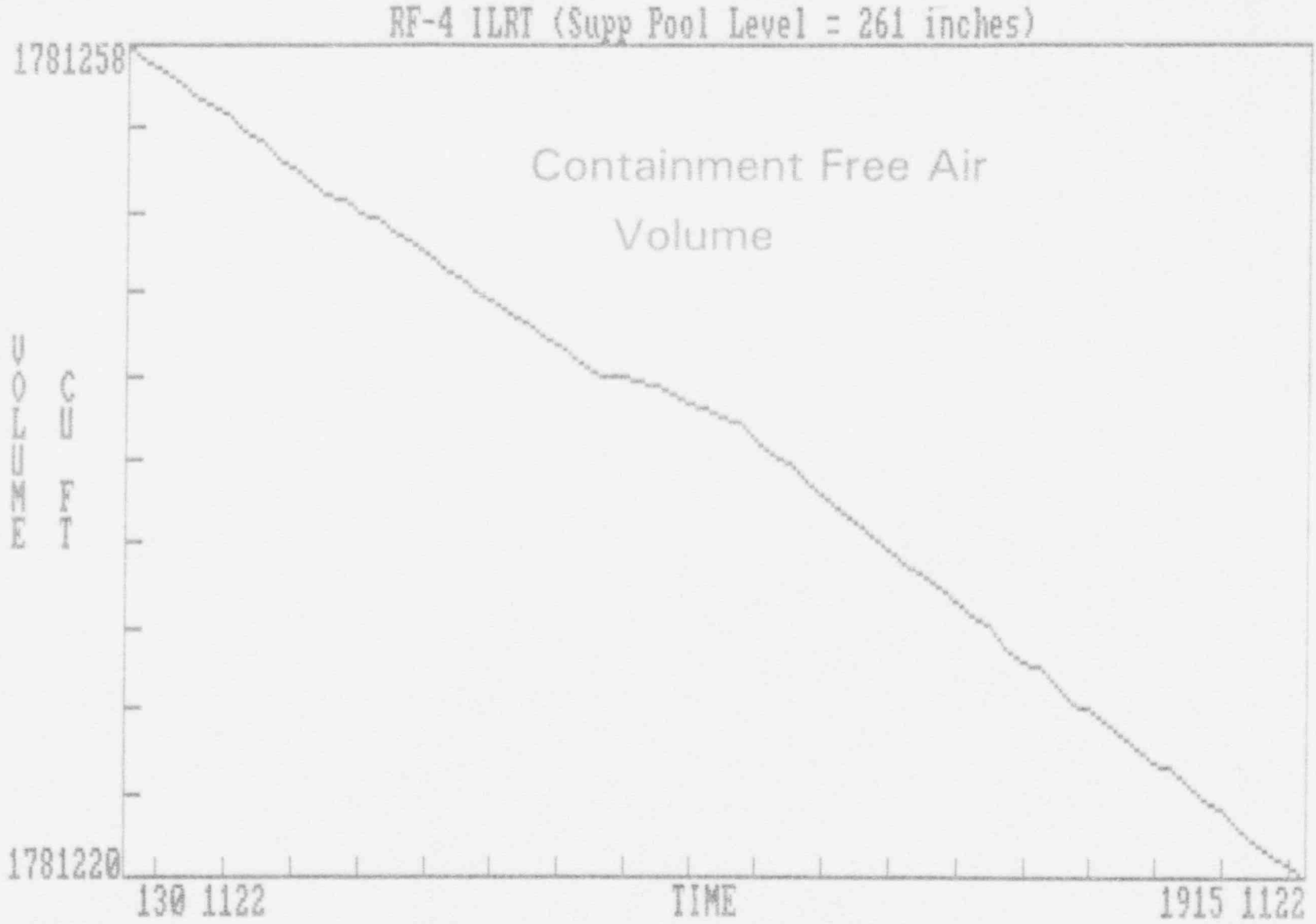
- Air Mass
- Temperature
- Pressure
- Vapor Pressure
- Free Air Volume


RF-4 ILRT (Supp Pool Level = 261 inches)
214370
213570
AIR MASS
LBM
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
75.700
74.450
TEMPERATURE
deg F
ILRT
Verification
Test
Stabilization
Period
130 1122
TIME
1915 1122

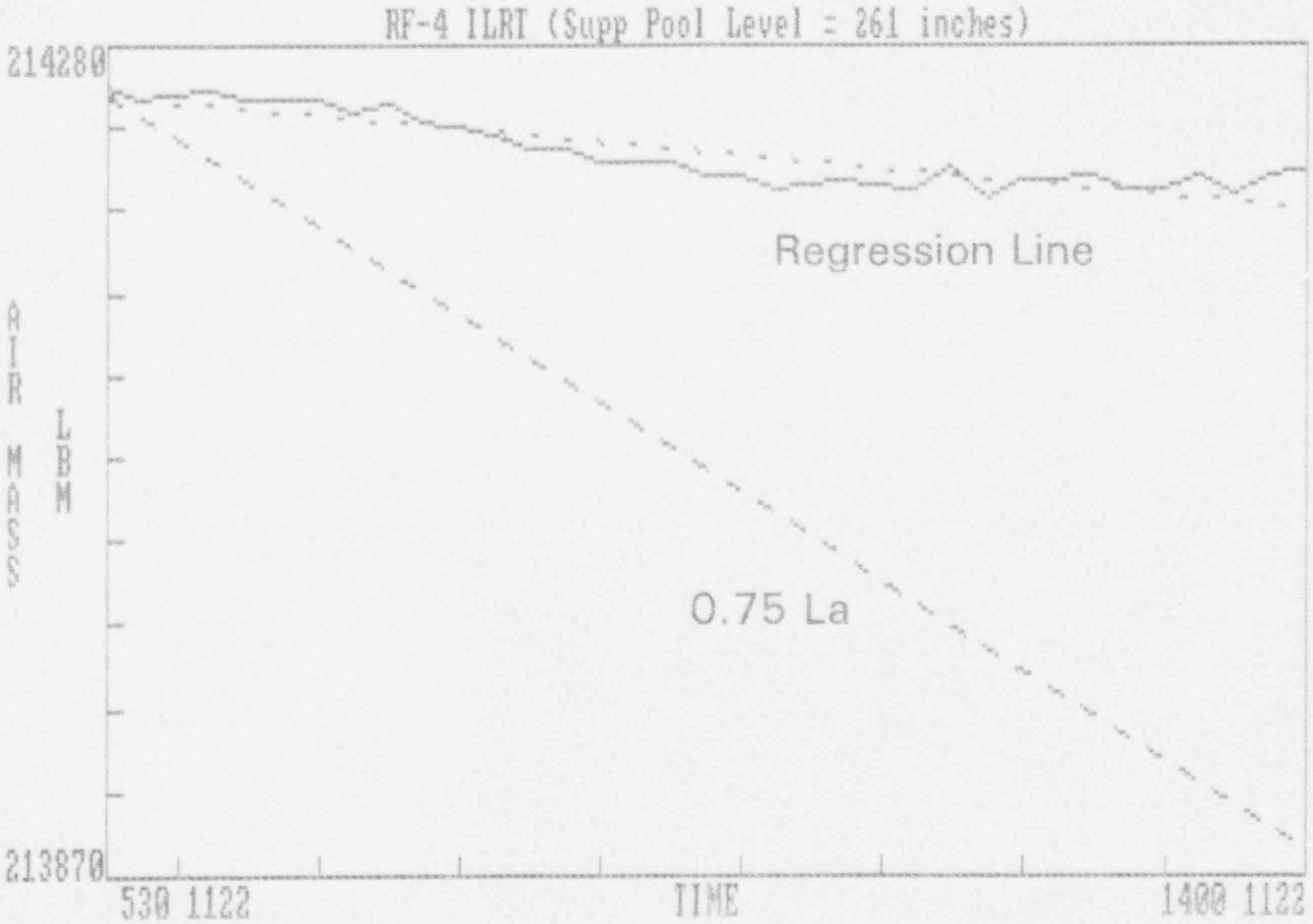

RF-4 ILRT (Supp Pool Level = 261 inches)
24.250
24.100
PRESSURE
PSIA
Stabilization
Period
ILRT
Verification
Period
130 1122
TIME
1915 1122

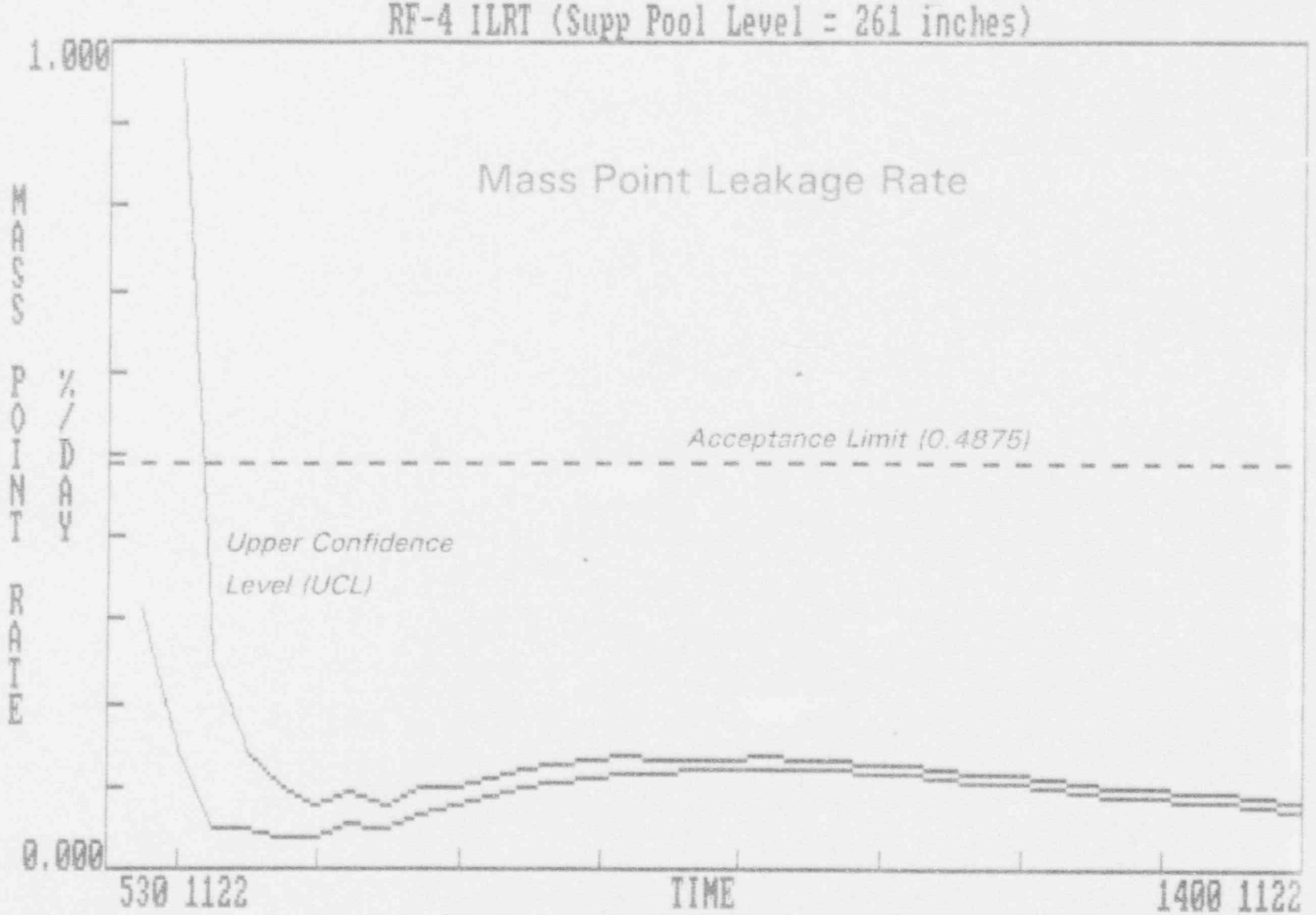

RF-4 ILRT (Supp Pool Level = 261 inches)
0.368
0.336
VAPOR PRESSURE PSIA
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

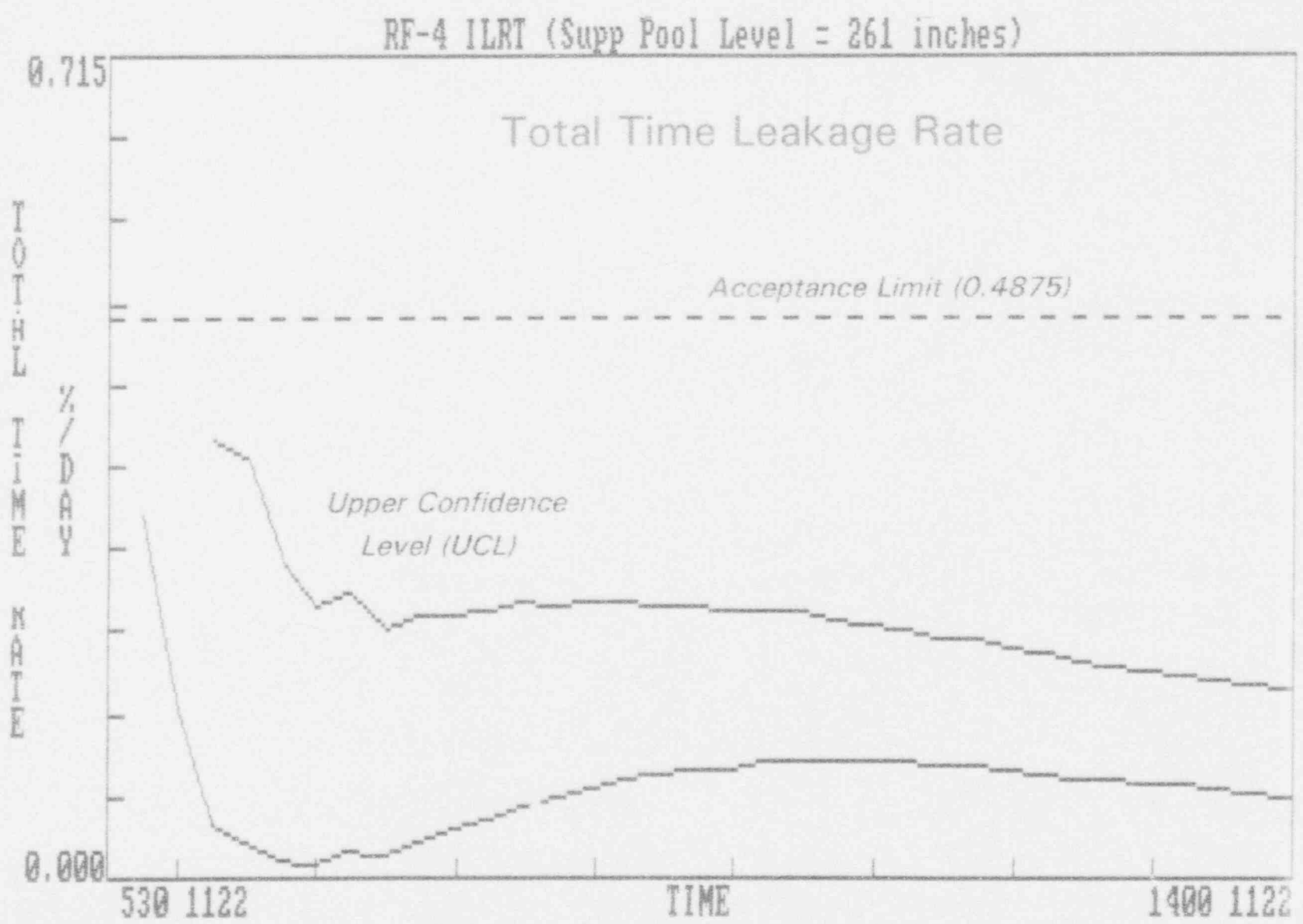

RF-4 ILRT (Supp Pool Level = 261 inches)
1781258
Containment Free Air
Volume
VOLUME CU FT
1781220
130 1122
TIME
1915 1122

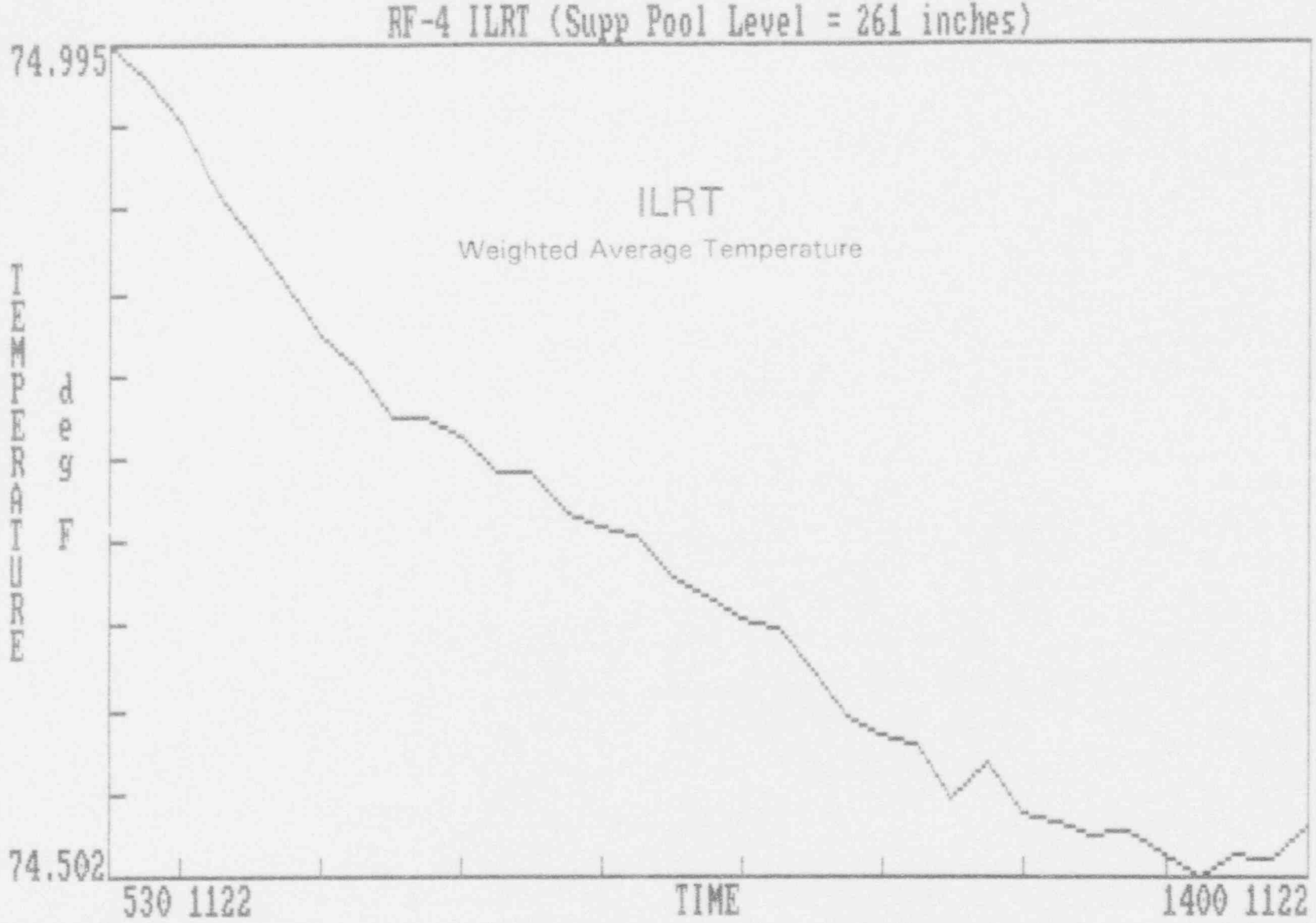
PLOTS - ILRT

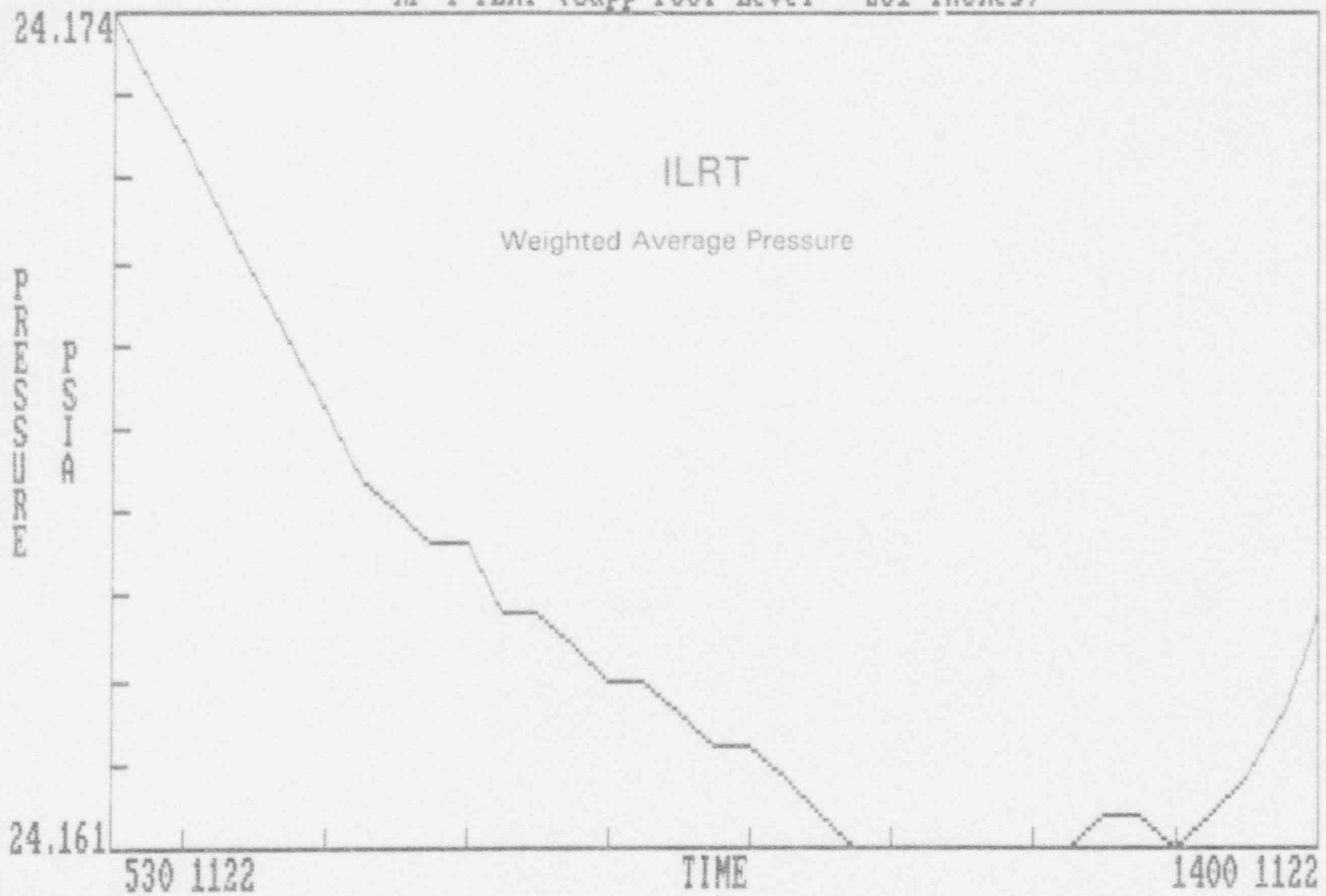
- Air Mass
- Mass Point Leakage Rate and UCL
- Total Time Leakage Rate and UCL
- Weighted Average Temperature
- Weighted Average Pressure
- Weighted Average Vapor Pressure

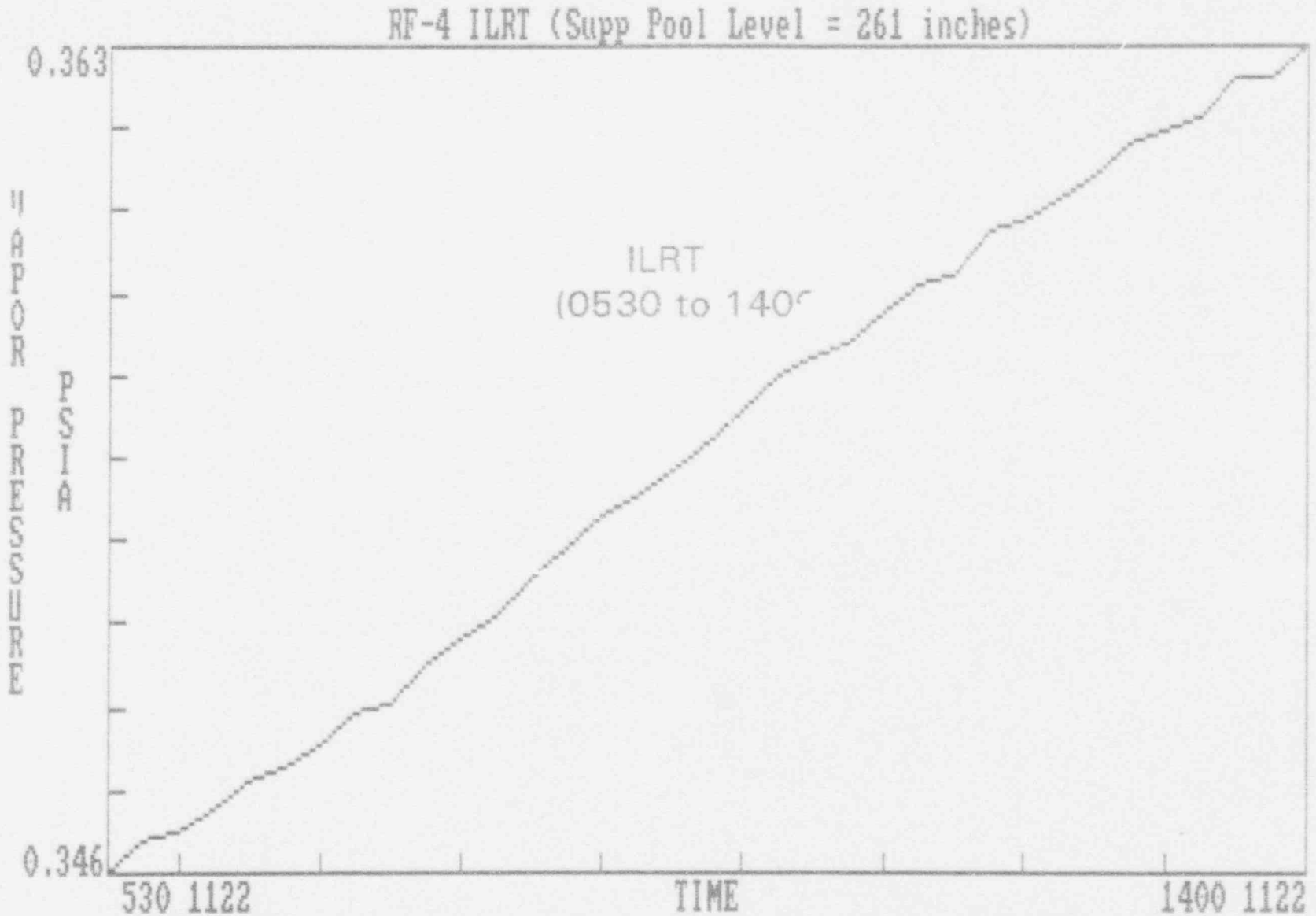

RF-4 ILRT (Supp Pool Level = 261 inches)
214280
213870
AIR MASS LBM
Regression Line
0.75 La
530 1122
TIME
1400 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
1.000
0.000
MASS POINT RATE %/DAY
Mass Point Leakage Rate
Acceptance Limit (0.4875)
Upper Confidence
Level (UCL)
530 1122
TIME
1400 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
Total Time Leakage Rate
Acceptance Limit (0.4875)
Upper Confidence Level (UCL)
TOTAL TIME MATE %/DAY
0.715
0.000
530 1122
TIME
1400 1122

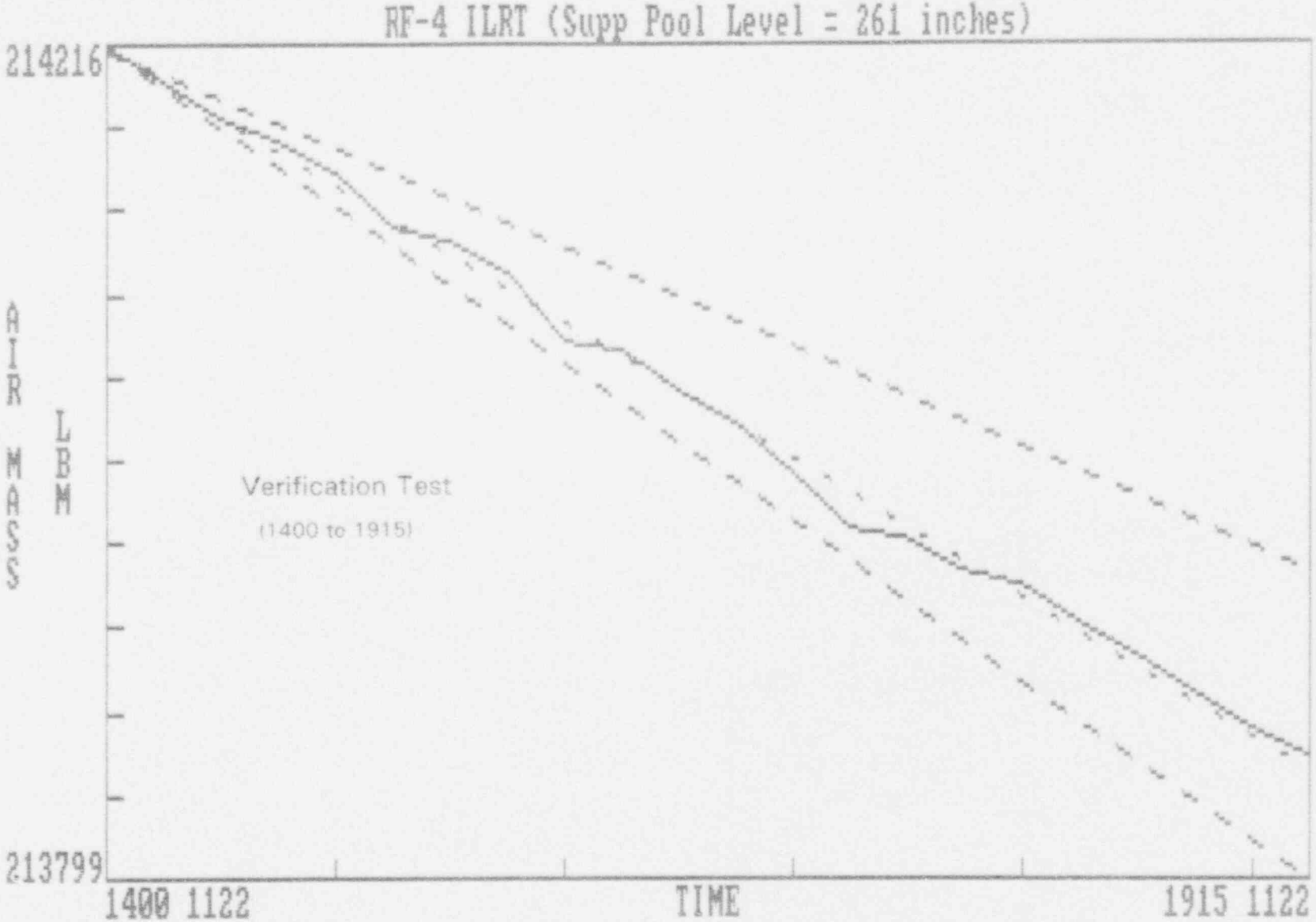

RF-4 ILRT (Supp Pool Level = 261 inches)
74.995
ILRT
Weighted Average Temperature
TEMPERATURE
deg F
74.502
530 1122
TIME
1400 1122

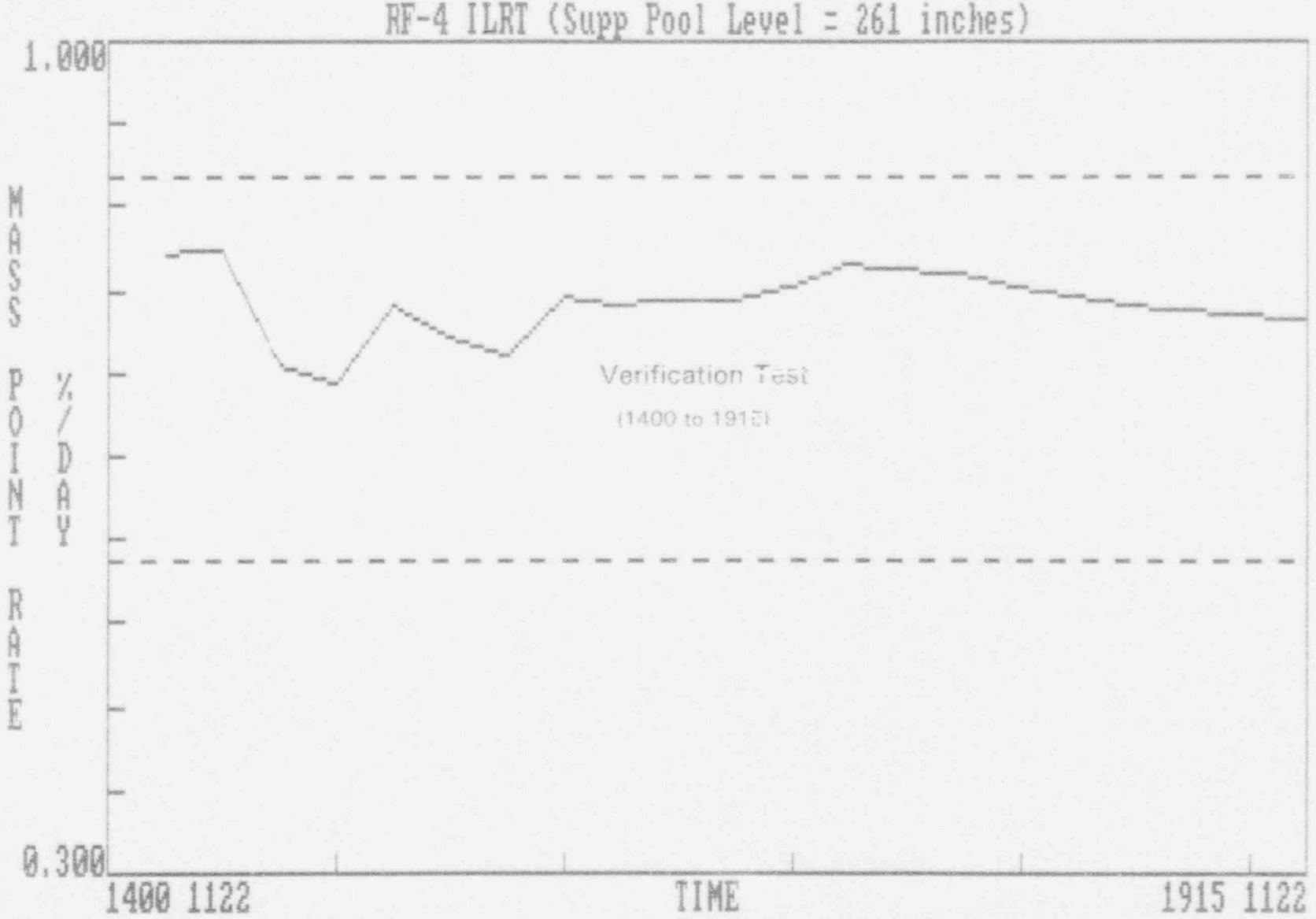

RF-4 ILRT (Supp Pool Level = 261 inches)
24.174
24.161
ILRT
Weighted Average Pressure
PRESSURE
PSIA
530 1122
TIME
1400 1122

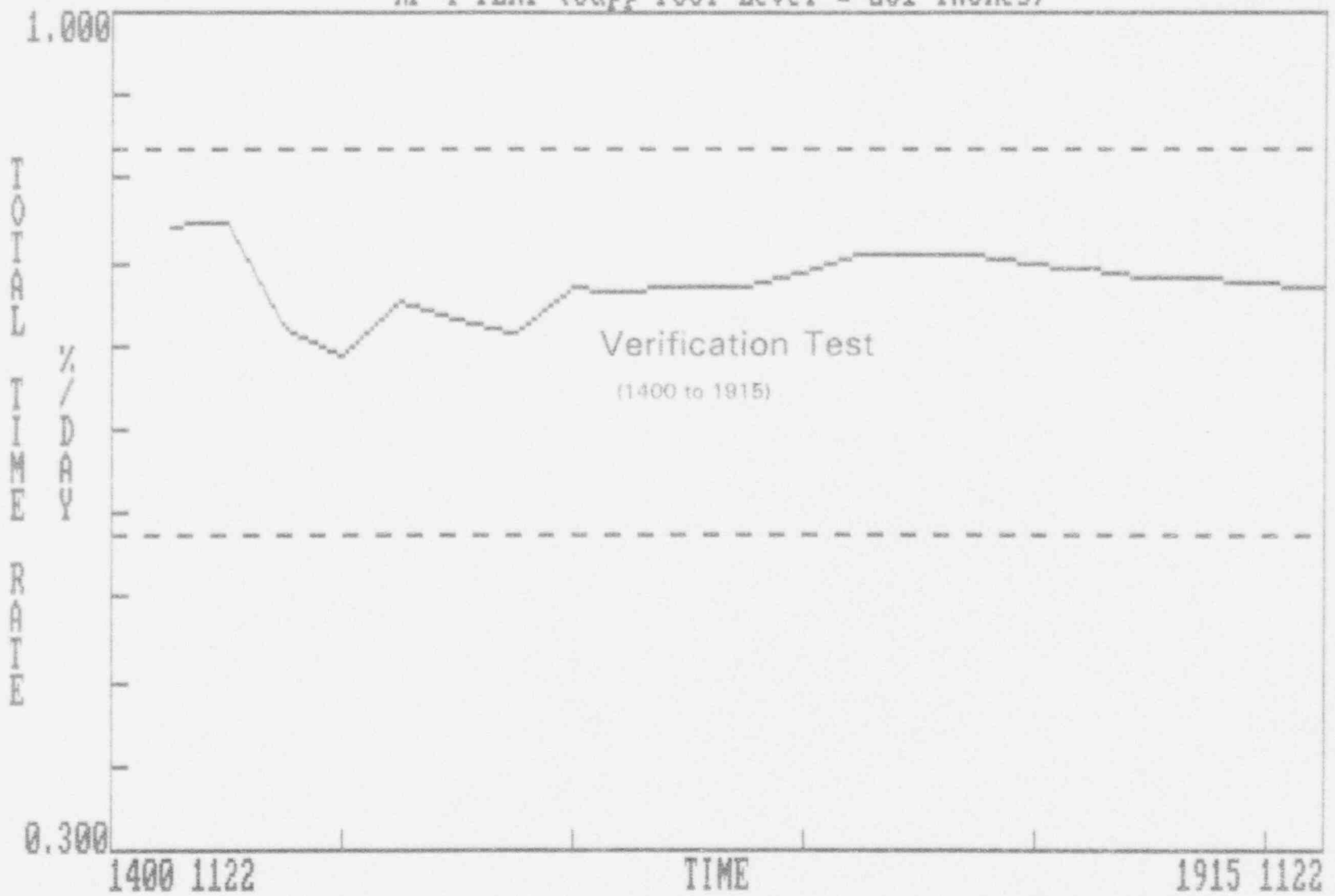

RF-4 ILRT (Supp Pool Level = 261 inches)
0.363
0.346
VAPOR PRESSURE
PSIA
ILRT
(0530 to 140
530 1122
TIME
1400 1122

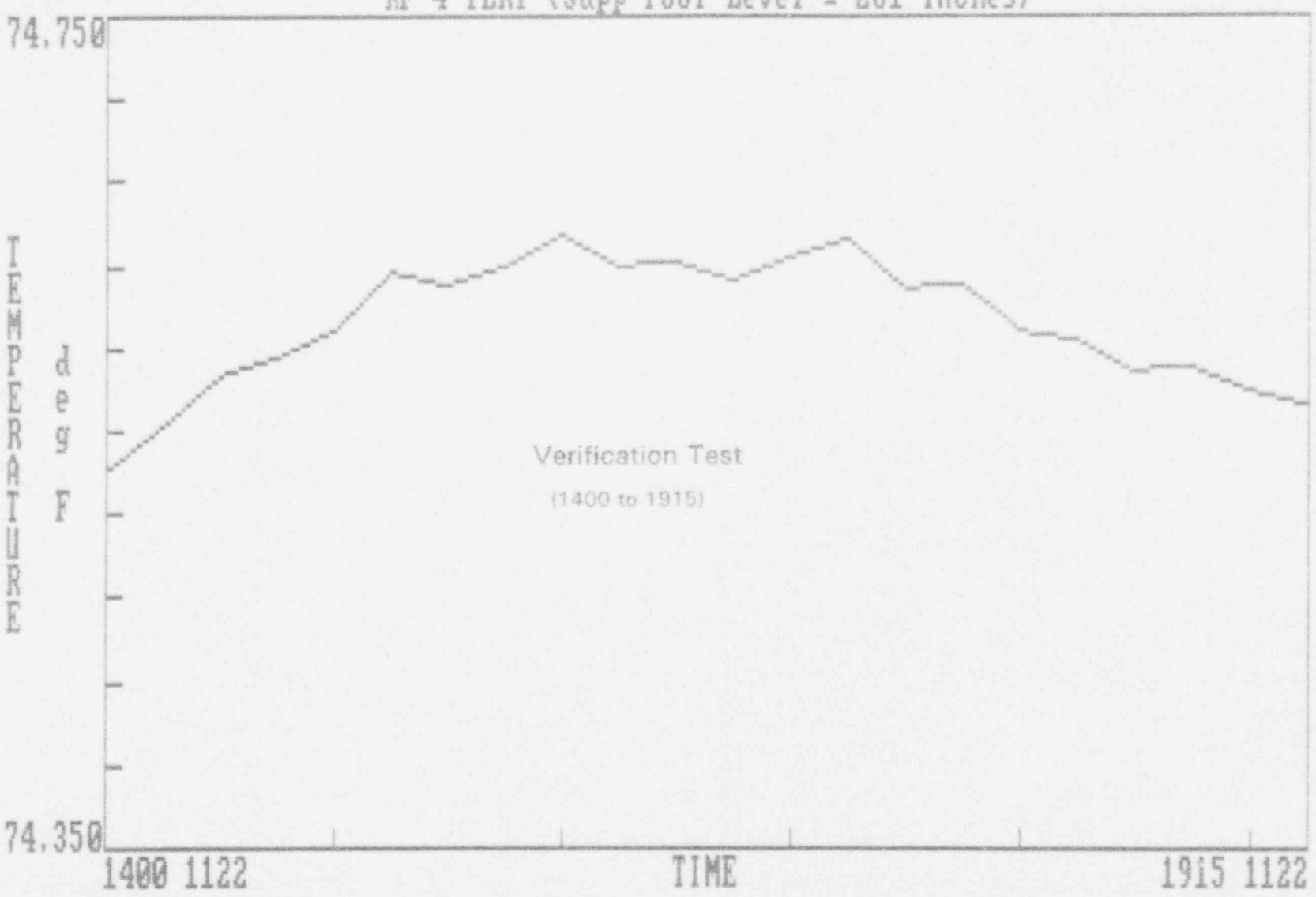
PLOTS - Verification

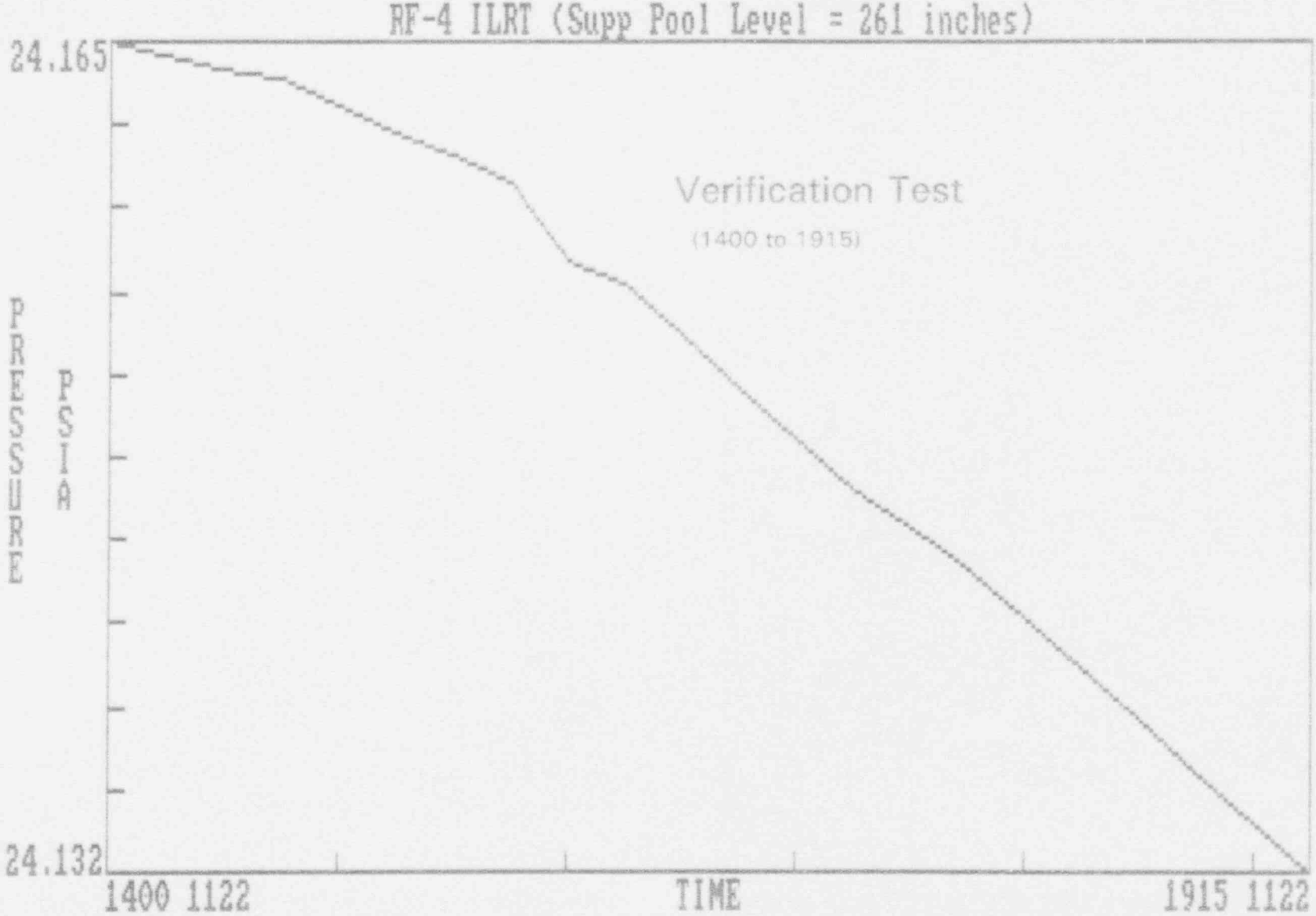
- Air Mass
- Mass Point Leakage Rate and UCL
- Total Time Leakage Rate and UCL
- Weighted Average Temperature
- Weighted Average Pressure
- Weighted Average Vapor Pressure

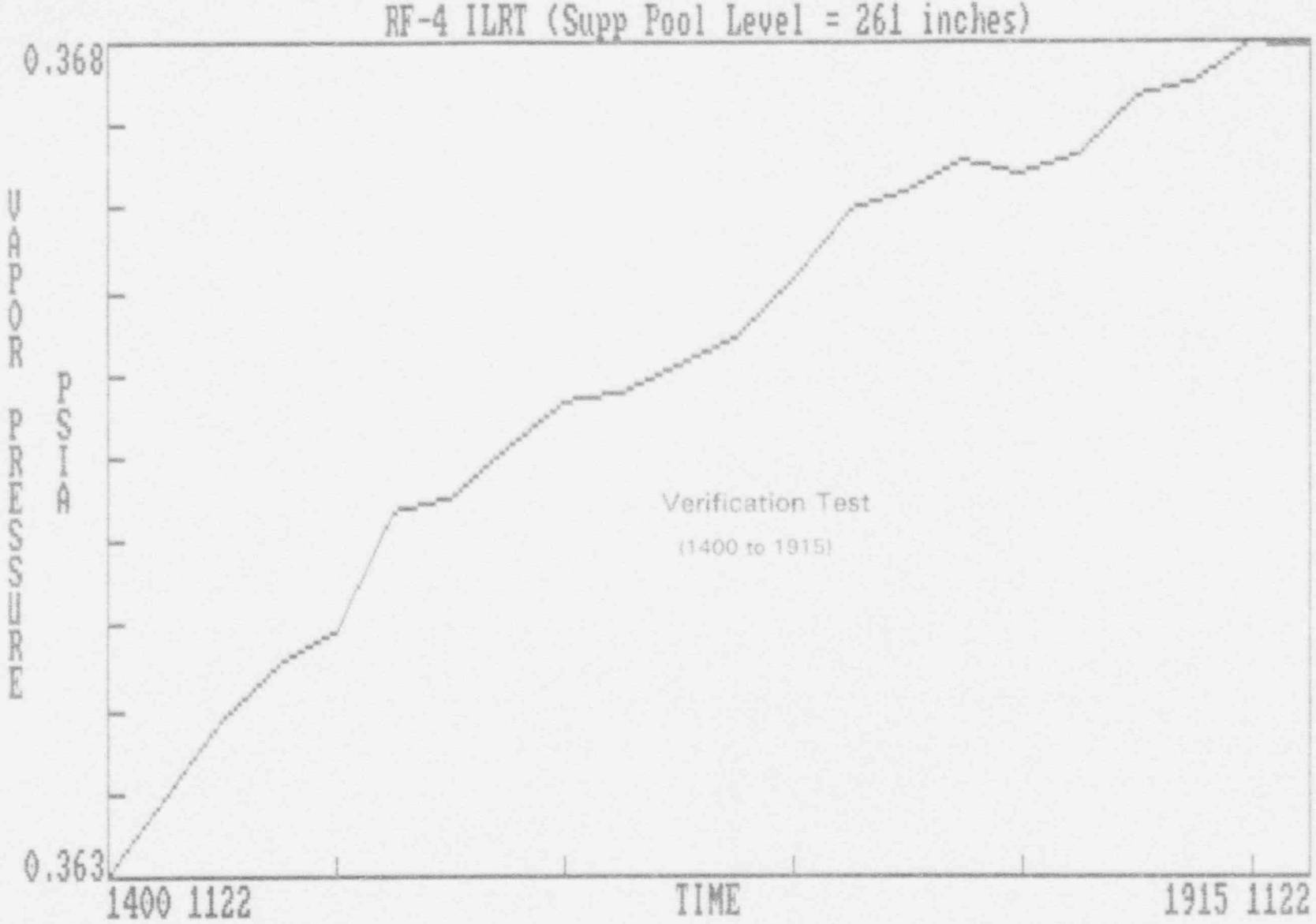

RF-4 ILRT (Supp Pool Level = 261 inches)
214216
213799
AIR MASS
LBM
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
1.000
0.300
MASS POINT RATE
%/DAY
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
1.000
0.300
TOTAL TIME RATE
%/DAY
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
74.750
74.350
TEMPERATURE
deg F
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
24.165
24.132
PRESSURE PSIA
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
0.368
0.363
VAPOR PRESSURE
PSIA
Verification Test
(1400 to 1915)
1400 1122
TIME
1915 1122

PLOTS - Data Rejection

- Data Rejection Report

RF-4 ILRT (Supp Pool Level = 261 inches)

DATA REJECTION REPORT

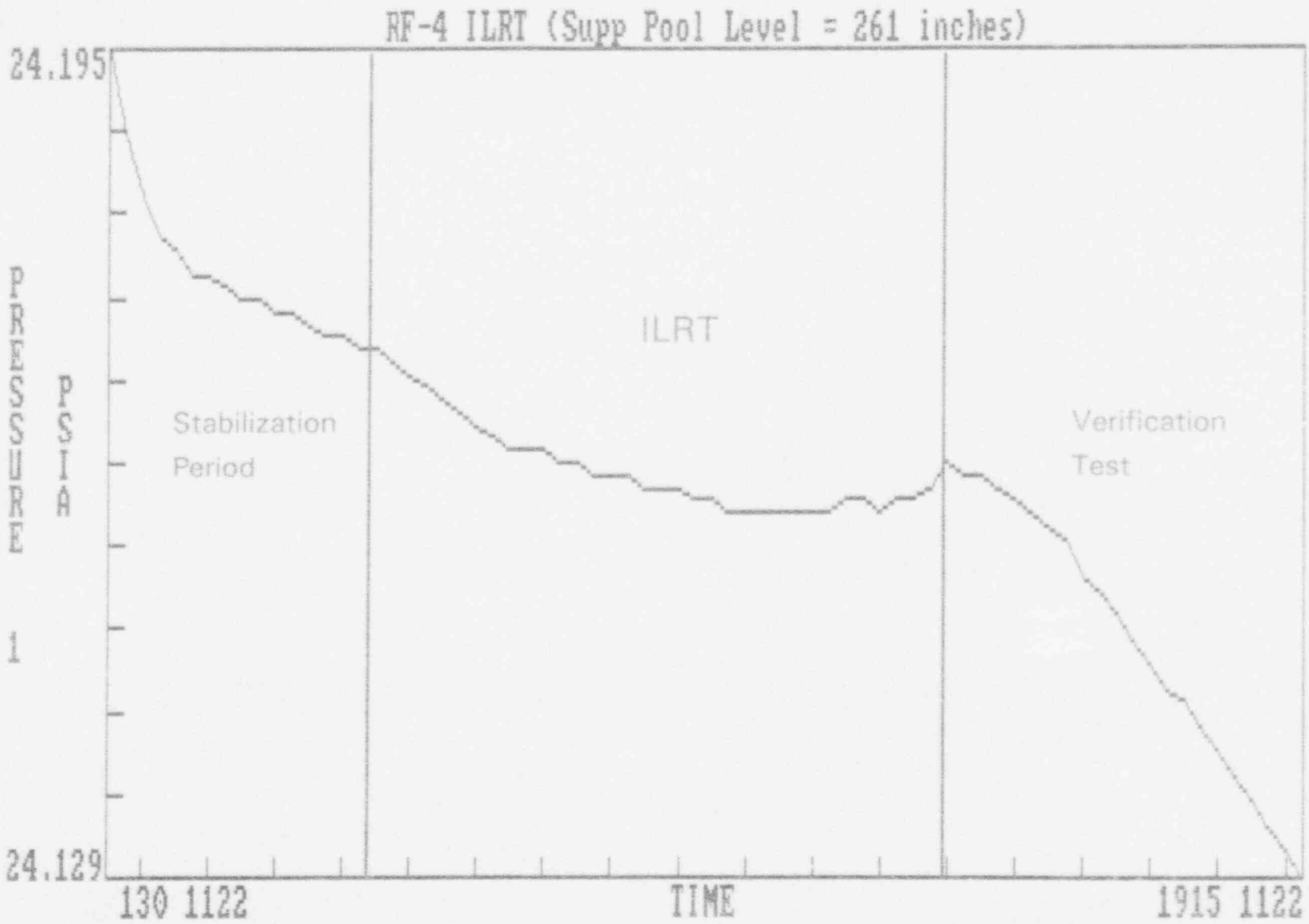
** data points rejectable at 1% rejection level
,i.e., standardized residual >= 3.34

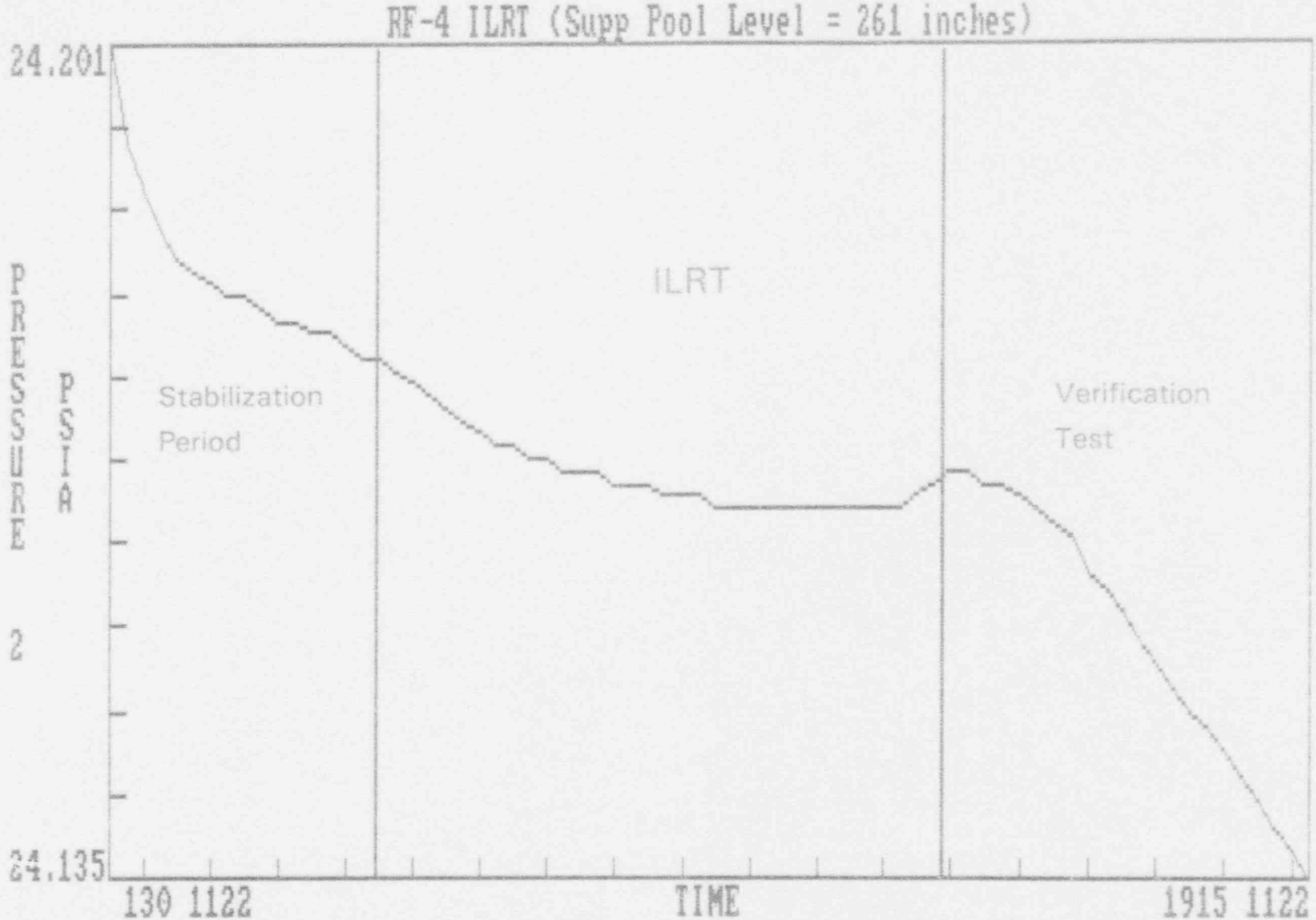
* data points rejectable at 5% rejection level
,i.e., standardized residual >= 3.02

ata set	time	date	air mass	linear least square fit	residual from least square fit	standand error of residual	standardized residual
17	530	1122	214260.65	214254.16	6.50	7.88	0.82
18	545	1122	214253.66	214252.53	1.13	7.92	0.14
19	600	1122	214254.22	214250.90	3.32	7.96	0.42
20	615	1122	214256.64	214249.28	7.37	7.99	0.92
21	630	1122	214253.57	214247.65	5.92	8.03	0.74
22	645	1122	214254.01	214246.02	7.99	8.06	0.99
23	700	1122	214252.94	214244.40	8.54	8.08	1.06
24	715	1122	214246.26	214242.77	3.49	8.11	0.43
25	730	1122	214251.80	214241.14	10.66	8.13	1.31
26	745	1122	214240.69	214239.51	1.17	8.15	0.14
27	800	1122	214240.14	214237.89	2.25	8.17	0.28
28	815	1122	214235.12	214236.26	-1.14	8.19	-0.14
29	830	1122	214229.01	214234.63	-5.62	8.20	-0.69
30	845	1122	214228.87	214233.01	-4.14	8.21	-0.50
31	900	1122	214221.55	214231.38	-9.83	8.22	-1.20
32	915	1122	214221.01	214229.75	-8.74	8.22	-1.06
33	930	1122	214221.64	214228.13	-6.49	8.23	-0.79
34	945	1122	214215.51	214226.50	-10.99	8.23	-1.34
35	1000	1122	214215.43	214224.87	-9.44	8.23	-1.15
36	1015	1122	214206.89	214223.25	-16.35	8.22	-1.99
37	1030	1122	214209.21	214221.62	-12.41	8.22	-1.51
38	1045	1122	214212.06	214219.99	-7.94	8.21	-0.97
39	1100	1122	214211.10	214218.37	-7.27	8.20	-0.89
40	1115	1122	214208.10	214216.74	-8.64	8.19	-1.06
41	1130	1122	214219.30	214215.11	4.18	8.17	0.51
42	1145	1122	214203.33	214213.49	-10.15	8.15	-1.25
43	1200	1122	214212.79	214211.86	0.93	8.13	0.11
44	1215	1122	214211.54	214210.23	1.31	8.11	0.16
45	1230	1122	214214.16	214208.60	5.55	8.08	0.69
46	1245	1122	214207.84	214206.98	0.87	8.06	0.11
47	1300	1122	214207.27	214205.35	1.92	8.03	0.24
48	1315	1122	214213.83	214203.72	10.11	7.99	1.26
49	1330	1122	214205.82	214202.10	3.72	7.96	0.47
50	1345	1122	214215.48	214200.47	15.01	7.92	1.90
51	1400	1122	214216.19	214198.84	17.35	7.88	2.20

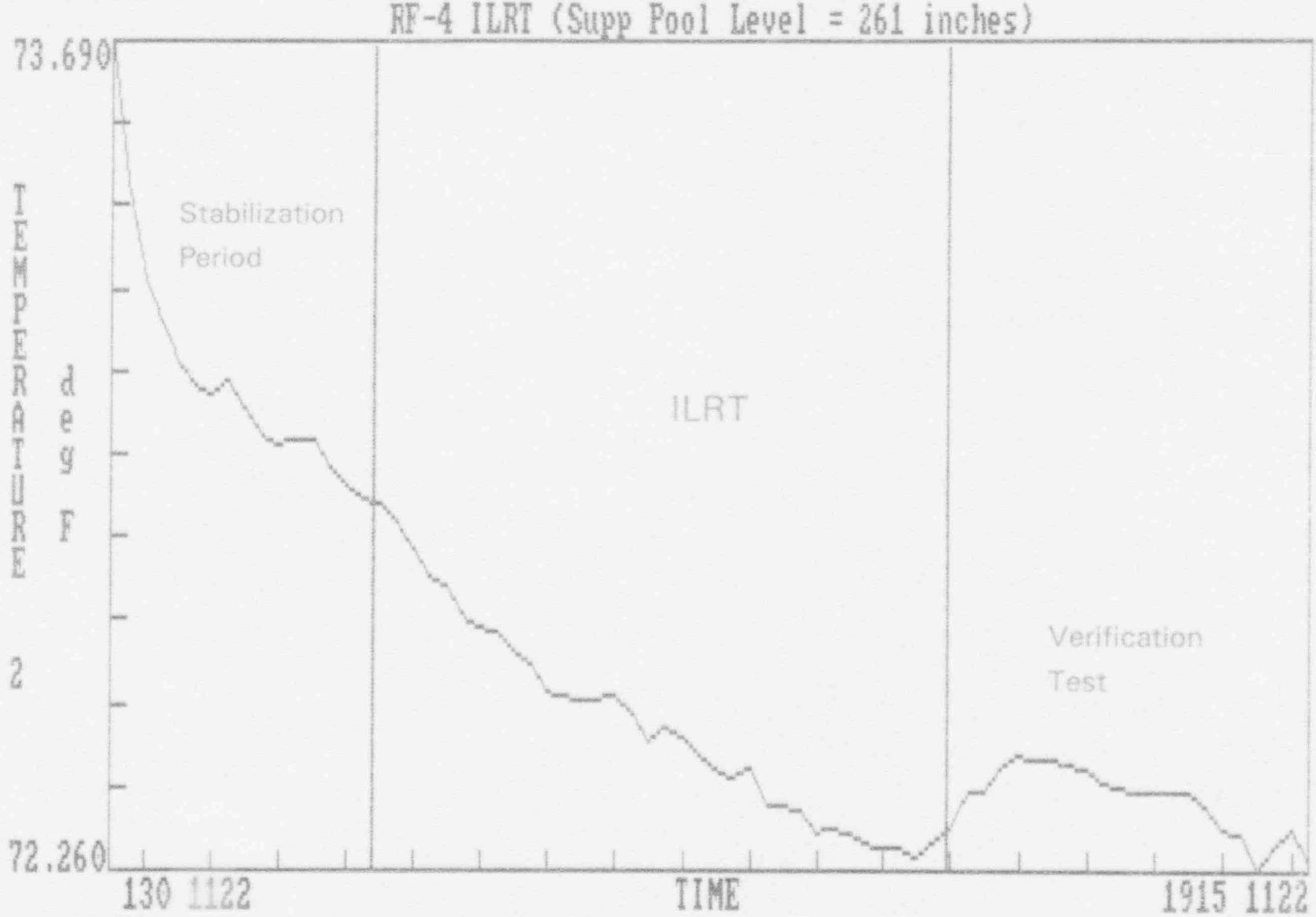
PLOTS - Individual Sensors

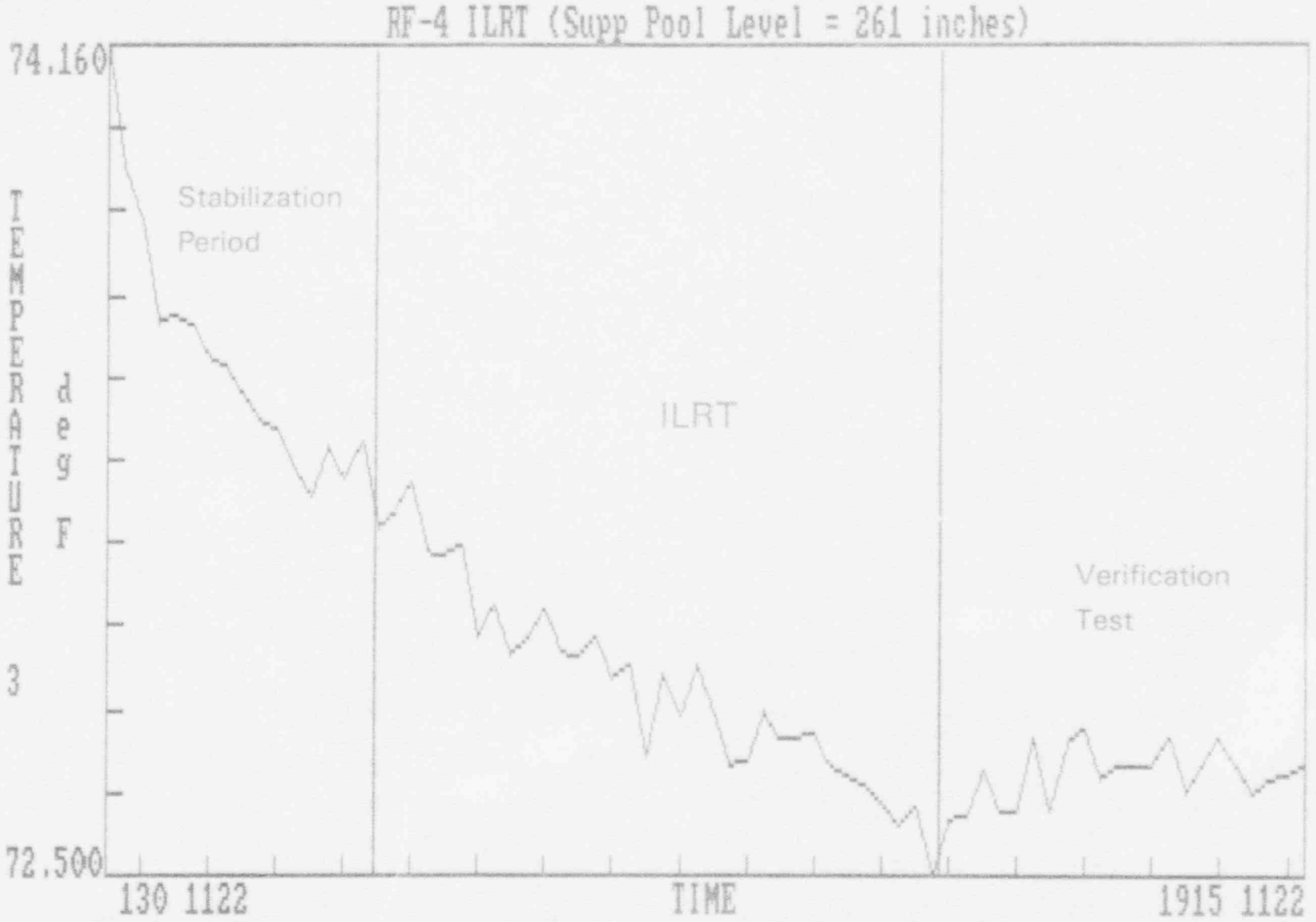
- Pressure Sensors 1 & 2
- RTDs 1 through 25
- Humidity Sensors 1 through 9

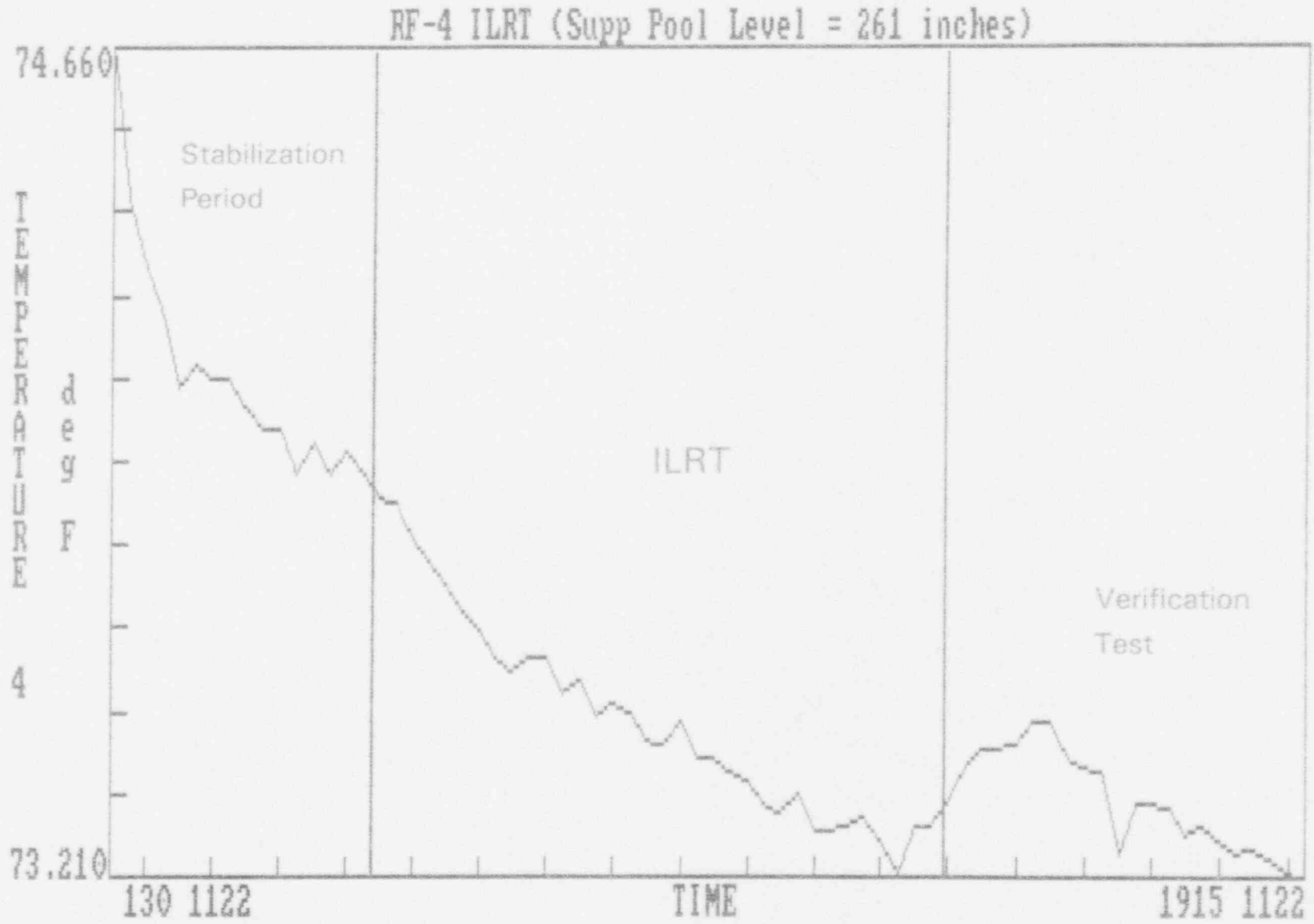

RF-4 ILRT (Supp Pool Level = 261 inches)
24.195
24.129
PRESSURE
PSIA
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

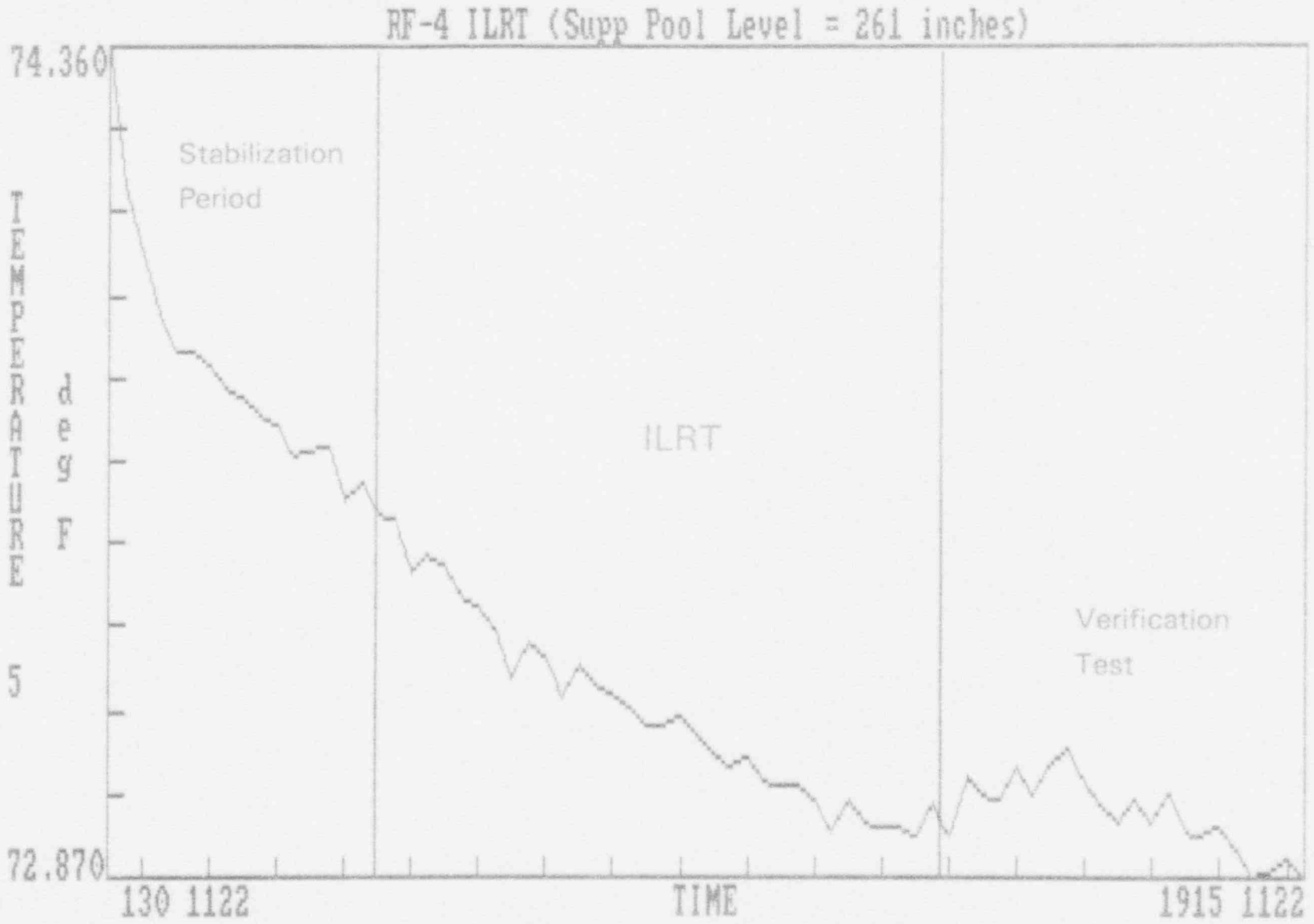

RF-4 ILRT (Supp Pool Level = 261 inches)
24.201
24.135
PRESSURE
PSIA
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

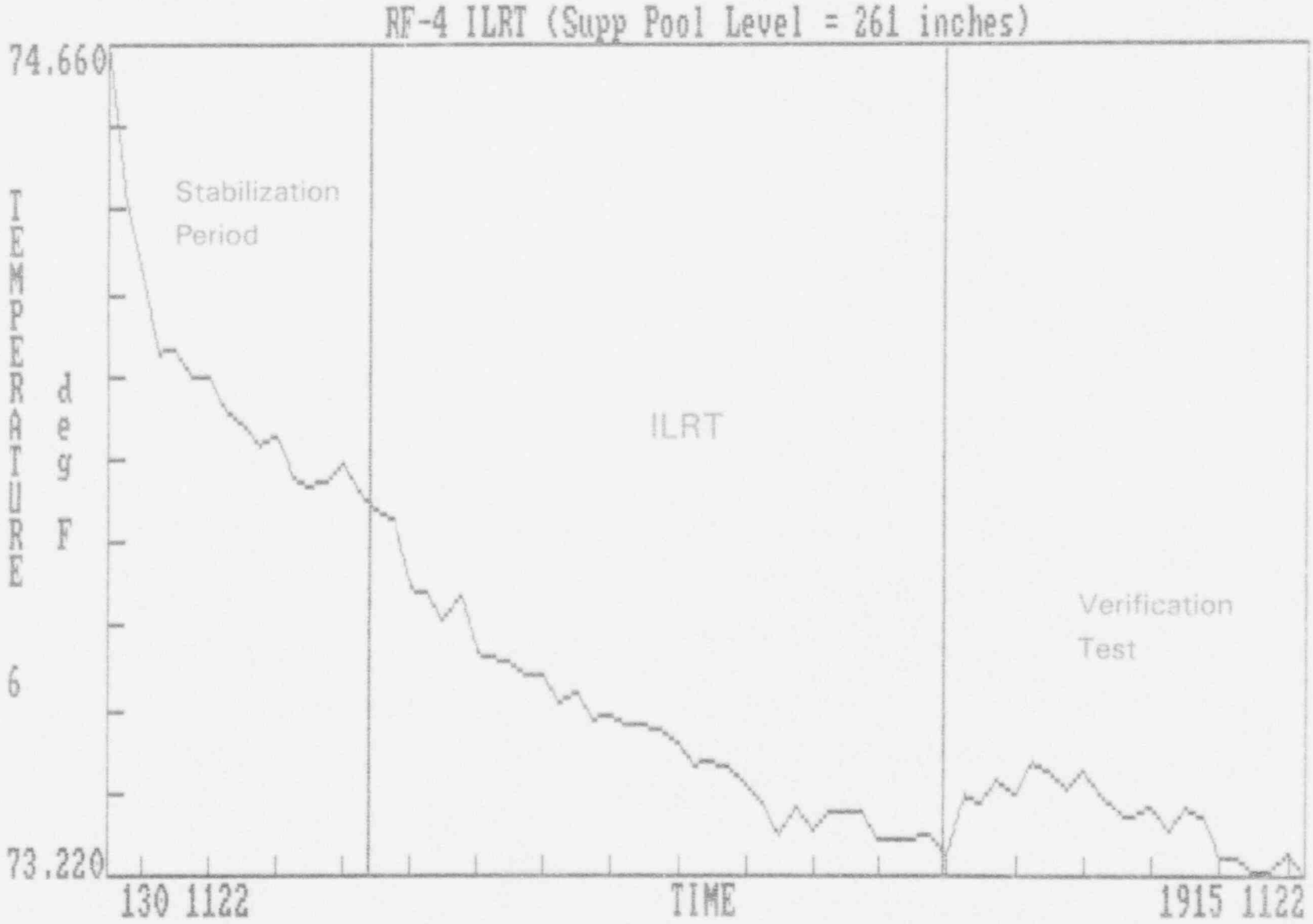

RF-4 ILRT (Supp Pool Level = 261 inches)
74.070
72.620
TEMPERATURE
deg F
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

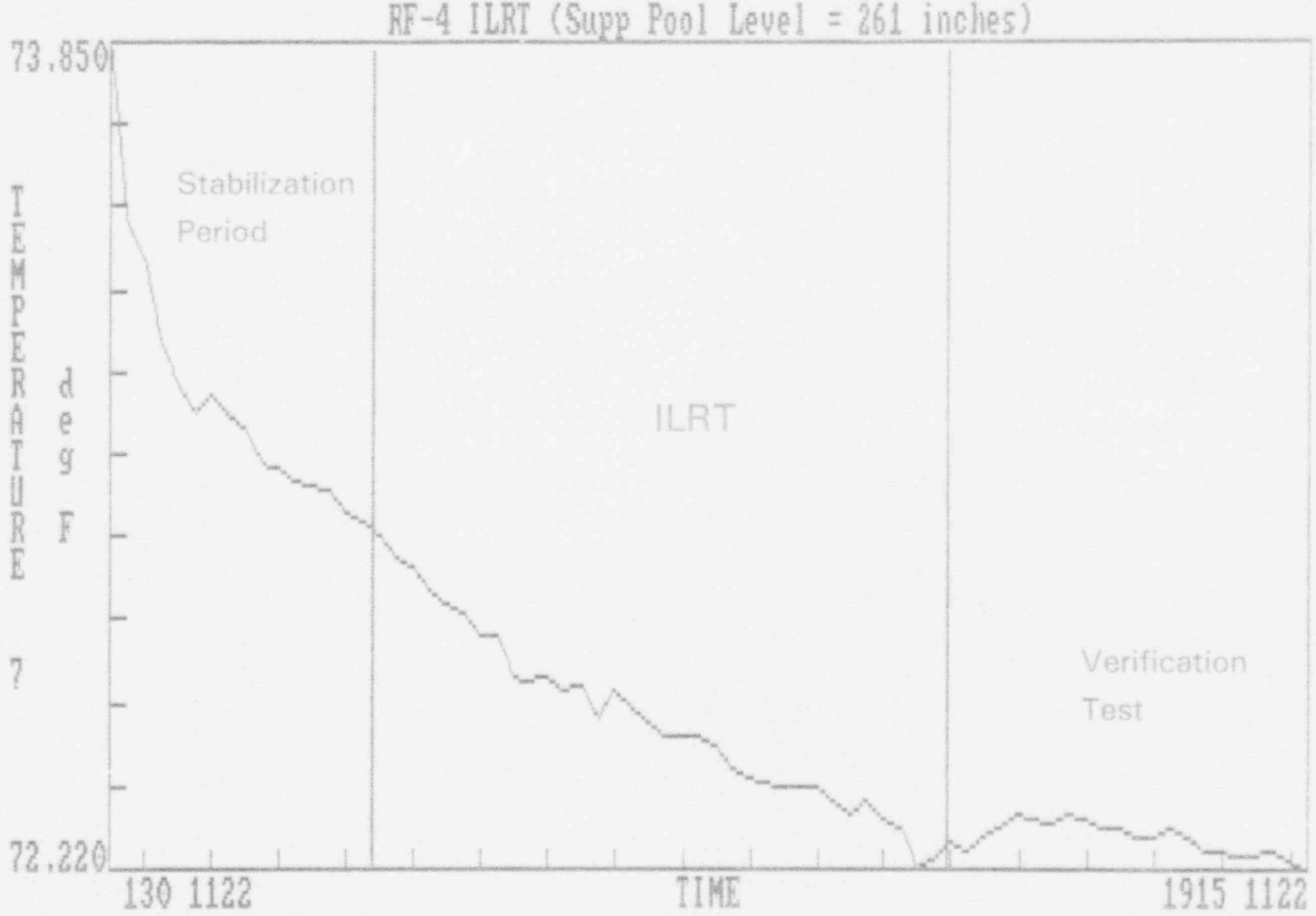

RF-4 ILRT (Supp Pool Level = 261 inches)
73.690
72.260
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

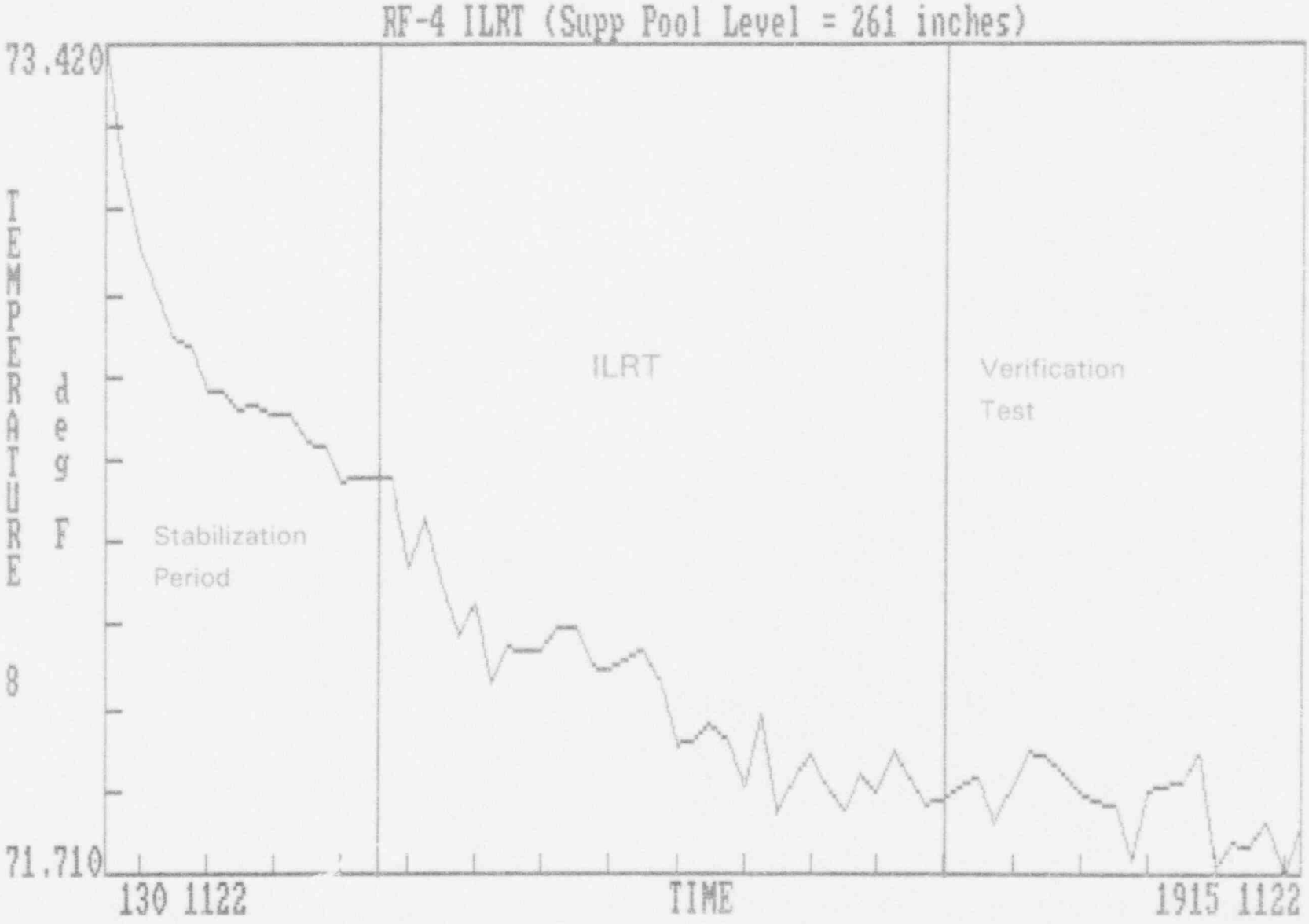

RF-4 ILRT (Supp Pool Level = 261 inches)
74.160
72.500
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

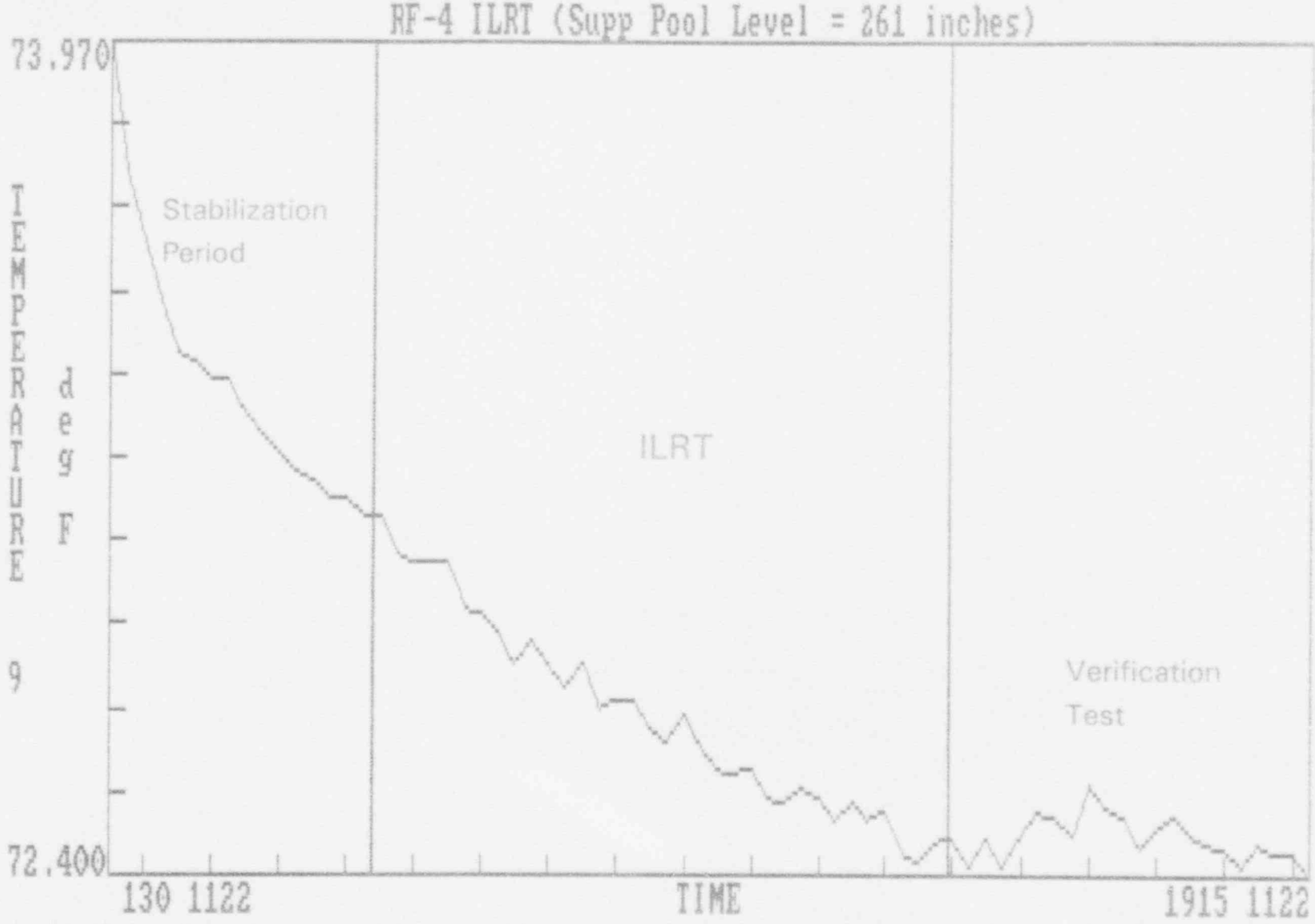

RF-4 ILRT (Supp Pool Level = 261 inches)
74.660
73.210
TEMPERATURE deg F
4
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

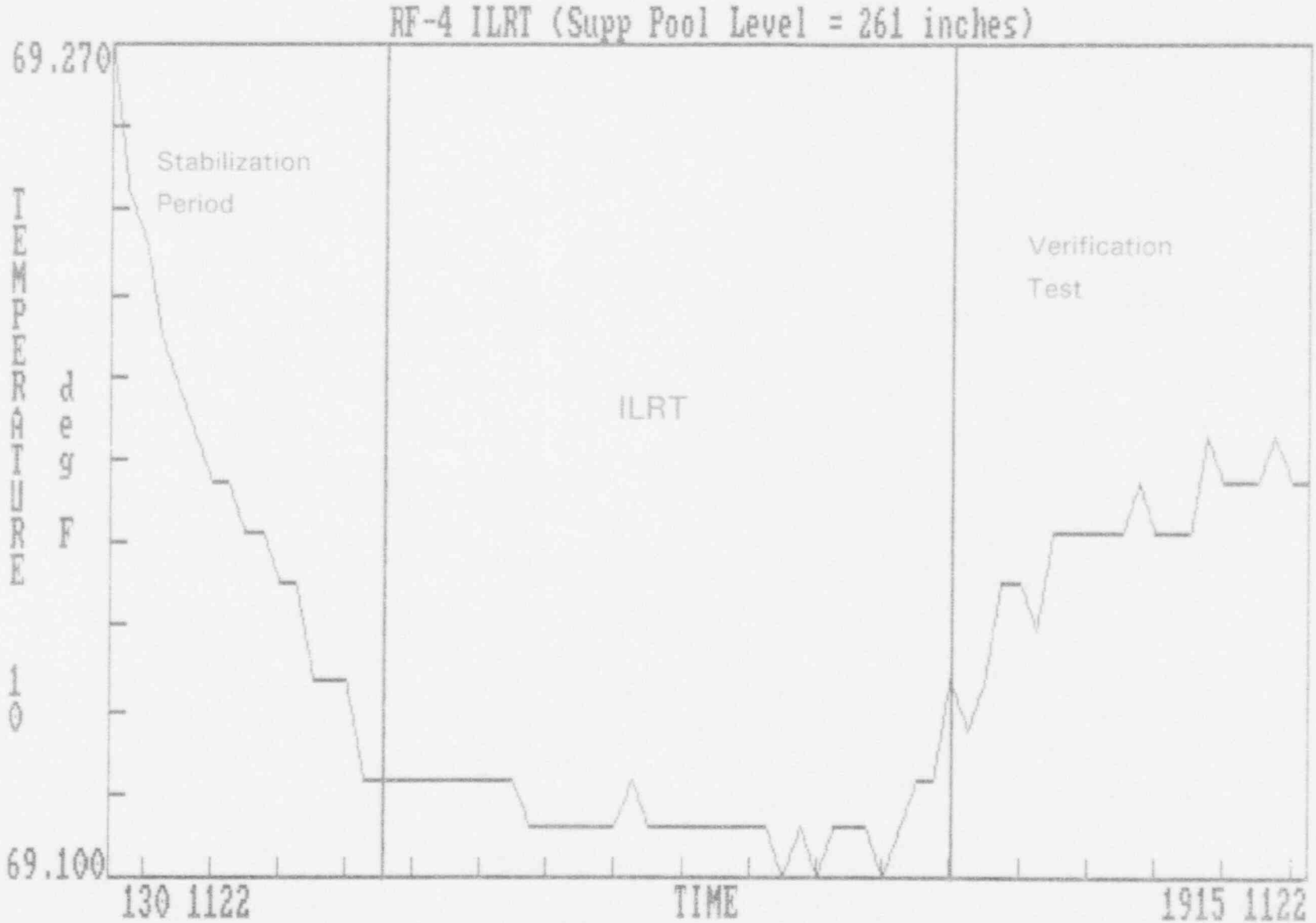

RF-4 ILRT (Supp Pool Level = 261 inches)
74.360
72.870
TEMPERATURE deg F
5
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

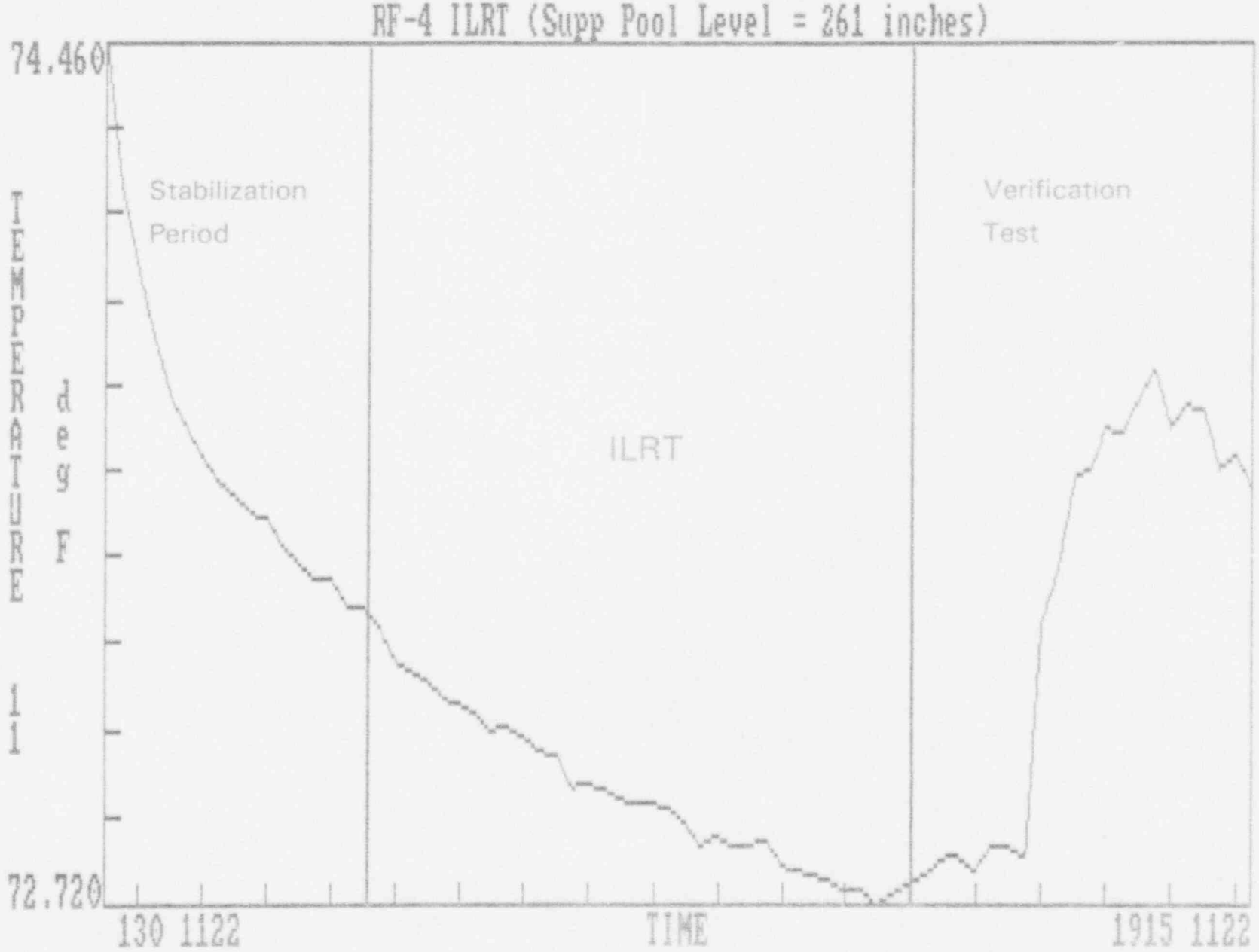

RF-4 ILRT (Supp Pool Level = 261 inches)
74.660
73.220
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

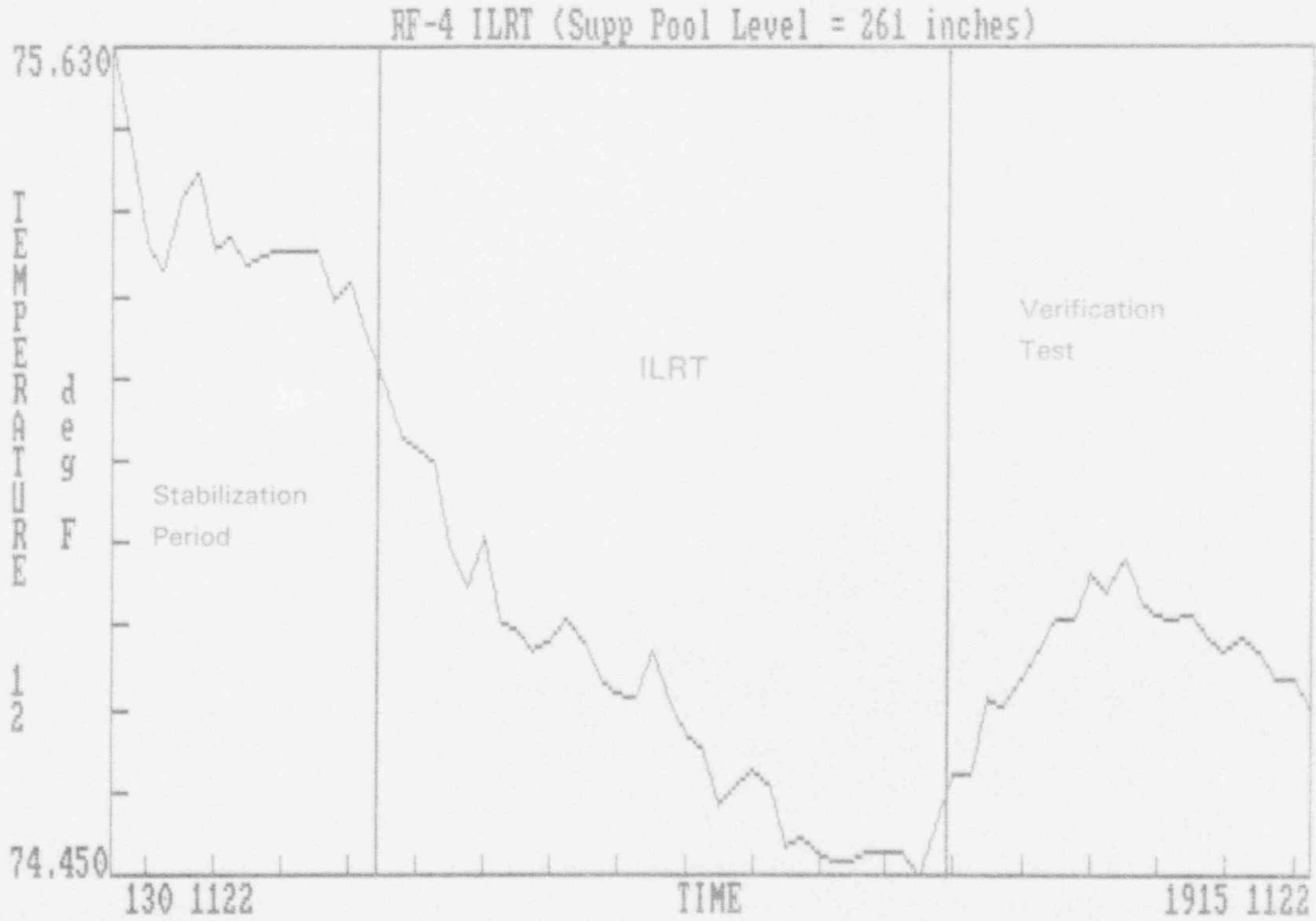

RF-4 ILRT (Supp Pool Level = 261 inches)
73.850
72.220
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

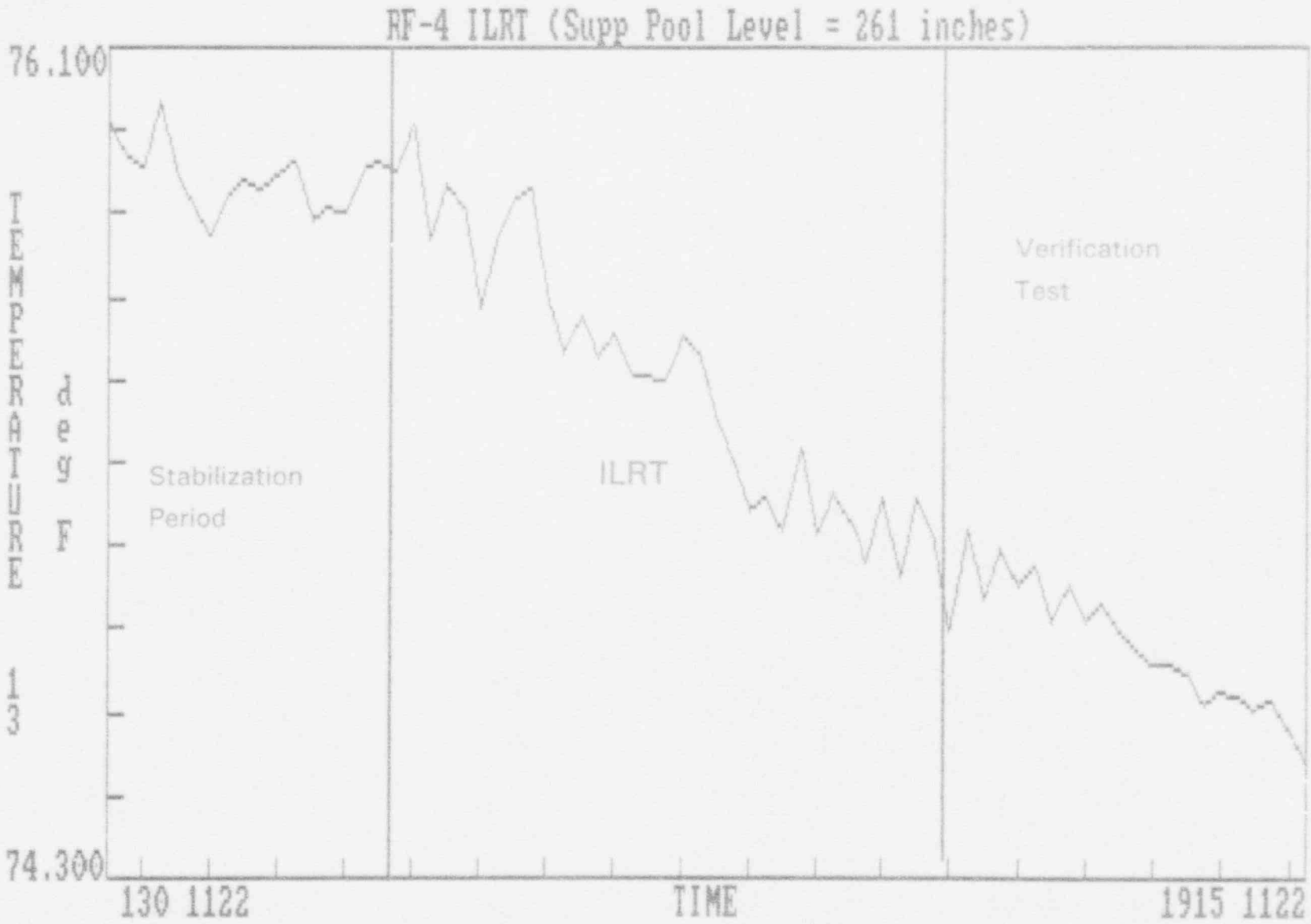

RF-4 ILRT (Supp Pool Level = 261 inches)
73.420
TEMPERATURE
deg F
8
71.710
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

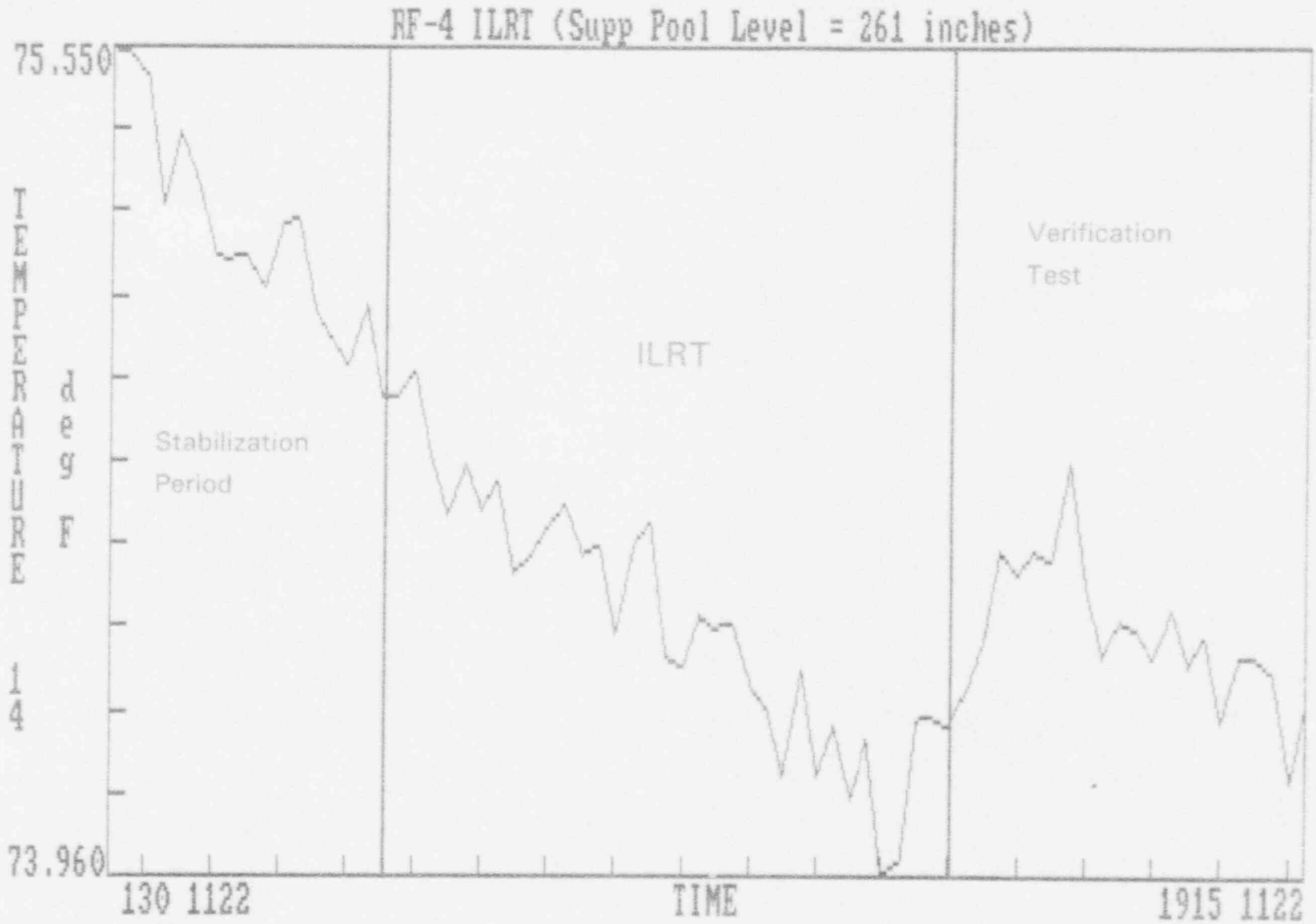

RF-4 ILRT (Supp Pool Level = 261 inches)
73.970
72.400
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

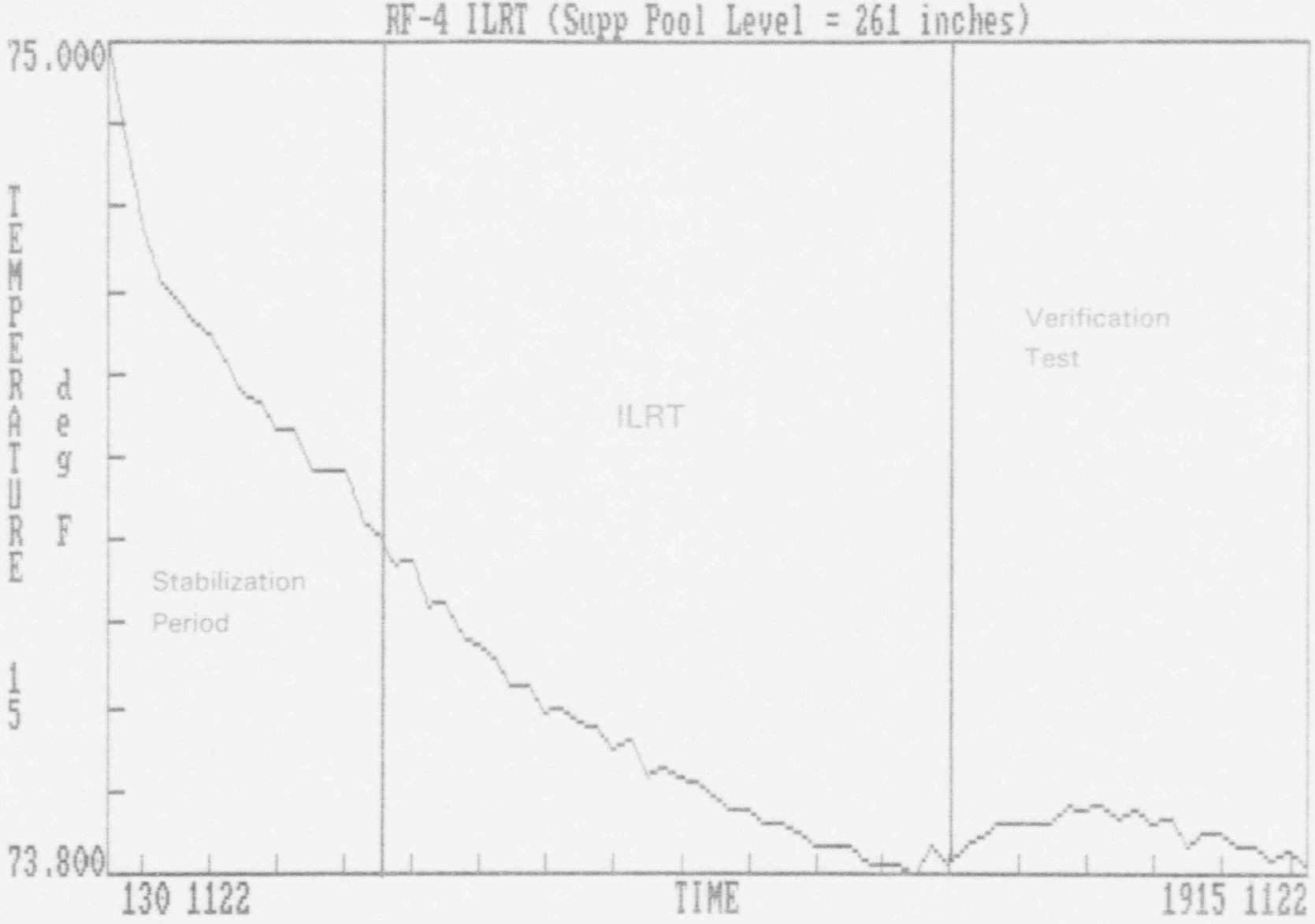

RF-4 ILRT (Supp Pool Level = 261 inches)
69.270
69.100
TEMPERATURE deg F
10
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

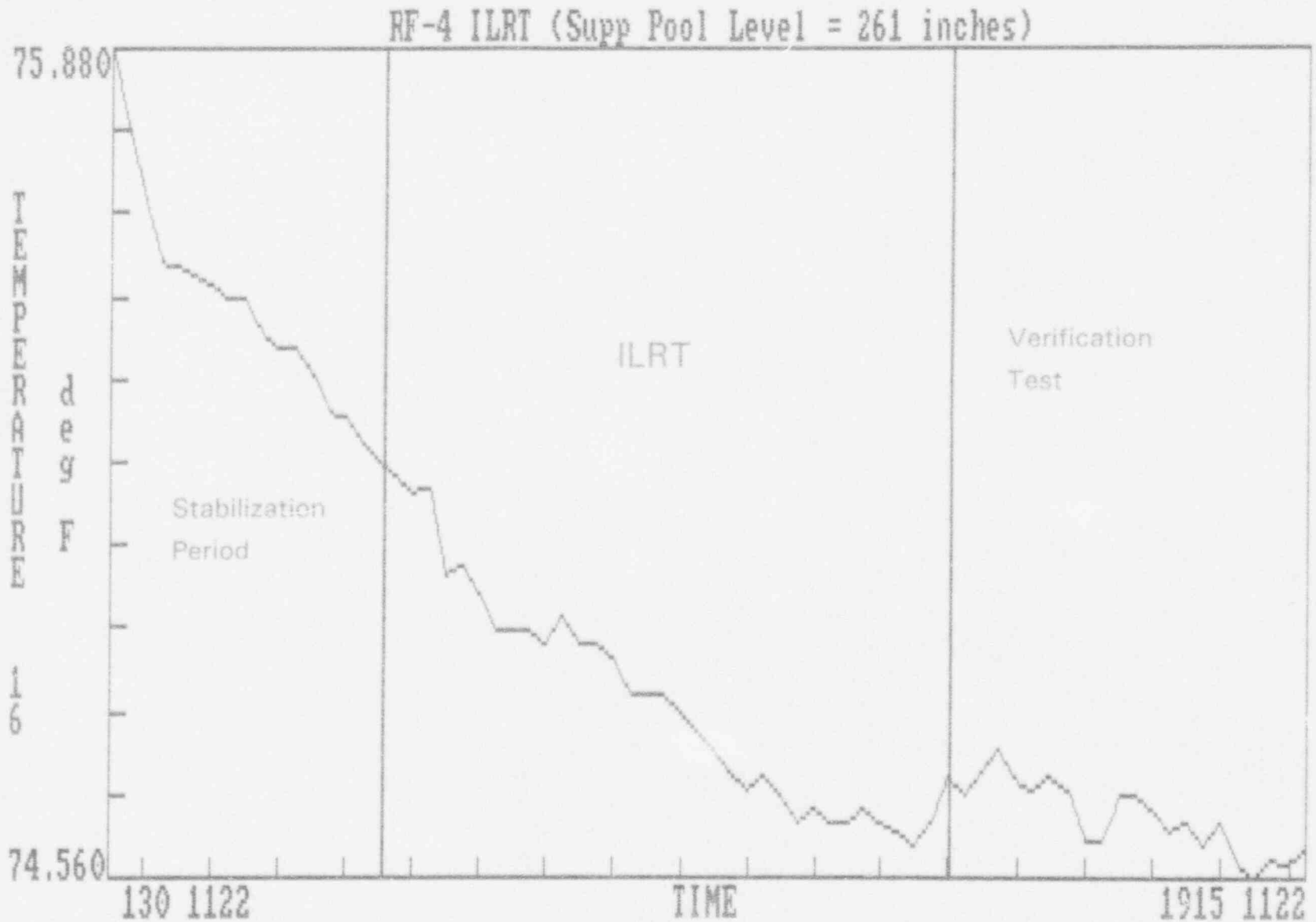

RF-4 ILRT (Supp Pool Level = 261 inches)
74.460
72.720
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

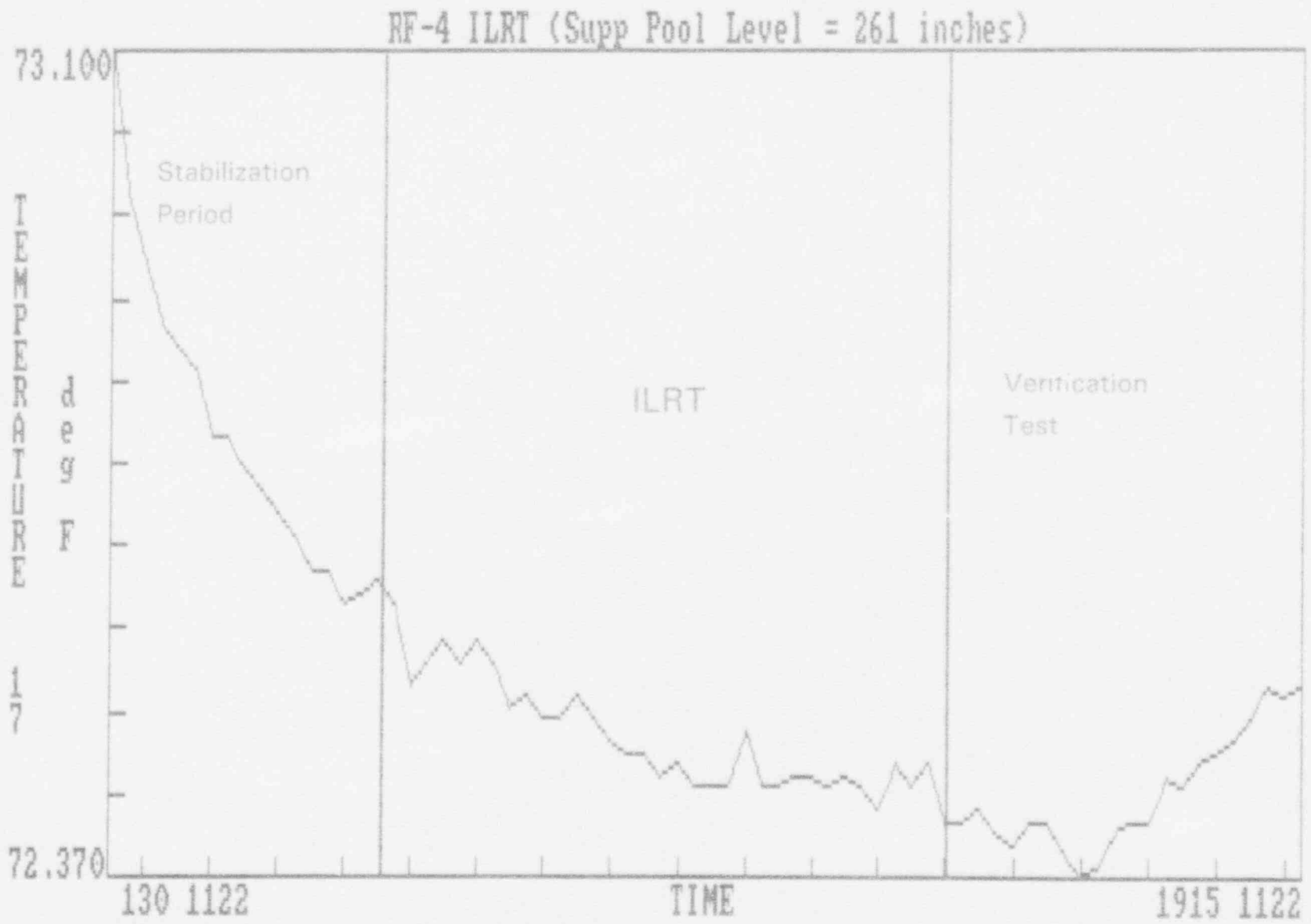

RF-4 ILRT (Supp Pool Level = 261 inches)
75.630
74.450
TEMPERATURE - deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

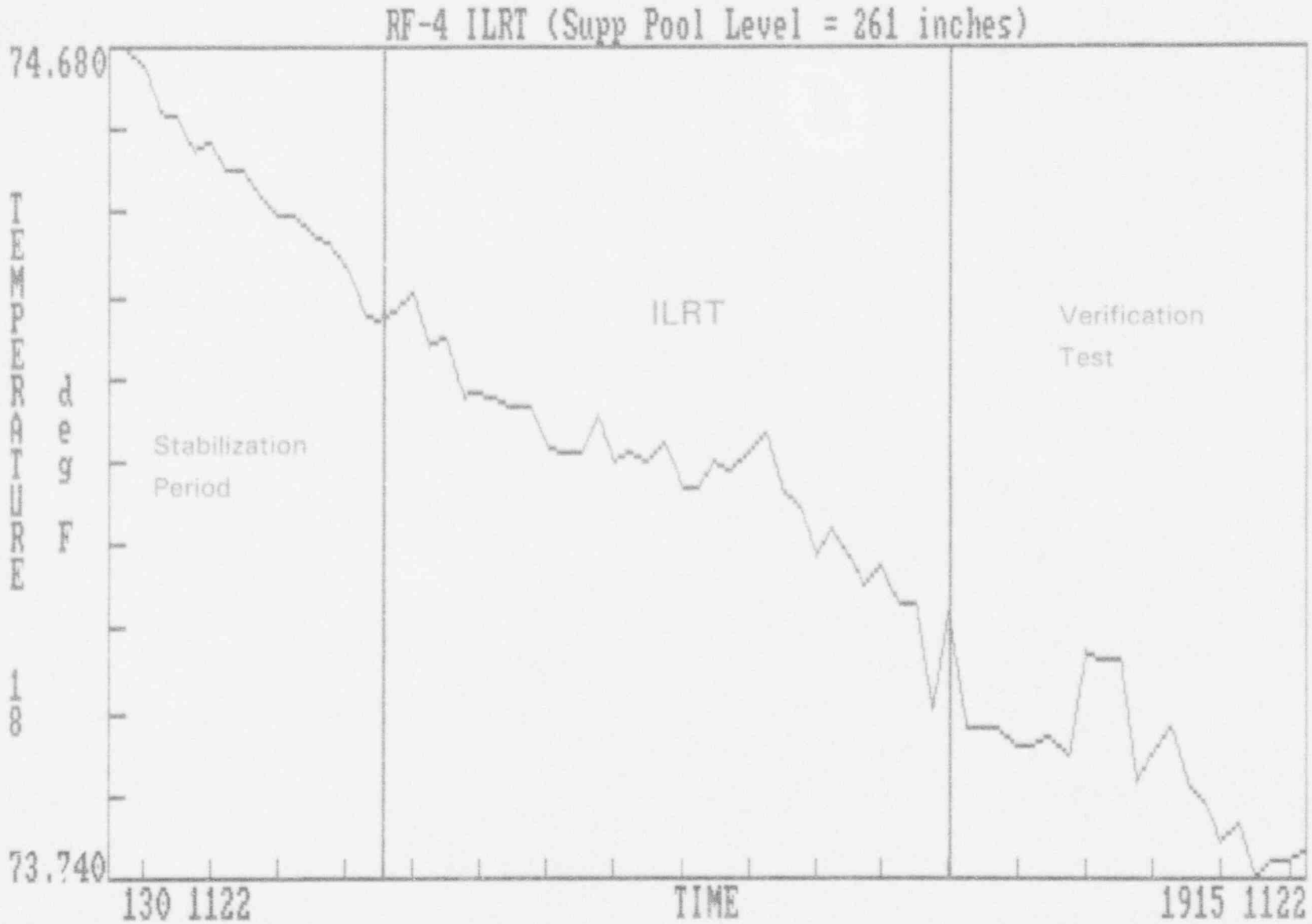

RF-4 ILRT (Supp Pool Level = 261 inches)
76.100
74.300
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

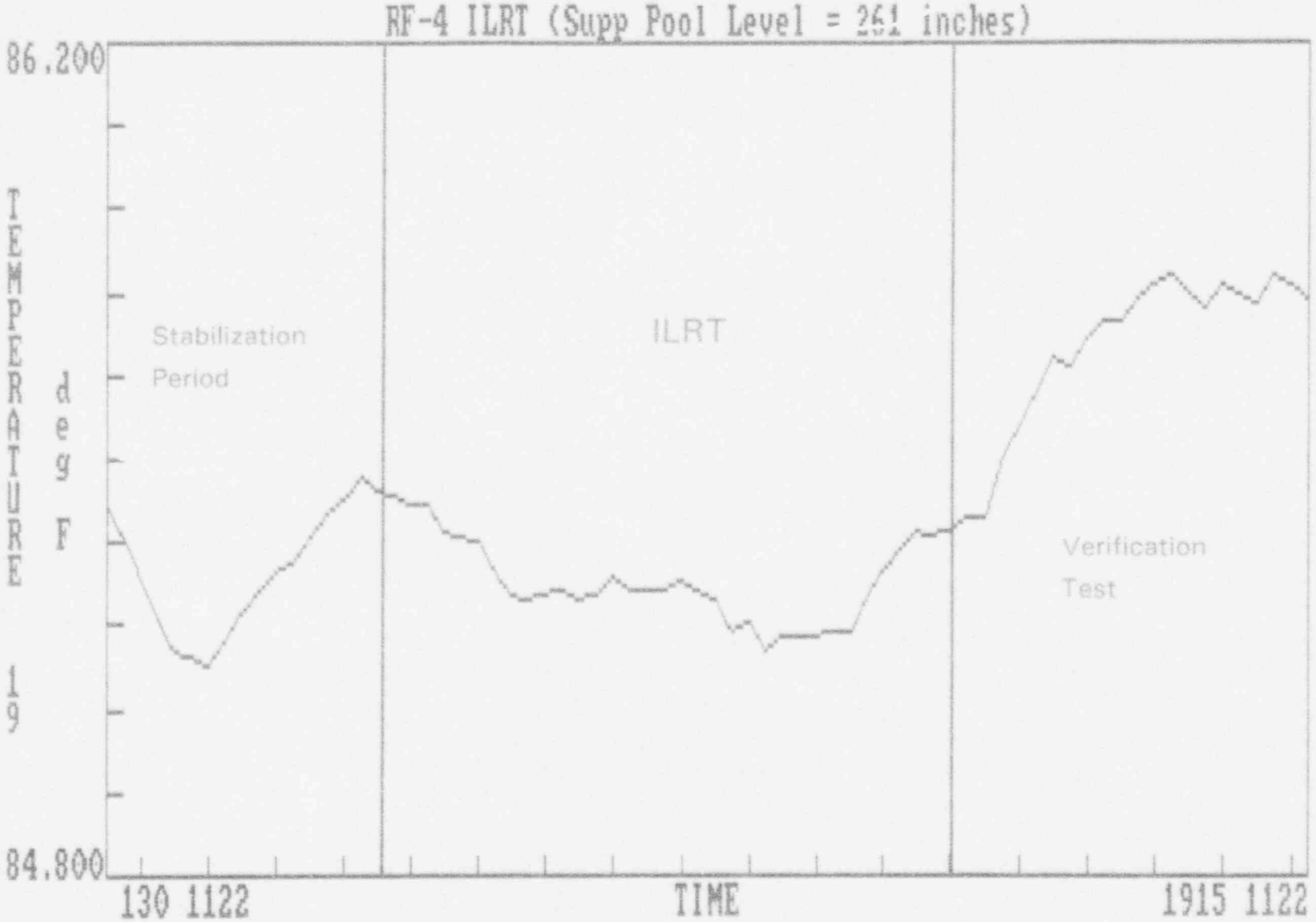

RF-4 ILRT (Supp Pool Level = 261 inches)
75.550
TEMPERATURE deg F
14
73.960
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

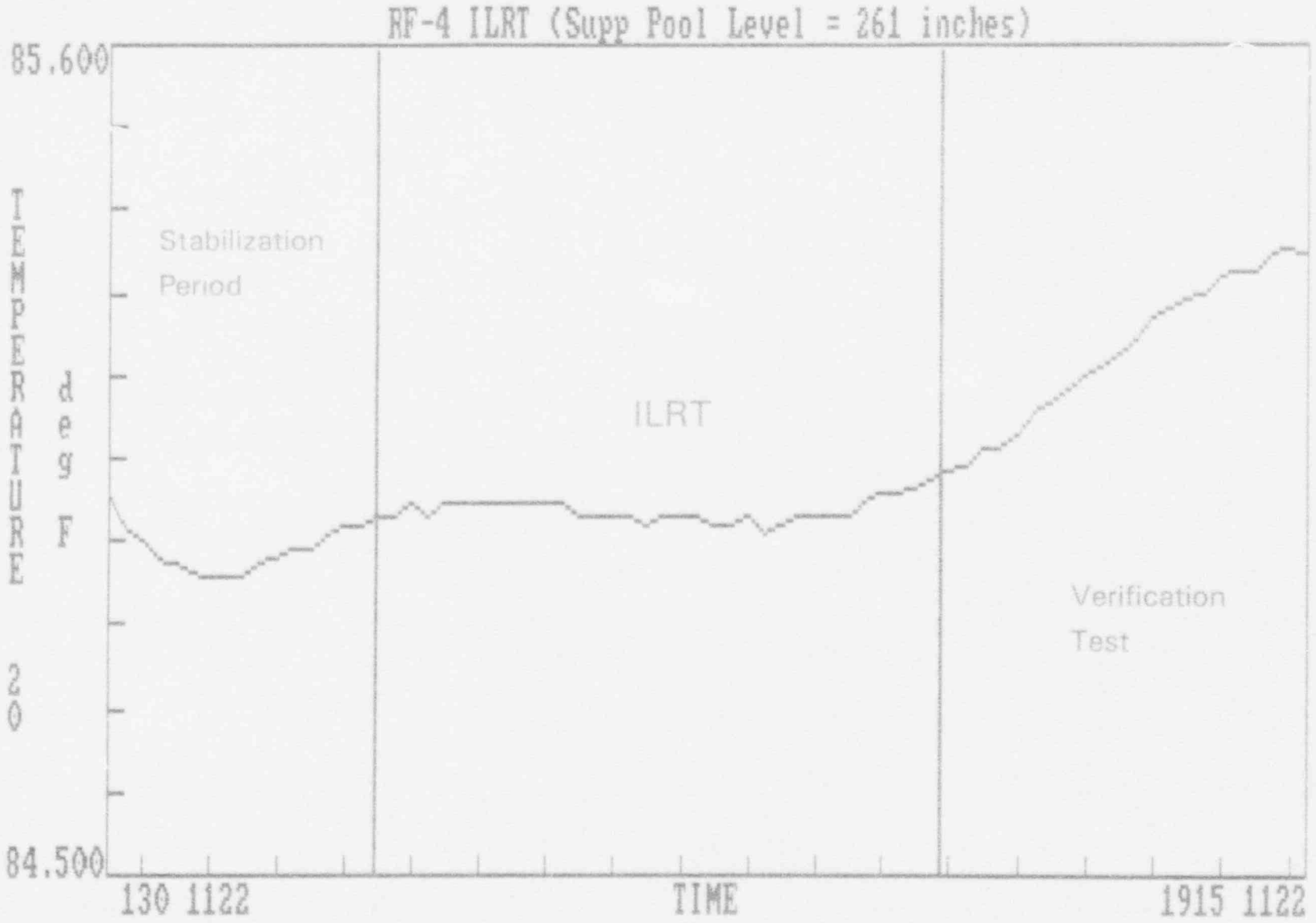

RF-4 ILRT (Supp Pool Level = 261 inches)
75.000
73.800
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

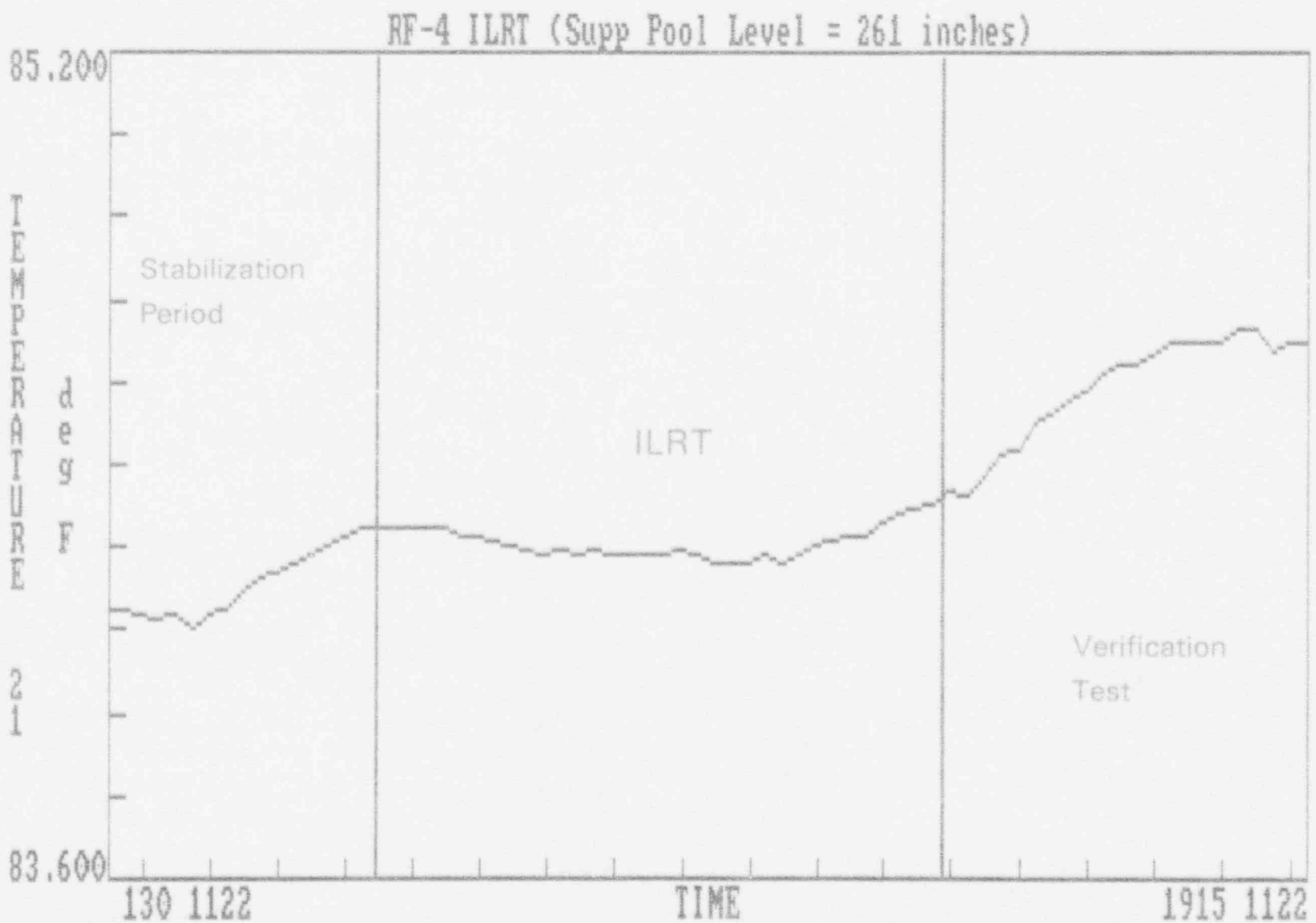

RF-4 ILRT (Supp Pool Level = 261 inches)
75.880
74.560
TEMPERATURE deg F
16
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

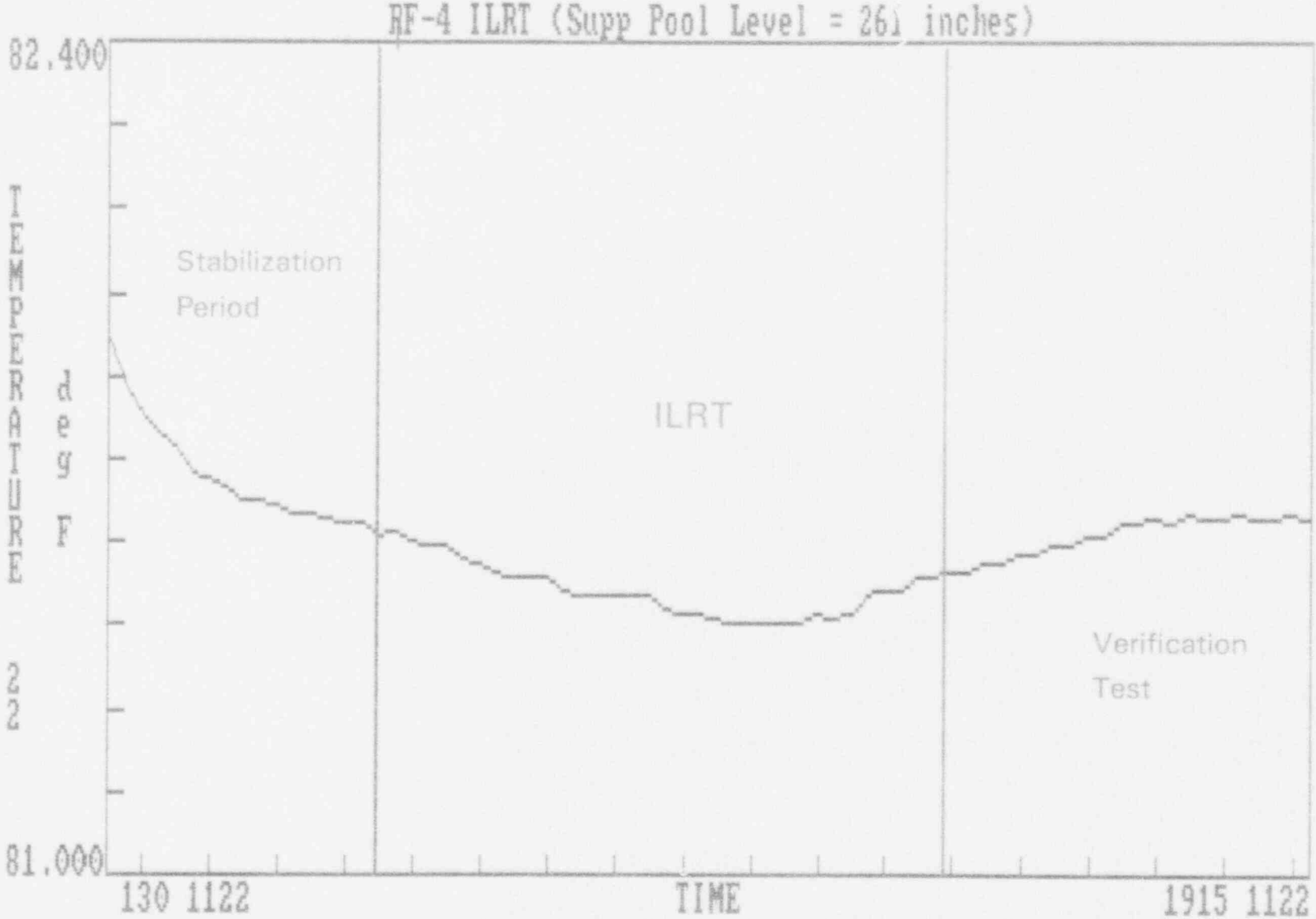

RF-4 ILRT (Supp Pool Level = 261 inches)
73.100
72.370
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

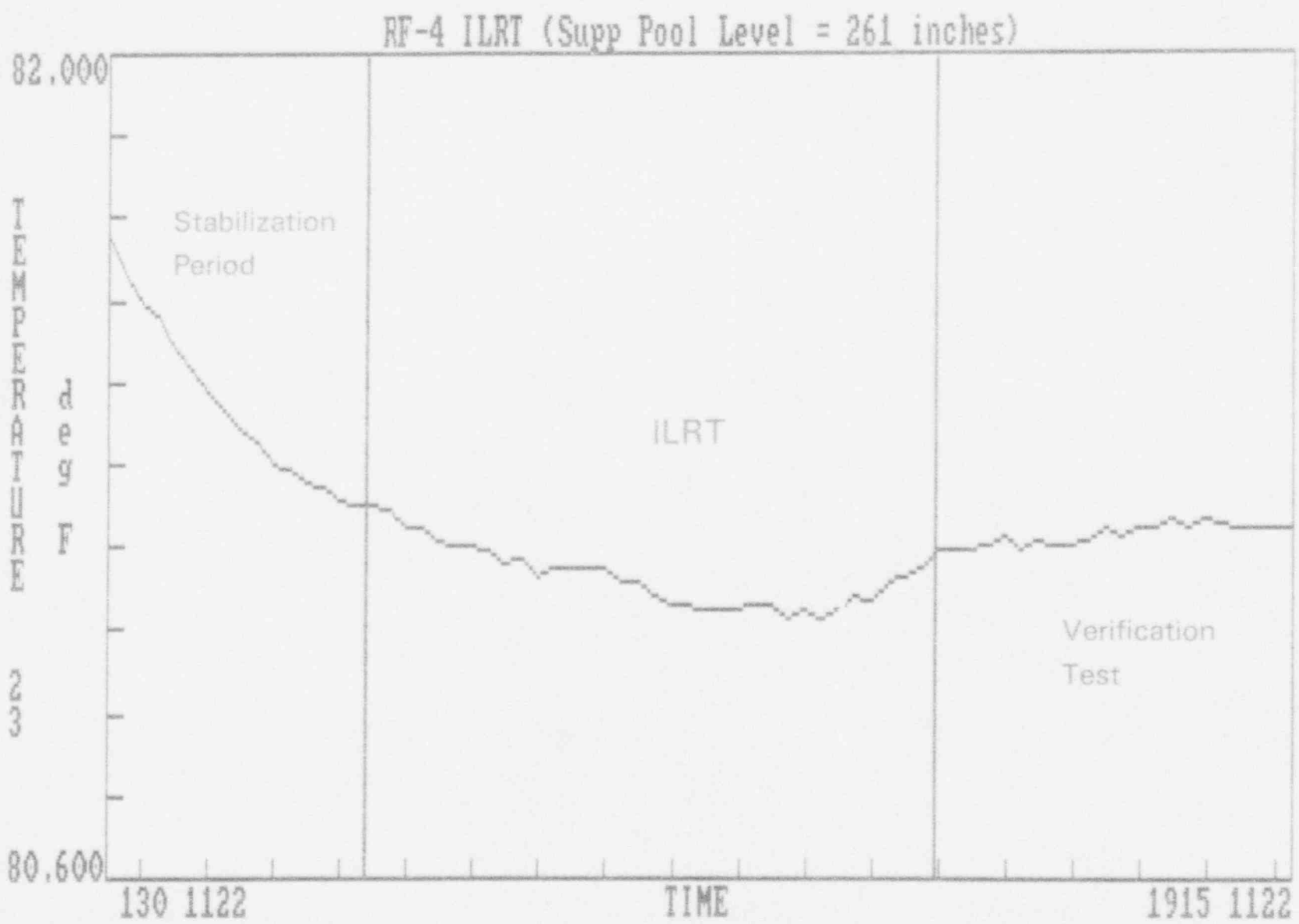

RF-4 ILRT (Supp Pool Level = 261 inches)
74.680
73.740
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

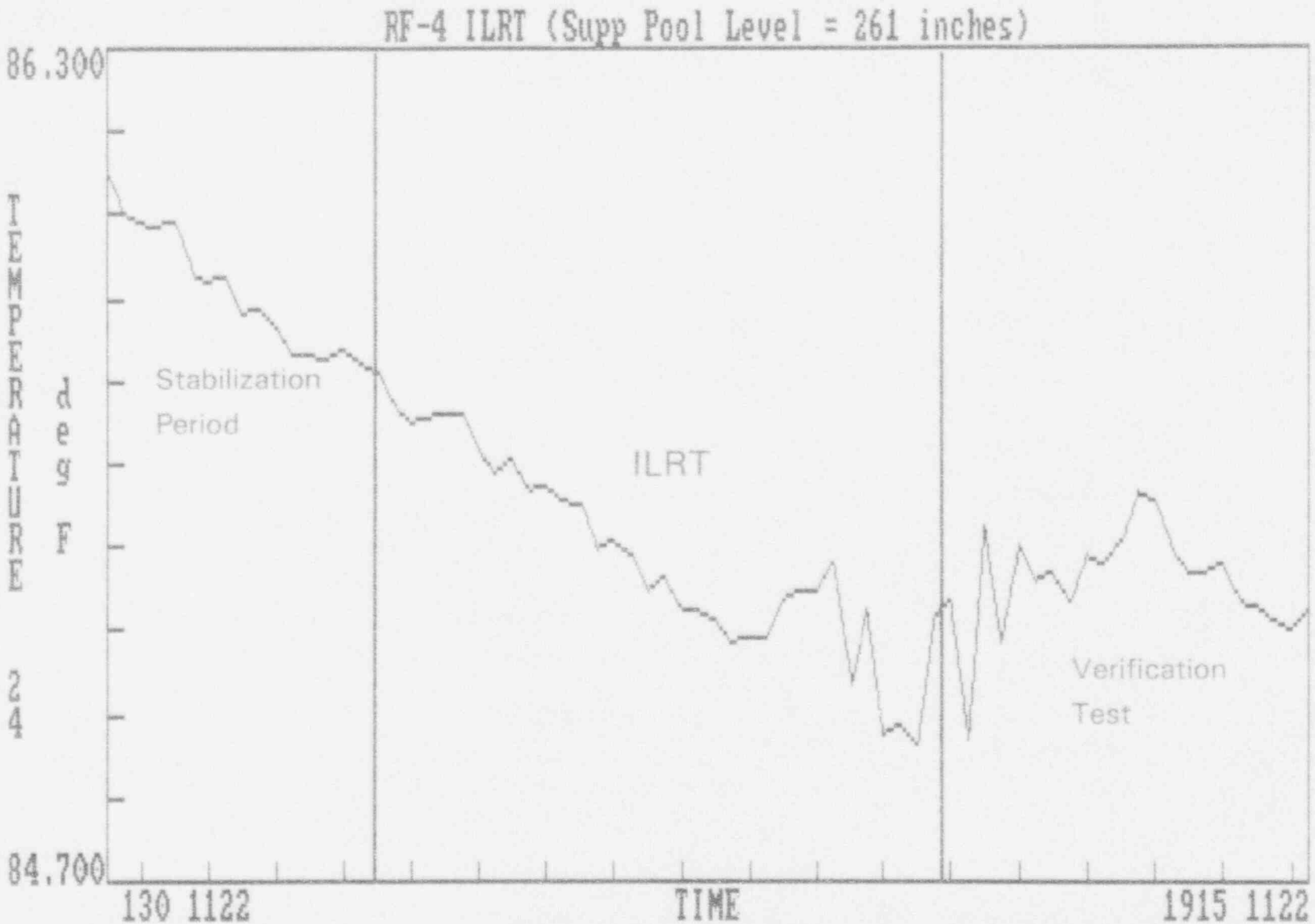

RF-4 ILRT (Supp Pool Level = 261 inches)
86.200
84.800
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
85.600
84.500
TEMPERATURE
deg F
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

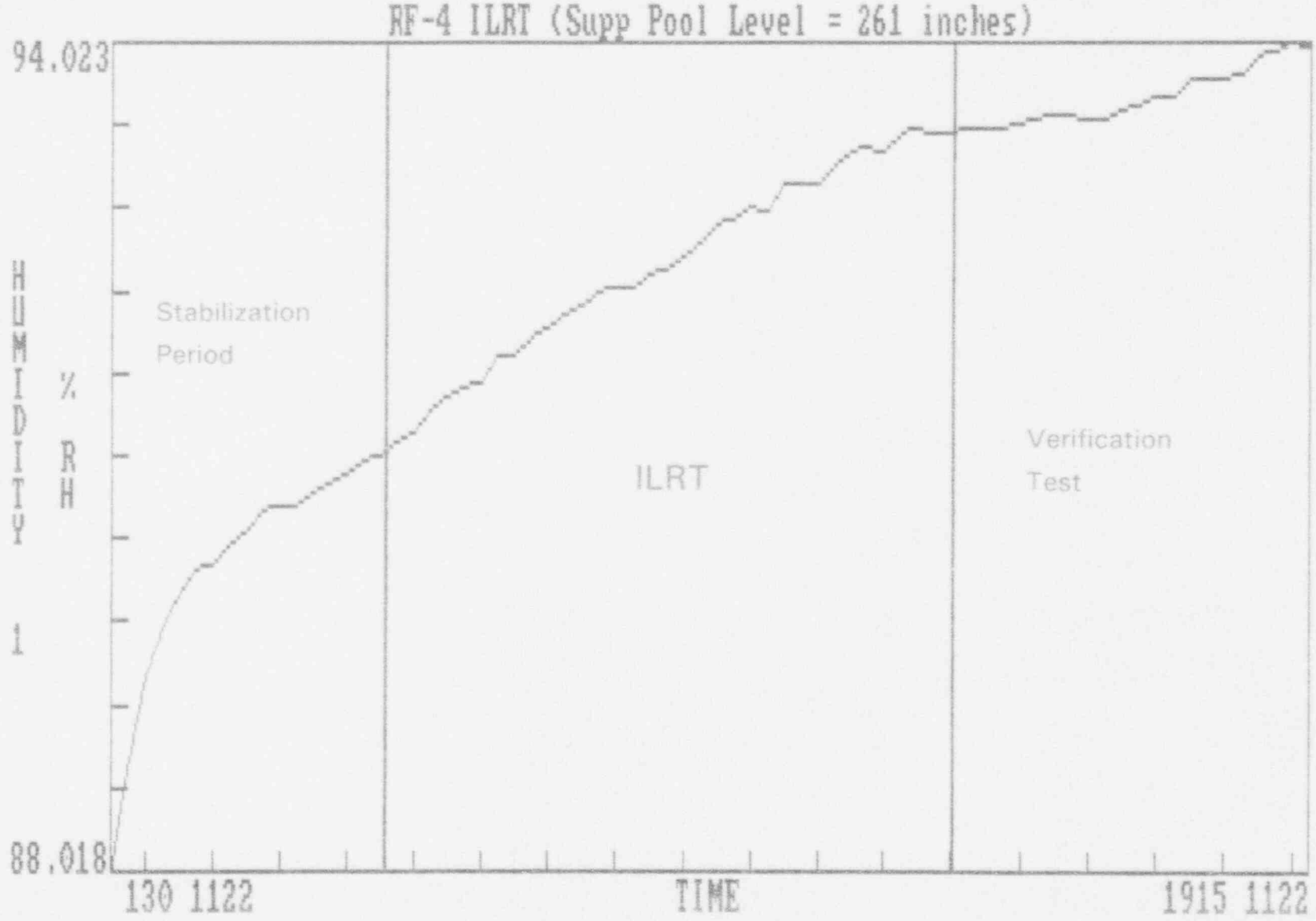

RF-4 ILRT (Supp Pool Level = 261 inches)
85.200
83.600
TEMPERATURE
deg F
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

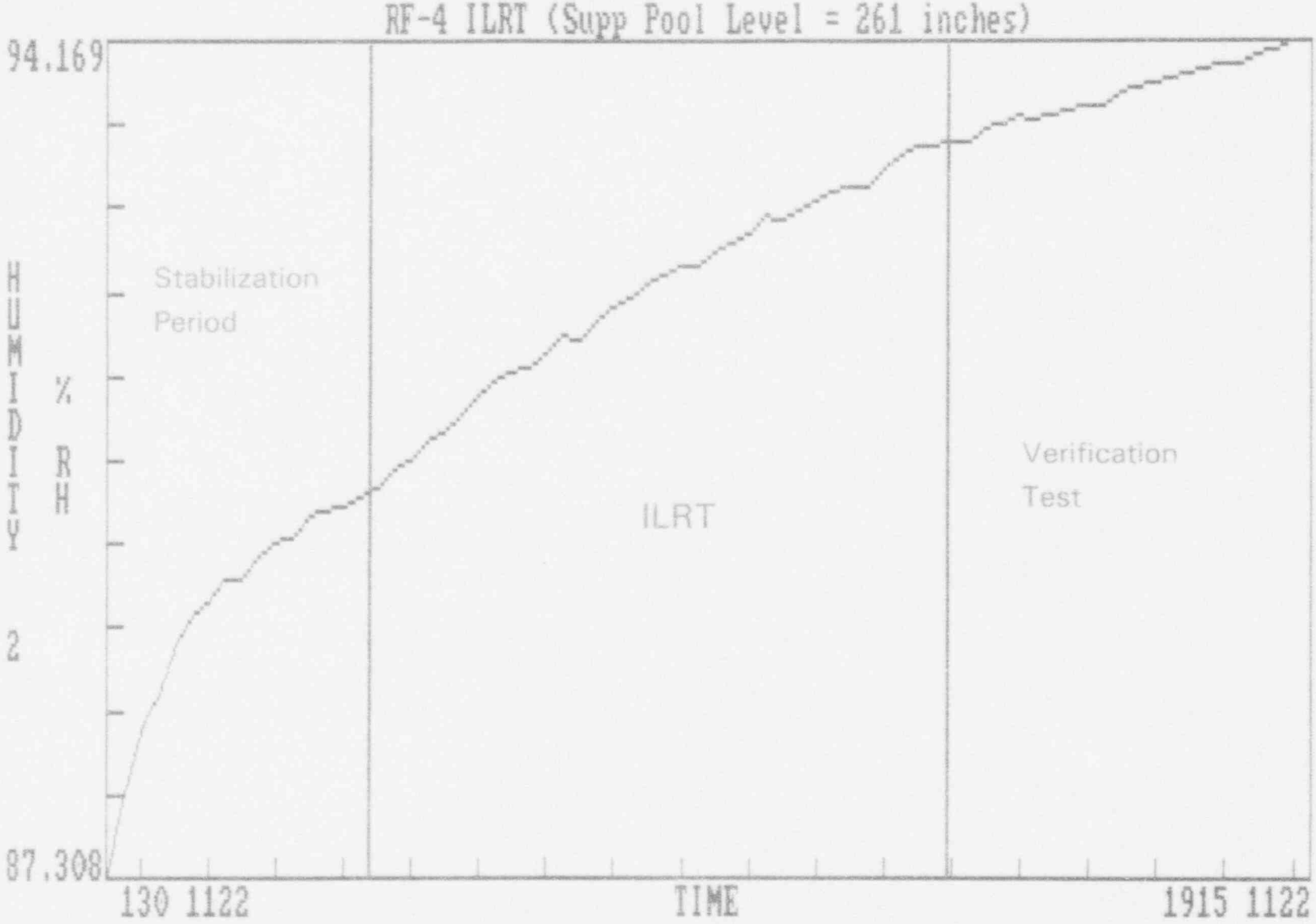

RF-4 ILRT (Supp Pool Level = 261 inches)
82.400
81.000
TEMPERATURE
deg F
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

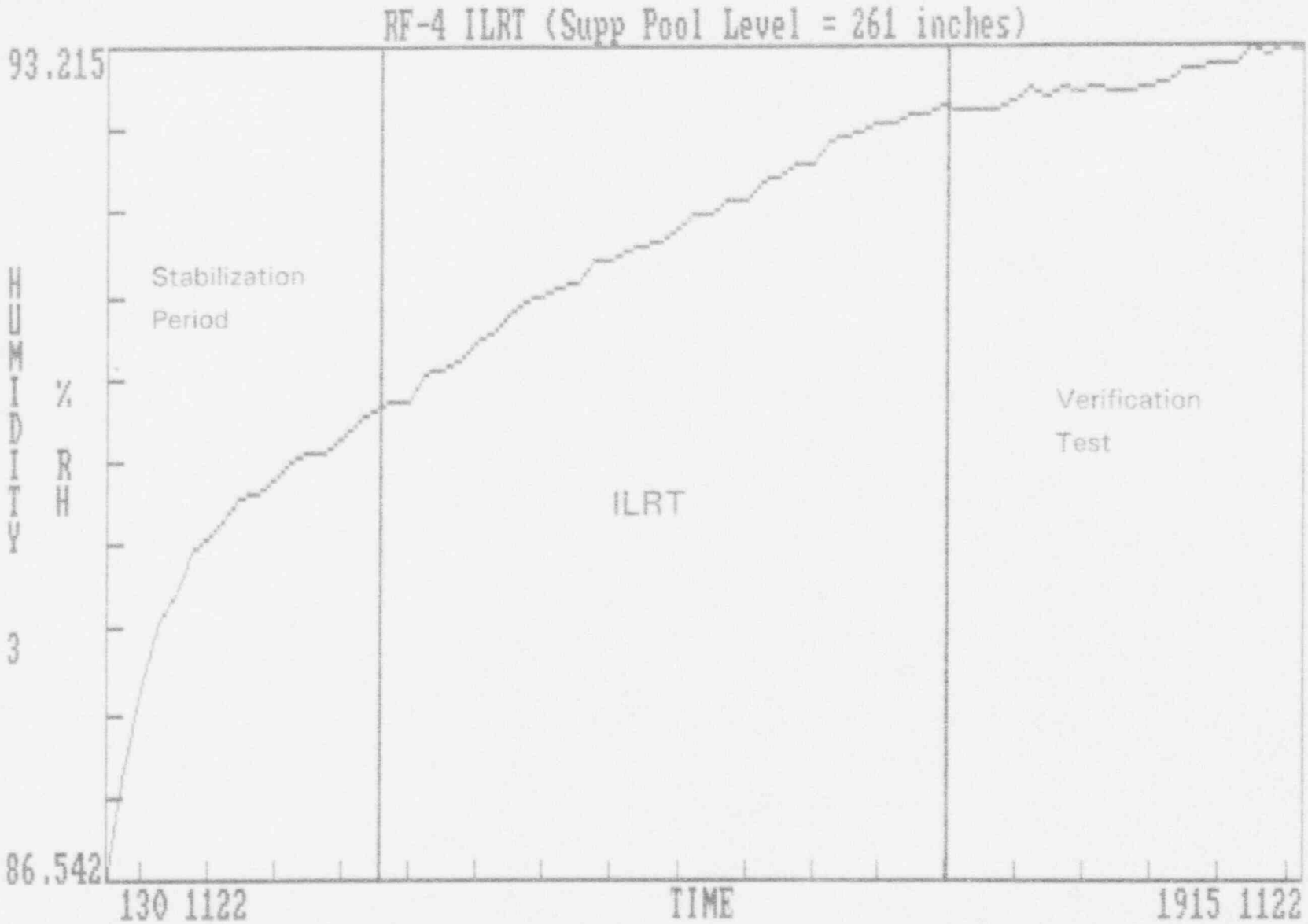

RF-4 ILRT (Supp Pool Level = 261 inches)
82.000
80.600
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

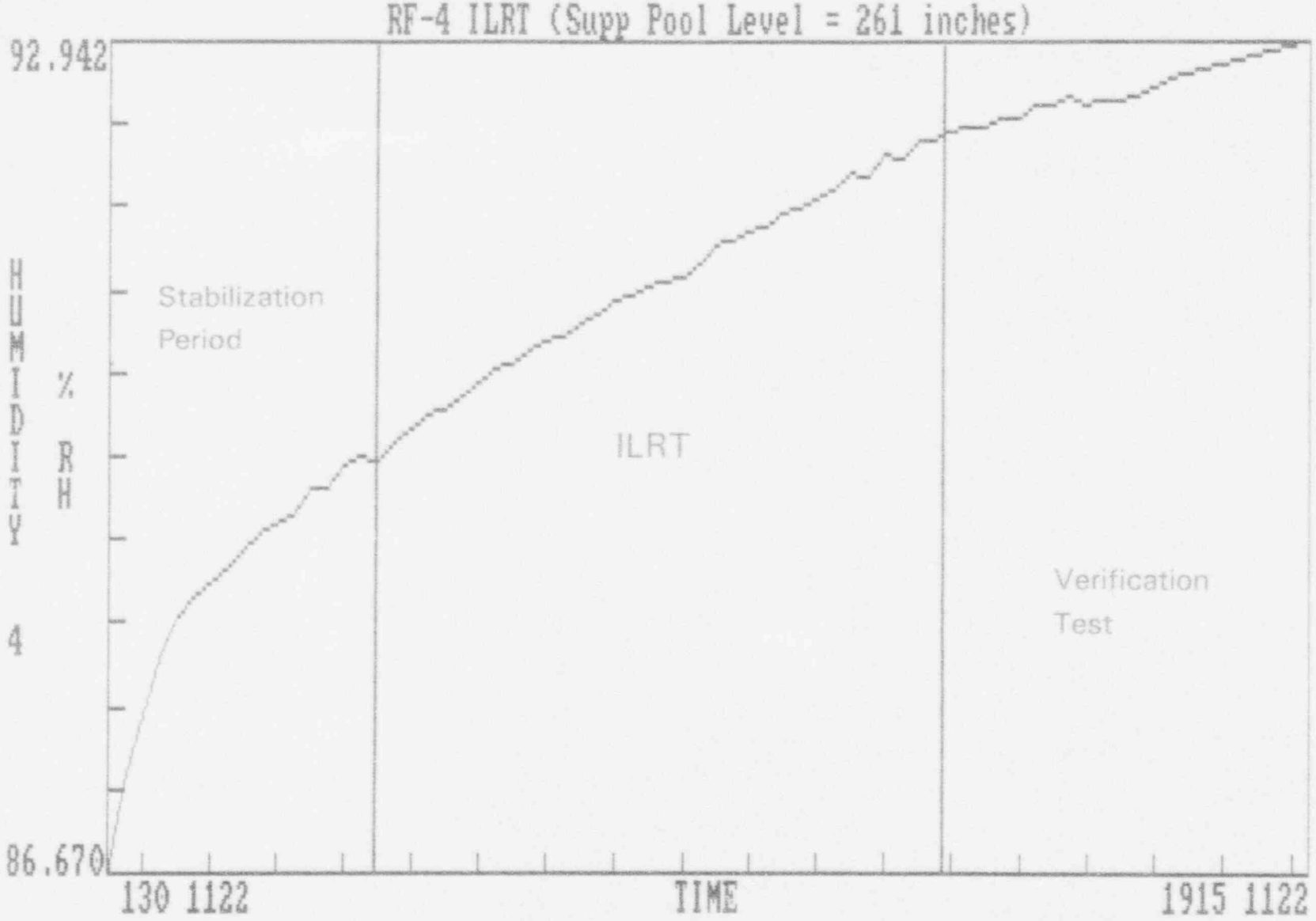

RF-4 ILRT (Supp Pool Level = 261 inches)
86.300
84.700
TEMPERATURE deg F
24
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

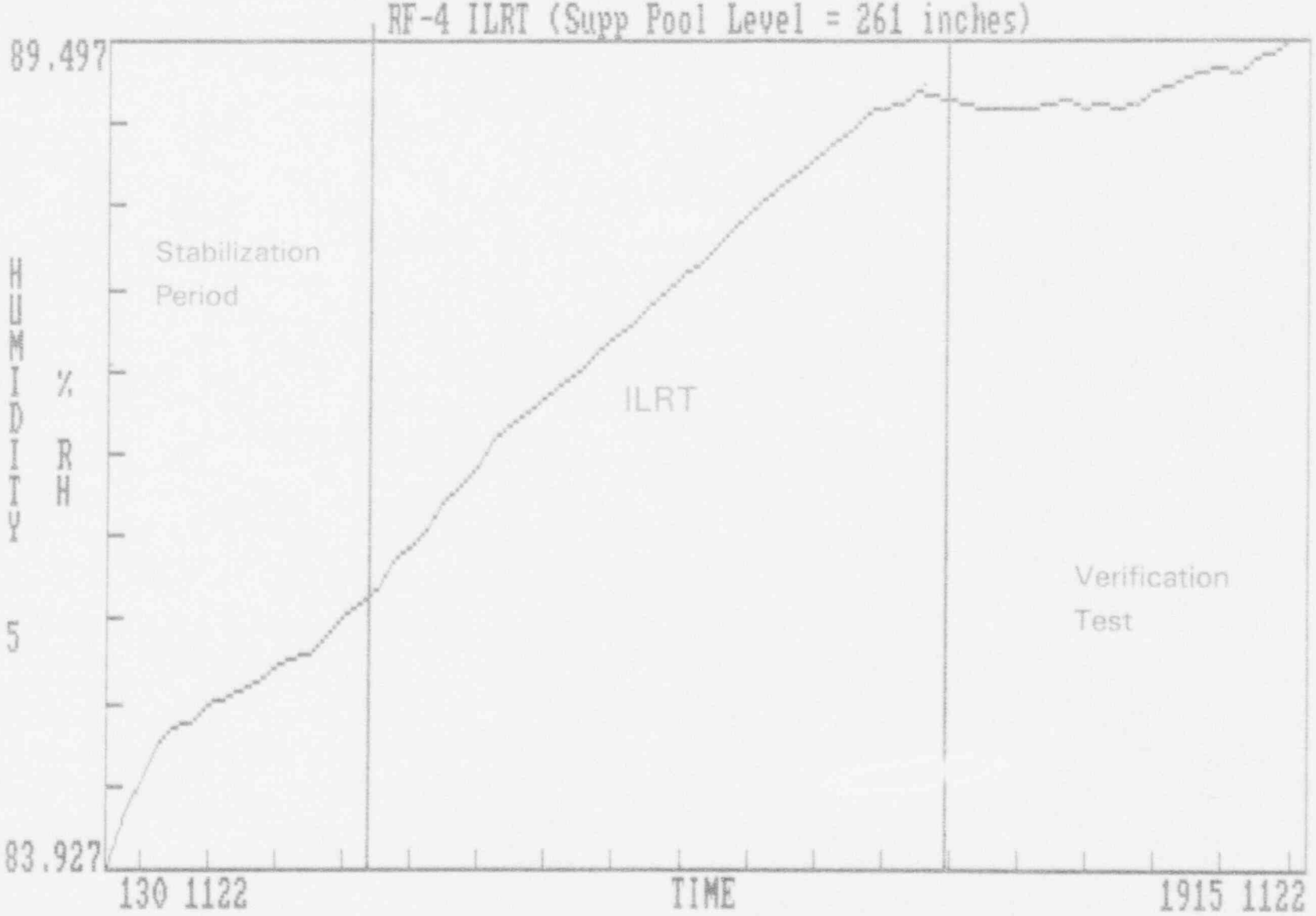

RF-4 ILRT (Supp Pool Level = 261 inches)
69.600
68.500
TEMPERATURE deg F
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

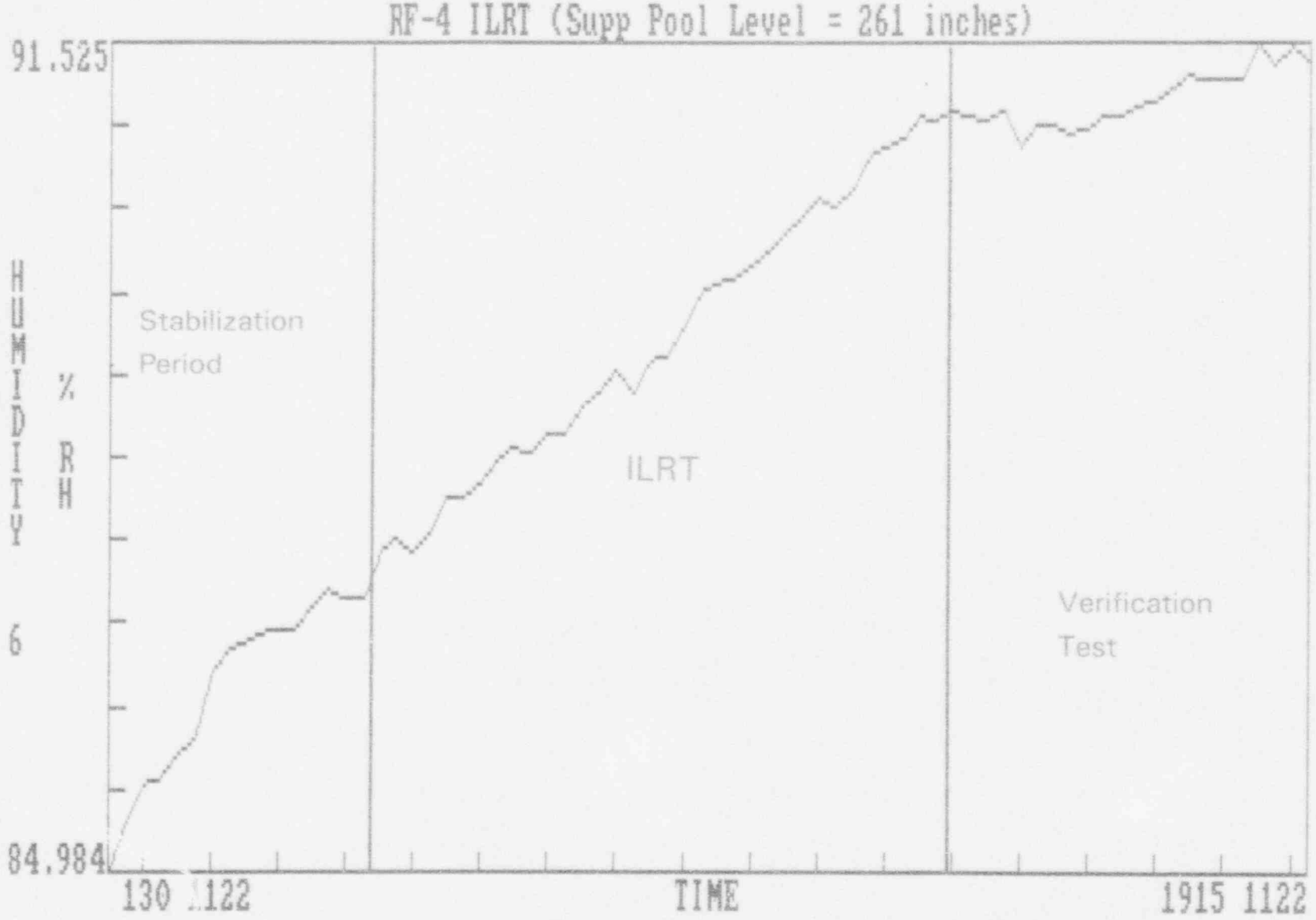

RF-4 ILRT (Supp Pool Level = 261 inches)
94.023
88.018
HUMIDITY % RH
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

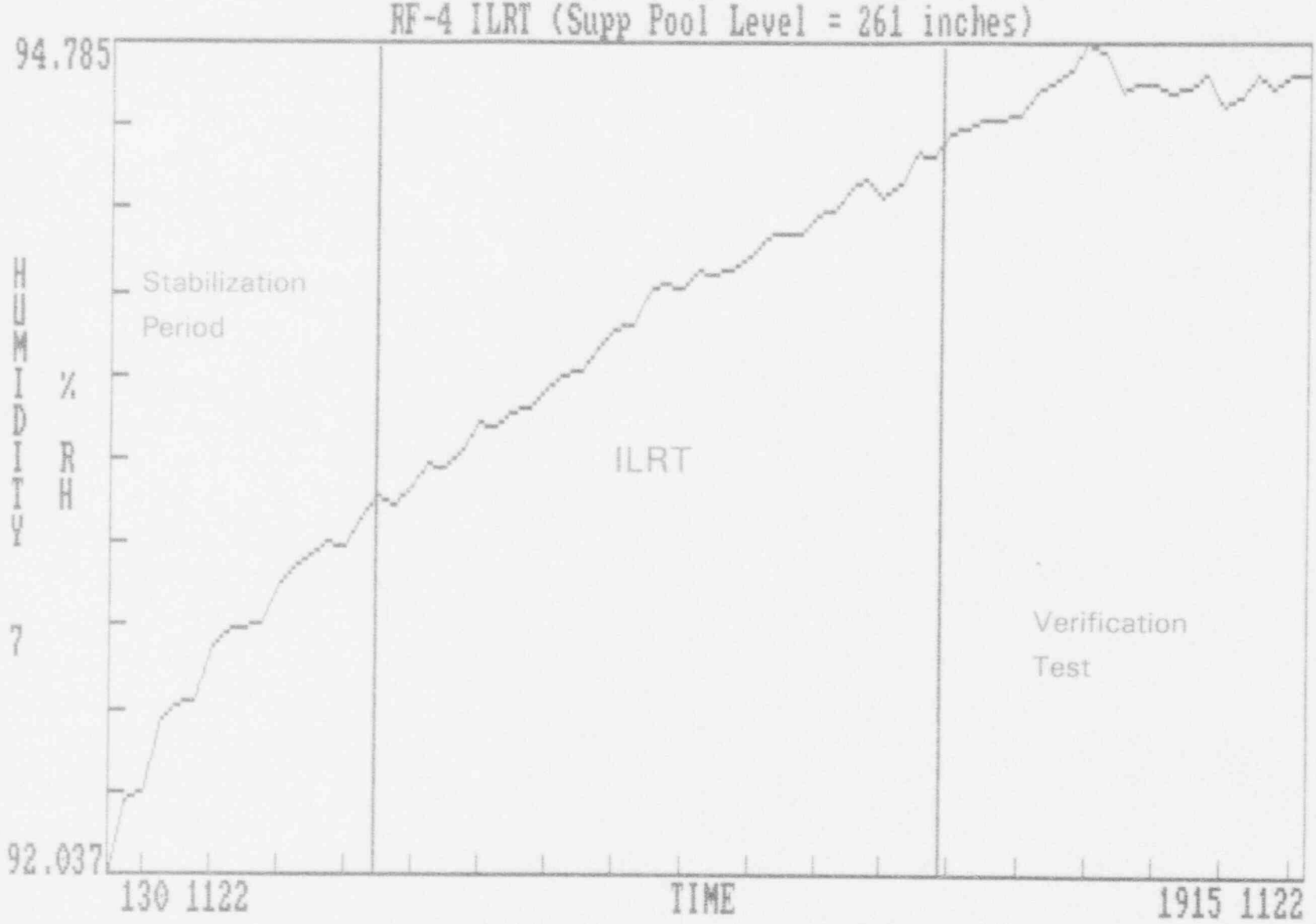

RF-4 ILRT (Supp Pool Level = 261 inches)
94.169
87.308
HUMIDITY % RH
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

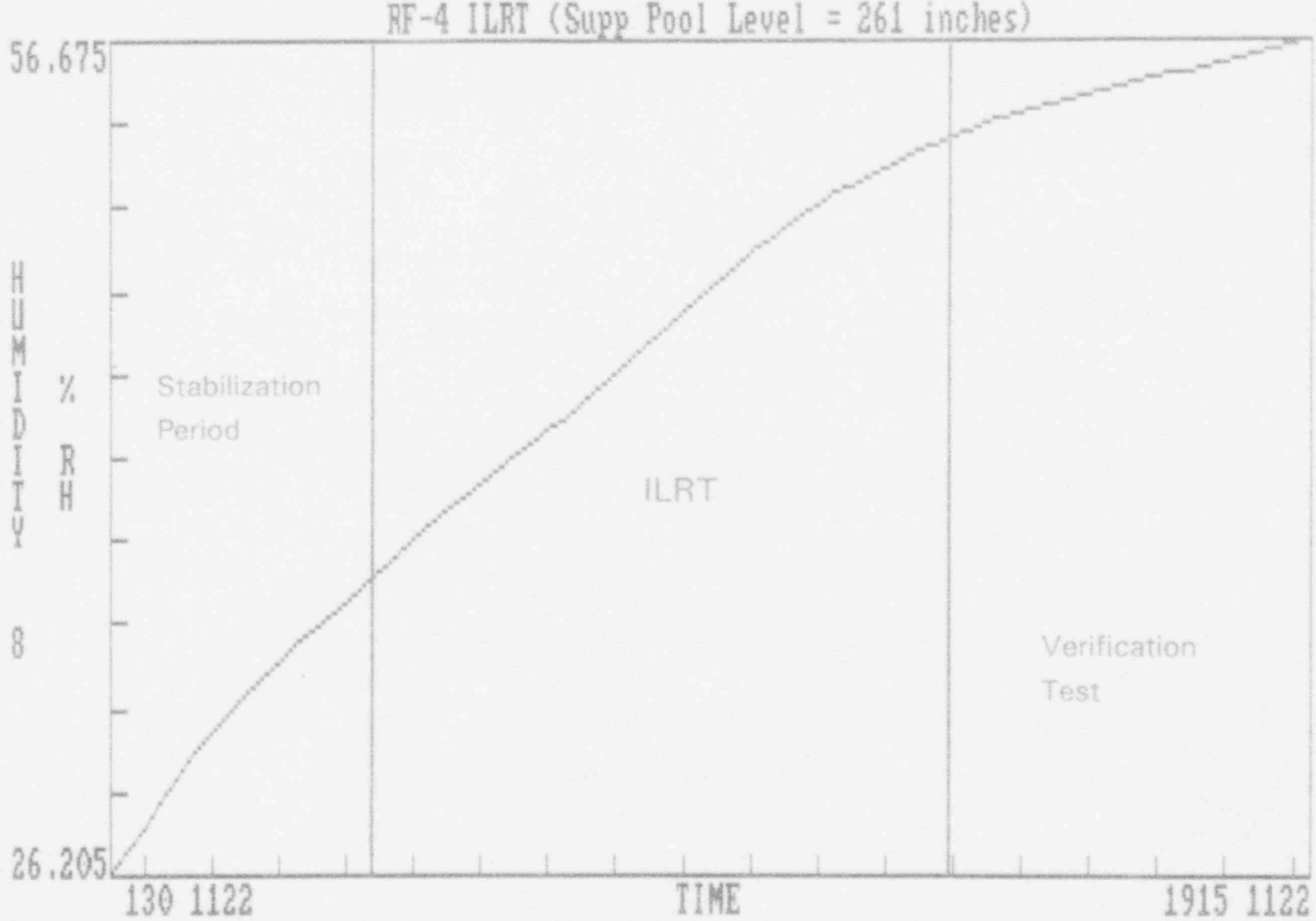

RF-4 ILRT (Supp Pool Level = 261 inches)
93.215
86.542
HUMIDITY
%
RH
3
Stabilization
Period
ILRT
Verification
Test
130 1122
TIME
1915 1122

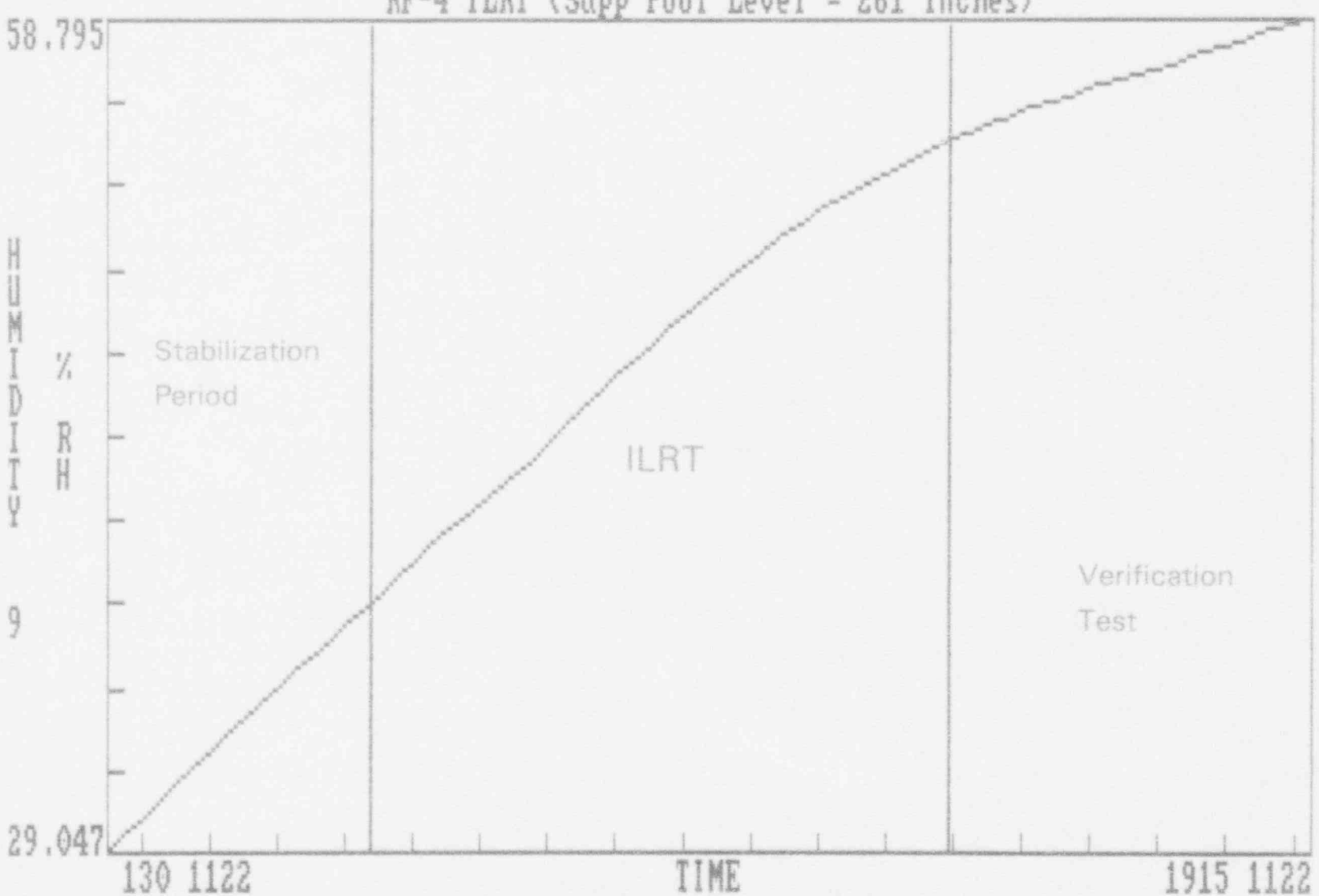

RF-4 ILRT (Supp Pool Level = 261 inches)
92.942
86.670
HUMIDITY % RH
4
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
89.497
83.927
HUMIDITY % RH
5
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
91.525
84.984
HUMIDITY % RH
6
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
94.785
92.037
HUMIDITY % RH
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
56.675
HUMIDITY % RH
Stabilization Period
ILRT
Verification Test
26.205
130 1122
TIME
1915 1122


RF-4 ILRT (Supp Pool Level = 261 inches)
58.795
HUMIDITY % RH
9
29.047
Stabilization Period
ILRT
Verification Test
130 1122
TIME
1915 1122

APPENDIX G

Instrument Selection Guide Calcs.

ISG CALCULATION
(ANSI/ANS 56.8 - 1981)

CALIBRATION DATA

PARAMETER	# OF SENSORS	SENSITIVITY(E)	REPEATABILITY(r)
TEMPERATURE(T)	25	0.0100 °F	0.0100 °F
PRESSURE(P)	2	0.0003 psia	0.0010 psia
VAPOR PRESS.(P_V)	9	0.5000 °F	0.1000 °F

TEST DATA

Test Duration(t)	8.50 hours
Test Pressure(P)	24.1735 psia
Test Temperature(T)	534.5 °R
Vapor Pressure Correction Factor(C)	0.1259 psi/°F (@ 70 °F dewpoint)
L_a	0.65 wt%/day

INSTRUMENT MEASUREMENT ERROR CALCULATIONS

$e_T = [(Et)^2 + (\varepsilon T)^2]^{1/2} / (\#\ of\ Sensors)^{1/2}$

$e_T =$ 0.00447 °R

$e_P = [(EP)^2 + (\varepsilon P)^2]^{1/2} / (\#\ of\ Sensors)^{1/2}$

$e_P =$ 0.00272 psia

$e_{PV} = [(E_{PV})^2 + (\varepsilon_{PV})^2]^{1/2} / (\#\ of\ Sensors)^{1/2}$

$e_{PV} =$ 0.00214 psia

INSTRUMENT SELECTION GUIDE CALCULATIONS

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

ISG = **0.065 wt%/day**

Acceptance Criteria: < 0.1625 wt%/day (25% of L_a)

APPENDIX H

Drywell Bypass Leakage Rate Test

DRYWELL BYPASS LEAKAGE RATE TEST
(1215 TO 1615, November 23, 1993)

WEIGHTED AVERAGE TEMPERATURE CALCULATION

INITIAL TEMPERATURE

RTD #	TEMPERATURE(T_i)	VOLUME FRACTION(VF_i)	WEIGHTED AVG. (T_iX VF_i)/ΣVF_i
T19	546.18 °R	0.0326	129.31
T20	545.87 °R	0.0326	129.23
T21	545.20 °R	0.0326	129.07
T22	542.48 °R	0.0326	128.43
T23	541.42 °R	0.0041	16.12
T24	543.47 °R	0.0032	12.63
TOTALS		ΣVF_i = 0.1377	ΣT_i = 544.79 °R

FINAL TEMPERATURE

RTD #	TEMPERATURE(T_f)	VOLUME FRACTION(VF_f)	WEIGHTED AVG. (T_fX VF_f)/ΣVF_f
T19	546.56 °R	0.0326	129.39
T20	546.11 °R	0.0326	129.29
T21	545.47 °R	0.0326	129.13
T22	542.74 °R	0.0326	128.50
T23	541.54 °R	0.0041	16.12
T24	543.34 °R	0.0032	12.63
TOTALS		ΣVF_f = 0.1377	ΣT_f = 545.06 °R

CONTAINMENT AND DRYWELL PRESSURES

	INITIAL PRESS.	FINAL PRESS.
DRYWELL	Pd_i = 17.736 psia	Pd_f = 17.344 psia
CONTAINMENT	Pc_i = 14.328 psia	Pc_f = 14.303 psia

DRYWELL VOLUME CORRECTIONS

INITIAL DRYWELL VOLUME (V_i) = 249,187 cu. ft.

FINAL DRYWELL VOLUME (V_f) = 248,785 cu. ft.

DRYWELL LEAKAGE RATE CALCULATION

LEAKAGE = $[(Pd_i * V_i/T_i) - (Pd_f * V_f/T_f)](T_s/P_s * t)$ t = test duration

LEAKAGE = **29.33 scfm**

LEAKAGE CORRECTION = 0.90 scfm

CORRECTED LEAKAGE = 30.23 scfm

ALLOWABLE LEAKAGE = 4312 scfm

APPENDIX I

Type B and C Leakage Rate Test Results

APPENDIX I

LOCAL LEAKAGE RATE TEST SUMMARY

This appendix includes a summary of the local leak rate (Type B and C) test results for the period between the ILRT performed in RF2 (March 1991) and the ILRT performed in RF4 (November 1993). Leakage rates for the Main Steam Isolation Valves (MSIVs) and the water tests (tests of piping systems that are normally filled with water and are discribed in the USAR as Closed Loop Outside Containment -- CLOC -- systems) are listed separately.

Local Leakage Rate Test Results Summary

	Leakage Rate	Tolerance
Type C	49,068 sccm	± 1076 sccm
Type B	312 sccm	± 76 sccm
Total B & C (excluding MSIV and water tests)	49,380 sccm	± 1079 sccm
Total MSIV	14,163 sccm	± 696 sccm
Total Water Test	6.3 gpm	± 0.6 gpm

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC001	A	04/15/92	11:04	0.000 ±	10.00	
1MC001	A	11/14/93	00:10	0.000 ±	10.00	
1MC005	A	03/03/92	17:45	250.000 ±	10.00	THIS IS A TEST OF THE OUTBOARD C MSIV VALVES WITH THE INBOARD FLOODED. IDENTIFIED THE INBOARD AS THE LEAKING VALVE AND WILL HAVE MSF012 PERFORMED ON IT.
1MC005	A	04/28/92	04:30	400.000 ±	10.00	This is a post MSF012 repair to the 1B21F022C and is PMT for D09912.
1MC005	A	09/27/93	18:34	900.000 ±	45.00	
1MC005	B	03/01/92	09:43	20.000 ±	10.00	
1MC005	B	04/28/92	03:40	0.000 ±	10.00	
1MC005	B	09/27/93	13:25	20.000 ±	10.00	
1MC006	A	03/03/92	13:15	500.000 ±	10.00	
1MC006	A	09/27/93	18:15	6000.000 ±	400.00	
1MC006	B	03/02/92	10:00	170.000 ±	10.00	
1MC006	B	09/27/93	13:05	200.000 ±	10.00	
1MC007	A	02/29/92	09:43	999999.999 ±	0.00	This is the combined leakage's for the inboard and out board valves, and was not measurable with the test equipment installed latter measurements indicate that combine leakage was approximately equal to 38000 SCCM.
1MC007	A	04/28/92	05:00	999999.999 ±	0.00	This is PMT for D09913 (FAILED) installation of modification MSF012 to 1B21F022D. Leakage determined to be from the inboard valve still.
1MC007	A	04/28/92	21:30	999999.999 ±	0.00	This is PMT for D09913 (FAILED) installation of modification MSF012 to 1B21F022D. Leakage determined to be from the inboard valve still.
1MC007	A	05/01/92	16:58	850.000 ±	45.00	This is PMT for D09913 (FAILED) installation of modification MSF012 to 1B21F022D. Leakage determined to be from the inboard valve still. leakage for the outboard valves was determined to be 850 SCCM and the inboard was determined to be approximately 30000. During trouble shooting it was identified that 1B21F069 leaks by its seat and MWR D30612 was written to correct the problem.
1MC007	A	05/01/92	01:40	999999.999 ±	2300.00	This is the combined leakage of the inboard and outboard valves, and is another failed pmt for D09913.
1MC007	A	05/13/92	14:45	7000.000 ±	400.00	Retest after vessel pressure test and PMT for D09913 to install SF012 Modification.
1MC007	A	06/29/92	00:50	71310.000 ±	2300.00	This is the measurement of the combined inboard and outboard leakage's. D31129 written to repair 1B21F022D. Trouble shooting identified this as the major leakage path.
1MC007	A	07/04/92	07:55	500.000 ±	10.00	
1MC007	A	09/27/93	18:25	3000.000 ±	400.00	
1MC007	B	02/29/92	09:43	20.000 ±	10.00	
1MC007	B	04/23/92	22:50	0.000 ±	10.00	This is PMT for D09913 (FAILED) installation of modification MSF012 to 1B21F022D. Leakage determined to be from the inboard valve still. No credit taken for this test of the test connection valve.
1MC007	B	04/28/92	19:15	0.000 ±	10.00	This is PMT for D09913 (FAILED) installation of modification MSF012 to 1B21F022D. Leakage determined to be from the inboard valve still. No credit taken for this test of the test connection valve.
1MC007	B	05/13/92	13:08	20.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC007	B	06/28/92	21:25	20.000 ±	10.00	
1MC007	B	07/01/92	21:25	20.000 ±	10.00	
1MC007	B	09/27/93	12:57	20.000 ±	10.00	
1MC007	C	02/29/92	17:45	500.000 ±	10.00	Inboard MSIV is flooded and outboard valve leakage measured.
1MC007	C	03/02/92	07:57	38000.000 ±	2300.00	outboard of the 1B21F028D pressurized and the water drained from upstream of the 1B21F022D to measusre the inboard valve leakage.
1MC008	A	03/03/92	14:50	5000.000 ±	400.00	
1MC008	A	04/23/92	04:03	4500.000 ±	400.00	This is a retest of the penetration after repair of a torqueswitch on 1E32F001E and a MOVATs under MWR D17299 that reduced the torque setting. The entire penetration was retested.
1MC008	A	05/13/92	04:03	4500.000 ±	400.00	This is retest for MWR D17992 on 1E32F001N repack and MOVATs.
1MC008	A	09/27/93	14:26	2500.000 ±	400.00	Partial 1B21F028B only
1MC008	A	09/27/93	23:45	20500.000 ±	2278.00	Partial 1B21F022B only
1MC008	A	10/27/93	19:15	1500.000 ±	45.00	This is PMT test for repair and modification of the inboard MSIV 1B21F022B and 89-10 testing of the 1E32F001E.
1MC008	B	03/02/92	09:43	20.000 ±	10.00	
1MC008	B	03/03/92	15:10	20.000 ±	10.00	
1MC008	B	04/23/92	22:01	0.000 ±	10.00	Performed as part of the retest of 1E32F001E and MWR D17299.
1MC008	B	09/27/93	12:36	20.000 ±	10.00	
1MC009	A	03/01/92	13:50	550.000 ±	45.00	TPD 92-072 used to perform 1B21F010A test and not affect the rest of the piping for the A feed Water line. MWR D30588 was written to investigate the possibility of a plugged test connection line 1B21F377A & 376A.
1MC009	A	03/05/92	09:00	999999.999 ±	400.00	
1MC009	A	04/18/92	16:55	20.000 ±	10.00	PMT FOR REBUILD OF VALVE UNDER MWR D23626.
1MC009	A	10/02/93	14:06	20.000 ±	10.00	
1MC009	B	04/19/92	13:00	5300.000 ±	400.00	PMT FOR REBUILD OF VALVE UNDER MWR D23628.
1MC009	B	10/02/93	17:40	999999.999 ±	0.00	
1MC009	B	10/20/93	05:00	250.000 ±	10.00	
1MC009	C	04/18/92	21:40	55.000 ±	10.00	
1MC009	C	10/02/93	18:30	90.000 ±	10.00	
1MC009	D	04/22/92	23:55	2750.000 ±	400.00	
1MC009	D	10/07/93	07:51	4250.000 ±	400.00	
1MC009	D	10/24/93	07:30	5500.000 ±	400.00	
1MC009	E	04/23/92	00:45	135.000 ±	10.00	
1MC009	E	10/07/93	09:59	20.000 ±	10.00	
1MC009	E	10/24/93	08:30	0.000 ±	10.00	
1MC010	A	03/05/92	10:00	999999.999 ±	400.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC010	A	04/11/92	06:30	20.000 ±	10.00	PMT FOR REBUILD OF VALVE UNDER MWR D23627. SOFT SEAT REPLACEMENT.
1MC010	A	09/29/93	00:40	20.000 ±	10.00	
1MC010	B	04/11/92	18:00	6200.000 ±	400.00	PMT FOR REBUILD OF VALVE UNDER MWR D23629.
1MC010	B	09/29/93	03:50	999999.999 ±	0.00	Pretest (as found) for contingent MWR D26416
1MC010	B	10/27/93	07:45	400.000 ±	10.00	PMT for Repair and centering of 1B21F032B Per MWR D26416 (as left)
1MC010	C	04/11/92	18:30	85.000 ±	10.00	
1MC010	C	09/29/93	06:30	410.000 ±	0.00	
1MC010	C	09/29/93	07:45	280.000 ±	10.00	Retest performed after packing adjustment. The packing leak was not a part of the containment boundary.
1MC010	D	03/14/92	23:55	6500.000 ±	400.00	
1MC010	D	10/29/93	09:20	350.000 ±	10.00	Pre-test for D34857 repair to 1B21F065B
1MC010	D	11/02/93	12:30	250.000 ±	10.00	Post-test for MWR D34857.
1MC010	E	03/15/92	03:53	20.000 ±	10.00	
1MC010	E	10/29/93	06:00	10.000 ±	5.00	
1MC010	F	03/15/92	05:20	20.000 ±	10.00	
1MC010	F	10/29/93	10:40	0.000 ±	10.00	
1MC010	G	03/15/92	04:57	20.000 ±	10.00	
1MC010	G	10/29/93	11:50	10.000 ±	5.00	PMT for Repairs to 1E31N077B and the reassembly of 1G33F051. The pre-tests were Snoop tests with zero leakage. No ILRT correction required.
1MC010	X	04/24/92	19:05	0.000 ±	0.00	PMT (zero leakage test) of bonnet for D27415.
1MC010	X	10/06/93	21:25	0.000 ±	0.00	SNOOP INSPECTION OF AREAS TO BE WORKED ON.
1MC014	A	04/15/92	03:45	800.000 ±	45.00	
1MC014	A	11/05/93	00:20	8500.000 ±	400.00	
1MC014	B	04/15/92	06:15	350.000 ±	10.00	
1MC014	B	11/05/93	03:20	600.000 ±	45.00	
1MC015	A	04/15/92	16:35	248.400 ±	10.00	
1MC015	A	10/07/93	12:00	633.000 ±	45.00	Pretest for 89-10 mod's/tests per MWR D23941.
1MC015	A	10/16/93	05:30	3392.000 ±	400.00	Post 89-10 mod/test for MWR D23941. No ILRT correction required.
1MC015	B	04/15/92	17:52	5.000 ±	10.00	
1MC015	B	10/07/93	13:54	20.000 ±	10.00	
1MC015	B	10/16/93	02:40	10.000 ±	5.00	
1MC016	A	03/16/92	01:55	15491.000 ±	400.00	
1MC016	A	10/27/93	21:00	7731.000 ±	400.00	Pretest for 89-10 RH040 Mod (gear replacement per MWR D25067.)
1MC016	A	11/04/93	13:35	5551.000 ±	400.00	Post-test gear replacement under MWR D25067 (RH-040). This requires a 1090 SCCM ILRT As Found correction.

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC016	B	03/16/92	04:00	20.000 ±	10.00	
1MC016	B	10/27/93	18:41	20.000 ±	10.00	
1MC016	B	11/04/93	11:22	20.000 ±	10.00	
1MC017	A	03/16/92	05:45	0.000 ±	10.00	
1MC017	A	10/26/93	10:35	20.000 ±	10.00	Pretest for 89-10 gear mod per MWR D25068.
1MC017	A	10/30/93	20:30	20.000 ±	10.00	This is the as-left for MWR D25068. No ILRT correction.
1MC017	B	03/16/92	12:31	11280.000 ±	400.00	THE MEASURED LEAKAGE RATE WAS CORRECTED FOR PRESSURE DUE TO THE INCREASED PRESSURE AT THE ROTAMETER. MEASURED LEAKAGE WAS 11000 PLUS OR MINUS 400 SCCM.
1MC018	A	04/17/92	01:22	0.000 ±	10.00	
1MC018	B	04/16/92	18:02	10.200 ±	10.00	
1MC018	C	04/16/92	18:18	0.000 ±	10.00	
1MC018	D	04/16/92	18:27	0.000 ±	10.00	
1MC018	E	04/16/92	22:37	0.000 ±	10.00	
1MC018	F	04/16/92	22:57	0.000 ±	10.00	
1MC018	G	04/16/92	23:22	184.600 ±	10.00	
1MC018	H	04/16/92	23:36	410.300 ±	10.00	
1MC018	I	04/16/92	16:45	20.500 ±	10.00	
1MC018	J	04/16/92	16:54	0.000 ±	10.00	
1MC019	A	02/19/91	23:30	10.000 ±	10.00	
1MC019	A	03/21/92	10:27	0.000 ±	10.00	1E12F354 PACKING WAS IDENTIFIED TO BE LEAKING. THE PACKING WAS ADJUSTED AND TEST SETS A AND B RE PERFORMED INITIAL LEAKAGE WAS 120 SCCM FOR TEST SET A AND 205 FOR TEST SET B.
1MC019	B	02/19/91	23:40	150.000 ±	10.00	
1MC019	B	03/21/92	10:37	5.000 ±	10.00	1E12F354 PACKING WAS IDENTIFIED TO BE LEAKING. THE PACKING WAS ADJUSTED AND TEST SETS A AND B RE PERFORMED INITIAL LEAKAGE WAS 120 SCCM FOR TEST SET A AND 205 FOR TEST SET B.
1MC019	C	02/20/91	12:47	0.000 ±	10.00	
1MC019	C	03/21/92	04:35	0.000 ±	10.00	
1MC019	D	02/20/91	12:58	0.000 ±	10.00	
1MC019	D	03/21/92	04:44	5.000 ±	10.00	
1MC020	A	02/20/91	21:00	10.000 ±	10.00	
1MC020	A	03/22/92	12:24	0.000 ±	10.00	
1MC020	B	02/20/91	21:15	10.000 ±	10.00	
1MC020	B	03/22/92	12:34	0.000 ±	10.00	
1MC020	C	02/20/91	18:35	0.000 ±	10.00	
1MC020	C	03/22/92	01:13	102.430 ±	10.00	
1MC020	D	02/20/91	18:25	0.000 ±	10.00	
1MC020	D	03/22/92	01:24	5.120 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC024	A	08/20/91	11:15	21.500 ±	10.00	
1MC024	B	08/20/91	11:05	21.500 ±	10.00	
1MC026	A	03/27/91	18:18	0.000 ±	10.00	
1MC026	A	08/25/92	13:35	0.000 ±	10.00	Entered 4 hour LCO for secondary containment.
1MC026	B	03/27/91	18:10	0.000 ±	10.00	
1MC026	B	08/25/92	13:45	0.000 ±	10.00	Entered 4 hour LCO for secondary containment
1MC035	A	03/18/92	13:45	20.000 ±	10	
1MC035	A	10/05/93	04:00	20.000 ±	.	e-test for 89-10 testing Per D25237 and Operator eplacement per D51556.
1MC035	A	10/19/93	10:15	999999.999 ±	0.00	Operator failure on the 1E22F004.
1MC035	A	11/01/93	03:35	20.000 ±	10.00	As-left for 89-10 mod and operator replacement per MWR's D25237 & D51556. No ILRT correction
1MC035	B	03/18/92	15:00	3000.000 ±	400.00	
1MC036	A	04/08/92	05:11	20.000 ±	10.00	
1MC036	A	10/04/93	13:45	20.000 ±	10.00	Pre-test for D35007 89-010 Mod's and Votes testing
1MC036	A	10/16/93	13:10	20.000 ±	10.00	Post-test for D35007. NO ILRT CORRECTION REQUIRED
1MC036	B	04/07/92	11:45	16000.000 ±	400.00	MWR D26641 WRITTEN TO REPAIR THE LARGE LEAKAGE ON 1E12F006.
1MC041	A	11/05/92	14:45	160.000 ±	10.00	
1MC041	E	11/05/92	16:25	0.000 ±	10.00	
1MC042	A	03/27/92	05:15	2500.000 ±	400.00	IDENTIFIE. ODY TO BONNET SEAL LEAKAGE ON 1E12F019 WILL BE REWORKED AND RETESTED.
1MC042	A	03/30/92	04:00	100.000 ±	10.00	RETEST AFTER REPAIRS TO 1E12F019.
1MC042	A	11/03/93	01:40	20.000 ±	10.00	Post-test for MWR D35177 for 89-10 testing / mods on the 1E51F013 valve.
1MC042	A	11/06/93	18:33	10.000 ±	5.00	PMT for 89-10 testing of 1E51F013. There will be a 10 SCCM correction for the ILRT.
1MC042	B	03/27/92	05:15	20.000 ±	10.00	
1MC042	B	11/02/93	23:35	10.000 ±	5.00	
1MC042	B	11/06/93	16:45	10.000 ±	5.00	
1MC042	C	03/12/92	13:32	10000.000 ±	400.00	
1MC042	D	03/12/92	14:23	470.000 ±	10.00	
1MC042	D	03/13/92	11:41	0.000 ±	10.00	Pmt for tightening of the packing on this valve.
1MC043	A	03/25/92	19:25	2100.000 ±	45.00	
1MC043	A	05/05/92	05:05	2000.000 ±	45.00	Retest and PMT for D26592 MOVATs and disk replacement for 1E51F063
1MC043	A	11/09/93	12:48	3250.000 ±	400.00	Pretest for MWR's D35179 & D35180 89-10 testing/mods.
1MC043	A	11/14/93	19:04	2600.000 ±	400.00	Post (as left) for MWR's D35179 & D35180 89-10 testing and mods. There will be a 325 SCCM ILRT correction for the improvement to the Min. path leakage as found Min. Path = 1635 SCCM. As-left Min. Path = 1310 SCCM.

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC043	B	03/25/92	20:55	20.000 ±	10.00	
1MC043	B	05/05/92	06:15	20.000 ±	10.00	
1MC043	B	11/09/93	08:30	20.000 ±	10.00	
1MC043	B	11/14/93	18:26	20.000 ±	10.00	
1MC044	A	11/05/92	14:45	160.000 ±	10.00	
1MC044	A	08/11/93	05:50	90.000 ±	10.00	PMT for D53412 repair to 1E51F079 (body to bonnet seal)
1MC044	B	11/05/92	15:25	155.000 ±	10.00	
1MC044	C	11/05/92	15:16	0.000 ±	10.00	
1MC044	D	11/05/92	15:08	0.000 ±	10.00	
1MC045	A	05/02/92	22:08	0.000 ±	10.00	
1MC045	A	11/10/93	18:25	650.000 ±	45.00	Pre-test for packing leak repair MWR D31774 and 89-10 MWR D35159 and clean and inspect PM PEMMSA001 on the valve.
1MC045	A	11/12/93	23:57	100.000 ±	10.00	Post- test for MWR's D35159 & D31774 and PM PEMMSA001 No ILRT correction. Min. Path Leakage is through the 1B21F019.
1MC045	B	05/03/92	01:50	20.000 ±	10.00	
1MC045	B	11/10/93	21:45	10.000 ±	5.00	Pre-test for 89-10 testing Per MWR D35172 of the 1B21F019.
1MC045	B	11/13/93	01:19	20.000 ±	10.00	Post-test for MWR D35172 89-10 Testing/ mod. There is no ILRT correction for leakage improvement. As found leakage rate is 10 SCCM. As-left leakage rate is 20 SCCM.
1MC046	A	04/08/92	20:15	20.000 ±	10.00	
1MC046	A	10/30/93	02:13	20.000 ±	10.00	
1MC046	B	04/08/92	19:20	60.000 ±	10.00	
1MC046	B	10/30/93	03:13	20.000 ±	10.00	
1MC047	A	04/04/92	07:50	250.000 ±	10.00	
1MC047	A	10/30/93	14:40	60.000 ±	10.00	
1MC047	B	04/04/92	09:10	270.000 ±	10.00	
1MC047	B	10/30/93	05:20	100.000 ±	10.00	
1MC048	A	10/01/92		450.000 ±	45.00	
1MC048	A	09/07/93	18:40	20.000 ±	10.00	Pre-test for D34949, 89-10 testing.
1MC048	A	09/10/93	14:25	60.000 ±	10.00	PMT for 89-10 testing of D34949 & D34576. No ILRT correction since this line is not required to be Type A tested per the USAR.
1MC048	B	10/01/92		240.000 ±	10.00	
1MC048	B	09/07/93	19:10	80.000 ±	10.00	Pre-test for D34576 89-10 testing.
1MC048	B	09/10/93	14:44	20.000 ±	10.00	PMT for 89-10 testing D34949 & D34576. No ILRT correction required since this penetration is not required to be Type A tested.
1MC049	A	04/10/91	14:22	40.000 ±	10.00	
1MC049	A	01/07/93	10:10	60.000 ±	10.00	
1MC049	B	04/10/91	14:42	30.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASUREL LEAKAGE	TOL	
1MC049	B	01/07/93	10:33	240.000 ±	10.00	
1MC050	A	07/21/92	09:04	10.000 ±	10.00	Induced flow test performed.
1MC050	A	08/25/93	10:09	10.000 ±	10.00	
1MC050	B	07/21/92	09:40	10.000 ±	10.00	Induced flow test performed.
1MC050	B	08/25/93	10:35	0.000 ±	10.00	
1MC052	A	02/21/91	22:10	390.000 ±	10.00	
1MC052	A	03/03/92	17:45	500.000 ±	45.00	
1MC052	A	05/26/93	13:20	370.000 ±	10.00	
1MC052	A	08/18/93	20:10	450.000 ±	10.00	PMT for Valve operator Modification. D35202
1MC052	B	02/21/91	22:50	370.000 ±	10.00	
1MC052	B	03/03/92	18:25	490.000 ±	45.00	
1MC052	B	05/26/93	13:45	360.000 ±	10.00	
1MC052	B	08/18/93	20:32	350.000 ±	10.00	PMT for D34582.
1MC053	A	02/21/91	20:45	10.000 ±	10.00	
1MC053	A	03/04/92	10:30	0.000 ±	10.00	
1MC053	A	09/28/93	06:50	0.000 ±	10.00	
1MC053	A	09/29/93	22:00	0.000 ±	45.00	POST-TEST DATA FOR 1MC053. NO ILRT CORRECTION REQUIRED.
1MC053	B	02/21/91	21:10	0.000 ±	10.00	
1MC053	B	03/04/92	11:00	25.000 ±	10.00	
1MC053	B	09/28/93	07:42	0.000 ±	10.00	
1MC053	B	09/29/93	22:30	20.000 ±	10.00	
1MC056	A	04/27/92	18:20	20.000 ±	10.00	
1MC056	A	11/08/93	10:35	250.000 ±	10.00	Pre-test for 89-10 tests and mods per MWR's D34583, D15893 & D34584.
1MC056	A	11/11/93	02:55	400.000 ±	400.00	Post-test for MWR D34583. Leakage by the seat is a major contributor to Bypass leakage and the valve will be repaired prior to the ILRT. NO ILRT Correction.
1MC056	A	11/15/93	20:45	150.000 ±	10.00	Post-test for 89-10 MWR's D34583, D15893 & D34584. There is 50 SCCM ILRT correction required for leakage Improvement Min. path As-Found leakage =135 SCCM and As-Left = 85 SCCM. Test set B was not worked on and both as-found and as left tests were performed 11/8/93 11:10
1MC056	B	04/27/92	18:50	0.000 ±	10.00	
1MC056	B	11/08/93	11:10	10.000 ±	5.00	
1MC056	B	11/15/93	21:22	0.000 ±	10.00	
1MC057	A	04/08/92	02:20	82.000 ±	10.00	
1MC057	A	10/04/93	21:28	110.000 ±	10.00	
1MC057	A	10/06/93	11:55	0.000 ±	10.00	Scheduled PMT for PCIIAM016 and MWR D51650 neither of which affected the LLRT boundary. However, the pressurization boundary for Test Set A was affected by the work by the decrease of the leakage rate. No ILRT correction required for the Improvement.

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC057	B	04/07/92	16:35	10.000 ±	10.00	
1MC057	B	10/04/93	22:16	200.000 ±	10.00	MWR D52617 written for the increase from 20 to 200 SCCM leakage.
1MC057	C	04/08/92	04:40	613.800 ±	45.00	
1MC057	C	10/04/93	23:40	500.000 ±	45.00	
1MC058	A	04/22/92	18:35	575.000 ±	45.00	
1MC058	A	09/29/93	10:53	1800.000 ±	45.00	MWR D53619 generated to identify the increase in leakage and the need to repair to reduce Bypass leakage.
1MC058	B	04/22/92	20:35	140.000 ±	10.00	MWR D30586 was written to repair the packing leakage identified on 1IA012B. This leakage is NOT part of the containment boundary and the MWR was worked prior to completion of the testing on the valve.
1MC058	B	09/29/93	16:08	0.000 ±	10.00	
1MC058	C	04/23/92	07:51	320.000 ±	10.00	
1MC058	C	09/29/93	20:14	40.000 ±	10.00	
1MC058	C	10/01/93	21:18	1150.000 ±	45.00	THIS TEST WAS AFTER INITIAL PRESSURIZATION AND BEFORE CHECKING ALL TEMPORARY TEST FITTINGS.
1MC058	C	10/01/93	22:00	650.000 ±	45.00	POST-TEST FOR 89-10 MWR D34566 AND CLEAN AND INSPECT PM. LEAKAGE INCREASED AND MWR D52615 WRITTEN TO IDENTIFY THE VALVE AS A CANDIDATE FOR LEAKAGE REDUCTION. (NO ILRT CORRECTION ALLOWED)
1MC059	A	07/16/91	13:45	173.200 ±	10.00	
1MC059	A	03/14/92	22:21	219.900 ±	10.00	PCC PERFORMED ON SK0700A INDICATED THAT IT READ 13.98 SCCM LESS THAN ACTUAL AT 200 SCCM INDICATED. THIS INCREASED LEAKAGE WAS ADDED AND CORRECTED FOR USE OF NITROGEN.
1MC059	B	07/16/91	14:05	203.800 ±	10.00	
1MC059	B	03/14/92	22:55	219.900 ±	10.00	SAME COMMENT AS TEST SET A.
1MC060	A	04/07/92	03:10	600.000 ±	45.00	
1MC060	A	10/27/93	01:58	300.000 ±	10.00	Pre-test for Yoke replacement per MWR's D25208 & D30658.
1MC060	A	11/01/93	02:36	250.000 ±	10.00	PMT for MWR's D30658 & D25208. This will require a 25 SCCM ILRT correction.
1MC060	B	04/08/92	03:55	0.000 ±	10.00	
1MC060	B	10/27/93	01:25	20.000 ±	10.00	
1MC060	B	10/31/93	21:28	20.000 ±	10.00	
1MC061	A	04/05/92	16:10	150.000 ±	10.00	
1MC061	A	10/22/93	10:55	400.000 ±	45.00	Pre-test for 89-10 testing per MWR D35162 & D35163 and clean and inspect PM's PEMRTA073 & 074.
1MC061	A	10/29/93	06:05	260.000 ±	10.00	PMT for 89-10 testing per MWR D35162 & D35163 and Clean and Inspect PM's PEMRTA073 & 074. This will require a 70 SCCM ILRT correction.
1MC061	B	04/05/92	17:02	30.000 ±	10.00	
1MC061	B	10/22/93	12:15	100.000 ±	45.00	
1MC061	B	10/29/93	05:53	120.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC062	A	06/06/91	17:40	10.000 ±	5.00	BOTH TEST SETS HAVE BEEN COMBINED INTO ONE TEST SET BY PDR 91-0257 AND 0 WILL BE RECORDED IN TEST SET B UNTIL THE FORM 2 CAN BE REVISED TO REFLECT THE NEW TEST CONFIGURATION.
1MC062	A	02/25/92	16:22	20.000 ±	10.00	
1MC062	C	02/25/92	14:45	400.000 ±	45.00	BOTH TEST SETS HAVE BEEN COMBINED INTO ONE TEST SET BY PDR 91-0257 AND 0 WILL BE RECORDED IN TEST SET B UNTIL THE FORM 2 CAN BE REVISED TO REFLECT THE NEW TEST CONFIGURATION.
1MC062	C	02/25/92	14:45	400.000 ±	45.00	
1MC063	A	04/23/92	16:05	230.000 ±	10.00	
1MC063	A	10/01/93	02:07	600.000 ±	45.00	
1MC063	B	04/23/92	17:40	20.000 ±	10.00	
1MC063	B	09/30/93	22:48	20.000 ±	10.00	
1MC063	C	04/23/92	18:12	20.000 ±	10.00	
1MC063	C	09/30/93	23:35	20.000 ±	10.00	
1MC064	A	04/02/92	22:52	90.000 ±	10.00	
1MC064	A	10/22/93	12:58	250.000 ±	10.00	Pre-test for 89-10 testing per MWR's D35160 & D35161.
1MC064	A	10/30/93	07:30	20.000 ±	10.00	As-left for PMT of 89-10 testing and Modification. Will require 115 SCCM leakage be added to the ILRT to account for the Minimum Path leakage improvement.
1MC064	B	04/02/92	22:07	40.000 ±	10.00	
1MC064	B	10/22/93	13:22	150.000 ±	10.00	
1MC064	B	10/30/9[illegible]	10:05	40.000 ±	10.00	
1MC065	A	03/31/92	16:20	0.000 ±	10.00	
1MC065	A	10/25/93	12:20	20.000 ±	10.00	
1MC065	A	11/01/93	14:05	20.000 ±	10.00	
1MC065	B	03/31/92	17:12	0.000 ±	10.00	
1MC065	B	10/25/93	12:50	20.000 ±	10.00	
1MC065	B	11/01/93	14:30	20.000 ±	10.00	
1MC067	A	05/15/92	15:00	20.000 ±	10.00	
1MC067	A	11/30/93	00:59	0.000 ±	10.00	
1MC068	A	05/14/91	11:15	20.000 ±	10.00	
1MC068	A	02/11/93	08:35	10.000 ±	10.00	
1MC068	B	05/14/91	11:34	20.000 ±	10.00	
1MC068	B	02/11/93	08:55	0.000 ±	10.00	
1MC068	C	05/14/91	13:02	20.000 ±	10.00	
1MC068	C	02/11/93	09:23	0.000 ±	10.00	
1MC068	D	05/14/91	13:20	20.000 ±	10.00	
1MC068	D	02/11/93	09:42	0.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC068	E	05/16/91	10:40	20.500 ±	10.00	
1MC068	E	02/11/93	11:20	0.000 ±	10.00	
1MC068	F	05/16/91	13:18	20.500 ±	10.00	
1MC068	F	02/11/93	11:37	0.000 ±	10.00	
1MC068	G	05/16/91	09:20	20.500 ±	10.00	
1MC068	G	02/11/93	12:53	0.000 ±	10.00	
1MC068	H	05/16/91	09:00	20.500 ±	10.00	
1MC068	H	02/11/93	13:10	0.000 ±	10.00	
1MC068	I	05/15/91	11:18	614.300 ±	45.00	
1MC068	I	02/11/93	13:40	270.000 ±	10.00	
1MC068	J	05/15/91	11:35	20.500 ±	10.00	
1MC068	J	02/11/93	13:53	0.000 ±	10.00	
1MC069	A	03/21/92	10:30	90.000 ±	10.00	
1MC069	A	10/19/93	01:37	65.000 ±	10.00	
1MC069	B	03/21/92	13:55	4000.000 ±	400.00	MWR D30579 WRITTEN TO REPAIR 1RE022 FOR RF-4.
1MC069	B	10/19/93	01:57	2200.000 ±	45.00	MWR D30579 WAS NOT WORKED NO REPAIRS.
1MC070	A	03/29/92	09:30	1200.000 ±	45.00	
1MC070	A	11/04/93	17:20	210.000 ±	10.00	
1MC070	B	03/29/92	09:55	1150.000 ±	45.00	
1MC070	B	11/04/93	18:00	210.000 ±	10.00	
1MC071	A	07/10/91	13:30	120.000 ±	10.00	
1MC071	A	04/13/92	17:40	25.000 ±	10.00	
1MC071	A	10/27/93	11:50	30.000 ±	10.00	
1MC071	B	07/10/91	13:57	20.000 ±	10.00	
1MC071	C	04/13/92	18:50	170.000 ±	10.00	
1MC071	C	10/27/93	17:55	400.000 ±	10.00	
1MC072	A	07/10/91	14:20	1250.000 ±	45.00	
1MC072	B	07/10/91	14:42	20.000 ±	10.00	
1MC072	B	04/13/92	18:00	110.000 ±	10.00	
1MC072	B	10/27/93	16:25	100.000 ±	10.00	
1MC074	A	09/30/93	23:35	0.000 ±	0.00	SNOOP INSPECTION PERFORMED OF THE AREA TO BE AFFECTED BY RT-034 MOD WITH ZERO LEAKAGE AS A RESULT. NO ILRT CORRECTION REQUIRED.
1MC078	A	04/11/92	15:05	20.000 ±	10.00	
1MC078	A	11/07/93	21:05	0.000 ±	10.00	
1MC078	B	04/11/92	13:32	20.000 ±	10.00	
1MC078	B	11/07/93	20:50	0.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC079	A	07/22/92	14:55	0.000 ±	10.00	
1MC079	A	02/08/93	10:10	200.000 ±	10.00	
1MC079	A	04/08/93	16:40	31.000 ±	10.00	
1MC079	B	07/22/92	14:42	0.000 ±	10.00	
1MC079	B	02/08/93	10:45	10.000 ±	5.00	
1MC079	B	04/08/93	16:58	20.000 ±	10.00	
1MC081	A	04/28/92	03:40	30.000 ±	10.00	
1MC081	A	11/08/93	12:30	100.000 ±	10.00	
1MC081	B	04/28/92	04:20	0.000 ±	10.00	
1MC081	B	11/08/93	13:10	10.000 ±	5.00	
1MC082	A	04/27/92	23:25	700.000 ±	45.00	
1MC082	A	11/08/93	14:20	150.000 ±	10.00	Pre-test for 89-10 testing per MWR D34585 & D34586 and packing leak on 1FP053 MWR D30596 also MWR D15892 worked with D34586.
1MC082	A	11/11/93	02:55	400.000 ±	10.00	Post-test for MWR's D34585, D34586 & D15892 for 89-10 testing and Mods and D30596 for a packing leak on 1FP053. NO ILRT Correction post-test results greater than pre-test results.
1MC082	B	04/27/92	23:50	0.000 ±	10.00	
1MC082	B	11/08/93	15:00	10.000 ±	5.00	
1MC085	A	09/10/92	01:05	650.000 ±	45.00	
1MC085	A	05/06/93	21:20	700.000 ±	45.00	PMT for 89-10 testing and modification of the 1CY017valve.
1MC085	A	05/27/93	13:55	1200.000 ±	45.00	PMT FOR 89-10
1MC085	B	09/10/92	01:33	20.000 ±	10.00	
1MC085	B	05/06/93	21:40	20.000 ±	10.00	
1MC085	B	05/27/93	14:15	20.000 ±	10.00	
1MC086	A	04/08/92	07:35	20.000 ±	10.00	
1MC086	A	10/19/93	23:00	20.000 ±	10.00	Pre-test for PM's PEMRTM007 & A067 , MWR D35189 for 89-10 testing and MWR D31031 for a packing leak.
1MC086	A	11/01/93	15:15	90.000 ±	10.00	
1MC086	B	04/08/92	09:02	20.000 ±	10.00	
1MC086	B	10/19/93	21:55	210.000 ±	10.00	
1MC086	B	11/01/93	14:35	190.000 ±	10.00	
1MC088	A	04/11/92	03:10	30.000 ±	10.00	
1MC088	A	11/07/93	13:20	20.000 ±	10.00	Pre-test for 89-10 testing and mods. per MWR D25798 & D15850.
1MC088	A	11/10/93	12:30	0.000 ±	10.00	Post-test for MWR's D15850 and D25798 89-10 testing and mod. There is a 10 SCCM ILRT correction for leakage improvement the Min. Path as found = 30 SCCM and the as left = 20 SCCM.
1MC088	B	04/11/92	04:50	30.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC088	B	11/07/93	14:00	20.000 ±	10.00	
1MC088	B	11/10/93	14:54	0.000 ±	10.00	
1MC101	A	03/01/91	13:55	2500.000 ±	400.00	
1MC101	A	03/02/91	04:30	2500.000 ±	400.00	
1MC101	A	05/29/91	15:84	2500.000 ±	400.00	
1MC101	A	08/28/91	11:22	2500.000 ±	400.00	
1MC101	A	12/10/91	14:55	2060.000 ±	200.00	
1MC101	A	05/19/92	14:20	3000.000 ±	400.00	
1MC101	A	08/19/92	13:34	3000.000 ±	400.00	
1MC101	A	12/01/92	13:30	3000.000 ±	400.00	
1MC101	A	03/04/93	15:12	3250.000 ±	400.00	
1MC101	A	06/21/93	12:05	2750.000 ±	400.00	
1MC101	A	09/24/93	11:20	3250.000 ±	400.00	
1MC101	A	11/04/93	12:30	19500.000 ±	400.00	Performed for the replacement of the packing on 1VR001A. 1VR001A was closed by normal means for this test.
1MC101	A	11/20/93	12:00	150.000 ±	10.00	1VR001A was not shut by its normal means. The operator for 1VR001A is damaged and will need to be repaired prior to completion of the ILRT. The 150 SCCM leakage is determined to be the-as left Min. path leakage for this penetration. The as-found Min. path leakage was 1630 SCCM for an ILRT correction of 1480 SCCM. These valves will be lined up and stroked normally for the ILRT and no penalty added for the penetration. Since this is the PMT for D33372 valve replacement.
1MC101	A	11/28/93	16:55	250.000 ±	10.00	1VR001A was assisted closed with additional air pressure and will be tagged in this position.
1MC101	B	05/19/92	13:00	0.000 ±	10.00	THIS SET PERFORMED PRIOR TO PERFORMANCE OF SET A.
1MC101	B	11/20/93	06:50	10.000 ±	5.00	
1MC102	A	03/01/91	13:55	450.000 ±	10.00	
1MC102	A	05/29/91	12:44	350.000 ±	45.00	
1MC102	A	08/28/91	11:40	300.000 ±	45.00	
1MC102	A	12/10/91	14:25	350.000 ±	10.00	
1MC102	A	05/19/92	14:50	900.000 ±	45.00	
1MC102	A	08/19/92	13:33	800.000 ±	45.00	
1MC102	A	12/01/92	13:39	550.000 ±	45.00	
1MC102	A	03/04/93	15:10	550.000 ±	45.00	
1MC102	A	06/21/93	12:07	550.000 ±	45.00	
1MC102	A	09/24/93	11:26	650.000 ±	45.00	
1MC102	A	11/20/93	11:55	900.000 ±	45.00	
1MC102	A	11/28/93	16:55	1140.000 ±	45.00	
1MC102	B	05/19/92	13:01	0.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC102	B	11/20/93	06:40	20.000 ±	10.00	
1MC103	A	04/18/92	15:25	40.000 ±	10.00	
1MC103	A	10/22/93	10:00	55.000 ±	4.00	
1MC103	B	04/18/92	16:10	20.000 ±	10.00	
1MC103	B	10/22/93	10:33	30.000 ±	4.00	
1MC104	A	04/18/92	18:40	20.000 ±	10.00	
1MC104	A	10/22/93	14:00	85.000 ±	4.00	
1MC104	B	04/18/92	19:05	20.000 ±	10.00	
1MC104	B	10/22/93	13:29	148.000 ±	4.00	
1MC106	A	04/09/92	04:35	5000.000 ±	400.00	MWR'S D30608 FOR 1VR007A AND D30609 FOR 1VR007B WRITTEN TO REPAIR LEAKAGE. PACKING LEAKAGE WAS IDENTIFIED ON BOTH VALVES.
1MC106	A	04/24/92	15:00	20.000 ±	10.00	
1MC106	A	10/30/93	10:35	0.000 ±	10.00	
1MC106	B	04/09/92	05:08	20.000 ±	10.00	
1MC106	B	04/24/92	15:25	0.000 ±	10.00	
1MC106	B	10/30/93	11:05	25.000 ±	10.00	
1MC107	A	04/07/92	05:11	10.000 ±	10.00	
1MC107	A	10/12/93	09:35	150.000 ±	10.00	
1MC107	B	04/07/92	03:24	50.000 ±	10.00	
1MC107	B	10/12/93	10:40	100.000 ±	10.00	
1MC108	A	04/08/92	02:53	10.000 ±	5.00	
1MC108	A	10/12/93	09:35	20.000 ±	10.00	
1MC108	B	04/07/92	22:30	10.000 ±	5.00	
1MC108	B	10/12/93	10:45	20.000 ±	10.00	
1MC109	A	04/28/92	05:30	50.000 ±	10.00	
1MC109	A	10/11/93	19:25	130.000 ±	10.00	
1MC109	B	04/28/92	08:52	1500.000 ±	45.00	MWR D30597 WRITTEN TO IDENTIFY THE LEAKAGE ON 1VP004A.
1MC109	B	10/11/93	20:20	650.000 ±	45.00	
1MC110	A	04/28/92	12:25	20.000 ±	10.00	
1MC110	A	10/11/93	19:25	20.000 ±	10.00	
1MC110	B	04/28/92	13:35	20.000 ±	10.00	
1MC110	B	10/11/93	20:01	20.000 ±	10.00	
1MC113	A	04/08/92	17:45	80.000 ±	10.00	
1MC113	A	10/26/93	10:48	20.000 ±	10.00	
1MC113	B	04/08/92	18:20	0.000 ±	10.00	
1MC113	B	10/26/93	11:10	20.000 ±	10.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC116	A	06/20/91	10:49	20.000 ±	10.00	
1MC116	A	01/26/93	11:25	10.000 ±	5.00	
1MC116	B	06/20/91	10:55	20.000 ±	10.00	
1MC116	B	01/26/93	11:32	10.000 ±	5.00	
1MC151	A	02/26/92	11:07	21.000 ±	10.00	
1MC151	B	02/26/92	11:16	21.000 ±	10.00	
1MC151	C	02/26/92	10:43	21.000 ±	10.00	
1MC152	A	03/20/92	01:01	10.000 ±	10.00	
1MC152	A	10/22/93	02:25	0.000 ±	10.00	
1MC152	B	03/20/92	00:12	10.000 ±	10.00	
1MC152	B	10/22/93	15:58	0.000 ±	10.00	
1MC152	C	03/18/92	06:43	80.000 ±	10.00	
1MC152	C	10/22/93	01:36	0.000 ±	10.00	
1MC152	D	03/19/92	10:45	95.000 ±	10.00	
1MC152	D	10/22/93	14:50	0.000 ±	10.00	
1MC152	E	03/19/92	11:42	35.000 ±	10.00	
1MC152	E	10/22/93	14:07	60.000 ±	10.00	
1MC152	F	03/19/92	12:30	45.000 ±	10.00	
1MC152	F	10/22/93	13:20	0.000 ±	10.00	
1MC153	A	06/06/91	10:55	90.800 ±	10.00	TEST WAS PERFORMED IN CONJUNCTION WITH 1MC153002 TEST SET D. THE SAME CART WAS USED AND BOTH TESTS WERE TESTED AT THE SAME TIME WITH ONE RESULT AND THAT RESULT RECORDED FOR BOTH TESTS.
1MC153	A	04/07/93	10:47	62.000 ±	4.00	
1MC153	B	06/06/91	14:00	90.800 ±	10.00	
1MC153	B	04/07/93	12:50	64.000 ±	4.00	
1MC153	C	06/06/91	14:00	90.800 ±	10.00	
1MC153	C	04/07/93	11:44	2.000 ±	0.40	
1MC153	D	06/06/91	10:55	90.800 ±	10.00	
1MC153	D	04/07/93	11:08	2.000 ±	0.40	
1MC160	A	02/12/92	10:34	30.000 ±	10.00	
1MC160	B	02/12/92	10:46	40.000 ±	10.00	
1MC166	A	06/06/91	18:20	90.000 ±	10.00	
1MC166	A	02/25/92	:	0.000 ±	0.00	
1MC166	B	02/25/92	15:50	20.000 ±	10.00	
1MC169	A	04/09/92	04:20	10.000 ±	10.00	
1MC169	A	10/30/93	15:45	20.000 ±	4.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL
1MC169	B	04/09/92	04:50	10.000 ±	10.00
1MC169	B	10/30/93	16:35	20.000 ±	4.00
1MC169	C	04/09/92	05:25	100.000 ±	10.00
1MC169	C	10/30/93	14:45	92.000 ±	4.00
1MC169	D	04/09/92	05:48	10.000 ±	10.00
1MC169	D	10/30/93	16:35	5.200 ±	0.40
1MC173	A	06/18/91	14:37	20.000 ±	10.00
1MC173	A	02/04/93	11:22	2.000 ±	0.40
1MC173	B	06/18/91	13:20	20.000 ±	10.00
1MC173	B	02/04/93	13:39	2.000 ±	0.40
1MC173	C	06/18/91	13:40	20.000 ±	10.00
1MC173	C	02/04/93	13:20	2.000 ±	0.40
1MC173	D	06/18/91	14:20	20.000 ±	10.00
1MC173	D	02/04/93	11:40	2.000 ±	0.40
1MC177	A	10/09/91	09:07	0.000 ±	10.00
1MC177	A	04/21/93	15:10	2.000 ±	0.40
1MC177	B	10/09/91	09:28	20.000 ±	10.00
1MC177	B	04/21/93	15:17	2.000 ±	0.40
1MC179	A	09/25/91	10:50	20.000 ±	10.00
1MC179	A	02/17/93	08:32	0.000 ±	10.00
1MC179	B	09/25/91	11:00	20.000 ±	10.00
1MC179	B	02/17/93	08:39	0.000 ±	10.00
1MC179	C	09/25/91	11:32	20.000 ±	10.00
1MC179	C	02/17/93	08:48	0.000 ±	10.00
1MC179	D	09/25/91	11:40	20.000 ±	10.00
1MC179	D	02/17/93	08:55	0.000 ±	10.00
1MC181	A	10/01/91	09:40	0.000 ±	10.00
1MC181	A	05/12/93	10:23	0.000 ±	10.00
1MC181	B	10/01/91	09:30	0.000 ±	10.00
1MC181	B	05/12/93	10:17	0.000 ±	10.00
1MC183	A	11/20/91	13:54	20.000 ±	10.00
1MC183	B	11/20/91	13:43	20.000 ±	10.00
1MC203	A	02/13/92	13:58	92.000 ±	10.00
1MC204	A	03/19/92	23:07	5.000 ±	10.00
1MC204	A	10/28/92	14:56	140.000 ±	2.00

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC204	A	05/10/93	10:05	10.000 ±	5.00	
1MC204	B	03/20/92	04:25	20.000 ±	10.00	
1MC204	B	10/28/92	16:10	20.000 ±	2.00	
1MC204	B	05/10/93	10:50	2750.000 ±	400.00	
1MC205	A	03/20/92	17:50	800.000 ±	45.00	LEAKAGE WAS IDENTIFIED THROUGH PRESSURIZATION BOUNDARY VALVE 1SX090B. THIS LEAKAGE WAS NOT QUANTIFIED. MWR D30592 WRITTEN TO REPAIR THE LEAKING 1SX090B PRIOR TO NEXT TEST.
1MC205	A	10/28/92	13:56	20.000 ±	2.00	
1MC205	A	07/16/93	14:00	10.000 ±	5.00	PMT for 89-10 testing and modification.
1MC205	B	03/20/92	18:50	700.000 ±	45.00	LEAKAGE WAS IDENTIFIED TO BE THOUGH 1SX090B BUT WAS NOT QUANTIFIED. MWR D30592 WRITTEN TO REPAIR THE LEAKING 1SX090B PRIOR TO THE NEXT TEST.
1MC205	B	10/28/92	14:21	20.000 ±	2.00	
1MC205	B	07/16/93	14:20	10.000 ±	5.00	PMT for 89-10 testing.
1MC206	A	04/23/92	18:30	1425.000 ±	45.00	
1MC206	A	09/29/93	13:00	1200.000 ±	45.00	
1MC206	B	04/23/92	09:51	120.000 ±	10.00	
1MC206	B	09/29/93	21:39	40.000 ±	10.00	
1MC206	C	04/24/92	07:55	500.000 ±	10.00	
1MC206	C	09/29/93	23:45	900.000 ±	45.00	
1MC206	C	10/01/93	19:04	860.000 ±	45.00	PMT FOR 89-10 TESTING AND RESULTED IN 40 SCCM IMPROVEMENT TO BE ADDED TO THE ILRT.
1MC208	A	10/01/92		800.000 ±	45.00	
1MC208	A	01/07/93	13:45	20.000 ±	10.00	PMT for 89-010 testing and periodic testing of the penetration.
1MC208	A	04/26/93	13:20	20.000 ±	10.00	LLRT was performed to identify the cause for the increase in leakage of the last test. Identified that the leakage recorded last time 1/7/93 on 1SX097A was due to leakage past the 1SX095A not the containment isolation valve. MWR D30636 was written to repair this valve and the procedure was PDR'ed to remove the 1SX095A as a pressurization boundary.
1MC208	B	10/01/92		20.000 ±	10.00	
1MC208	B	01/07/93	14:45	7000.000 ±	400.00	Penetration was retested for the PMT on 1SX096A and found an increase of approximately 7000 SCCM. MWR D34670 was written to investigate the reason for the increase in the leakage. This is indicated as an excessive leakage for ISI criteria however the acceptance criteria for ISI has been increased to 20000 SCCM and the acceptance criteria in this data sheet has not yet been revised to reflect the new acceptance criteria.
1MC208	B	04/26/93	13:00	20.000 ±	10.00	
1MC210	A	03/30/92	01:20	0.000 ±	10.00	
1MC210	A	10/29/93	21:30	0.000 ±	10.00	
1MC210	B	03/30/92	01:42	0.000 ±	10.00	
1MC210	B	10/30/93	21:52	10.000 ±	5.00	

REPORT OF TYPE C LEAKAGE'S PERFORMED
SINCE THE LAST ILRT

PENET. No.	TEST SET	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	
1MC210	C	03/30/92	02:05	30.000 ±	10.00	
1MC210	C	10/30/93	23:13	20.000 ±	10.00	
1MC210	D	03/30/92	02:28	40.000 ±	10.00	
1MC210	D	10/30/93	23:32	20.000 ±	20.00	
1MC210	E	03/30/92	02:50	800.000 ±	45.00	
1MC210	E	10/30/93	23:56	3250.000 ±	400.00	
1MC210	F	03/30/92	05:45	570.000 ±	45.00	
1MC210	F	10/31/93	00:16	800.000 ±	45.00	
1MC210	G	03/30/92	03:50	50.000 ±	10.00	
1MC210	G	10/31/93	00:40	20.000 ±	10.00	
1MC210	H	03/30/92	04:10	40.000 ±	10.00	
1MC210	H	10/31/93	00:57	20.000 ±	10.00	
1MC210	I	03/30/92	04:55	10.000 ±	10.00	
1MC210	I	10/31/93	01:20	20.000 ±	10.00	
1MC210	J	03/30/92	05:20	0.000 ±	10.00	
1MC210	J	10/31/93	01:38	20.000 ±	10.00	
SPL	A	04/16/92	22:30	0.000 ±	10.00	This is a test to prove the integrity of the 1SM009 sensing line fter replacement under MWR D25205.
SPL	A	05/02/92	03:25	0.000 ±	10.00	Zero leakage test for replacement of 1CM067 per MWR D25201.
SPL	A	05/16/92	22:45	0.000 ±	0.00	Zero leakage test of the 1G33F051 valve after repair of the packing leakage per D31037.
SPL	X	04/24/92	19:05	0.000 ±	0.00	Zero leakage test of bonnet for pmt of 1G33F052B (D27415.)
SPL	X	11/26/93	04:25	0.000 ±	0.00	Zero leakage test of bonnet for pmt of 1G33F052B (D53800.)

REPORT OF THE TYPE B TESTS
PERFORMED SINCE THE LAST ILRT

PENET. No.	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	Remarks:
1EE01E	01/20/92	11:39	0.000 ±	10.0	
1EE02E	01/20/92	14:19	0.000 ±	10.0	
1EE03E	01/20/92	11:39	0.000 ±	10.0	
1EE04E	01/20/92	14:19	0.000 ±	10.0	
1EE05E	01/20/92	11:39	0.000 ±	10.0	
1EE06E	01/20/92	14:19	0.000 ±	10.0	
1EE07E	01/20/92	11:39	0.000 ±	10.0	
1EE08E	01/20/92	14:19	0.000 ±	10.0	
1EE09E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE10E	01/21/92	13:40	0.000 ±	10.0	
1EE11E	01/21/92	13:40	0.000 ±	10.0	
1EE12E	01/20/92	11:39	0.000 ±	10.0	
1EE13E	01/20/92	14:19	0.000 ±	10.0	
1EE14E	01/20/92	11:39	0.000 ±	10.0	
1EE15E	01/20/92	14:19	0.000 ±	10.0	
1EE16E	01/20/92	11:39	0.000 ±	10.0	
1EE17E	01/20/92	14:19	0.000 ±	10.0	
1EE18E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE19E	01/21/92	13:40	0.000 ±	10.0	
1EE20E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE21E	01/21/92	13:40	0.000 ±	10.0	
1EE22E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE23E	01/21/92	13:40	0.000 ±	10.0	
1EE24E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE25E	01/21/92	13:40	0.000 ±	10.0	
1EE26E	01/20/92	11:39	0.000 ±	10.0	
1EE27E	01/20/92	14:19	0.000 ±	10.0	
1EE28E	01/20/92	11:39	0.000 ±	10.0	
1EE29E	01/20/92	14:19	0.000 ±	10.0	
1EE30E	01/20/92	11:39	0.000 ±	10.0	
1EE31E	01/20/92	14:19	0.000 ±	10.0	
1EE32E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE33E	01/21/92	13:40	0.000 ±	10.0	
1EE34E	01/21/92	13:40	0.000 ±	10.0	
1EE35E	01/21/92	13:40	0.000 ±	10.0	
1EE36E	01/20/92	11:39	0.000 ±	10.0	
1EE37E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE38E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.
1EE39E	01/22/92	10:43	0.000 ±	10.0	
1EE40E	01/16/92	16:22	0.000 ±	10.0	
1EE41E	01/22/92	10:43	0.000 ±	10.0	
1EE42E	01/22/92	10:43	0.000 ±	10.0	
1EE43E	01/16/92	17:00	0.000 ±	10.0	1EE09E, 1EE20E, 1EE18E, 1EE22E, 1EE24E, 1EE32E, 1EE37E, 1EE38E & 1EE43E PERFORMED AS ONE SINGLE TEST. MEASURED LEAKAGE ASSIGNED TO EACH PENETRATION.

REPORT OF THE TYPE B TESTS
PERFORMED SINCE THE LAST ILRT

PENET. No.	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	Remarks:
1EE44E	01/22/92	13:35	0.000 ±	10.0	
1EE44E	10/23/93	13:20	0.000 ±	10.0	
1EE45E	01/20/92	14:19	0.000 ±	10.0	
1EE46E	01/22/92	14:25	0.000 ±	10.0	Upper air lock penetrations.
1EE47E	01/22/92	14:25	0.000 ±	10.0	Upper air lock penetrations.
1EE48E	01/22/92	14:55	0.000 ±	10.0	Lower air lock penetrations.
1EE49E	01/22/92	14:55	0.000 ±	10.0	Lower air lock penetrations.
1MC001	05/13/92	20:28	0.000 ±	10.0	
1MC001	05/16/92	18:28	0.000 ±	10.0	
1MC001	07/05/92	12:30	10.000 ±	5.0	
1MC001	07/05/92	11:05	0.000 ±	10.0	
1MC001	09/20/93	10:22	0.500 ±	0.4	LRM and induced flow used for test.
1MC001	11/17/93	22:40	0.000 ±	10.0	
1MC001	11/20/93	04:10	2.000 ±	0.4	LRM used and is PMT for hatch installation.
1MC002	07/10/91	13:30	30.000 ±	7.1	THIS TEST RESULT INCLUDES THE TOTAL OF THE TEST FLANGE AND THE BARREL.
1MC002	01/02/92	11:39	40.000 ±	14.1	This test is a combination of the barrel and the flange.
1MC002	06/09/92	13:23	20.000 ±	14.1	O rings replaced on the 2" flange. Tolerance is the square root of the sum of the squares of the to test segments.
1MC002	11/18/92	12:45	250.000 ±	14.1	
1MC002	12/01/92	23:10	380.000 ±	14.1	PMT FOR SHAFT REPLACEMENT PER MWR D32491
1MC002	05/05/93	13:55	260.000 ±	14.1	
1MC002	11/20/93	20:05	230.000 ±	11.2	Leakage is 220 ±10 SCCM for the Barrel and 10 ±5 for the test flange.
1MC003	07/08/91	13:45	40.000 ±	14.1	THIS TEST RESULT INCLUDES THE TOTAL OF THE TEST FLANGE AND THE BARREL.
1MC003	12/18/91	11:38	20.000 ±	14.1	
1MC003	05/21/92	15:48	3800.000 ±	400.0	MWR D30599 written to repair the upper inner and outer shaft seals. Upper inner leaked about 180 SCCM and the upper outer leaked about 18000 SCCM. when tested separately.
1MC003	05/22/92	09:20	20.000 ±	14.1	PMT for MWR D30599 written to repair the upper inner and outer shaft seals.
1MC003	05/22/92	09:20	20.000 ±	14.1	PMT for MWR D30599 written to repair the upper inner and outer shaft seals.
1MC003	10/28/92	13:16	40.000 ±	14.1	
1MC003	03/31/93	13:25	10.000 ±	11.2	
1MC003	09/01/93	21:50	50.000 ±	14.1	
1MC003	11/15/93	21:08	5500.000 ±	400.0	Leakage identified by the shaft seal and MWR D52671 written to repair the leakage.
1MC003	11/16/93	16:48	40.000 ±	14.1	PMT for D52671 repair of the leaking shaft seal. The as-found leakage for the ILRT was 50 SCCM leakage the As-Left was 40 SCCM. There is a 10 SCCM ILRT correction.
1MC004	03/30/92	23:27	21.360 ±	22.4	THIS IS COMBINED LEAKAGE FOR ALL FIVE TEST BOUNDARIES.
1MC004	09/13/93	13:59	10.000 ±	10.0	All five test boundaries tested at once. The entire bellows was snooped with no indication of leakage.
1MC004	10/26/93	23:35	21.000 ±	10.0	The entire bellow was snooped and zero leakage indicated.
1MC042	05/05/92	12:27	20.000 ±	10.0	
1MC067	02/25/91	14:15	0.000 ±	10.0	THIS IS A POST TEST FOR THE ILRT AND PMT FOR MWR D05469 THAT REPLACED THE INBOARD BLIND FLANGE.
1MC067	05/15/92	18:34	0.000 ±	10.0	
1MC067	09/16/93	11:34	0.000 ±	10.0	
1MC067	11/28/93	08:55	10.000 ±	5.0	
1MC067	11/30/93	01:22	0.000 ±	10.0	
1MC074	11/14/93	13:28	20.000 ±	10.0	
1MC151	11/02/93	14:35	0.000 ±	0.0	Pre-test Snoop of welds for repair of 1CM051 excess flow check valve.
1MC211	05/14/92	17:42	320.000 ±	10.0	
1MC211	11/19/93	20:20	10.000 ±	5.0	
1MC212	12/23/91	13:22	17.700 ±	10.0	
1MC212	12/23/91	13:30	17.700 ±	10.0	
1MC212	12/26/91	02:38	17.800 ±	10.0	

REPORT OF THE TYPE B TESTS
PERFORMED SINCE THE LAST ILRT

PENET. No.	TEST DATE	TEST TIME	MEASURED LEAKAGE	TOL	Remarks:
1MC212	12/26/91	02:53	17.800 ±	10.0	
1MC212	04/30/92	23:00	352.000 ±	45.0	
1MC212	04/30/92	19:02	17.500 ±	10.0	
1MC212	04/30/92	19:10	17.500 ±	10.0	
1MC212	05/21/92	09:53	17.900 ±	10.0	
1MC212	05/21/92	10:13	17.900 ±	10.0	
1MC212	05/26/92	13:57	18.000 ±	10.0	
1MC212	05/26/92	13:49	18.000 ±	10.0	
1MC212	05/30/92	08:27	0.000 ±	10.0	
1MC212	05/30/92	08:35	0.000 ±	10.0	
1MC212	07/05/92	14:20	17.700 ±	10.0	
1MC212	07/05/92	14:28	17.700 ±	10.0	
1MC212	07/05/92	12:15	17.600 ±	10.0	
1MC212	07/05/92	12:08	17.600 ±	10.0	
1MC212	07/06/92	16:37	18.000 ±	10.0	
1MC212	07/06/92	16:43	18.000 ±	10.0	
1MC212	11/06/93	12:40	350.000 ±	10.0	
1MC212	11/06/93	13:58	0.000 ±	10.0	
1MC212	11/06/93	13:38	17.500 ±	10.0	