ROBERT E. GINNA

NUCLEAR POWER STATION

# REACTOR CONTAINMENT BUILDING INTEGRATED LEAK RATE TEST

MAY 1982

ROCHESTER GAS AND ELECTRIC CORPORATION

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## 1.0 SYNOPSIS

The R. E. Ginna Nuclear Power Station reactor containment building was subjected to a periodic integrated leak rate test during the period from April 29, 1982 to May 5, 1982. The purpose of this test was to demonstrate the acceptability of the building leakage rate at an internal pressure of 35 psig ($P_t$). Testing was performed in accordance with the requirements of 10 CFR 50, Appendix J, ANSI N45.4 - 1972 and R.E. Ginna Nuclear Power Station Technical Specifications. In addition, the recommendations of ANS 56.8 - 1981 were considered where appropriate for reduced pressure testing.

The measured leakage rate based on the mass point method of analysis was found to be 0.0076%/day with an associated 95% confidence interval of 0.0054%/day. The post test repair leakage and local leakage from valves in service during the ILRT was 0.0067%/day and must be considered in the final results. Thus, the combined leakage rate at the upper bound of the 95% confidence interval is 0.0197 percent by weight per day which is well below the acceptance criterion of 0.1146 percent by weight per day. The supplemental instrumentation verification at $P_t$ demonstrated an agreement between measured reactor containment building integrated leakage rates of 8.7 percent of $L_t$ which is well within the 25 percent requirement of 10 CFR 50, Appendix J, Section III A.3.b.

All testing was performed by Rochester Gas and Electric Corporation with the technical assistance of Gilbert Associates Inc.

## 2.0 INTRODUCTION

The objective of the periodic integrated leak rate test was the verification of the overall leak tightness of the reactor containment building at an internal pressure of 35 psig. The allowable leakage is defined by the design basis accident applied in the safety analysis in accordance with site exposure guidelines specified by 10 CFR 100. For R.E. Ginna Nuclear Power Station, the maximum allowable integrated leak rate at a pressure of 35 psig ($P_t$) is 0.1528 percent by weight per day ($L_t$).

Testing was performed in accordance with the procedural requirements as stated in R.E. Ginna Nuclear Power Station Containment Integrated Leak Rate Test Procedures RSSP-6.0, 6.1, 6.2 and 6.3. These procedures were reviewed by the Plant Operations Review Committee and approved by the Plant Superintendent prior to the commencement of the test.

Leakage rate testing was accomplished at the pressure level of 35 psig for a period of 24 hours, followed by a 6 hour supplemental test for a verification of test instrumentation.

## 3.0 GENERAL AND TECHNICAL DATA

### 3.1 GENERAL DATA

| | |
|---|---|
| Owner: | Rochester Gas and Electric |
| Docket No.: | 50-244 |
| Location: | South shore of Lake Ontario, 16 miles east of Rochester, N.Y. |

| | |
|---|---|
| Containment Description: | Reinforced concrete vertical cylinder with pre-stressed tendons in the vertical wall, a reinforced concrete ring anchored to bedrock and a reinforced hemispherical dome. |

3.2 TECHNICAL DATA

| | |
|---|---|
| Containment Net Free Volume: | $9.7 \times 10^5$ cubic feet |
| Design Pressure: | 60 psig |
| Design Temperature: | 286°F |

4.0 ACCEPTANCE CRITERIA

Acceptance criteria established prior to the test and as specified by Ginna Station Technical Specifications and an exemption to 10 CFR 50, Appendix J, dated March 28, 1978 are as follows:

a. The measured leakage rate ($L_{tm}$) for reduced pressure testing at 35 psig ($P_t$) shall be less than 75 percent of the maximum allowable leakage rate ($L_t$) specified as 0.1528 percent by weight of the building atmosphere per day. The acceptance criteria is determined as follows:

$$L_t = L_a \left( \frac{P_t}{P_a} \right)^{1/2}$$

where

$L_a$ = 0.2%/day

$P_a$ = 60 psig

$P_t$ = 35 psig

Substituting the values for $L_a$, $P_a$, and $P_t$,

$L_t$ = 0.1528% per day

and .75 $L_t$ = 0.1146% per day.

b. The test instrumentation shall be verified by means of a supplemental test. Agreement between the containment leakage measured during the Type A test and the containment leakage measured during the supplemental test shall be within 25 percent of $L_t$.

## 5.0 TEST INSTRUMENTATION

### 5.1 SUMMARY OF INSTRUMENTS

Test instruments employed are described, by system, in the following subsections. An Instrumentation Selection Guide (ISG) formula, as discussed in Section 5.5 was calculated to be $\pm$ 0.010%/day.

5.1.1 Temperature Indicating System

Components:

a. Resistance Temperature Detectors (sensors)

| | |
|---|---|
| Quantity | 24 |
| Manufacturer | Leeds & Northrup |
| Type | 100 ohm, copper |
| Range, $^{o}F$ | -325 to 250 |
| Accuracy, $^{o}F$ | ±0.1 |
| Sensitivity, $^{o}F$ | ±0.1 |

b. Temperature Indicator

| | |
|---|---|
| Quantity | 1 Indicator (24 inputs) |
| Manufacturer | Leeds and Northrup |
| Type | 24 point Speedomax G Strip Chart Recorder |
| Range, $^{o}F$ | 40-130 |
| Accuracy, $^{o}F$ | ±0.3% of full scale |
| Repeatability, $^{o}F$ | ±0.1% of full scale |

5.1.2 Dewpoint Indicating System

Components:

a. Dewcell Elements

| | |
|---|---|
| Quantity | 6 |
| Manufacturer | Foxboro |
| Type | Model 2711A |
| Range, $^{o}F$ | 0-100 |
| Accuracy, $^{o}F$ | ±0.5 |

b. Dewpoint Recorder

| | |
|---|---|
| Quantity | 1 |
| Manufacturer | Foxboro |
| Type | Model 9435 TM |
| Range, $^{o}F$ | 2-142 |
| Accuracy, $^{o}F$ | ±0.35 over range |

5.1.3 Pressure Monitoring System

Precision Pressure Gauges

| | |
|---|---|
| Quantity | 2 |
| Manufacturer | Texas Instruments |
| Type | Model 144 |
| Range, psia | 0-100 |
| Accuracy, psia | ±0.015% of indication |
| Sensor Sensitivity, psia | ±0.001% of full scale |
| Repeatability, psia | ±0.0003% of full scale |

5.1.4 Supplemental Test Flow Monitoring System

Flowmeter

| | |
|---|---|
| Quantity | 2 |
| Manufacturer | Wallace & Tiernan |
| Type | Model 1855 |
| Range, scfm | 0-7 at 110°F |
| Accuracy | ±1% of full scale |

## 5.2 SCHEMATIC ARRANGEMENT

The arrangement of the four measuring systems summarized in Section 5.1 is depicted in Appendix A.

The 24 temperature sensors and 6 dewcells were placed throughout the reactor containment volume to permit monitoring of internal temperature and dewpoint. A temperature survey was performed with the sensors installed which verified no large areas of temperature variation.

Placement of the temperature sensors and dewcells can be grouped into five elevations as follows:

| Elevation | Number of Temperature Sensors | Number of Dewcells |
|---|---|---|
| 243' | 6 | 1 |
| 261' | 6 | 1 |
| 286' | 3 | 2 |
| 301' | 3 | 2 |
| 330' | 6 | |

## 5.3 CALIBRATION CHECKS

Temperature, dewpoint, pressure and flow measuring systems were checked for calibration before the test in accordance with RG&E, procedures as recommended by ANSI N45.4-1972, Section 6.2 and 6.3. Results of the calibration and calibration checks are on file at R.E. Ginna Nuclear Power Station. The supplemental test at 35 psig confirmed the instrumentation acceptability.

## 5.4 INSTRUMENTATION PERFORMANCE

The twenty-four temperature sensors, six dewcells and rotameter performed satisfactorily during the integrated leakage rate test. However, both bourdon capsules in the Texas Instruments precision pressure gauges failed to respond properly during the initial performance of the test. These were eventually replaced with the two spare bourdon capsules which performed well throughout the second phase of the test.

## 5.5 SYSTEMATIC ERROR ANALYSIS

Systematic error, in this test, is induced by the operation of the temperature indicating system, dewpoint indicating system and the pressure indicating system.

Justification of instrumentation selection was accomplished, using manufacturer's sensitivity, accuracy and repeatability tolerances stated in Section 4.1, by computing the instrumentation selection guide (ISG) formula.

Utilizing the methods, techniques and assumptions in Apendix G to ANS 56.8-1981, the ISG formula was computed for the absolute method as follows:

a. Conditions

$L_t = 0.153\%/day$

$P = 50.5$ psia

$T = 54^{\circ}F = 513.69^{\circ}R$ dry bulb

$T_{dp} = 40^{\circ}F$

$t = 24$ hours

b. Total Absolute Pressure: $e_p$

No. of sensors: 2

Range: 0-100 psia

Sensor sensitivity error (E): $\pm$ 0.001% of full scale

Measurement system error ($\varepsilon$): $\pm$ 0.0003% of full scale

$$e_p = \pm \left[(E_p)^2 + (\varepsilon_p)^2\right]^{\frac{1}{2}} \Big/ \left[\text{no. of sensors}\right]^{\frac{1}{2}}$$

$$e_p = \pm \left[(0.001)^2 + (0.0003)^2\right]^{\frac{1}{2}} \Big/ \left[2\right]^{\frac{1}{2}}$$

$$e_p = \pm 0.00074 \text{ psia}$$

c. Water Vapor Pressure: $e_{pv}$

No. of sensors: 6

*Sensor sensitivity error (E): $\pm$ 0.5°F

*Measurement system error ($\varepsilon$) excluding sensor: $\pm$ 0.35°F

*Values given are accuracy; true sensitivity and repeatability values would be lower but are unknown.

At a dewpoint temperature of 40°F, the equivalent water vapor pressure change (as determined from the steam tables) is 0.0048 psia/°F.

$$E_{pv} = \pm 0.5^{\circ}F \cdot (0.0048 \text{ psia}/^{\circ}F)$$

$$E_{pv} = \pm 0.0024 \text{ psia}$$

$$\varepsilon_{pv} = \pm 0.35^{\circ}F \cdot (0.0048 \text{ psia}/^{\circ}F)$$

$$\varepsilon_{pv} = \pm 0.00168 \text{ psia}$$

$$e_{pv} = \pm \left[ (E_{pv})^2 + (\varepsilon_{pv})^2 \right]^{\frac{1}{2}} / \left[ \text{no. of sensors} \right]^{\frac{1}{2}}$$

$$e_{pv} = \pm \left[ (0.0024)^2 + (0.00168)^2 \right]^{\frac{1}{2}} / \left[ 6 \right]^{\frac{1}{2}}$$

$$e_{pv} = \pm 0.00119 \text{ psia}$$

d. Temperature

No. of sensors: 24

Sensor sensitivity error (E): $\pm 0.1^{\circ}F = 0.1^{\circ}R$

Measurement system error ($\varepsilon$), excluding sensor: $\pm$ 0.1% full scale

Range: 40-130°F

$$\varepsilon_T = 0.001 \cdot (130^{\circ}F) = 0.13^{\circ}F$$

$$e_T = \pm \left[ (E_T)^2 + (\varepsilon_T)^2 \right]^{\frac{1}{2}} / \left[ \text{no. of sensors} \right]^{\frac{1}{2}}$$

$$e_T = \pm \left[ (0.1)^2 + (0.13)^2 \right]^{\frac{1}{2}} / \left[ 24 \right]^{\frac{1}{2}}$$

$$e_T = \pm 0.0335^{\circ}R$$

e. Instrumentation Selection Guide (ISG)

$$ISG = \pm \frac{2400}{t} \left[ 2\left(\frac{e_p}{p}\right)^2 + 2\left(\frac{e_{pv}}{p}\right)^2 + 2\left(\frac{e_T}{T}\right)^2 \right]^{\frac{1}{2}}$$

$$ISG = \pm \frac{2400}{24} \left[ 2\left(\frac{0.00074}{50.5}\right)^2 + 2\left(\frac{0.00119}{50.5}\right)^2 + 2\left(\frac{0.0335}{513.69}\right)^2 \right]^{\frac{1}{2}}$$

$$ISG = \pm 100 \left[ 4.295 \times 10^{-10} + 1.110 \times 10^{-9} + 8.506 \times 10^{-9} \right]^{\frac{1}{2}}$$

$$ISG = \pm 0.010\%/day$$

The ISG formula does not exceed 0.25 $L_t$ (0.038%/day) and it is therefore concluded that the instrumentation selected was acceptable for use in determining the reactor containment integrated leakage rate.

## 5.6 SUPPLEMENTAL VERIFICATION

In addition to the calibration checks described in Section 5.2, test instrumentation operation was verified by a supplemental test subsequent to the completion of the 24 hour leakage rate test. This test consisted of imposing a known calibrated leakage rate on the reactor containment building. After the flow rate was established it was not altered for the duration of the test.

During the supplemental test, the measured leakage rate was

$$L_c = L_v' + L_o$$

where,

$L_c$ = measured composite leakage rate consisting of the reactor building leakage rate plus the imposed leakage rate

$L_o$ = imposed leakage rate

$L_v'$ = leakage rate of the reactor building during the supplemental test phase

Rearranging the above equation,

$$L_v' = L_c - L_o$$

The reactor containment building leakage during the supplemental test can be calculated by subtracting the known superimposed leakage rate from the measured composite leakage rate.

The reactor containment building leakage rate during the supplemental test ($L_v'$) was then compared to the measured reactor containment building leakage rate during the preceding 24 hour test ($L_{tm}$) to determine instrumentation acceptability. Instrumentation is considered acceptable if the difference between the two building leakage rates is within 25 percent of the maximum allowable leakage rate ($L_t$).

## 6.0 TEST PROCEDURE

### 6.1 PREREQUISITES

Prior to commencement of reactor containment building pressurization, the following basic prerequisites were satisfied:

a. Proper operation of all test instrumentation was verified.

b. All reactor containment building isolation valves were closed using the normal mode of operation. All associated system valves were placed in post-accident positions.

c. Equipment within the reactor containment building, subject to damage, was protected from external differential pressures.

d. Portions of fluid systems which, under post-accident conditions become extensions of the containment boundary, were drained and vented.

e. The penetration pressurization system was depressurized and isolated with test gauges installed to detect any leakage.

f. Pressure gauges were provided on the following systems to provide a means of detection for leakage into these systems:

1. Purge Supply

2. Purge Exhaust

3. Personnel Access Hatch

4. Equipment Access Hatch

g. Containment recirculation fans were operational.

h. Potential pressure sources were removed or isolated from the containment.

i. A general inspection of the accessible interior and exterior areas of the containment was completed.

## 6.2 GENERAL DISCUSSION

Following the satisfaction of the prerequisites stated in Section 6.1, the reactor containment building pressurization was initiated at a rate of approximately 5.0 psi per hour. Building pressure and temperature were monitored continuously throughout the pressurization stage. Leak rate testing was initiated at the 35.7 psig pressure level. For the duration of the testing period service water flow rate to the containment recirculation fans was adjusted to control containment temperature.

During the test the following occurred at fifteen minute intervals (See Appendix B-Reduced Leakage Data):

a. The numerical values indicated by each of the two precision pressure gauges were recorded and corrected to a true pressure reading via the computer.

b. The twenty-four RTD temperatures were recorded and the average calculated via the computer.

c. The six dewpoint values were recorded. The average of the six values was calculated and converted to vapor pressure using steam tables, via the computer. This permitted correction of the total pressure to the partial pressure of air by subtracting the vapor pressure.

The use of vapor pressure ($P_{wv}$), temperature (T) and the total pressure ($P_T$) is described in more detail in Section 7.1. All original data is on file at R.E. Ginna Nuclear Power Station.

The plot of average temperature and weight of air was maintained for each fifteen minute reading (See Appendix C).

Throughout the test all fifteen minute interval values of $P_{wv}$, T and $P_T$ were transmitted via on-site portable computer terminal to the Rochester Gas and Electric Company home office for analysis. Computer program results, including the least squares fit of the data, were returned to the site via the terminal. A final computer run was made after data for a full 24 hour period was available.

Immediately following the 24 hour leak test, a superimposed leakage rate was established for an additional 6 hour period. During this time, temperature, pressure and vapor pressure were monitored as described above.

## 6.3 TEST PERFORMANCE

### 6.3.1 Pressurization Phase

Pressurization of the reactor building containment was started on April 29, 1982 at 1230. The pressurization rate was approximately 5.0 psi per hour. During pressurization, a buildup of pressure was observed between the purge supply and purge exhaust valves.

When containment internal pressure reached 35.7 at 2019 on April 29, 1982, pressurization was secured. At 0030 on April 30, 1982, the containment stabilization criteria had been met.

### 6.3.2 Integrated Leak Rate Testing Phase

At 0100 on April 30, 1982, fifteen minute frequency test data collection was initiated. Containment internal temperature was controlled throughout the test by throttling the Service Water flow to the containment vessel recirculation fans.

Subsequent to 0100, April 30, 1982, the following sequence of events took place:

a. At 0110, MV'S 6151 and 6165 (Auxilliary Steam supply to the containment) were found to be not fully closed. Both valves were tightened and a snoop check revealed no leakage.

b. At 0315, a lineup discrepancy was noted. Roving test personnel found a reactor support cooling valve, V-2726 closed but not capped and RCDT gas header valve V-1676B capped. At this time a cap was installed on V-2726 and the cap removed from V-1676B. Also a leak was noted on valve V-2831, $N_2$ to accumulators, but no action was taken to secure the leak.

c. At 0630, test personnel entered the duct work to the purge supply and exhaust valves. Excessive leakage was observed at both ends of the actuator pin for the supply valve and the seal area of the exhaust valve.

d. At 0840, the decision was made to adjust the purge supply and exhaust valves for minimum leakage. Following these adjustments the recording of official Integrated Leakage Rate Test data was resumed.

e. At approximately 2200 a leak was found on the B Steam Generator blowdown sample line. It was determined that this line had been disconnected inside containment for work being performed on the Steam Generators prior to the ILRT. This line was eventually capped to prevent any further leakage.

f. From 0900 on April 30, 1982 until 0545 on May 1, 1982, an excessive leakage rate of between 0.168 and 0.187%/day was indicated by the data collected. During this time a search for possible leakage paths was conducted by all test personnel but only minor leaks were discovered.

At 0830 on May 1, 1982 a meeting was held with the plant superintendent and test personnel to discuss a possible solution. Due to the extensive work being performed on the Steam Generators just prior to the leak rate test it was thought that the major source of leakage could be into the Steam Generators. A decision was made to pressurize the Steam Generators to a pressure approximately equal to that of the containment. Subsequent to the meeting, the following sequence of events took place:

a. At 1000 on May 1, 1982 recording of test data was resumed to establish a base line weight of the containment air prior to pressurizing the B Steam Generator.

b. At approximately 1200, pressurization of the B Steam Generator was initiated. Test data taken during and after pressurization indicated no change in the reactor containment leakage rate.

c. At 2030 the A Steam Generator was pressurized to 35 psig. This also showed no decrease in the containment leakage rate.

d. At 0015 on May 2, 1982, a survey of the test data was performed. At this time it was found that the Texas Instrument precision pressure gauges had drifted apart from each other by approximately 0.6 psi. Two leak rate calculations were performed at this time using PI-3A and PI-3B independently rather than averaging the two. A large discrepancy between the two leak rates existed. To prove the validity of one of the Texas Instrument precision pressure gauges the following actions were taken:

1) At 0645 a controlled leakage was established thru rotameter FI-2A to verify which pressure gauge was corresponding correctly to the changes in containment atmospheric conditions.

2) After 4 hours of controlled leakage data had been collected, it was determined that neither pressure instrument was responding properly to the increase in containment leakage.

3) At 1400, both Texas Instruments pressure gauges were disconnected and preparations for changing out the bourdon capsules were made. After the capsules were replaced, several tests were performed to determine the validity of the newly installed capsules.

4) From 1520 til 2140 the reactor containment building was depressurized to approximately 12 psig so an inspection team could enter to inspect the containment and Steam Generators. Nothing unusual was found.

e. At 1130 on May 3, 1982, pressurization of the reactor containment building was initiated. By 1659, the containment internal pressure was 35.6 psig and all air compressors were secured.

f. At 1700, 30 minute frequency test data collection was initiated and by 2100, the containment atmospheric conditions were determined to be stable.

g. Following the sequence of events mentioned above, 15 minute frequency test data collection was initiated and an acceptable leakage rate of 0.0076%/day with an associated 95 percent confidence interval of 0.0054 percent by weight per day was obtained from 2100 on May 3, 1982 to 2100 on May 4, 1982.

6.3.3 Supplemental Leakage Rate Test Phase

After the 24 hour integrated leak rate test data was obtained and evaluated, the leakage rate found to be acceptable and a release permit had been obtained, a known leak rate was imposed at 2100 on May 4, 1982, on the reactor containment building through a calibrated flowmeter for a period of 6 hours. With an imposed leak rate of 0.1170% per day a measured composite leakage rate of 0.1113% per day was obtained. This results in a containment building leakage rate agreement within 8.7% of $L_t$ with the results of the 24 hour test, well within the acceptance limit of 25 percent of $L_t$.

6.3.4 Depressurization Phase

After all required data was obtained and evaluated, the supplemental test results were considered to be acceptable, and permission from the health physics department was obtained, depressurization of the reactor containment building was started. A post test inspection of the building revealed no unusual findings.

6.3.5 Local Testing

Subsequent to the ILRT, maintenance was performed on the purge supply and exhaust valves, resulting in the replacement of the valve seats. Both valves were then tested using local leakage rate methods. The results were a leakage rate of 96 sccm for purge supply valve AOV-5869 and 6409 sccm for purge exhaust valve AOV-5879. The total leakage of 6505 sccm is equivalent to 0.0067%/day, which must be added to the ILRT results. Therefore, the measured leakage rate is 0.0143%/day and the leakage rate at the upper bound of the 95 percent confidence interval is 0.0197%/day.

7.0 METHODS OF ANALYSIS

The absolute method of leakage rate determination was employed during testing at the 35 psig pressure level. The Rochester Gas and Electric Company computer code calculates the percent per day leakage rate using the mass point method of data analysis.

The mass point method of computing leakage rates uses the following ideal gas law equation to calculate the weight of air inside containment for each fifteen minute interval:

$$W = \frac{144\ PV}{RT} = \frac{KP}{T}$$

where,

W = mass of air inside containment, lbm

$$K = 144\ V/R = 2.6182 \times 10^{6}\ \frac{\text{lbm} - {}^{\circ}\text{R} - \text{in.}^2}{\text{lbf}}$$

P = partial pressure of air, psia

T = average internal containment temperature, $^{\circ}$R

$$V = 9.7 \times 10^{5}\ \text{ft}^3$$

The partial pressure of air, P, is calculated as follows:

$$P = P_T - P_{wv}$$

where,

$P_T$ = True corrected pressure by averaging PI-3A and PI-3B, psia

$P_{wv}$ = partial pressure of water vapor determined by averaging the six dewpoint temperatures and converting to vapor pressure with the use of steam tables, psia.

The average internal containment temperature, T, is calculated as follows:

$$T = \frac{\text{sum of 24 RTD's}}{24} + 459.69^{\circ}R$$

The weight of air is plotted versus time for the 24 hour test and for the 6 hour supplemental test. The Rochester Gas and Electric Company computer code fits the locus of these points to a straight line using a linear least squares fit. In addition the computer code also computes the upper bound of the 95% confidence interval.

## 8.0 DISCUSSION OF RESULTS

### 8.1 RESULTS AT $P_t$

The method used in calculating the mass point leakage rate is defined in Section 7.0. The results of this calculation is a mass point leakage rate of 0.0076%/day. The local leakage rate of the purge supply and exhaust valves, as discussed in Section 6.3.5 must be added to the results. In addition, the local leakage rate of the instrumentation valves which were in service during the ILRT must also be considered. The combined leakage rate of valves MV-7448,

7452 and 7456 is 0.000003% per day. The addition of this negligible value does not change the results of the integrated leakage rate test.

The 95 percent confidence interval associated with this leakage rate is 0.0054 percent per day. Thus, the leakage rate at the upper bound of the 95 percent confidence interval becomes

$$L_{tm} = 0.0076 + 0.0067 + 0.0054$$

$$L_{tm} = 0.0197\%/day$$

The measured leakage rate and the measured leakage rate at the upper bound of the 95 percent confidence level are well below the acceptance criteria of 0.1146 percent per day (0.75 $L_t$). Therefore, reactor containment building leakage at 35 psig ($P_t$) is considered acceptable.

## 8.2 SUPPLEMENTAL TEST RESULTS

After conclusion of the 24 hour test at 35 psig, flowmeter FI-2A was placed in service and a flow rate, corrected for pressure and temperature conditions of 2.784 SCFM was established. This flow rate is equivalent to a leakage rate of 0.117 percent per day. After the flow was established, it was not altered for the duration of the supplemental test.

The measured leakage rate ($L_c$) during the supplemental test was calculated to be 0.1113 percent per day using the mass point method of analysis. The 95 percent confidence interval associated with this leakage rate is 0.0218 percent per day.

The building leakage rate during the supplemental test is then determined as follows:

$$L_v' = L_c - L_o$$

$$L_v' = 0.1113\%/day - 0.117\%/day$$

$$L_v' = -0.0057\%/day$$

Comparing this leakage rate with the building leakage rate during the 24 hour test yields the following:

$$\left| \frac{L_{tm} - L_v'}{L_t} \right| = \left| \frac{(0.0076) - (-0.0057)}{0.153} \right| = 0.0869$$

The building leakage rates agree within 8.7 percent of $L_t$ which is below the acceptance criteria of 25 percent of $L_t$.

Using the formulation of ANS 56.8 - 1981,

$$(L_o + L_{tm} - 0.25\ L_t) \leq L_c \leq (L_o + L_{tm} + 0.25\ L_t)$$

$$(0.117 + 0.0076 - 0.0383) \leq L_c \leq (0.117 + 0.0076 + 0.0383)$$

$$0.0863 \leq L_c \leq 0.1629$$

Since $L_c$ was measured to be 0.1113 percent per day, this value falls within the acceptable range 0.0863 to 0.1629 percent per day. Therefore, the acceptability of the test instrumentation is considered to have been verified.

8.3 SCHEDULE FOR RETESTING

The thorough examination of the containment penetration boundaries revealed no structural deterioration or abnormalities other than the leaking purge supply and exhaust dampers. All remaining portions of the containment were found to be in good repair. After the identified leaks were repaired and problems with the Texas Instrument pressure gauges were corrected, the containment leakage rate was well within the allowable value. Both of the penetrations which exhibited excessive leakage are periodically retested.

Therefore, the next periodic Type A retest is proposed to be performed in approximately four years.

## 9.0 TYPE B AND C LEAKAGE RATE HISTORIES

9.1 DISCUSSION OF LEAKAGE HISTORY

For the years 1979, 1980, 1981 and 1982 all Class "B" and "C" testing was performed during the reactor shutdowns for refueling. The shutdown for 1979 was from February 9 to April 3, the 1980 shutdown was from March 28 to May 23 and the 1981 shutdown was from April 17 to June 20. The shutdown for 1982 was from January 25 to May 26 because of a steam generator tube rupture.

All local Type B and C tests were performed at 60 psig. The acceptance criteria for the test periods of 1979, 1980, 1981, per plant technical specifications 4.4.2.2 was that total leakage from all penetrations and isolation valves not exceed 0.60 La. (Equivalent to 22,930 cc/min.).

The 1982 leakage tests were performed with a leak rate monitor instead of rotameters as in previous tests. The criteria of technical specification 4.4.2.2 was adhered to.

Tabulation of the leakage rate results during the 1979, 1980, and 1981 teting periods indicates that the acceptance criterion was not exceeded. The following is a summary of the total leakage tabulated during the reporting period of 1979, 1980, and 1981:

1979

| | HIGHEST KNOWN LEAKAGE DURING TEST YEAR | KNOWN LEAKAGE AS OF YEAR END |
|---|---|---|
| CLASS B | 348.43 | 298.79 |
| CLASS C | 4267.89 | 1276.42 |
| TOTAL | 4616.32 | 1575.21 |

1980

| | HIGHEST KNOWN LEAKAGE DURING TEST YEAR | KNOWN LEAKAGE AS OF YEAR END |
|---|---|---|
| CLASS B | 899.242 | 790.94 |
| CLASS C | 3725.80 | 1752.75 |
| TOTAL | 4625.042 | 2543.69 |

1981

| | HIGHEST KNOWN LEAKAGE DURING TEST YEAR | KNOWN LEAKAGE AS OF YEAR END |
|---|---|---|
| CLASS B | 1071.9085 | 910.8859 |
| CLASS C | 3756.881 | 1016.424 |
| TOTAL | 4828.7895 | 1927.3099 |

Tabulation of the leakage rate results during the 1982 testing period indicates that the acceptance criterion was exceeded prior to repairs. The following is a summary of the total leakage tabulated during the test period.

1982

| | HIGHEST KNOWN LEAKAGE DURING TEST YEAR | KNOWN LEAKAGE AS END OF ILRT |
|---|---|---|
| CLASS B | 3155.234 | 3155.234 |
| CLASS C | 307809.15 | 5946.71 |
| TOTAL | 310964.384 | 9101.944 |

The excessive leakage during this test period was attributed to check valve 1599, purge exhaust valve 5878 and purge supply valve 5870. A new check valve (1599) was installed prior to the test and the seats replaced on the purge supply and exhaust valves, after the ILRT. A Licensee Event Report (LER 82-11) was submitted regarding check valve 1599. Check valve 1599 was subsequently replaced in November 1982 with an AOV to give greater assurance of proper valve operability.

Penetration and manifold leakage histories since the Integrated Leak Rate Test in 1978 are given in Appendix E. A description of the isolation valves for each test with the corresponding penetration number is contained in Appendix F.

## 10.0 REFERENCES


1) RSSP - 6.0, 6.1, 6.2 and 6.3, "Containment Integrated Leakage Rate Test Procedure"

2) Code of Federal Regulations, Title 10, Part 50, Appendix J, (1-1-82).

3) ANSI N45.4 - 1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors," American Nuclear Society, (March 16, 1972).

4) Steam Tables, American Society of Mechanical Engineers, (1967).

5) Rochester Gas and Electric Corporation Computer Code.

6) ANS 56.8 - 1981, N274, "Containment System Leakage Testing Requirements," American Nuclear Society, (February 19, 1981).

7) "Rochester Gas and Electric Corporation" Reactor Containment Building Integrated Leak Rate Test, R.E. Ginna Nuclear Power Plant, (March 1978).

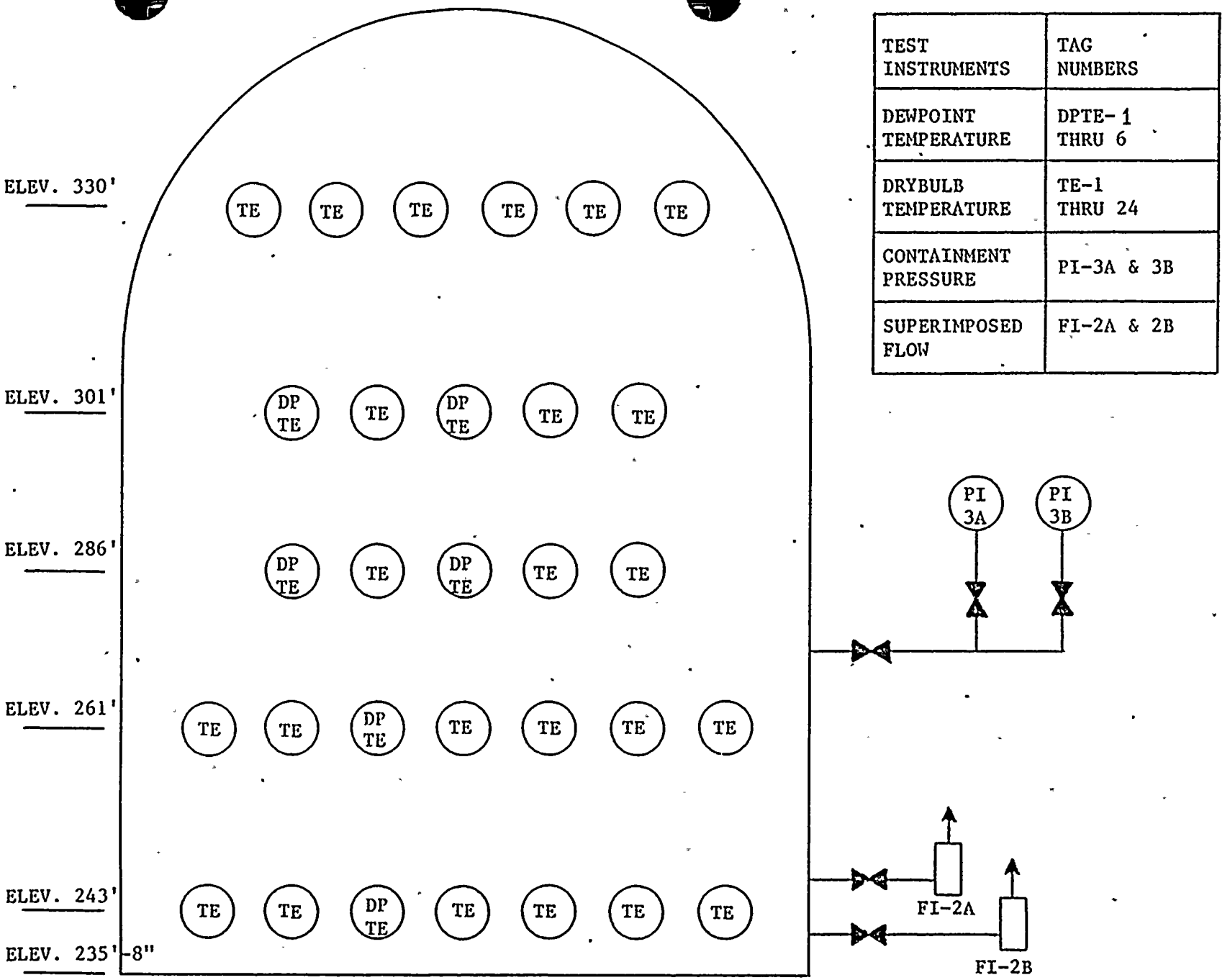
# APPENDICES

# APPENDIX A

# SCHEMATIC ARRANGEMENT OF TEST INSTRUMENTATION

# APPENDIX A
## SCHEMATIC ARRANGEMENT OF TEST INSTRUMENTATION

| TEST INSTRUMENTS | TAG NUMBERS |
|---|---|
| DEWPOINT TEMPERATURE | DPTE-1 THRU 6 |
| DRYBULB TEMPERATURE | TE-1 THRU 24 |
| CONTAINMENT PRESSURE | PI-3A & 3B |
| SUPERIMPOSED FLOW | FI-2A & 2B |



# APPENDIX B

# REDUCED TEST DATA

REDUCED TEST DATA

| | Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|---|
| 5/3/82 | 2100 | 50.430 | 514.50 | 256,630 |
| | 2115 | 50.425 | 514.44 | 256,635 |
| | 2130 | 50.420 | 514.43 | 256,617 |
| | 2145 | 50.422 | 514.45 | 256,615 |
| | 2200 | 50.423 | 514.43 | 256,631 |
| | 2215 | 50.419 | 514.41 | 256,616 |
| | 2230 | 50.418 | 514.37 | 256,635 |
| | 2245 | 50.422 | 514.42 | 256,628 |
| | 2300 | 50.424 | 514.43 | 256,630 |
| | 2315 | 50.425 | 514.46 | 256,622 |
| | 2330 | 50.427 | 514.45 | 256,635 |
| | 2345 | 50.421 | 514.45 | 256,609 |
| 5/4/82 | 2400 | 50.426 | 514.45 | 256,632 |
| | 0015 | 50.425 | 514.47 | 256,618 |
| | 0030 | 50.426 | 514.50 | 256,610 |
| | 0045 | 50.426 | 514.51 | 256,604 |
| | 0100 | 50.417 | 514.42 | 256,603 |
| | 0115 | 50.414 | 514.39 | 256,602 |
| | 0130 | 50.417 | 514.37 | 256,628 |
| | 0145 | 50.420 | 514.42 | 256,618 |
| | 0200 | 50.419 | 514.43 | 256,605 |

REDUCED TEST DATA

| Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|
| 0215 | 50.422 | 514.43 | 256,627 |
| 0230 | 50.422 | 514.44 | 256,620 |
| 0245 | 50.422 | 514.46 | 256,607 |
| 0300 | 50.419 | 514.42 | 256,617 |
| 0315 | 50.416 | 514.41 | 256,605 |
| 0330 | 50.417 | 514.41 | 256,607 |
| 0345 | 50.415 | 514.41 | 256,598 |
| 0400 | 50.415 | 514.40 | 256,602 |
| 0415 | 50.415 | 514.37 | 256,615 |
| 0430 | 50.414 | 514.37 | 256,612 |
| 0445 | 50.413 | 514.35 | 256,616 |
| 0500 | 50.413 | 514.34 | 256,620 |
| 0515 | 50.412 | 514.38 | 256,602 |
| 0530 | 50.415 | 514.39 | 256,610 |
| 0545 | 50.416 | 514.41 | 256,605 |
| 0600 | 50.416 | 514.42 | 256,600 |
| 0615 | 50.413 | 514.38 | 256,601 |
| 0630 | 50.405 | 514.33 | 256,583 |
| 0645 | 50.407 | 514.30 | 256,614 |
| 0700 | 50.410 | 514.35 | 256,604 |
| 0715 | 50.416 | 514.38 | 256,620 |
| 0730 | 50.410 | 514.38 | 256,588 |
| 0745 | 50.412 | 514.34 | 256,617 |
| 0800 | 50.415 | 514.37 | 256,619 |

REDUCED TEST DATA

| Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|
| 0815 | 50.413 | 514.36 | 256,616 |
| 0830 | 50.417 | 514.40 | 256,615 |
| 0845 | 50.417 | 514.37 | 256,628 |
| 0900 | 50.418 | 514.38 | 256,631 |
| 0915 | 50.427 | 514.49 | 256,620 |
| 0930 | 50.433 | 514.52 | 256,636 |
| 0945 | 50.438 | 514.60 | 256,624 |
| 1000 | 50.442 | 514.65 | 256,615 |
| 1015 | 50.445 | 514.65 | 256,627 |
| 1030 | 50.437 | 514.65 | 256,589 |
| 1045 | 50.425 | 514.51 | 256,598 |
| 1100 | 50.427 | 514.45 | 256,643 |
| 1115 | 50.426 | 514.47 | 256,626 |
| 1130 | 50.426 | 514.49 | 256,612 |
| 1145 | 50.422 | 514.46 | 256,611 |
| 1200 | 50.427 | 514.51 | 256,605 |
| 1215 | 50.437 | 514.63 | 256,603 |
| 1230 | 50.449 | 514.69 | 256,631 |
| 1245 | 50.450 | 514.71 | 256,628 |
| 1300 | 50.458 | 514.77 | 256,637 |
| 1315 | 50.467 | 514.88 | 256,624 |
| 1330 | 50.467 | 514.88 | 256,627 |
| 1345 | 50.470 | 514.89 | 256,640 |

REDUCED TEST DATA

| Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|
| 1400 | 50.465 | 514.91 | 256,603 |
| 1415 | 50.463 | 514.86 | 256,618 |
| 1430 | 50.453 | 514.82 | 256,583 |
| 1445 | 50.440 | 514.70 | 256,577 |
| 1500 | 50.427 | 514.64 | 256,540 |
| 1515 | 50.416 | 514.42 | 256,597 |
| 1530 | 50.410 | 514.42 | 256,569 |
| 1545 | 50.399 | 514.30 | 256,570 |
| 1600 | 50.395 | 514.23 | 256,584 |
| 1615 | 50.393 | 514.12 | 256,631 |
| 1630 | 50.418 | 514.32 | 256,655 |
| 1645 | 50.435 | 514.55 | 256,632 |
| 1700 | 50.410 | 514.48 | 256,540 |
| 1715 | 50.401 | 514.27 | 256,597 |
| 1730 | 50.401 | 514.21 | 256,625 |
| 1745 | 50.404 | 514.24 | 256,628 |
| 1800 | 50.406 | 514.25 | 256,632 |
| 1815 | 50.410 | 514.27 | 256,640 |
| 1830 | 50.411 | 514.32 | 256,623 |
| 1845 | 50.409 | 514.35 | 256,598 |
| 1900 | 50.410 | 514.30 | 256,628 |
| 1915 | 50.413 | 514.35 | 256,618 |
| 1930 | 50.415 | 514.37 | 256,621 |

REDUCED TEST DATA

| | Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|---|
| | 1945 | 50.417 | 514.48 | 256,575 |
| | 2000 | 50.420 | 514.52 | 256,571 |
| | 2015 | 50.416 | 514.45 | 256,583 |
| | 2030 | 50.415 | 514.45 | 256,575 |
| | 2045 | 50.414 | 514.43 | 256,579 |
| | 2100 | 50.417 | 514.44 | 256,595 |
| | | SUPERIMPOSED TEST | | |
| | 2115 | 50.420 | 514.48 | 256,584 |
| | 2130 | 50.417 | 514.51 | 256,561 |
| | 2145 | 50.413 | 514.45 | 256,566 |
| | 2200 | 50.411 | 514.43 | 256,568 |
| | 2215 | 50.416 | 514.46 | 256,578 |
| | 2230 | 50.416 | 514.50 | 256,560 |
| | 2245 | 50.418 | 514.55 | 256,547 |
| | 2300 | 50.421 | 514.55 | 256,561 |
| | 2315 | 50.417 | 514.51 | 256,557 |
| | 2330 | 50.414 | 514.52 | 256,541 |
| | 2345 | 50.431 | 514.64 | 256,568 |
| 5/5/82 | 2400 | 50.424 | 514.61 | 256,547 |
| | 0015 | 50.407 | 514.46 | 256,529 |
| | 0030 | 50.400 | 514.42 | 256,516 |
| | 0045 | 50.400 | 514.37 | 256,542 |

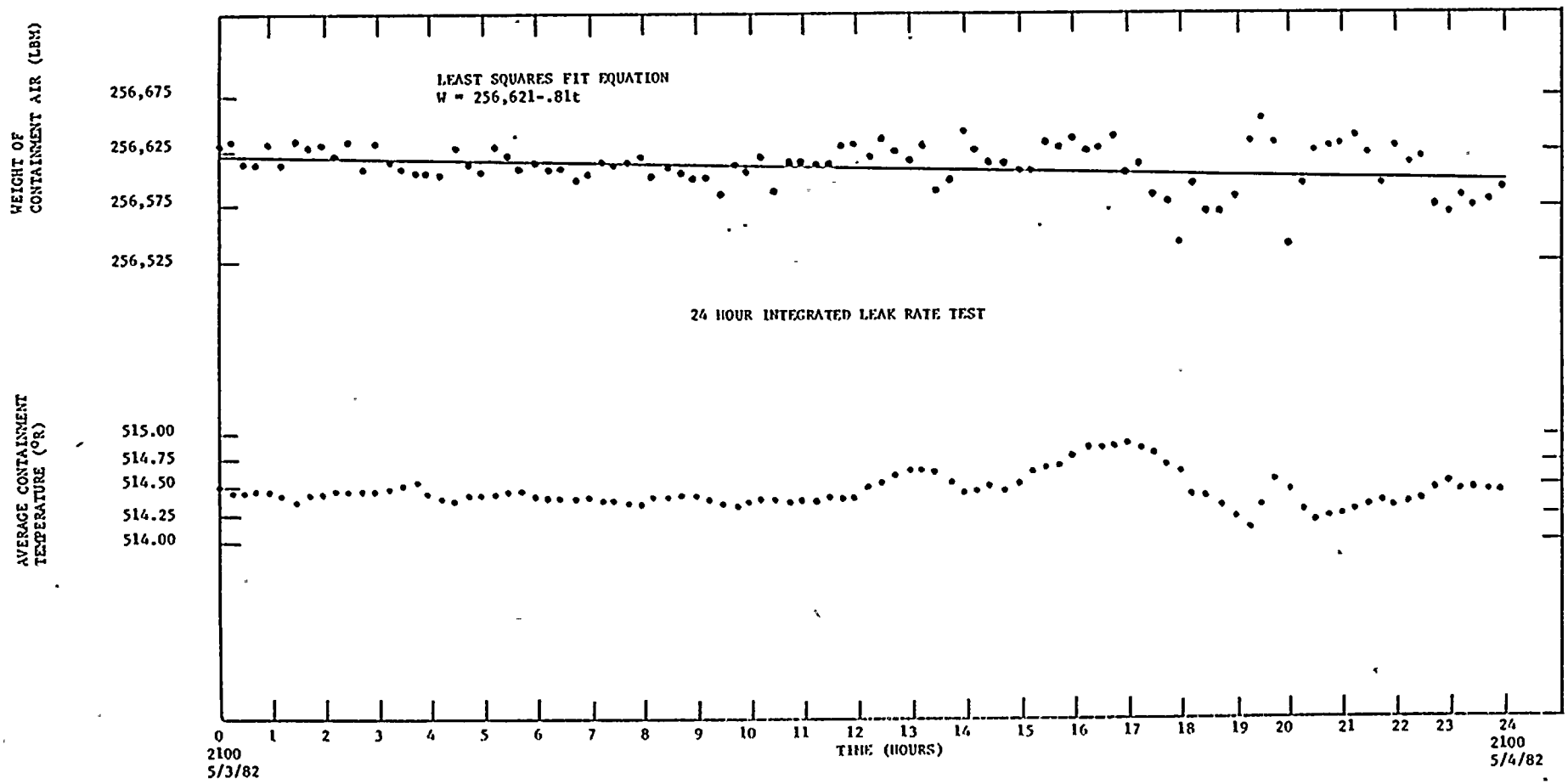
REDUCED TEST DATA

| Time | Partial Pressure of Containment Air (psia) | Average Containment Temperature (°R) | Weight of Containment Air (lbm) |
|---|---|---|---|
| 0100 | 50.416 | 514.54 | 256,538 |
| 0115 | 50.419 | 514.56 | 256,541 |
| 0130 | 50.419 | 514.60 | 256,524 |
| 0145 | 50.419 | 514.58 | 256,532 |
| 0200 | 50.417 | 514.57 | 256,526 |
| 0215 | 50.414 | 514.57 | 256,513 |
| 0230 | 50.412 | 514.55 | 256,514 |
| 0245 | 50.409 | 514.54 | 256,504 |
| 0300 | 50.409 | 514.52 | 256,515 |
| 0315 | 50.406 | 514.52 | 256,496 |

# APPENDIX C

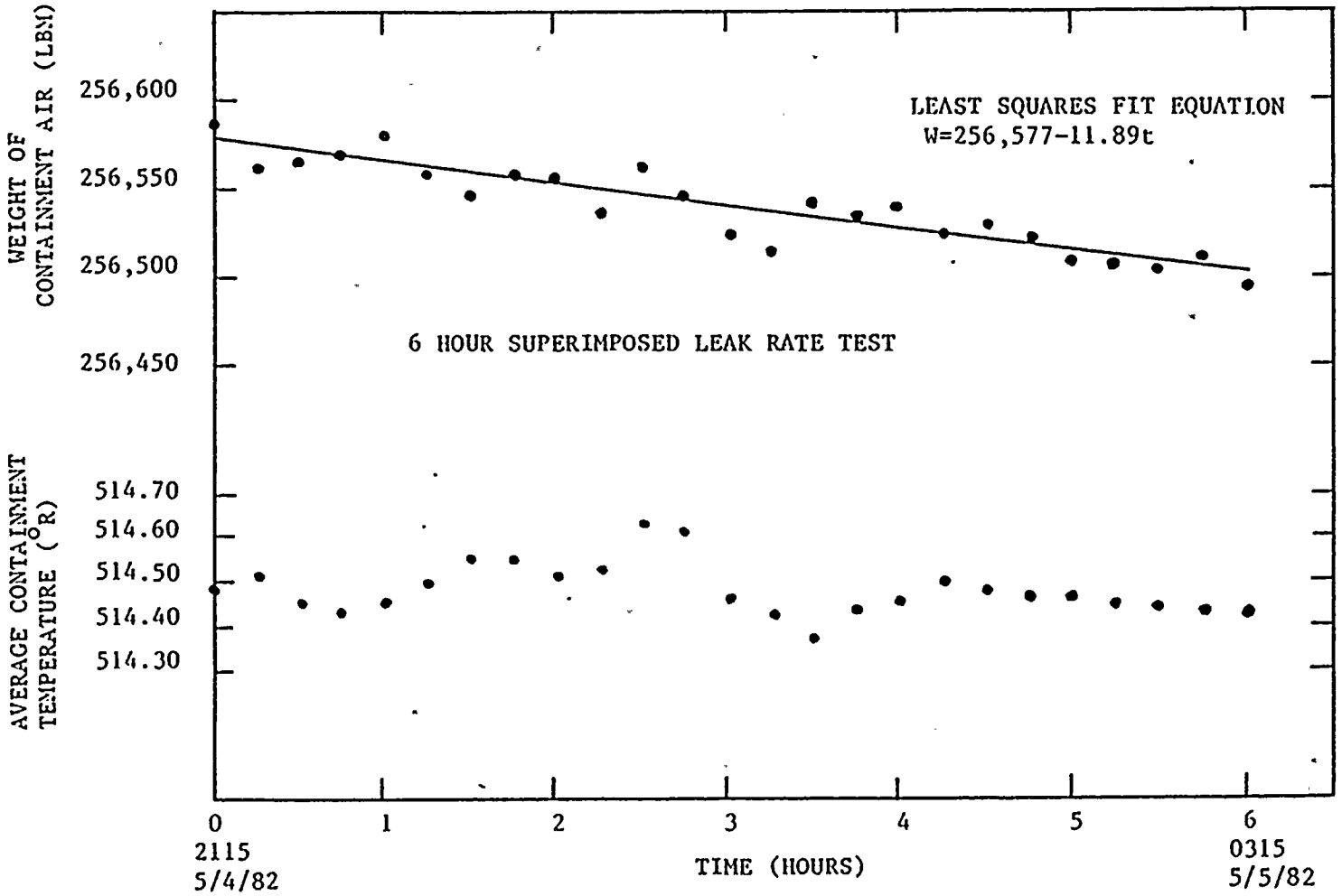
# WEIGHT OF CONTAINMENT AIR AND AVERAGE CONTAINMENT TEMPERATURE VERSUS TIME

APPENDIX C
WEIGHT OF CONTAINMENT AIR AND
AVERAGE CONTAINMENT TEMPERATURE VERSUS TIME



APPENDIX C

WEIGHT OF CONTAINMENT AIR AND
AVERAGE CONTAINMENT TEMPERATURE VERSUS TIME



# APPENDIX D

# COMPUTER PRINTOUT

APPENDIX D

COMPUTER PRINTOUT

R.E. GINNA ILRT TEST 2100 5/3/82 THRU 2100 5/4/82 LEAST SQUARES RESULTS BASED ON 97 DATA POINTS

THE LEAST SQUARES SLOPE OF THE WEIGHT LINE IS -.8118 LBS. PER HOUR.

THE INTERCEPT OF THE LINEAR LEAST SQUARES FIT OF THE WEIGHTS IS 256,621 LBS.

THE LINEAR LEAST SQUARES WEIGHT 24 HOURS INTO THE TEST IS 256,602 LBS.

LEAST SQUARES SLOPE OF WEIGHT LINE: -.0076%/DAY.

THE 95.0 CONFIDENCE BARS IS .0054% PER DAY.

THE 95.0 CONFIDENCE BAR IS .5821 LBS PER HR.

WITH 95.0 CONFIDENCE, THE MASS CHANGE RATE IS BETWEEN -.0130 AND -.0021% PER DAY

WITH 95.0 CONFIDENCE, THE MASS CHANGE RATE IS BETWEEN -1.3939 AND -.2297 LBS. PER HOUR.

R.E. GINNA SUPERIMPOSED ILRT 2115 5/4/82 THRU 0315 5/5/82 LEAST SQUARES RESULTS BASED ON 25 DATA POINTS.

THE LEAST SQUARES SLOPE OF THE WEIGHT LINE IS -11.8939 LBS. PER HOUR.

THE INTERCEPT OF THE LINEAR LEAST SQUARES FIT OF THE WEIGHTS IS 256,577 LBS.

THE LINEAR LEAST SQUARES WEIGHT 6 HOURS INTO THE TEST IS 256,505 LBS.

LEAST SQUARES SLOPE OF WEIGHT LINE -.1113%/DAY.

THE 95.0 CONFIDENCE BAR IS .0218% PER DAY.

APPENDIX D (Cont'd)

COMPUTER PRINTOUT

THE 95.0 CONFIDENCE BAR IS 2.3353 LBS. PER HOUR

WITH 95.0 CONFIDENCE, THE MASS CHANGE RATE IS BETWEEN -.1331 AND -.0894% PER DAY

WITH 95.0 CONFIDENCE, THE MASS CHANGE RATE IS BETWEEN -14.2292 AND -9.5586 LBS. PER HOUR.

# APPENDIX E

# ISOLATION VALVE LEAKAGE RATE

ISOLATION VALVE LEAKAGE RATE (cc/min. at 60 psig)

TEST PERIOD: 1979 OUTAGE

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 1 | 539 | 2.03 | 2.03 | | | |
| 2 | 528 | 1.09 | 1.09 | | | |
| 3 | 529 | 1.09 | 1.09 | 508 | 0 | 0 |
| 7 | 371 | 1.09 | 1.09 | | | |
| 8 | 370B | 1.09 | 1.09 | | | |
| 9A | 304A | Not Determined | 145 | | | |
| 9B | 304B | 26.57 | 26.57 | | | |
| 10 | 383B | 1.09 | 1.09 | | | |
| 11 | 313 | 0 | 0 | | | |
| 12A | 966A | 2.01 | 2.01 | | | |
| 12B | 966B | 2.01 | 2.01 | | | |
| 12C | 966C | 2.01 | 2.01 | | | |
| 13A | 5735 | 2.01 | 2.01 | | | |
| 13B | 5736 | 0 | 0 | | | |
| 14 | 1599 | 1.08 | 1.08 | 1598 | 1.09 | 1.09 |
| 15 | 1597 | 1.08 | 1.08 | | | |
| 16A | 5738 | 0 | 0 | | | |
| 16B | 5737 | 0 | 0 | | | |
| 17A | PT-945 | 1.09 | 1.09 | | | |
| | PT-946 | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 17B | PT-947 | 1.1 | 1.1 | | | |
| | PT-948 | | | | | |
| 17C | PT-944 | 1.09 | 1.09 | | | |
| | PT-949 | | | | | |
| | PT-950 | | | | | |
| 18A | 864A | 2.01 | 2.01 | | | |
| | 862A | | | | | |
| 18B | 862B | 2.01 | 2.01 | | | |
| 19 | 889A | 2.02 | 2.02 | | | |
| | 889B | 2.02 | 2.02 | | | |
| | 870A | 0 | 0 | | | |
| | 870B | 0 | 0 | | | |
| | 879 | 0 | 0 | | | |
| 20 | 1787 | 2.03 | 2.03 | 1786 | 2.03 | 2.03 |
| | 1713 | 2.03 | 2.03 | | | |
| 21 | 1789 | 2.03 | 2.03 | | | |
| 22 | 1721 | 1.09 | 1.09 | 1003A | 0.54 | 0.54 |
| | | | | 1003B | 0.54 | 0.54 |
| 23 | 1728 | 1.09 | 1.09 | 1723 | 1.09 | 1.09 |
| 24 | 813 | 0 | 0 | | | |
| | 814 | 1.09 | 1.09 | | | |
| 26 | 750A | 1.09 | 1.09 | | | |
| 27 | 750B | 1.09 | 1.09 | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 28 | 759A | 1.09 | 1.09 | | | |
| 29 | 759B | 1.09 | 1.09 | | | |
| 30 | 743 | 1.09 | 1.09 | | | |
| | 745 | 1.09 | 1.09 | | | |
| 32 | 5393 | 1.08 | 1.08 | 5392 | 1.08 | 1.08 |
| 33 | 7226 | 1.08 | 1.08 | | | |
| 34 | 7970 | 1.0 | 1.0 | 7971 | 1.0 | 1.0 |
| 35 | 5870 | 399.25 | 399.25 | 5869 | 0 | 0 |
| 36 | 5878 | 226.8 | 226.8 | 5879 | 0 | 0 |
| 37 | | | | 4757 | 0 | 0 |
| | | | | 4758 | 3.94 | 3.94 |
| 38 | | | | 4635 | 0 | 0 |
| | | | | 4636 | 0 | 0 |
| 39 | 8419 | 19.1 | 19.1 | 8418 | 0 | 0 |
| 40 | 6151 | 0 | 1.08 | | | |
| | 6175 | 130 | 1.08 | | | |
| 42 | B.F. | 0 | 0 | 7444 | 2.25 | 2.25 |
| 43 | B.F. | 0 | 0 | 7443 | 2.38 | 2.38 |
| 44 | B.F. | 0 | 0 | 7445 | 2.38 | 2.38 |
| 45A | 3 Separate | 0 | 0 | | | |
| | Lines with | 0 | 0 | | | |
| | Tubing Cap | 0 | 0 | | | |
| | on each | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 46 | 846 | 1.09 | 1.09 | | | |
| 48 | Tubing Cap | 0 | 0 | 549A | 193.5 | 2.38 |
| 49 | Pipe Cap | 2.01 | 2.01 | | | |
| 50A | 1554 | 1.09 | 1.09 | | | |
| | 1557 | 1.09 | 1.09 | | | |
| | 1560 | 1.09 | 1.09 | | | |
| 50B | 1563 | 1.08 | 1.08 | | | |
| | 1566 | 1.01 | 1.01 | | | |
| 50C | 1569 | 1.09 | 1.09 | | | |
| | 1572 | 1.09 | 1.09 | | | |
| 51A | 1076A | 1.08 | 1.08 | IV-3A | 9.35 | 9.35 |
| | 1084A | 1.1 | 1.1 | IV-5A | 1.08 | 1.08 |
| 51B | 1076B | 1.1 | 1.1 | IV-3B | 1.1 | 1.1 |
| | 1084B | 1.1 | 1.1 | IV-5B | 1.1 | 1.1 |
| 51C | 1080A | 0 | 0 | IV-2A | 1.0 | 1.0 |
| | | | | IV-2B | 1.0 | 1.0 |

Pressure decay tests performed in 1979 subsequent to the value listed for Test No. 35 on the containment purge supply dampers are as follows:

| | |
|---|---|
| 3-24-79 | 231.1 cc/min. |
| 5-15-79 | 128.42 cc/min. |
| 8-1-79 | 129.33 cc/min. |
| 11-15-79 | 19.26 cc/min. |
| 12-14-79 | 474.14 cc/min. |
| 12-18-79 | 32.14 cc/min. |

Pressure decay tests performed in 1979 subsequent to the value listed for Test No. 36 on the Containment purge exhaust dampers are as follows:

| | |
|---|---|
| 3-24-79 | 227.51 cc/min. |
| 5-15-79 | 163.8 cc/min. |
| 8-1-79 | 163.96 cc/min. |
| 11-15-79 | -56.17 cc/min. |
| 12-14-79 | 1336.16 cc/min. |
| 12-18-79 | 326.97 cc/min. |

ISOLATION VALVE LEAKAGE RATE (cc/min. at 60 psig)

TEST PERIOD: 1980 OUTAGE

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 1 | 539 | 0.4 | 0.4 | | | |
| 2 | 528 | 1.45 | 1.45 | | | |
| 3 | 529 | 1.45 | 1.45 | 508 | 0.4 | 0.4 |
| 7 | 371 | 1.46 | 1.46 | | | |
| 8 | 370B | 1.45 | 1.45 | | | |
| 9A | 304A | 1.45 | 1.45 | | | |
| 9B | 304B | 1.45 | 1.45 | | | |
| 10 | 383B | 1.45 | 1.45 | | | |
| 11 | 313 | 1.45 | 1.45 | | | |
| 12A | 966A | 0.4 | 0.4 | | | |
| 12B | 966B | 0.4 | 0.4 | | | |
| 12C | 966C | 1.45 | 1.45 | | | |
| 13A | 5735 | 0.4 | 0.4 | | | |
| 13B | 5736 | 0.4 | 0.4 | | | |
| 14 | 1599 | 1.45 | 1.45 | 1598 | 1.45 | 1.45 |
| 15 | 1597 | 1.45 | 1.45 | | | |
| 16A | 5738 | 139.38 | 139.38 | | | |
| 16B | 5737 | 1294.26 | 0 | | | |
| 17A | PT-945 | 1.45 | 1.45 | | | |
| | PT-946 | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 17B | PT-947 | 1.45 | 1.45 | | | |
| | PT-948 | | | | | |
| 17C | PT-944 | 1.45 | 1.45 | | | |
| | PT-949 | | | | | |
| | PT-950 | | | | | |
| 18A | 864A | 0.39 | 0.39 | | | |
| | 862A | | | | | |
| 18B | 862B | 0.39 | 0.39 | | | |
| 19 | 889A | 0.39 | 0.39 | | | |
| | 889B | 0.39 | 0.39 | | | |
| | 870A | 0.39 | 0.39 | | | |
| | 870B | 0.39 | 0.39 | | | |
| | 879 | 0 | 0 | | | |
| 20 | 1787 | 0.39 | 0.39 | 1786 | 0.39 | 0.39 |
| | 1713 | 0.39 | 0.39 | | | |
| 21 | 1789 | 0.4 | 0.4 | | | |
| 22 | 1721 | 1.45 | 1.45 | 1003A | 0.725 | 0.725 |
| | | | | 1003B | 0.725 | 0.725 |
| 23 | 1728 | 1.45 | 1.45 | 1723 | 1.45 | 1.45 |
| 24 | 813 | 1.46 | 1.46 | | | |
| | 814 | 1.46 | 1.46 | | | |
| 26 | 750A | 1.45 | 1.46 | | | |

| TEST NO. | PRIMARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | SECONDARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
|---|---|---|---|---|---|---|
| 27 | 750B | 1.45 | 1.45 | | | |
| 28 | 759A | 1.45 | 1.45 | | | |
| 29 | 759B | 1.45 | 1.45 | | | |
| 30 | 743 | 1.45 | 1.45 | | | |
| | 745 | 1.45 | 1.45 | | | |
| 32 | 5393 | 2.24 | 2.24 | 5392 | 54.23 | 54.23 |
| 33 | 7226 | 2.24 | 2.24 | | | |
| 34 | 7970 | 0.2 | 0.2 | 7971 | 0.2 | 0.2 |
| 35 | 5870 | 47.3 | 47.3 | 5869 | 0 | 0 |
| 36 | 5878 | 241.1 | 241.1 | 5879 | 0 | 0 |
| 37 | | | | 4757 | 7.94 | 7.94 |
| | | | | 4758 | 0 | 0 |
| 38 | | | | 4635 | 0.41 | 0.41 |
| | | | | 4636 | 0 | 0 |
| 39 | 8419 | 2.24 | 2.24 | 8418 | 2.24 | 2.24 |
| 40 | 6151 | 1.45 | 1.45 | | | |
| | 6175 | 1.45 | 1.45 | | | |
| 42 | B.F. | 0 | 0 | 7444 | 2.25 | 2.25 |
| 43 | B.F. | 0 | 0 | 7443 | 2.25 | 2.25 |
| 44 | B.F. | 0 | 0 | 7445 | 0 | 0 |
| 45A | 3 Separate | 2.22 | 2.22 | | | |
| | Lines with | 2.22 | 2.22 | | | |
| | Tubing Cap | 2.22 | 2.22 | | | |
| | on each | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 46 | 846 | 1.45 | 1.45 | | | |
| 48 | Tubing Cap | 2.22 | 2.22 | | | |
| 49 | Pipe Cap | 0.39 | 0.39 | | | |
| 50A | 1554 | 1.45 | 1.45 | | | |
| | 1557 | 1.45 | 1.45 | | | |
| | 1560 | 1.45 | 1.45 | | | |
| 50B | 1563 | 1.45 | 1.45 | | | |
| | 1566 | 1.45 | 1.45 | | | |
| 50C | 1569 | 1.45 | 1.45 | | | |
| | 1572 | 1.45 | 1.45 | | | |
| 51A | 1076A | 1.44 | 1.44 | IV-3A | 1.44 | 1.44 |
| | 1084A | 1.44 | 1.44 | IV-5A | 1.44 | 1.44 |
| 51B | 1076B | 1.45 | 1.45 | IV-3B | 1.45 | 1.45 |
| | 1084B | 1.45 | 1.45 | IV-5B | 1.45 | 1.45 |
| 51C | 1080A | 1.45 | 1.45 | IV-2A | 0.72 | 0.72 |
| | | | | IV-2B | 0.72 | 0.72 |
| 52 | 9229 | 17.5 | 17.5 | 9227 | 17.5 | 17.5 |

Pressure decay tests performed in 1980 subsequent to the value listed for Test No. 35 on the containment purge supply dampers are as follows:

| | |
|---|---|
| 5-5-80 | 419.28 cc/min. |
| 11-20-80 | 481.82 cc/min. |

Pressure decay tests performed in 1980 subsequent to the value listed for Test No. 36 on the Containment purge exhaust dampers are as follows:

| | |
|---|---|
| 5-5-80 | 259.6 cc/min. |
| 11-20-80 | 648 cc/min. |

ISOLATION VALVE LEAKAGE RATE (cc/min. at 60 psig)

TEST PERIOD: 1981 OUTAGE

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 1 | 539 | 0 | 0 | | | |
| 2 | 528 | 0 | 0 | | | |
| 3 | 529 | 1.417 | 1.417 | 508 | 0.41 | 0.41 |
| 7 | 371 | 0 | 0 | | | |
| 8 | 370B | 0 | 0 | | | |
| 9A | 304A | 0 | 0 | | | |
| 9B | 304B | 28.68 | 28.68 | | | |
| 10 | 383B | 0 | 0 | | | |
| 11 | 313 | 0 | 0 | | | |
| 12A | 966A | 0 | 0 | 956C | 2.5 | 2.5 |
| 12B | 966B | 0 | 0 | 956A | 0.41 | 0.41 |
| 12C | 966C | 0 | 0 | 956B | 0.41 | 0.41 |
| 13A | 5735 | 0 | 0 | | | |
| 13B | 5736 | 0.41 | 0.41 | | | |
| 14 | 1599 | 0 | 0 | 1598 | 1.42 | 1.42 |
| 15 | 1597 | 0 | 0 | 1596 | 0 | 0 |
| 16A | 5738 | 1659.02 | 0 | | | |
| 16B | 5737 | 0 | 0 | | | |
| 17A | PT-945 | 0 | 0 | | | |
| | PT-946 | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 17B | PT-947 | 0 | 0 | | | |
| | PT-948 | | | | | |
| 17C | PT-944 | | | | | |
| | PT-949 | 2.24 | 2.24 | | | |
| | PT-950 | 0 | 0 | | | |
| 18A | 864A | 0 | 0 | | | |
| | 862A | | | | | |
| 18B | 862B | 0 | 0 | | | |
| 19 | 889A | 0.41 | 0.41 | | | |
| | 889B | 32.54 | 32.54 | | | |
| | 870A | 0.26 | 0.26 | | | |
| | 870B | 0.41 | 0.41 | | | |
| | 879 | 0.41 | 0.41 | | | |
| 20 | 1787 | 0 | 0 | 1786 | 0 | 0 |
| | 1713 | 0 | 0 | | | |
| 21 | 1789 | 0 | 0 | | | |
| 22 | 1721 | 1.4 | 1.4 | 1003A | 1.4 | 1.4 |
| | | | | 1003B | 1.4 | 1.4 |
| 23 | 1728 | 1.4 | 1.4 | 1723 | 1.41 | 1.41 |
| 24 | 813 | 0 | 0 | | | |
| | 814 | 0 | 0 | | | |
| 26 | 750A | 1.417 | 1.417 | | | |

| TEST NO. | PRIMARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | SECONDARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
|---|---|---|---|---|---|---|
| 27 | 750B | 0 | 0 | | | |
| 28 | 759A | 0 | 0 | | | |
| 29 | 759B | 0 | 0 | | | |
| 30 | 743 | 0 | 0 | | | |
| | 745 | 0 | 0 | | | |
| 32 | 5393 | 1.4 | 1.4 | 5392 | 5.5 | 5.5 |
| 33 | 7226 | 1.4 | 1.4 | 7141 | 1.31 | 1.31 |
| 34 | 7970 | 0 | 0 | 7971 | 0.41 | 0.41 |
| 35 | 5870 | 94.82 | 94.82 | 5869 | 0 | 0 |
| 36 | 5878 | 214.85 | 214.85 | 5879 | 0 | 0 |
| 37 | | | | 4757 | 0.41 | 0.41 |
| | | | | 4758 | 0 | 0 |
| 38 | | | | 4635 | 0.41 | 0.41 |
| | | | | 4636 | 0 | 0 |
| 39 | 8419 | 1.4 | 1.4 | 8418 | 1.4 | 1.4 |
| 40 | 6151 | 1.42 | 1.42 | | | |
| | 6175 | 0 | 0 | | | |
| 42 | B.F. | 0 | 0 | 7444 | 1.32 | 1.32 |
| 43 | B.F. | 1.32 | 1.32 | 7443 | 0 | 0 |
| 44 | B.F. | 0 | 0 | 7445 | 1.32 | 1.32 |
| 45A | 3 Separate | 0 | 0 | | | |
| | Lines with | 0 | 0 | | | |
| | Tubing Cap | 0 | 0 | | | |
| | on each | | | | | |

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 46 | 846 | 15.4 | 15.4 | | | |
| 48 | Tubing Cap | 1.42 | 1.42 | | | |
| 49 | Pipe Cap | 0 | 0 | | | |
| 50A | 1554 | 0 | 0 | | | |
| | 1557 | 0 | 0 | | | |
| | 1560 | 0 | 0 | | | |
| 50B | 1563 | 1.4 | 1.4 | | | |
| | 1566 | 1.4 | 1.4 | | | |
| 50C | 1569 | 0 | 0 | | | |
| | 1572 | 0 | 0 | | | |
| 51A | 1076A | 0 | 0 | IV-3A | 1.43 | 1.43 |
| | 1084A | 0 | 0 | IV-5A | 35.52 | 1.31 |
| 51B | 1076B | 0 | 0 | IV-3B | 1.41 | 1.41 |
| | 1084B | 0 | 0 | IV-5B | 10.88 | 10.88 |
| 51C | 1080A | 0 | 0 | IV-2A | 0.2 | 0.2 |
| | | | | IV-2B | 0.2 | 0.2 |
| 52 | 9229 | 1.4 | 1.4 | 9227 | 1.4 | 1.4 |

Pressure decay tests performed in 1981 subsequent to the value listed for Test No. 35 on the containment purge supply dampers are as follows:

| | |
|---|---|
| 5-16-81 | 394.61 cc/min. |
| 8-19-81 | 264.547 cc/min. |
| 11-18-81 | 173.59 cc/min. |

Pressure decay tests performed in 1981 subsequent to the value listed for Test No. 36 on the Containment purge exhaust dampers are as follows:

| | |
|---|---|
| 5-16-81 | 331.8 cc/min. |
| 8-19-81 | 90.48 cc/min. |
| 11-18-81 | 361.73 cc/min. |

ISOLATION VALVE LEAKAGE RATE (cc/min. at 60 psig)

TEST PERIOD: 1982 OUTAGE

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 1 | 539 | 0.18 | 0.18 | 546 | 0 | 0 |
| 2 | 528 | 0 | 0 | 547 | 0 | 0 |
| 3 | 529 | 0.69 | 0.69 | 508 | 0 | 0 |
| 7 | 371 | 0 | 0 | 820 | 0 | 0 |
| | | | | 204A | 0 | 0 |
| 8 | 370B | 0 | 0 | | | |
| 9A | 304A | 2556.12 | 304.87 | | | |
| 9B | 304B | 15.3 | 15.3 | | | |
| 10 | 383B | 0 | 0 | | | |
| 11 | 313 | 4.53 | 4.53 | | | |
| 12A | 966A | 1.413 | 15.89 | 956F | 1.413 | 0.12 |
| 12B | 966B | 1.413 | 1.37 | 956E | 1.413 | 0.2 |
| 12C | 966C | 0 | 0 | 956D | 1.2 | 1.2 |
| 13A | 5735 | 0 | 0 | 5733 | 0.45 | 0.45 |
| 13B | 5736 | 0 | 0 | 5734 | 2.76 | 2.76 |
| 14* | 1599 | Unmeasurable | 0.3 | 1598 | 1.97 | 1.97 |
| 15 | 1597 | 0.2 | 0.2 | 1596 | 0.3 | 0.3 |
| 16A | 5738 | 0 | 0 | 5701 | 551.2 | 551.2 |
| 16B | 5737 | 0 | 0 | 5702 | 94.5 | 631.71 |
| 17A | PT-945 | 7.9 | 0 | 1819A | 7.9 | 0.19 |

* - Refer to Section 9.1 (page 26) for explanation

| TEST NO. | PRIMARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | SECONDARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
|---|---|---|---|---|---|---|
| | PT-946 | 7.9 | 0 | 1819B | 7.9 | 0.19 |
| 17B | PT-947 | 0 | 0 | 1819C | 0 | 0 |
| | PT-948 | 0 | 0 | 1819D | 0 | 0 |
| 17C | PT-944 | 0 | 0 | 1819E | 0 | 0 |
| | PT-949 | 0 | 0 | 1819F | 0 | 0 |
| | PT-950 | 0 | 0 | 1819G | 0 | 0 |
| 18A | 862A | 1.57 | 1.57 | | | |
| 18B* | 862B | Unmeasurable | 0.4 | | | |
| 19 | 889A | 0 | 0 | | | |
| | 889B | 0.39 | 0.39 | | | |
| | 870A | 98.15 | 98.15 | | | |
| | 870B | 3.93 | 3.93 | | | |
| | 879 | 0 | 0 | | | |
| 20 | 1787 | 0 | 0 | 1786 | 0 | 0 |
| | 1713 | 2.47 | 0 | | | |
| 21 | 1789 | 0 | 0 | 1655 | 0 | 0 |
| 22 | 1721 | 0 | 0 | 1003A | 432.26 | 432.26 |
| | | | | 1003B | 432.26 | 432.26 |
| 23 | 1728 | 2.0 | 2.0 | 1723 | 3.0 | 3.0 |
| 24 | 813 | 0 | 0 | | | |
| | 814 | 0.99 | 0.99 | | | |
| 26 | 750A | 0 | 0 | 749A | 0 | 0 |

* Valve would not seat. Valve was disassembled, cleaned, reassembled and tested satisfactorily.

| | PRIMARY ISOLATION BOUNDARY | | | SECONDARY ISOLATION BOUNDARY | | |
|---|---|---|---|---|---|---|
| TEST NO. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
| 27 | 750B | 0 | 0 | 749B | 0 | 0 |
| 28 | 759A | 0 | 0 | | | |
| 29 | 759B | 0 | 0 | | | |
| 30 | 743 | 0 | 0 | | | |
| | 745 | 0 | 0 | | | |
| 32 | 5393 | 40.27 | 40.27 | 5392 | 0 | 0 |
| 33 | 7226 | 0 | 0 | 7141 | 0 | 0 |
| 34 | 7970 | 42.32 | 0 | 7971 | 0 | 39.22 |
| 35 | 5870 | 15,593.4 | 158.55 | 5869 | 0 | 0 |
| 36* | 5878 | 244,141.7 | 741.32 | 5879 | 0 | 0 |
| 37 | | | | 4757 | 316 | 316 |
| | | | | 4758 | 0 | 0 |
| 38 | | | | 4635 | 353 | 353 |
| | | | | 4636 | 353 | 353 |
| 39 | 8419 | 9.5 | 9.5 | 8418 | 0 | 0 |
| 40 | 6151 | 5.0 | 5.0 | 6165 | 0 | 0 |
| | 6175 | 0 | 0 | 6152 | 0 | 0 |
| 42 | B.F. | 0 | 0.98** | 7444 | 0 | 0* |
| 43 | B.F. | 0 | 0 | 7443 | 0 | 0* |
| 44 | B.F. | 0 | 1.57* | 7445 | 4.53 | 0* |

* - Refer to Section 9.1 (page 26) for explanation

** Post ILRT value

| TEST NO. | PRIMARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. | SECONDARY ISOLATION BOUNDARY VALVE NO. OR BOUNDARY | AS FOUND LEAKAGE RATE cc/min. | AS LEFT LEAKAGE RATE cc/min. |
|---|---|---|---|---|---|---|
| 45A | 3 Separate | 1.34 | 1.34 | | | |
| | Lines with | 1.34 | 1.34 | | | |
| | Tubing Cap | 1.34 | 1.34 | | | |
| | on each | 1.34 | 1.34 | | | |
| 46* | 846 | Unmeasurable | 10 | 8623 | Unmeasurable | 16.92 |
| 49 | Pipe Cap | 0 | 0 | 5129 | 3.53 | 3.53 |
| 50A | 1554 | 0.55 | 0.55 | 1556 | 0 | 0 |
| | 1557 | 0.3 | 0.3 | 1559 | 0 | 0 |
| | 1560 | 0.4 | 0.4 | 1562 | 0 | 0 |
| 50B | 1563 | 0.39 | 0.39 | 1565 | 0.39 | 0.39 |
| | 1566 | 0.39 | 0.39 | 1568 | 0.49 | 0.49 |
| 50C | 1569 | 0 | 0 | 1571 | 0 | 0 |
| | 1572 | 0 | 0 | 1574 | 0 | 0 |
| 51A | 1076A | 0 | 0 | IV-3A | 5.96 | 5.96 |
| | 1084A | 0 | 0 | IV-5A | 556.5 | 38.03 |
| 51B | 1076B | 0.4 | 0.4 | IV-3B | 0 | 0 |
| | 1084B | 0.6 | 0.6 | IV-5B | 8.3 | 8.3 |
| 51C | 1080A | 2.5 | 2.5 | IV-2A | 0.9 | 0.9 |
| | | | | IV-2B | 0.4 | 0.4 |
| 52 | 9229 | 0 | 0 | 9227 | 43.66 | 43.66 |

* Valves could not be tested because downstream boundary valve 8624 was leaking. After 8624 was replaced the Containment Isolation valves were tested satisfactorily.

Following the 1982 Integrated Leak Rate Test the purge supply and exhaust valves were retested with the following results:

Purge Supply:

| | | |
|---|---|---|
| 5-5-82 | 88.45 cc/min. | Post ILRT |
| 5-19-82 | 19.16 cc/min. | Post Maintenance |

Purge Exhaust:

| | | |
|---|---|---|
| 5-5-82 | 39,759 cc/min. | Post ILRT |
| 5-6-82 | 193.83 cc/min. | Post Maintenance |
| 5-17-82 | 646.6 cc/min. | New Seats |
| 5-19-82 | 1261.7 cc/min. | Post Maintenance |

## TYPE B PENETRATION MANIFOLD DESIGNATION AND LEAKAGE RATES

NOTE: Where applicable, significant leakage comments follow test data listing for manifold and/or penetrations.

| MANIFOLD A | Total Volume 21.88 $ft.^3$ |
|---|---|
| Penetrations Included: | 312, 309, 332, 310, 317, 318, 321, 322, 306, 316, 319, 304 and 313 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 2.39 |
| 11/5/79 | 1.20 |
| 4/7/80 | 7.19 |
| 4/29/81 | 3.208 |
| 3/15/82 | 0 |

| MANIFOLD B | Total Volume 25.24 $ft.^3$ |
|---|---|
| Penetrations Included: | 323, 324, 325, 326, 336, 320, 315, 307, 305, 311, 308, 303 and 301 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 2.08 |
| 4/3/80 | 0 |
| 4/29/81 | 0 |
| 3/15/82 | 0 |

| MANIFOLD C | Total Volume 45.92 $ft.^3$ |
|---|---|
| Penetrations Included: | 300, 401 and 403 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 0 |
| 4/3/80 | 14.13 |
| 4/30/81 | 58.16 |
| 3/8/82 | 6.97 |

## TYPE B PENETRATION MANIFOLD DESIGNATION AND LEAKAGE RATES

| MANIFOLD D | Total Volume 636 ft.$^3$ |
|---|---|
| Penetrations Included: | Personnel Hatch Personnel Access Lock |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 5/10/79 | 148.95 |
| 11/6/79 | 183.57 |
| 3/26/80 | 0 |
| 9/26/80 | 283.6 |
| 4/1/81 | 297.3935 |
| 9/23/81 | 300.63 |
| 5/21/82 | 2440.1 |

| MANIFOLD E | Total Volume 37.67 ft.$^3$ |
|---|---|
| Penetrations Included: | 202, 203, 209, 201, 204, 210, 206, 205 and 207 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 1.13 |
| 4/7/80 | 0 |
| 4/30/81 | 17.92 |
| 3/16/82 | 2.56 |

| MANIFOLD F | Total Volume 7.4 ft.$^3$ |
|---|---|
| Penetrations Included: | 119, 129, 123, 133 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 0 |
| 4/15/80 | 1.58 |
| 4/30/81 | 0 |
| 3/9/82 | 0 |

| MANIFOLD G | Total Volume 15.25 ft.$^3$ |
|---|---|
| Penetrations Included: | 120, 121, 124, 125, 126, 127, 128, 130, 131, and 132 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 12.26 |
| 11/5/79 | 3.8 |
| 4/15/80 | 1.33 |
| 4/30/81 | 0 |
| 3/9/82 | 1.004 |

APPENDIX E (Cont'd)

TYPE B PENETRATION MANIFOLD DESIGNATION AND LEAKAGE RATES

| | |
|---|---|
| MANIFOLD H | Total Volume 29.31 $ft^3$ |
| Penetrations Included: | 402, 404 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 3.10 |
| 11/15/79 | 5.65 |
| 4/15/80 | 0 |
| 5/1/81 | 0 |
| 3/15/82 | 0 |
| MANIFOLD I | Total Volume 1065 $ft.^3$ |
| Penetrations Included: | Equipment Hatch Personnel Access Lock |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 5/11/79 | -118.98 |
| 11/8/79 | -151.09 |
| 3/27/80 | 108.7742 |
| 10/1/80 | 121.8 |
| 4/2/81 | -136.3709 |
| 9/24/81 | 184.2079 |
| 5/20/82 | 413.47 |
| MANIFOLD J | Total Volume 22.22 $ft.^3$ |
| Penetrations Included: | 102, 111, 101, 113, 118, 105, 109, 99, 103 and 107 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 1.92 |
| 11/15/79 | 0 |
| 4/15/80 | 1.93 |
| 5/1/81 | 0 |
| 3/15/82 | 3.5 |
| MANIFOLD K | Total Volume 20.88 $ft.^3$ |
| Penetrations Included: | 104, 106, 108, 110, 112, 100 and 140 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/20/79 | 1.80 |
| 4/15/80 | 7.92 |
| 5/1/81 | 0 |
| 3/15/82 | 12.75 |

## TYPE B PENETRATION MANIFOLD DESIGNATION AND LEAKAGE RATES

| MANIFOLD L | Total Volume 3 ft.$^3$ |
|---|---|
| Penetrations Included: | 29, 141, 142, 143 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 3/15/79 | 4.36 |
| 4/21/80 | 5.8 |
| 6/12/81 | 5.64 |
| 4/16/82 | 1.28 |

| FUEL TRANSFER TUBE | |
|---|---|
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 3/19/79 | 1.08 |
| 5/1/80 | 1.45 |
| 6/12/81 | 32.25 * |
| 4/1/82 | 5.94 |

| MANIFOLD: ELECTRICAL 1 | Total Volume 102 ft.$^3$ |
|---|---|
| Penetrations Included: | CE-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 29, 30, 31, 32, 33, 34 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/19/79 | 212.99 |
| 4/3/80 | 281.90 |
| 5/1/81 | 278.58 |
| 3/16/82 | 221.9 |

| MANIFOLD: ELECTRICAL 2 | Total Volume 15 ft.$^3$ |
|---|---|
| Penetrations Included: | BE-1, 2, 3, 4 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/19/79 | 0 |
| 4/7/80 | 0 |
| 5/2/81 | 2.8 |
| 3/16/82 | 0 |

*NOTE: THE INITIAL LEAKAGE WAS BEYOND THE RANGE OF THE ROTAMETER. ATTEMPTS WERE MADE TO TIGHTEN FLANGE BOLTS, BUT LEAK RATE COULD NOT BE REDUCED TO AN ACCEPTABLE LEVEL UNTIL GASKET WAS REPLACED.

TYPE B PENETRATION MANIFOLD DESIGNATION AND LEAKAGE RATES

| MANIFOLD: ELECTRICAL 3 | Total Volume 36 ft.$^3$ |
|---|---|
| Penetrations Included: | AE-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 |
| Date Tested: | Leakage Rate cc/min. (at 60 psig) |
| 2/22/79 | 32.22 |
| 4/15/80 | 62.22 |
| 5/2/81 | 27.49 |
| 3/10/82 | 45.76 |

# APPENDIX F

# ISOLATION VALVE DESCRIPTIONS

# APPENDIX F

## DESCRIPTION OF ISOLATION VALVES

| TEST NO. | DESCRIPTION/IDENTIFICATION | PENETRATION NO. |
|---|---|---|
| 1 | PRT to Gas Analyzer | 120 |
| 2 | Nitrogen to PRT | 121 |
| 3 | Makeup to PRT | 121 |
| 7 | Letdown to Non-Regen HX | 112 |
| 8 | Charging Line to "B" Loop | 100 |
| 9A | "A" RCP Seal Water Inlet | 106 |
| 9B | "B" RCP Seal Water Inlet | 110 |
| 10 | Alternate Charging to "A" Cold Leg | 102 |
| 11 | RCP Seal Rt. and Excess Letdown | 108 |
| 12A | Pressurizer Steam Space Sample | 207 |
| 12B | Pressurizer Liquid Space Sample | 206 |
| 12C | Hot Leg Loop Sample | 205 |
| 13A | "A" S/G Sample | 206 |
| 13B | "B" S/G Sample | 207 |
| 14 | Radiation Monitors R-11, R-12 & R-10A Outlet | 305 |
| 15 | Radiation Monitors R-11, R-12 & R-10A Inlet | 305 |
| 16A | "A" S/G Blowdown | 321 |
| 16B | "B" S/G Blowdown | 322 |
| 17A | C.V. Press. Trans. PT-945 & PT-946 | 121 |
| 17B | C.V. Press. Trans. PT-947 & PT-948 | 203 |
| 17C | C.V. Press. Trans. PT-944, PT-949 & PT-950 | 322 |
| 18A | Containment Spray Pump 1A | 105 |
| 18B | Containment Spray Pump 1B | 109 |
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| 39 | DW to Containment | 324 |
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|---|---|---|
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