REACTOR CONTAINMENT BUILDING
INTEGRATED LEAKAGE RATE TEST

TYPES A, B, AND C
PREOPERATIONAL TEST

GULF STATES UTILITIES COMPANY
RIVER BEND STATION
UNIT NO. 1

APRIL 1985

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LIST OF ATTACHMENTS

REFERENCES

1. 10CFR50, Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors, October 22, 1980.

2. River Bend Station Test Procedure, 1-PT-57-1, Revision 1, Integrated Leakage Rate Test.

3. ANSI/ANS-56.8, Containment System Leakage Testing Requirements, February 19, 1981.[1]

4. ANSI N45.4, American National Standard Leakage Rate Testing of Containment Structures for Nuclear Reactors, March 16, 1972.

5. River Bend Station Test Procedure, 1-PT-57-2 and 1-PT-57-4, Local Leakage Rate Test.

6. Bechtel Corporation's Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants, BN-TOP-1, Revision 1, November 1, 1972.

[1] This document used only as a guideline and any reference to said document in no way implies compliance.

SECTION 1

PURPOSE

The purpose of this report is to present a description and analysis of the April, 1985 Type A Preoperational Integrated Leakage Rate Test (ILRT), and a summary of the Types B and C local leakage rate tests performed at the River Bend Station Unit No. 1.

Stone & Webster Engineering Corporation provided engineering consultation services to GSU during their performance of this test.

This report is submitted as required by 10CFR50, Appendix J, Paragraph V.B. (Reference 1).

SECTION 2

SUMMARY

2.1 TYPE A TEST

2.1.1 TYPE A TEST SUMMARY

A plot of the mass versus time for the period of 1022 hours on April 5, 1985 to 0900 hours on April 6, 1985 is shown in Attachment 2.1. This period coincides with the end of temperature stabilization to just after the last adjustment to the containment boundary.

Typically, significant changes in the mass trend can be achieved by isolating significant leakage paths. Using graphical techniques, these changes or breakpoints, can usually be seen immediately although several data points, e.g. two hours minimum, are required before an analytical analysis can be predicted with certainty. This breakpoint analysis will be used to evaluate each action that was performed during the leakage investigation period.

The temperature stabilization criteria of 1-PT-57.1, Revision 1, was satisfied at 1010 hours on April 5, 1985. The mass trend data from 1022 hours on April 5, 1985 to 0326 hours on April 6, 1985, shows an excessive mass loss of about 39 lbm per hour. This rate exceeded the test procedure's acceptance criteria of 0.75 La, or 0.195 percent/day, which is approximately 13 lbm per hour.

In order to reduce the mass loss, or to place the containment boundary in its most conservative configuration, the following actions were performed:

a) At 1700 hours on April 5, 1985, the Residual Heat Removal System (RHS) root valve 1RHS*V15 was closed to stop the loss of suppression pool water. The local leakage was approximately 0.625 gallons per minute.

b) At 2130 hours on April 5, 1985, the Main Steam Isolation Valve (MSIV) Outboard division was pressurized to slightly less than containment pressure.

c) At 0315 hours on April 6, 1985, the Reactor Plant Ventilation (HVR) System differential pressure transmitter low side isolation valves were closed.

d) At 0823 hours on April 6, 1985, the motor operated valve 1DFR*MOV146 was opened.

Each of these actions is evaluated separately, using the breakpoint technique to determine whether the leakage path was significant. The following Table summarized the mass trend data before and after the action. If the before and after mass trend data is the same, the action is judged to be insignificant. Also, reference Attachment 2.1.

TABLE 2.1

	ACTION	TIME/DATE	MASS TREND LBM/HR	SIGNIFICANT
a.	1RHS*V15 Isolation at 1700 hours	1022 to 1700 April 5, 1985	42.47	
		1700 to 2130 April 5, 1985	39.68	NO
b.	MSIV Outboard Division Air Block	1700 to 2130 April 5, 1985	39.68	
		2130 to 0305	38.99	NO
c.	HVR low side isolation valves closed	2130 to 0305	38.99	
		0326 to 0446	2.85	YES
d.	HVR equalizing valves closed, low side isolation valves opened	0326 to 0446 April 6, 1985	2.85	
		0507 to 0819	2.82	NO
e.	DFR motor operated valve opened	0326 to 0819 April 6, 1985	2.73	
		0839 to 1534 April 6, 1985	3.24	NO

Based on the results of Table 2.1 the only action that is judged to be significant is the isolation of the HVR instrument isolation valves at 0315 hours on April 6, 1985.

1RHS*V15 is an instrument root valve on the discharge of 1RHS*PC002B. It was to be closed during the Type A test as Operations had been using a temporary connection on one of the downstream instruments to vent the RHS pump casing. This root valve would normally be open, and the system subject to periodic inspection for system leakage during plant operation. Adequate administrative controls exist regarding the alignment of systems, the tagging of system components, and the handling of temporary system modifications. The mispositioning of 1RHS*V15 is a procedural and a tagging concern, not a Type A concern.

The MSIV lines are excluded from the Type A Leakage per River Bend Final Safety Analysis Report (FSAR), Section 15.6.5.5.2 Fission Product Transport to the Environment. During the Type A test, these lines were pressurized to less than Pa to minimize the outleakage. The original airblock consisted of pressurizing only the body of the outboard division block valve. As the line from the outboard MSIV to the block valve is a large diameter line, it was pressurized to reduce any leakage by the inboard division. The leakage of the MSIV divisions are treated as Technical Specification surveillance tests. The low leakage reported by the surveillance tests combined with the insignificant change in the mass trend, indicates that the pressurizing of the outboard division was not a significant leakage path.

The HVR differential pressure transmitters were the significant leakage path. There are six HVR differential pressure transmitters that monitor the annulus and containment differential pressure for automatic shutdown of the containment unit coolers to aid in preventing containment negative pressure. The isolation provisions for these lines are discussed in the River Bend FSAR, Section 6.2.4.3.5, Conformance to Regulatory Guide 1.11. Three of the six HVR differential pressure transmitters were not properly aligned for the Type A test. Only the positions of the root valve were specified. See Section 2.1.2 for the recommended corrective action.

The 1DFR*MOV146 had been installed just prior to the Type A test. Control and power cables had not been run, nor had the generic electrical testing been performed. The position of all containment isolation valves were set prior to the performance of the Containment Weld Integrity Test. This valve was supposed to be opened but its opening was restricted by a tagging clearance. Since it had not been closed by its normal means, it was conservatively opened. The downstream check valves had been air seat leakage tested prior to the Type A. The Type C test combined with the relatively insignificant change in the mass trend, see Table 2.1, indicates that the DFR motor operated valve position change did not significantly impact the leakage trend.

2.1.2 Corrective Action

The leakage investigation resulted in a number of actions taken to reduce the leakage trend. Each action taken was properly documented prior to performing the action. The effect of each action was monitored using the Type A mass trend to determine which leakage path was significant. This analysis has identified the three HVR differential pressure transmitters as the sole leakage paths responsible for the excessive leakage rate. These paths were not the result of a failed component, nor the result of an unconservative local leakage test. The Type A Procedure failed to adequately address the entire valve alignment required for these transmitters.

To prevent the occurrence of the HVR leakage again the following corrective action is to be taken:

a) The surveillance Type A procedure will address the entire valve alignment for all of the instruments included in the River Bend FSAR, Section 6.2.4.3.5.

b) Permanent caution tags will be placed on the instrument valves (equalizing, vent or drain valves, and test valves) stating that the valve is a containment isolation valve and that it is to be normally closed except when performing maintenance or calibration.

c) The instruments will have the position verified every 31 days per the recommendations in the Standard Technical Specifications Section 3./4.6.1.1 (b).

In addition to the HVR corrective action, all changes made to the preoperational Type A test procedure will be evaluated for incorporation into the surveillance Type A procedure.

2.1.3 Conclusions

The preoperational Type A test should be considered a successful test as once the HVR procedure deficiency was corrected the measured leakage rate was well within the plant's maximum allowable leakage rate.

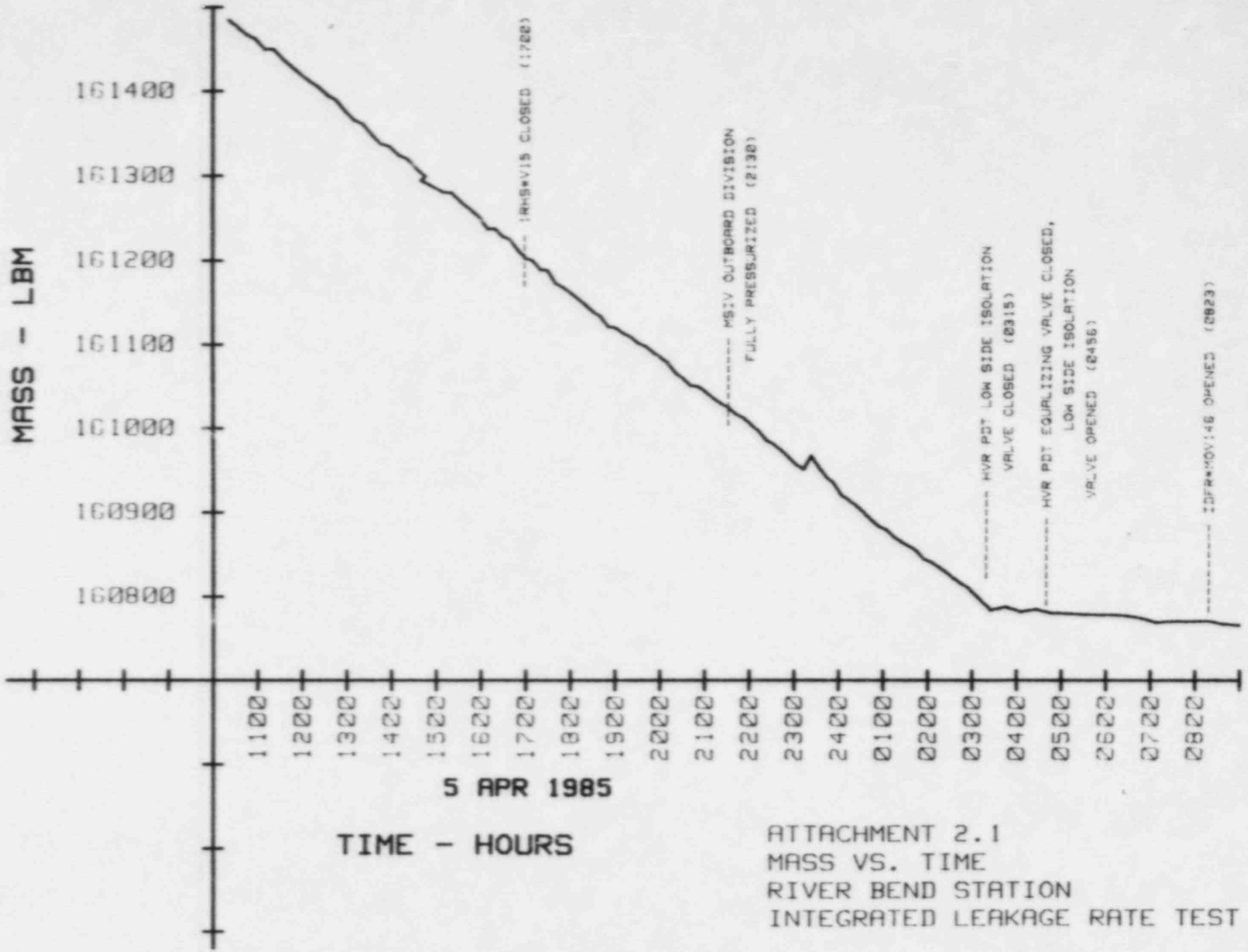
The preoperational Type A test was run for a minimum of twenty-four (24) hours in order to verify that there were no effects due to diurnal bias, based on the data taken.

2.2 LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

The Local Leakage Rate Tests (LLRT's) of containment isolation valves and other primary containment penetrations were performed by the methods described in the plant preoperational test procedure No. 1-PT-57-2, and 1-PT-57-4.

In accordance with Appendix J to 10CFR50, Paragraph V.B., data for the Local Leakage Rate Tests are summarized in Section 4 of this report.

Only the LLRT's for those containment isolation valves that are in the Appendix J, 10CFR50, Type B and C program are included in Section 4 of this report. LLRT's for valves that are a part of the Technical Specification Program (e.g. bypass or penetration leakage collection systems) have been exempted from the Appendix J, 10CFR50 Program. The LLRT's for these exempted valves are maintained in the site test records.



ATTACHMENT 2.1
MASS VS. TIME
RIVER BEND STATION
INTEGRATED LEAKAGE RATE TEST

SECTION 3

TYPE A TEST

3.1 EDITED LOG OF EVENTS

This log was edited from the information contained in the Chronological Log of Events.

April 4, 1985

2300 - Completed all the prerequisites of the Integrated Leakage Rate Test (ILRT) Procedure 1-PT-57-1, Revision 1.

\- Commenced the Containment and Drywell Inspection.

April 5, 1985

0000 - Completed Containment and Drywell Inspection. No significant findings were noted.

0145 - Started the compressors and began pressurizing to Pa.

0443 - Containment pressure is 21.16 psia (6.46 psig).
Note: Since the Containment Weld Integrity Test had been performed prior to the Type A Test, the pressure was held below 85% Pa (6.46 psig) for 24 hours before repressurizing to Pa for the leakage rate test.

0517 - Containment pressure equal to Pa (7.6 psig or 22.3 psia).

0546 - Compressors secured, outboard service air isolation valve closed, and charging line was vented.

0559 - Started containment temperature stabilization.

1010 - Satisfied the test procedure acceptance criteria for temperature stabilization.

\- Started taking data for the 24 hour ILRT.

1313 - Noticed that the pressure gage on the outboard Main Steam Isolation Valve (MSIV) division was increasing.

1600 - Found Residual Heat Removal System (RHS) vent valve 1RHS*V15 open, and leaking water at the rate of 0.625 gallons per minute. Test procedure called for the valve to be closed.

1700 - Closed 1RHS*V15

1900 - Continued leakage investigation. Opened manway in ductwork to inspect the containment purge supply outboard isolation valve 1HVR*AOV166. Leakage was audible, but was judged to be insignificant.

2130 - The pressure in the MSIV outboard divisions was slightly less than containment pressure. The pressurization lines were secured and vented.

April 6, 1985

0258 - Differential pressure transmitter equalizing valves on the Reactor Plant Ventilation (HVR) System were found open.
Note: The transmitters were located in the auxiliary building, the high side tap sensed the containment pressure, and the low side sensed the annulus pressure.

0315 - The HVR system low side isolation valves on transmitters 1HVR*PDT60A, 1HVR*PDT60C, and 1HVR*PDT60E were closed.

0456 - Closed the equalizing valves and opened the low side isolation valves on 1HVR*PDT60A, 1HVR*PDT60C, and 1HVR*PDT60E.

0823 - Determined that the lineup for 1DFR*MOV146, which had been recently installed, had not been positioned by normal means. The valve was not operable and was in the closed position. Opened 1DFR*MOV146.

April 7, 1985

0328 - Satisfied 24 hour leakage rate test criteria.

0355 - Commenced superimposed leakage flow.

0405 - Stabilized superimposed leakage rate at 3.15 cubic feet per minute.

0459 - Started superimposed leakage verification test.

0901 - Satisfied the superimposed leakage verification test.

1105 - Began depressurization.

April 8, 1985

0300 - Control room opened airlock for containment access.

3.2 GENERAL TEST DESCRIPTION

3.2.1 Prerequisites

In accordance with the River Bend Unit No. 1 ILRT Procedure (Reference 2), the following is a listing of the significant prerequisites that were compiled and documented prior to primary containment pressurization:

a. General inspection of the containment and drywell areas.

b. All test instrumentation calibrated or functionally verified within six months of the test.

c. Containment and drywell unit coolers operating with cooling water severely throttled to maintain stable temperature limits.

d. The Data Acquisition and Analysis Computers were operational and programmed for ILRT functions.

e. The containment dome air circulating fans were operating to maintain stable conditions above the operating deck.

f. All system valve lineups were complete.

g. The Official Log of Events was established.

h. The Temperature survey was complete.

i. Site meteorological data was recorded prior to and during the performance of the test.

j. All required Type B and Type C leakage testing was complete or the status reviewed by the Test Director.

k. Gages were installed on the airlock accumulators to monitor for inleakage.

l. Water levels were taken prior to the start of the Type A test.

m. Annulus Temperature monitoring system was operational to measure any diurnal bias effects.

3.2.2 Equipment

Pressurization of the containment was achieved by the utilization of a temporary system consisting of diesel driven air compressors, an aftercooler, and a refrigerant air dryer as shown on Attachment 3.2C. Adequate instrumentation and valving were installed to maintain the quality of the air throughout the pressurization sequence.

3.2.3 Instrumentation

The various containment and drywell parameters required to calculate the leakage rate during the ILRT were monitored using pressure, temperature and moisture sensors. Pertinent data for the temporary ILRT instrumentation is listed in Attachment 3.2A. The temperature zone layout is shown on Attachment 3.2B.

The following table describes the arrangement of the moisture zones:

	Temperature Zones
Zone A	I and II
Zone B	III through VI
Zone C	VI and VIII

A rotameter was used to perform the superimposed leakage verification test. With the exception of this rotameter, all test instrumentation was monitored by the plant computer.

3.2.4 Data Aquisition System

The data acquisition system used for the River Bend Unit No. 1 ILRT was the Emergency Response Information System (ERIS) Computer.

For the ILRT, ERIS monitored the following parameters:

	Containment	Drywell
Temperatures	18	4
Moisture	4	2
Pressure	1	1

The input to the ILRT programs was an ERIS calculated ten minute average. Each data set was time stamped to account for any time skewing. Instantaneous data (e.g. one sampling for each sensor) was also taken every ten minutes during the test period.

The ILRT program performed sensor validity checks on the temperature, moisture, and pressure sensors to identify any aberrant behavior. There were no sensor failures during the April 1985 ILRT.

3.2.5 Data Resolution System

The ERIS ILRT Computer program calculated the leakage rate using the Absolute Method, Mass Point Analysis. The leakage rate was also calculated using the Absolute Method, Total Time Analysis. The Total Time Analysis was run on the Stone & Webster Engineering Corporation's portable computer.

Absolute Method, Mass Point Analysis

The Absolute Method, Mass Point Analysis consists of calculating air masses within containment structure, over the test period, from pressure, temperature, and dewpoint observations made during the ILRT. The air masses are computed using the ideal gas law as follows:

$$M = \frac{144V\ (P-Pv)}{RT} \qquad \text{(Eq. 1)}$$

Where:

M = air mass, lbm
P = total pressure, psia
Pv = average vapor pressure, psia
R = 53.35 Ft - lbf/lbm ^{o}R (for air)
T = average containment temperature, ^{o}R
V = containment free volume, Ft^{3}

The leakage rate is then determined by plotting the air mass as a function of time, using a least-squares fit to determine the slope, A=dM/dT. The leakage rate is expressed as a percentage of the air mass lost in 24 hours or symbolically:

$$\text{Leakage rate} = A/B\ (-2400) \qquad \text{(Eq. 2)}$$

Where A is the slope of the least-squares curve and B is the y-intercept. The sign convention is such that an outward leak is positive and the units are in percent/day.

In general, the containment is divided into two volumes: the containment and the drywell air volumes. The mass of each volume is computed separately and added together. The result is correlated as a function of time by means of a least-squares curve fit of the form:

$$M = At + B \qquad \text{(Eq. 3)}$$

The slope A and the y-intercept B are then used in Equation 2 to determine the leakage rate.

A 95 percent confidence interval is calculated using a Student's T distribution. The sum of the leakage rate and the 95 percent confidence interval is the upper confidence limit (UCL). The measured leakage rate may be described as 95 percent accurate to within the value of the UCL.

Absolute Method, Total Time Analysis

This method consists of calculating a measured leakage rate. The containment air mass is computed using Equation 1. The measured leakage rate at any time (t) is then determined by subtracting the mass at the time (M_t) from the initial mass (M_i) and then by dividing by the initial mass. The measured leakage rate is then expressed as a percentage of the containment mass lost in 24 hours or symbolically:

$$\text{Measured leakage rate} = \frac{Mi - Mt}{Mi} \quad \frac{(2400)}{(\Delta t)} \qquad \text{(Eq. 4)}$$

The sign convention is such that an outward leakage rate is positive and the units are in percent/day.

The estimated leakage rate is then determined by performing a linear least squares fit of the measured leakage rate values, as follows:

$$\text{Estimated leakage rate} = At+B \qquad \text{(Eq. 5)}$$

Where A is the slope and B is the y-intercept of the least squares line. The confidence level is determined in accordance with the equations of BN-TOP-1, Revision 1, Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants.

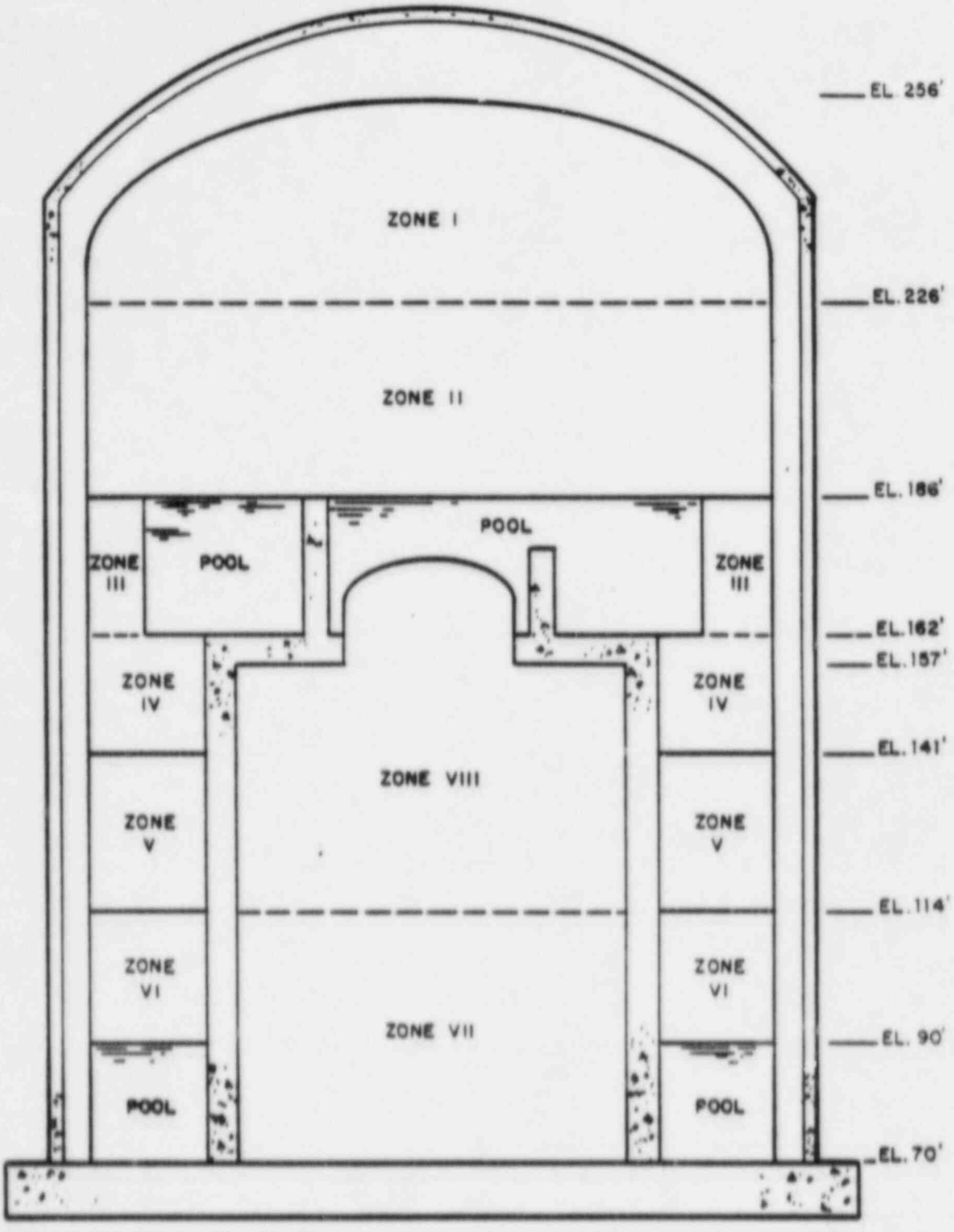
The sum of the total time estimated leakage rate and the confidence limit is the Upper Confidence Limit (UCL).

ATTACHMENT 3.2A
INSTRUMENTATION

ZONE	LOCATION	INSTRUMENT	ELEVATION	AZIMUTH	WEIGHT FACTOR
I	Containment 226' to 256'	RTD22C	240'	020°	0.09427
		RTD22D	240'	270°	0.09427
		RTD22B	240'	180°	0.09427
II	Containment 186' to 226'	RTD21P	193'	340°	0.09541
		RTD22A	196'	225°	0.09541
		RTD21N	193'	100°	0.09540
III	Containment 162' to 186'	RTD21K	175'	120°	0.03064
		RTD21L	170'	038°	0.03064
		RTD21M	175'	270°	0.05637
IV	Containment 141' to 162'	RTD21G	152'	075°	0.03712
		RTD21H	150'	300°	0.02538
		RTD21J	152'	230°	0.02155
V	Containment 114' to 141'	RTD21D	128'	230°	0.03887
		RTD21E	126'	145°	0.03887
		RTD21F	128'	050°	0.03887
VI	Containment 90' to 114'	RTD21A	103'	180°	0.03755
		RTD21B	103'	75°	0.03756
		RTD21C	103'	330°	0.03755

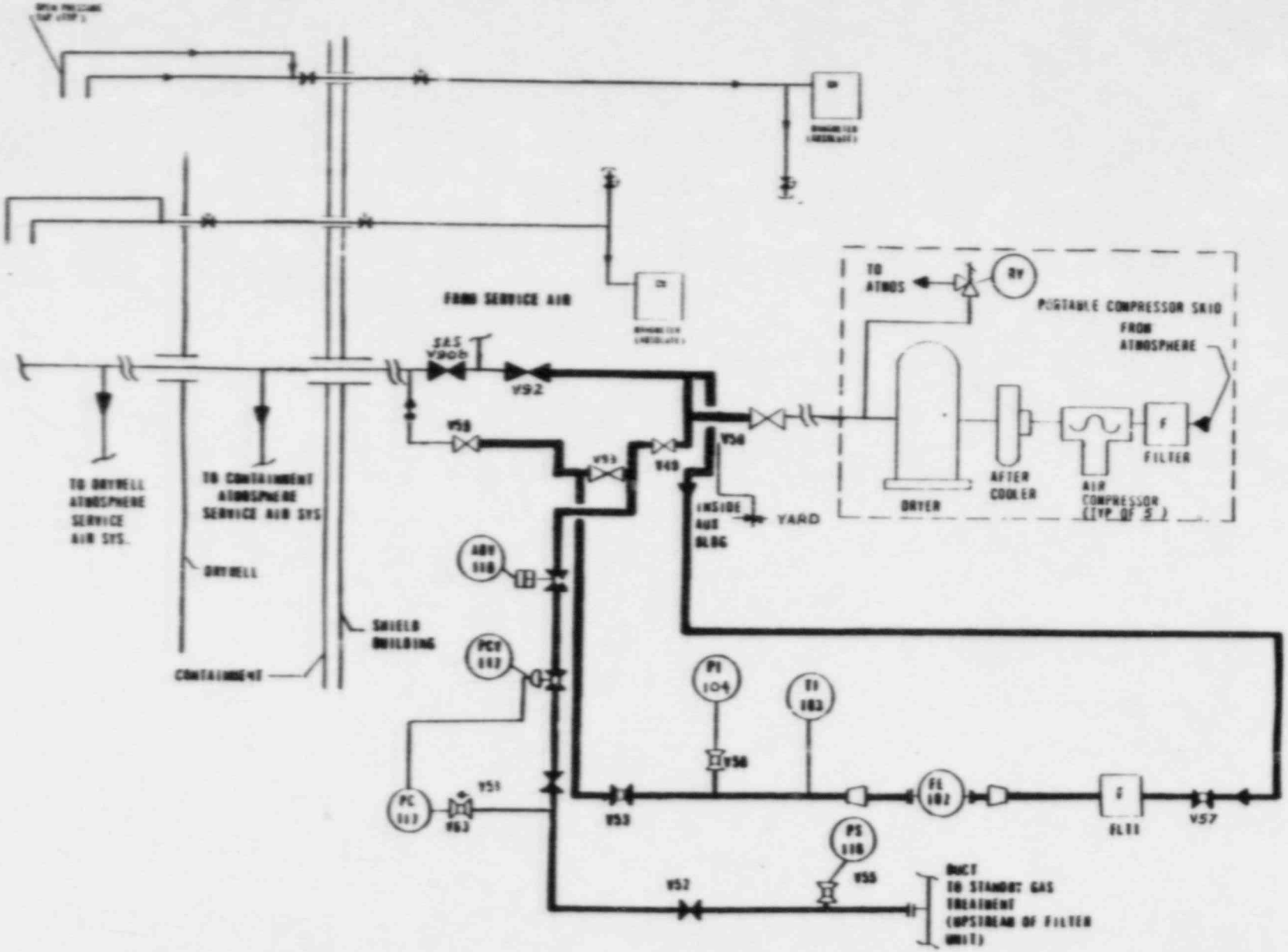
ATTACHMENT 3.2A (CON'T)
INSTRUMENTATION

ZONE	LOCATION	INSTRUMENT	ELEVATION	AZIMUTH	WEIGHT FACTOR
VII	Drywell 70' to 114'	RTD22H	100'	300°	0.25
		RTD22G	100'	125°	0.25
VIII	Drywell 114' to 157'	RTD22E	130'	030°	0.25
		RTD22F	130'	210°	0.25
A	Containment	MT128	240'	270°	0.28451
		MT129	240'	90°	0.28451
B	Containment	MT132	152'	305°	0.21549
		MT133	146'	140°	0.21549
C	Drywell	MT130	113'	95°	0.5
		MT131	115'	275°	0.5
-	Containment Pressure	PIT120	-	-	1.0
-	Drywell Pressure	PIT122	-	-	1.0
-	Spare Pressure	PIT121	-	-	0.0



PROFILE VIEW REACTOR BUILDING

ATTACHMENT 3.2B
TEMPERATURE ZONES
RIVER BEND STATION
GULF STATES UTILITIES



ATTACHMENT 3.2C
CONTAINMENT LEAKAGE
MONITORING SYSTEM
ARRANGEMENT
RIVER BEND STATION-UNIT I
GULF STATES UTILITIES COMPANY

3.3 TEST RESULTS

3.3.1 Presentation of Test Results

The test data for the April 1985 ILRT is based upon a 24 hour test period starting at 0326 hours on April 6, 1985 to 0328 on April 7, 1985. The final test results were determined using GSU's ERIS Computer for the Mass Point Analysis, see Attachment 3.3B, and by SWEC's portable computer for the Total Time Analysis, See Attachment 3.3C.

Both the Mass Point and the Total Time results were well within the 0.75 L_a, or 0.195 percent/day.

The Type A test results were verified by performing a superimposed leakage rate test. Both the Mass Point and Total Time test results for the superimposed leakage test were well within the Appendix J, 10CFR50 acceptance criteria of $\pm$ 0.25L_a, or $\pm$ 0.065 percent/day. The information for the superimposed leakage test is contained in Attachment 3.3G.

3.3.2 ILRT Results

The ILRT was conducted in accordance with the River Bend ILRT test procedure 1-PT-57-1, Revision 1. The results for the ILRT and for the superimposed leakage rate test are shown below:

3.3.2.1 Mass Point Analysis ILRT Results

Item	Percent/day)
a. Leakage rate calculated, LAM	.052605
b. 95% Confidence level	.002186
c. UCL, leakage rate with 95 percent confidence level	.054791
d. Corrections for Type C leakage	.000279
e. Corrections for airlock inleakage	.001210
f. Total Type "A" leakage rate	.056280
Results were within the acceptable limit of	.1950

3.3.2.2 Total Time Analysis ILRT Results

Item	Percent/day)
a. Leakage rate calculated, LAM	.057141
b. 95% Confidence level	.052312
c. UCL, leakage rate with 95 percent confidence level	.109453
d. Corrections for Type C leakage	.000279
e. Corrections for airlock inleakage	.001210
f. Total Type "A" leakage rate	.110942
Results were within the acceptable limit of	.1950

3.3.2.3 Superimposed Leakage Rate Test Results

A. Calculate superimposed leakage rate, L_o

i) Correct indicated flow of 3.15 cubic feet per minute to standard temperature and pressure (per rotameter calibration records)

$$L_o = L_I \left(\frac{P_I + 14.7}{14.7} \times \frac{530^\circ R}{T_I + 460} \right)^{\frac{1}{2}}$$

where P_I = average pressure over 4 hours = 8.2 psig
L_I = average flow over 4 hours = 3.15 CFM
T_I = average temperature over 4 hours = 83°F

L_o = 3.88 standard cubic feet per minute

ii) Convert corrected flow to percent per day

$$\frac{3.88 \text{ SCFM}}{3.94 \text{ SCFM}} = \frac{L_o \text{ percent/day}}{0.26 \text{ percent/day}}$$

L_o = 0.256041 percent/day

B. Mass Point Analysis Verification Test Results

i) L_c = 0.283301 percent/day
ii) $L_{am} + L_o \pm 0.25L_a$

0.052605 + 0.256041 + 0.065 = 0.373646
0.052605 + 0.256041 - 0.065 = 0.243646
0.243646 ≤ 0.283301 ≤ 0.373646

C. Total Time Analysis Verification Test Results

i) L_c = 0.288155 percent/day
ii) $L_{am} + L_o \pm 0.25\ L_a$

0.057141 + 0.256041 + 0.065 = 0.378182
0.057141 + 0.256041 - 0.065 = 0.248182
0.248182 ≤ 0.288155 ≤ 0.378182

ATTACHMENT 3.3A

INTEGRATED LEAKAGE RATE TEST
REDUCED INPUT VARIABLES
FROM 0326 HOURS ON 06 APR 1985 TO 0328 ON 07 APR 1985

	CONTAINMENT			DRYWELL			
TIME HRS	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	TOTAL MASS LBM
0.0	23.258	549.83	0.5449	23.256	549.33	0.5295	160783.684
.337	23.259	549.84	0.5446	23.256	549.33	0.5292	160787.349
.673	23.258	549.85	0.5443	23.255	549.34	0.5286	160781.586
1.010	23.258	549.85	0.5437	23.255	549.34	0.5281	160784.603
1.347	23.257	549.87	0.5433	23.254	549.34	0.5277	160779.885
1.684	23.257	549.88	0.5430	23.254	549.35	0.5274	160779.362
2.020	23.256	549.87	0.5424	23.253	549.35	0.5268	160778.552
2.357	23.256	549.88	0.5422	23.253	549.35	0.5266	160777.768
2.694	23.255	549.87	0.5416	23.253	549.36	0.5261	160777.738
3.030	23.255	549.87	0.5413	23.253	549.36	0.5256	160776.849
3.367	23.255	549.88	0.5409	23.252	549.37	0.5253	160774.007
3.704	23.254	549.89	0.5407	23.252	549.37	0.5249	160768.819
4.040	23.254	549.90	0.5404	23.252	549.38	0.5247	160770.013
4.377	23.254	549.90	0.5402	23.252	549.38	0.5242	160769.901
4.884	23.254	549.91	0.5399	23.251	549.39	0.5242	160770.329
5.220	23.254	549.91	0.5398	23.251	549.40	0.5241	160766.717
5.557	23.254	549.92	0.5400	23.251	549.41	0.5244	160765.235
5.894	23.255	549.93	0.5399	23.252	549.42	0.5246	160770.205
6.231	23.255	549.93	0.5406	23.253	549.43	0.5248	160766.919
6.567	23.256	549.95	0.5409	23.253	549.44	0.5254	160764.477
6.940	23.257	549.95	0.5412	23.253	549.46	0.5259	160762.328
7.342	23.258	549.96	0.5417	23.254	549.47	0.5265	160763.825
7.744	23.258	549.97	0.5421	23.255	549.48	0.5271	160763.629
8.144	23.259	549.97	0.5417	23.256	549.49	0.5259	160769.409

ATTACHMENT 3.3A (CON'T)

INTEGRATED LEAKAGE RATE TEST
REDUCED INPUT VARIABLES
FROM 0326 HOURS ON 06 APR 1985 TO 0328 ON 07 APR 1985

	CONTAINMENT			DRYWELL			
TIME HRS	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	TOTAL MASS LBM
8.545	23.259	549.98	0.5430	23.256	549.50	0.5275	160761.251
8.946	23.261	549.99	0.5438	23.257	549.51	0.5287	160761.392
9.347	23.262	549.99	0.5446	23.259	549.53	0.5295	160761.456
9.746	23.263	550.01	0.5454	23.260	549.55	0.5261	160763.552
10.146	23.264	550.01	0.5461	23.262	549.56	0.5307	160761.910
10.545	23.265	550.03	0.5470	23.262	549.58	0.5319	160757.571
10.944	23.266	550.05	0.5481	23.264	549.61	0.5331	160750.584
11.343	23.267	550.06	0.5490	23.265	549.63	0.5342	160748.821
11.742	23.269	550.06	0.5500	23.265	549.65	0.5353	160748.026
12.141	23.270	550.08	0.5509	23.267	549.66	0.5363	160744.253
12.541	23.271	550.10	0.5520	23.268	549.68	0.5375	160741.584
12.490	23.273	550.12	0.5529	23.270	549.70	0.5384	160740.830
13.339	23.275	550.14	0.5538	23.272	549.72	0.5395	160744.986
13.739	23.277	550.17	0.5549	23.274	549.74	0.5405	160743.986
14.138	23.280	550.18	0.5559	23.276	549.76	0.5417	160749.024
14.539	23.280	550.20	0.5568	23.278	549.78	0.5427	160745.617
14.938	23.281	550.22	0.5576	23.279	549.79	0.5435	160739.252
15.338	23.282	550.24	0.5584	23.280	549.79	0.5543	160735.007
15.959	23.284	550.26	0.5595	23.281	549.82	0.5457	160734.192
16.296	23.286	550.27	0.5604	23.281	549.83	0.5463	160734.715
16.663	23.287	550.28	0.5609	23.283	549.85	0.5468	160737.496
16.969	23.288	550.29	0.5615	23.284	549.86	0.5470	160734.483

ATTACHMENT 3.3A (CON'T)

INTEGRATED LEAKAGE RATE TEST
REDUCED INPUT VARIABLES
FROM 0326 HOURS ON 06 APR 1985 TO 0328 ON 07 APR 1985

	CONTAINMENT			DRYWELL			
TIME HRS	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	TOTAL MASS LBM
17.306	23.288	550.31	0.5619	23.285	549.88	0.5477	160731.209
17.643	23.289	550.32	0.5623	23.286	549.89	0.5479	160730.483
17.979	23.290	550.33	0.5626	23.287	549.89	0.5483	160730.919
18.316	23.290	550.35	0.5631	23.287	549.89	0.5484	160724.892
18.653	23.290	550.37	0.5634	23.288	549.90	0.5488	160720.515
18.989	23.291	550.38	0.5637	23.289	549.91	0.5491	160720.383
19.325	23.291	550.40	0.5638	23.289	549.93	0.5488	160714.862
19.663	23.292	550.41	0.5641	23.289	549.95	0.5492	160715.097
19.999	23.292	550.42	0.5618	23.289	549.96	0.5461	160730.382
20.336	23.292	550.43	0.5636	23.290	549.98	0.5483	160717.001
20.673	23.293	550.44	0.5637	23.290	549.99	0.5488	160712.737
21.010	23.293	550.45	0.5637	23.290	549.99	0.5488	160712.885
21.347	23.293	550.47	0.5638	23.290	550.00	0.5487	160703.979
21.683	23.293	550.47	0.5634	23.290	550.01	0.5481	160721.413
22.020	23.293	550.48	0.5634	23.290	550.01	0.5471	160709.314
22.357	23.293	550.49	0.5636	23.290	550.02	0.5463	160708.375
22.694	23.294	550.53	0.5635	23.290	550.02	0.5473	160702.347
23.030	23.294	550.54	0.5634	23.290	550.02	0.5480	160699.451
23.367	23.294	550.55	0.5634	23.291	550.03	0.5467	160701.861
23.704	23.294	550.56	0.5634	23.291	550.05	0.5482	160692.665
23.041	23.294	550.57	0.5632	23.291	550.06	0.5476	160692.883

ATTACHMENT 3.3B
INTEGRATED LEAKAGE RATE TEST RESULTS
FROM 0326 ON 06 APR 1985 TO 0328 ON 07 APR 1985

RIVER BEND STATION
ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
1	0.000	160783.68	0.000000	0.000000	0.000000
2	.337	160787.35	0.000000	0.000000	0.000000
3	.673	160781.59	.046429	1.033259	1.079687
4	1.010	160784.60	.013282	.168534	.181817
5	1.347	160779.89	.045843	.089536	.135379
6	1.684	160779.36	.051896	.053579	.105474
7	2.020	160778.52	.052497	.035823	.088320
8	2.357	160777.77	.051155	.025793	.076948
9	2.694	160777.74	.047204	.019952	.067156
10	3.030	160776.85	.044774	.015840	.060614
11	3.367	160774.01	.047137	.012993	.060130
12	3.704	160768.82	.055533	.013835	.069368
13	4.040	160770.01	.057034	.011691	.068725
14	4.377	160769.90	.056489	.009951	.066440
15	4.884	160770.33	.053415	.008952	.062367
16	5.220	160766.72	.053851	.007734	.061585
17	5.557	160765.23	.054372	.006774	.061146
18	5.894	160770.20	.049971	.007392	.057364
19	6.231	160766.92	.048345	.006772	.055117
20	6.567	160764.48	.048006	.006078	.054084
21	6.940	160762.33	.048288	.005481	.053769
22	7.342	160763.82	.047054	.005097	.052151
23	7.744	160763.63	.045609	.004829	.050438
24	8.144	160769.41	.041441	.005935	.047376
25	8.545	160761.25	.041070	.005434	.046505
26	8.946	160761.39	.040319	.005033	.045352
27	9.347	160761.46	.039335	.004722	.044057
28	9.746	160763.55	.037553	.004669	.042222
29	10.146	160761.91	.036323	.004473	.040796
30	10.545	160757.57	.036269	.004151	.040420
31	10.944	160750.58	.037778	.004114	.041892
32	11.343	160748.82	.039187	.004059	.043246
33	11.742	160748.03	.040283	.003931	.044215
34	12.141	160744.25	.041758	.003935	.045693
35	12.541	160741.58	.043290	.003964	.047254
36	12.940	160740.83	.044490	.003895	.048386
37	13.339	160744.99	.044547	.003671	.048218
38	13.739	160743.99	.044563	.003465	.048027
39	14.138	160749.02	.043587	.003402	.046988
40	14.539	160745.62	.043094	.003254	.046348

ATTACHMENT 3.3B (CON'T)
INTEGRATED LEAKAGE RATE TEST RESULTS
FROM 0326 ON 06 APR 1985 TO 0328 ON 07 APR 1985

RIVER BEND STATION
ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
41	14.938	160739.25	.043418	.003100	.046518
42	15.338	160735.01	.044114	.003016	.047130
43	15.959	160734.19	.044592	.002895	.047487
44	16.296	160734.72	.044808	.002760	.047568
45	16.633	160737.50	.044546	.002641	.047187
46	16.969	160734.48	.044545	.002520	.047065
47	17.306	160731.21	.044784	.002420	.047204
48	17.643	160730.48	.044964	.002322	.047286
49	17.979	160730.92	.044982	.002225	.047207
50	18.316	160724.89	.045459	.002185	.047644
51	18.653	160720.52	.046176	.002211	.048387
52	18.989	160720.38	.046735	.002195	.048930
53	19.325	160714.86	.047594	.002273	.049868
54	19.663	160715.10	.048258	.002285	.050543
55	19.999	160730.38	.047623	.002290	.049913
56	20.336	160717.00	.047943	.002232	.050175
57	20.673	160712.74	.048453	.002214	.050667
58	21.010	160712.88	.048829	.002172	.051001
59	21.347	160703.98	.049677	.002262	.051939
60	21.683	160721.41	.049277	.002225	.051502
61	22.020	160709.31	.049583	.002176	.051759
62	22.357	160708.37	.049851	.002125	.051975
63	22.694	160702.35	.050375	.002125	.052499
64	23.030	160699.45	.050950	.002139	.053089
65	23.367	160701.85	.051285	.002103	.053387
66	23.704	160692.67	.052011	.002166	.054177
67	24.041	160692.88	.052605	.002186	.054791

ATTACHMENT 3.3C
INTEGRATED LEAKAGE RATE TEST RESULTS
FROM 0326 ON 06 APR 1985 TO 0328 ON 07 APR 1985

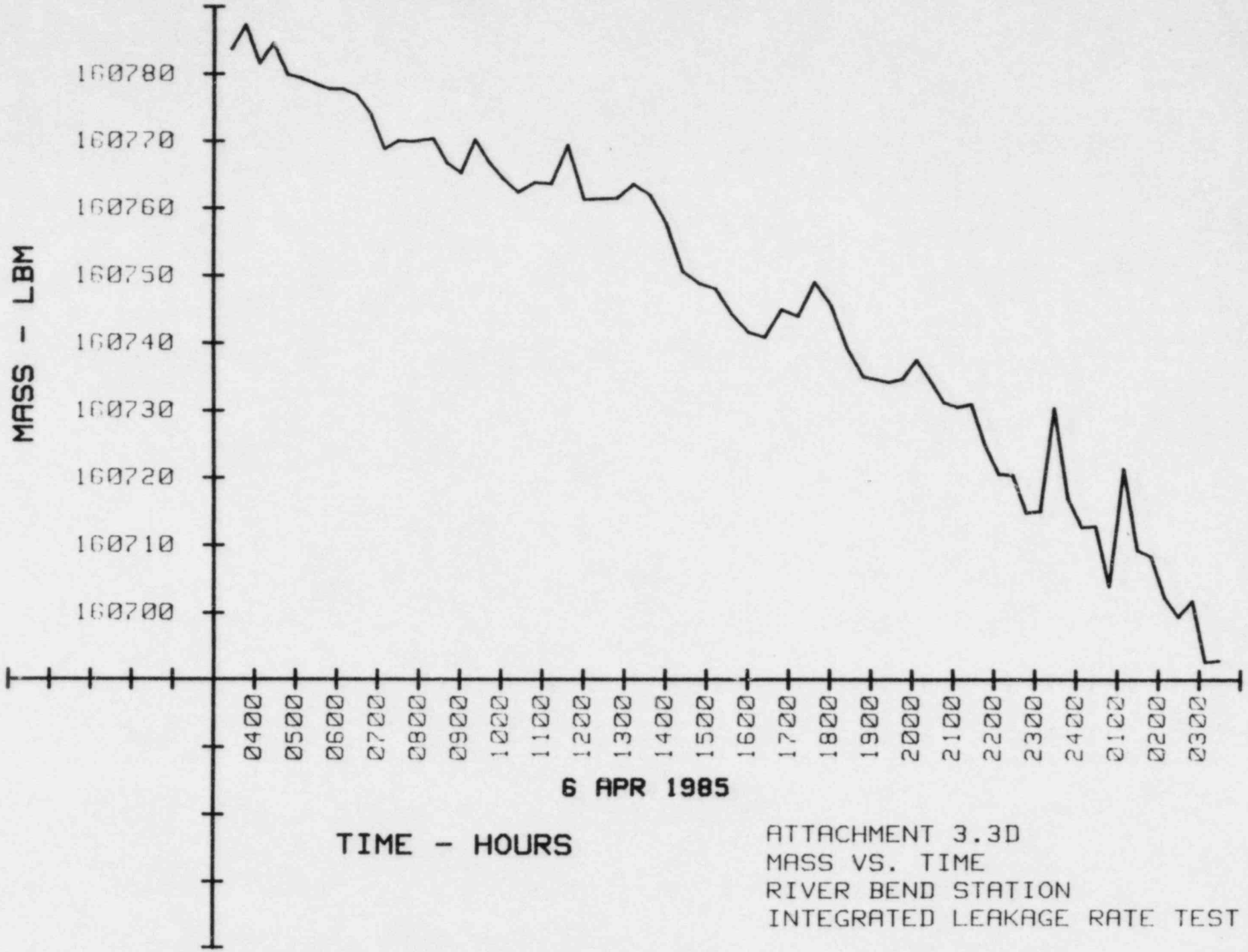
RIVER BEND STATION
ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
1	0.000	160783.68	0.000000	0.000000	0.000000	0.000000	0.00000
2	.337	160787.35	-.162335	0.000000	0.000000	0.000000	0.00000
3	.673	160781.59	.046533	0.000000	0.000000	0.000000	0.00000
4	1.010	160784.60	-.013582	0.000000	.031219	1.064824	1.09604
5	1.347	160779.89	.042099	0.000000	.061138	.409395	.47053
6	1.684	160779.36	.038310	0.000000	.069556	.280697	.35025
7	2.020	160778.52	.038145	0.000000	.071963	.226821	.29878
8	2.357	160777.77	.037466	0.000000	.071773	.196542	.26831
9	2.694	160777.74	.032946	0.000000	.068817	.177527	.24634
10	3.030	160776.85	.033672	0.000000	.066432	.162821	.22925
11	3.367	160774.01	.042901	0.000000	.067489	.149718	.21720
12	3.704	160768.82	.059905	0.000000	.073245	.137867	.21111
13	4.040	160770.01	.050511	0.000000	.074343	.129736	.20407
14	4.377	160769.90	.047004	0.000000	.073935	.123565	.19750
15	4.884	160770.33	.040817	0.000000	.073999	.120564	.19456
16	5.220	160766.72	.048518	0.000000	.072846	.115362	.18820
17	5.557	160765.23	.049557	0.000000	.072211	.110780	.18299
18	5.894	160770.20	.034136	0.000000	.068272	.108272	.17654
19	6.231	160766.92	.040162	0.000000	.066309	.105104	.17141
20	6.567	160764.48	.043658	.027521	.065331	.101900	.16723
21	6.940	160762.33	.045934	.029818	.065183	.098974	.16415
22	7.342	160763.82	.040375	.039953	.064132	.096728	.16086
23	7.744	160763.63	.038657	.039559	.062767	.094691	.15745
24	8.144	160769.41	.026164	.041547	.059326	.093619	.15294
25	8.545	160761.25	.039187	.041401	.058414	.091541	.14995
26	8.946	160761.39	.037195	.041345	.057234	.089664	.14689
27	9.347	160761.46	.035497	.041213	.055886	.087943	.14383
28	9.746	160763.55	.030834	.040881	.053961	.086498	.14045
29	10.146	160761.91	.032034	.040836	.052411	.085002	.13741
30	10.545	160757.57	.036964	.041001	.051696	.083359	.13505
31	10.944	160750.58	.045146	.041113	.052136	.081618	.13375
32	11.343	160748.82	.045878	.040411	.052597	.079977	.13257
33	11.742	160748.03	.045330	.040152	.052915	.078446	.13136
34	12.141	160744.25	.048479	.040226	.053564	.076965	.13052
35	12.541	160741.58	.050109	.040691	.054322	.075556	.12987
36	12.940	160740.83	.049434	.040737	.054905	.074233	.12913
37	13.339	160744.99	.043305	.040424	.054727	.073082	.12780
38	13.739	160743.99	.043130	.040874	.054534	.071989	.12652
39	14.138	160749.02	.036594	.040695	.053648	.071108	.12475
40	14.539	160745.62	.039083	.040466	.053092	.070180	.12327

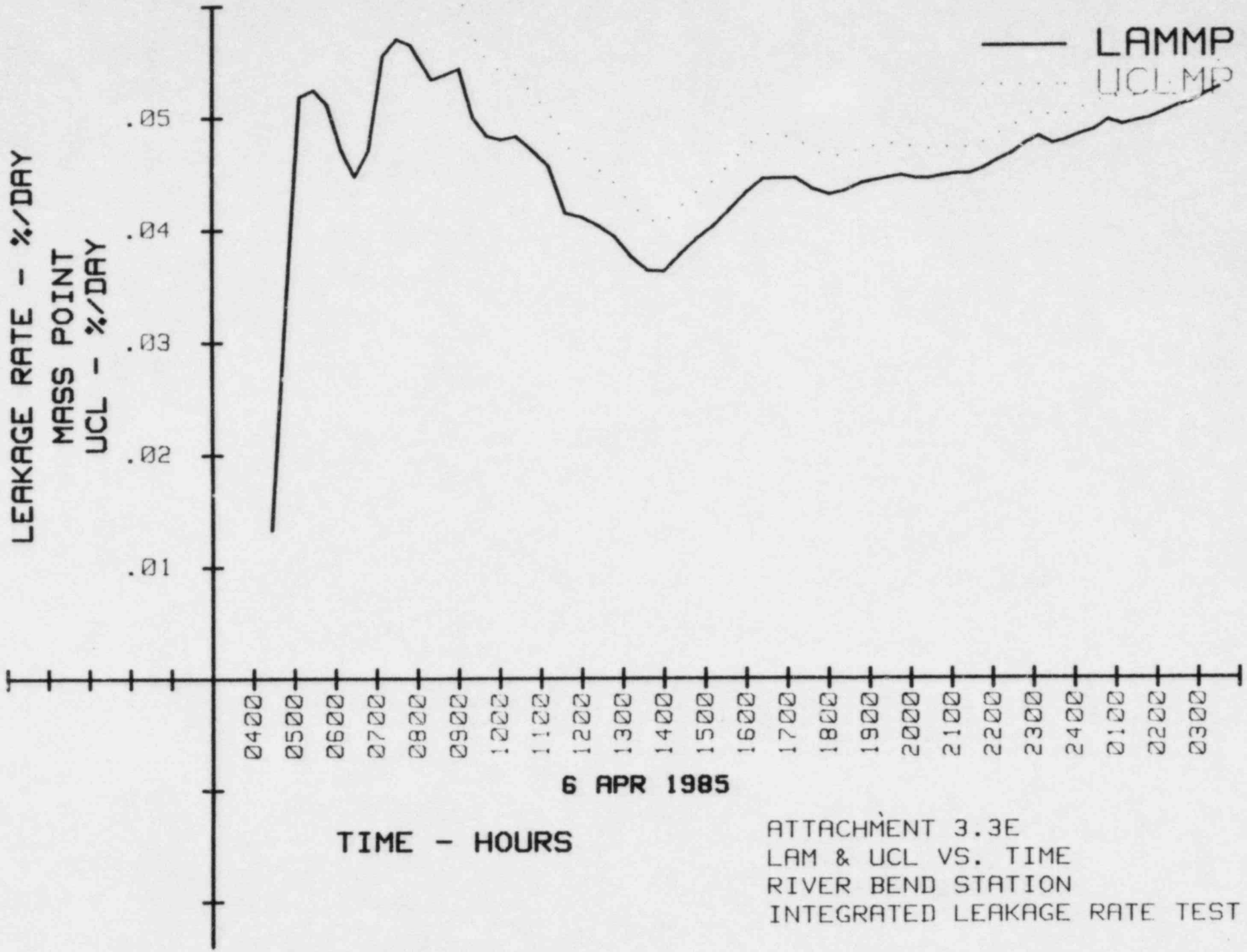
ATTACHMENT 3.3C (CON'T)
INTEGRATED LEAKAGE RATE TEST RESULTS
FROM 0326 ON 06 APR 1985 TO 0328 ON 07 APR 1985

RIVER BEND STATION
ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

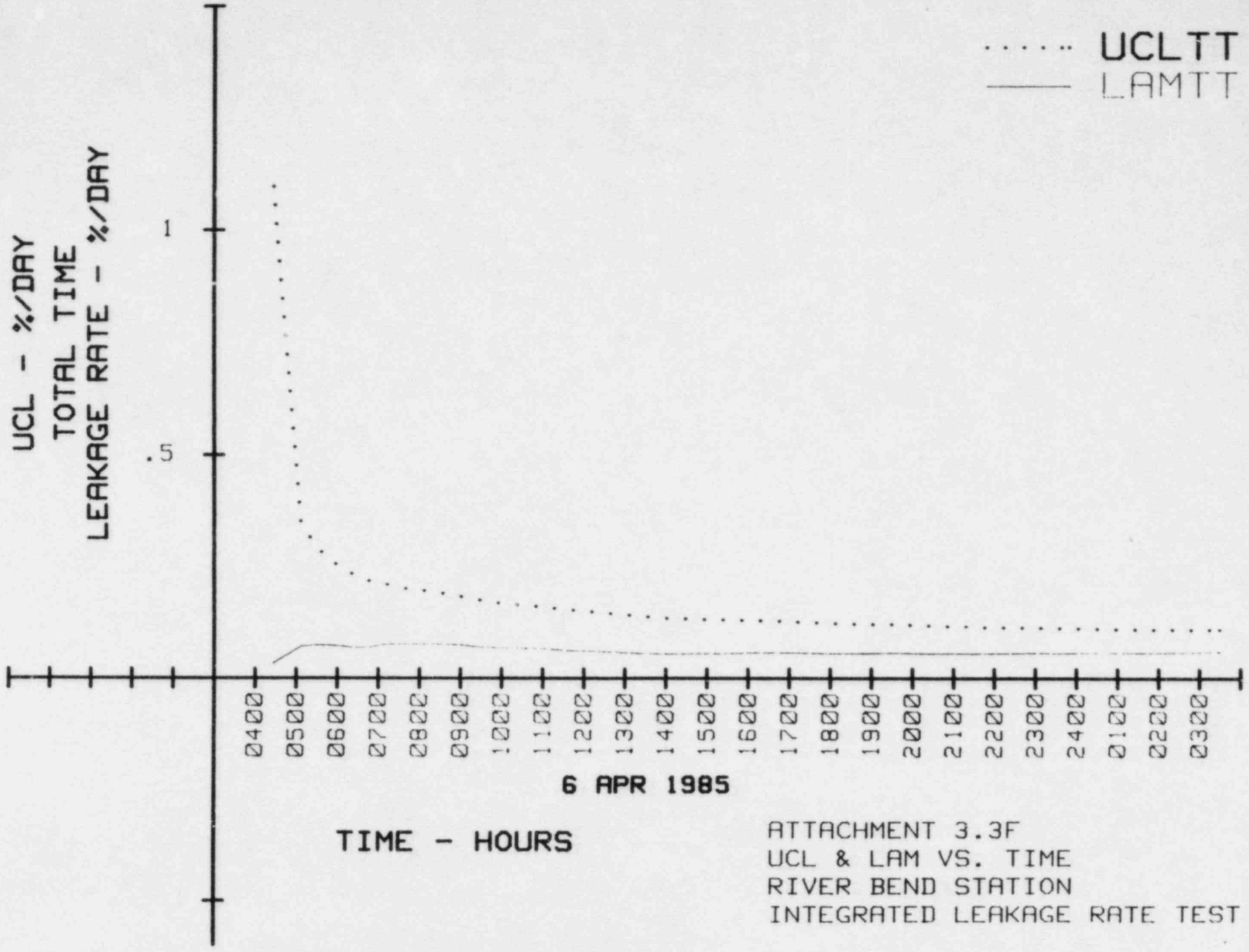
SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
41	14.938	160739.25	.044399	.040390	.053105	.069179	.12228
42	15.338	160735.01	.047372	.040740	.053400	.068186	.12158
43	15.959	160734.19	.046291	.041121	.053987	.067368	.12135
44	16.296	160734.72	.044855	.042056	.053794	.066450	.12024
45	16.633	160737.50	.041450	.042169	.053312	.065629	.11894
46	16.969	160734.48	.043280	.042473	.053043	.064808	.11785
47	17.306	160731.21	.045261	.042961	.052974	.063993	.11696
48	17.643	160730.48	.045011	.043670	.052892	.063216	.11610
49	17.979	160730.92	.043808	.044259	.052720	.062484	.11520
50	18.316	160724.89	.047913	.044806	.052889	.061737	.11462
51	18.653	160720.52	.050550	.045077	.053249	.061005	.11425
52	18.989	160720.38	.049760	.045271	.053521	.060305	.11382
53	19.325	160714.86	.053159	.045662	.054022	.059619	.11364
54	19.663	160715.10	.052067	.045842	.054412	.058961	.11337
55	19.999	160730.38	.039784	.045325	.053910	.058473	.11238
56	20.336	160717.00	.048946	.045301	.054071	.057872	.11194
57	20.673	160712.74	.051227	.045697	.054373	.057279	.11165
58	21.010	160712.88	.050300	.046056	.054594	.056710	.11130
59	21.347	160703.98	.055734	.047012	.055151	.056145	.11129
60	21.683	160721.41	.042868	.047202	.054855	.055700	.11055
61	22.020	160709.31	.050414	.047503	.055046	.055183	.11022
62	22.357	160708.37	.050281	.047648	.055217	.054682	.10989
63	22.694	160702.35	.053499	.048008	.055569	.054182	.10975
64	23.030	160699.45	.054596	.048495	.055963	.053693	.10965
65	23.367	160701.86	.052269	.049036	.056200	.053227	.10942
66	23.704	160692.67	.057317	.049738	.056711	.052764	.10947
67	24.041	160692.88	.056378	.050294	.057141	.052312	.10945



ATTACHMENT 3.3D
MASS VS. TIME
RIVER BEND STATION
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3E
LAM & UCL VS. TIME
RIVER BEND STATION
INTEGRATED LEAKAGE RATE TEST



ATTACHMENT 3.3F
UCL & LAM VS. TIME
RIVER BEND STATION
INTEGRATED LEAKAGE RATE TEST

ATTACHMENT 3.3G
SUPERIMPOSED LEAKAGE VERIFICATION TEST
REDUCED INPUT VARIABLES
FROM 0459 ON 07 APR 1985 TO 0901 ON 07 APR 1985
SUPPLEMENTAL TEST

	CONTAINMENT			DRYWELL			
TIME HRS	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	PRESSURE PSIA	TEMPERATURE DEGR	VAPOR PRESSURE PSIA	TOTAL MASS LBM
0.0	23.291	550.61	0.5622	23.288	550.08	0.5465	160667.007
.336	23.290	550.62	0.5618	23.287	550.08	0.5463	160661.380
.673	23.290	550.62	0.5614	23.286	550.10	0.5456	160660.680
1.010	23.288	550.63	0.5612	23.285	550.10	0.5460	160649.172
1.347	23.288	550.65	0.5609	23.284	550.11	0.5452	160642.213
1.683	23.287	550.66	0.5605	23.283	550.11	0.5448	160637.478
2.020	23.286	550.66	0.5604	23.281	550.11	0.5445	160632.123
2.357	23.285	550.68	0.5602	23.281	550.12	0.5445	160622.754
2.694	23.285	550.68	0.5601	23.281	550.12	0.5438	160620.588
3.031	23.284	550.69	0.5601	23.281	550.13	0.5431	160613.531
3.368	23.284	550.70	0.5603	23.280	550.15	0.5435	160605.841
3.705	23.283	550.72	0.5603	23.281	550.16	0.5445	160598.261
4.041	23.283	550.74	0.5607	23.280	550.17	0.5449	160589.876

ATTACHMENT 3.3G (CON'T)
SUPERIMPOSED LEAKAGE VERIFICATION TEST RESULTS
FROM 0459 ON 07 APR 1985 TO 0901 ON 07 APR 1985

RIVER BEND STATION
ABSOLUTE TEST METHOD, MASS POINT ANALYSIS

SUPPLEMENTAL TEST

SET	TIME HRS	MASS LBM	LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
71	0.000	160667.01	0.000000	0.000000	0.000000
72	.336	160661.38	0.000000	0.000000	0.000000
73	.673	160660.68	.140379	.541225	.681604
74	1.010	160649.17	.240498	.189177	.429675
75	1.347	160642.21	.274094	.098583	.372676
76	1.683	160637.48	.274622	.058451	.333072
77	2.020	160632.12	.270815	.039316	.310131
78	2.357	160622.75	.281278	.030598	.311876
79	2.694	160620.59	.273799	.024512	.298311
80	3.031	160613.53	.272121	.019275	.291396
81	3.368	160605.84	.274332	.015689	.290021
82	3.705	160598.26	.277981	.013459	.291439
83	4.041	160589.88	.283301	.012549	.295851

ATTACHMENT 3.3G (CON'T)
SUPERIMPOSED LEAKAGE VERIFICATION TEST RESULTS
FROM 0459 ON 07 APR 1985 TO 0901 ON 07 APR 1985

RIVER BEND STATION
ABSOLUTE TEST METHOD, TOTAL TIME ANALYSIS

SUPPLEMENTAL TEST

SET	TIME HRS	MASS LBM	MEAS LEAKAGE PCT/DAY	MEAN OF MEAS PCT/DAY	CALC LEAKAGE PCT/DAY	CONF PCT/DAY	UCL PCT/DAY
71	0.000	160667.01	0.000000	0.000000	0.000000	0.000000	0.00000
72	.336	160661.38	.250162	0.000000	0.000000	0.000000	0.00000
73	.673	160660.68	.140432	0.000000	0.000000	0.000000	0.00000
74	1.010	160649.17	.263777	0.000000	.224931	.921790	1.14672
75	1.347	160642.21	.274956	0.000000	.261991	.348195	.61018
76	1.683	160637.48	.262089	0.000000	.269945	.221147	.49109
77	2.020	160632.12	.257964	0.000000	.271219	.169612	.44083
78	2.357	160622.75	.280458	0.000000	.281868	.138821	.42068
79	2.694	160620.59	.257385	0.000000	.278424	.123469	.40189
80	3.031	160613.53	.263547	0.000000	.278141	.110851	.38899
81	3.368	160605.84	.271283	0.000000	.280363	.100598	.38096
82	3.705	160598.26	.277168	0.000000	.283613	.092403	.37601
83	4.041	160589.88	.285118	0.000000	.288155	.085657	.37381

SECTION 4

LOCAL LEAKAGE RATE TESTS (TYPES B AND C)

Attachment 4A summarizes the Local Leakage Rate Tests (LLRT's) data that was established to support the overall containment leakage testing program. Attachment 4B summarized the leakage penalties added to the Type A overall leakage for systems that were either isolated or not vented and drained during the Type A Test. The LLRT's were performed by pressurizing the listed penetrations with air or nitrogen and either measuring leakage across the containment isolation valves (Type C) or across the resilient seals (Type B). Each penetrations leakage rate can be obtained from site reference material. Attachment 4C summarizes the results of the hydrostatic local leakage tests conducted on valves, identified in the plant Technical Specification, as being in systems that remain either filled or sealed by water.

The acceptance criteria of Types B and C testing is in accordance with 10CFR50, Appendix J. The combined leakage rate for all penetrations and valves, subject to Types B and C tests, is well below the acceptable leakage rate of $0.6L_a$.

The Attachments for this section are:

Attachment No.	Title
4A	Local Leakage Rate Test Data
4B	Leakage Penalties Added to Type A Leakage
4C	Hydrostatic Leakage Rate Test Data

ATTACHMENT 4A
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z3A - Feedwater Line	C	1E12*MOVF053A/B	3.797	
1KJB*Z3B - Feedwater Line				
1KJB*Z6 - Reactor Water Cleanup	C	1G33*MOVF040/39	10.3	
1KJB*Z7 - Reactor Water Cleanup	C	1G33*MOVF061/4	0.03	
1KJB*Z8 - High Pressure Core Spray	C	1E22*MOVF015	2.42	
1KJB*Z9 - High Pressure Core Spray	C	1E22*MOVF004	6.67	
	C	1E22*AOVF005	593.75	
1KJB*Z11 - Test Returns	C	1E22*MOVF023	1.76	Note 2
	C	1E22*MOVF012	5.69	
1KJB*Z12 - Low Pressure Core Spray	C	1E21*MOVF001	0.024	
1KJB*Z13 - Low Pressure Core Spray	C	1E21*MOVF005	24.2	
	C	1E21*AOVF006	127.35	
1KJB*Z15 - Reactor Core Isolation Cooling	C	1E51*MOVF063	0.03	
	C	1E51*MOVF076	2.20	
	C	1E51*MOVF064	19.07	

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z16 - Reactor Core Isolation Cooling	C	1E51*MOVF031	8.95	
1KJB*Z17 - Reactor Core Isolation Cooling	C	1E51*MOVF068	0.026	
1KJB*Z18A - Reactor Core Isolation Cooling	C	1E51*MOVF019	0.03	
1KJB*Z18B,C- Reactor Core Isolation Cooling	C	1E51*MOVF077/F078	0.03	
1KJB*Z19 - Reactor Core Isolation Cooling	C	1E51*MOVF013 1E12*MOVF023	0.024	Combination of two valves.
	C	1E51*AOVF065	0.03	
	C	1E51*AOVF066	10.125	
1KJB*Z20 - Residual Heat Removal	C	1E12*MOVF009 1RHS*V240	101.269	Combination of two valves.
	C	1E12*MOVF008	177.759	
1KJB*Z21A - Low Pressure Core Injection	C	1E12*MOVF027A	0.024	Combination of all five valves.
	C	1E12*MOVF042A		
	C	1E12*MOVF037A		
	C	1E128VF099A		
	C	1E12*VF044A		

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z21B - Low Pressure Core Injection	C	1E12*MOVF027B	0.355	Combination of all five valves
	C	1E12*MOVF042B		
	C	1E12*MOVF037B		
	C	1E12*VF099B		
	C	1E12*VF044B		
1KJB*Z21C - Low Pressure Core Injection	C	1E12*MOVF042C	21.02	
	C	1E12*AOVF041C	95.70	
1KJB*Z23A - Residual Heat Removal Vent Discharges	C	1E12*MOVF073A	0.024	
1KJB*Z23B - Residual Heat Removal Vent Discharges	C	1E12*MOVF073B	0.024	Note 3
1KJB*Z24A - Residual Heat Removal	C	1E12*MOVF024A	24.77	
	C	1E12*MOVF011A	0.024	
	C	1E12*MOVF064A	0.024	
	C	1E21*MOVF012	0.024	
	C	1E21*MOVF011	9.84	
1KJB*Z24B - Residual Heat Removal	C	1E12*MOVF024B	9.869	
	C	1E12*MOVF011B	0.024	
	C	1E12*MOVF064B	0.957	

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z24C - Residual Heat Removal	C	1E12*MOVF021	9.87	
	C	1E12*MOVF064C	0.624	
1KJB*Z25A - Residual Heat Removal	C	1E12*MOVF004A	0.024	
1KJB*Z25B - Residual Heat Removal	C	1E12*MOVF004B	0.024	
1KJB*Z25C - Residual Heat Removal	C	1E12*MOVF105	14.3	
1KJB*Z26 - Fuel Pool Cooling	C	1SFC*MOV119	0.03	
	C	1SFC*V101	30.90	
1KJB*Z27 - Fuel Pool Cooling	C	1SFC*MOV120	23.10	Combination of two valves
		1SFC*V350		
	C	1SFC*MOV122	15.16	
1KJB*Z28 - Fuel Pool Purification	C	1SFC*MOV139	0.03	Combination of two valves
		1SFC*V351		
	C	1SFC*MOV121	0.024	
1KJB*Z29 - Control Rod Drive	C	1C11*VF122	0.848	
	C	1C11*MOVF083	0.0264	
1KJB*Z31 - Purge	C	1HVR*AOV165	0.024	Combination of all three valves
	C	1CPP*SOV140		
	C	1HVR*AOV123		
1KJB*Z33 - Purge	C	1HVR*AOV128	396.457	Combination of all four valves
	C	1CPP*MOV104		
	C	1CPP*MOV105		
	C	1HVR*AOV166		
1KJB*Z35 - Floor Drain	C	1DFR*AOV102	2.529	
	C	1DFR*AOV101	14.386	Combination of two valves
		1DFR*V180		
1KJB*Z38 - Equipment Drain	C	1DER*AOV127	0.024	
	C	1DER*AOV126	0.024	Combination of two valves
		1DER*V4		

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z48 - Component Cooling	C	1CCP*MOV138	0.024	
	C	1CCP*V118	26.8	
1KJB*Z49 - Component Cooling	C	1CCP*MOV158 1CCP*V160	9.68	Combination of two valves
	C	1CCP*MOV159	2.087	
1KJB*Z52A - Service Water	C	1SWP*MOV507A	54.70	
	C	1SWP*V174	1.446	
1KJB*Z52B - Service Water	C	1SWP*MOV507B	12.60	
	C	1SWP*V175	1.340	
1KJB*Z53A - Service Water	C	1SWP*MOV81A	9.53	
	C	1SWP*MOV5A/503A	1.583	Combination of two valves
	C	1SWP*SOV522A/522C	3.81	Combination of two valves
1KJB*Z53B - Service Water	C	1SWP*MOV81B	0.024	
	C	1SWP*MOV5B/503B	0.03	Combination of two valves
	C	1SWP*SOV522B/522D	0.024	Combination of two valves
1KJB*Z102 - ADS Air	C	1SVV*MOV1B	3.89	
	C	1SVV*V9	49.855	
1KJB*Z103 - ADS Air	C	1SVV*MOV1A	0.024	
	C	1SVV*V31	9.088	

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	TYPE TEST	EQUIPMENT/VALVES TESTED (NOTE 1)	LEAKAGE (SCFD)	REMARKS
1KJB*Z129 - Reactor Water Cleanup	C	1G33*MOVF054/F053	0.024	
1KJB*Z601B - Reactor Plant Sampling	C	1SSR*SOV130	0.024	
	C	1SSR*SOV131	0.024	
1KJB*Z601E - Sampling	C	1CMS*SOV35D	0.024	
	C	1CMS*SOV31B	0.024	
1KJB*Z601F - Sampling	C	1CMS*SOV31D	0.024	
	C	1CMS*SOV35B	0.024	
1KJB*Z603A - Leakage Monitoring	C	1LMS*V14	0.024	
	C	1LMS*V12	0.024	
1KJB*Z603C - Leakage Monitoring	C	1LMS*V7	0.064	
	C	1LMS*V16	0.024	
1KJB*Z605E - Sampling	C	1CMS*SOV35C	0.024	
	C	1CMS*SOV31A	0.024	
1KJB*Z605F - Sampling	C	1CMS*SOV31C	0.024	
	C	1CMS*SOV35A	0.024	
Fuel Transfer Tube (Flange)	B	-	0.024	
Control Rod Drive Hatch	B	-	0.024	
Upper Personnel Airlock	B	-	0.160	
Lower Personnel Airlock	B	-	0.024	
Equipment Hatch	B	-	0.024	
Expansion Bellows	B	-	0	Note 4
Electrical Penetrations	B	-	1.008	Note 5

ATTACHMENT 4A (CON'T)
LOCAL LEAKAGE RATE TEST DATA

NOTES:

1. The preliminary local leakage rate program commenced approximately 12 months prior to the Type A test. Repairs performed to these isolation valves were generally minor in nature and consisted of packing adjustments, torque switch adjustments, lapping, cleaning/flushing, and alignment adjustments. Specific repairs are identified in the site maintenance records. Containment isolation valves that are not Type C tested, but that are tested in a separate Technical Specification Program (e.g. bypass leakage, seal system, etc.) are not included in this Report.

2. Valves 1DFR*V181, 1DFR*V182, and 1DFR*MOV146 are part of a recent modification. The Type C seat leakages will be reported under the Technical Specification Surveillance Program. The seat leakage test will be done prior to Primary Containment Integrity - Operating being required.

3. Valve 1SSR*SOV139 was not Type C leak tested prior to the Type A test. The Type C seat leakage will be reported under the Technical Specification Surveillance Program. The seat leakage test will be done prior to Primary Containment Integrity - Operating being required.

4. These are penetration assembly bellows. There are 19 penetration assembly bellows.

5. Reported leakage is the total for the 42 penetrations tested.

ATTACHMENT 4B

LEAKAGE PENALTIES ADDED TO THE TYPE A LEAKAGE

1. Type C Penalty

Penetration		Minimun Pathway Leakage (SCFH)
1KJB*Z3A/Z3B		0.158
1KJB*Z17		0.001
1KJB*Z15		0.093
1KJB*Z603A		0.001
1KJB*Z603C		0.001
	Total	0.254 SCFH

$$\frac{0.254\ \text{SCFH}}{236.924\ \text{SCFH}} = \frac{X}{0.26\%/\text{DAY}}$$

Type C Penalty = 0.000279 percent/day

2. Type B Penalty (From Personnel Upper and Lower Airlock Seal Systems)

1KJB*DRA1		0.3 scfh
1KJB*DRA2		0.8 scfh
	Total	1.1 scfh

$$\frac{1.1\ \text{SCFH}}{236.924\ \text{SCFH}} = \frac{X}{0.26\%/\text{DAY}}$$

Type B Penalty = 0.001210 percent/day

ATTACHMENT 4C
HYDROSTATIC LOCAL LEAKAGE RATE TEST DATA

PENETRATION NO. - SYSTEM	VALVES TESTED	LEAKAGE (GPM)	REMARKS
1KJB*Z8 - High Pressure Core Spray	1E22*MOVF015	0.57	Tested with 1KJB*Z11
1KJB*Z11 - High Pressure Core Spray	1E22*MOVF023 1E22*MOVF012	0.57	Tested with 1KJB*Z8 See Note #1.
1KJB*Z12 - Low Pressure Core Spray	1E21*MOVF001	0.0	Tested with 1E21*MOVF011, 12
1KJB*Z16 - Reactor Core Isolation Cooling	1E51*MOVF031	0.0	
1KJB*Z18A - Reactor Core Isolation Cooling	1E51*MOVF019	0.0	
1KJB*Z23A - Residual Heat Removal Vent Discharges	1E12*MOVF073A	0.282	Tested with 1E12*MOVF024A, 11A, 64A, 04A
1KJB*Z23B - Residual Heat Removal Vent Discharges	1E12*MOVF073B	0.312	Tested with 1KJB*Z24B, 25B. See Note #2.
1KJB*Z24A - Residual Heat Removal	1E12*MOVF024A 1E12*MOVF011A 1E12*MOVF064A	0.282	Tested with 1KJB*Z23A, 25A
	1E21*MOVF012 1E21*MOVF011	0.0	Tested With 1KJB*Z12
1KJB*Z24B - Residual Heat Removal	1E12*MOVF024B 1E12*MOVF011B 1E12*MOVF064B	0.312	Tested With 1KJB*Z25B, 23B
1KJB*Z24C - Residual Heat Removal	1E12*MOVF021 1E12*MOVF064C	0.023	Tested with 1KJB*Z25C

ATTACHMENT 4C
HYDROSTATIC LOCAL LEAKAGE RATE TEST DATA (CON'T)

PENETRATION NO. - SYSTEM	VALVES TESTED	LEAKAGE (GPM)	REMARKS
1KJB*Z24A - Residual Heat Removal	1E12*MOVF004A	0.282	Tested with 1E12*MOVF073A, 24A, 11A, 64A
1KJB*Z25B - Residual Heat Removal	1E12*MOVF004B	0.312	Tested with 1KJB*Z24B, 23B
1KJB*Z25C - Residual Heat Removal	1E12*MOVF105	0.023	Tested with 1KJB*Z24C

NOTES:

1. Valves 1DFR*V181, 1DFR*V182, and 1DFR*MOV146 are part of a recent modification. The seat leakages will be reported under the Technical Specification Surveillance Program. The seat leakage test will be done prior to Primary Containment Integrity - Operating being required.

2. Valve 1SSR*SOV139 was not hydrostatically tested prior to the Type A test. The seat leakage will be reported under the Technical Specification Surveillance Program. The seat leakage test will be done prior to Primary Containment Integrity - Operating being required.