

THREE MILE ISLAND NUCLEAR STATION UNIT 1

ADDENDUM TO

REACTOR CONTAINMENT BUILDING

INTEGRATED LEAK RATE TEST

APRIL 1977

METROPOLITAN EDISON COMPANY

SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORPORATION

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The measured leakage rate based on the mass point method of analysis and using absolute values corrected for instrument error was found to be 0.041 percent by weight per day at 50.6 psig. The leakage rate at the upper bound of the 95 percent confidence interval is 0.051 percent by weight per day which is well below the allowable leakage rate of 0.075 percent by weight per day at 50.6 psig.

The supplemental instrumentation verification at P_a was 2.0 percent, well within the 25 percent requirement of 10 CFR 50, Appendix J, Section III A.3.b.

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2.0

INSTRUMENTATION CORRECTION FACTORS

Instrumentation correction factors were determined from Metropolitan Edison Company Procedure, 1430-Y-23, "Reactor Building Integrated Leak Rate Test" and were applied to the temperatures, pressures and vapor pressures recorded in Metropolitan Edison Company Procedure, SP 1303-6.1, "Reactor Building Integrated Leak Rate Test". Both of these procedures are on file at Three Mile Island Nuclear Station Unit 1.

2.1

PRESSURE MONITORING SYSTEM

Due to the high accuracy of the precision pressure gages, it is not possible to do a field calibration. The gages were compared with each other at various pressure levels as a check to determine the relative calibration status. Calibration information from the manufacturer, Texas Instruments, for the pressure plateau closest to the test pressure, indicates gage PI-390 (S/N 2604) was reading 0.005 psi above the true pressure and gage PI-391 (S/N 2605) was reading 0.000 psi from the true pressure. However, a conservative correction factor of -0.015 psi was applied for both gages (representing the maximum possible error).

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Correction factors for each RTD reading (sensor, bridge card, and digital readout) are listed below:

<u>Temperature Reading</u>	<u>Correction Factor, °F</u>
655 A	+0.1
655 B	+0.6
655 C	+0.6
655 D	+0.5
655 E	+0.6
655 F	-0.4
655 G	-0.6
655 H	-0.4
655 I	-0.4
655 J	-0.2
655 K	-0.2
655 L	+0.5
655 M	+0.6
655 N	-0.5
655 O	+0.2
655 P	-0.2
655 Q	+0.4
655 R	-0.2
655 S	-0.5
655 T	+0.4
655 U	+0.3
655 V	+0.1
655 W	+0.3
655 X	-0.6

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2.3

DEWPOINT INDICATING SYSTEM

Correction factors for each dewpoint temperature reading are listed below:

<u>Dewpoint Temperature Reading</u>	<u>Dewcell Correction Factor, °F</u>	<u>Dewpoint Recorder Correction Factor, °F</u>	<u>Applied Correction Factor, °F</u>
654 A	-0.3	+0.4	+0.1
654 B	-0.1	+0.4	+0.3
654 C	-0.5	+0.4	-0.1
654 D	-0.1	+0.4	+0.3
654 E	-0.1	+0.4	+0.3
654 F	-0.5	+0.4	-0.1
654 G	-0.2	+0.4	+0.2
654 H	-0.1	+0.4	+0.3
654 I	-0.4	+0.4	0.0
654 J	NOT USED		

2.4

SUPPLEMENTAL TEST FLOW MONITORING SYSTEM

A comparison check was made between the flowmeters at various flow rates to determine the relative calibration status. Since it was not possible to perform a field calibration, a correction factor of 3.09 scfh (representing the maximum possible error) was applied in the conservative direction.

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3.0

DISCUSSION OF RESULTS

The reduced test data, corrected for instrument error, is presented in Table 1. The plot of average temperature and weight of air, corrected for instrument error, is shown in Figure 1.

3.1

RESULTS AT P_a

The mass point leakage rate using absolute valves corrected for instrument error was found to be 0.041 percent by weight per day. The 95 percent confidence limit associated with this leakage rate is 0.010 percent per day. Thus the leakage rate at the upper bound of the 95 confidence interval is:

$$L_{am} = 0.041 + 0.010 \text{ \%/day}$$

$$L_{am} = 0.051 \text{ \%/day}$$

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 0.075 percent per day.

3.2

SUPPLEMENTAL TEST RESULTS

The measured leakage rate, (L_c) using absolute values corrected for instrument error, during the supplemental test was calculated to be 0.097 percent per day using the mass point method of analysis. The 95 percent confidence interval associated with this leakage rate is 0.018 percent per day.

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A flow rate, corrected for instrument error, of 204 SCFH was superimposed on the building leakage rate. This flow rate is equivalent to a leakage rate of 0.056 percent per day (L_o).

The building leakage rate during the supplemental test (L_v') is then determined as follows:

$$L_v' = L_c - L_o$$

$$L_v' = 0.099 - 0.056 \text{ \%/day}$$

$$L_v' = 0.043 \text{ \%/day}$$

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

$$\frac{|L_{am} - L_v'|}{L_a} = \frac{|(0.041) - (0.043)|}{0.10} = 0.02$$

The building leakage rates agree within 2.0 percent of L_a which is well below the acceptance criteria of 25 percent of L_a . Therefore, the acceptability of the test instrumentation is considered to have been verified.

4.0

REFERENCES

1. "Three Mile Island Nuclear Station Unit 1 Reactor Containment Building Integrated Leak Rate Test, April 1977", Metropolitan Edison Company Test Report.
2. 1430-Y-23, "Reactor Building Integrated Leak Rate Test Instrument Calibrations", Metropolitan Edison Company Procedure.
3. SP 1303-6.1 "Reactor Building Integrated Leak Rate Test", Metropolitan Edison Company Surveillance Procedure.

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TABLE 1

REDUCED TEST DATA

	Time	Average Containment Pressure (psia)	Partial Pressure of Containment Water Vapor (psia)	Partial Pressure of Containment Air (psia)	Average Containment Temperature (°R)	Weight of Containment Air (lbm)
4/18/77	0500	65.324	0.295	65.029	531.41	660,593.61
	0530	65.322	0.295	65.027	531.41	660,573.29
	0600	65.320	0.296	65.024	531.41	660,542.82
	0630	65.322	0.296	65.026	531.42	660,550.70
	0700	65.320	0.294	65.026	531.43	660,538.28
	0730	65.322	0.297	65.025	531.43	660,528.12
	0800	65.324	0.298	65.026	531.49	660,463.71
	0830	65.326	0.296	65.030	531.51	660,479.48
	0900	65.327	0.295	65.032	531.53	660,474.94
	0930	65.328	0.296	65.032	531.56	660,437.67
	1000	65.330	0.296	65.034	531.59	660,420.70
	1030	65.334	0.297	65.037	531.63	660,401.48
	1100	65.336	0.295	65.041	531.67	660,392.41
	1130	65.338	0.296	65.042	531.69	660,377.72
	1200	65.340	0.294	65.046	531.74	660,356.23
	1230	65.340	0.293	65.047	531.75	660,353.96
	1300	65.342	0.295	65.047	531.77	660,329.13
	1330	65.346	0.300	65.046	531.80	660,281.73
	1400	65.343	0.294	65.049	531.80	660,312.18
	1430	65.342	0.294	65.048	531.81	660,289.61
	1500	65.343	0.295	65.048	531.82	660,277.20
	1530	65.342	0.296	65.046	531.83	660,244.48
	1600	65.341	0.293	65.048	531.84	660,252.37
	1630	65.340	0.294	65.046	531.82	660,256.89
	1700	65.338	0.296	65.042	531.81	660,228.71
	1730	65.339	0.295	65.044	531.82	660,236.59
	1800	65.342	0.293	65.049	531.83	660,274.93
	1830	65.344	0.296	65.048	531.86	660,227.54

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TABLE 1 (Cont'd)

REDUCED TEST DATA

Time	Average Containment Pressure (psia)	Partial Pressure of Containment Water Vapor (psia)	Partial Pressure of Containment Air (psia)	Average Containment Temperature (°R)	Weight of Containment Air (lbm)
1900	65.344	0.293	65.051	531.86	660,257.99
1930	65.341	0.293	65.044	531.84	660,252.37
2000	65.344	0.295	65.049	531.85	660,250.10
2030	65.344	0.295	65.049	531.85	660,250.10
2100	65.345	0.296	65.049	531.87	660,225.27
2130	65.346	0.295	65.051	531.87	660,245.57
2200	65.345	0.291	65.054	531.86	660,288.44
2230	65.342	0.296	65.046	531.83	660,244.48
2300	65.338	0.295	65.043	531.8	660,238.86
2330	65.336	0.295	65.041	531.78	660,255.80
2400	65.334	0.296	65.038	531.76	660,250.18
0030	65.335	0.294	65.041	531.74	660,305.47
0100	65.332	0.293	65.039	531.72	660,319.00
0130	65.334	0.293	65.041	531.72	660,330.31
0200	65.330	0.293	65.037	531.72	660,289.70
0230	65.330	0.293	65.037	531.73	660,277.28
0300	65.331	0.293	65.038	531.72	660,299.85
0330	65.333	0.295	65.038	531.74	660,275.01
0400	65.333	0.294	65.039	531.76	660,260.33
0430	65.329	0.294	65.035	531.71	660,281.81
0500	65.326	0.289	65.037	531.69	660,326.95

SUPERIMPOSED TEST

0730	65.315	0.295	65.020	531.67	660,179.18
0800	65.318	0.290	65.028	531.72	660,198.32
0830	65.319	0.293	65.026	531.75	660,140.77
0900	65.318	0.293	65.025	531.75	660,130.52
0930	65.315	0.289	65.026	531.72	660,178.02

4/19/77

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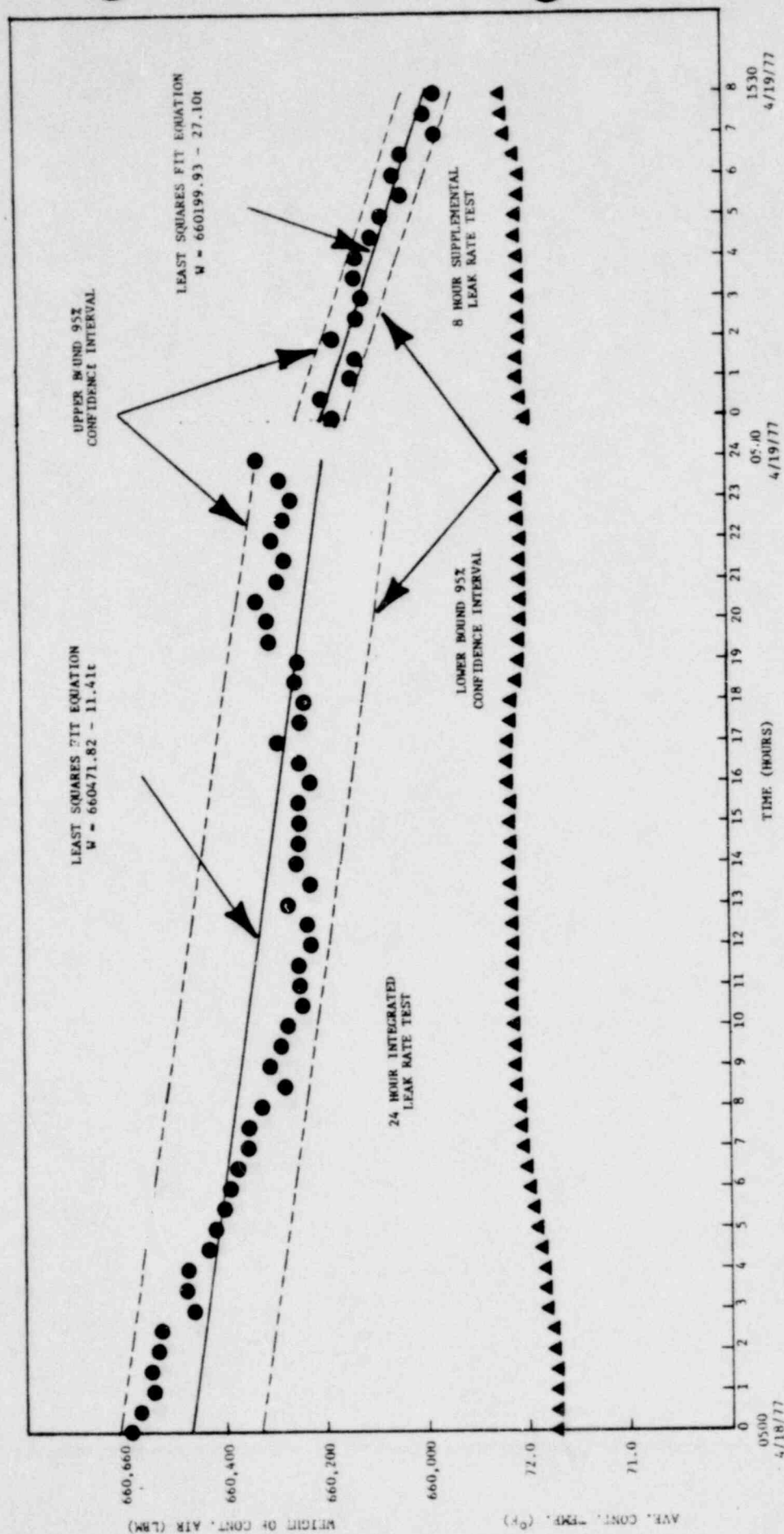
TABLE 1 (Cont'd)

REDUCED TEST DATA

<u>Time</u>	<u>Average Containment Pressure (psia)</u>	<u>Partial Pressure of Containment Water Vapor (psia)</u>	<u>Partial Pressure of Containment Air (psia)</u>	<u>Average Containment Temperature (°R)</u>	<u>Weight of Containment Air (lbm)</u>
SUPERIMPOSED TEST (CONT'D)					
1000	65.314	0.293	65.021	531.72	660,127.26
1030	65.312	0.293	65.019	531.71	660,119.37
1100	65.314	0.293	65.021	531.72	660,127.26
1130	65.314	0.292	65.022	531.73	660,124.99
1200	65.316	0.293	65.023	531.76	660,097.90
1230	65.312	0.291	65.021	531.76	660,077.60
1300	65.307	0.296	65.011	531.71	660,038.14
1330	65.304	0.294	65.010	531.69	660,052.82
1400	65.309	0.292	65.017	531.76	660,036.99
1430	65.314	0.294	65.020	531.84	659,968.16
1500	65.317	0.291	65.026	531.87	659,991.83
1530	65.318	0.292	65.026	531.89	659,967.02

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FIGURE 1
WEIGHT OF CONTAINMENT AIR AND
AVERAGE CONTAINMENT TEMPERATURE VERSUS TIME



THREE MILE ISLAND NUCLEAR STATION
UNIT 1
INTEGRATED LEAK RATE TEST
FIGURE 1