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10 CFR 50 Appendix J

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Joseph M. Farley Nuclear Plant - Unit 1
Reactor Containment Building Integrated Leakage Rate Test

Gentlemen:

Pursuant to the requirements of 10CFR50, Appendix J, Section V.B., Alabama Power Company herewith submits the Joseph M. Farley Nuclear Plant Unit 1 fourth periodic Reactor Containment Building Integrated Leakage Rate Test Report. This report describes and summarizes the Integrated Leakage Rate Test (ILRT) activities performed as a part of the Unit 1 tenth refueling outage. This test was completed on May 9, 1991.

Other pertinent report information, including, as applicable, test plans and schedules, test results and reports and test methods and procedures, is available at Farley Nuclear Plant for review.

If there are any questions, or if additional information is needed, please advise.

Respectfully submitted,

J. D. Woodard

JDW/DEM/TRH:pgr trh-oa

Enclosure

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REACTOR CONTAINMENT BUILDING INTEGRATED LEAK RATE TEST UNIT 1 - FOURTH PERIODIC

Prepared by:

Southern Company Services, Inc.

May 1991

Alabama Power

the southern electric system

ALABAMA POWER COMPANY

J. M. FARLEY NUCLEAR PLANT

UNIT 1

FOURTH PERIODIC

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

MAY 1991

FINAL REPORT

Prepared by

Southern Company Services, Inc.

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1.0 INTRODUCTION

The Fourth Periodic Integrated Leakage Rate Test (ILRT) at Alabama Power Company's Joseph M. Farley Nuclear Plant (FNP) Unit 1 was performed on May 8-9, 1991. The ILRT was performed as required by 10CFR50 Appendix J (Reference 1) and the Farley FSAR (Reference 4) to demonstrate that leakage through the containment boundary at design basis accident pressure does not exceed the FNP Technical Specification (Reference 2) limit. The test was performed in accordance with procedure FNP-1-STP-117.0 Revision 8, Official Test Copy #910422-1 (Reference 3). The following documentation is retained at the site along with the Official Test Copy of the procedure:

- o access procedure
- o containment penetrations
- o operating instrumentation status (used for test)
- o systems status (lineup)
- o event log
- o instrumentation validation (calibrations, ISG, etc.)
- o temperature stabilization data
- o test procedure
- o local leak rate tests
- o integrated leakage rate data
- o quality assurance
- o verification leakage rates

A summary of general plant information as related to the Integrated Leak Rate Test is provided in Appendix IV.

2.0 SUMMARY

The Fourth Periodic Integrated Leakage Rate Test for the Farley Unit 1 containment was successfully completed at 5:30 p.m. on May 9, 1991. The duration of the test was 24 hours. The results of the test follow: (Additional leakage to account for penetrations in service or isolated during the test and not in post accident alignment are included in the leakage rates. The 95% UCL plus any penalty addition is referred to as the final leakage rate.)

Leakage Rate (weight % / day)

Mass Point Analysis

Measured Leakage Rate	95% UCL	Final Leakage Rate (UCL + penalties)	Acceptance Limit (0.75 La)
0.0529	0.0545	0.0547	0.1125

3.0 METHODOLOGY

3.1 Leakage Rate Calculations

Data from the instrumented containment is reduced by direct application of the ideal gas law, PV = w RT, to calculate air mass at each data point. The change in air mass provides information to develop the leakage rate.

The mass point data analysis technique assumes that the leakage rate is constant with time and thus the data can be analyzed by the method of linear least squares. The slope of this line represents the rate of change of air mass with respect to time, which is the leakage rate. A typical description of the mass point method can be found in ANSI/ANS 56.8 1987 (Reference 5).

An upper confidence limit (UCL) is set such that there is only a five percent chance that the actual containment leakage rate exceeds the reported UCL value. This 95% UCL on calculated leakage rate rather than the calculated rate itself is the number used to determine acceptance.

3.2 Test Measurements

Twenty-three drybulb and six dewpoint temperature sensors located inside containment were used to collect information for leakage rate calculations. These were located at approximately equally spaced elevations. Sensor locations and volume fractions (Table 1) were established by considering temperature distributions in past tests and the containment free volume.

Drybulb temperatures were measured using 100 Ohm platinum resistance temperature detectors (RTDs). Dewpoint temperatures were measured using optical chilled mirror dew point hygrometers. These devices use a direct-measuring sensor automatically held at the dew point temperature by an optical system. This technique is a primary measurement of the water vapor content of the air. The mirror temperature represents the true dew point temperature and is measured by an imbedded precision platinum resistance thermometer.

Absolute pressure was measured using a vibrating cylinder element sensor connected through tubing to a containment penetration. The change in pressure during an ILRT is quite small relative to absolute pressure. The pressure device used has an accuracy of +/- 0.015% RDG, +/- 0.002% F.S. and a repeatability of +/- 0.001% F.S.

A data logger was used to collect data at fifteen minute intervals. Information from the RTDs, dewpoint sensors, and

pressure indicators was transferred from the data logger to the ILRT computer for analysis. The data system generated a printed tape record of each data set transmitted to the computer.

The ILRT computer was an IBM PC compatible. A compiled Basic program as described in Appendix I was run on the computer.

The imposed leakage rate for the verification test was measured using a float type flowmeter.

All instrumentation was calibrated prior to the ILRT. Instrumentation characteristics and calibration information is summarized in Appendix III. Calibration documents are included with the official test copy of the procedure.

4.0 TEST PROCEDURE

4.1 Initial Conditions

A general inspection of the accessible interior and exterior surfaces of the containment building was performed prior to the ILRT. No repairs or adjustments were made to the containment after initiation of the inspection so that the building could be tested as close as practical to the "as is" condition. All Type B an C local leak rate tests (Appendix II) were completed prior to the inspection. The inspection uncovered no evidence of structural deterioration which would affect the containment structural integrity or leak-tightness.

Plant systems were aligned for the ILRT as specified in the plant procedure. Isolation valves, except those in systems required to maintain the plant in a safe condition and those systems used to conduct the ILRT, were set in post-LOCA positions specified in the FSAR.

For those systems or penetrations that were in service or isolated during the test a penalty addition must be made to the Type A test results. The penalty addition is the sum of the minimum pathway leakages for those penetrations determined to be in a position other than normal post-LOCA position. Penetrations included in this penalty calculation were RCP Seal Return (#28), Component Cooling Water (#46), Pressurizer Steam Sample (#56), Pressurizer Liquid Sample (#57), and ILRT Post Accident Sample/Pressure Sensing Line (#61A).

Piping was vented and drained to expose valve seats per post-LOCA scenarios. All sources of gas at pressures above containment test pressure were isolated or vented to prevent leakage into the containment during the ILRT.

A temperature survey was performed to confirm the placement locations of the sensors. An in-situ test on the sensors was performed to demonstrate the proper functioning of the sensors and the data collection system. RTD in-situ tests were done using an ice bath (32 degrees F) and verifying that temperature at the data system. Dewpoint in-situ tests were done using a calibrated dewpoint instrument (spare dewcell) to measure dewpoint temperature at each sensor and comparing the results with dewpoint temperature at the data system. The temperature survey showed that all instruments were operating within +/- one degree of the standard.

The Official Test Copy of the procedure documents the completion of the prerequisites for the test including all exceptions to specified conditions.

4.2 Pressurization

The containment was pressurized using oil free compressors discharging through an after cooler/moisture separator and refrigerated air dryer. Six 1500 SCFM, two 1200 SCFM, and one 900 SCFM compressors were used. Start of pressurization occurred at 3:00 a.m. on May 8, 1991. Pressurization was terminated when containment pressure reached 50 psig at 1:30 p.m. on May 8, 1991. This allowed a 2 psi margin for pressure drop to ensure the gage pressure would be at or above the 48 psig minimum pressure required for the test.

To assist with the circulation of pressurizing air the containment ventilation fans were run until the containment pressure had reached 50 psi. Containment lights were turned off when the pressure reached 10 psi.

4.3 Stabilization

Upon reaching ILRT test pressure the containment was allowed to stabilize. Containment conditions were recorded at fifteen minute intervals. Stabilization criteria was met at 5:30 p.m. on May 8 (see Table 2). Actual change rates and maximum allowable change rates are listed below:

Rate	Actual	Maximum Allowable
Difference between rate of temperature change averaged over last hour and the rate of temperature change averaged over the last four hours	dT1 = -0.139 dT4 = -0.293 dT1 - dT4 = 0.155 degrees	0.5 degrees (0.155<0.5)

Containment temperature stabilization data is shown graphically in Figure 1.

4.4 Type A Test

Immediately upon meeting stabilization criteria data the start of the Type A test was declared. (i.e. the last stabilization data point was used for the first type A test data point.) Thus the Type A test was started at 5:30 p.m. on May 8. Containment conditions were recorded at fifteen minute intervals. The test was successfully concluded at 5:30 p.m. on May 9. Results of the test are recorded in section 5.1 of this report. The Type A test was conducted in accordance with the provisions of ANS N45.4-1972 (Reference 6).

4.5 Verification

Following completion of the Type A test a 9.744 SCFM (0.1649 wt.%/day) verification leak was imposed. The verification test was then started at 5:45 p.m. on May 9 and successfully completed at 9:45 p.m. on May 9. Results of the test are recorded in section 5.2.

Table 3 provides a summary of data collected during the stabilization, the Type A test, and the verification as discussed in sections 4.3, 4.4, and 4.5.

5.0 RESULTS AND ANALYSIS

5.1 Mass Point Results

The end of test leakage rate was well within the acceptance criteria stated in Reference 2 and 3. This includes the 95% UCL plus any penalty additions. Penalty additions are the sum of the minimum pathway leakages determined for those penetrations which were not in a normal post-LOCA position. A summary of these penetrations and their contribution to the penalty addition are presented below:

Penetration	Description	As-left leakage (SCCM)
28	RCP Seal Return	133.9
46	Component Cooling Water	206.1
56	Pressurizer Steam Sample	39.2
57	Pressurizer Liquid Sample	1.6
61A	ILRT Post Accident Containment Sample/ Pressure Sensing Line	21.9
Total leakage (SCCM)		402.7
Total leakage (wt.%/day)		0.00024

The FNP Technical Specifications specify a maximum allowable leakage rate of 0.150 wt.%/day. To allow a margin for deterioration of the leakage boundary the as left leakage rate must be less than 75% of the maximum allowable rate. UCL leakage rate, penalty addition, final leakage rate and acceptance limit are listed below:

95% UCL Leakage Rate	0.0545 wt.%/day
Penalty Addition	0.0002 wt.%/day
Final Leakage Rate	0.0547 wt.%/day
Acceptance Limit (0.75 La)	0.1125 wt.%/day

Figures 2 through 6 present a graphic demonstration of the data collected during the Type A test. The air mass plot (figure 2) shows lines whose slopes represent leakage rates. A least squares fit line is plotted through the actual test data which must lie above a line representing the acceptance limit. As seen in the graph the actual leakage rate was easily less than the allowable rate. The temperature plot (figure 3) shows the weighted average drybulb temperature of the containment air mass. The total temperature change was 0.8075 degrees F over the 24 hour test period. The pressure plot (figure 4) shows the containment total pressure and a total change of 0.1337 psi. The vapor pressure plot (figure 5) shows a total change in vapor pressure of 0.0032 psi. Figure 6 shows a plot of mass point leakage rate data from Table 4. The leakage rate UCL must be below a line representing the acceptance limit. As seen from the graph the UCL is well below the allowable limit.

5.2 Verification Results

The verification test introduced an additional leak of 9.744 SCFM (0.1649 wt.%/day). Verification test results are listed in Table 5 and graphed in Figures 7 and 8. The results of verification are acceptable if the leakage rate calculated after imposition of the additional leak falls within the limits of Lam + Lo +- 0.25 La, where Lam is the previously calculated leakage rate; Lo is the imposed leakage; and La is the maximum allowable leakage rate. The final results and acceptance limits are listed below:

Upper Limit Rate	0.2553 wt.%/day
Mass Point Calculated Rate	0.1892 wt.%/day
Lower Limit Rate	0.1803 wt.%/day

6.0 REFERENCES

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

2. Joseph M. Farley Nuclear Plant, Unit 1, Technical Specifications 3/4.6.1

3. Farley Nuclear Plant, Surveillance Test Procedure FNP-1-STP-117.0 revision 8, Containment Integrated Leak Rate Test, Official Test Copy #910422-1

4. Farley Nuclear Plant, Units 1 and 2, Final Safety Analysis Report. (Sections 3.1.45, 6.2.1.4)

5. ANSI/ANS 56.8-1987, Containment System Leakage Testing Requirements.

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

TABLES AND FIGURES

TABLE 1

DRYBULB AND DEWPOINT TEMPERATURE SENSOR LOCATIONS

DRYBULB SENSORS

Sensor Number	Elevation (feet)	Azimuth (degrees)	Distance From Ctr of Ctmt (ft)	Volume Fractions
1	247	275	40	0.0456
2	240	145	48	0.0461
3	265	85	30	0.0507
4	232	95	48	0.0460
5	211	145	45.5	0.0460
6	197	325	45.5	0.0460
7	218	300	45.5	0.0460
8	255	325	40	0.0507
9	190	275	45.5	0.0456
10	226	45	48	0.0460
11	176	95	45.5	0.0508
12	183	145	45.5	0.0447
13	168	325	45.5	0.0494
14	152	30	55	0.0368
15	143	175	55	0.0411
16	125	25	55	0.0323
17	116	130	55	0.0432
18	108	250	55	0.0278
19	272	325	8	0.0525
20	138	75	25	0.0200
21	160	275	45.5	0.0464
22	204	95	45.5	0.0460
23	134	310	55	0.0403
				1.0000

DEWPOINT SENSORS

1	204	325	45.5	0.1836
2	232	95	48	0.1841
3	262	325	8	0.1995
4	176	60	60	0.1449
5	143	175	55	0.1746
6	116	250	43	0.1133
				1.0000

TABLE 2

TEMPERATURE STABILIZATION REPORT
Start Time = 1330 5/8/91
* = stabilization criterion satisfied

data set	elapsed time, hr	temperature T, deg F	dT1 avg dT (1 hr)	dT4 avg dT (4 hr)	dT1-Dt4
1	0.00	86.206			
2	0.25	85.948			
3	0.50	85.848			
4	0.75	85.746			
5	1.00	85.651	-0.555		
6	1.25	85.576	-0.372		
7	1.50	85.493	-0.354		
8	1.75	85.429	-0.317		
9	2.00	85.362	-0.288		
10	2.25	85.306	-0.270		
11	2.50	85.258	-0.236		
12	2.75	85.213	-0.216		
13	3.00	85.171	-0.192		
14	3.25	85.133	-0.173		
15	3.50	85.100	-0.158		
16	3.75	85.067	-0.146		
17	4.00	85.032	-0.139	-0.293	0.155*

TABLE 3 (STABILIZATION)

DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	dry air mass lbm
1	1330	508	86.2058	64.5953	0.4522	634327.99
2	1345	508	85.9477	64.5952	0.4554	634595.37
3	1400	508	85.8475	64.5806	0.4544	634577.74
4	1415	508	85.7462	64.5673	0.4558	634549.91
5	1430	508	85.6506	64.5554	0.4550	634551.04
6	1445	508	85.5760	64.5448	0.4535	634547.75
7	1500	508	85.4934	64.5347	0.4557	634522.67
8	1515	508	85.4291	64.5254	0.4551	634511.18
9	1530	508	85.3622	64.5171	0.4559	634499.41
10	1545	508	85.3062	64.5095	0.4549	634499.28
11	1600	508	85.2575	64.5026	0.4533	634502.63
12	1615	508	85.2133	64.4963	0.4545	634480.06
13	1630	508	85.1705	64.4903	0.4534	634481.06
14	1645	508	85.1329	64.4849	0.4540	634465.68
15	1700	508	85.0996	64.4797	0.4537	634456.11
16	1715	508	85.0671	64.4747	0.4539	634441.91
17	1730	508	85.0320	64.4702	0.4544	634433.69

TABLE 3 (TYPE A TEST)

DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	dry air mass lbm
1	1730	508	85.0320	64.4702	0.4544	634433.69
2	1745	508	85.0020	64.4661	0.4539	634432.98
3	1800	508	84.9700	64.4619	0.4537	634430.28
4	1815	508	84.9432	64.4580	0.4539	634421.70
5	1830	508	84.9212	64.4541	0.4539	634407.84
6	1845	508	84.8944	64.4503	0.4536	634404.51
7	1900	508	84.8757	64.4467	0.4538	634388.87
8	1915	508	84.8476	64.4432	0.4540	634385.20
9	1930	508	84.8286	64.4399	0.4539	634375.08
10	1945	508	84.8017	64.4366	0.4541	634372.20
11	2000	508	84.7807	64.4333	0.4542	634362.21
12	2015	508	84.7513	64.4303	0.4539	634370.45
13	2030	508	84.7411	64.4275	0.4542	634351.51
14	2045	508	84.7263	64.4247	0.4539	634343.70
15	2100	508	84.7081	64.4221	0.4537	634341.10
16	2115	508	84.6933	64.4196	0.4538	634332.60
17	2130	508	84.6759	64.4171	0.4539	634326.69
18	2145	508	84.6620	64.4147	0.4537	634321.74
19	2200	508	84.6497	64.4124	0.4537	634313.35
20	2215	508	84.6337	64.4104	0.4539	634309.69
21	2230	508	84.6170	64.4083	0.4538	634309.54
22	2245	508	84.6030	64.4061	0.4538	634303.97
23	2300	508	84.5936	64.4041	0.4534	634298.90
24	2315	508	84.5851	64.4021	0.4539	634284.22
25	2330	508	84.5682	64.4002	0.4536	634288.00
26	2345	508	84.5579	64.3984	0.4537	634281.60
27	0	509	84.5431	64.3966	0.4536	634281.76
28	15	509	84.5287	64.3948	0.4535	634281.31
29	30	509	84.5195	64.3931	0.4534	634275.86
30	45	509	84.5111	64.3915	0.4533	634271.00
31	100	509	84.4975	64.3899	0.4530	634273.92
32	115	509	84.4897	64.3884	0.4532	634266.06
33	130	509	84.4798	64.3868	0.4532	634261.74
34	145	509	84.4741	64.3855	0.4529	634258.74
35	200	509	84.4687	64.3839	0.4529	634249.01
36	215	509	84.4601	64.3825	0.4527	634247.56
37	230	509	84.4506	64.3811	0.4527	634244.14
38	245	509	84.4443	64.3797	0.4528	634237.22
39	300	509	84.4386	64.3785	0.4526	634233.32
40	315	509	84.4345	64.3772	0.4527	634224.82
41	330	509	84.4258	64.3760	0.4521	634228.52
42	345	509	84.4184	64.3748	0.4525	634221.93
43	400	509	84.4149	64.3739	0.4524	634217.40
44	415	509	84.4066	64.3728	0.4524	634216.77
45	430	509	84.4006	64.3716	0.4523	634212.24
46	445	509	84.3975	64.3707	0.4523	634206.77
47	500	509	84.3899	64.3696	0.4525	634203.64
48	515	509	84.3819	64.3686	0.4521	634206.51

49	530	509	84.3762	64.3674	0.4522	634200.78
50	545	509	84.3717	64.3664	0.4523	634194.75
51	600	509	84.3681	64.3655	0.4523	634189.84
52	615	509	84.3647	64.3646	0.4521	634187.24
53	630	509	84.3560	64.3636	0.4521	634187.18
54	645	509	84.3453	64.3627	0.4520	634191.58
55	700	509	84.3404	64.3615	0.4521	634184.54
56	715	509	84.3310	64.3603	0.4520	634184.65
[illegible]	730	509	84.3228	64.3591	0.4520	634182.39
[illegible]	745	509	84.3141	64.3580	0.4520	634181.32
[illegible]	800	509	84.3060	64.3569	0.4520	634179.94
[illegible]	815	509	84.3037	64.3560	0.4523	634170.85
[illegible]	830	509	84.3025	64.3549	0.4520	634163.94
[illegible]	845	509	84.2955	64.3539	0.4520	634162.27
63	900	509	84.2910	64.3531	0.4519	634160.68
64	915	509	84.2889	64.3524	0.4519	[illegible]
65	930	509	84.2834	64.3515	0.4518	[illegible]
66	945	509	84.2751	64.3508	0.4517	[illegible]
67	1000	509	84.2753	64.3503	0.4519	[illegible]
68	1015	509	84.2683	64.3493	0.4519	[illegible]
69	1030	509	84.2627	64.3487	0.4515	[illegible]
70	1045	509	84.2608	64.3480	0.4517	634147.06
71	1100	509	84.2573	64.3472	0.4517	634142.80
72	1115	509	84.2557	64.3465	0.4519	634136.62
73	1130	509	84.2569	64.3460	0.4519	634129.94
74	1145	509	84.2526	64.3455	0.4516	634133.34
75	1200	509	84.2460	64.3448	0.4516	634133.95
76	1215	509	84.2480	64.3444	0.4514	634129.14
77	1230	509	84.2499	64.3438	0.4513	634122.45
78	1245	509	84.2441	64.3435	0.4517	634121.84
79	1300	509	84.2421	64.3429	0.4517	634118.64
80	1315	509	84.2421	64.3426	0.4514	634118.14
81	1330	509	84.2386	64.3419	0.4513	634117.04
82	1345	509	84.2358	64.3412	0.4514	634111.68
83	1400	509	84.2335	64.3408	0.4514	634110.54
84	1415	509	84.2320	64.3403	0.4516	634105.15
85	1430	509	84.2328	64.3399	0.4514	634102.63
86	1445	509	84.2332	64.3393	0.4513	634096.73
87	1500	509	84.2267	64.3390	0.4513	634101.39
88	1515	509	84.2273	64.3387	0.4513	634097.96
89	1530	509	84.2278	64.3383	0.4516	634090.62
90	1545	509	84.2271	64.3378	0.4512	634090.17
91	1600	509	84.2283	64.3376	0.4516	634083.01
92	1615	509	84.2286	64.3374	0.4512	634084.34
93	1630	509	84.2278	64.3371	0.4514	634080.02
94	1645	509	84.2273	64.3371	0.4511	634084.24
95	1700	509	84.2267	64.3369	0.4511	634083.19
96	1715	509	84.2263	64.3367	0.4515	634077.16
97	1730	509	84.2245	64.3365	0.4512	634080.44

TABLE 3 (VERIFICATION)

DATA SUMMARY REPORT

data set	time	date	temperature deg F	pressure psia	vapor pressure psia	dry air mass lbm
1	1745	509	84.2198	64.3348	0.4511	634070.01
2	1800	509	84.2194	64.3332	0.4512	634053.90
3	1815	509	84.2151	64.3317	0.4511	634045.06
4	1830	509	84.2155	64.3301	0.4512	634027.15
5	1845	509	84.2121	64.3285	0.4511	634016.79
6	1900	509	84.2112	64.3271	0.4511	634003.64
7	1915	509	84.2075	64.3256	0.4511	633992.57
8	1930	509	84.2091	64.3242	0.4512	633976.33
9	1945	509	84.2052	64.3226	0.4509	633967.77
10	2000	509	84.2025	64.3210	0.4510	633954.53
11	2015	509	84.2023	64.3197	0.4510	633941.09
12	2030	509	84.1996	64.3184	0.4510	633931.54
13	2045	509	84.1973	64.3169	0.4512	633918.09
14	2100	509	84.1959	64.3158	0.4509	633906.73
15	2115	509	84.2010	64.3144	0.4509	633891.52
16	2130	509	84.2014	64.3133	0.4508	633880.66
17	2145	509	84.2022	64.3120	0.4509	633866.60

TABLE 4

MASS POINT LEAKAGE RATE REPORT

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	leakage rate (%/day)	ucl rate (%/day)
1	1730	508	0.00	634433.69	0.0000	0.0000
2	1745	508	0.25	634432.98	0.0108	0.0108
3	1800	508	0.50	634430.28	0.0258	0.1002
4	1815	508	0.75	634421.70	0.0585	0.1152
5	1830	508	1.00	634407.84	0.0953	0.1518
6	1845	508	1.25	634404.51	0.0994	0.1332
7	1900	508	1.50	634388.87	0.1156	0.1450
8	1915	508	1.75	634385.20	0.1173	0.1385
9	1930	508	2.00	634375.08	0.1205	0.1369
10	1945	508	2.25	634372.20	0.1179	0.1311
11	2000	508	2.50	634362.21	0.1180	0.1286
12	2015	508	2.75	634370.45	0.1088	0.1218
13	2030	508	3.00	634351.51	0.1090	0.1199
14	2045	508	3.25	634343.70	0.1095	0.1187
15	2100	508	3.50	634341.10	0.1080	0.1161
16	2115	508	3.75	634332.60	0.1074	0.1145
17	2130	508	4.00	634326.69	0.1067	0.1130
18	2145	508	4.25	634321.74	0.1057	0.1113
19	2200	508	4.50	634313.35	0.1052	0.1103
20	2215	508	4.75	634309.69	0.1042	0.1089
21	2230	508	5.00	634309.54	0.1021	0.1068
22	2245	508	5.25	634303.97	0.1004	0.1050
23	2300	508	5.50	634298.90	0.0988	0.1032
24	2315	508	5.75	634284.22	0.0987	0.1028
25	2330	508	6.00	634288.00	0.0973	0.1013
26	2345	508	6.25	634281.60	0.0962	0.1000
27	0	509	6.50	634281.76	0.0945	0.0984
28	15	509	6.75	634281.31	0.0925	0.0966
29	30	509	7.00	634275.86	0.0908	0.0950
30	45	509	7.25	634271.00	0.0893	0.0935
31	100	509	7.50	634273.92	0.0873	0.0917
32	115	509	7.75	634266.06	0.0858	0.0902
33	130	509	8.00	634261.74	0.0845	0.0888
34	145	509	8.25	634258.74	0.0832	0.0874
35	200	509	8.50	634249.01	0.0824	0.0864
36	215	509	8.75	634247.56	0.0814	0.0854
37	230	509	9.00	634244.14	0.0805	0.0843
38	245	509	9.25	634237.22	0.0798	0.0835
39	300	509	9.50	634233.32	0.0792	0.0827
40	315	509	9.75	634224.82	0.0788	0.0822
41	330	509	10.00	634228.52	0.0780	0.0813
42	345	509	10.25	634221.93	0.0773	0.0806
43	400	509	10.50	634217.40	0.0768	0.0799
44	415	509	10.75	634216.77	0.0761	0.0791
45	430	509	11.00	634212.24	0.0754	0.0784
46	445	509	11.25	634206.77	0.0749	0.0778
47	500	509	11.50	634203.64	0.0744	0.0772
48	515	509	11.75	634206.51	0.0736	0.0764

49	530	509	12.00	634200.78	0.0729	0.0757
50	545	509	12.25	634194.75	0.0724	0.0751
51	600	509	12.50	634189.84	0.0719	0.0746
52	615	509	12.75	634187.24	0.0715	0.0740
53	630	509	13.00	634187.18	0.0709	0.0734
54	645	509	13.25	634191.58	0.0701	0.0726
55	700	509	13.50	634184.54	0.0694	0.0720
56	715	509	13.75	634184.65	0.0687	0.0713
57	730	509	14.00	634182.39	0.0680	0.0706
58	745	509	14.25	634181.32	0.0673	0.0699
59	800	509	14.50	634179.94	0.0666	0.0691
60	815	509	14.75	634170.85	0.0660	0.0686
61	830	509	15.00	634163.94	0.0656	0.0681
62	845	509	15.25	634162.27	0.0651	0.0676
63	900	509	15.50	634160.68	0.0647	0.0671
64	915	509	15.75	634156.55	0.0642	0.0666
65	930	509	16.00	634154.19	0.0638	0.0661
66	945	509	16.25	634158.59	0.0632	0.0656
67	1000	509	16.50	634149.30	0.0628	0.0651
68	1015	509	16.75	634149.03	0.0624	0.0646
69	1030	509	17.00	634154.26	0.0618	0.0640
70	1045	509	17.25	634147.06	0.0613	0.0635
71	1100	509	17.50	634142.90	0.0608	0.0631
72	1115	509	17.75	634136.62	0.0605	0.0627
73	1130	509	18.00	634129.94	0.0602	0.0623
74	1145	509	18.25	634133.34	0.0598	0.0619
75	1200	509	18.50	634133.95	0.0593	0.0615
76	1215	509	18.75	634129.14	0.0589	0.0610
77	1230	509	19.00	634122.45	0.0586	0.0607
78	1245	509	19.25	634121.84	0.0583	0.0603
79	1300	509	19.50	634118.64	0.0580	0.0600
80	1315	509	19.75	634118.14	0.0576	0.0596
81	1330	509	20.00	634117.04	0.0572	0.0592
82	1345	509	20.25	634111.68	0.0569	0.0589
83	1400	509	20.50	634110.54	0.0566	0.0585
84	1415	509	20.75	634105.15	0.0563	0.0582
85	1430	509	21.00	634102.63	0.0560	0.0579
86	1445	509	21.25	634096.73	0.0558	0.0577
87	1500	509	21.50	634101.39	0.0555	0.0573
88	1515	509	21.75	634097.96	0.0552	0.0570
89	1530	509	22.00	634090.62	0.0550	0.0568
90	1545	509	22.25	634090.17	0.0547	0.0565
91	1600	509	22.50	634083.01	0.0545	0.0562
92	1615	509	22.75	634084.34	0.0543	0.0560
93	1630	509	23.00	634080.02	0.0541	0.0557
94	1645	509	23.25	634084.24	0.0538	0.0554
95	1700	509	23.50	634083.19	0.0535	0.0551
96	1715	509	23.75	634077.16	0.0532	0.0549
97	1730	509	24.00	634080.44	0.0529	0.0546

Allowable leakage rate, La	=	0.1500 %/day
75% La	=	0.1125 %/day
Mass point leakage rate	=	0.0529 %/day
Mass point UCL	=	0.0546 %/day

TABLE 5
MASS POINT LEAKAGE RATE REPORT

VERIFICATION

data set	time	date	elapsed time (hrs)	dry air mass (lbm)	leakage rate (%/day)
1	1745	509	0.00	634070.01	0.0000
2	1800	509	0.25	634053.90	0.2440
3	1815	509	0.50	634045.06	0.1889
4	1830	509	0.75	634027.15	0.2081
5	1845	509	1.00	634016.79	0.2017
6	1900	509	1.25	634003.64	0.1995
7	1915	509	1.50	633992.57	0.1953
8	1930	509	1.75	633976.33	0.1977
9	1945	509	2.00	633967.77	0.1943
10	2000	509	2.25	633954.53	0.1930
11	2015	509	2.50	633941.09	0.1927
12	2030	509	2.75	633931.54	0.1907
13	2045	509	3.00	633918.09	0.1899
14	2100	509	3.25	633906.73	0.1889
15	2115	509	3.50	633891.52	0.1892
16	2130	509	3.75	633880.66	0.1890
17	2145	509	4.00	633866.60	0.1892

Upper limit on leakage rate = 0.2553 %/day
Mass point leakage rate = 0.1892 %/day
Lower limit on leakage rate = 0.1803 %/day

FARLEY UNIT 1 1991 ILRT
TEMPERATURE DURING STABILIZATION

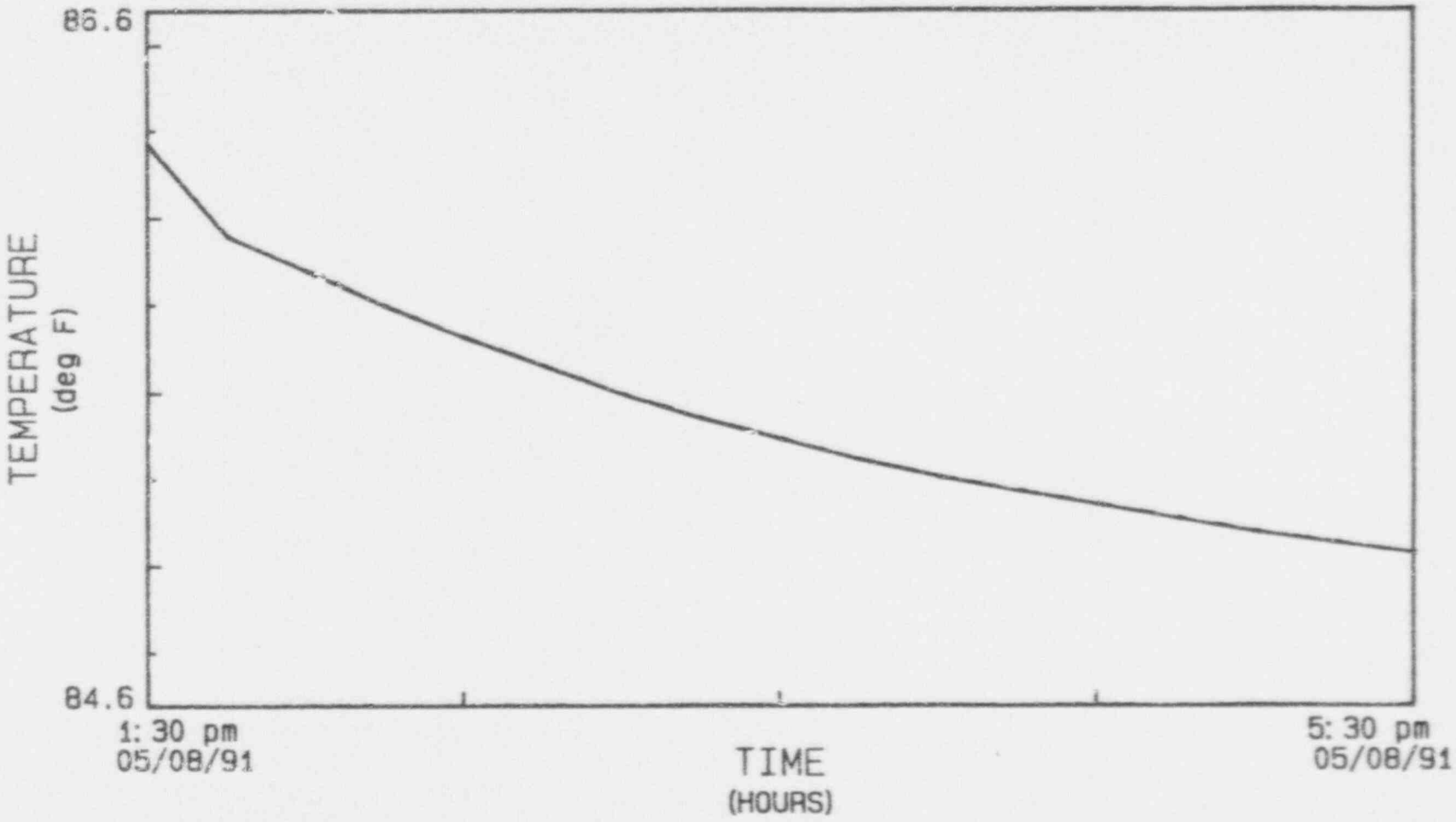

FIGURE 1

FARLEY UNIT 1 1991 ILRT

AIR MASS - TYPE A TEST

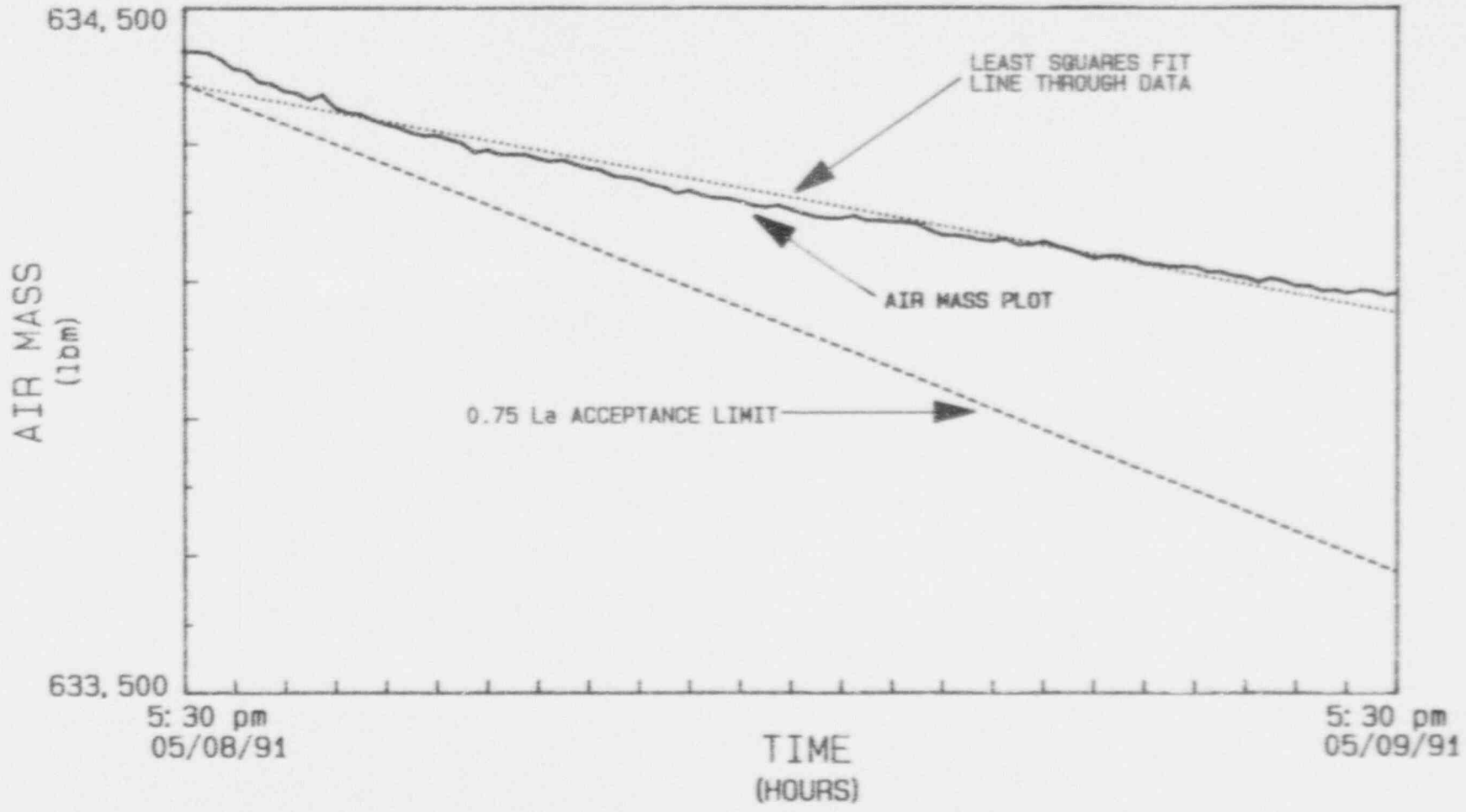

FIGURE 2

FARLEY UNIT 1 1991 ILRT

MEAN TEMPERATURE - TYPE A TEST

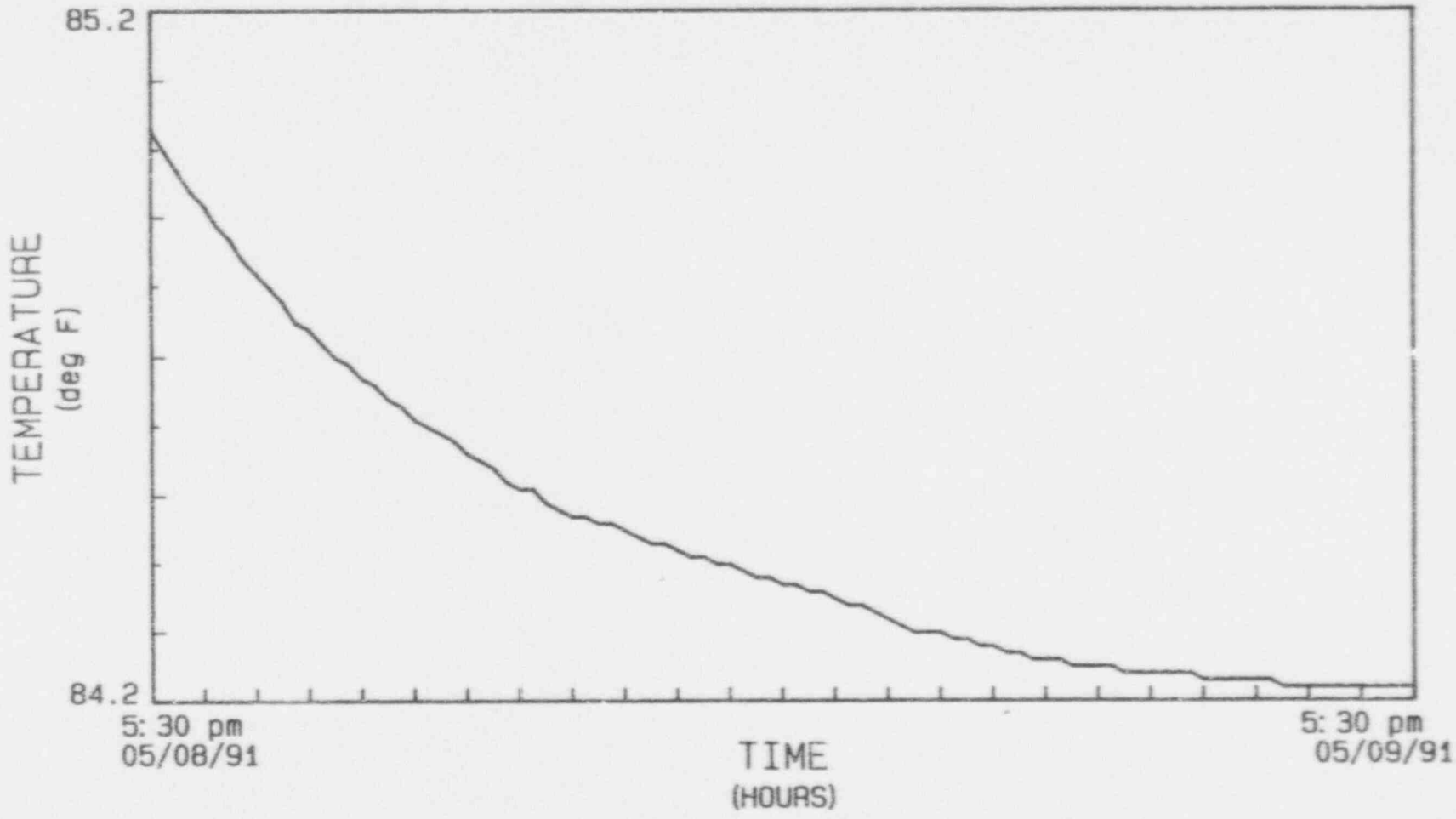

FIGURE 3

FARLEY UNIT 1 1991 ILRT
TOTAL PRESSURE - TYPE A TEST

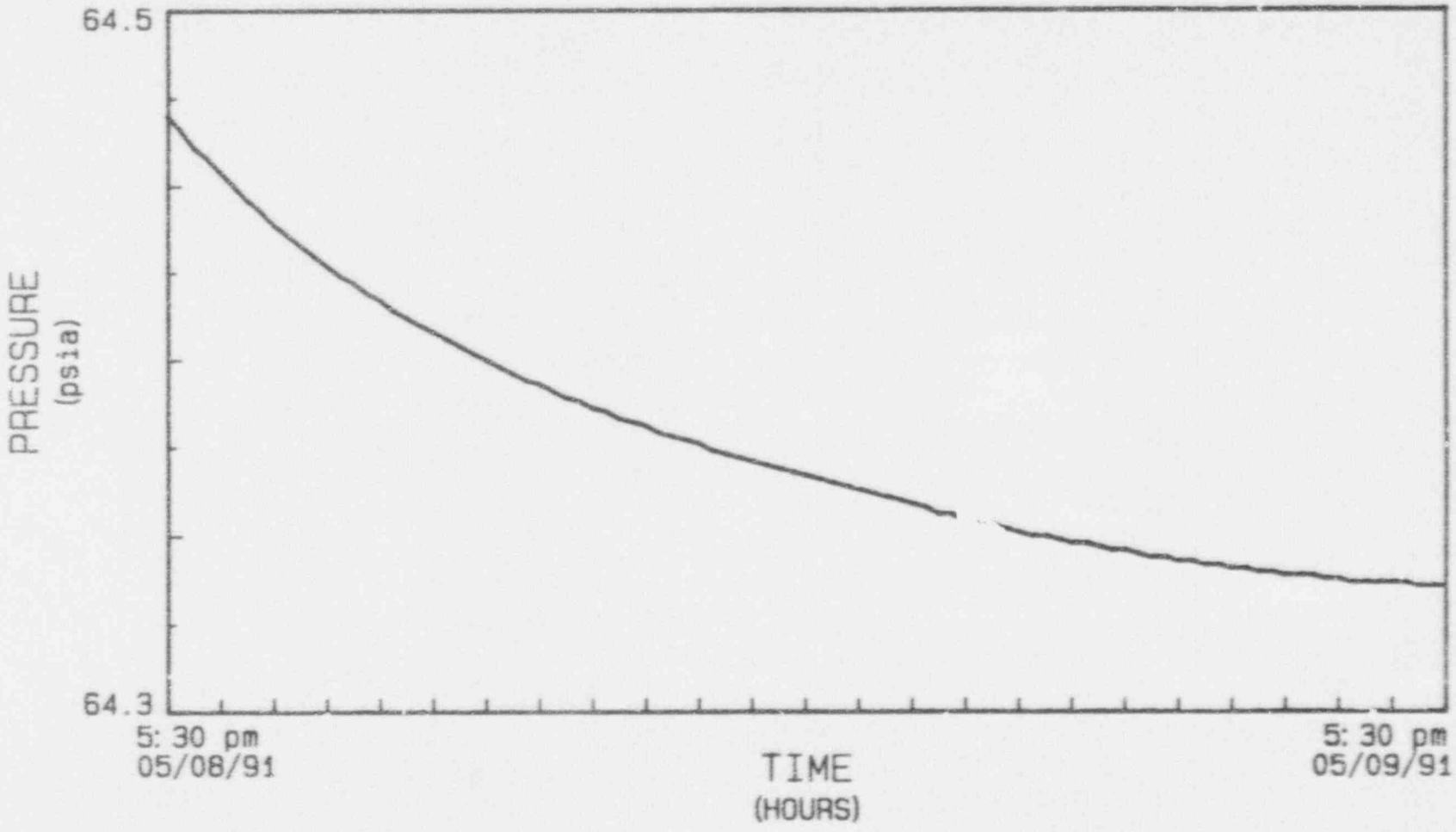

FIGURE 4

FARLEY UNIT 1 1991 ILRT
VAPOR PRESSURE - TYPE A TEST

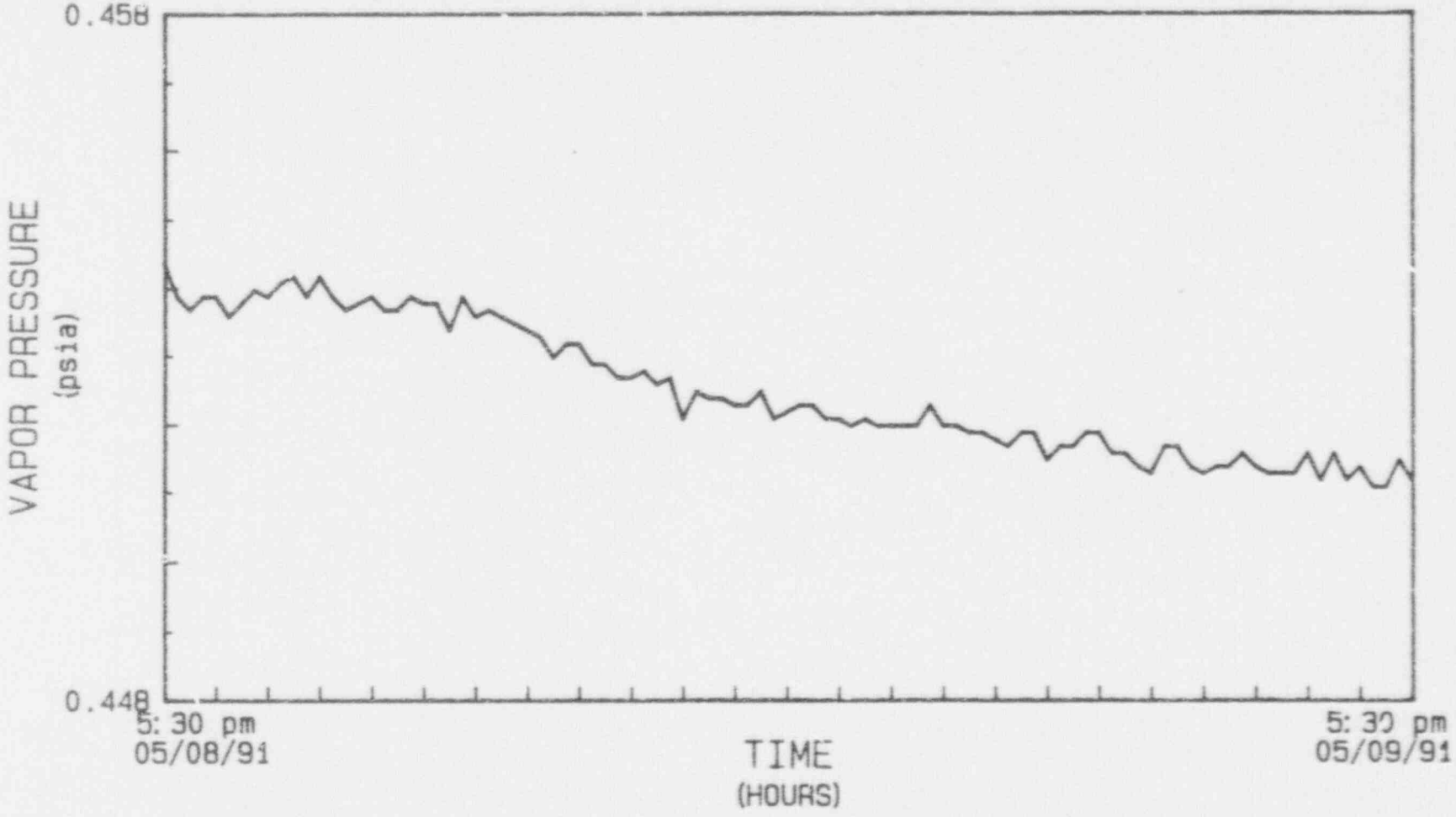

FIGURE 5

FARLEY UNIT 1 1991 ILRT
MASS POINT LEAKAGE RATE
TYPE A TEST

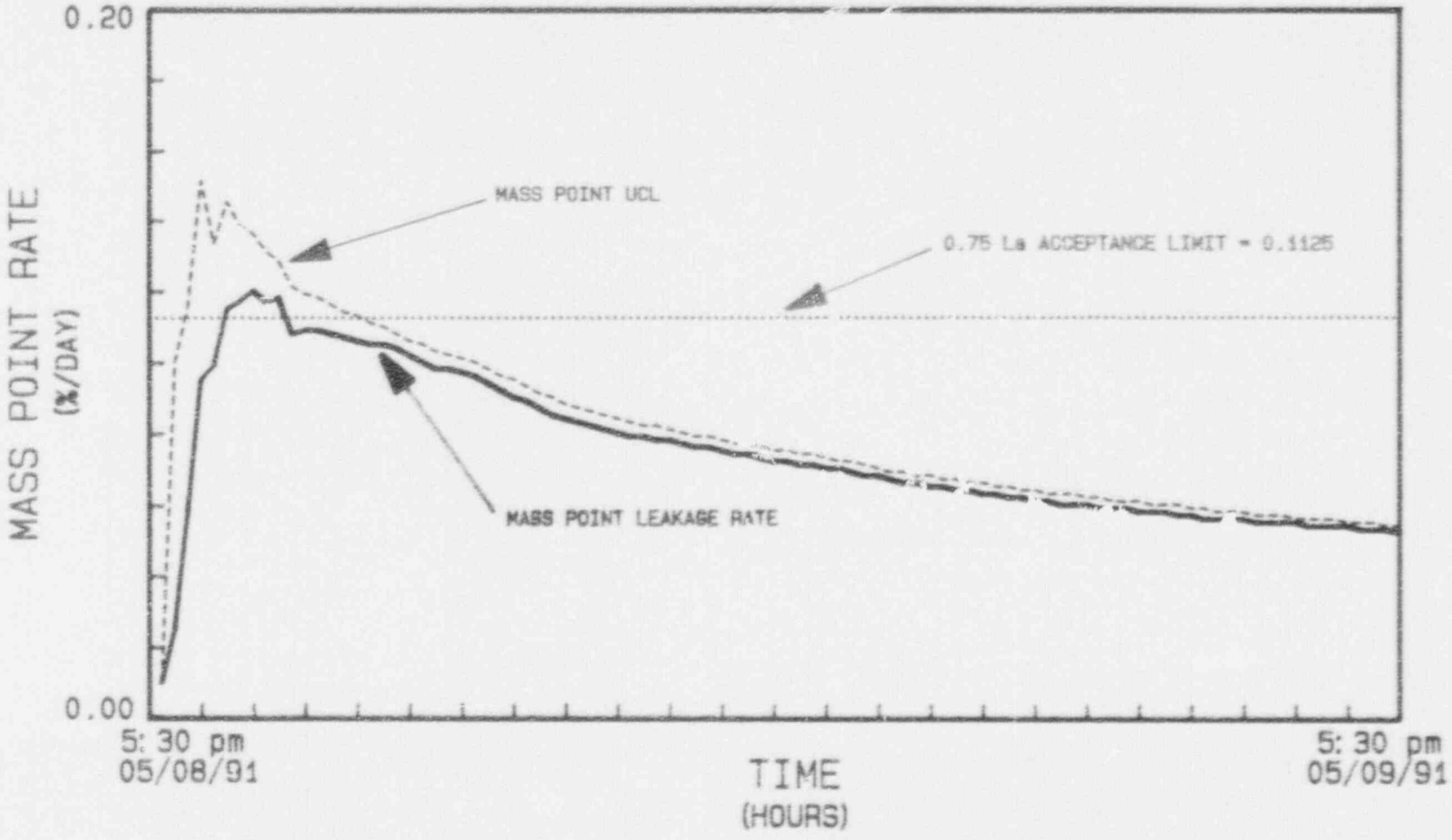

FIGURE 6

FARLEY UNIT 1 1991 ILRT
AIR MASS - VERIFICATION

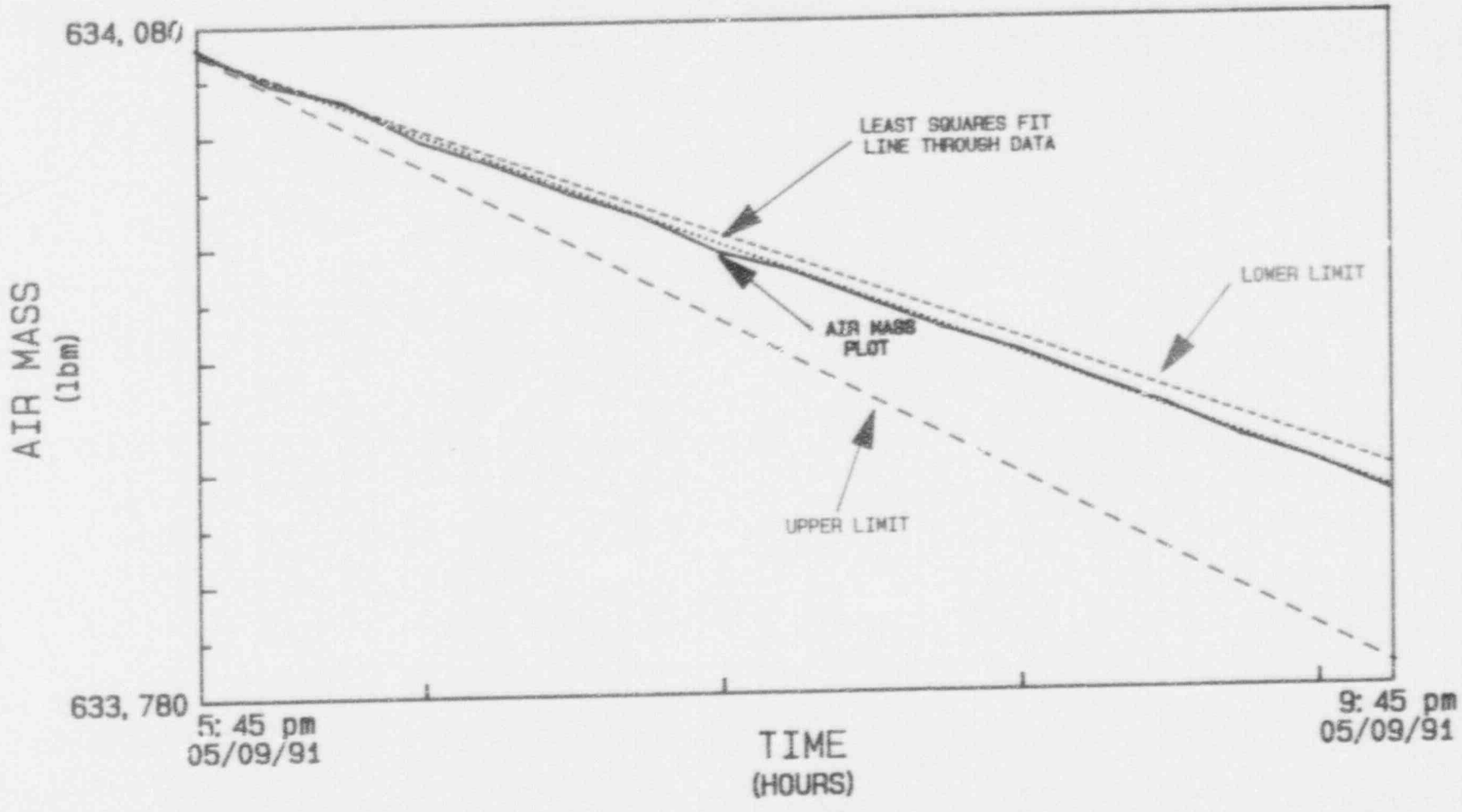

FIGURE 7

FARLEY UNIT 1 1991 ILRT
MASS POINT - VERIFICATION

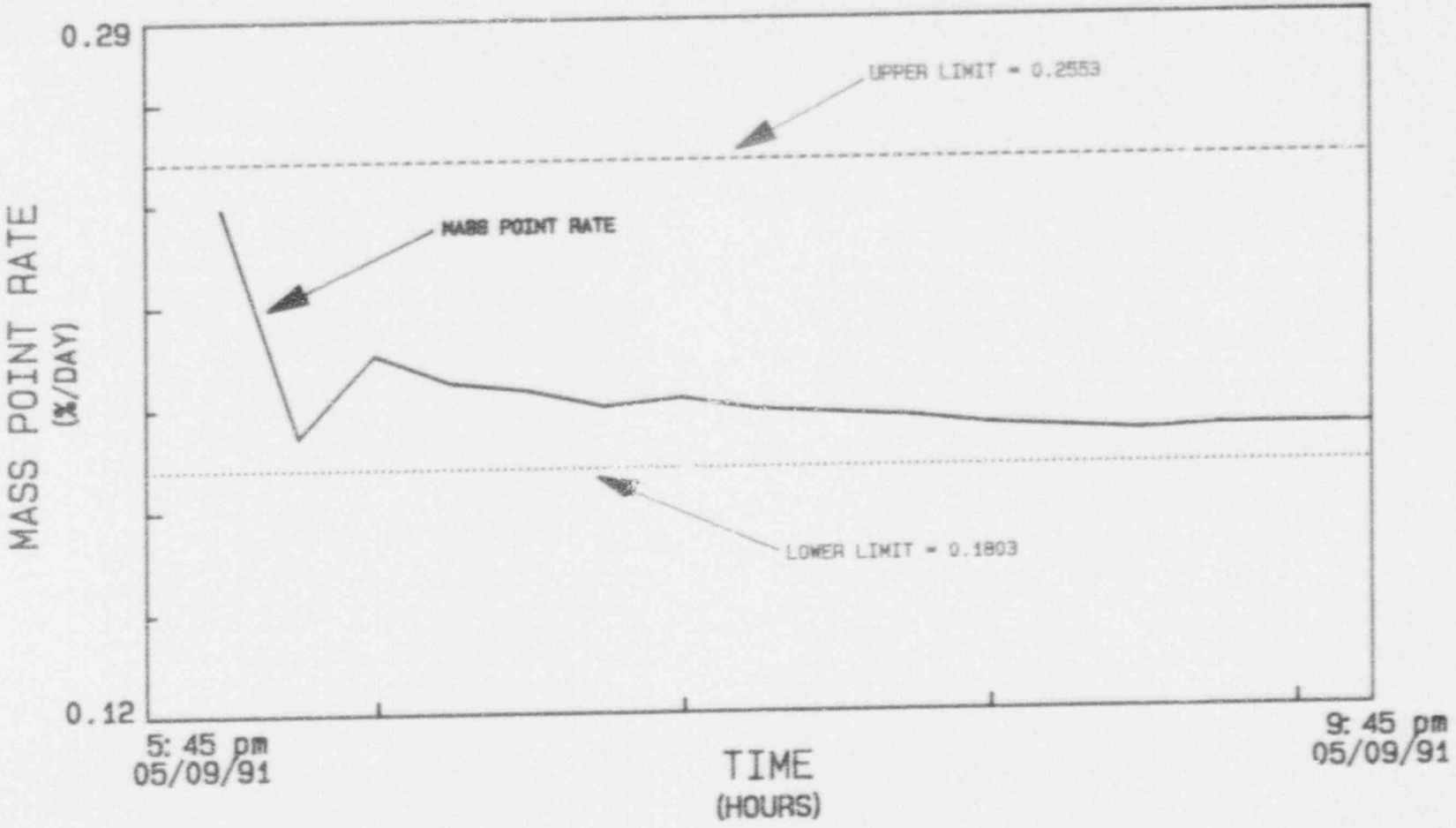

FIGURE 8

APPENDIX I

ILRT COMPUTER PROGRAM DESCRIPTION

The ILRT computer program used in this test was a program purchased by Southern Company Services (SCS) from BCP Technical Services. The program is a modified version of the BCP standard ILRT program prepared for specific use at FNP. Complete verification of the FNP version has been performed and documented. The program source code was included in the purchase of the software should there be the need to review the routines used to calculate the various ILRT parameters. The BCP ILRT program is written in Microsoft QuickBASIC, Version 4.5, for IBM Personal Computers and Compatibles.

Upon starting the program the user is prompted for the following predata:
Number of temperature sensors
Number of dewpoint sensors
Number of pressure sensors
Containment free air volume
Allowable leakage rate, La
Sensor volume fractions

Once the test is started the following data is received from the data acquisition system during the test:
Time and date
Containment atmosphere drybulb temperatures
Containment atmosphere pressure
Containment atmosphere dewpoint temperatures

Program options provide calculation of the following reports:
DATA SUMMARY REPORT. Displays data set number, time, date, temperature, pressure, vapor pressure and dry air mass for all data sets.
DATA SET REPORT. 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.
MASS POINT LEAKAGE RATE REPORT. (ANSI/ANS 56.8 - 1987). Displays data set number, time, date, elapsed time, dry air mass, mass point leakage rate and UCL for all data sets.
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.
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.
DATA REJECTION REPORT. (ANSI/ANS 56.8 - 1987). 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.
TEMPERATURE STABILIZATION REPORT. (ANSI/ANS 56.8 - 1987 and BN-TOP-1, rev. 1). Displays start time and date, 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.

The following plots are available:
AIR MASS. Plots the air mass, regression line and 75% La line.
LEAK RATES. Plots the mass point and total time leakage rate, UCLs and 75% La line.
TEMPERATURE. Plots the weighted average temperature, temperature for one sensor, or temperature for all sensors.
PRESSURE. Plots the weighted average pressure, pressure for one sensor, or pressure for all sensors.
DEWPOINT/VAPOR PRESSURE. Plots the weighted average vapor pressure, dewpoint temperature for one sensor, or dewpoint temperature for all sensors.

In addition the program allows for manual data entry, data correction, data set insertion, and deletion of a data set from calculations.

APPENDIX II

TYPE B AND C LOCAL LEAKAGE RATE TEST RESULTS

Results for Type B and C local leakage rate tests performed between the completion of the 1986 ILRT and the start of the 1991 ILRT are presented herein.

LOCAL LEAK RATE TEST

The following data is a summary of the leakage for Unit 1 8th Refueling Outage.

"As Found" (Min)

Electrical Penetration Total	23.50 sccm
Type B test (less Elec. Pene.) Total (Hatches, etc.)	1765.90
Type C "As Found" Min. Path Leakage	4391.75
Total	6181.15

Max. Allowable Leakage (.6 LA) = 150,975 SCCM

"As Left" (Min)

Electrical Penetration Total	27.37
Type B Test (less Elec. Pene.) Total (Hatches, etc.)	566.30
Type C Min. Path Leakage	2288.75
Total	2882.42

"As Left" Min. $\frac{2882.42}{150,975} \times 100 = 1.91\%$ of Allowable Leakage

"As Left" (Max)

Electrical Penetration Total	27.37
Type B Test (Less Elec. Pene.) Total (Hatches, etc.)	566.30
Type C Max. Path Leakage	4056.60
Total	4650.27

"As Left" Max. $\frac{4650.27}{150,975} \times 100 = 3.08\%$ of Allowable Leakage

UNIT 1
TYPE B TEST SUMMARY - 8th REFUELING

PENE NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
EA01	Q1T52A003-A	03-29-88	0.32		0.32
EA02	Q1T52A004-A	03-29-88	0.14		0.14
EA03	Q1T52B014-A	03-29-88	0.14	04-09-88	0
EA05	Q1T52B001-A	03-29-88	0.14		0.14
EA06	Q1T52B005-A	04-04-88	1.7		1.7
EA09	Q1T52B002-A	03-29-88	0.32		0.32
EA10	Q1T52A001-A	03-29-88	0.18		0.18
EA11	Q1T52A002-A	03-29-88	0.0		0.0
EB01	Q1T52B019-A	03-27-88	0.32	04-08-88	1.8
EB05	Q1T52B007-A	03-27-88	0.09	04-07-88	0.8
EB09	Q1T52B006-A	03-29-88	0.14		0.14
EC01	Q1T52B013-1	03-28-88	0.21		0.21
EC03	Q1T52B012-1	03-29-88	0.10		0.10
EC07	Q1T52B009-A	03-27-88	0.07	05-01 88	0.4
EC08	Q1T52B010-4	03-29-88	0.14		0.14
EC10	Q1T52B008-4	03-29-88	0.14		0.14
WA02	Q1T52B015-B	03-28-88	0.09		0.09
WA03	Q1T52B023-B	03-30-88	0.18		0.18
WA05	Q1T52B046-B	03-27-88	0.23	03-31-88	0.6
WA06	Q1T52B047-B	03-27-88	0.27	04-01-88	0.0
WA07	Q1T52A005-B	03-27-88	0.36		0.36
WA08	Q1T52A006-B	03-27-88	0.41		0.41
WA09	Q1T52B018-B	03-29-88	0.14		0.14
WA10	Q1T52B016-B	03-27-88	0.32		0.32

UNIT 1
TYPE B TEST SUMMARY - 8th REFUELING

PENE. NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
WA11	Q1T52B017-B	03-27-88	0.27		0.27
WA21	Q1T52B032-N	03-27-88	0.57		0.57
WA22	Q1T52B033-N	03-27-88	0.38		0.38
WA23	Q1T52B034-N	03-27-88	0.57		0.57
WA24	Q1T52B035-N	03-27-88	0.38		0.38
WB03	Q1T52B020-B	03-28-88	0.23		0.23
WB07	Q1T52B022-B	04-01-88	0.14		0.14
WB09	Q1T52B025-B	03-28-88	0.13		0.13
WB11	Q1T52B038-B	03-27-88	0.43		0.43
WB21	Q1T52B037-N	03-27-88	0.38		0.38
WB24	Q1T52B039-N	03-27-88	0.38		0.38
WC01	Q1T52B026-3	03-28-88	0.14		0.14
WC03	Q1T52B024-3	03-27-88	0.18		0.18
WC05	Q1T52B028-3	03-27-88	0.59		0.59
WC07	Q1T52B030-2	03-27-88	0.77		0.77
WC08	Q1T52B011-B	03-27-88	0.05	05-01-88	0.2
WC09	Q1T52B042-2	03-28-88	0.45		0.45
WC11	Q1T52B031-2	03-27-88	0.38		0.38
WC21	Q1T52B040-N	03-27-88	0.47	04-21-88	0.4
WC23	Q1T52B041-N	03-27-88	0.39	04-08-88	1.7
WC02	Q1T52B053-B	03-28-88	5.38		5.38
EB10	Q1T52B052-4	03-30-88	2.36		2.36
EB02	Q1T52B055	03-30-88	1.09		1.09
EC05	Q1T52B056	03-29-88	0.0		0.0
EB04	Q1T52B054	03-30-88	1.24		1.24

UNIT 1
TYPE B TEST SUMMARY FOR 8TH REFUELING

PENE NO.	DESCRIPTION	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
84	Equip Hatch	03-27-88	42.0	05-13-88	78.4
86	Personnel Lock Interior	05-11-88	1562.0	05-11-88	295.0
86	Personnel Lock Outer Door Between Seals				0
87	Aux Access Lock Outer Door Between Seals	05-10-88	0	05-10-88	0
87	Aux Access Lock Vol. Between Doors	05-09-88	7.3	05-09-88	7.3
14	Fuel Transfer Tube - Bellows	04-13-88	131.0	04-13-88	131.0
14	Fuel Transfer Tube Blind Flange	03-28-88	23.6	05-07-88	54.6
TOTAL			1765.90		566.30

UNIT 1 - TYPE C TEST SUMMARY FOR 8TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
10	Q1E11V025B	04-04-88	297 #	148.5	04-27-88	112.7 #	56.35	112.7
	Q1E11V026B	04-04-88	297 #		04-27-88	112.7 #		
11	Q1E11V025A	04-12-88	36.0 #	18.0	04-21-88	46.6 #	23.3	46.6
	Q1E11V026A	04-12-88	36.0 #		04-21-88	46.6 #		
12	Q1P13V282	03-27-88	379 #	189.5	05-09-88	417 #	208.5	417
	Q1P13V281	03-27-88	379 #		05-09-88	417 #		
	Q1P13V301	03-27-88	379 #		05-09-88	417 #		
	Q1P13V302	03-27-88	379 #		05-09-88	417 #		
	Q1P13V287	03-27-88	379 #		05-09-88	417 #		
13	Q1P13V283	03-27-88	307 #	153.5	05-09-88	249 #	124.5	249
	Q1P13V284	03-27-88	307 #		05-09-88	249 #		
	Q1P13V304	03-27-88	307 #		05-09-88	249 #		
	Q1P13V303	03-27-88	307 #		05-09-88	249 #		
	Q1P13V288	03-27-88	307 #		05-09-88	249 #		
16	Q1E11V001A	04-12-88	128.3	128.3	04-21-88	270	270	270
18	Q1E11V001B	04-04-88	84.9	84.9	04-04-88	84.9	84.9	84.9
23	Q1E21V253A	03-30-88	5.0 *	5.0	04-19-88	113 *	113	281
	Q1E21V253B	03-30-88	5.0 *			113 *		
	Q1E21V253C	03-30-88	5.0 *			113 *		
	Q1E21V254	03-30-88	281 *			281 *		
	Q1E21V255	03-30-88	281 *			281 *		
24	Q1E21V257	04-07-88	24.8	7.7	04-24-88	39.7	7.7	39.7
	Q1E21V258	04-07-88	23.4		04-24-88	37.5		
	Q1E21V119	04-07-88	7.7		04-07-88	7.7		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 8TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
25	Q1E21V115B	03-29-88	2.5	2.5	03-29-88	2.5	2.5	2.5
26	Q1E21V115C	03-29-88	7.8	7.8	03-29-88	7.8	7.8	7.8
27	Q1E21V115A	03-29-88	1837	1837	04-23-88	18.8	18.8	18.8
28	Q1E21V213	03-29-88	17.6*	17.6	04-25-88	91.0*	91.0	121.9
	Q1E21V249A	03-29-88	17.6*		04-25-88	91.0*		
	Q1E21V249B	03-29-88	34.8		04-25-88	121.9		
29	Q1E21V049	03-28-88	0.2	0.2	03-28-88	0.2	0.2	2.2
	Q1E21V050	03-28-88	2.2		03-28-88	2.2		
30	Q1B13V040	03-29-88	8.8	8.8	04-28-88	16.2	14.3	16.2
	Q1B13V038	03-29-88	14.3		03-29-88	14.3		
31	Q1G21V005	03-31-88	1.5	14.4	03-31-88	1.5	9.4	14.4
	Q1G21V006	03-31-88	14.4		03-31-88	14.4		
	Q1G21V064	03-31-88	Off Scale		04-05-88	7.9		
32	Q1P16V081	03-29-88	43.5	43.5	03-29-88	43.5	15.2	43.5
	Q1P16V072	03-29-88	174 *		04-28-88	15.2*		
	Q1P16V203	03-29-88	174 *		04-28-88	15.2*		
33	Q1G21HV3380	05-06-88	155.9	155.9	05-06-88	155.9	97.5	155.9
	Q1G21V204	05-06-88	Off Scale		05-10-88	97.5		
42	Q1P17V083	03-30-88	19.1	6.7	03-30-88	19.1	6.7	19.1
	Q1P17V082	03-30-88	6.7*		03-30-88	6.7*		
	Q1P17V158	03-30-88	6.7*		03-30-88	6.7*		
43	Q1P17HV3045	10- 8-86	96.8	7.4	10- 8-86	96.8	7.4	96.8
	Q1P17HV3184	10- 8-86	7.4		10- 8-86	7.4		

*Values represent total leakage from group sets of valves as physically tested.

UNIT 1 - TYPE C TEST SUMMARY FOR 8TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
44	Q1P17V097	03-30-88	45.3	45.3	03-30-88	45.3	45.3	49.6
	Q1P17V099	03-30-88	49.6*		03-30-88	49.6*		
	Q1P17V155	03-30-88	49.6*		03-30-88	49.6*		
45	Q1P17HV3095	03-30-88	2.5*	2.5	04-28-88	258 *		
	Q1P17V159	03-30-88	11.3		03-30-88	11.3	11.3	258
	Q1P17V153	03-30-88	2.5*		04-28-88	258 *		
46	Q1P17HV3443	03-30-88	8.7	4.7	03-30-88	4.7	3.0	4.7
	Q1P17HV3067	03-30-88	4.7*		05-06-88	3.0*		
	Q1P17V154	03-30-88	4.7*		05-06-88	3.0*		
47	Q1P18V001	04-26-88	26.5#	13.25	04-26-88	26.5#	13.25	26.5
	Q1P18V002	04-26-88	26.5#		04-26-88	26.5#		
48	Q1P19HV3611	05-03-88	194	114.2	05-03-88	194	114.2	194
	Q1P19V002	05-03-88	114.2		05-03-88	114.2		
49	Q1E21V052	03-28-88	113.6	97.6	03-28-88	113.6	97.6	113.6
	Q1E21V091	03-28-88	97.6		03-28-88	97.6		
50	Q1P15HV3766	03-28-88	3.8	3.7	03-28-88	3.8	3.7	3.8
	Q1P15HV3334	03-28-88	3.7		03-28-88	3.7		
54	Q1E14V002	03-29-88	0.3	0.3	04-25-88	4.1	0.4	4.1
	Q1E14HV3658	03-29-88	0.4		03-29-88	0.4		
55	Q1E14HV3657	03-29-88	19.9	18.7	03-29-88	19.9	18.7	19.9
	Q1E1 V001	03-29-88	18.7		03-29-88	18.7		
56	Q1P15HV3104	03-30-88	0.2	0.2	03-30-88	0.2	0.2	2.0
	Q1P15HV3331	03-30-88	2.0		03-30-88	2.0		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 8TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
57	Q1P15HV3103	03-30-88	28.3	22.7	03-30-88	28.3	22.7	28.3
	Q1P15HV3332	03-30-88	22.7		03-30-88	22.7		
58	Q1P15HV3765	03-31-88	5.2		03-31-88	5.2	3.5	5.2
	Q1P15HV3333	03-31-88	3.5	3.5	03-31-88	3.5		
59	Q1E11V039B	04-07-88	26.2*	20.6	04-07-88	26.2*	20.6	26.2
	Q1E11V039A	04-07-88	26.2*		04-07-88	26.2*		
	Q1E21V263A	04-07-88	26.2*		04-07-88	26.2*		
	Q1E21V263B	04-07-88	26.2*		04-07-88	26.2*		
	Q1B13V054	04-07-88	20.6		04-07-88	20.6		
	Q1E11V040	04-07-88	26.2*		04-07-88	26.2*		
60	Q1P16V075	03-29-88	288		03-29-88	288	44.8	288
	Q1P16V071	03-29-88	124 *	124	05-15-88	44.8*		
	Q1P16V204	03-29-88	124 *		05-15-88	44.8*		
61A	Q1E23V022C	03-28-88	0.2#	0.1	04-22-88	9.3#	4.65	9.3
	[illegible]22D	03-28-88	0.2#		04-22-88	9.3#		
	[illegible]V023B	03-28-88	0.2#		04-22-88	9.3#		
61	[illegible]23V024B	03-28-88	0.2#	0.1	04-22-88	0.8#	0.4	0.8
	[illegible]3V025B	03-28-88	0.2#		04-22-88	0.8#		
62	Q1G21V082	03-30-88	0.2	0.2	03-30-88	0.2	0.2	0.3
	Q1G21V001	03-30-88	0.3		03-30-88	0.3		
63	Q1E21V058	04-17-88	229	121.8	04-17-88	144.8	121.8	144.8
	Q1E21V059	04-17-88	121.8		04-17-88	121.8		
64A	Q1B13V039	03-29-88	8.4	8.4	03-29-88	8.4	8.4	88.6
	Q1B13V037	03-29-88	88.6		03-29-88	88.6		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 8TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	MAX.
66	Q1E23V025A	03-28-88	7.7#	3.85	04-17-88	11.3#	5.65	11.3
	Q1E23V024A	03-28-88	7.7#		04-17-85	11.3#		
67	Q1E23V022A	03-28-88	6.4#	3.2	04-18-88	12.1#	6.05	12.1
	Q1E23V022B	03-28-88	6.4#		04-18-88	12.1#		
	Q1E23V023A	03-28-88	6.4#		04-18-88	12.1#		
70	Q1E14V004	03-28-88	OFF SCALE		04-28-88	2.0	2.0	47.3
	Q1E14V003	03-28-88	178	178	05-09-88	47.3		
71	Q1P23V002A	03-26-88	44	44	05-13-88	199	199	199
72	Q1P23V002B	03-26-88	282	282	05-13-88	185	185	185
78	Q1G21HV3377	05-07-88	53.6	53.6	05-07-88	53.6	31.8	53.6
	Q1G21V291	05-07-88	85 *		05-09-88	31.8*		
	Q1G21HV3376	05-07-88	85 *		05-09-88	31.8*		
82	Q1P11HV3659	04-25-88	10.6	2.2	04-25-88	10.6	2.2	10.6
	Q1P11V002	04-25-88	2.2		04-25-88	2.2		
93	Q1E13V003B	03-28-88	28.0#	14.0	04-29-88	23.6#	11.8	23.6
	Q1E13V004B	03-28-88	28.0#		04-29-88	23.6#		
94	Q1E13V003A	03-28-88	731 #	365.5	04-29-88	289 #	144.5	289
	Q1E13V004A	03-28-88	731 #		04-29-88	289 #		
95	Q1G31V012	03-28-88	5.9	5.9	03-28-88	5.9	5.9	14.4
	Q1G31V013	03-28-88	14.4		03-28-88	14.4		
97B	Q1P19V004	03-28-88	0.3	0.3	03-28-88	0.3	0.3	0.4
	Q1P19HV2228	03-28-88	0.4		03-28-88	0.4		
103	Q1E23V003	03-28-88	4.7#	2.35	04-14-88	6.0#	3.0	6.0
	Q1E23V002	03-28-88	4.7#		04-14-88	6.0#		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

LOCAL LEAK RATE TEST

The following data is a summary of the leakage for Unit 1 9th Refueling Outage.

"As Found" (Min)

Electrical Penetration Total	17.34	sccm
Type B test (less Elec. Pene.) Total (Hatches, etc.)	929.20	sccm
Type C "As Found" Min. Path Leakage	19,391.30	sccm
Total	20,337.84	sccm

Max. Allowable Leakage (.6 La) = 150,975 sccm

"As Left" (Min)

Electrical Penetration Total	17.61	sccm
Type B Test (less Elec. Pene.) Total (Hatches, etc.)	904.50	sccm
Type C Min. Path Leakage	1,654.90	sccm
Total	2,577.01	sccm

"As Left" Min. $\frac{2577.01}{150,975} \times 100 = 1.71\%$ of Allowable Leakage

"As Left" (Max)

Electrical Penetration Total	17.61	sccm
Type B Test (Less Elec. Pene.) Total (Hatches, etc.)	904.50	sccm
Type C Max. Path Leakage	3,692.20	sccm
Total	4,614.31	sccm

"As Left" Max. $\frac{4614.31}{150,975} \times 100 = 3.06\%$ of Allowable Leakage

UNIT 1
TYPE B TEST SUMMARY - 9th REFUELING

PENE NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
EA01	Q1T52A003-A	09-29-89	0.80	09-29-89	0.80
EA02	Q1T52A004-A	09-27-89	0.23	09-27-89	0.23
EA03	Q1T52B014-A	09-27-89	0.19	09-27-89	0.19
EA05	Q1T52B001-A	09-27-89	0.14	09-27-89	0.14
EA06	Q1T52B005-A	09-25-89	1.81	10-10-89	1.65
EA09	Q1T52B002-A	09-27-89	0.23	09-27-89	0.23
EA10	Q1T52A001-A	09-27-89	0.14	09-27-89	0.14
EA11	Q1T52A002-A	09-27-89	0.77	09-27-89	0.77
EB01	Q1T52B019-A	09-26-89	0.00	09-26-89	0.00
EB05	Q1T52B007-A	09-27-89	0.00	09-27-89	0.00
EB09	Q1T52B006-A	09-28-89	0.79	09-28-89	0.79
EC01	Q1T52B013-1	09-26-89	0.00	09-26-89	0.00
EC03	Q1T52B012-1	09-27-89	0.30	09-27-89	0.30
EC07	Q1T52B009-A	09-27-89	0.14	09-27-89	0.14
EC08	Q1T52B010-4	09-27-89	0.00	09-27-89	0.00
EC10	Q1T52B008-4	09-27-89	0.09	09-27-89	0.09
WA02	Q1T52B015-B	09-26-89	0.09	09-26-89	0.09
WA03	Q1T52B023-B	09-26-89	0.14	09-26-89	0.14
WA05	Q1T52B046-B	09-26-89	0.23	09-26-89	0.23
WA06	Q1T52B047-B	09-26-89	0.47	09-26-89	0.47
WA07	Q1T52A005-B	09-26-89	1.22	09-26-89	1.22
WA08	Q1T52A006-B	09-25-89	0.23	09-25-89	0.23
WA09	Q1T52B018-B	09-25-89	0.18	09-25-89	0.18
WA10	Q1T52B016-B	09-26-89	0.59	09-28-89	0.83

UNIT 1
TYPE B TEST SUMMARY - 9th REFUELING

PENE. NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
WA11	Q1T52B017-B	09-25-89	0.09	09-25-89	0.09
WA21	Q1T52B032-N	09-25-89	0.00	09-25-89	0.00
WA22	Q1T52B033-N	09-25-89	0.57	09-25-89	0.57
WA23	Q1T52B034-N	09-25-89	0.00	09-25-89	0.00
WA24	Q1T52B035-N	09-25-89	0.00	09-25-89	0.00
WB03	Q1T52B020-B	09-26-89	0.00	09-26-89	0.00
WB07	Q1T52B022-B	09-25-89	0.00	09-25-89	0.00
WB09	Q1T52B025-B	09-25-89	0.07	10-11-89	0.26
WB11	Q1T52B038-B	09-25-89	0.00	09-25-89	0.00
WB21	Q1T52B037-N	09-29-89	0.87	09-29-89	0.87
WB24	Q1T52B039-N	09-25-89	0.38	09-25-89	0.38
WC01	Q1T52B026-3	09-26-89	0.05	09-26-89	0.05
WC03	Q1T52B024-3	09-26-89	0.14	09-26-89	0.14
WC05	Q1T52B028-3	09-26-89	0.00	09-26-89	0.00
WC07	Q1T52B030-2	09-25-89	0.30	09-25-89	0.30
WC08	Q1T52B011-B	09-25-89	0.03	09-25-89	0.03
WC09	Q1T52B042-2	09-25-89	0.23	09-25-89	0.23
WC11	Q1T52B031-2	09-25-89	0.19	09-25-89	0.19
WC21	Q1T52B040-N	09-25-89	0.00	09-25-89	0.00
WC23	Q1T52B041-N	09-25-89	0.00	09-25-89	0.00
WC02	Q1T52B053-B	09-26-89	2.11	09-26-89	2.11
EB10	Q1T52B052-4	09-27-89	0.59	09-27-89	0.59
EB02	Q1T52B055	09-27-89	1.25	09-27-89	1.25
EC05	Q1T52B056	09-28-89	0.89	09-28-89	0.89
EB04	Q1T52B054	09-29-89	0.80	09-29-89	0.80

UNIT 1
TYPE B TEST SUMMARY FOR 9TH REFUELING

PENE NO.	DESCRIPTION	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
84	Equip Hatch	09-24-89	30.1	11-03-89	29.8
86	Personnel Lock Interior	11-03-89	815.0	11-03-89	815.0
86	Personnel Lock Outer Door Between Seals	N/A	N/A	11-03-89	0
87	Aux Access Lock Outer Door Between Seals	N/A	N/A	11-02-89	0
87	Aux Access Lock Vol. Between Doors	11-01-89	2.9	11-01-89	2.9
14	Fuel Transfer Tube - Bellows	10-09-89	49.0	10-09-89	49.0
14	Fuel Transfer Tube Blind Flange	09-25-89	32.2	10-31-89	7.8
TOTAL			929.20		904.50

UNIT 1 - TYPE C TEST SUMMARY FOR 9TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
10	Q1E11V025B	10-07-89	56.4#	28.2	10-15-89	27.0#	13.5	27.0
	Q1E11V026B	10-07-89	56.4#		10-15-89	27.0#		
11	Q1E11V025A	10-02-89	8.6#	4.3	10-10-89	72.6#	36.3	72.6
	Q1E11V026A	10-02-89	8.6#		10-10-89	72.6#		
12	Q1P13V282	09-25-89	100.9#	50.5	11-02-89	30.7#	15.4	30.7
	Q1P13V281	09-25-89	100.9#		11-02-89	30.7#		
	Q1P13V301	09-25-89	100.9#		11-02-89	30.7#		
	Q1P13V302	09-25-89	100.9#		11-02-89	30.7#		
	Q1P13V287	09-25-89	100.9#		11-02-89	30.7#		
13	Q1P13V283	09-25-89	316.0#	158.0	11-02-89	0.84#	0.4	0.8
	Q1P13V284	09-25-89	316.0#		11-02-89	0.84#		
	Q1P13V304	09-25-89	316.0#		11-02-89	0.84#		
	Q1P13V303	09-25-89	316.0#		11-02-89	0.84#		
	Q1P13V288	09-25-89	316.0#		11-02-89	0.84#		
16	Q1E11V001A	10-03-89	14,950.0	14,950.0	10-10-89	34.1	34.1	34.1
18	Q1E11V001B	10-07-89	91.3	91.3	10-15-89	299.0	299.0	299.0
23	Q1E21V253A	09-28-89	29.1*		10-31-89	72.1*		
	Q1E21V253B	09-28-89	29.1*		10-31-89	72.1*		
	Q1E21V253C	09-28-89	29.1*		10-31-89	72.1*	14.1	72.1
	Q1E21V254	09-28-89	5.2	5.2	10-31-89	14.1		
	Q1E21V255	09-28-89	5.2		10-31-89	14.1		
24	Q1E21V257	10-02-89	583.0		10-03-89	31.8		
	Q1E21V258	10-02-89	525.0		10-03-89	7.8	7.8	31.8
	Q1E21V119	10-02-89	8.7	8.7	10-02-89	8.7		

*Values represent total leakage from group sets of v[illegible] physically tested.
#Leakage represent total leakage for the Penetration [illegible] set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 9TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
25	Q1E21V115B	09-29-89	28.7	28.7	09-29-89	28.7	28.7	28.7
26	Q1E21V115C	09-29-89	28.1	28.1	09-29-89	28.1	28.1	28.1
27	Q1E21V115A	09-29-89	23.6	23.6	09-29-89	23.6	23.6	23.6
28	Q1E21V213	09-29-89	34.5*		10-24-89	49.8*		
	Q1E21V249A	09-29-89	34.5*		10-24-89	49.8*	8.9	49.8
	Q1E21V249B	09-29-89	7.1	7.1	10-26-89	8.9		
29	Q1E21V049	09-29-89	15.2	15.2	09-29-89	15.2	15.2	18.2
	Q1E21V050	09-29-89	18.2		09-29-89	18.2		
30	Q1B13V040	09-28-89	15.4		09-28-89	15.4	2.3	15.4
	Q1B13V038	09-28-89	2.3	2.3	09-28-89	2.3		
31	Q1G21V005	09-29-89	8.8	8.8	09-29-89	8.8	8.8	25.2
	Q1G21V006	09-29-89	25.2		09-29-89	25.2		
	Q1G21V[illegible]64	09-29-89	7.7		09-29-89	7.7		
32	Q1P16V081	10-08-89	29.9	29.9	10-29-89	21.6	21.6	
	Q1P16V072	10-08-89	4,390.0*		10-29-89	139.8		139.8
	Q1P16V203	10-08-89	4,390.0*		10-29-89	99.7		
33	Q1G21HV3380	10-09-89	172.2	172.2	10-09-89	172.2		
	Q1G21V204	10-09-89	196,000.0		10-13-89	157.6	157.6	
42	Q1P17V083	09-27-89	19.5		09-27-89	19.5	19.5	786.0
	Q1P17V082	09-27-89	2.8	2.8	10-26-89	786.0		
	Q1P17V158	09-27-89	2.8		10-22-89	4.9		
43	Q1P17HV3045	09-27-89	16.9		09-27-89	16.9		
	Q1P17HV3184	09-27-89	5.8	5.8	09-27-89	5.8	5.8	16.9

*Values represent total leakage from group sets of valves as physically tested.

UNIT 1 - TYPE C TEST SUMMARY FOR 9TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
44	Q1P17V097	09-28-89	39.1	39.1	10-29-89	281.0	99.4	281.0
	Q1P17V099	09-28-89	99.4*		09-28-89	99.4		
	Q1P17V155	09-28-89	99.4*		10-29-89	48.0		
45	Q1P17HV3095	09-27-89	207.0	207.0	10-19-89	153.0	153.0	235.0
	Q1P17V159	09-27-89	235.0		09-27-89	235.0		
	Q1P17V153	09-27-89	57.5		10-19-89	64.7		
46	Q1P17HV3443	09-27-89	44.1	3.2	09-27-89	44.1	36.5	44.1
	Q1P17HV3067	09-27-89	3.2*		09-27-89	3.2		
	Q1P17V154	09-27-89	3.2*		10-29-89	33.3		
47	Q1P18V001	10-28-89	26.7#	13.4	10-28-89	26.7#	13.4	26.7
	Q1P18V002	10-28-89	26.7#		10-28-89	26.7#		
48	Q1P19HV3611	10-10-89	Off Scale	112.1	10-13-89	10.1	10.1	112.1
	Q1P19V002	10-10-89	112.1		10-10-89	112.1		
49	Q1E21V052	09-28-89	8.8	6.8	09-28-89	8.8	6.8	8.8
	Q1E21V091	09-28-89	6.8		09-28-89	6.8		
50	Q1P15HV3766	09-26-89	0.5	0.5	09-26-89	0.5	0.5	0.7
	Q1P15HV3334	09-26-89	0.7		09-26-89	0.7		
54	Q1E14V002	09-27-89	3.1	0.8	10-16-89	2.0	0.8	2.0
	Q1E14HV3658	09-27-89	0.8		09-27-89	0.8		
55	Q1E14HV3657	09-28-89	6.9	6.9	11-01-89	348.0	145.3	348.0
	Q1E14V001	09-28-89	145.3		09-28-89	145.3		
56	Q1P15HV3104	09-26-89	15.0	15.0	09-26-89	15.0	2.5	15.0
	Q1P15HV3331	09-26-89	98.2		11-02-89	2.5		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 9TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
57	Q1P15HV3103	09-26-89	0.7	0.7	09-26-89	0.7	0.7	5.2
	Q1P15HV3332	09-26-89	5.2		09-26-89	5.2		
58	Q1P15HV3765	09-26-89	3.4	3.4	09-26-89	3.4	3.4	4.1
	Q1P15HV3333	09-26-89	4.1		09-26-89	4.1		
59	Q1E11V039B	10-03-89	3.4*	3.4	10-11-89	1.8*	1.8	56.6
	Q1E11V039A	10-03-89	3.4*		10-11-89	1.8*		
	Q1E21V263A	10-03-89	3.4*		10-11-89	1.8*		
	Q1E21V263B	10-03-89	3.4*		10-11-89	1.8*		
	Q1B13V054	10-03-89	56.6		10-03-89	56.6		
	Q1E11V040	10-03-89	3.4*		10-11-89	1.8*		
60	Q1P16V075	10-08-89	137,000.0	2,600.0	10-11-89	5.2	5.2	91.2
	Q1P16V071	10-08-89	2,600.0		10-08-89	1.3		
	Q1P16V204	10-08-89	1.3		10-20-89	89.9		
61A	Q1E23V022C	09-25-89	10.4#	5.2	10-31-89	4.2#	2.1	4.2
	Q1E23V022D	09-25-89	10.4#		10-31-89	4.2#		
	Q1E23V023B	09-25-89	10.4#		10-31-89	4.2#		
61B	Q1E23V024B	09-25-89	8.9#	4.5	11-01-89	1.9#	1.0	1.9
	Q1E23V025B	09-25-89	8.9#		11-01-89	1.9#		
62	Q1G21V082	09-29-89	0.9	0.3	09-29-89	0.9	0.3	0.9
	Q1G21V001	09-29-89	0.3		09-29-89	0.3		
63	Q1E21V058	09-28-89	0.3	0.3	09-28-89	0.3	0.3	0.3
	Q1E21V059	09-28-89	0.3		09-28-89	0.3		
64A	Q1B13V039	09-28-89	7.3	7.3	09-28-89	7.3	7.3	12.2
	Q1B13V037	09-28-89	12.2		09-28-89	12.2		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

UNIT 1 - TYPE C TEST SUMMARY FOR 9TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
66	Q1E23V025A	09-25-89	1.1#	0.6	10-25-89	3.0#	1.5	3.0
	Q1E23V024A	09-25-89	1.1#		10-25-89	3.0#		
67	Q1E23V022A	09-25-89	7.9#	4.0	10-20-89	4.2#	2.1	4.2
	Q1E23V022B	09-25-89	7.9#		10-20-89	4.2#		
	Q1E23V023A	09-25-89	7.9#		10-20-89	4.2#		
70	Q1E14V004	09-25-89	7.8	7.8	10-21-89	241.0	89.3	241.0
	Q1E14V003	09-25-89	77.2		10-18-89	89.3		
71	Q1P23V002A	09-23-89	69.7	69.7	10-30-89	123.6	123.6	123.6
72	Q1P23V002B	09-23-89	268.0	268.0	11-03-89	54.2	54.2	54.2
78	Q1G21HV3377	10-09-89	52.1	52.1	10-09-89	52.1	35.4	52.1
	Q1G21V291	10-09-89	193.4*		10-09-89	35.4*		
	Q1G21HV3376	10-09-89	193.4*		10-09-89	35.4*		
82	Q1P11HV3659	10-26-89	11.9	2.0	10-26-89	11.9	2.0	11.9
	Q1P11V002	10-26-89	2.0		10-26-89	2.0		
93	Q1E13V003B	09-25-89	24.0#	12.0	10-23-89	180.0#	90.0	180.0
	Q1E13V004B	09-25-89	24.0#		10-23-89	180.0#		
94	Q1E13V003A	09-25-89	608.0#	304.0	10-12-89	13.3#	6.7	13.3
	Q1E13V004A	09-25-89	608.0#		10-12-89	13.3#		
95	Q1G31V012	09-29-89	33.9	12.3	09-29-89	33.9	12.3	33.9
	Q1G31V013	09-29-89	12.3		09-29-89	12.3		
97B	Q1P19V004	09-29-89	5.6	5.6	09-29-89	5.6	5.6	23.1
	Q1P19HV2228	09-29-89	23.1		09-29-89	23.1		
103	Q1E23V003	09-26-89	5.1#	2.6	10-31-89	2.1#	1.1	2.1
	Q1E23V002	09-26-89	5.1#		10-31-89	2.1#		

*Values represent total leakage from group sets of valves as physically tested.
#Leakage represent total leakage for the Penetration from a group set of valves.

LOCAL LEAK RATE TEST

The following data is a summary of the leakage for Unit 1 10th Refueling Outage.

"As Found" (Min)

Electrical Penetration Total	12.4	sccm
Type B test (less Elec. Pene.) Total (Hatches, etc.)	2,086.0	sccm
Type C "As Found" Min. Path Leakage	9,244.9	sccm
Total	11,343.3	sccm

Max. Allowable Leakage (.6 La) = 150,975 sccm

"As Left" (Min)

Electrical Penetration Total	8.0	sccm
Type B Test (less Elec. Pene.) Total (Hatches, etc.)	2,138.1	sccm
Type C Min. Path Leakage	3,731.5	sccm
Total	5,877.6	sccm

"As Left" Min. $\frac{5,877.6}{150,975} \times 100 = 3.89\%$ of Allowable Leakage

"As Left" (Max)

Electrical Penetration Total	8.0	sccm
Type B Test (Less Elec. Pene.) Total (Hatches, etc.)	2,138.1	sccm
Type C Max. Path Leakage	7,250.1	sccm
Total	9,396.2	sccm

"As Left" Max. $\frac{9,396.2}{150,975} \times 100 = 6.22\%$ of Allowable Leakage

UNIT 1
TYPE B TEST SUMMARY - 10th REFUELING

PENE NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
EA01	Q1T52A003-A	03-11-91	0.23	03-11-91	0.23
EA02	Q1T52A004-A	03-11-91	0.18	03-11-91	0.18
EA03	Q1T52B014-A	03-12-91	0.39	03-12-91	0.39
EA05	Q1T52B001-A	03-11-91	0.05	03-11-91	0.05
EA06[1]	Q1T52B005-A	03-12-91	6.71	04-03-91	0.24*
EA09	Q1T52B002-A	03-11-91	0.05	03-11-91	0.05
EA10	Q1T52A001-A	03-11-91	0.09	03-11-91	0.09
EA11	Q1T52A002-A	03-11-91	0.14	03-11-91	0.14
EB01	Q1T52B019-A	03-12-91	0.45	03-12-91	0.45
EB05	Q1T52B007-A	03-11-91	0.00	03-11-91	0.00
EB09	Q1T52B006-A	03-11-91	0.00	03-11-91	0.00
EC01	Q1T52B013-1	03-11-91	0.21	03-11-91	0.21
EC03[2]	Q1T52B012-1	03-11-91	0.30	03-29-91	0.01*
EC07	Q1T52B009-A	03-11-91	0.02	03-11-91	0.02
EC08[2]	Q1T52B010-4	03-12-91	0.00	04-04-91	0.16*
EC10	Q1T52B008-4	03-11-91	0.00	03-11-91	0.00
WA02	Q1T52B015-B	03-12-91	0.05	03-12-91	0.05
WA03	Q1T52B023-B	03-12-91	0.14	03-12-91	0.14
WA05	Q1T52B046-B	03-12-91	0.00	03-12-91	0.00
WA06	Q1T52B047-B	03-12-91	0.00	03-12-91	0.00
WA07	Q1T52A005-B	03-12-91	0.32	03-12-91	0.32
WA08	Q1T52A006-B	03-13-91	0.00	03-13-91	0.00
WA09	Q1T52B018-B	03-12-91	0.09	03-12-91	0.09
WA10	Q1T52B016-B	03-12-91	0.33	03-12-91	0.33

UNIT 1
TYPE B TEST SUMMARY - 10th REFUELING

PENE. NO.	TPNS NO.	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
WA11[2]	Q1T52B047-B	03-11-91	0.14	04-02-91	0.23*
WA21	Q1T52B032-N	03-13-91	0.00	03-13-91	0.00
WA22	Q1T52B033-N	03-16-91	0.04*	03-16-91	0.04*
WA23	Q1T52B034-N	03-13-91	0.38	03-13-91	0.38
WA24	Q1T52B035-N	03-13-91	0.00	03-13-91	0.00
WB03	Q1T52B020-B	03-12-91	0.23	03-12-91	0.23
WB07	Q1T52B022-B	03-12-91	0.00	03-12-91	0.00
WB09	Q1T52B025-B	03-13-91	0.21	03-13-91	0.21
WB11	Q1T52B038-B	03-15-91	0.00*	03-15-91	0.00*
WB21	Q1T52B037-N	03-12-91	0.19	03-12-91	0.19
WB24	Q1T52B039-N	03-13-91	0.00	03-13-91	0.00
WC01	Q1T52B026-3	03-12-91	0.00	03-12-91	0.00
WC03	Q1T52B024-3	03-12-91	0.18	03-12-91	0.18
WC05	Q1T52B028-3	03-12-91	0.00	03-12-91	0.00
WC07[2]	Q1T52B030-2	03-11-91	0.14	03-28-91	0.72*
WC08	Q1T52B011-B	03-12-91	0.17	03-12-91	0.17
WC09	Q1T52B042-2	03-12-91	0.36	03-12-91	0.36
WC11	Q1T52B031-2	03-12-91	0.56	03-12-91	0.56
WC21[2]	Q1T52B040-N	03-13-91	0.00	03-28-91	0.81*
WC23	Q1T52B041-N	03-13-91	0.00	03-13-91	0.00
WC02[2]	Q1T52B053-B	03-13-91	0.00	03-27-91	0.31*
EB10[2]	Q1T52B052-A	03-13-91	0.00	03-26-91	0.47*
EB02	Q1T52B055-N	03-11-91	0.00	03-11-91	0.00
EC05	Q1T52B056	03-13-91	0.03*	03-13-91	0.03*
EB04	Q1T52B054	03-11-91	0.00	03-11-91	0.00

NOTES: *Tested Using Volumetrics Machine
[1] Failed "As Found" Testing
[2] Retested Due to Maintenance

UNIT 1
TYPE B TEST SUMMARY FOR 10TH REFUELING

PENE NO.	DESCRIPTION	DATE	AS FOUND LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)
84	Equip Hatch	03-11-91	17.0	04-06-91	46.6
86	Personnel Lock Interior	05-04-91	880.0	05-04-91	880.0
86	Personnel Lock Outer Door Between Seals	N/A	N/A		
87	Aux Access Lock Outer Door Between Seals	N/A	N/A		
87	Aux Access Lock Vol. Between Doors	05-03-91	1,097	05-03-91	1,097
14	Fuel Transfer Tube - Bellows	04-01-91	86.2	04-01-91	86.2
14	Fuel Transfer Tube Blind Flange	03-11-91	5.8	05-02-91	28.3
TOTAL			2,086.0		2,138.1

UNIT 1 - TYPE C TEST SUMMARY FOR 10TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
10	Q1E11V025B	03-28-91	14.3*		03-28-91	14.3*		
	Q1E11V026B	03-28-91	14.3*	7.2	03-28-91	14.3*	7.2	14.3
11	Q1E11V025A	03-23-91	64.6*		03-23-91	64.6*		
	Q1E11V026A	03-23-91	64.6*	32.3	03-23-91	64.6*	32.3	64.6
12	Q1P13V282	03-10-91	8,460 *	4,230.0	05-04-91	949 *	474.5	949.0
	Q1P13V281	03-10-91	8,460 *		05-04-91	949 *		
	Q1P13V301	03-10-91	8,460 *		05-04-91	949 *		
	Q1P13V302	03-10-91	8,460 *		05-04-91	949 *		
	Q1P13V287	03-10-91	8,460 *		05-04-91	949 *		
13	Q1P13V283	03-10-91	5,330 *	2,665.0	05-04-91	306 *	153.0	306.0
	Q1P13V24	03-10-91	5,330 *		05-04-91	306 *		
	Q1P13V304	03-10-91	5,330 *		05-04-91	306 *		
	Q1P13V303	03-10-91	5,330 *		05-04-91	306 *		
	Q1P13V288	03-10-91	5,330 *		05-04-91	306 *		
16	Q1E11V001A	03-23-91	117.2	117.2	04-01-91	9.3	9.3	9.3
18	Q1E11V001B	04-02-91	170.0	170.0	09-11-91	426	426.0	426.0
23	Q1E21V253A	03-18-91	3,510 *	18.8	04-08-91	59.2*	18.8	64.5
	Q1E21V253B	03-18-91	3,510 *		04-08-91	59.2*		
	Q1E21V253C	03-18-91	3,510 *		04-08-91	59.2*		
	Q1E21V254	03-18-91	18.8		03-18-91	18.8*		
	Q1E21V255	03-25-91	47.9		04-13-91	64.5*		
24	Q1E21V257	03-24-91	25.7	5.9	04-02-91	192.7	31.5	199.0
	Q1E21V258	04-02-91	199.0		04-02-91	199.0		
	Q1E21V119	03-24-91	5.9		03-27-91	31.5		

*Values represent total leakage from group sets of valves as physically tested.

UNIT 1 - TYPE C TEST SUMMARY FOR 10TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
25	Q1E21V115B	03-15-91	25.9	25.9	03-15-91	25.9	25.9	25.9
26	Q1E21V115C	03-15-91	25.5	25.5	03-15-91	25.5	25.5	25.5
27	Q1E21V115A	03-15-91	4.0	4.0	03-15-91	4.0	4.0	4.0
28	Q1E21V213	03-16-91	48.5*	36.9	03-16-91	48.5*	36.9	48.5
	Q1E21V249A	03-16-91	48.5*		03-16-91	48.5*		
	Q1E21V249B	03-16-91	36.9		03-16-91	36.9		
29	Q1E21V049	04-03-91	19.4	19.4	04-03-91	19.4	19.4	35.2
	Q1E21V050	04-03-91	35.2		04-03-91	35.2		
30	Q1B13V040	03-25-91	15.3	3.2	03-25-91	15.3		
	Q1B13V038	03-25-91	3.2		04-08-91	11.5	11.5	15.3
31	Q1G21V005	03-30-91	47.3	11.5	04-15-91	136.1	47.1	136.1
	Q1G21V006	03-30-91	11.5		04-15-91	47.1		
	Q1G21V06	03-30-91	Off Scale		04-15-91	69.0		
32	Q1P16V081	04-27-91	396.0	396.0	04-27-91	396.0	396.0	472.0
	Q1P16V072	04-01-91	448.0		04-01-91	448.0		
	Q1P16V203	04-01-91	472.0		04-01-91	472.0		
33	Q1G21HV3380	04-06-91	126.1	126.1	04-06-91	126.1	126.1	279.0
	Q1G21V204	04-06-91	279.0		04-06-91	279.0		
42	Q1P17V083	03-16-91	53.8	53.8	03-25-91	640.0	321.1	640.0
	Q1P17V082	03-17-91	91.1*		03-17-91	91.1		
	Q1P17V158	03-17-91	91.1*		05-02-91	230.0		
43	Q1P17HV3045	03-14-91	6.9	6.9	04-16-91	303.0	8.1	303.0
	Q1P17HV3184	03-14-91	19.5		04-16-91	8.1		

*Values represent total leakage from group sets of valves as physically tested.

UNIT 1 - TYPE C TEST SUMMARY FOR 10TH REFUELING

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
44	Q1P17V097	03-14-91	348.0	28.3	04-15-91	96.0	28.3	96.0
	Q1P17V099	03-14-91	28.3		03-14-91	28.3		
	Q1P17V155	03-14-91	0.0		03-14-91	0.0		
45	Q1P17HV3095	03-17-91	234.0	31.7	04-09-91	460.0	561.0	561.0
	Q1P17V159	03-16-91	31.7		03-26-91	561.0		
	Q1P17V153	03-17-91	110.0		03-17-91	110.0		
46	Q1P17HV3443	03-14-91	5.5	5.5	03-14-91	5.5	5.5	111.3
	Q1P17HV3067	04-03-91	111.3		04-03-91	111.3		
	Q1P17V154	03-14-91	11.940		04-03-91	89.3		
47	Q1P18V001	05-02-91	39.1	22.6	05-02-91	39.1	22.6	39.1
	Q1P18V002	05-02-91	22.6		05-02-91	22.6		
48	Q1P19HV3611	04-04-91	271.0	121.6	04-04-91	271.0	121.6	271.0
	Q1P19V002	04-04-91	121.6		04-04-91	121.6		
49	Q1E21V052	03-13-91	2.7	1.2	03-13-91	2.7	2.7	5.8
	Q1E21V091	03-13-91	1.2		04-10-91	5.8		
50	Q1P15HV3766	03-16-91	1.0	1.0	03-16-91	1.0	1.0	1.2
	Q1P15HV3334	03-16-91	1.2		03-16-91	1.2		
54	Q1E14V002	03-12-91	4.6	4.6	03-12-91	4.6	4.6	9.7
	Q1E14HV3658	03-12-91	9.7		03-12-91	9.7		
55	Q1E14HV3657	03-12-91	39.9	39.9	04-26-91	22.1	22.1	67.1
	Q1E14V001	03-12-91	67.1		03-12-91	67.1		
56	Q1P15HV3104	03-25-91	37.3	1.9	03-25-91	37.3	1.9	37.3
	Q1P15HV3331	03-25-91	1.9		03-25-91	1.9		

*Values represent total leakage from group sets of valves as physically tested.

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
57	Q1P15HV3103	03-13-91	1.0	0.6	03-13-91	1.0	0.6	1.0
	Q1P15HV3332	03-13-91	0.6		03-13-91	0.6		
58	Q1P15HV3765	03-25-91	1.5	0.7	03-25-91	1.5	0.7	1.5
	Q1P15HV3333	03-25-91	0.7		03-25-91	0.7		
59	Q1E11V039B	03-25-91	4.0*	4.0	03-31-91	25.6*	6.2	25.6
	Q1E11V039A	03-25-91	4.0*		03-31-91	25.6*		
	Q1E21V263A	03-25-91	4.0*		03-31-91	25.6*		
	Q1E21V263B	03-25-91	4.0*		03-31-91	25.6*		
	Q1B13V054	03-25-91	6.2		03-25-91	6.2		
	Q1E11V040	03-25-91	4.0*		03-31-91	25.6*		
60	Q1P16V075	03-29-91	6.1	6.0	04-28-91	4.1	4.1	794.0
	Q1P16V071	03-29-91	3.0		04-19-91	794.0		
	Q1P16V204	03-29-91	3.0		03-29-91	3.0		
61A	Q1E23V022C	03-12-91	7.3*	3.7	03-12-91	7.3*	3.7	7.3
	Q1E23V022D	03-12-91	7.3*		03-12-91	7.3*		
	Q1E23V023B	03-12-91	7.3*		03-12-91	7.3*		
61B	Q1E23V024B	03-12-91	4.8*	2.4	05-03-91	5.2*	2.6	5.2
	Q1E23V025B	03-12-91	4.8*		05-03-91	5.2*		
62	Q1G21V082	03-27-91	2.7	1.4	03-27-91	2.7	1.4	2.7
	Q1G21V001	03-27-91	1.4		03-27-91	1.4		
63	Q1E21V058	03-13-91	720	129.2	04-07-91	131.9	129.2	131.9
	Q1E21V059	03-13-91	129.2		03-13-91	129.2		
64A	Q1B13V039	03-22-91	6.8	6.8	04-09-91	9.6	9.6	10.6
	Q1B13V037	03-22-91	10.6		03-22-91	10.6		

*Values represent total leakage from group sets of valves as physically tested.

PENE. NO.	VALVE NO.	DATE	AS FOUND LEAKAGE (SCCM)	AS FOUND MIN. PATH LEAKAGE (SCCM)	DATE	AS LEFT LEAKAGE (SCCM)	AS LEFT PER PENE. MIN.	AS LEFT PER PENE. MAX.
66	Q1E23V025*	03-12-91	2.1*	1.1	05-03-91	4.5*	2.3	4.5
	Q1E23V02[illegible]	03-12-91	2.1*		05-03-91	4.5*		
67	Q1E23V022A	03-12-91	1.1*	0.6	03-12-91	1.1*	0.6	1.1
	Q1E23V022B	03-12-91	1.1*		03-12-91	1.1*		
	Q1E23V023A	03-12-91	1.1*		03-12-91	1.1*		
70	Q1E14V004	03-18-91	734.0	287.0	04-12-91	46.9	46.9	51.5
	Q1E14V003	03-18-91	287.0		04-12-91	51.5		
71	Q1P23V002A	03-10-91	38.9	38.9	05-10-91	67.5	67.5	67.5
72	Q1P23V002B	03-10-91	75.8	75.8	05-10-91	88.7	88.7	88.7
78	Q1G21HV3377	04-06-91	18.0	6.9	04-06-91	18.0	6.9	18.0
	Q1G21V291	04-06-91	6.9*		04-06-91	6.9*		
	Q1G21HV3376	04-06-91	6.9*		04-06-91	6.9*		
82	Q1P11HV3659	03-31-91	8.9	2.9	03-31-91	8.9	8.1	8.9
	Q1P11V002	03-31-91	2.9		04-02-91	8.1		
93	Q1E13V003B	03-11-91	293.0*	146.5	04-14-91	134.0*	67.0	134.0
	Q1E13V004B	03-11-91	293.0*		04-14-91	134.0*		
94	Q1E13V003A	03-11-91	590.0*	295.0	03-11-91	590.0*	295.0	590.0
	Q1E13V004A	03-11-91	590.0*		03-11-91	590.0*		
95	Q1G31V012	03-19-91	4.1	1.5	03-19-91	4.1	1.5	4.1
	Q1G31V013	03-19-91	1.5		03-19-91	1.5		
97B	Q1P19V004	03-17-91	8.7	8.7	03-17-91	8.7	8.7	15.9
	Q1P19HV2228	03-17-91	15.9		03-17-91	15.9		
103	Q1E23V003	03-18-91	22.5*	11.3	04-13-91	69.4	34.7	69.4
	Q1E23V002	03-18-91	22.5*		04-13-91	69.4		

*Values represent total leakage from group sets of valves as physically tested.

APPENDIX III

INSTRUMENT CALIBRATION SUMMARY

Parameter/Instrument	Data
Pressure/ Volumetrics Model PPM-1000 Precision Pressure Gauge	Range: 0 - 100 psia Accuracy: +/-0.015% RDG +/-0.002% F.S. Repeatability: +/-0.001% F.S. Resolution: 0.001% F.S. Cal. Date: 2-21-91
Drybulb Temperature/ 100 OHM Platinum Resistance Temperature Detectors	Range: 0 to +150 degrees F Accuracy: +/-0.1 degrees F Sensitivity: 0.01 degrees F Repeatability: 0.01 degrees F Cal. Date: 5-3-91
Dewpoint Temperature/ EG&G Dewtrak Humidity Transmitter	Range: -40 to +140 degrees F Accuracy: +/-1 degrees F Cal. Date: 4-2-91
Flow/ Brooks Rotameter Model 1110	Range: 0 to 10 scfm Accuracy: +/-1.0% FS Cal. Date: 5-1-91

APPENDIX IV

GENERAL INFORMATION

General Data

Owner - Alabama Power Company
Plant Name - Joseph M. Farley Nuclear Plant (FNP)
Unit - 1
Docket Number - 50-348
Location - Houston County near Dothan AL
Outage Cycle - 10th refueling
Containment Description - steel lined prestressed concrete
Date test was completed - May 9, 1991

Technical Data

Containment net free volume - 2,000,000 cf
Design Pressure - 54 psig
Design Temperature - 280 degrees F
Calculated Accident Peak Pressure - 48 psig
Calculated Accident Peak Temperature - 273.7 degrees F

Test Data

Test Method - absolute
Test Duration - 24 hours
Data Analysis Technique - mass point
Test Pressure 48.0 (+3.0 psig, -0 psig)
Maximum Allowable Leakage Rate (La) 0.15 %/day
Acceptance Limit (0.75La) 0.1125 %/day
Measured Leakage Rate (Lam) 0.0529 %/day
Calculated leakage rate at upper confidence limit (UCL)
0.0545 %/day
Final leakage rate (UCL + penalties) 0.0547 %/day

Verification Test

Calibrated Leak Superimposed 0.1649 wt.%/day
Upper limit rate 0.2553 wt.%/day
Lower limit rate 0.1803 wt.%/day
Mass point calculated rate 0.1892 wt.%/day