Surry Power Station Unit No. 1

Reactor Containment Building Integrated Leakage Rate Test Types A, B, and C Periodic Test

July 1986

VIRGINIA POWER

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

TYPE A,B AND C
PERIODIC TESTS

VIRGINIA POWER
SURRY POWER STATION
UNIT NO. 1

JULY 1986

PREPARED BY: EDWARD TURKO
DAVID VALDIVIESO
JOHN HENDERSON

TABLE OF CONTENTS

REFERENCES

1.0 ANSI/ANS-56.8 Containment System Leakage Testing Requirements, February 19, 1981

2.0 1-PT-16.3 Reactor Containment Building Integrated Leak Rate Test

3.0 10CFR50 Appendix J, Primary Reactor Containment Leakage Testing For Water Cooled Power Reactors, October 22, 1980

4.0 ANSI-45.4 American National Standard Leakage-Rate Testing of Containment Structures for Nuclear Reactors, March 16, 1972

5.0 Surry Power Station, Units 1 and 2, Technical Specifications, Section 4.4

LIST OF ATTACHMENTS

1.0 PURPOSE

The purpose of this report is to present a description and an analysis of the results from the Type A test that was performed on Surry Unit 1 in July 1986 as required by Paragraph V.B of 10CFR50 Appendix J. Included in the report are the results from Type B and C tests that were performed since the last Type A test in April 1983.

2.0 SUMMARY

TYPE A TEST

The CILRT which was performed on Unit 1 is considered to be a complete success. The test results demonstrated that the integrity of the containment structure satisfied the criteria in 10CFR50 Appendix J, Paragraph III.A.5.(b).(2). The calculated leakage for the test was .055951 wt%/day which is below the acceptance criteria of .075 wt%/day. The success in this test was a result of the ongoing improvements that are being made to the station's Type A, B and C testing program following the successful CILRT on Unit 2 in June 1985.

The CILRT commenced on July 2, 1986 with containment closeout occurring at 0645 hours. Prior to the start of pressurization, MOV-CS-101A (Penetration 64) was removed and the line blanked due to excessive valve seat leakage following As-Left Type C testing and because the amount of time required to repair the valve would have impacted the start of the CILRT. The valve seat had been damaged following limit switch adjustments. The valve was reinstalled after the CILRT and its leakage following repairs(1.4 SCFH) was added to the final results.

Testing of the personnel hatch prior to the start of pressurization indicated that a significant amount of leakage was occurring past the emergency escape hatch which is located on the inner door of the personnel hatch. The station immediately initiated repairs to try to reduce the leakage. The post repair test results on the personnel hatch was 15.13 SCFH. Checks made by test personnel verified that none of the leakage was occurring past the outer door of the personnel hatch into the Auxiliary Building. All the leakage from this test was past the emergency escape hatch o-rings into containment. A decision was made to continue on with the CILRT with the emergency escape hatch in its existing condition and to repair it following the CILRT. As a part of procedure ENG-70.2 "Data Collection During Type A Test", a pressure gage was installed on the personnel hatch to monitor its internal pressure during the CILRT.

Containment pressurization commenced at 2041 hours on July 2, 1986 and continued until 0654 hours on July 3, 1986 with a peak containment pressure of 61.248 psia.

Containment temperature stabilization criteria as stated in 1-PT-16.3 were met at 1204 hours but the actual start of the CILRT test period was delayed until 1754 hours on July 3, 1986. This was due to the continued decline of average containment temperature and dewpoint temperature. In addition, B Containment Air Recirculation fan tripped off line lengthening the stabilization period.

The CILRT was started at 1754 hours with the calculated containment leakage slowly declining from an initial .14 wt%/day. At approximately 2230 hours, average containment dewpoint became unstable. This was due to the oscillation of moisture analyzer No. 7. It was not until approximately 0020 hours on July 4, 1986 that average dewpoint temperature had become stable again. If the CILRT had been run from the initial start time of 1754 hours on July 3, 1986 until 0026 hours on July 5, 1986, the calculated containment leakage would have been .068 wt%/day which is below the acceptance criteria of .075 wt%/day. The CILRT was restarted at 0024 hours on July 4, 1986 due to this fluctuation in average dewpoint temperature.

The 24 hour CILRT which then ran from 0024 hours on July 4, 1986 through 0024 hours on July 5, 1986, can be broken down into three segments according to the varying slopes of the leakage line(See Attachment 5.2). The first part of the CILRT which ran from 0024 hours to 0324 hours on July 4, 1986 had an average leakage of .102 wt%/day. This leakage value was calculated by determining the mass lost during the time period and converting its units to wt%/day. During the next nine hours, which ran from 0324 to 1224 hours, containment leakage averaged .088 wt%/day. It was during the last twelve hours of the test, from 1224 to 0024 hours on July 5, 1986 that leakage averaged .024 wt%/day.

During the nine hour period when leakage averaged .088 wt%/day, an extensive effort was made to identify and quantify all possible leakage paths. Leakage from penetrations that were vented during the test totalled approximately 2.5 SCFH or .00084 wt%/day. The personnel hatch was pressurizing during the CILRT due to the leaking emergency escape hatch on the inner door, but leakage into the hatch averaged a relatively stable 3.86 SCFH or .0013 wt%/day throughout the test. The leakage from these two sources totaled approximately .002 wt%/day which was only a small part of the total leakage during that time period. Other possible leakage paths were checked with no leakage being identified.

A review of previous CILRT results indicates that the test performed in 1981 exhibited similar leakage characteristics as the 1986 test. During the last 22 hours of that test, leakage averaged .09 wt%/day for nine hours then changed to approximately .04 wt%/day for the next 13 hours. It appears that this leakage trend may be an inherent characteristic of Unit 1 containment during CILRTS. This could be due to the amount of time that it takes for ingassing(air filling voids within insulation,concrete or piping) to occur.

During the CILRT, walkdowns of control room indications identified various containment isolation valves that had indications other than the required closed position. Valves TV-SS-104A and TV-SS-101A were indicating open while TV-SS-100A and TV-DA-100A indicated in the intermediate position. Following the CILRT, an investigation was made to determine the cause for the intermediate or open indication of these valves.

For the Sampling valves, the problem was found to be with the limit switch. The limit switches, which are Microswitch brand, actuated without any actual movement of the valves. It was determined following the CILRT that containment pressure during the CILRT was pressurizing the space between the limit switch head and the flexible seal which is between the head and switch body. This then caused the seal in each limit switch to flex, thereby pressing against the electrical contacts assembly and actuating it, thus giving the faulty valve indication. To correct this problem, it is planned to replace these valve/limit switch assemblies with Target Rock valves during the next outage of sufficient length.

The problem with TV-DA-100A was found to be with the actuator. The actuator was removed from the valve following the CILRT and sent to the manufacturer for a determination of the problem. It was completely disassembled without any problems being identified. Later inspections of the installed actuator by station personnel revealed that the nut holding the limit switch arm had worked itself loose thereby not allowing it to make proper contact. It is thought that this could be the cause for the faulty indication during the CILRT. To prevent this limit switch arm from working itself loose again, flats will be machined on new limit switch arms to prevent their movement even if the nuts do come lose.

In addition, the new valves have experienced higher seat and packing leakages than expected when Type C testing following the CILRT was performed. It was determined by the manufacturer that the cause of this leakage was galling of the valve's ball. The galling occurred because the tolerances of the trunion bushings were not tight enough, thereby allowing excessive movement of the valve stem. It is also suspected that the slack in the stem translated back to the packing, thereby causing the packing gland follower nuts to work themselves lose. This is the reason why the valves had excessive packing leakage when Type C tested. To resolve these problems, the trunion bushings will be machined on both the valves currently installed in Unit 1 and the new valves to be installed in Unit 2. A locking device will also be installed on the packing gland follower nuts to prevent them from working lose.

VERIFICATION TEST

The superimposed verification test commenced at 0026 hours on July 5, 1986 with stabilization being complete at 0230 hours. The actual verification test then ran for 7 hours until 0930 hours on July 5, 1986. The test period was greater than the minimum of 4 hours that is required for a 24 hour CILRT. Due to the significant change in leakage during the CILRT, as mentioned previously, the composite leakage (L_c) during the verification test could not meet the acceptance criteria using the 24 hour test results. See Attachment 2.1 for an example of the verification test acceptance criteria using 24 and 12 hour CILRT results.

When the test results from the last 12 hours of the CILRT are used in the verification test acceptance criteria, L_c easily falls within the limits. The basis for the decision to use the last 12 hours is that it is felt that the leakage during the last 12 hours of the test is a reflection of the containment's actual leak rate. In addition, the leakage trend from the 1981 CILRT provides support to this.

Containment depressurization started at 1215 hours and was completed at 2210 hours on July 5, 1986.

CONCLUSION

Since all applicable acceptance criteria were met,the normal CILRT schedule as specified in paragraph III.D.1.(a) of 10CFR50 Appendix J should continue.

LOCAL LEAK RATE TESTS (TYPE B AND C)

Local leak rate testing was conducted on containment penetrations in accordance with the stations approved Type B and C test procedures.

Attachment 6.1 summarizes all the local leak rate tests that were performed since the 1983 refueling on Unit 1. In addition, an AS-FOUND Type A test analysis is included in this section which analyzes the effects that repairs to containment penetrations had on the final CILRT results.

ATTACHMENT 2.1

SUPPLEMENTAL TEST RESULTS ANALYSIS

The equation used for the verification test is below:

$$(L_{am} + L_o - .25L_a) \leq L_c \leq (L_{am} + L_o + .25L_a)$$

Where:

L_{am} = Type A calculated leakage(12 hour or 24 hour results
L_o = Leakage imposed on containment
L_c = Leakage calculated during Verification Test
L_a = Maximum allowable leakage

Leakage over the 1st 12 hours of CILRT = .0912 wt%/day
Leakage over the 2nd 12 hours of CILRT = .027 wt%/day
Average leakage over 24 hours = .0592 wt%/day

EXAMPLE OF RESULTS USING 24 HOUR TEST RESULTS

$$(.0592 + .098 - .025) \leq .1099 \leq (.0592 + .098 + .025)$$

$$.1322 \leq .1099 \leq .1822$$

Acceptance criteria not satisfied

EXAMPLE OF RESULTS USING 12 HOUR TEST RESULTS

$$(.027 + .098 - .025) \leq .1099 \leq (.027 + .098 + .025)$$

$$.10 \leq .1099 \leq .15$$

Acceptance criteria satisfied

3.0 SUMMARY OF EVENTS

This summary of events is an edited version of the events that occurred during the CILRT.

7/1/86	2024	MOV-CS-101A is removed and blanked due to excessive leakage. Post repair leakage to be added to CILRT test results.
7/2/86	0330	Personnel Hatch failed PT-16.5
	0510	Working on inner o-ring and equalizing valve on personnel hatch
	0630	Performed PT-16.7 on personnel hatch
	0645	Finished final inspection inside containment
	0700	Escape hatch on personnel hatch leaks excessively
	0900	HP air sample taken prior to final closeout of containment was satisfactory
	2031	Completed maintenance on personnel hatch. Leakage through the inner door is 15.13 SCFH. Outer door has no leakage into Aux. Bldg.
	2041	Start pressurization
	2125	Pressurization rate approximately 7.5 psia/hr
7/3/86	0135	Purge valves closed on high alarm on manipulator crane radiation monitor. Reset monitor and reopened purge valves.
	0200	TV-SS-104A and TV-SS-101A indicate open in control room. TV-DA-100A indicates in the intermediate position.
	0300	Containment pressure at 43.10 psia. Pressurization rate at 4.68 psia/hr.
	0500	Personnel hatch pressure increasing
	0654	Secured pressurization
	0736	Reinitialized ILRT program on P-250
	0825	Personnel hatch pressure at 29.4 psig
	0850	TV-SS-100A indicates in the intermediate position
	1204	Containment stabilization criteria were procedurally met.

	1240	B containment air recirc fan tripped
	1448	Moisture analyzer #6 is saturated. Taken out of service to allow surface to dry.
	1512	Put moisture analyzer #6 back in service
	1739	Completed walk down of Aux. Bldg. Noted that TV-CV-150A and 1-IA-982 have packing leaks and Penetration #53 has leakage out of the LMC
	1754	Commencing Type A test.
	2005	Completed walk down of control room. Noted that HCV-1850B indicated in the intermediate position.
	2230	Average containment dewpoint temperature became unstable due to the oscillation of moisture analyzer #7.
	2328	Calculated containment leakage approximately 22.12 lbm/hr. Walk downs indicate no significant leakage.
7/4/86	0024	Restarted CILRT following stabilization of average containment dewpoint temperature.
	0130	Calculated containment leakage is approximately 28.1 lbm/hr.
	0230	Calculated containment leakage is approximately 23.79 lbm/hr.
	0905	Checked Aux. Bldg. for leaks. Used rotometers to quantify leakage.
	1631	Chiller tripped off line
	1646	Chiller returned to service
	2024	Containment leakage is approximately 10.13 lbm/hr and trending downward.
	2220	Containment leakage is approximately 7.62 lbm/hr.
7/5/86	0024	Type A test complete
	0026	Pressurizing verification rig
	0047	Start stabilization period for verification test

	0230	Stabilization complete. Started superimposed leakage verification test.
	0957	Secured from verification test. Results satisfactory
	1215	Containment depressurization started.
	2210	Depressurization complete
7/6/86	0030	Started post CILRT containment inspection
	0130	Completed containment inspection

4.0 GENERAL TEST DESCRIPTION

INITIAL CONDITIONS

The following are initial conditions and prerequisites which are required to be completed prior to the commencement of the Type A test:

A. Type B and C testing in accordance with station procedures shall have been completed.

B. Temporary air pressurization equipment shall have been checked and is available for pressurization.

C. Instrumentation used for this Type A test will have been calibrated or checked no more than six months prior to the commencement of this test.

D. All equipment and instrumentation that may be damaged during the test will be removed or otherwise protected prior to pressurization.

E. Containment air recirculating fan blades have been set for operation at test pressure.

F. The required computer systems are operational and have been loaded with the CILRT programs.

G. Output power for the emergency safeguards system signal has been blocked.

H. Support systems(CC and Chilled CC) are operational and available for this test.

I. Controlled access requirements for CILRT shall be set up.

J. The secondary side of the steam generators shall be pressurized and checked for leakage prior to the commencement of the Type A test.

K. Site meteorological data will be collected throughout the CILRT(Attachment 4.1).

L. A general inspection of the accessible interior and exterior surfaces of the containment structure and components shall be performed prior to pressurization.

TEST EQUIPMENT AND INSTRUMENTATION

The containment air pressurization system consisted of eight portable compressors producing oil-free air which was piped through two aftercoolers lined up in parallel and through a refrigerated air dryer. Miscellaneous instrumentation and control valves were used to monitor and control the containment air pressurization system while the system was in service. The air flow rate for the containment air pressurization system was approximately 10,000 SCFM.

The following special test equipment was used to monitor various plant parameters which were needed to perform calculations of containment leakage during the Type A test:

A) Absolute pressure quartz manometers

B) Moisture analyzers

C) Resistance temperature detectors

D) Hastings flow meter

Calibration and/or functional test results of the test instrumentation listed above are shown in Attachment 4.2. Attachment 4.3 shows the locations of the RTD's used during the CILRT. Attachment 4.4 shows the locations of the moisture analyzers used during the CILRT. All instrumentation except the flow meter have inputs into the plant's P-250 computer for data trending and calculations.

CILRT PROGRAM - P-250 COMPUTER

The integrated leakage rate testing program is loaded on both Units' P-250 computers. The P-250 gathers and analyzes data received from the instruments used during the CILRT. The CILRT program enables the P-250 to scan all analog inputs in a pre-programmed review, changes the values of the inputs into engineering units and keeps these values in memory for retrieval by the plant engineers and the CILRT program.

The following instrumentation was monitored by the P-250 computer during the CILRT:

INSTRUMENTS	SCAN RATE (SEC)
24 Resistance Temperature Detectors	20
5 Moisture Analyzers	20
2 Quartz Manometers	2

The P-250 digital trend function was used to record the instantaneous values of the CILRT instrumentation. The trend function ran every 5 minutes. The P-250 Average and Integrate program was used to calculate a ten minute average of the instrumentation readings.

These averages were used as input into the CILRT programs. The CILRT program then calculates weighted averages for containment temperature, vapor pressure, dewpoint temperature and air mass. The program runs every ten minutes and also performs sensor validity checks.

CILRT MAINFRAME COMPUTER PROGRAM

The output from the P-250 computer is manually entered into the mainframe computers CILRT program. The mainframe computer CILRT uses these values to perform the necessary leak rate calculations. The analysis performed can either be mass point or total time.

CILRT RESULTS - MASS POINT ANALYSIS

Upon completion of the CILRT, the mass point method of analysis was used to demonstrate that the containment leak rate was less than the allowable limit of 0.75 La.

The air mass in containment was calculated using pressure, temperature, and dewpoint data which was collected by the P-250 computers. Air mass is calculated using the ideal gas law formula. The formula is as follows:

$$M = \frac{144\ V\ (P-Pv)}{R\ T}$$

Where: M=airmass,lbm
P=total pressure,psia
Pv=vapor pressure,psia
R=53.35 ft-lbf/lbm ^{o}R (for air)
T=average containment temperature,deg R
V=containment free volume,1.8xE6 CU FT

After the mass is calculated, the results are correlated as a function of time by using a least-squares-curve fit of the form:

$$M=At+B$$

Where: M=estimated mass
A=least squares slope - dM/dT
B=least squares y - intercept - Mo

The slope (A) and y-intercept (B) are used to calculate the leak rate. The leakage rate is calculated after the mass is plotted as a function of time using a least-square fit to determine the slope, A=dM/dT. Leak rate is expressed as the fraction of mass lost per 24 hours out of containment:

$$\text{Leakage Rate} = (dM/dT)/Mo \times (-2400)$$

The sign convention is such that a positive leakage rate value is an indication of outward leakage. The units for this value are in wt%/day.

A 95 percent confidence limit is calculated for each value using a Student's T distribution. The sum of the 95 percent confidence limit and leakage rate is the Upper Confidence Limit (UCL).

ATTACHMENT 4.1

SITE METEOROLOGICAL DATA

DATE/TIME	DRY BULB TEMP(^{0}F)	BAROMETRIC PRESSURE(mm/H_g)
7/2/86 2047	68	758.0
2150	68	758.0
2251	68	758.0
2354	68	759.0
7/3/86 0051	68	759.0
0148	66	758.9
0250	66	759.2
0350	64	751.8
0450	63	759.6
0548	63	759.9
0646	63	759.9
0725	63	759.6
0746	62.5	759.6
0841	65.0	760.5
0900	-	761.5
0935	66.0	761.5
1033	65.5	762.0
1136	68.5	762.2
1236	70.5	762.4
1334	71.0	762.4
1435	71.0	762.8
1535	71.0	762.8
1635	71.0	762.9
1735	71.0	762.9
1835	71.0	763.0
1935	69.0	736.6
2035	66	764.2
2137	61.0	764.4
2237	58.0	765.2
2335	59.5	765.8
7-4-86 0036	57.0	767.0
0138	57.0	767.0
0236	56.0	767.0
0336	55.0	767.0
0437	54.0	767.0
0537	55.0	767.5
0637	56.0	768.0
0737	61.0	768.7
0837	63.0	769.3
0935	66.0	769.4
1035	68.0	769.5
1135	69.0	769.6
1233	70.0	769.3
1335	71.0	769.1

ATTACHMENT 4.1(CONT)

DATE/TIME	DRY BULB TEMP(^{0}F)	BAROMETRIC PRESSURE(mmH_g)
1435	72.0	769.4
1535	72.0	769.3
1637	72.0	768.7
1730	72.0	768.8
1830	71.0	768.4
1935	71.0	769.1
2035	69.0	768.4
2135	66.0	768.6
2237	65.0	769.5
2337	65.0	770.5
7-5-86 0040	65.0	770.1
0140	65.0	770.0
0240	64.0	770.0
0340	63.0	770.0
0440	63.0	770.0
0540	62.0	770.0
0640	61.0	770.0
0740	63.0	770.0
0840	64.0	771.0
0950	68.0	770.0
1036	70.0	770.0
1139	72.0	771.0

ATTACHMENT 4

INSTRUMENTATION

In accordance with 10CFR50, Appendix J, the following instrumentation was calibrated and/or functionally verified within 6 months prior to the performance of this test.

Instrument	Weight Factor	Point	Range	Zone	Accuracy	Sensitivity
RTD-LM-00-1	0.025697	T1000A	55-105°F	F	±0.1°F	±0.09°F
RTD-LM-00-2	0.022766	T1001A	55-105°F	F	±0.1°F	±0.09°F
RTD-LM-00-3	0.025609	T1002A	55-105°F	F	±0.1°F	±0.09°F
RTD-LM-00-4	0.014484	T1003A	55-105°F	E	±0.1°F	±0.09°F
RTD-LM-00-5	0.088892	T1004A	55-105°F	B	±0.1°F	±0.09°F
RTD-LM-00-6	0.088892	T1005A	55-105°F	B	±0.1°F	±0.09°F
RTD-LM-00-7	0.088892	T1006A	55-105°F	C	±0.1°F	±0.09°F
RTD-LM-00-8	0.088892	T1007A	55-105°F	C	±0.1°F	±0.09°F
RTD-LM-00-9	0.049432	T1008A	55-105°F	A	±0.1°F	±0.09°F
RTD-LM-00-10	0.049432	T1009A	55-105°F	A	±0.1°F	±0.09°F

ATTACHMENT 4.2 (Con't)

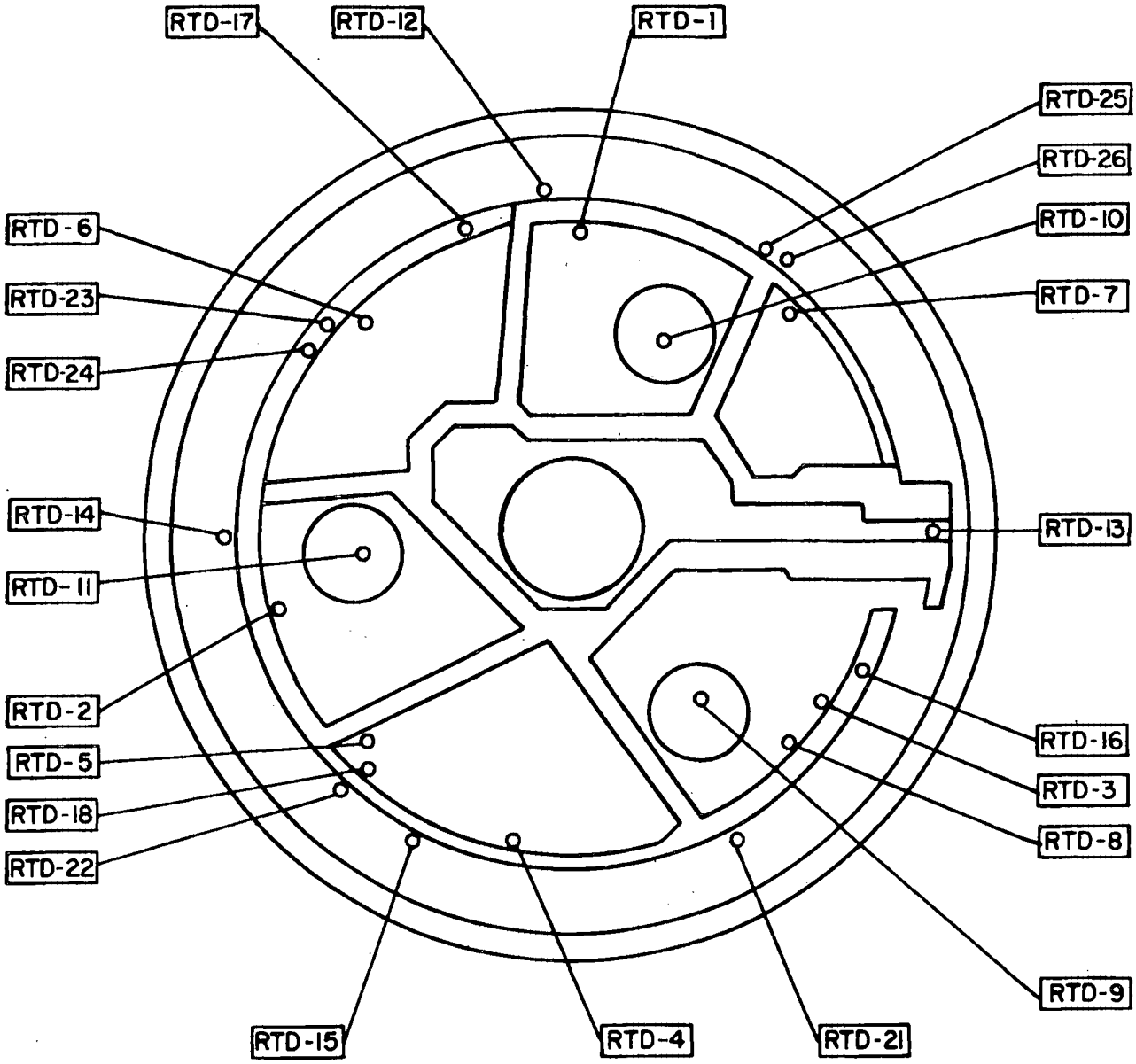
INSTRUMENTATION

Instrument	Weight Factor	Computer Point	Range	Zone	Accuracy	Sensitivity
RTD-LM-100-11	0.049432	T10010A	55-105°F	A	±0.1°F	±0.09°F
RTD-LM-100-12	0.024442	T1011A	55-105°F	D	±0.1°F	±0.09°F
RTD-LM-100-13	0.024442	T1012A	55-105°F	D	±0.1°F	±0.09°F
RTD-LM-100-14	0.024442	T1013A	55-105°F	E	±0.1°F	±0.09°F
RTD-LM-100-15	0.024442	T4024A	55-105°F	E	±0.1°F	±0.09°F
RTD-LM-100-16	0.043602	T4025A	55-105°F	I	±0.1°F	±0.09°F
RTD-LM-100-17	0.043602	T4026A	55-105°F	I	±0.1°F	±0.09°F
RTD-LM-100-18	0.043602	T4027A	55-105°F	I	±0.1°F	±0.09°F
RTD-LM-100-21	0.024296	T4009A	55-105°F	H	±0.1°F	±0.09°F
RTD-LM-100-22	0.053389	T4020A	55-105°F	H	±0.1°F	±0.09°F
RTD-LM-100-23	0.035157	T4021A	55-105°F	G	±0.1°F	±0.09°F
RTD-LM-100-24	0.024778	T4022A	55-105°F	G	±0.1°F	±0.09°F

ATTACHMENT 4.2 (Con't)

INSTRUMENTATION

Instrument	Weight Factor	Point	Range	Zone	Accuracy	Sensitivity
MT-LM-100-6	0.14064	T4039A	-15 to +150°C	K	±0.5°C	±0.1°C
MT-LM-100-7	0.14064	T4040A	-15 to +150°C	K	±0.5°C	±0.1°C
MT-LM-100-8	0.23959	T4041A	-15 to +150°C	L	±0.5°C	±0.1°C
MT-LM-100-9	0.23959	T4042A	-15 to +150°C	L	±0.5°C	±0.1°C
MT-LM-100-10	0.23959	T4043A	-15 to +150°C	L	±0.5°C	±0.1°C
PI-LM-206	.5	U0962	0-100 psia	-	±0.030 psia	±0.001%
PI-LM-207	.5	U0963	0-100 psia	-	±0.030 psia	±0.001%
FI-LM-101	N/A	N/A	0 to 9.99 SCFM	N/A	±1.5% F.S.	±0.1% F.S.



PLAN VIEW

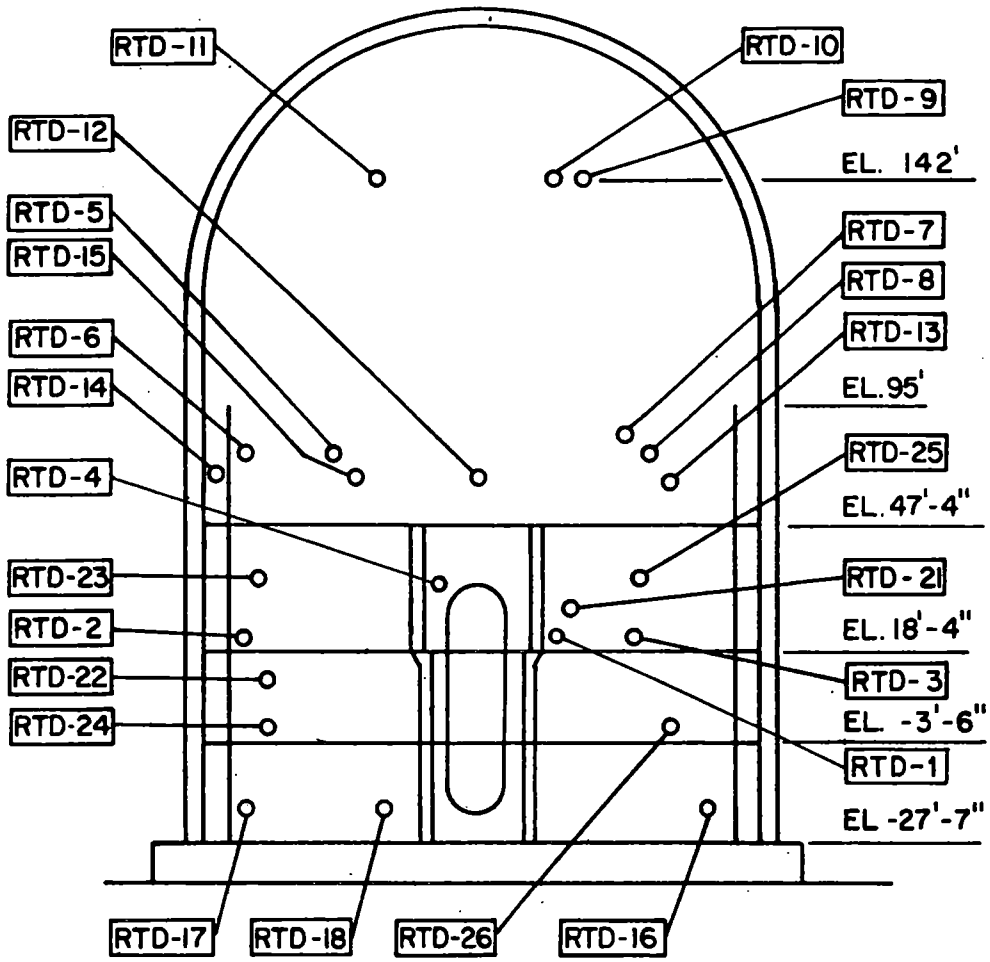
NOTES:

1. RTD-1 = RTD-LM-100-1 (TYP)
2. RTD-19, 20 NOT USED
3. INSTRUMENT LOCATIONS SHOWN ARE ONLY APPROXIMATE

ATTACHMENT 4.3

CILRT TEMPERATURE DETECTOR LOCATIONS

SURRY NUCLEAR POWER STATION-UNIT 1



PROFILE VIEW

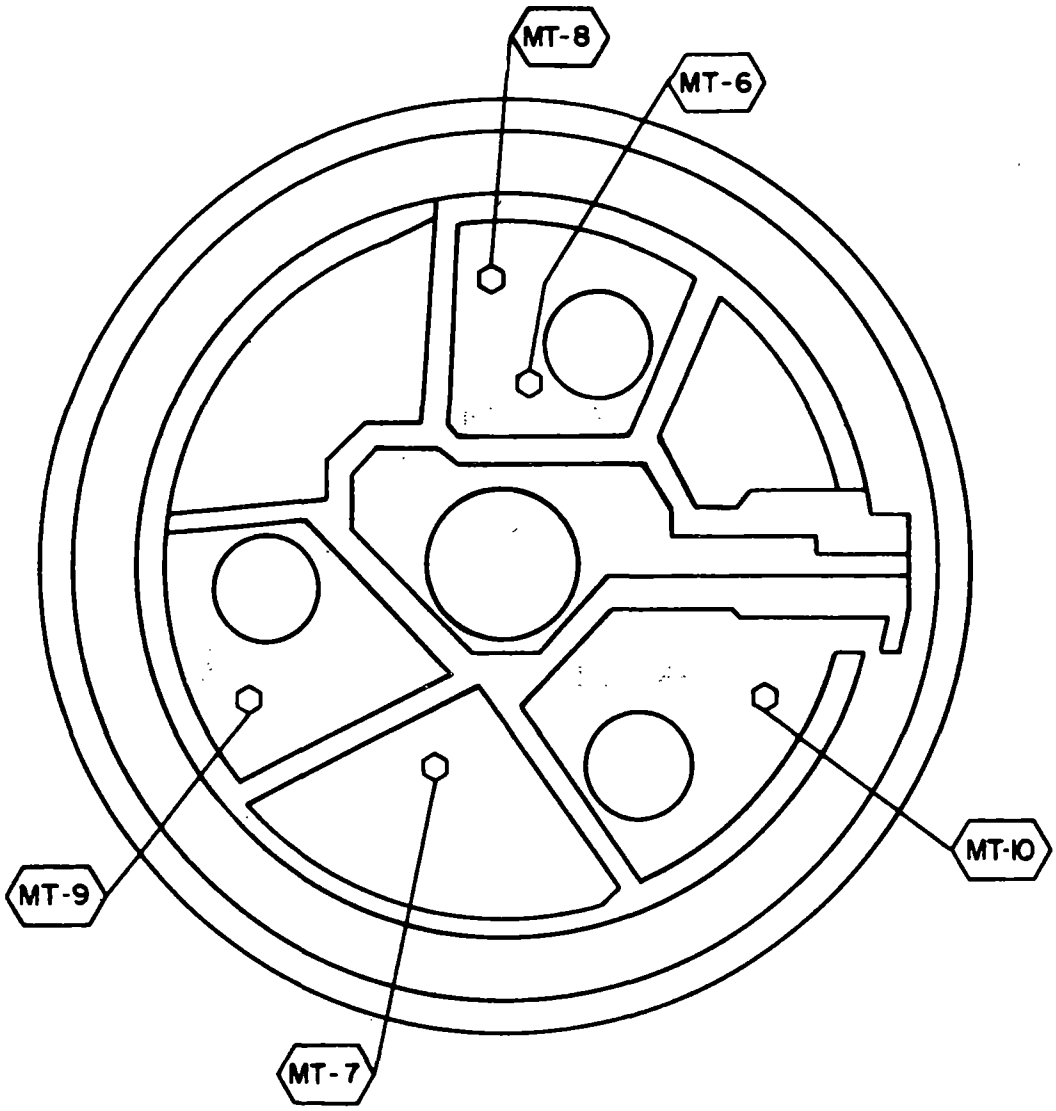
NOTES:

1. RTD-1 = RTD-LM-100-1 (TYP)
2. RTD-19, 20 NOT USED
3. INSTRUMENT LOCATIONS SHOWN ARE ONLY APPROXIMATE

ATTACHMENT 4.3

CILRT TEMPERATURE DETECTOR LOCATIONS

SURRY NUCLEAR POWER STATION-UNIT 1



PLAN VIEW

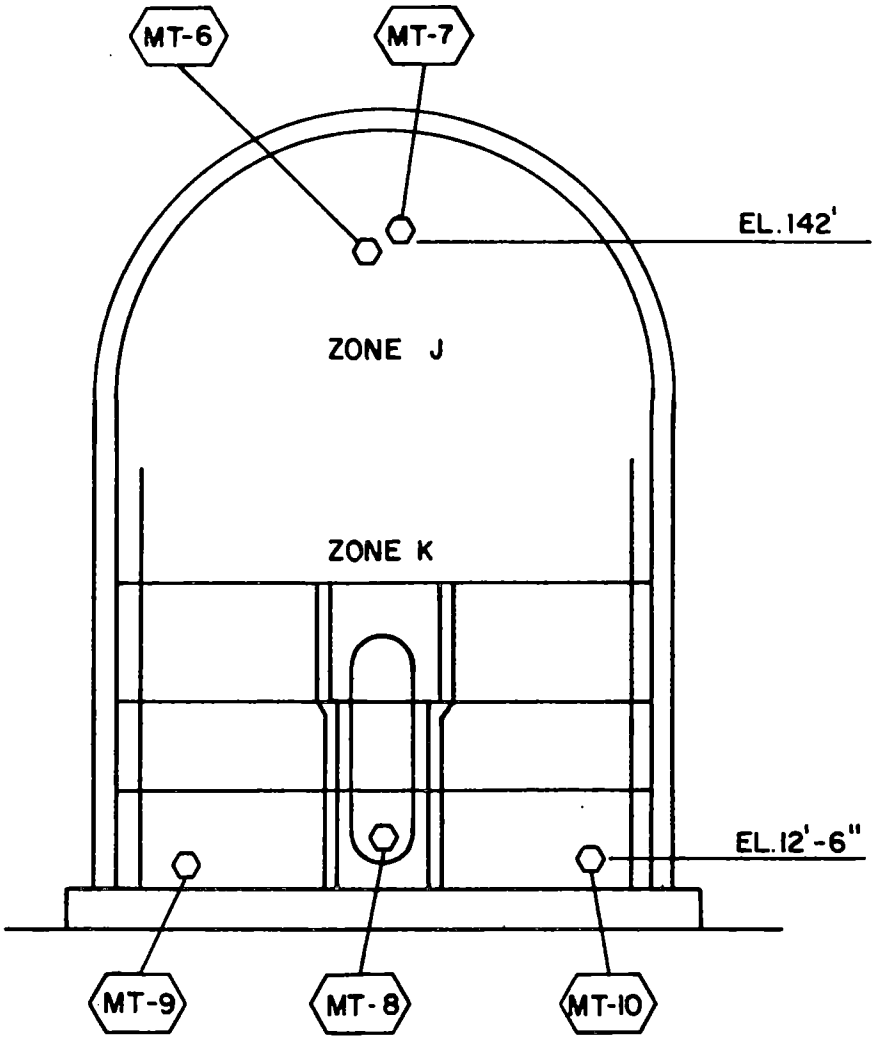
NOTES:

1. MT-6 = MT-LM-100-6 (TYP)
2. INSTRUMENT LOCATIONS SHOWN ARE ONLY APPROXIMATE

ATTACHMENT 4.4

CILRT DEWPOINT TEMPERATURE SENSOR LOCATIONS

SURRY NUCLEAR POWER STATION - UNIT 1



PROFILE VIEW

NOTES:

1. MT-6 = MT-LM-100-6 (TYP)
2. INSTRUMENT LOCATIONS SHOWN ARE ONLY APPROXIMATE

ATTACHMENT 4.4
CILRT DEWPOINT TEMPERATURE SENSOR LOCATIONS
SURRY NUCLEAR POWER STATION - UNIT 1

5.0 TEST RESULTS

PRESENTATION OF TEST RESULTS

The CILRT is based on a 24 hour test which started at 0024 hours on July 4, 1986. Input data, test results, and graphs of mass, average dewpoint and containment leakage are contained in Attachments 5.1 through 5.9

For the 24 hour test which was completed on July 5, 1986, the mass point analysis results for the CILRT satisfied the procedural acceptance criteria.

For the verification of the Type A test instrumentation, the superimposed leakage verification test method was utilized. The mass point analysis results for the superimposed leakage verification test satisfied the procedural acceptance criteria.

CILRT RESULTS

In accordance with 1-PT-16.3, the CILRT was conducted and completed on July 5, 1986. The results for the CILRT are shown below:

MASS POINT ANALYSIS

		Leakage (wt%/day)
1.	Lam, leakage rate calculated	0.051923
2.	95% confidence level	0.004029
3.	UCL - Lam + UCL	0.055952
4.	Type C leakage	0.000721
5.	Total Type A leakage	0.056673

The acceptable limit of 0.075 wt%/day as stated in Paragraph III.A.5.(b).(2) of 10CFR50 Appendix J has been satisfied.

SUPPLEMENTAL TEST RESULTS

In accordance with Attachment 7.17 of 1-PT-16.3, the supplemental verification test was performed using the superimposed leakage verification test method. The results of this verification test are as follows:

For the superimposed leakage verification test, the test is acceptable if Lc falls within the limits below:

$$(Lam + Lo - .25La) \leq Lc \leq (Lam + Lo + .25La)$$

Where: Lam = Type A calculated leakage
Lo = Superimposed leakage rate
Lc = Composite leakage
La = Maximum allowable leakage

Actual test results are:

$$(.017052 + .098472 - .025) \leq .109897 \leq (.017052 + .098472 + .025)$$

$$.90524 \leq .109897 \leq .140524$$

As shown above, the results from the verification test are acceptable.

TYPE C PENETRATION PENALTIES

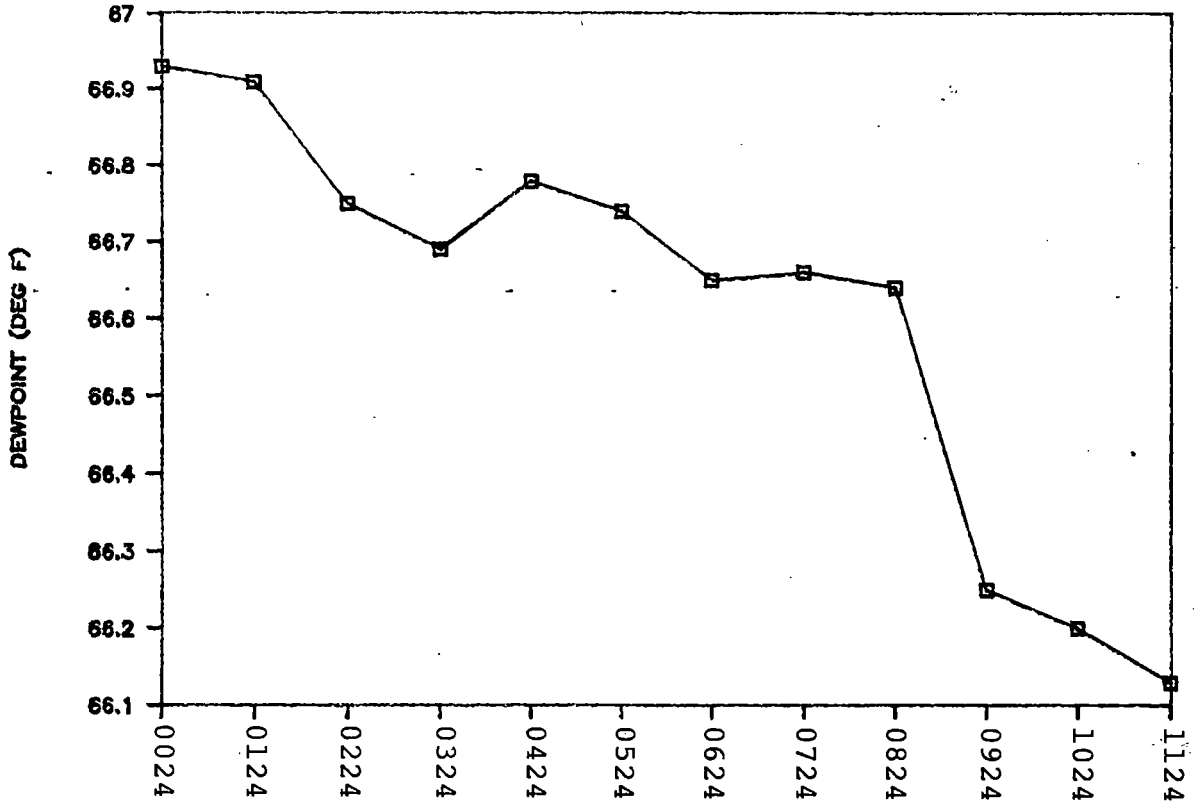
The Type C leakage listed below is to be added to the total CILRT leakage because the penetrations could not be vented and drained during the test. Minimum pathway leakage is used in this analysis.

Penetration No.	Description	Leakage(SCFH)
19	Charging	0.0
20	Safety Injection	0.0
24	Residual Heat Removal	0.24
28	CVCS	0.0
32	Gaseous Waste	0.0
33	Primary Drains	0.07
45	Primary Grade Water	0.0
46	Loop Fill	0.112
50	Safety Injection	0.18
64	Containment Spray	1.4
92	Gaseous Waste	0.0
93	Gaseous Waste	0.0
97B	Sample System	0.071
100	Gaseous Waste	0.0
101	Fire Protection	0.0
106	Safety Injection	0.08

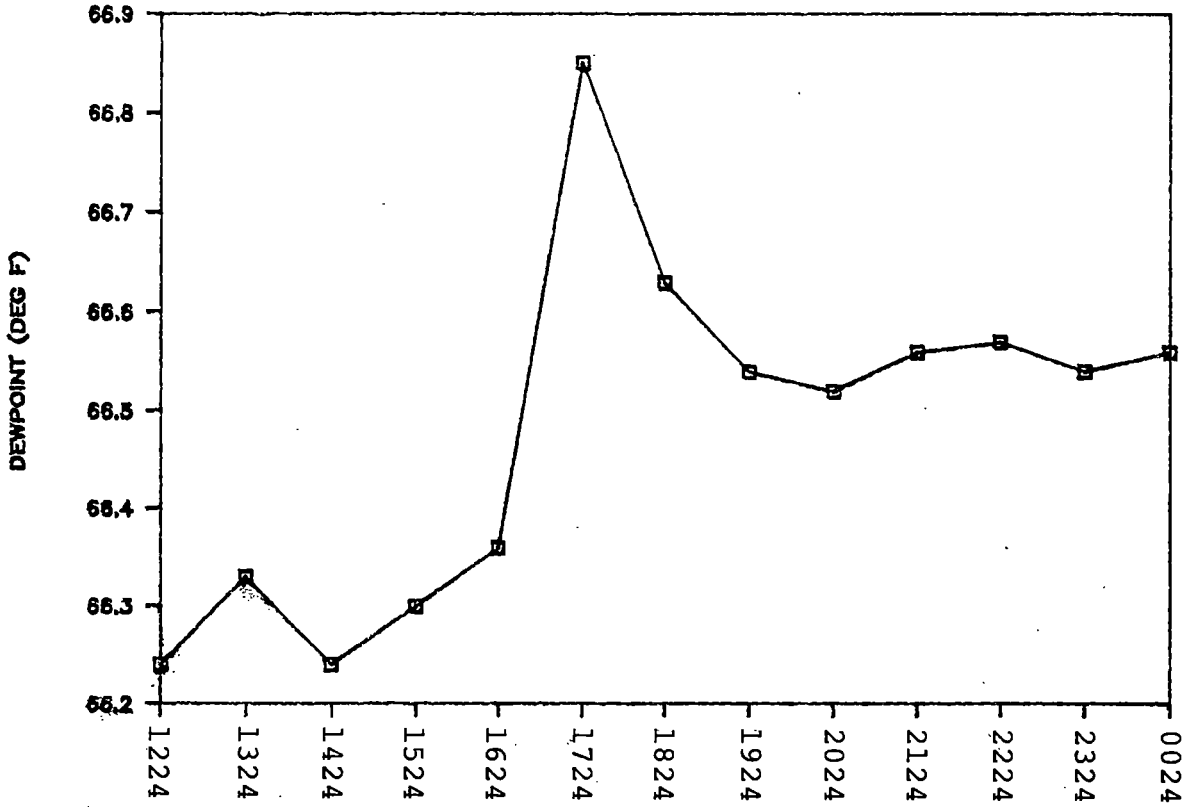
Total Type C Penalties	2.153 SCFH
Total Type C Penalties	0.000720548 wt%/day

ATTACHMENT 5.1

AVERAGE DEWPOINT VS TIME



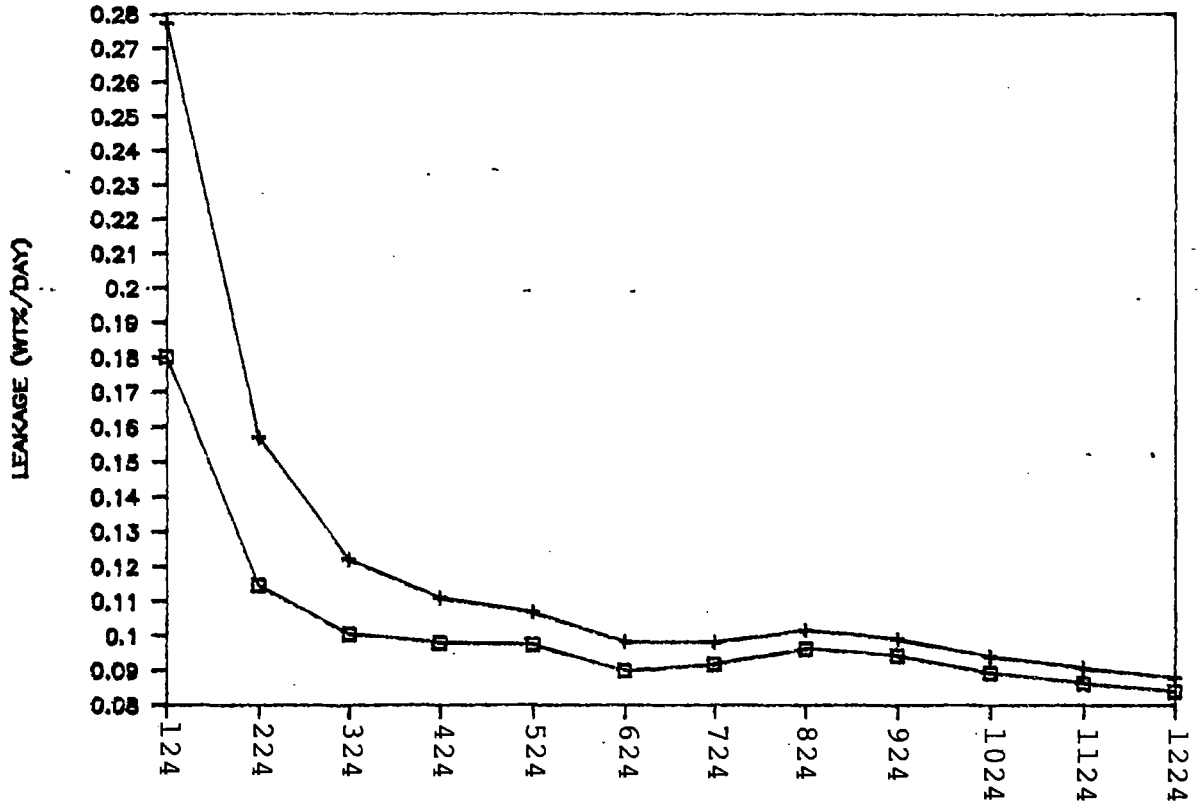
7/4/86



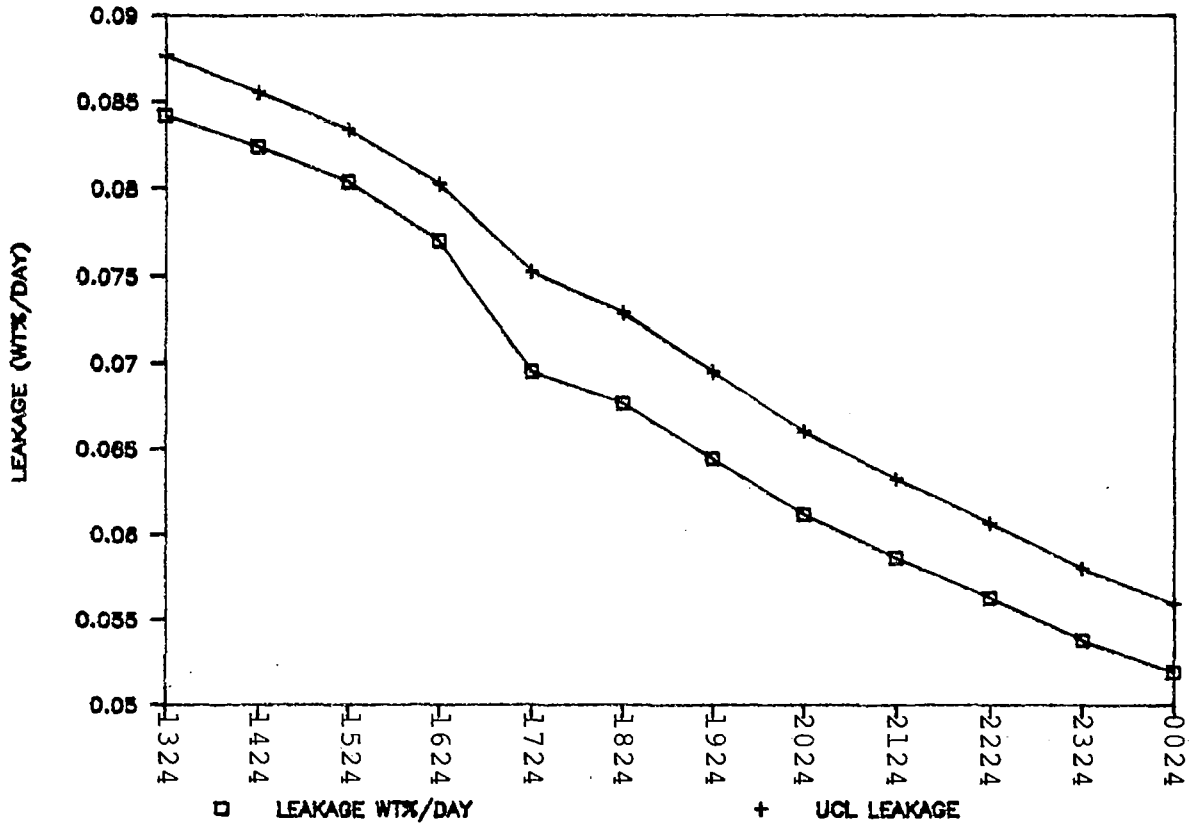
7/5/86

ATTACHMENT 5.2

CONTAINMENT LEAKAGE VS TIME

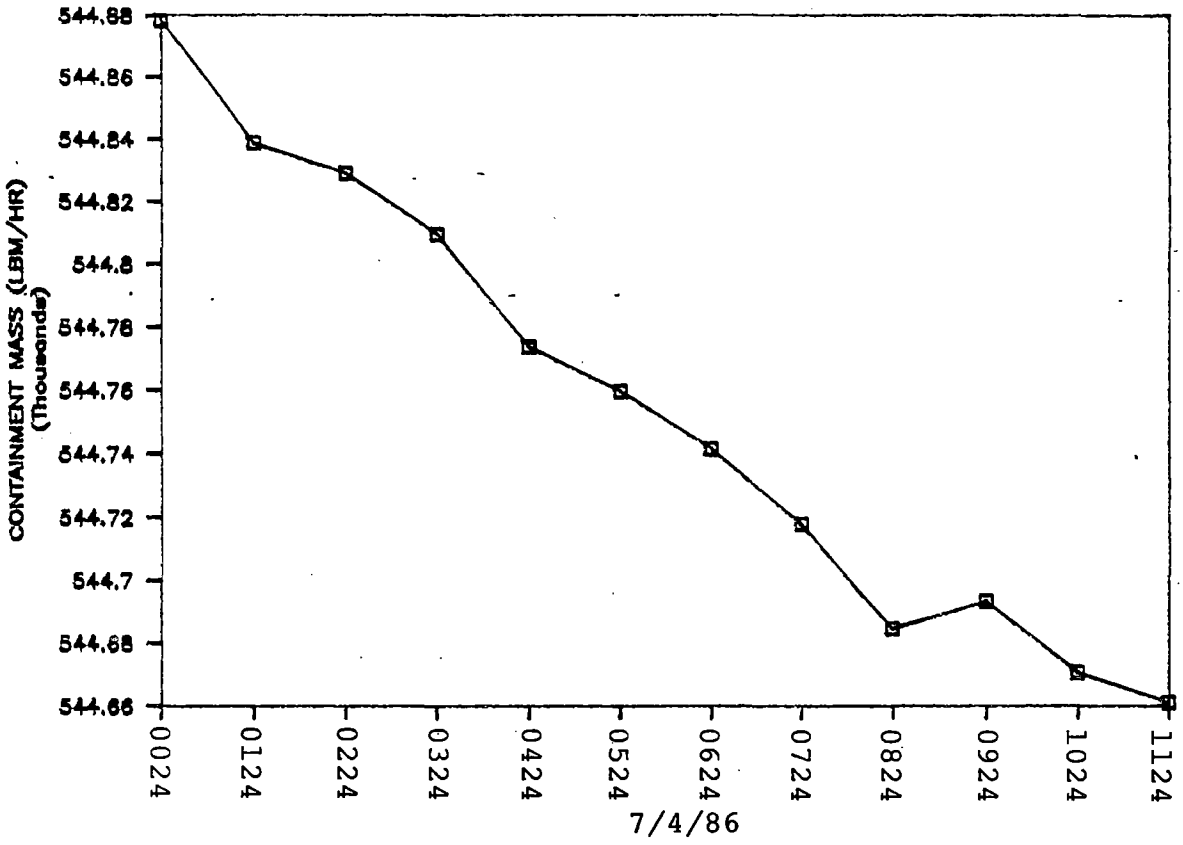


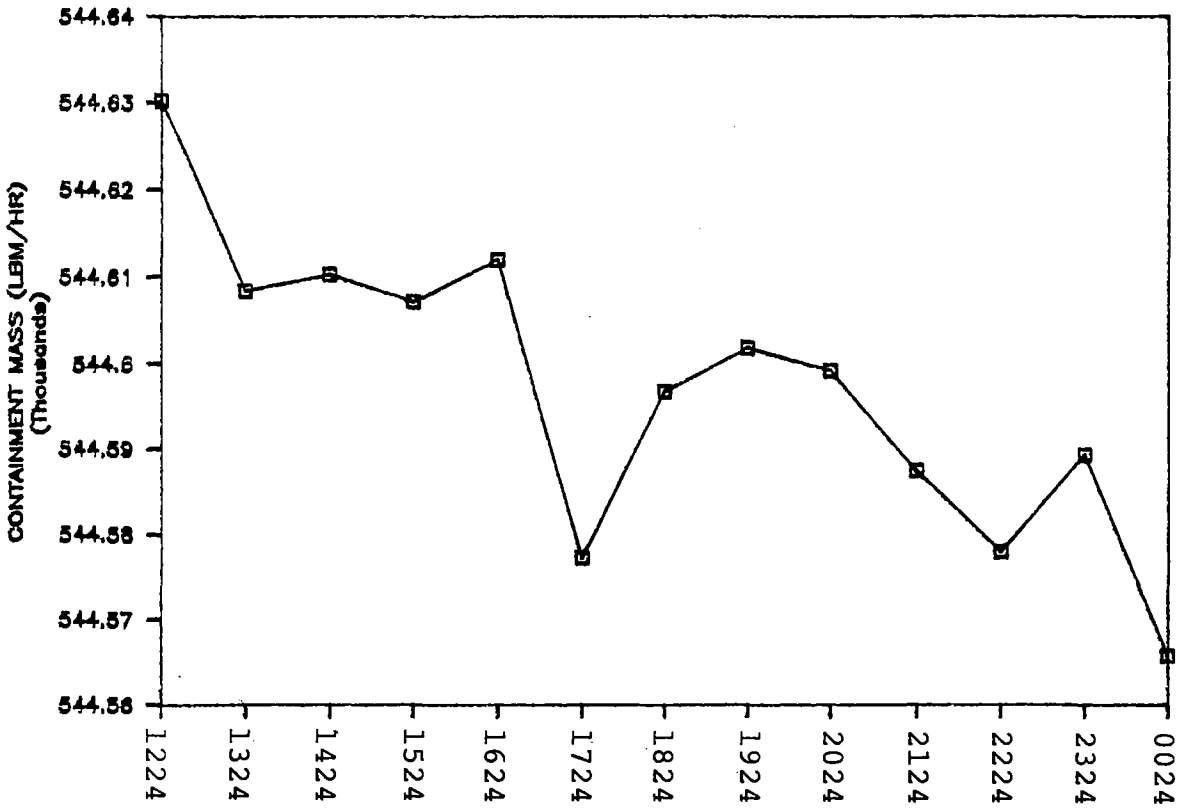
7/4/86



ATTACHMENT 5.3

CONTAINMENT MASS VS TIME





7/5/86

ATTACHMENT 5.4
CONTAINMENT INTEGRATED LEAK RATE TEST
INPUT DATA FOR 24 HOUR TEST
FROM 0024 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HR)	PRESSURE (PSIA)	DEWPOINT (DEGF)	TEMP (DEGR)
0.0	60.568	66.93	537.15
0.333	60.566	66.99	537.15
0.666	60.565	66.97	537.15
1.001	60.563	66.91	537.15
1.333	60.561	66.85	537.14
1.668	60.559	66.83	537.14
2.001	60.558	66.75	537.13
2.335	60.557	66.82	537.13
2.668	60.556	66.84	537.13
3.000	60.554	66.69	537.12
3.335	60.553	66.68	537.12
3.668	60.551	66.75	537.11
4.000	60.550	66.78	537.11
4.333	60.548	66.70	537.10
4.668	60.546	66.72	537.10
5.001	60.545	66.74	537.08
5.333	60.543	66.58	537.08
5.668	60.541	66.45	537.07
6.001	60.539	66.65	537.06
6.335	60.537	66.64	537.05
6.666	60.535	66.62	537.04
7.001	60.533	66.66	537.03
7.333	60.530	66.66	537.02
7.668	60.528	66.58	537.01
8.000	60.526	66.64	537.00
8.333	60.523	66.53	536.99
8.666	60.521	66.45	536.97
9.001	60.518	66.25	536.96
9.335	60.515	66.24	536.94
9.666	60.513	66.24	536.92
10.000	60.510	66.20	536.91
10.333	60.507	66.21	536.90
10.666	60.505	66.16	536.88
11.000	60.503	66.13	536.86
11.335	60.499	66.08	536.84
11.666	60.497	66.09	536.83
12.001	60.495	66.24	536.81
12.333	60.492	66.31	536.80
12.668	60.490	66.15	536.78
13.000	60.488	66.33	536.71
13.333	60.487	66.13	536.76

ATTACHMENT 5.4(CONT)
CONTAINMENT INTEGRATED LEAK RATE TEST
INPUT DATA FOR 24 HOUR TEST
FROM 0024 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HR)	PRESSURE (PSIA)	DEWPOINT (DEGF)	TEMP (DEGR)
13.666	60.487	66.29	536.76
14.000	60.486	66.24	536.76
14.335	60.486	66.24	536.75
14.668	60.484	66.31	536.75
15.001	60.484	66.30	536.74
15.335	60.484	66.22	536.74
15.666	60.484	66.39	536.74
16.000	60.485	66.36	536.73
16.335	60.491	66.32	536.75
16.668	60.530	66.80	536.98
17.000	60.510	66.85	536.94
17.333	60.503	66.76	536.88
17.668	60.499	66.72	536.85
18.001	60.497	66.63	536.83
18.333	60.497	66.63	536.83
18.666	60.496	66.58	536.82
19.000	60.496	66.54	536.82
19.335	60.496	66.58	536.82
19.668	60.496	66.53	536.82
20.001	60.496	66.52	536.83
20.333	60.497	66.59	536.84
20.666	60.497	66.59	536.84
21.001	60.498	66.56	536.85
21.335	60.498	66.57	536.85
21.668	60.499	66.57	536.86
22.001	60.500	66.57	536.88
22.335	60.501	66.55	536.88
22.666	60.502	66.57	536.89
23.000	60.503	66.54	536.90
23.333	60.503	66.52	536.91
23.668	60.504	66.51	536.92
24.000	60.504	66.56	536.93

ATTACHMENT 5.5
CONTAINMENT INTEGRATED LEAK RATE TEST
TEST RESULTS FOR 24 HOUR TEST
FROM 0024 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HRS)	MASS (LBM)	LEAKAGE (PCT/DAY)	CONF (PCT/DAY)	UCL (PCT/DAY)
0.000	544884.5	0.0	0.0	0.0
0.333	544860.28	0.0	0.0	0.0
0.666	544853.28	0.206489	0.562723	0.769211
1.001	544841.32	0.180260	0.097130	0.277390
1.333	544839.49	0.143992	0.066732	0.210724
1.668	544823.43	0.143246	0.039544	0.182784
2.001	544832.67	0.114596	0.042538	0.157128
2.335	544816.50	0.110875	0.030856	0.141730
2.668	544805.42	0.111518	0.023315	0.134833
3.000	544812.71	0.100544	0.021739	0.122283
3.335	544804.68	0.094781	0.018529	0.113310
3.668	544789.63	0.095462	0.015261	0.110722
4.000	544777.54	0.098005	0.013051	0.111056
4.333	544777.71	0.096744	0.011169	0.107913
4.668	544757.59	0.100139	0.010218	0.110357
5.001	544766.80	0.097520	0.009278	0.106798
5.333	544764.92	0.094308	0.008770	0.103078
5.668	544770.08	0.089194	0.009316	0.098510
6.001	544741.94	0.089997	0.008342	0.098339
6.335	544735.00	0.090604	0.007506	0.098110
6.666	544729.07	0.090902	0.006777	0.097679
7.001	544717.07	0.091922	0.006228	0.098150
7.333	544700.07	0.094145	0.006087	0.100231
7.668	544700.22	0.094891	0.005616	0.100507
8.000	544686.20	0.096310	0.005344	0.101654
8.333	544680.31	0.097268	0.005014	0.102281
8.666	544690.57	0.096181	0.004757	0.100938
9.001	544693.64	0.094297	0.004784	0.099082
9.335	544687.79	0.092659	0.004731	0.097390
9.666	544689.98	0.090548	0.004873	0.095421
10.000	544676.97	0.089310	0.004712	0.094022
10.333	544658.97	0.089134	0.004416	0.093550
10.666	544666.16	0.088005	0.004289	0.092294
11.000	544671.34	0.086274	0.004374	0.090647
11.335	544660.41	0.085097	0.004277	0.089374
11.666	544651.46	0.084258	0.004118	0.088376
12.001	544638.68	0.083908	0.003907	0.087815
12.333	544614.66	0.084556	0.003752	0.088309
12.668	544632.86	0.083859	0.003622	0.087480
13.000	544606.89	0.084210	0.003455	0.087665
13.333	544627.99	0.083249	0.003415	0.086664
13.666	544611.99	0.082844	0.003274	0.086118
14.000	544607.95	0.082399	0.003150	0.085549
14.335	544618.10	0.081355	0.003171	0.084526

ATTACHMENT 5.5(CONT)
CONTAINMENT INTEGRATED LEAK RATE TEST
TEST RESULTS FOR 24 HOUR TEST
FROM 0024 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HRS)	MASS (LBM)	LEAKAGE (PCT/DAY)	CONF (PCT/DAY)	UCL (PCT/DAY)
14.668	544592.98	0.081170	0.003034	0.084204
15.001	544604.13	0.080375	0.003001	0.083376
15.335	544612.14	0.079181	0.003097	0.082278
15.666	544595.09	0.078503	0.003038	0.081543
16.000	544617.31	0.076997	0.003259	0.080255
16.335	544655.34	0.074297	0.004076	0.078373
16.668	544726.43	0.069610	0.005992	0.075602
17.000	544580.95	0.069478	0.005761	0.075239
17.333	544587.63	0.069030	0.005558	0.074588
17.668	544585.92	0.068535	0.005372	0.073906
18.001	544597.23	0.067667	0.005242	0.072909
18.333	544597.23	0.066763	0.005128	0.071891
18.666	544604.40	0.065658	0.005061	0.070718
19.000	544607.43	0.064477	0.005016	0.069493
19.335	544603.39	0.063393	0.004956	0.068349
19.668	544608.44	0.062201	0.004926	0.067127
20.001	544599.30	0.061216	0.004857	0.066072
20.333	544591.14	0.060394	0.004765	0.065160
20.666	544591.14	0.059559	0.004683	0.064242
21.001	544593.08	0.058677	0.004614	0.063291
21.335	544592.06	0.057809	0.004549	0.062358
21.668	544590.97	0.056960	0.004485	0.061445
22.001	544579.73	0.056305	0.004396	0.060701
22.335	544590.80	0.055447	0.004345	0.059792
22.666	544587.69	0.054644	0.004288	0.058933
23.000	544589.62	0.053812	0.004241	0.058053
23.333	544581.50	0.053110	0.004176	0.057286
23.668	544581.42	0.052406	0.004115	0.056521
24.000	544566.23	0.051923	0.004029	0.055951

ATTACHMENT 5.6
CONTAINMENT INTEGRATED LEAK RATE TEST
INPUT DATA FOR 12 HOUR TEST
FROM 1224 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HRS)	PRESSURE (PSIA)	DEWPOINT (DEGF)	TEMP (DEGR)
0.000	60.495	66.24	536.81
0.332	60.492	66.31	536.80
0.667	60.490	66.15	536.78
0.999	60.488	66.33	536.77
1.332	60.487	66.13	536.76
1.665	60.487	66.29	536.76
1.999	60.486	66.24	536.76
2.334	60.486	66.24	536.75
2.667	60.484	66.31	536.75
3.000	60.484	66.30	536.74
3.334	60.484	66.22	536.74
3.665	60.484	66.39	536.74
3.999	60.485	66.36	536.73
4.334	60.491	66.32	536.75
4.667	60.530	66.80	536.98
4.999	60.510	66.85	536.94
5.332	60.503	66.76	536.88
5.667	60.499	66.72	536.85
6.000	60.497	66.63	536.83
6.332	60.497	66.63	536.83
6.665	60.496	66.57	536.82
6.999	60.496	66.54	536.82
7.334	60.496	66.58	536.82
7.667	60.496	66.53	536.82
8.000	60.496	66.52	536.83
8.332	60.497	66.59	536.84
8.665	60.497	66.59	536.84
9.000	60.498	66.56	536.85
9.334	60.498	66.57	536.85
9.667	60.499	66.57	536.86
10.000	60.500	66.57	536.88
10.334	60.501	66.55	536.88
10.665	60.502	66.57	536.89
10.999	60.503	66.54	536.90
11.332	60.503	66.52	536.91
11.667	60.504	66.51	536.92
11.999	60.504	66.56	536.93

ATTACHMENT 5.7
CONTAINMENT INTEGRATED LEAK RATE TEST
TEST RESULTS FOR 12 HOUR TEST
FROM 1224 ON JULY 4, 1986 TO 0024 ON JULY 5, 1986

TIME (HRS)	MASS (LBM)	LEAKAGE (PCT/DAY)	CONF (PCT/DAY)	UCL (PCT/DAY)
0.0	544638.68	0.0	0.0	0.0
0.332	544614.66	0.0	0.0	0.0
0.667	544632.86	0.038054	1.378685	1.416739
0.999	544606.89	0.101867	0.238355	0.340222
1.332	544627.99	0.038482	0.139890	0.178372
1.665	544611.99	0.045092	0.083325	0.128416
1.999	544607.95	0.048342	0.055804	0.104146
2.334	544618.10	0.034452	0.043001	0.077453
2.667	544592.98	0.047829	0.035610	0.083440
3.000	544604.13	0.043990	0.028184	0.072174
3.334	544612.14	0.035079	0.024564	0.059643
3.665	544595.09	0.037264	0.020342	0.057606
3.999	544617.31	0.027678	0.019726	0.047403
4.334	544655.34	0.006484	0.027499	0.033982
4.667	544726.43	-0.030946	0.044989	0.014043
4.999	544580.95	-0.012890	0.043226	0.030336
5.332	544587.63	-0.001974	0.039523	0.037548
5.667	544585.92	0.006121	0.035911	0.042032
6.000	544597.23	0.009457	0.032178	0.041635
6.332	544597.23	0.011751	0.028952	0.040704
6.665	544604.40	0.012068	0.026117	0.038185
6.999	544607.43	0.011688	0.023680	0.035368
7.334	544603.39	0.011852	0.021567	0.033419
7.667	544608.44	0.011191	0.019736	0.030927
8.000	544599.30	0.011689	0.018126	0.029815
8.332	544591.14	0.012903	0.016744	0.029647
8.665	544591.14	0.013765	0.015501	0.029265
9.000	544593.08	0.014163	0.014376	0.028539
9.334	544592.06	0.014479	0.013368	0.027847
9.667	544590.97	0.014735	0.012463	0.027198
10.000	544579.73	0.015755	0.011687	0.027441
10.334	544590.80	0.015673	0.010944	0.026617
10.665	544587.69	0.015743	0.010270	0.026013
10.999	544589.62	0.015592	0.009657	0.025249
11.332	544581.5	0.015903	0.009102	0.025005
11.667	544581.42	0.016098	0.008590	0.024689
11.999	544566.23	0.017052	0.008172	0.025224

ATTACHMENT 5.8
SUPERIMPOSED VERIFICATION TEST
INPUT DATA FOR VERIFICATION TEST
FROM 0244 ON JULY 5, 1986 TO 0944 ON JULY 5, 1986

TIME (HRS)	PRESSURE (PSIA)	DEWPOINT (DEGF)	TEMP (DEGR)
0.000	60.504	66.55	536.98
0.333	60.504	66.47	536.99
0.668	60.504	66.44	536.99
1.002	60.505	66.58	537.00
1.333	60.504	66.53	537.01
1.668	60.503	66.60	537.00
2.000	60.503	66.59	537.01
2.335	60.502	66.55	537.00
2.668	60.501	66.58	537.01
3.002	60.500	66.55	537.01
3.333	60.498	66.54	537.01
3.667	60.497	66.45	537.00
4.000	60.496	66.54	537.00
4.335	60.494	66.54	537.00
4.668	60.492	66.46	536.99
5.002	60.490	66.51	536.98
5.335	60.488	66.50	536.97
5.668	60.486	66.39	536.97
6.002	60.484	66.45	536.95
6.333	60.482	66.40	536.95
6.667	60.480	66.50	536.93
7.000	60.479	66.42	536.92

ATTACHMENT 5.9
SUPERIMPOSED VERIFICATION TEST
TEST RESULTS FOR VERIFICATION TEST
FROM 0244 ON JULY 5, 1986 TO 0944 ON JULY 5, 1986

TIME (HRS)	MASS (LBM)	LEAKAGE (PCT/DAY)	CONF (PCT/DAY)	UCL (PCT/DAY)
0.000	544516.53	0.0	0.0	0.0
0.333	544514.46	0.0	0.0	0.0
0.668	544517.48	-0.006292	0.165910	0.159618
1.002	544502.27	0.052462	0.102966	0.155428
1.333	544488.13	0.091109	0.071704	0.162183
1.668	544482.15	0.100426	0.043654	0.144080
2.000	544473.02	0.105964	0.029894	0.135858
2.335	544478.15	0.093745	0.025479	0.119224
2.668	544455.94	0.101383	0.020978	0.122363
3.002	544449.92	0.104071	0.016675	0.120747
3.333	544432.84	0.111101	0.015354	0.126455
3.667	544443.00	0.105716	0.013833	0.119549
4.000	544424.88	0.106875	0.011648	0.118523
4.335	544406.78	0.111372	0.010926	0.122298
4.668	544406.89	0.111477	0.009402	0.120879
5.002	544393.98	0.112874	0.008299	0.121173
5.335	544386.95	0.113423	0.007306	0.120729
5.668	544379.92	0.113450	0.006465	0.119915
6.002	544376.07	0.112480	0.005843	0.118323
6.333	544363.00	0.112645	0.005244	0.117889
6.667	544355.11	0.112656	0.004730	0.117386
7.000	544364.26	0.109897	0.005093	0.114991

6.0 TYPE B AND C LEAKAGE TESTS

Attachment 6.1 summarizes the Type B and C tests that have been performed since the 1983 refueling. Included in these Tables are the As-Found ,As-Left leakages for each penetration and a description of repairs if they were performed.

The Type C test method which was used prior to May 1985 was the downstream method. At that time though, it was identified that the test results were not conservative. Subsequent Type C testing was performed using the makeup method where it was feasible.

The total As-Found Type B and C leakage value during the 1986 refueling was 1221.19 SCFH which is above the maximum leakage of .6La (180 SCFH) as specified in 10CFR50, Appendix J, Section III.B.3.(a).

The corrective action taken to reduce the Type B and C leakage below .6La was to repair/replace valves which had leakages above the maximum allowable leakages as specified in the Type C test procedure. Those penetrations which were repaired are listed in Attachment 6.1. Included in the repairs that were performed during the outage was the replacement of the containment sump valves(TV-DA-100A and TV-DA-100B) with a design that is more suitable for its duty. Its anticipated that the problems that were encountered previously with this penetration have been eliminated. Following these repairs, the final As-Left Type B and C leakage was 78.437 SCFH which is below the .6La value of 180 SCFH.

A major part of the As-Left leakage can be attributed to Penetration 28 (HCV-1200's). Due to the piping arrangement which makes identification of a faulty valve difficult and the valves location, a final As-Left value which is higher than the maximum allowable value in the Type C test procedure was accepted. The basis for the acceptance of this leakage was that with the outside trip valve taken into account, the maximum leakage that could pass through this penetration is 0 SCFH.

To possibly alleviate problems with this penetration in the future, a study has been initiated to determine the feasibility of installing a trip valve downstream of the HCV-1200's and inside containment wall, thereby replacing the 1200's as the inside containment isolation valve. If the results from this feasibility study are favorable, the project would be turned into a design change which would then be completed at some future outage.

Attachment 6.2 contains results of an As-Found Type A test analysis as requested by the NRC.

ATTACHMENT 6.1
1984 TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
7 Safety Injection	C	1-SI-150 MOV-1867C MOV-1867D		.019(4-21-84)	
46 Loop Fill	C	FCV-1160		.65(3-5-84)	
90 Ventilation	C	MOV-VS-100C MOV-VS-100D MOV-VS-101	1.0(3-19-84)	1.0	
91 Ventilation	C	MOV-VS-100A MOV-VS-100B MOV-VS-102	47.0(3-19-84)	47.0	
Equipment Hatch	B	O-ring	0.0(3-7-84)	0.0	
Escape Hatch	B	O-ring	0.0(3-7-84)	0.0	
Personnel Hatch	B	O-ring	1.7(3-9-84)	1.7	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
7 Safety Injection	C	1-SI-150 MOV-1867C MOV-1867D	.45(9/84)	.45	
15 Charging	C	1-CH-309 MOV-1289A	0.0(10/84)	0.0	
19 Charging	C	MOV-1381	0.0(10/84)	0.0	
20 Safety Injection	C	1-SI-32	0.0(9/84)	0.0	
21 Safety Injection	C	MOV-1842	0.7(9/84)	0.7	
23 Safety Injection	C	MOV-1869B	0.0(9/84)	0.0	
24 Residual Heat Removal	C	MOV-RH-100	0.2(10/84)	0.2	
28 CVCS	C	HCV-1200A	160.6(10/84)	0.5(11/84)	008519 Lapped seat and plug
		HCV-1200B			008520 Lapped seat and plug
		HCV-1200C			008521 Lapped seat and plug
		TV-1204	0.0(10/84)	0.0	
32 Gaseous Waste	C	TV-GW-106	0.0(10/84)	0.0	
		TV-GW-107	0.0(10/84)	0.0	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
33 Gaseous Waste	C	TV-GW-106	0.0(10/84)	0.0	
		TV-GW-107	0.0(10/84)	0.0	
33 Gaseous Drains	C	TV-DG-108A	55.0(9/84)	1.82(12/84)	007457 Lap Seat,Plug
		TV-DG-108B	12.0(9/84)	0.0(12/84)	007456 Lap seat,plug and repack
38 Aerated Drain	C	TV-DA-100A	54.0(10/84)	0.0(11/84)	007553 Pulled trim parts
		TV-DA-100B	0.0(10/84)	0.0	
42 Service Air	C	1-SA-60	0.0(9/84)	0.0	
		1-SA-62	0.0(9/84)	0.0	
43 Radiation Monitoring	C	1-RM-3	0.0(10/84)	0.0	
		TV-RM-100A	0.26(10/84)	.084(11/84)	007745 Lap seat,plug
44 Radiation Monitoring	C	TV-RM-100B	.045(10/84)	.045	
		TV-RM-100C	0.0(10/84)	0.0	
45 Primary Grade Water	C	1-RC-160	1.88(10/84)	.927(10/84)	007330 Lap seat,disc
		TV-1519A	0.0(10/84)	0.0	
46 Charging	C	FCV-1160	.18(12/84)	.18	
47 Instrument Air	C	1-IA-446	.57(9/84)	0.0(11/84)	007370 Lap seat,gate
		1-IA-939	7.6(9/84)	0.8(11/84)	007368 Lap seat,disc
		TV-IA-100	0.0(9/84)	0.0	
48 Vent and Drain	C	TV-VG-109A	.37(10/84)	.37	
		TV-VG-109B	.26(10/84	.26	
50 Safety Injection	C	TV-SI-101A	.30(10/84)	0.0(10/84)	007316 Replace stem, plug,seat,gasket
		TV-SI-101B	.15(10/84)	.15	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
51 Service Water	C	1-SW-206	.11(10/84)	.11	
		1-SW-208	0.0(10/84)	0.0	
53 Safety Injection	C	TV-SI-100	0.0(10/84)	0.0	
		1-SI-234	.75(10/84)	.20(10/84)	007328 Lap seat,gate
54 Primary Vent	C	1-VA-1	0.0(10/84)	0.0	
		1-VA-6	0.0(10/84)	0.0	
55A Leakage Monitoring	C	TV-LM-100E	0.0(10/84)	0.0	
		TV-LM-100F	0.0(10/84)	0.0	
56A Sample System	C	TV-SS-100A	.30(10/84)	0.0(10/84)	006827 Replace stem adapter
		TV-SS-100B	1.0(10/84)	.0195(10/84)	006828 Replace stem adapter
56B Sample System	C	TV-SS-102A	.60(10/84)	0.0(11/84)	098183 Replaced valve
		TV-SS-102B	1.0(10/84)	0.0(11/84)	007148 Replaced valve
56D Sample System	C	TV-SS-106A	0.0(10/84)	0.0	
		TV-SS-106B	0.0(10/84)	0.0	
57A Leakage Monitoring	C	TV-LM-100G	0.0(10/84)	0.0	
		TV-LM-100H	0.0(10/84)	0.0	
57B Sample System	C	TV-SS-104A	.07(9/84)	.07	
		TV-SS-104B	.30(9/84)	.10(10/84)	008584 Adjusted limits
					006826 Replace stem adapter
57C Sample System	C	TV-SS-101A	.30(10/84)	0.0(10/84)	006825 Replaced stem adapter
		TV-SS-101B	0.0(10/84)	0.0	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
57D Drain System	C	TV-DA-103A	0.0(10/84)	0.0	
		TV-DA-103B	0.0(10/84)	0.0	
58 Instrument Air	C	2-IA-446	.305(10/84)	.305	
		1-IA-938	.34(10/84)	.34	
60 Safety Injection	C	MOV-1890A	1.4(9/84)	1.4	
61 Safety Injection	C	MOV-1890C	12.0(9/84)	1.5(12/84)	006824 Lap seat,disc
62 Safety Injection	C	MOV-1890B	22.0(9/84)	10.0(12/84)	006822 Lap seat,disc
63 Containment Spray	C	1-CS-24	0.0(10/84)	0.0	
		MOV-CS-101C			
		MOV-CS-101D	0.0(10/84)	0.0	
64 Containment Spray	C	1-CS-13	0.0(9/84)	0.0	
		MOV-CS-101A			
		MOV-CS-101B	124.71(9/84)	0.0(10/84)	Packing leak 101B
66,67 Recirc. Spray	C	MOV-RS-155A			
		MOV-RS-155B	2.144(11/84)	2.144	
68,69 Safety Injection	C	MOV-1860A			
		MOV-1860B	.8(11/84)	.8	
70 Recirculation Spray	C	1-RS-11	0.0(11/84)	0.0	
		MOV-RS-156B	0.0(11/84)	0.0	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
71 Recirculation Spray	C	1-RS-17	0.0(11/84)	0.0	
		MOV-RS-156A	0.0(11/84)	0.0	
89 Air Ejector Discharge	C	1-VP-12	.45(10/84)	.45	
		TV-SV-102A	0.0(10/84)	0.0	
90 Ventilation	C	MOV-VS-100C			
		MOV-VS-100D			
		MOV-VS-101	11.3(11/84)	11.3	
91 Ventilation	C	MOV-VS-100A			
		MOV-VS-100B			
		MOV-VS-102	122(10/84)	3.68(10/84)	Tightened packing(B)
92 Containment Vacuum	C	TV-CV-150C	30.0(10/84)	.7(10/84)	007333 Lapped seat
		TV-CV-150D	.68(10/84)	.045(10/84)	007334 Lapped seat
		TV-GW-100	0.0(10/84)	0.0	
		TV-GW-101	0.0(10/84)	0.0	
93 Containment Vacuum	C	TV-CV-150A	56.0(10/84)	.095(10/84)	007315 Lapped seat
		TV-CV-150B	.9(10/84)	.2(10/84)	007317 Lapped seat
		TV-GW-104	0.0(9/84)	0.0	
		TV-GW-105	0.0(9/84)	0.0	
94 Containment Vacuum	C	HCV-CV-100	1.55(10/84)	1.55	
		1-CV-2	12.0(10/84)	1.1(10/84)	006982 Lap seat,gate
97B Sampling System	C	TV-SS-103A	0.0(9/84)	0.0	
		TV-SS-103B	0.0(9/84)	0.0	
97C Leakage Monitoring	C	TV-LM-100A	0.0(10/84)	0.0	
		TV-LM-100B	0.0(10/84)	0.0	

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
100 Gaseous Waste	C	TV-GW-102	0.0(10/84)	0.0	
		TV-GW-103	0.0(10/84)	0.0	
101 Fire Protection	C	1-FP-151	0.0(10/84)	0.0	
		1-FP-152	0.0(10/84)	0.0	
103 Reactor Cavity Liquid	C	1-RL-3	0.0(10/84)	0.0	
		1-RL-5	0.0(10/84)	0.0	
104 Reactor Cavity Liquid	C	1-RL-13	0.0(10/84)	0.0	
		1-RL-15	0.0(10/84)	0.0	
105C Post Accident Sampling	C	TV-GW-111A	0.0(10/84)	0.0	
		TV-GW-111B	0.0(10/84)	0.0	
105D Leakage Monitoring	C	TV-LM-100C	0.0(10/84)	0.0	
		TV-LM-100D	0.0(10/84)	0.0	
106 Safety Injection	C	1-SI-73	0.0(10/84)	0.0	
112 Instrument Air	C	TV-IA-101A	1.9(10/84)	0.0(10/84)	007458 Adjust stroke, packing
		TV-IA-101B	1.3(10/84)	0.0(10/84)	007459 Adjust stroke
113 Safety Injection	C	1-SI-174	0.0(12/84)	0.0	
		MOV-1869A	3.1(12/84)	0.0(12/84)	006821 New valve

ATTACHMENT 6.1
1984 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
Fuel Transfer Tube	B	O-Ring	0.0(12/84)	0.0	
Electrical Penetrations	B	O-Ring	.226(12/84)	.226	
Personnel Hatch	B	O-Ring	.04(12/84)	.04	
Equipment Hatch	B	O-Ring	0.0(12/84)	0.0	
Emergency Air Lock	B	O-Ring	0.0(12/84)	0.0	

ATTACHMENT 6.1
1985 TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
38 Aerated Drains	C	TV-DA-100A	40.0(5/2/85)	3.411(5/10/85)	019097 Used U2 valve
		TV-DA-100B	46.0(5/2/85)	0.0(5/10/85)	019282 Lap seat,plug
		TV-DA-100A	1.6(8/9/85)	1.6	
		TV-DA-100B	50.0(8/19/85)	2.931(8/19/85)	022737 Replace plug,stem and seat
90 Ventilation	C	MOV-VS-100C			
		MOV-VS-100D			
		MOV-VS-101	4.5(5/10/85)	4.5	
91 Ventilation	C	MOV-VS-100A			
		MOV-VS-100B			
		MOV-VS-102	21.9(5/10/85)	6.5(5/10/85)	Adjusted packing on 100A
Personnel Hatch	B	O-Ring	0.0(5/11/85)	0.0	
			.47(8/17/85)	.47	
Equipment Hatch	B	O-Ring	0.0(5/9/85)	0.0	
Escape Hatch	B	O-Ring	.697(5/9/85)	.697	

ATTACHMENT 6.1
1985 TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
Electrical Penetrations	B	O-Ring			
		7E	.47(11/17/85)	.47	
			.157(12/22/85)	.157	
		2E	0.0(12/20/85)	0.0	
		17E	.08(12/20/85)	.08	
		9B	.013(12/22/85)	.013	
			.007(12/22/85	.007	

ATTACHMENT 6.1
1986 TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
38 Aerated Drains	C	TV-DA-100A	.6(1/27/86)	.6	
		TV-DA-100B	22.2(1/27/86)	3.6(2/2/86)	Lapped seat
90 Ventilation	C	MOV-VS-100C			
		MOV-VS-100D			
		MOV-VS-101	3.06(2/6/86)	3.06	
91 Ventilation	C	MOV-VS-100A			
		MOV-VS-100B			
		MOV-VS-102	5.3(2/6/86)	5.3	
Electrical Penetrations	B	O-Ring			
		1C	.002(1/8/86)	.002	
			.027(2/3/86)	.027	
		9B	.019(2/3/86)	.019	
			.006(3/27/86)	.006	
		7E	.0014(2/3/86)	.0014	
			.0074(3/27/86)	.0074	
		16A	.001(1/7/86)	.001	
		18B	.0008(2/4/86	.0008	
		1A	.001(3/4/86)	.001	
		7A	.008(3/4/86)	.008	
		18D	.009(3/4/86)	.009	

ATTACHMENT 6.1
1986 TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
		2E	.0041(3/4/86)	.0041	
		17E	.1153(3/4/86) 18.0(4/2/86)	.1153 18.0	
Personnel Hatch	B	O-Ring	1.67(2.5.86)	1.67	
Escape Hatch	B	O-Ring	.75(1/29/86)	.75	

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
7 Safety Injection	C	1-SI-150			035263 1867C Pulled actuator
		MOV-1867C			035913 1867C Movats tested
		MOV-1867D	.126(5/17/86)	.281(6/30/86)	037053 1867C Adjusted torque switch
					035251 1867D Pulled actuator
					036915 1867D Movats tested
					037052 1867D Adjusted torque switch
					011701 150 Repacked
15 Charging	C	1-CH-309	0.0(516/86)	0.0	
		MOV-1289A	.124(5/16/86)	.12(6/30/86)	Movats tested
19 Charging	C	MOV-1381	0.0(5/15/86)	0.0(6/26/86)	035252 Pulled actuator
					036924 Adjusted torque switch
20 Safety Injection	C	1-SI-32	0.0(5/13/86)	0.0	
21 Safety Injection	C	MOV-1842	22.99(5/11/86)	.936/30/86)	035343 Pulled actuator
					036835 Movats tested
23 Safety Injection	C	MOV-1869B	0.0(5/12/86)	.189(6/30/86)	035352 Pulled actuator
					036835 Movats tested
24 Residual Heat Removal	C	MOV-RH-100	4.2(5/16/86)	.24(6/7/86)	035693 Lap seat,gate
					036416 Adjusted torque switch
28 CVCS	C	HCV-1200A			
		HCV-1200B			
		HCV-1200C	44.09(6/3/86)	44.09	
		TV-1204	0.0(6/3/86)	0.0	

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
32 Gaseous Waste	C	TV-GW-106	0.0(5/15/86)	0.0	
		TV-GW-107	0.0(5/15/86)	0.0	
33 Gaseous Drains	C	TV-DG-108A	3.73(5/19/86)	.46(6/18/86)	035840 Lap seat,plug
		TV-DG-108B	35.0(5/19/86)	.07(6/18/86)	035841 Lap seat,plug
38 Aerated Drains	C	TV-DA-100A	340.0(5/22/86)	0.0(6/21/86)	New valve D/C 85-19
		TV-DA-100B	35.0(5/22/86)	0.0(6/21/86)	New valve D/C 85-19
42 Service Air	C	1-SA-60	.19(6/24/86)	.19	
		1-SA-62	.076(6/24/86)	.076	
43 Radiation Monitoring	C	1-RM-3	28.4(5/29/86)	0.0(6/23/86)	035941 New valve
		TV-RM-100A	2.32(5/29/86)	.33(6/22/86)	Reteated following RM-3 repair
44 Radiation Monitoring	C	TV-RM-100B	.067(5/21/86)	.067	
		TV-RM-100C	0.0(5/21/86)	0.0	
45 Primary Grade Water	C	1-RC-160	2.42(5/17/86)	3.28(6/16/86)	035791 Lap disc
		TV-1519A	0.0(5/17/86)	0.0(6/16/86)	
46 Charging	C	FCV-1160	4.91(5/14/86)	.112(6/7/86)	035594 Repacked, replaced stem gaskets,plug and cage
47 Instrument Air	C	1-IA-446			
		TV-IA-100	0.0(5/17/86)	0.0	
		1-IA-939	101.0(5/17/86)	0.0(5/27/86)	035795 Lap seat
48 Vent and Drain	C	TV-VG-109A	.187(5/20/86)	.187	
		TV-VG-109B	0.0(5/20/86)	0.0	

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
50 Safety Injection	C	TV-SI-101A	6.4(5/15/86)	.042(5/28/86)	036872 Adjusted limits
					035595 Lap seats,repacked
		TV-SI-101B	.26(5/15/86)	.26	
51 Service Water	C	1-SW-206	.661(5/14/86)	1.1(6.30/86)	037734 Lapped and repacked
		1-SW-208	.514(5/14/86)	1.6(6/30/86)	037738 Clean seat,repacked
53 Safety Injection	C	TV-SI-100	.125(5/14/86)	.125	
		1-SI-234	.612(5/14/86)	.612	
54 Primary Vent	C	1-VA-1	.34(5/21/86)	.34	
		1-VA-6	.31(5/21/86)	.34	
55A Leakage Monitoring	C	TV-LM-100E	0.0(5/12/86)	0.0	
		TV-LM-100F	0.0(5/12/86)	0.0	
56A Sampling System	C	TV-SS-100A	0.0(5/22/86)	0.0(6/15/86)	
		TV-SS-100B	.547(5/22/86)	.42(6/17/86)	016847 New valve
56B Sampling System	C	TV-SS-102A	260(5/22/86)	0.0(6/10/86)	036202 New valve
		TV-SS-102B	5.7(5/22/86)	.023(6/10/86)	036203 New valve
56D Sampling System	C	TV-SS-106A	8.55(5/29/86)	0.0(6/15/86)	036284 New valve
		TV-SS-106B	9.16(5/29/86)	.11(6/15/86)	036285 New valve
57A Leakage Monitoring	C	TV-LM-100G	0.0(5/12/86)	0.0	
		TV-LM-100H	0.0(5/12/86)	0.0	
57B Sample System	C	TV-SS-104A	.012(5/18/86)	.119(6/14/86)	Adjusted limits
		TV-SS-104B	.02(5/18/86)	.02	
57C Sample System	C	TV-SS-101A	180(5/22/86)	0.0(7/1/86)	023210 Replace valve internals
					rebuilt actuator
		TV-SS-101B	.229(5/22/86)	.229	037875 Adjusted limits

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
57D Drain System	C	TV-DA-103A	0.0(5/15/86)	0.0	
		TV-DA-103B	0.0(5/15/86)	0.0	
58 Instrument Air	C	2-IA-446	0.0(5/17/86)	0.0	
		1-IA-938	0.0(5/17/86)	0.0	
60 Safety Injection	C	MOV-1890A	6.0(5/12/86)	.596(6/30/86)	035349 Removed actuator
61 Safety Injection	C	MOV-1890C	9.0(5/12/86)	2.4(7/1/86)	036225 Removed actuator
62 Safety Injection	C	MOV-1890B	1.1(5/12/86)	.745(7/1/86)	035260 Removed actuator
63 Containment Spray	C	1-CS-24	.263(5/26/86)	.263(6/14/86)	
		MOV-CS-101C			035235 Removed actuator(D)
		MOV-CS 101D	1.65(5/26/86)	.71(7/1/86)	035324 Removed actuator(C)
64 Containment Spray	C	1-CS-13	0.0(5/26/86)	0.0	035322 Removed actuator(A)
		MOV-CS-101A			037726 Adjust stop nuts(A)
		MOV-CS-101B	3.37(5/26/86)	3.3(7/1/86)	037820 New seal ring,gaskets clean valve seat(A)
					037819 Renewed inlet/outlet gaskets(A)
					035323 Removed actuator(B)
					014131 Installed new gasket(B)
66,67 Recirc Spray	C	MOV-RS-155A			155A
		MOV-RS-155B	19.3(5/25/86)	1.69(6/27/86)	026322 Movats tested
					035250 Actuator removal
					155B
					024939 Movats tested
					035249 Actuator removal
					036822/037597 Replaced inlet, outlet gaskets
					037727 Tightened BB gasket

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
68,69 Safety Injection	C	MOV-1860A MOV-1860B	11.58(5/25/86)	2.4(6/30/86)	1860A 035320 Removed actuator 036174 Lap seat,disc 1860B 035321 Removed actuator 036175 Repacked valve
70 Recirc. Spray	C	1-RS-11 MOV-RS-156B	.053(5/30/86) 2.09(5/30/86)	.053 .12(6/27/86)	035339 Removed actuator 037596 Adjusted limits
71 Recirc. Spray	C	1-RS-17 MOV-RS-156A	.134(5/29/86) .213(5/29/86)	.134 0.0(6/27/86)	035248 Removed actuator 037595 Adjusted limits
89 Air Ejector Discharge	C	1-VP-12 TV-SV-102A	.2(5/20/86) 1.31(5/20/86)	.2 1.08(5/20/86)	Adjusted packing
90 Ventilation	C	MOV-VS-100C MOV-VS-100D MOV-VS-101	2.1(5/11/86)	1.57(7/1/86)	
91 Ventilation	C	MOV-VS-100A MOV-VS-100B MOV-VS-102	6.2(5/11/86)	4.06(7/1/86)	
92 Containment Vacuum	C	TV-CV-150C	9.0(5/21/86)	.27(6/9/86)	035926 Lap seat,plug,replace seat ring
		TV-CV-150D	.87(5/21/86)	.19(6/9/86)	035927 Replace seat,plug
		TV-GW-104	.66(5/15/86)	.02(5/26/86)	035673 New valve
		TV-GW-105	.66(5/15/86)	0.0(5/15/86)	

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (scfh)	Post-repair Leakage (scfh)	W.O. No./Repair
94 Containment Vacuum	C	HCV-CV-100	.3(5/26/86)	.30	
		1-CV-2	0.0(5/26/86)	0.0	
97B Sample System	C	TV-SS-103A	.076(5/23/86)	.076	
		TV-SS-103B	.071(5/23/86)	.071	
97C Leakage Monitoring	C	TV-LM-100A	0.0(5/12/86)	0.0	
		TV-LM-100B	0.0(5/12/86)	0.0	
100 Gaseous Waste	C	TV-GW-102	0.0(5/16/86)	0.0	
		TV-GW-103	0.0(5/16/86)	0.0	
101 Fire Protection	C	1-FP-151	.11(5/31/86)	.11	
		1-FP-152	0.0(5/31/86)	0.0	
103 Reactor Cavity Liquid	C	1-RL-3	0.0(5/16/86)	0.0	
		1-RL-5	0.0(5/16/86)	0.0	
104 Reactor Cavity Liquid	C	1-RL-13	.503(5/19/86)	.503	
		1-RL-15	.48(5/16/86)	.48	
105C Gaseous Waste	C	TV-GW-111A	0.0(5/16/86)	0.0	
		TV-GW-111B	0.0(5/16/86)	0.0	
106 Safety Injection	C	1-SI-73	.08(5/15/86)	.08	
112 Instrument Air	C	TV-IA-101A	.157(5/20/86)	.157	
		TV-IA-101B	.12(5/20/86)	.12	

ATTACHMENT 6.1
1986 REFUELING TYPE B AND C TESTING

Penetration No.	Type Test	Equipment/valves Tested	Pre-repair Leakage (acfh)	Post-repair Leakage (acfh)	W.O. No./Repair	
113 Safety Injection	C	1-SI-174 MOV-1869A	54.95(5/11/86)	1.37(6/29/86)	018334	Repacked and replaced bonnet gasket(1869A)
Electrical Penetrations	B	O-Ring	.013(6/28/86)	.013		
Personnel Hatch	B	O-Ring	7.78(5/14/86)	2.4(7/9/86)		
Equipment Hatch	B	O-Ring	0.0(5/6/86)	0.0(6/30/86)		
Escape Hatch	B	O-Ring	0.0(5/6/86)	.667(6/30/86)		

ATTACHMENT 6.2
1986 "AS-FOUND" LLRT LEAKAGE SUMMARY

During the 1986 Surry Power Station Unit 1 refueling outage,certain containment isolation valves were repaired and/or replaced following the As-Found Type C tests.

The total leakage savings from these repairs or replacements was added to the Type A test results to determine the "AS-FOUND" condition of the containment. Each penetration was evaluated using the following criteria:

1) The leakage savings was calculated for each penetration that was repaired and/or replaced.

2) Minimum pathway leakage is the lowest leakage of the inside or outside valve grouping for the penetration.

3) If there were no repairs or replacements, a zero leakage savings is assessed to the penetration.

4) If the post-repair minimum leakage is greater than pre-repair minimum pathway leakage, a leakage savings of zero is assigned to the penetration.

5) The leakage savings is the difference between the pre-repair minimum pathway and post-repair minimum pathway leakages.

6) The net leakage savings (wt%/day) is added to the final Type A test results.

ATTACHMENT 6.2(CONT)
1986 "AS-FOUND" LLRT LEAKAGE SUMMARY

PENETRATION NO.	PRE-REPAIR MINIMUM PATHWAY LEAKAGE	POST-REPAIR MINIMUM PATHWAY LEAKAGE	LEAKAGE SAVINGS	REMARKS
7	0.126	0.281	0	NOTE 1
21	22.99	.93	22.06	NOTE 1
23	0	0.189	0	NOTE 1
24	4.20	0.24	3.96	
33	3.73	0.07	3.66	
38	35.0	0.0	35	NOTE 2
43	2.32	0.0	2.32	
46	4.91	0.112	4.798	NOTE 1
50	0.26	0.042	0.218	
51	0.514	1.1	0	
56B	5.7	0.0	5.7	
56D	8.55	0.0	8.55	
57B	0.012	0.119	0	
57C	0.229	0.0	0.229	
60	6.0	0.596	5.404	NOTE 3
61	9.0	2.4	6.6	NOTE 3
62	1.1	0.745	0.355	NOTE 3
66/67	19.302	1.688	17.614	NOTE 4
68/69	11.575	2.402	9.173	NOTE 5
71	0.134	0.0	0.134	NOTE 6

ATTACHMENT 6.2(CONT)
1986 "AS-FOUND" LLRT LEAKAGE SUMMARY

PENETRATION NO.	PRE-REPAIR MINIMUM PATHWAY LEAKAGE	POST-REPAIR MINIMUM PATHWAY LEAKAGE	LEAKAGE SAVINGS	REMARKS
90	2.1	1.57	0.53	
91	6.2	4.06	2.14	
92	1.09	0.19	0.9	
93	1.32	0.0	1.32	
113	54.95	1.37	53.58	NOTE 1

ATTACHMENT 6.2(CONT)
1986 "AS-FOUND" LLRT LEAKAGE SUMMARY

CILRT RESULTS

1.	NET LEAKAGE SAVINGS	64.527 SCFH
2.	NET LEAKAGE SAVINGS	0.021272 WT%/DAY
3.	"AS-FOUND" TYPE A TEST RESULTS	
	A.MASS POINT RESULTS	0.056672 WT%/DAY
	B.NET LEAKAGE SAVINGS	0.021272 WT%/DAY
	C."AS-FOUND" RESULTS	0.077944 WT%/DAY

NOTES:

1) This line is from the charging pump header and is used to supply the loops. The charging pumps are used as the high head safety injection pumps. The CVCS system valves, piping and components have been designed to permit essentially zero leakage. Periodic surveillance is performed to verify that leakage is within specifications. Reference Surry UFSAR Section 6.2.3.10, External Recirculation Loop Leakage.

2) An earlier test of this penetration recorded a leakage of greater than 300 SCFH. A retest was performed following a verification of the test valve lineup and the flowing of water through the line. A minimum pathway leakage of 35 SCFH was recorded during the retest. This retest was performed following the closing of both penetration valves (TV-DA-100A and B) in the normal manner, and without any external adjustments or repairs to the valves. Therefore, 35 SCFH is being listed as the "pre-repair" leakage. The basis for assigning this "pre-repair" leakage is discussed below.

   These valves, and the corresponding valves on Unit 2, have been Type C tested at each cold shutdown since 1983. When high leakage has been found, it has generally occurred during refueling outages, rather than during shorter maintenance outages. This can be attributed to the extensive containment decontamination efforts which are now routinely performed at the start of each refueling outage prior to Type C testing. These efforts have the effect of depositing additional debris in the containment sump, potentially leading to deposition of debris on the valve seat and the resulting failure of the valve to close completely. These valves had been previously tested on 1/27/86 (TV-DA-100A) and 2/2/86 (TV-DA-100B) with leakages of 0.6 and 3.6 SCFH, respectively. Thus it is likely that the high leakage seen at the start of the 1986 refueling outage can be attributed to debris from the decontamination effort, rather than being indication of actual containment condition prior to shutdown. This is further supported by the significant reduction in leakage following a flush of the valves.

   Both valves were replaced during the outage with an improved design that should provide more suitable for this application. This replacement was scheduled as a result of continuing leakage problems with these valves in previous outages. Therefore, suitable corrective action has been taken to address the as-found condition of this penetration.

3) This line is from the low head safety injection pump header and is used to supply the loops. The safety injection system valves, piping and components have been designed to permit essentially zero leakage. Periodic surveillance is performed to verify that leakage is within specification. Reference Surry UFSAR Section 6.2.3.10, External Recirculation Loop Leakage.

NOTES: (CONT)

4) The recirculation spray system is designed to operate after the DBA LOCA to depressurize the containment to subatmospheric pressure. The sump lines are filled with water and would prevent atmospheric out leakage either through operation and/or static head. Periodic Surveillance is performed to verify that leakage is within specifications. Reference Surry UFSAR Section 6.3.1.4.

5) This is the sump suction line to the low head safety injection pump. The sumps lines are filled with water and would prevent atmospheric out leakage either through operation and/or static head. The SI system valves, piping and components have been designed to permit essentially zero leakage. Periodic Surveillance is performed to verify that leakage is within specifications. Reference Surry UFSAR Section 6.2.3.10, External Recirculation Loop Leakage.

6) This line is from the RS pump discharge. The RS system is designed to operate after the DBA LOCA to depressurize the containment to subatmospheric pressure. The RS system valves, piping and components have been designed to permit essentially zero leakage. Periodic surveillance is performed to verify that leakage is within specifications. Reference Surry UFSAR Section 6.3.1.4.