NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT

REPORT TO THE

UNITED STATES NUCLEAR REGULATORY COMMISSION

DIVISION OF OPERATING REACTORS

LICENSE NO. DPR-22

# REACTOR CONTAINMENT BUILDING

# INTEGRATED LEAK TEST

NOVEMBER 1975

Report Date: January 23, 1976

Report Prepared by:
D A Brosseau

Test Conducted by:
D A Brosseau
R A Goranson
B L Jenness

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# 1. Introduction

## 1.1 Purpose of Containment Leakage Tests

As stated in 10CFR 50, Appendix J, primary containment leakage tests are conducted to assure that:

a) Leakage through the primary reactor containment and systems and components penetrating primary containment shall not exceed allowable leakage rate values as specified in the Technical Specifications or associated Bases.

b) Periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of the containment, and systems and components penetrating primary containment.

Results of containment leakage tests are reported to the Director-Division of Operating Reactors, USNRC, following each periodic containment integrated leakage test (Type A test). This report must include:

a) Analysis and interpretation of the Type A test results.

b) Summary of containment penetration local leakage tests (Type B tests) and containment isolation valve local leakage tests (Type C tests) conducted since the last Type A test.

c) Separate accompanying summary report of Types A, B, and C tests which failed the acceptance criteria.

## 1.2 Testing Requirements

### 1.2.1 Frequency of Testing

Type A tests are scheduled in accordance with Paragraph 4.7.A.2 (d) of the Monticello Technical Specifications. Testing is required at the following intervals:

a) During the first refueling outage.

b) Within 24 months of the test in (a) above.

c) Within 48 months of the test in (b) above [illegible] every 48 months thereafter.

In the event that any testing (local or inte[illegible] [illegible]elds a leak rate in excess of $L_t$ = 1.2 weight percent of the co[illegible] air per 24 hours at the test pressure $P_t$ = 41 psig, the condition must be corrected and the testing schedule reverts to:

a) At the first refueling outage following the retest made (local or integrated) to correct the excess leakage.

b) Within 24 months of the test in (a) above.

c) Within 48 months of the test in (b) above and every 48 months thereafter.

Type B and Type C tests are scheduled in accordance with Paragraph 4.7.A.2 (b) of the Monticello Technical Specifications. Testing is required each operating cycle.

1.2.2 Test Acceptance Criteria

The acceptance criteria for Type A tests is contained in Paragraph 4.7.A.2 (b) (2) of the Monticello Technical Specifications. The allowable operational leak rate, $L_{to}$, is 0.9 weight percent of the contained air per 24 hours at $P_t$ = 41 psig. The containment leak rate, either as measured or following repairs and retesting, must be less than $L_{to}$ prior to resumption of power operation.

The acceptance criteria for Type B and Type C tests are contained in Paragraph 4.7.A.2 (f). The allowable leakage rates are:

| | | |
|---|---|---|
| a) | Double-gasketed seals total leakage | 34.4 scfh (10% $L_{to}$) @ 41 psig |
| b) | Testable penetrations and isolation valves except main steam isolation valves | 103.2 scfh total (30% $L_{to}$)<br>17.2 scfh each ( 5% $L_{to}$)<br>@ 41 psig |
| c) | Main steam isolation valves | 11.5 scfh each @ 25 psig |

1.2.3 Required Procedure for Leakage Test

All containment leakage tests were conducted in accordance with 10CFR 50, Appendix J, and American National Standard ANSI N45.4-1972, "Leakage-Rate Testing of Containment Structures for Nuclear Reactors".

2. Test Results

2.1 Type A Test Results

The containment integrated leakage rate test was conducted over the period November 12 to November 16, 1975. Following identification and closure of a faulty Traversing In-Core Probe (TIP) ball valve, the as-left leakage was determined to be 0.2456 ± 0.0087 wt%/day at the 95% confidence level. This leakage is well within the Technical Specification acceptance criterion of 0.9 wt%/day. The detailed leak rate calculations are presented in Appendix C. The measured combined leakage during performance of the verification test was 0.4262 wt %/day as compared to a predicted value of 0.5023 wt %/day. This comparison is well within the required accuracy prescribed in 10CFR 50, Appendix J. Data and leak rate calculations for the supplemental verification test are included in Appendix D.

## 2.2 Type B and Type C Test Results

During November 1974 and January 1975, local leak rate tests were conducted on selected testable penetrations, gasketed seals, doors, and isolation valves. Results of all tests were reported in Semi-Annual Reports No. 8 and No. 9, July 1, 1974 to December 31, 1974 and January 1, 1975 to June 30, 1975, respectively, to the USNRC.

During September, October and November, 1975, local leak rate tests were conducted on all testable penetrations, gasketed seals, doors and isolation valves. Results of all tests were tabulated in Appendix A and summarized in Table 1.

A separate summary report of all Type C tests which failed to meet the leakage acceptance criteria of the Technical Specifications and a discussion of the repairs accomplished is included in Appendix B. All isolation valves with leakage in excess of the individual valve leakage limit were restored to acceptable leak tightness. Total leakage for double-gasketed seals and total leakage for all other penetrations and isolation valves following repairs satisfied the Technical Specification limits.

## 3. Description of Test Procedures

## 3.1 Type B and Type C Test Procedure

All tests were conducted with air or nitrogen using the pressure decay or rotameter methods. The rotameter method was also used to estimate gross leakage. The volume between redundant isolation valves, the center of double-gasketed seals, or the volume of an expansion bellows, electrical penetration, or hot fluid piping penetration was pressurized slightly above test pressure. Conditions were allowed to stabilize and the pressure decay or rotameter indicated flow was measured. In tests using the pressure decay method, the decay rate at $P_t$ was obtained by interpolation of the test data and used in conjunction with the known test volume to calculate the leakage rate. Temperature corrections were not made because of the difficulty of positioning a temperature sensor in the test volume. In addition, it is demonstrated in the error analysis that these corrections are small compared to other uncertainties in the testing procedure. Rotameter tests were vented to the atmosphere. Temperature and pressure corrections were made based upon rotameter calibration.

Isolation valves were tested either singly or several in the same line were tested simultaneously depending upon the location of installed test connections. Nitrogen was used to test all electrical penetrations. Results from leakage tests conducted using nitrogen were corrected to equivalent air leakage rates.

3.2 Type A Test Procedure

3.2.1 Type A Test Instruments and Equipment

The integrated containment leakage rate test was conducted using the reference vessel method specified in ANSI N 45.4-1972. The principal measuring instruments consisted of a reference chamber system, a 36-inch U-tube manometer, a 0-60 psig Wallace Tiernan gauge, 20 temperature transmitters with platinum resistance temperature sensors, and six Foxboro dewcels.

The reference chamber (Figure 1) consisted of three sections sized in proportion to the containment volume represented by each. All sections were fabricated from 2-inch thin-wall copper pipe connected by 1/4 inch copper tubing. Prior to the integrated leakage test the reference system was evacuated and filled with dry nitrogen. The reference system and all instrument piping was then subjected to a 24-hour leak test at 50 psig using the absolute method specified in ANSI N-45.4-1972. The reference system leak test was also conducted at the conclusion of the integrated leakage rate test. In both instances, the reference system was verified to have essentially zero leakage under test conditions.

The U-tube manometer (Figure 2) was used to measure reference chamber-containment differential pressure. Pressure gauge PI-1 was used to insure that reference chamber pressure was higher than containment pressure when the manometer was placed in service. Valves E, F and G were opened first to permit a small amount of dry nitrogen to flow from the reference system into containment thereby equalizing pressures. This procedure prevents the introduction of moisture into the reference system. Closing valve E then places the manometer between reference system and containment atmospheres. Valve E is leak tested as part of the initial 24-hour reference system leakage test.

The Wallace Tiernan Model 1500 pressure gauge, PI-2, was used to indicate containment pressure. This gauge was certified by the manufacturer's comparison with a calibrating standard traceable to Natural Bureau of Standards.

Rosemount Model 442A ALPHALINE Temperature Transmitters were placed throughout the containment to monitor temperature. The temperature sensing system consisted of twenty individual 2- wire temperature transmitters each connected to a platinum resistance temperature sensor and a regulated DC power supply. Each resistance temperature detector was assigned a weighting factor proportional to the volume monitored for use in calculating the average containment temperature. Tables 2 and 3 list the resistance temperature detector locations and assigned weighting factors. The RTD signals were transmitted to the plant process computer where a ten minute average of the temperature at each locale was printed by the computer typer in degrees F.

Foxboro Model 2701 RPG dewcels were used to monitor containment vapor pressure. Each dewcel was assigned a weighting factor proportional to the containment volume monitored for calculation of average vapor pressure. Tables 2 and 3 list the dewcel locations and assigned weighting factors. The dewcel signals were transmitted to the plant process computer via resistance-to-current converters and a ten minute average of the vapor pressure at each locale was printed in inches of water by the computer typer. Reading the dewcel resistance and conversion to vapor pressure was accomplished by entering the required calibration curves into the computer memory. Calibr..:ion was checked using a certified resistance decade box to simulate each dewcel RTD.

Additional data on the integrated leakage rate test instruments are summarized in Table 4.

The containment was pressurized using 3-750 cfm portable diesel air compressors (Figure 3). The air was cooled using an air treatment pressurizing skid. The air was supplied and metered to the drywell through a flange connection on the nitrogen purge system.

Containment ventilation was provided by a two-speed drywell ventilation fan operating at low speed and six portable 10,000 cfm electric fans equipped with oversized motors to promote mixing of the air.

3.2.2 Type A Test Summary of Events

The pre-test containment inspection was completed on November 10th with no visible structural deterioration found. Major preliminary steps were completed and included:

a) Installation of portable electric fans in the containment.

b) Final check-out of temperature and humidity instruments.

c) Completion of pre-test reference system leakage measurement.

d) Replacement of all manway covers followed by Type B Tests.

e) Blocking of all vacuum breakers in the open position.

f) Valving out of all drywell pressure switches.

g) Jumpering of all reactor water LOW level switches.

h) Draining of the reactor vessel below steam and feedwater nozzles.

i) Draining of steam and feedwater lines.

j) Venting of reactor vessel to containment atmosphere.

k) Completion of valve lineup sheets.

l) Isolation of the drywell instrument air system and venting of the main steam isolation valve and safety/relief valve air accumulators.

On November 12 at 2248 the containment was closed out and pressurization was begun at 5 psi/hr. At 0902 on November 13, the compressors were shut down at an indicated drywell pressure of 42 psig. Logging of containment parameters commenced immediately and preliminary leak rate calculations were performed beginning at 1000 on November 13.

Data was logged hourly and the initial measurements indicated a leakage in excess of approximately 1.5 wt %/day over a period of 12 hours from 1400 on November 13 to 0100 on November 14. During this time, searches were conducted to locate the sources of leakage. At 2345 on November 13 leakage was found in the #3 Tip ball valve. Investigation revealed that a wafer-type limit switch on the valve was stuck preventing the valve from closing fully. For more information on this problem refer to the Licensee Event Report dated November 26, 1975 on this subject. The valve was subsequently closed and the leak rate test was continued. At 0600 on November 14th data collection resumed. Data was recorded hourly and a point-to-point calculation of leakage rate was plotted to detect possible spurious readings. At 1000 on November 15, sufficient data had been collected and the integrated containment leakage rate test was considered complete.

The controlled bleed verification test was begun at 1015. At 1715 on November 15, sufficient data had been collected to verify the accuracy of the integrated leakage rate test within the allowable accuracy of 10CFR 50, Appendix J.

The containment was depressurized through the torus 2-inch and 18-inch vent lines to the Standby Gas Treatment System. At 0000 on November 16 depressurization was completed and the containment was inspected. No damage was discovered.

## 4. Summary of Test Calculations

### 4.1 Type B and Type C Calculations

#### 4.1.1 Pressure Decay Method Calculations

The Type B and C local leak rate test calculations made using the pressure decay method are as reported in the summary technical report submitted August 3, 1973 entitled "Reactor Containment Building Integrated Leak Test - May, 1973."

#### 4.1.2 Rotameter Method Calculations

For the rotameter method, indicated leakage flow was corrected (where applicable) as follows:

$$L_c = L \times f_p \times f_{d_{N2}} \times f_t \times f_{t_p} \quad \text{where}$$

$$f_p = \frac{(P_t + 14.7)^{1/2}}{(P_c + 14.7)^{1/2}} \qquad f_{d_{N_2}} = 1.037$$

$$f_t = \frac{(T_c + 460)^{1/2}}{(T_t + 460)^{1/2}} \qquad f_{t_p} = \frac{(P_t + 14.7)^{1/2}}{(P_c)^{1/2}} \frac{(P_r)^{1/2}}{(P_t)^{1/2}}$$

The nomenclature is defined as follows:

$L$ = Observed leakage rate corrected to current calibration records (CFH).

$L_c$ = Corrected leakage rate (SCFH)

$f_p$ = Rotameter discharge pressure correction factor.

$P_t$ = Rotameter discharge pressure during test (psig)

$P_c$ = Rotameter discharge pressure during calibration (psig)

$f_{d_{N_2}}$ = Nitrogen correction factor

$f_t$ = Rotameter discharge temperature correction factor.

$T_t$ = Rotameter discharge temperature during test (°F)

$T_c$ = Rotameter discharge temperature during calibration (°F)

$f_{t_p}$ = Reduced test pressure correction factor.

$P_r$ = Required test pressure (psig)

4.2 Type A Test Calculations

Each hour during the integrated containment leakage test and during the accuracy verification test, the following calculations were made to determine the point-to-point method leak rate:

a) Containment Absolute Pressure

CONTAINMENT PRESSURE (psia) = $P_{BAR} + P_{PI-2}$

$P_{BAR}$ = Local Barometric Pressure (psia)

$P_{PI-2}$ = Drywell Wallace Tiernan Gauge Pressure (psig)

b) Containment Average Temperature ($^oR$) =

$$\sum_{i=1}^{i=20} w_i t_i + 459.72$$

$w_i$ = Weighting factor for $RTD_i$ from (tables 2 & 3)

$t_i$ = Computer reading of $RTD_i$ ($^oF$)

c) Containment Average Vapor Pressure

WEIGHTED AVERAGE CONTAINMENT VAPOR PRESSURE (inches water) =

$$\sum_{i=1}^{i=6} w_{vi} P_{vi}$$

$w_{vi}$ = weighting factor for dewcel i (tables 2 & 3)

$P_{vi}$ = Computer reading (inches water) for dewcel i

d) Containment - Reference Chamber $\Delta p$

CONTAINMENT - REF CHAMB DIFF PRES (inches water) =

$$L_{RL} - L_{LL}$$

$L_{RL}$ = Right leg level (inches) of DPI-1

$L_{LL}$ = Left leg level (inches) of DPI-1

e) Leak Rate Calculation

CONTAINMENT LEAKAGE RATE (WT%/24-HR) =

$$\frac{2400}{h}\left[\frac{T_1\ (\Delta P_2 + P_{v2})}{T_2\ (P_1 - P_{v1})} - \frac{\Delta P_1 + P_{v1}}{P_1 - P_{v1}}\right]$$

$T_1$ = Average absolute containment temperature at start of interval (°R)

$T_2$ = Average absolute containment temperature at end of interval (°R)

$\Delta P_1$ = Containment-ref chamb dp at start of interval (inches water)

$\Delta P_2$ = Containment-ref chamb dp at end of interval (inches water)

$P_{v1}$ = Containment vapor pressure at start of interval (inches water)

$P_{v2}$ = Containment vapor pressure at end of interval (inches water)

$P_1$ = Absolute containment pressure at start of interval (inches water)

h = Length of interval (hours)

Derivation of the leakage rate equation may be found in ANSI N-45.4-1972, Appendix B.

The purpose of the hourly calculations was to construct a plot of point-to-point leakage rate (Figure C-1). This plot was useful in detecting trends or possible anomalies. The actual containment leakage rate however, was taken as the average of data comparisons from five 24-hour intervals. The first five hours of data following stabilization of the containment atmosphere and the last five hours of data were used for this purpose. All data and calculations for the integrated containment leak rate test are tabulated in Appendix C.

4.3 Calculations for Verification of Type A Test Accuracy

Six hours of useful data were taken with a controlled leakage rate established in addition to the normal containment leakage rate. The integrated leakage rate test validity was established by comparing $L_V'$ and $L_V$, where:

$$L_V' = L_c - L_o$$

Lv = Measured integrated leakage rate (wt %/day)

$L_c$ = Leakage measured during controlled bleed (wt%/day)

$L_o$ = Controlled bleed rate (wt%/day)

As described in 10CFR 50, Appendix J, results from the controlled leak test are acceptable provided $L_v' - L_v$ is less than or equal to 0.25 $L_t$. For Monticello with an allowable $L_t$ of 1.2 wt%/day the requirement is that $L_v' - L_v \leq 0.3$ wt %/day.

Throttle valve R (Figure 1) was adjusted for approximately $L_o = L_v$ through the controlled bleed rotameter. Rotameter indication and actual bleed rate were related in the following manner.

$$L_o \text{ (wt\%/day)} = \frac{F\, S_{cf}}{V_c} \; \frac{14.7}{P_c} \; \frac{1400 \text{ min}}{\text{day}} \; 100\%$$

F = [Rotameter indicated flowrate] = 0.9 scfm

$S_{cf}$ = [Rotameter scale factor correction for air metered at $P_c$ with 14.7 psia scale] = 1.88

$P_c$ = Average containment absolute pressure during controlled bleed = 56.40 psia

$V_c$ = Containment free air volume during testing = 247,353 $ft^3$

Data and calculations for the verification phase of the integrated leak rate test are tabulated in Appendix D.

## 5. Error Analysis

### 5.1 Type B and Type C Test Error Analysis

#### 5.1.1 Pressure Decay Method Error

The Type B and C test error analysis based on the pressure decay method has been performed using the method reported in the summary technical report submitted August 3, 1973 entitled "Reactor Containment Building Integrated Leak Test - May, 1973." A more accurate pressure gauge, with a certified accuracy of 0.1% of full scale was employed in the November 1975 testing, however, resulting in lower estimated errors of:

[TYPE B TEST 95% CONFIDENT INTERVAL] = L ± 0.08 scfh

[TYPE C TEST 95% CONFIDENCE INTERVAL] = L ± 0.58 scfh

5.1.2 Rotameter Method Error

For the rotameter method, two different rotameters were used. One, a Fischer Porter Model 7112A0997A2 with a 600 millimeter scale graduated from 0.5 to 4.5 scfm was certified accurate to 0.001 scfm or 0.02% of full scale. For results in scfh, the rotameter has a 1.2% error. The second rotameter, a Brooks Model 1110-01H161A, using a glass float and 10 to 100% scale, has a published industrial accuracy of ± 2% of full scale. With the glass float, full scale corresponds to 8.05 scfh, so error in measurement is ± 0.16 scfh.

5.2 Type A Test Error Analysis

The test data has been subjected to a standard error analysis. The results of this analysis are presented in Appendix E.

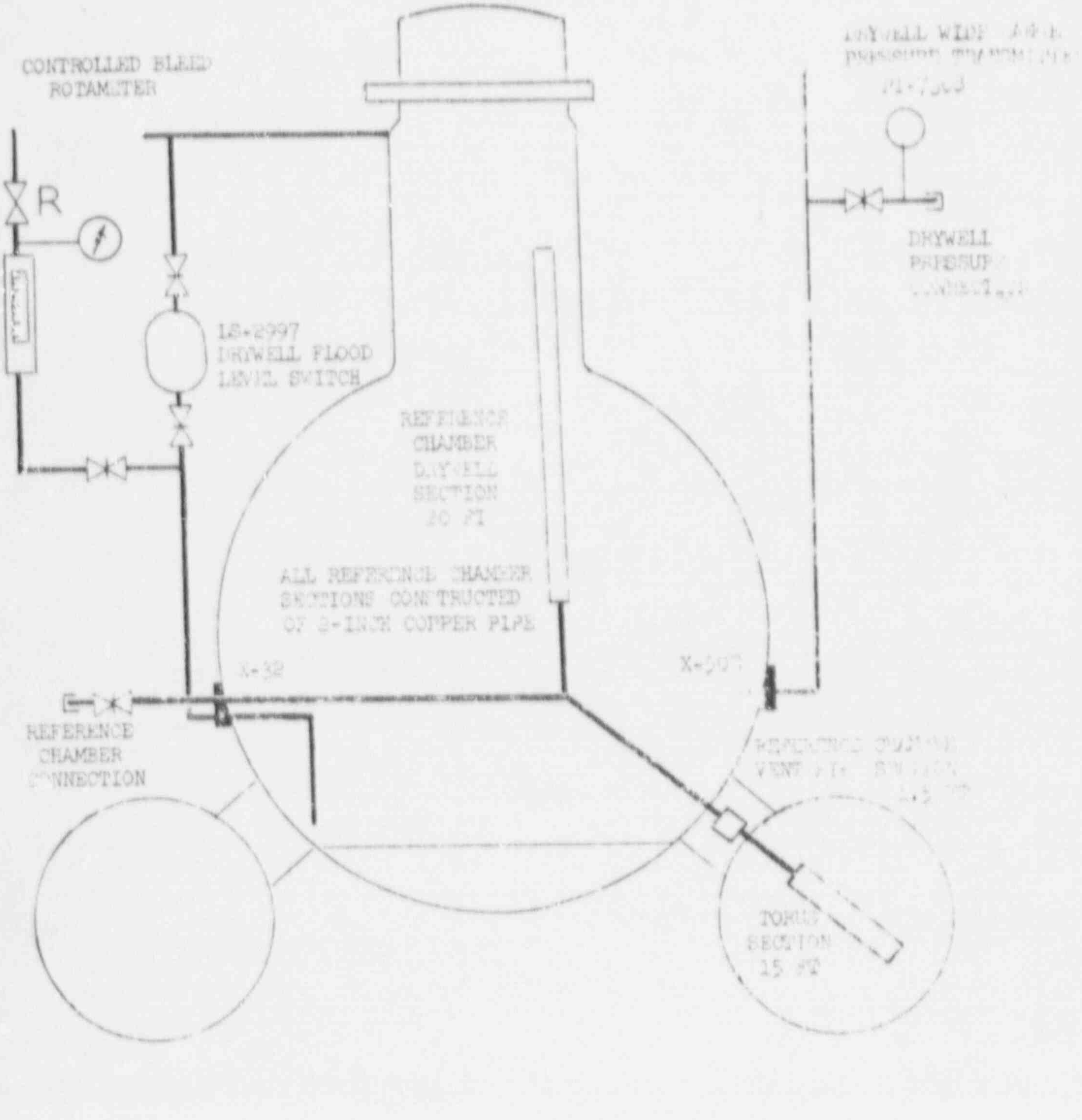


FIG. 1 Cross section of containment vessel showing location of reference chamber and controlled bleed rotometer connection.

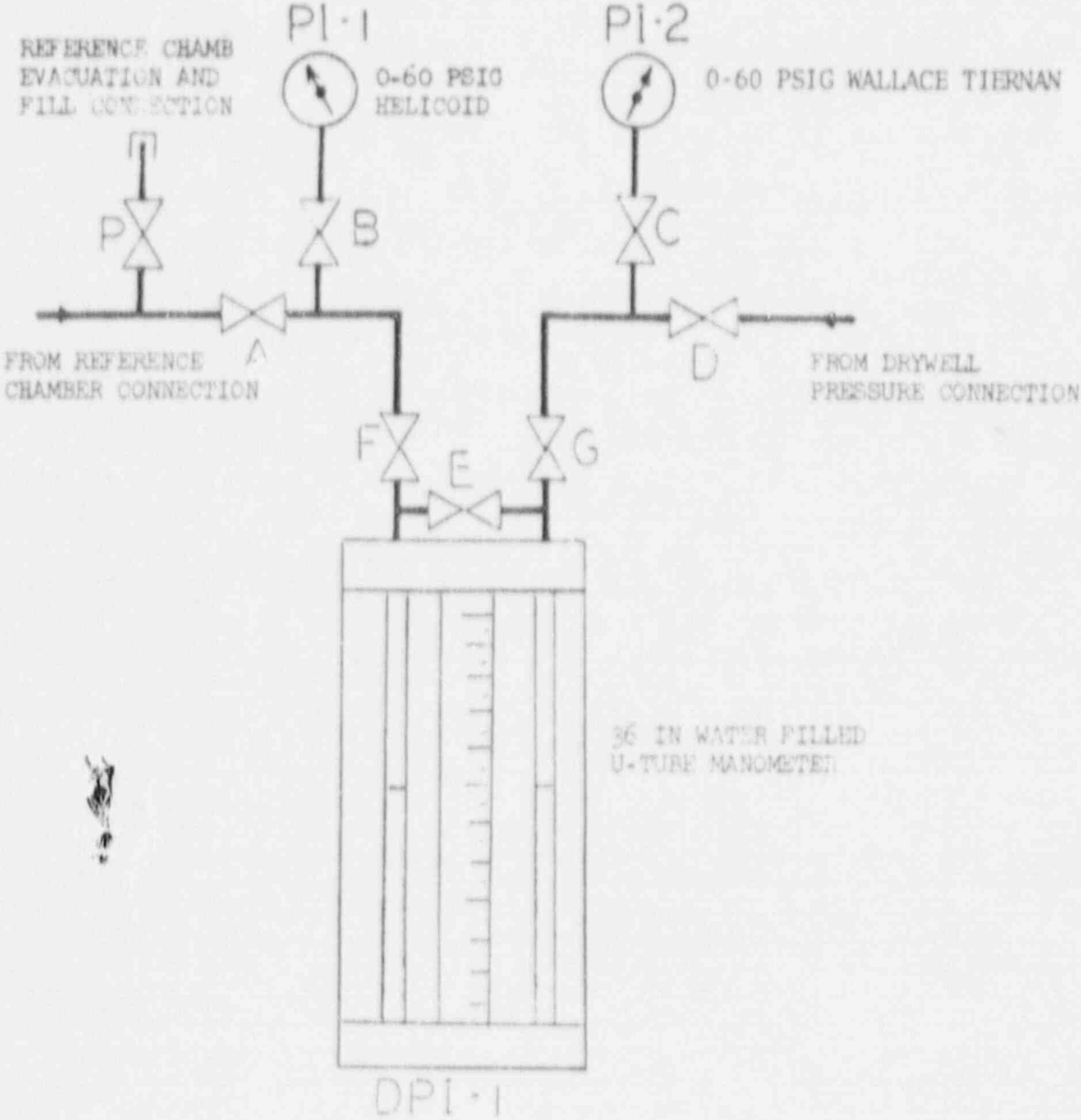


FIG. 2 Installation details of the test manometer
and pressure gauges.

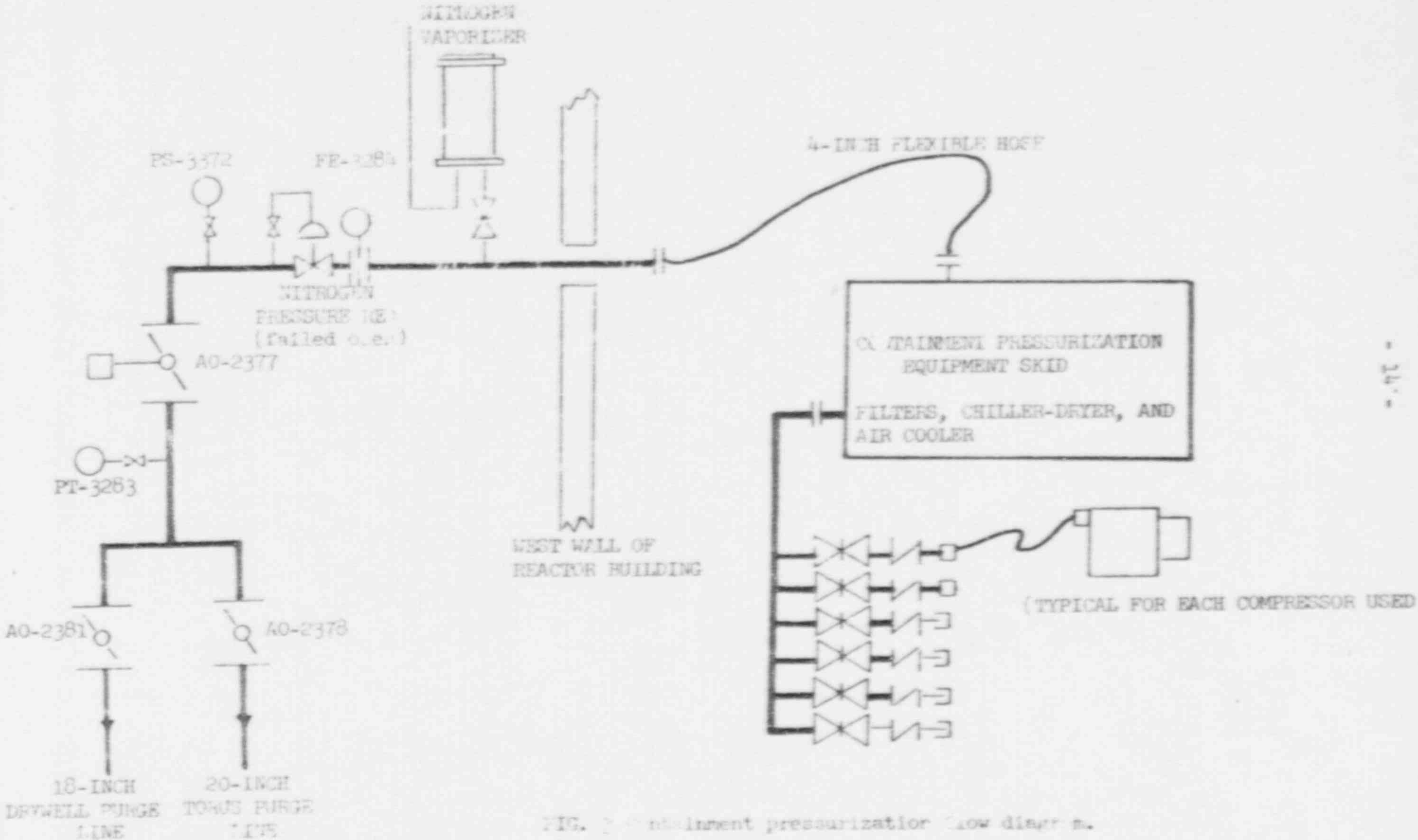


FIG. 2 Containment pressurization flow diagram.

TABLE 1. SUMMARY OF TYPE B AND TYPE C TEST RESULTS - NOVEMBER 1975

| Type of Test | Leakage (scfh) As Found | Leakage (scfh) As Left | No. Components Tested | No. Components Needing Repair |
|---|---|---|---|---|
| Double Gasketed Seal Type B Tests (combined leakage) | 23.51 | 4.82 | 14 | 3 |
| All other Type B Tests (combined leakage) | 4.65 | 4.65 | 48 | 0 |
| All Type C Tests except Main Steam Isolation Valves (combined leakage) | 1045 Note 1 | 76.07 Note 1 | 68 | 8 |
| Main Steam Isolation Valves | | | 8 | 4 |
| AO 2-80A | 21.87 | 0.00 | | |
| AO 2-86A | 24.95 | 0.00 | | |
| AO 2-80B | 4.45 | 4.45 | | |
| AO 2-86B | 8.65 | 8.65 | | |
| AO 2-80C | 10.85 | 0.00 | | |
| AO 2-86C | 33.26 | 0.00 | | |
| AO 2-80D | 2.20 | 2.20 | | |
| AO 2-86D | 9.98 | 9.98 | | |

NOTES: 1. Total "as found" and "as left" leakage was determined based on a worst single failure analysis

TABLE 2. DRYWELL DEWCELS AND RTD's

| Sensor Type | Sensor No. | Computer Point | Location * Elevation | Azimuth | Volume Weighting Factor |
|---|---|---|---|---|---|
| Dewcel | 1 | D126 | 933 | 0 | .2158 |
| | 2 | D127 | 951 | 90 | .2050 |
| | 3 | D128 | 966 | 180 | .0787 |
| | 4 | D129 | 994 | 270 | .0936 |
| RTD | 1 | C133 | 933 | 0 | .0537 |
| | 2 | C134 | 933 | 90 | .0537 |
| | 3 | C135 | 933 | 180 | .0537 |
| | 4 | C136 | 933 | 270 | .0537 |
| | 5 | C137 | 951 | 0 | .0513 |
| | 6 | C138 | 951 | 90 | .0513 |
| | 7 | C139 | 951 | 180 | .0513 |
| | 8 | C140 | 951 | 270 | .0513 |
| | 9 | C141 | 966 | 0 | .0198 |
| | 10 | C142 | 966 | 90 | .0198 |
| | 11 | C143 | 966 | 180 | .0198 |
| | 12 | C144 | 966 | 270 | .0198 |
| | 13 | F152 | 994 | 0 | .0235 |
| | 14 | F153 | 994 | 90 | .0235 |
| | 15 | F154 | 994 | 180 | .0235 |
| | 16 | F155 | 994 | 270 | .0235 |

TABLE 3. TORUS DEWCELS AND RTD's

| Sensor Type | Sensor No. | Computer Point | Location * Elevation | Azimuth | Volume Weighting Factor |
|---|---|---|---|---|---|
| Dewcel | 5 | D130 | 915 | 0 | .2034 |
| | 6 | D131 | 915 | 180 | .2034 |
| RTD | 17 | F156 | 915 | 0 | .1017 |
| | 18 | F157 | 915 | 90 | .1017 |
| | 19 | F158 | 915 | 180 | .1017 |
| | 20 | F159 | 915 | 270 | .1017 |

* Referenced to drywell floor at 920.5 ft., the torus center line at 912.5 ft, and the drywell airlock at 0 degrees.

TABLE 4. TEST INSTRUMENT DATA

| Instrument | Range | Manufacturer | Serial | Certification |
|---|---|---|---|---|
| Dewcels | -50°F to + 142°F Dewpoint | FOXBORO | DV 248<br>DV 255<br>EA 465<br>EA 544<br>E6 244<br>E6 264 | Manufacturer's Certification and comparison check with a certified decade resistance box. |
| RTD's | -15°F to + 185°F Ambient | ROSEMOUNT | #96673 thru #96694 | Manufacturer's Certification and comparison check with a certified decade resistance box. |
| Barometer | 36" Mercury | MERIAM | G-75731 | Manufacturer's certification. |
| PI-2 | 0-60 PSIG | WALLACE TIERNAN | UU-13922 | Compared with certified test device. |
| PI-1 | 0-60 PSIG | ACCO HELICOID | 2719-0 | Compared with certified test device. |
| DPI-1 | 36" $H_2O$ | MERIAM | NONE | Manufacturer's certified scale. |
| Flow Rator | 0-4.6 SCFM | FISCHER PORTER | 7112 AO 997-A2 | Compared to certified Rotameter |

APPENDIX A. TYPE B AND TYPE C TEST DATA AND RESULTS - FALL 1975

| Valve or Penetration | Test Volume ($ft^3$) | Technical Specification Leakage Limit | Measured Leak Rate (SCFH) As Found | As Left |
|---|---|---|---|---|
| X-230 | 0.76 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-100A | 2.26 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-100B | 2.31 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-100C | 1.92 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-100D | 2.05 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-101B | 1.93 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-101D | 1.97 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-103 | 2.05 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-104A | 1.94 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-104B | 2.06 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-104C | 1.93 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-104D | 2.05 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-105A | 1.92 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-105C | 2.05 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-105D | 1.93 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| AO 2541A & AO 2541B | .044 | 17.2 SCFH @ 41 psig | 1.73 | 1.73 |
| AO 2561A & AO 2561B | .044 | 17.2 SCFH @ 41 psig | 336 | 0.21 |
| $N_2$ Control System Sample Valves (Note 1) | 0.25 | 17.2 SCFH @ 41 psig | 0.12 | 0.12 |
| CV 3267 CV 3268 & CV 3269 | 1.15 | 17.2 SCFH @ 41 psig | 0.15 | 0.15 |
| MO 2373 & MO 2374 | 0.973 | 17.2 SCFH @ 41 psig | 306 | 0.01 |
| AO 2-80A | 40.74 | 11.5 SCFH @ 25 psig | 21.87 | 0.00 |
| AO 2-86A | 40.74 | 11.5 SCFH @ 25 psig | 24.95 | 0.00 |
| AO 2-80B | 40.74 | 11.5 SCFH @ 25 psig | 4.45 | 4.45 |
| AO 2-86B | 40.74 | 11.5 SCFH @ 25 psig | 8.65 | 8.65 |
| AO 2-80C | 40.74 | 11.5 SCFH @ 25 psig | 10.85 | 0.00 |
| AO 2-86C | 40.74 | 11.5 SCFH @ 25 psig | 33.26 | 0.00 |

APPENDIX A (contd)

| Valve or Penetration | Test Volume(ft$^3$) | Technical Specification Leakage Limit | Measured Leak Rate(SCFH) | |
|---|---|---|---|---|
| | | | As Found | As Left |
| AO 2-80D | 40.74 | 11.5 SCFH @ 25 psig | 2.20 | 2.20 |
| AO 2-86D | 40.74 | 11.5 SCFH @ 25 psig | 9.98 | 9.98 |
| AO 2379 & DWV 8-2 | 11.8 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| AO 2380 & DWV 8-1 | 11.8 | 17.2 SCFH @ 41 psig | 2.02 | 2.02 |
| AO 2377 AO 2378 & AO 2381 | 210 | 17.2 SCFH @ 41 psig | 0.86 | 0.86 |
| AO 2386 AO 2387 & CV 2385 | 3.7 | 17.2 SCFH @ 41 psig | 0.36 | 0.36 |
| AO 2896 AO 2383 & CV 2384 | 3.7 | 17.2 SCFH @ 41 psig | 7.55 | 7.55 |
| MO 2034 & MO 2035 | 10.4 | 17.2 SCFH @ 41 psig | 0.89 | 0.89 |
| HPCI-9 | 6.7 | 17.2 SCFH @ 41 psig | 21.88 | 14.77 |
| HPCI-14 | 0.05 | 17.2 SCFH @ 41 psig | 0.02 | 0.02 |
| RCIC-9 | 1.1 | 17.2 SCFH @ 41 psig | 0.10 | 0.10 |
| RCIC-16 | 0.06 | 17.2 SCFH @ 41 psig | 3.05 | 3.05 |
| CV 2790 & CV 2791 | 0.04 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| MO 2075 & MO 2076 | 1.46 | 17.2 SCFH @ 41 psig | 0.03 | 0.03 |
| XP-6 | 0.14 | 17.2 SCFH @ 41 psig | 60 | 0.06 |
| MO 2397 & MO 2398 | 1.7 | 17.2 SCFH @ 41 psig | 12.42 | 12.42 |
| FW 94-1 | 18.8 | 17.2 SCFH @ 41 psig | 0.38 | 0.38 |
| FW 94-2 | 18.8 | 17.2 SCFH @ 41 psig | 1.23 | 1.23 |
| FW 97-1 | 6.9 | 17.2 SCFH @ 41 psig | 0.68 | 0.68 |
| FW 97-2 | 6.9 | 17.2 SCFH @ 41 psig | 0.37 | 0.37 |
| AO 10-46A | 44.1 | 17.2 SCFH @ 41 psig | 1.26 | 1.26 |
| AO 10-46B | 43.1 | 17.2 SCFH @ 41 psig | 1.94 | 1.94 |
| MO 2014 | 80.9 | 17.2 SCFH @ 41 psig | 2.31 | 2.31 |
| MO 2015 | 77.1 | 17.2 SCFH @ 41 psig | 0.32 | 0.32 |

APPENDIX A (contd)

| Valve or Penetration | Test Volume($ft^3$) | Technical Specification Leakage Limit | Measured Leak Rate (SCFH) As Found | As Left |
|---|---|---|---|---|
| MO 2020 & MO 2022 | 5.9 | 17.2 SCFH @ 41 psig | 0.07 | 0.05 |
| MO 2021 & MO 2023 | 13.7 | 17.2 SCFH @ 41 psig | 0.17 | 1.40 |
| MO 2026 & MO 2027 | 1.23 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| MO 2029 | 20.8 | 17.2 SCFH @ 41 psig | 9.25 | 9.25 |
| MO 2030 | 83.7 | 17.2 SCFH @ 41 psig | 12.53 | 12.53 |
| MO 1753 | 8.3 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| MO 1754 | 7.13 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| AO 14-13A | 2.5 | 17.2 SCFH @ 41 psig | 29.12 | 12.87 |
| AO 14-13B | 1.69 | 17.2 SCFH @ 41 psig | 103.5 | 13.42 |
| CRD-31 | 1.2 | 17.2 SCFH @ 41 psig | 450 | 10.2 |
| CV 7436 | 0.011 | 17.2 SCFH @ 41 psig | 0.28 | 0.28 |
| CV-7437 | 0.016 | 17.2 SCFH @ 41 psig | 0.58 | 0.58 |
| Airlock | 380 | Ensure Sealing @ 10 psig | Not tested | 4.94 |
| Torus Manway Northeast | Note 2 | Note 3 | 0.04 | 0.01 Note 4 |
| Torus Manway Southwest | Note 2 | Note 3 | 0.01 | 0.01 Note 4 |
| Drywell Head | Note 2 | Note 3 | 0.05 Note 5 | 0.01 |
| Drywell Head Manway | Note 2 | Note 3 | 0.01 | 0.01 |
| CRD Manway | Note 2 | Note 3 | 0.00 | 0.00 |
| Drywell Equipment Hatch | Note 2 | Note 3 | 4.74 | 4.69 |
| Seismic Restraint Port A | Note 2 | Note 3 | 0.73 | 0.00 |
| Seismic Restraint Port B | Note 2 | Note 3 | 0.00 | 0.00 |

APPENDIX A (contd)

| Valve or Penetration | Test Volume($ft^3$) | Technical Specification Leakage Limit | Measured Leak Rate (SCFH) | |
|---|---|---|---|---|
| | | | As Found | As Left |
| Seismic Restraint Port C | Note 2 | Note 3 | 0.005 | 0.005 |
| Seismic Restraint Port D | Note 2 | Note 3 | 14.76 | 0.00 |
| Seismic Restraint Port E | Note 2 | Note 3 | 0.00 | 0.00 |
| Seismic Restraint Port F | Note 2 | Note 3 | 0.00 | 0.00 |
| Seismic Restraint Port G | Note 2 | Note 3 | 0.01 | 0.01 |
| Seismic Restraint Port H | Note 2 | Note 3 | 3.15 | 0.06 |
| X-7A Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.03 | 0.03 |
| X-7A Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-7B Inboard | Note 2 | 17.2 SCFH @ 41 psig | 1.33 | 1.33 |
| X-7B Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.83 | 0.83 |
| X-7C Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-7C Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-7D Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-7D Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.[illegible] | 0.04 |
| X-8A Inboard | Note 2 | 17.2 SCFH # 41 psig | 0.11 | 0.11 |
| X-8A Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-9A Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |

APPENDIX A (contd)

| Valve or Penetrant | Test Volume($ft^3$) | Technical Specification Leakage Limit | Measured Leak Rate (SCFH) As Found | As Left |
|---|---|---|---|---|
| X-9A Outboard | Note 2 | 17.2 SCFH @ 41 psig | 1.41 | 1.41 |
| X-9B Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-9B Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-10 Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-10 Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.01 | 0.01 |
| X-11 Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-11 Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-12 Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-12 Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-13A Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-13A Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.11 | 0.11 |
| X-13B Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-13B Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.03 | 0.03 |
| X-14 Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.04 | 0.04 |
| X-14 Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-16A Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-16A Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.00 | 0.00 |
| X-16B Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.10 | 0.10 |
| X-16B Outboard | Note 2 | 17.2 SCFH @ 41 psig | 0.39 | 0.39 |
| X-17 Inboard | Note 2 | 17.2 SCFH @ 41 psig | 0.18 | 0.18 |
| X-17 Outboard | Note 2 | Note 3 | 0.00 | 0.00 |

NOTES: 1. The following valves were tested as a group by pressurizing a common drain line manifold

CV 3305 & CV 3306

CV 3307 & CV 3308

CV 3309 & CV 3310

CV 3311 & CV 3312

CV 3313 & CV 3314

2. The volumes of the toroidal spaces in the double-gasketed seals are uncertain due to the presence of flexible rubber, and in any case are quite small. For all seals except the drywell head, the volume of the test rig was used as the test volume. For the drywell head, twice the volume of the test rig was used as the test volume.

The expansion bellows penetration similarly have a small volume and the volume of the test rig was used as the test volume.

3. The Technical Specification for double-gasketed seals is that the total leakage not exceed 34.4 scfh/hr @ 41 psig. No specification is given for an individual double-gasketed seal.

4. The "as left" leak rate for these penetrations was the leak rate measured immediately prior to the integrated leakage rate test. All Type B penetrations opened for the outage were retested when closed.

5. Drywell head "as found" is "as left" leakage from previous outage. Could not test due to bad test connection. After maintenance, seals were tested after re-installation.

APPENDIX B

## SUMMARY REPORT OF ALL TYPE C TESTS FAILING TO MEET THE LEAKAGE ACCEPTANCE CRITERIA

Fall 1975

Local leakage tests were conducted on all testable isolation valves during the Fall 1975 Monticello refueling outage. Of the 76 valves tested, 12 failed to meet applicable individual leakage limits.

The following is a summary of the causes of leakage and corrective actions taken for these valves:

a) Main Steam Isolation Valves

Three MSIV's were found to exceed the Technical Specification leakage limit and the initial test results for one additional MSIV were questionable. All were disassembled. No defects such as cracks, chips, or scratches could be observed. The pilot valve and main poppet seats were lapped on all four valves and they were reassembled. All valves exhibited zero leakage following repairs.

b) Core Spray Isolation Check Valves

Both core check valves, AO 14-13A and AO 14-13B, were disassembled and the valve internals examined. The cause of leakage was determined to be an accumulation of scale on valve seating surfaces of both valves. The valve seats were cleaned and valves reassembled, with satisfactory leak testing following reassembly.

c) Drywell Equipment Drain Sump Isolation Valves

Both drywell equipment drain sump isolation valves, AO 2561A and AO 2561B, were separately disassembled and examined. A piece of flexitallic gasket from maintenance work on an upstream valve was found lodged in the seat of AO 2561A. Valve seats in both valves were cleaned and the valves were reassembled. The valves were subsequently satisfactorily tested.

d) Standby Liquid Control Isolation Check Valve

The SBLC Isolation Check Valve, XP-6, was disassembled and examined, revealing scale accumulation on the valve seating surface. The valve seat was cleaned and lapped and the valve reassembled and satisfactorily tested.

e) Control Rod Drive Isolation Check Valve

CRD-31 was disassembled and found to have scale accumulations on the valve seating surface. The valve seat was cleaned and lapped, valve reassembled and satisfactorily tested.

f) Main Steam Inboard Drain Isolation Valve

Leak testing between the main steam line drain isolation valves, MO 2373 and 2374, showed that the inboard valve, MO 2373, was leaking excessively.

APPENDIX B (contd)

Due to high contact exposure rate, the valve seating surface and valve internals were not inspected. The valve was replaced with a similar valve and both isolation valves were then satisfactorily leak tested.

g) HPCI Turbine Exhaust Check Valve

The HPCI Turbine Exhaust Check Valve, HPCI-9, was disassembled and examined. Scratches were found on the valve seating surface. The valve seat was cleaned and lapped and the valve was reassembled. A satisfactory leak test followed maintenance on the valve.

APPENDIX C

## TYPE A TEST DATA AND CALCULATIONS

| DATE | TIME | Containment Press (psia) | Containment Press (In $H_2O$) | Containment Average Temp(°R) | Containment Ave. Vapor Press. (in $H_2O$) | Containment-Ref Chamber DP( in $H_2O$) | Test Internal (Hours) | Calculated Rate (wt %/24 Hour) |
|---|---|---|---|---|---|---|---|---|
| 11-13 | 1000 | 56.11 | 1554.85 | 527.17 | 4.85 | — | 0 | - |
| | 1100 | 56.17 | 1556.47 | 526.47 | 4.76 | -2.84 | 1 | -4.849 |
| | 1200 | 56.43 | 1563.69 | 529.86 | 5.55 | -2.38 | 1 | 1.904 |
| | 1300 | 56.51 | 1565.91 | 531.24 | 5.74 | -1.12 | 1 | 2.218 |
| | 1400 | 56.55 | 1566.89 | 532.17 | 5.87 | -0.14 | 1 | 1.694 |
| | 1500 | 56.56 | 1567.34 | 532.85 | 5.92 | 0.90 | 1 | 1.664 |
| | 1600 | 56.572 | 1567.62 | 533.39 | 6.04 | 1.88 | 1 | 1.680 |
| | 1700 | 56.88 | 1567.90 | 533.84 | 5.89 | 2.82 | 1 | 1.204 |
| | 1800 | 56.58 | 1567.90 | 534.22 | 6.06 | 3.81 | 1 | 1.774 |
| | 1900 | 56.57 | 1567.62 | 534.54 | 6.08 | 4.77 | 1 | 1.498 |
| | 2000 | 56.59 | 1567.52 | 534.83 | 6.06 | 5.65 | 1 | 1.313 |
| | 2100 | 56.55 | 1567.11 | 535.08 | 6.18 | 6.59 | 1 | 1.622 |
| | 2200 | 56.52 | 1566.14 | 535.30 | 6.16 | 7.51 | 1 | 1.377 |
| | 2300 | 56.51 | 1565.86 | 535.50 | 6.20 | 8.30 | 1 | 1.270 |
| 11-14 | 0000 | 56.48 | 1565.06 | 535.67 | 6.18 | 9.27 | 1 | 1.456 |
| | 0100 | 56.46 | 1564.51 | 535.84 | 6.21 | 10.10 | 1 | 1.317 |
| | 0200 | 56.46 | 1564.51 | 535.99 | 6.18 | 10.39 | Period of | 0.3938 |
| | 0300 | 56.46 | 1564.60 | 536.14 | 6.26 | 10.58 | stabilization | 0.4091 |
| | 0400 | 56.45 | 1564.33 | 536.27 | 6.24 | 10.84 | & Preliminary | 0.3637 |
| | 0500 | 56.46 | 1564.61 | 536.39 | 6.32 | 11.04 | Calculations | 0.4105 |
| | 0600 | 56.45 | 1564.34 | 536.49 | 6.28 | 11.34 | Following Isol- | 0.4113 |
| | 0600 | 56.45 | 1564.34 | 536.49 | 6.28 | 0.09 | ation of Leakage | - |
| | 0700 | 56.45 | 1564.21 | 536.60 | 6.24 | 0.30 | 1 | 0.2601 |
| | 0800 | 56.46 | 1564.49 | 536.70 | 6.23 | 0.49 | 1 | 0.2757 |
| | 0900 | 56.46 | 1564.49 | 536.78 | 6.30 | 0.67 | 1 | 0.3840 |
| | 1000 | 56.45 | 1564.36 | 536.88 | 6.28 | 0.90 | 1 | 0.3218 |
| | 1100 | 56.45 | 1564.36 | 536.95 | 6.32 | 1.06 | 1 | 0.3070 |
| | 1200 | 56.44 | 1564.10 | 537.03 | 6.36 | 1.21 | 1 | 0.2913 |
| | 1300 | 56.44 | 1563.83 | 537.10 | 6.39 | 1.38 | 1 | 0.3070 |
| | 1400 | 56.43 | 1563.70 | 537.17 | 6.36 | 1.58 | 1 | 0.2607 |
| | 1500 | 56.43 | 1563.71 | 537.24 | 6.36 | 1.70 | 1 | 9.1835 |
| | 1600 | 56.43 | 1563.57 | 537.32 | 6.40 | 1.90 | 1 | 0.3684 |
| | 1700 | 56.42 | 1563.44 | 537.38 | 6.37 | 2.01 | 1 | 0.1220 |
| | 1800 | 56.42 | 1563.30 | 537.45 | 6.38 | 2.18 | 1 | 0.2761 |
| | 1900 | 56.42 | 1563.44 | 537.52 | 6.43 | 2.34 | 1 | 0.3224 |
| | 2000 | 56.41 | 1563.17 | 537.57 | 6.46 | 2.43 | 1 | 0.1839 |
| | 2100 | 56.40 | 1562.90 | 537.63 | 6.44 | 2.60 | 1 | 0.2300 |
| | 2200 | 56.40 | 1562.90 | 537.70 | 6.48 | 2.76 | 1 | 0.3069 |

APPENDIX C (contd)

TYPE A TEST DATA AND CALCULATIONS

| DATE | TIME | Containment Press (psia) | Containment Press (In $H_2O$) | Containment Average Temp(°R) | Containment Ave. Vapor Press. (in $H_2O$) | Containment-Ref. Chamb-r DP (in $H_2O$) | Test Internal (Hours) | Calculated Rate (wt %/24 Hour) |
|---|---|---|---|---|---|---|---|---|
| 11-14 | 2300 | 56.40 | 1562.91 | 537.75 | 6.55 | 2.94 | 1 | 0.3846 |
| 11-15 | 0000 | 56.40 | 1562.91 | 537.80 | 6.47 | 3.09 | 1 | 0.1067 |
| | 0100 | 56.39 | 1562.49 | 537.87 | 6.51 | 3.22 | 1 | 0.2605 |
| | 0200 | 56.39 | 1562.49 | 537.91 | 5.54 | 3.38 | 1 | 0.2923 |
| | 0300 | 56.38 | 1562.22 | 537.97 | 6.56 | 3.46 | 1 | 0.1527 |
| | 0400 | 56.37 | 1561.95 | 538.02 | 6.45 | 3.61 | 1 | 0.0603 |
| | 0500 | 56.37 | 1561.98 | 538.06 | 6.53 | 3.74 | 1 | 0.3233 |
| | 0600 | 56.37 | 1561.98 | 538.12 | 6.44 | 3.88 | 1 | 0.0754 |
| | 0700 | 56.37 | 1561.98 | 538.16 | 6.48 | 4.00 | 1 | 0.2460 |
| | 0800 | 56.36 | 1561.83 | 538.21 | 6.49 | 4.15 | 1 | 0.2456 |
| | 0900 | 56.35 | 1561.55 | 538.26 | 6.47 | 4.26 | 1 | 0.1375 |
| | 1000 | 56.35 | 1561.41 | 538.30 | 6.44 | 4.46 | 1 | 0.2614 |

Average of 5 24-hour interval calculations 0.2456

APPENDIX C (cont'd) TYPE A TEST DATA AND CALCULATIONS

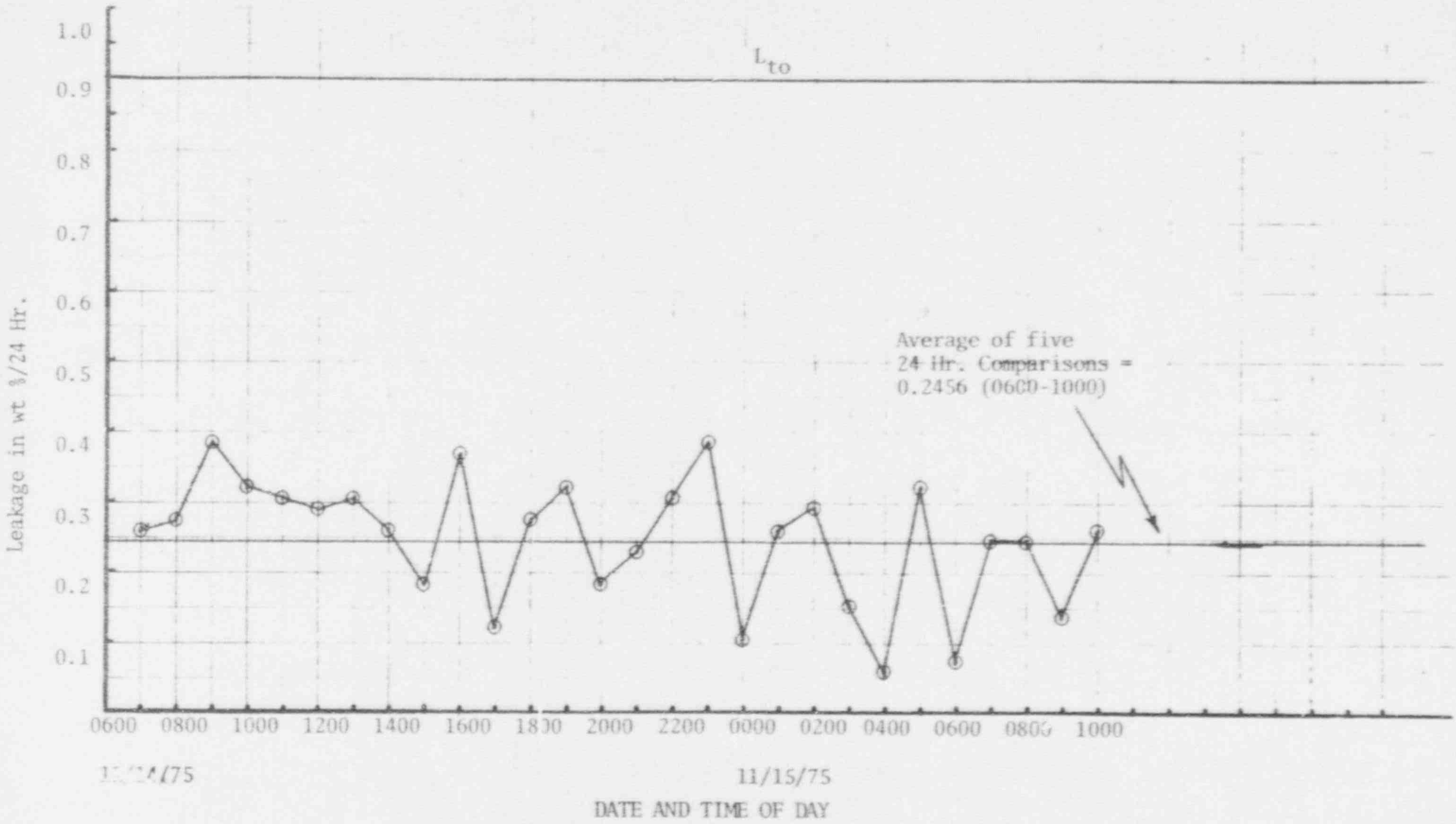


FIG. C-1. Point to Point Plot of Hourly Leak Rate Calculations

APPENDIX D

## TYPE A TEST VERIFICATION DATA AND CALCULATIONS

| DATE | TIME | Containment Press. (psia) | Containment Press. (In $H_2O$) | Containment Average Temp(°R) | Containment Ave. Vapor Press(in $H_2O$) | Containment-Ref Chamber DP(in$H_2O$) | Test Internal (Hours) | Calculated Rate (wt %/24 Hour) |
|---|---|---|---|---|---|---|---|---|
| 11-15 | 1100 | 56.35 | 1561.41 | 538.34 | 6.43 | 4.70 | 0 | - |
| | 1200 | 56.32 | 1560.71 | 538.39 | 6.43 | 5.00 | 1 | 0.4620 |
| | 1300 | 56.32 | 1560.71 | 538.44 | 6.44 | 5.27 | 1 | 0.4312 |
| | 1400 | 56.31 | 1560.30 | 538.48 | 6.41 | 5.58 | 1 | 0.4316 |
| | 1500 | 56.29 | 1559.75 | 538.53 | 6.43 | 5.86 | 1 | 0.4622 |
| | 1600 | 56.28 | 1559.61 | 538.58 | 6.37 | 6.18 | 1 | 0.4005 |
| | 1700 | 56.28 | 1559.60 | 538.63 | 6.36 | 6.43 | 1 | 0.3695 |
| | | | | | | | | 0.4262 |
| | | | | | | | | Ave. of 6 |

$L_c$ = 0.4262 wt %/day

$L_o$ = 0.2567

$L'_v$ = 0.4262 - 0.2567
= 0.1695

$L_v - L'_v$ = 0.2456 - 0.1695
= 0.0761 $\leq$ 0.3

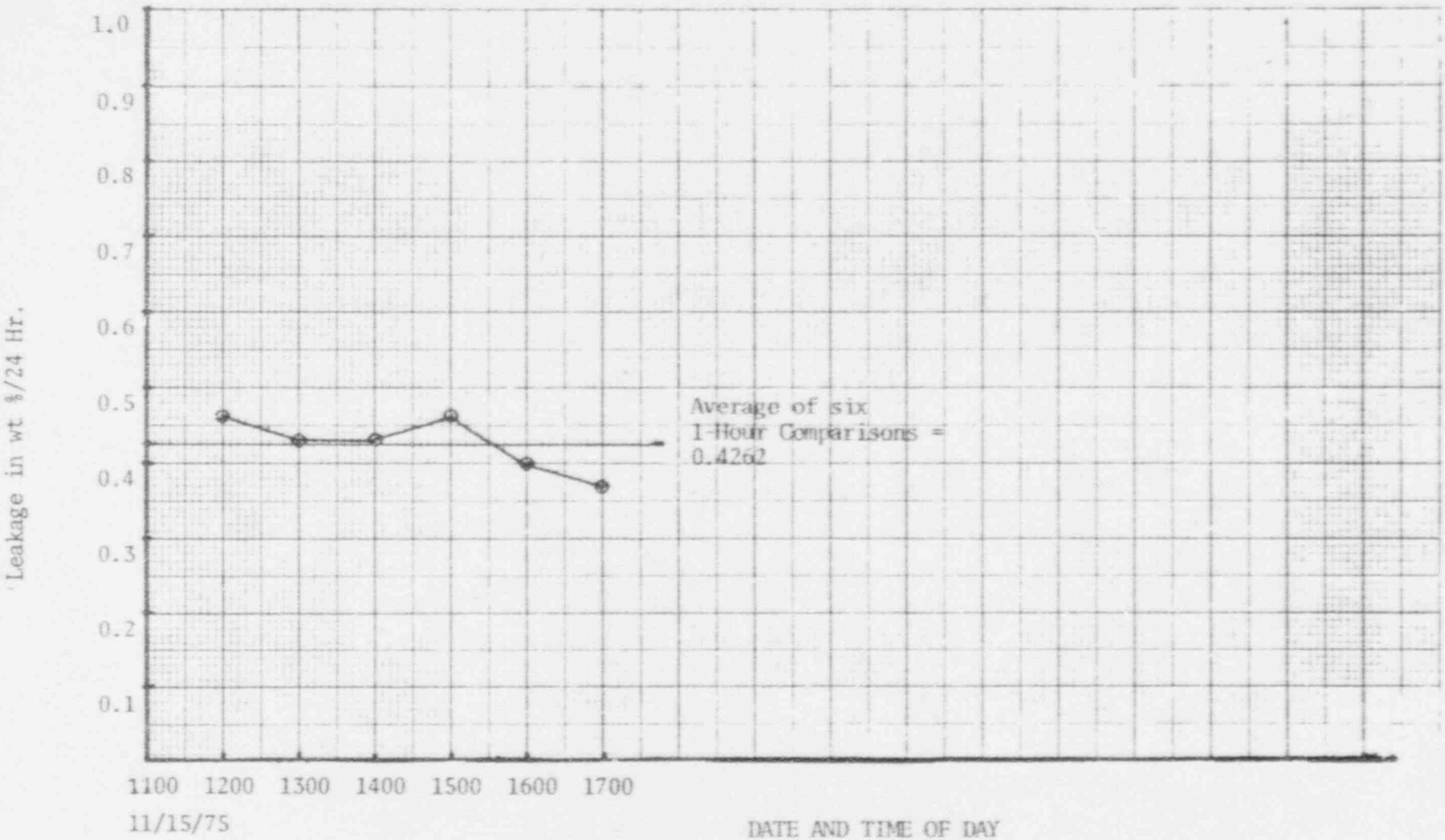


FIG. D-1. Point to Point Plot of Hourly Leak Rate Calculations During Controlled Bleed Test

MONTICELLO ILRT POINT TO POINT DATA - NOVEMBER, 1975

STATISTICAL ANALYSIS

INPUT XDATA IS:

1.00000E 00 2.00000E 00 3.00000E 00 4.00000E 00 5.00000E 00 6.00000E 00

7.00000E 00 8.00000E 00 9.00000E 00 1.00000E 01 1.10000E 01 1.20000E 01

1.30000E 01 1.40000E 01 1.50000E 01 1.60000E 01 1.70000E 01 1.80000E 01

1.90000E 01 2.00000E 01 2.10000E 01 2.20000E 01 2.30000E 01 2.40000E 01

2.50000E 01 2.60000E 01 2.70000E 01 2.80000E 01

INPUT YDATA IS:

2.60100E-01 2.75700E-01 3.84000E-01 3.21800E-01 3.07000E-01 2.91300E-01

3.07000E-01 2.60700E-01 1.83500E-01 3.68400E-01 1.22000E-01 2.76100E-01

3.22400E-01 1.83900E-01 2.30000E-01 3.06900E-01 3.84600E-01 1.06700E-01

2.60500E-01 2.92300E-01 1.52700E-01 6.03000E-02 3.23300E-01 7.54000E-02

2.46000E-01 2.45600E-01 1.37500E-01 2.61400E-01

THE MEAN OF THE 28 YDATA POINTS IS: 2.48111E-01
THE STANDARD DEVIATION OF EACH YDATA POINT IS: 8.93454E-02
THE STANDARD DEVIATION OF THE MEAN IS: 1.68847E-02

STUDENTS T DISTRIBUTION ERROR BASED ON 27 DEGREES OF FREEDOM

THE 95 PCNT CONFIDENCE INTERVAL IS: 2.82809E-01, 2.13413E-01

MONTICELLO ILRT 24-HOUR COMPARISON LEAKAGE CALCULATIONS - NOVEMBER, 1975

STATISTICAL ANALYSIS

INPUT XDATA IS:

1.00000E 00 2.00000E 00 3.00000E 00 4.00000E 00 5.00000E 00

INPUT YDATA IS:

2.51500E-01 2.50900E-01 2.45600E-01 2.39400E-01 2.36900E-01

THE MEAN OF THE 5 YDATA POINTS IS: 2.45660E-01
THE STANDARD DEVIATION OF EACH YDATA POINT IS: 6.94643E-03
THE STANDARD DEVIATION OF THE MEAN IS: 3.10654E-03

STUDENTS T DISTRIBUTION ERROR BASED ON 4 DEGREES OF FREEDOM

THE 95 PCNT CONFIDENCE INTERVAL IS: 2.54327E-01, 2.36993E-01

MONTICELLO ILRT VERIFICATION TEST - NOVEMBER, 1975

STATISTICAL ANALYSIS

INPUT XDATA IS:

1.00000E 00 2.00000E 00 3.00000E 00 4.00000E 00 5.00000E 00 6.00000E 00

INPUT YDATA IS:

4.62000E-01 4.31200E-01 4.31600E-01 4.62200E-01 4.00500E-01 3.69500E-01

THE MEAN OF THE 6 YDATA POINTS IS: 4.26167E-01
THE STANDARD DEVIATION OF EACH YDATA POINT IS: 3.60754E-02
THE STANDARD DEVIATION OF THE MEAN IS: 1.47277E-02

STUDENTS T DISTRIBUTION ERROR BASED ON 5 DEGREES OF FREEDOM

THE 95 PCNT CONFIDENCE INTERVAL IS: 4.64311E-01, 3.88022E-01

NRC DIST. UTION FOR PART 50 DOCKET M/ RIAL
(TEMPORARY FORM)

CONTROL NO: 821

FILE:

| FROM: Northern States Power Co<br>Minneapolis, Mn<br>L O Mayer | DATE OF DOC<br>1-23-76 | DATE REC'D<br>1-28-76 | | LTR<br>XXX | TWX | RPT | OTHER |
|---|---|---|---|---|---|---|---|
| TO:<br>Mr Stello | ORIG<br>one signed | CC | OTHER | SENT NRC PDR XX<br>SENT LOCAL PDR XX | | | |
| CLASS | UNCLASS XXXXXXn | PROP INFO | INPUT | NO CYS REC'D 1 | DOCKET NO: 50-263 | | |

DESCRIPTION:
Ltr trans the following:

ENCLOSURES:
"Reacfor Containment Building Ingegrated Leak Test - Nov 1975"..................

(40 cys encl red;d)

PLANT NAME: Monticeilo SCC RH

FOR ACTION/INFORMATION ENVIRO 1-28-76 ehf

SAFETY
ASSIGNED AD
BRANCH CHIEF Ziemann (6)
PROJECT MANAGER Buckley
LIC. ASST. Diggs W/16 CYS ACRS & all extras

ASSIGNED BRANCH CHIEF
PROJECT MANAGER
LIC ASST. W/ ACRS

INTERNAL DISTRIBUTION

REG FILES
NRC PDR
OELD
GOSSICK/STAFF
I&E (2)
MIPC
CASE

PROJECT MANAGEMENT
BOYD
P. COLLINS
HOUSTON
PETERSON
MELTZ
HELTEMES

SYSTEMS SAFETY
HEINEMAN
SCHROEDER

ENGINEERING
MACCARY
KNIGHT
SIHWEIL
PAWLICKI

REACTOR SAFETY
ROSS
NOVAK
ROSZTOCZY
CHECK

PLANT SYSTEMS
TEDESCO
BENAROYA
LAINAS
IPPOLITO

OPERATING REACTORS
STELLO

OPERATING TECH.
EISENHUT
SHAO
BAER
SCHWENCER
GRIMES

SITE SAFETY & ENVIRO ANALYSIS
DENTON
MULLER

ENVIRO TECH.
ERNST
BALLARD
SPANGLER

SITE TECH.
GAMMILL
STEPP
HULMAN

SITE ANALYSIS
VOLLMER
BUNCH
J. COLLINS
KREGER

AT&I
SALTZMAN
RUTBERG

MISCELLANEOUS

EXTERNAL DISTRIBUTION

LOCAL PDR Minneapolis, Mn
TIC
NSIC
ASLB

NATIONAL LAB W/ CYS
REGION V-I&E-(WALNUT CREEK)
LA PDR
CONSULTANTS

BROOKHAVEN NAT. LAB
ULRIKSON (ORNL)

914