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DATE OF DOCUMENT: 1-19-70
DATE RECEIVED: 1-26-70
NO.: 243

LTR.: x **MEMO:** **REPORT:** **OTHER:**

TO: Dr Peter A. Morris

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FILE CODE: 50-220

DESCRIPTION: (Must Be Unclassified)
Ltr trans the following pursuant to para 6.8.a of the Tech Specs:

ENCLOSURES:
Report - Primary Containment Integrated Leak Rate Test.

Report - Secondary Containment Integrated Leak Rate Test.

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NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

300 ERIE BOULEVARD WEST
SYRACUSE, N.Y. 13202

January 19, 1970

Dr. Peter A. Morris, Director
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Dr. Morris:

Regulatory File Cy.

Reference: Docket 50-220, DPR-17

We are forwarding you under separate cover, 40 copies of the original summary reports of the Primary Containment Integrated Leak Rate Test and the Secondary Containment Integrated Leak Rate Test as conducted at the Nine Mile Point Nuclear Station prior to original fuel loading. These reports should comply with the requirement under paragraph 6.8.a of the Technical Specifications.

Based upon a primary containment volume of 300,400 cubic feet, the maximum allowable leakage rate of 1.6 percent of the contained massive air at 35 psig amounts to 681 standard cubic feet per hour. The corresponding allowable test leakage at 22 psig is 370 standard cubic feet per hour, and the allowable operational leak rate is 276 standard cubic feet per hour.

Since the measured test leak rate at 22 psig was only 148 standard cubic feet per hour, the containment integrity is within the Technical Specifications. Inspection of the summary report for the Secondary Containment Integrated Leak Rate Test reveals that with the required differential pressure between the building atmosphere and outside the amount of leakage is well within the allowable.

Very truly yours,

Minot H. Pratt
Vice President and
Executive Engineer

mjs

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PRIMARY CONTAINMENT INTEGRATED LEAK TEST

SUMMARY REPORT

PRIMARY CONTAINMENT INTEGRATED LEAK TEST

1.0 Purpose

The purpose of the Integrated Leak Test is to verify that the Primary Containment System leakage is maintained within values specified in Section 4.3.3 of the Technical Specifications.

2.0 Scope

The containment tested included the drywell and pressure suppression chambers, the steam (reactor) side of the emergency condensers, and all testable penetrations and isolation valves on lines exposed to the free space of the primary containment. The reactor vessel is vented to the containment and the main steam, head spray, and emergency condenser steam vent isolation valves are included as primary containment isolation valves. The drywell downcomer pipes are submerged in the torus water to a depth of four feet.

3.0 Specifications

3.1 Integrated leak rate tests shall be performed prior to initial Station operation at the test pressure of 35 psig (P_p) and the test pressure (P_t) of 22 psig to obtain the respective measured leak rate $L_m(35)$ and $L_m(22)$.

3.2 Leak repairs, if necessary to permit integrated leakage rate testing, shall be preceded by local leakage measurements. The leakage rate difference, prior to and after repair when corrected to P_t shall be added to the final integrated leakage rate result.

3.3 Closure of the containment isolation valves for the purpose of the test shall be accomplished by the means provided for normal operation of the valves.

3.4 The test duration shall not be less than 24 hours for integrated leak rate measurements, but shall be extended to a sufficient period of time to verify, by measuring the quantity of air required to return to the starting point (or other methods of equivalent sensitivity), the validity and accuracy of the leakage rate results.

3.5 Primary containment testable penetrations and isolation valves shall be tested at a pressure of 35 psig each major refueling outage except bolted double-gasketed seals shall be tested whenever the seal is closed after being opened, and at least at each refueling outage.

3.6 Personnel air lock door seals shall be tested at a pressure of 10 psig each refueling outage.

3.7 Containment components not included in (1) and (2) which required leak repairs following any integrated leakage rates in order to meet the allowable leakage rate unit, L_t shall be subjected to local leak tests at a pressure of 35 psig at each refueling outage.

4.0 Acceptance Criteria

4.1 The maximum allowable leakage rate L_p shall not exceed 1.6 weight percent of the contained air per 24 hours at the test pressure of 35 psig (P_p).

4.2 The allowable test leak rate L_t (22) shall not exceed the value established as follows:

$$L_t (22) = 1.6 L_m (22)/L_m (35)$$

4.3 The allowable operational leak rate, L_{to} (22) which shall be met prior to resumption of power operation following a test (either as measured or following repairs and retest) shall not exceed $0.75L_t$ (22).

4.4 If the total leakage rates listed below as adjusted to a test pressure of 22 psig, are exceeded, repairs and retests shall be performed to correct the condition.

(a) double-gasketed seals	10% L_{to} (22)
(b) (1) testable penetrations and isolation valves	30% L_{to} (22)
(2) any one penetration or isolation valve	5% L_{to} (22)
(c) primary containment air purge penetrations and reactor building to torus vacuum relief valves	50% L_{to} (22)

5.0 Test Procedure

5.1 The penetrations are tested using gang test manifolds for pressurization. In this test all nitrogen seal type penetrations were proven for zero leakage using a nitrogen bubbler at 62.5 psig. No bubbles were detected over a minimum period of five minutes.

5.2 All double "O" ring seals were pressurized to 35 psig and held with no loss of pressure for five minutes.

5.3 Leakage through each isolation valve was tested at 35 psig using a calibrated displacement gas meter or calibrated rotometer.

5.4 Overall leakage was measureed using the reference vessel method. Calibrated resistance temperature sensors and suitably proportioned tubing type reference systems are distributed in the drywell and suppression chamber. Figure 1. A remote sampling system using heated probe extensions outside the vessel supplies a dew point detector. Read out is by means of precision electronic instruments. Test air is supplied through the Containment Spray System.

5.0 Test Procedures Cont'd.

5.5 Instrumentation penetrations are in the mode for normal operation except that the nitrogen purge for the TIP system is closed and isolated from the drywell. The vent valve outside the inline check is open to assure no inadvertent supply of nitrogen to the drywell.

The containment spray system isolation valves are open in the normal mode for containment spray system operation. The valves to the air test header are closed and a leak detector tap is open on the air supply side of these valves to prevent inadvertent supply of air to the drywell.

5.6 The core spray system will be filled with water as in operations. The condensate fill line (also the supply to the torus makeup) will be unwatered and vented. Leakage of water to the environment from this system is monitored and considered in the test results. Since there may be some interchange of water between the reactor vessel and torus, there will be no external manipulation to maintain reactor water level during the 24 hour leak test run nor will there be any addition to or subtraction of water from the system.

5.7 Isolation valves between the reactor vessel and the clean-up system are closed and the system vented. The shutdown cooling system is isolated from the reactor vessel and vented, and the feedwater lines are also isolated and vented just outside of the outer isolation valves. Provision is made to monitor these vents to detect magnitude of leakage. No exact quantitative measurements will be applied to this test. All leakage will count in the gross containment loss.

6.0 Test Data

6.1 Isolation Valve Leakage - Leakage through the following isolation valves was measured at 35 psig in the containment. Valves given are standard cubic feet per hour at one atmosphere.

		SCFH
Drywell N_2 Supply	Outer	0
	Inner	0.6
Drywell N_2 Vent & Fill	Outer	0
	Inner	0.7
Drywell Air Vent & Purge	Outer	0
	Inner	0
Torus N_2 Vent & Purge	Outer	1.25
	Inner	0
Torus N_2 Make-Up	Outer	0.62
	Inner	0.29
Torus Air Vent & Fill	Outer	4.3
	Inner	0
Torus Make-Up	Inner	0
	Outer	0
Drywell Equip. Drain	Inner	0.47
	Outer	7.00
Drywell Floor Drain	Inner	1.3
	Outer	0

6.0 Test Data Cont'd.

6.1 Isolation Valve Leakage Cont'd.

		SCFH	
Vacuum Relief	Outer	1.4	
	Outer	1.0	
	Outer	1.0	
	Inner	0	
	Inner	0	
	Inner	0	
Clean-Up System Vent to Torus	Inner	0	(6 ml water)/45 min.
	Outer	0.5	
Main Steam #01	Inner	2.8	
#03	Outer	14.3	
#02	Inner	<.1	
#04	Outer	0	
Head Spray	Outer	7.10	
	Inner	16.4	
Testable Penetrations	All	0	
Emergency Condenser #11	Inner	.25	
	Outer	0	
#12	Inner	0	
	Outer	0	
Total tested @ 35 psig		70.15	

6.2 Combined Leakage per Reference System Instruments
See Figure 3 for trend plot of test data.

Drywell	Date	Time	Drywell Pressure psia	Differential Pressure Drywell to Drywell Reference	Average Drywell Dew Point Temperature °F	Dew Point Saturation Pressure	Average Drywell Temperature °R
Start 35 psig	7 Aug	2100	50.07	.1096	42.8	.1356	537.08
End 35 psig	8 Aug	2100	49.76	.4516	43.5	.1393	537.39
End pump back	9 Aug	0205	50.03	.1768	43.4	.1385	537.34
Start 22 psig	9 Aug	1500	37.035	.0457	46.4	.15599	537.02
End 22 psig	10 Aug	1500	36.845	.2226	46.0	.15323	536.83
End pump back	10 Aug	1750	37.03	.0477	46.2	.15441	537.07
Torus (Suppression Chamber)							
Start 35 psig	7 Aug	2100	50.06	.1518	42.8	.1356	532.4
End 35 psig	8 Aug	2100	49.75	.4304	43.4	.13847	532.3
End pump back	9 Aug	0205	50.02	.1376	43.4	.13847	532.4
Start 22 psig	9 Aug	1500	37.00	-.1017	46.4	.15599	531.80
End 22 psig	10 Aug	1500	36.805	.0730	46.0	.15323	532.0
End pump back	10 Aug	1750	36.99	-.1007	46.2	.15441	532.2

6.0 Test Data Cont'd.

6.3 Pump back data using displacement gas meter and also 2276 ft.^{3} 100 psig air tank for supply.

35 pound test. Gas meter cubic ft. at 35 psig.

Temp Air	ΔTank psig	ΔGas Meter	Rel Humidity Atmosphere
80°F	56*	2060	59%

22 pound test. Gas meter cubic ft. at 22 psig.

Temp Air	ΔTank psig	ΔGas Meter	Rel Humidity Atmosphere
80°F	32	1676	61%

7.0 Calculations and Results

% Leakage of initial contained air

$$\left(\frac{100}{P_1}\right)\left[\left(\frac{T_1}{T_2}\right)(\Delta P_2 + P_{v2}) - (\Delta P_1 + P_{v1})\right]$$

P_1 Initial pressure psia

ΔP_1 Initial difference vessel pressure to reference pressure

P_{v1} Initial moisture saturation pressure

ΔP_2 Final difference vessel pressure to reference pre-sure

P_{v2} Final moisture saturation pressure

T_1 Initial weighted average vessel temperature °R

T_2 Final weighted average vessel temperature °R

Gas Meter S.C.F.

$$\frac{(P_m)\ (V_m)\ (530)}{T_m\ (14.7)}$$

P_m Meter pressure psia

V_m Meter C.F.

T_m Meter air temp °R

Tank S.C.F.

$$\frac{(\Delta P_t)\ (V_t)\ (530)}{(T_t)\ (14.7)}$$

ΔP_t Tank loss in pressure psi

V_t Volume of tank

T_t Air temp. of tank °R

7.0 Calculations and Results Cont'd.

7.1 35 psig test 24-hour leakage

Drywell	.69% of mass @ 35 psig
Torus	.56% of mass @ 35 psig
Combined*	.64% of mass @ 35 psig

*Drywell 61% of total containment volume

Net leakage after pump back

Drywell	.14% of mass @ 35 psig
Torus	-.03% of mass @ 35 psig
Combined	.07% of mass @ 35 psig

Gas meter pump back	6877 S.C.F.
Tank decay data**	8510 S.C.F.
Calculated from test	7107 S.C.F.

**Tank volume dimensional 2276 cubic feet

7.2 22 psig test 24-hour leakage

Drywell	.47% of mass @ 22 psig
Torus	.46+% of mass @ 22 psig
Combined	.47% of mass @ 22 psig

Net leakage after pump back

Drywell	.001% of mass @ 22 psig
Torus	-.002-% of mass @ 22 psig
Combined	.001% of mass @ 22 psig

Gas meter pump back	4144 S.C.F.
Tank decay data	4863 S.C.F.
Calculated from test	3924 S.C.F.

7.3 % Leakage using maximum deviated pump back data

35 psig test

$$\frac{8510}{7107} (.6399) = .77\% \text{ mass @ 35 psig}$$

22 psig test

$$\frac{4863}{3924} (.4680) = .58\% \text{ mass @ 22 psig}$$

7.4 Leak Test Conclusions

1. For the purposes of these conclusions, the dimensionally derived containment volume of 300, 400 cubic feet will be used. Volumes derived from pump back data would be larger and hence yield less conservative results.

7.0 Calculations and Results Cont'd.

7.4 Leak Test Conclusions Cont'd.

2. Maximum allowable leakage rate

$$\frac{(0.016)\ (300,400)\ \ (50)}{(14.7)\ (24)} = L_p \qquad 681 \text{ SCF/hr}$$

3. 35 pound measured leak rate ($L_{m(35)}$ = .64%)

$$\frac{(0.0064)\ (300,400)\ (50.07)}{(14.7)\ (24)} = \qquad 272 \text{ SCF/hr}$$

4. 22 pound measured leak rate ($L_{m(22)}$ = .47%)

$$\frac{(0.0047)\ (300,400)\ (37.04)}{(14.7)\ (24)} = \qquad 148 \text{ SCF/hr}$$

5. Allowable test leak rate at 22 psig

$$(1.6)\ \frac{(.47)}{(.64)} = L_{t(22)} \qquad = 1.17\%$$

$$\frac{(0.0117)\ (300,400)\ (37)}{(14.7)\ (24)} = \qquad 370 \text{ SCF/hr}$$

6. Allowable operational leak rate at 22 psig

$$(0.75)\ (1.17) = L_{to(22)} \qquad = .87\%$$

$$\frac{(0.0117)\ (.75)\ (300,400)\ (37)}{(14.7)\ (24)} = \qquad 276 \text{ SCF/hr}$$

7. 35 pound measured leak rate from pump back data (highest) — 330 SCF/hr

8. 22 pound measured leak rate from pump back data (highest) — 180 SCF/hr

9. Penetrations

Penetrations	Standard Cubic Feet/Hour Allowable	Test*
(a) Double gasketed seals 10% $L_{to(22)}$	27.6	0
(b) Testable penetrations and isolation valves 30% $L_{to(22)}$	82.8	37.8

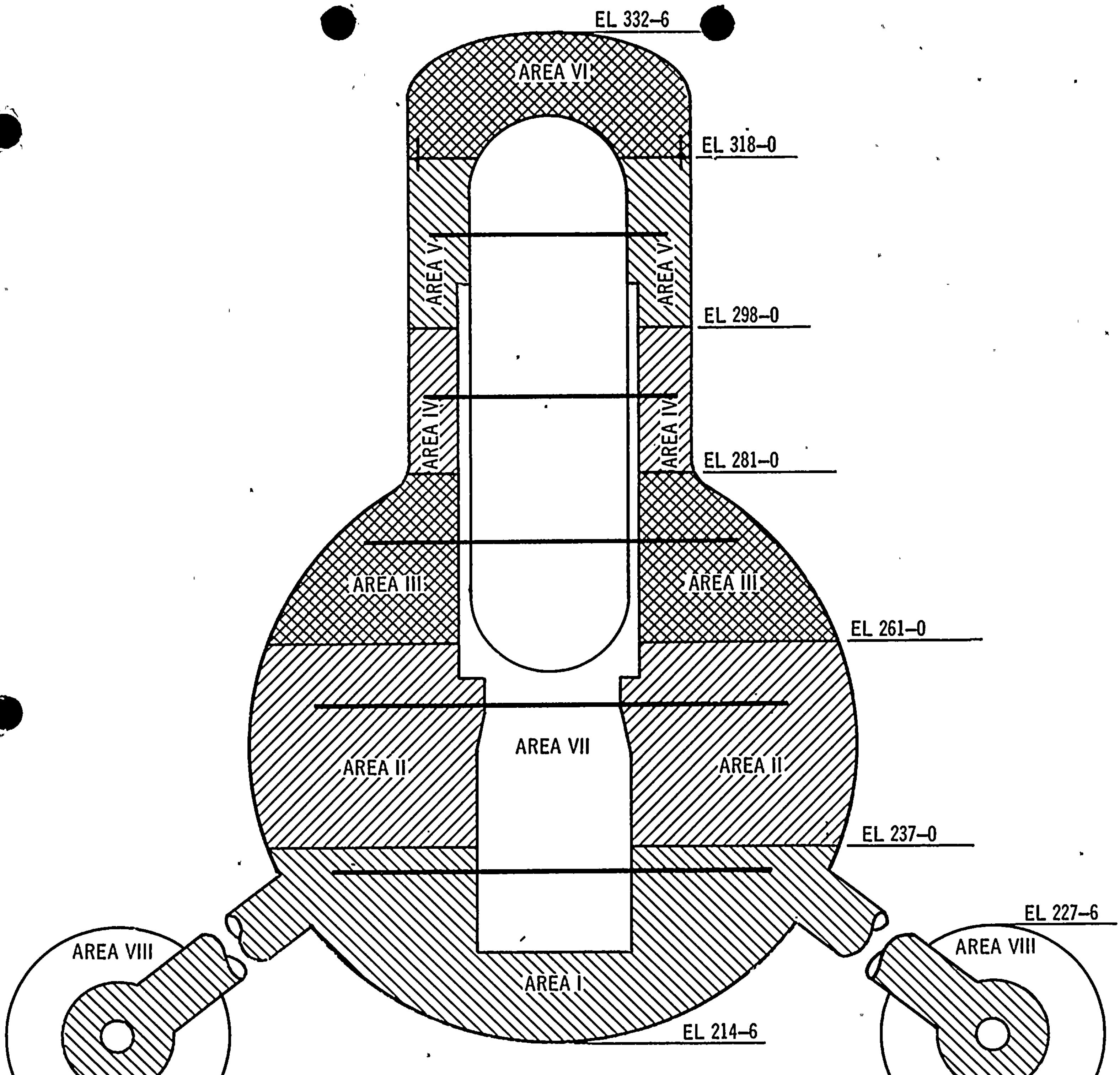
7.0 Calculations and Results Cont'd.

7.4 Leak Test Conclusions Cont'd.

9. Penetrations	Standard Cubic Feet/Hour Allowable	Test*
(c) Any one penetration or isolation valve 5% $L_{to}(22)$	13.8	
(#11 OUT M.S.I.V.)		7.8
(CRD HDSP IN IV)		8.4
(d) Primary containment air purge penetrations and reactor building to torus vacuum relief valves 50% $L_{to}(22)$	138.0	3.6

*Test data at 35 psig ratioed in proportion to mass leakage 35 to 22 psig

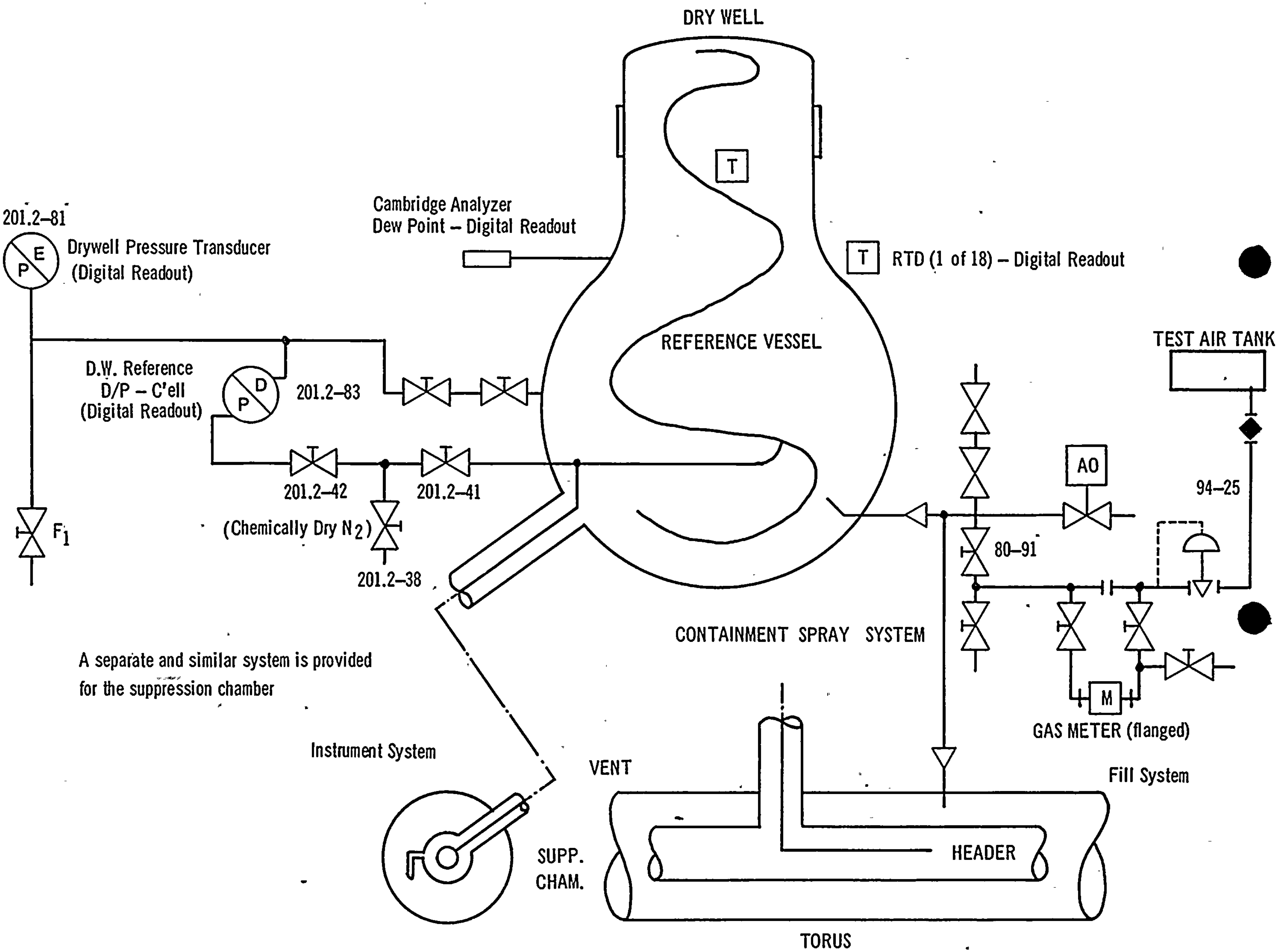
148/272 = .54



SUPPRESSION CHAMBER AREA	VOLUME IN CUBIC FT.	VOLUME IN CUBIC FT.	TEMPERATURE SENSORS E.D. #
D R Y W E L L		REFERENCE VESSEL	201.2-
Area I	47,598	1.0187	-53,54,55656
Area II	73,128	1.5637	-49,50,31
Area III	33,483	0.7172	-46,47,48
Area IV	6,064	0.1298	-45
Area V	4,289	0.0918	-44
Area VI	7,206	0.1624	-43
Area VII	13,667	0.2926	,52
T O R U S			
Area VIII	117,907	0.4035	-59,60,61662

REFERENCE VESSEL
DISTRIBUTION

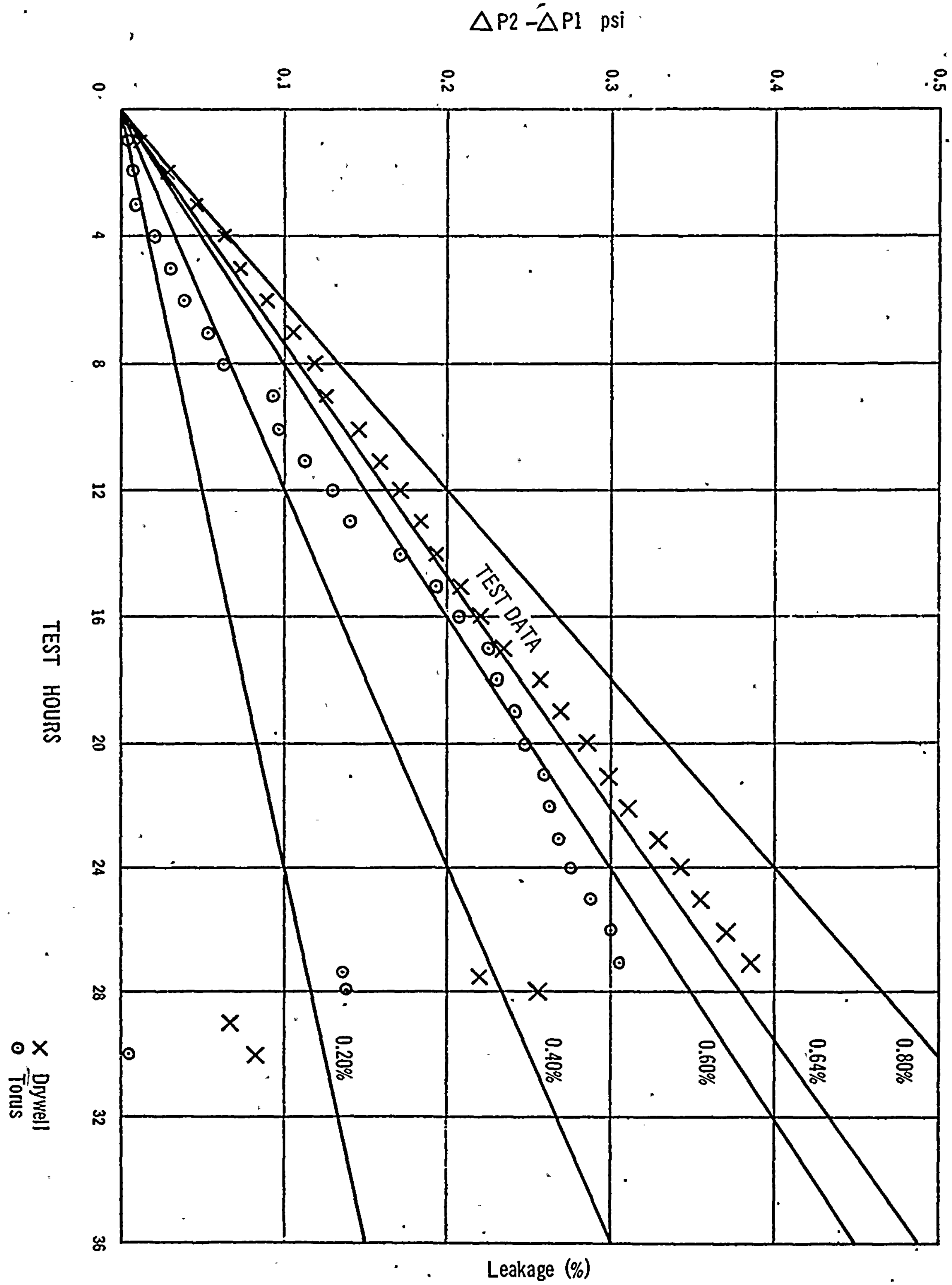
FIGURE 1

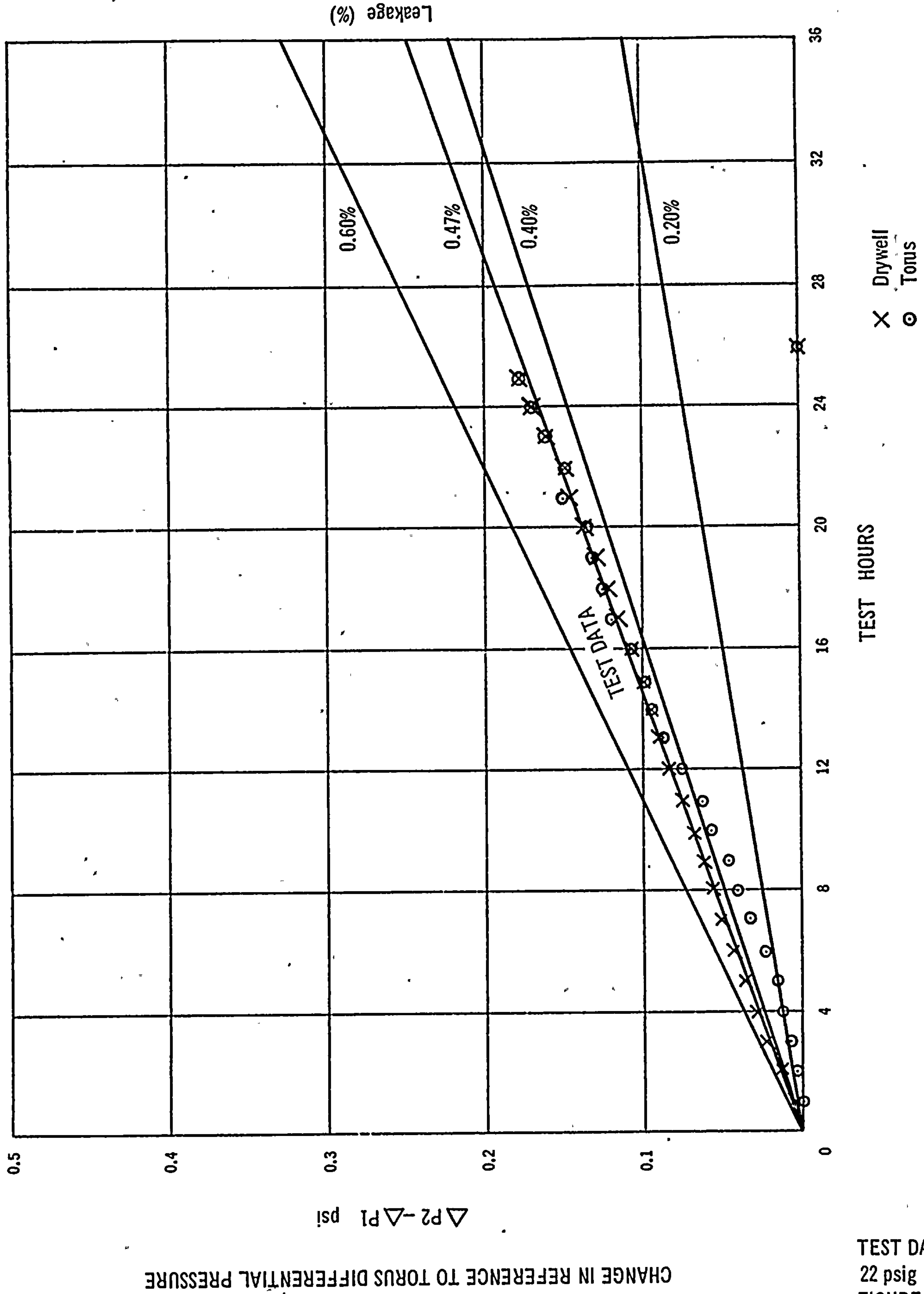


INSTRUMENT AND
FILL CONNECTIONS
FIGURE 2

TEST DATA
35 psig test
FIGURE 3A

CHANGE IN REFERENCE TO DRYWELL DIFFERENTIAL PRESSURE





TEST DATA
22 psig test
FIGURE 3B

SECONDARY CONTAINMENT INTEGRATED LEAK TEST

SUMMARY REPORT

SECONDARY CONTAINMENT INTEGRATED LEAK TEST

1.0 Purpose

The purpose of the test(s) was to investigate the leak rate of the secondary containment under various wind conditions. The results of the test were used to verify compliance with license limits. (See Technical Specifications 3.4.1 and 4.4.1)

2.0 Procedure

The Reactor Building was isolated and one of the two emergency ventilation systems placed into operation.

2.1 The door into the Reactor Building Railway Bay was open so that leakage through the railroad door is taken into account.

3.0 Test(s) Data

The test data is presented in the following Table:

TABLE I - TEST DATA

	7-2-69		7-2-69		10-28-69	
	#11	#12	#11	#12	#11	#12
Wind Speed (mph)	4	1	4	1	12	12
Wind Direction	SSW	SSW	SSW	SSW	N	NNE
Outside Temp. (°F)	75	75	75	75	43	43
Inside Temp. (°F)	90	90	90	90	70	70
Rx. Bldg. ΔP ("H_2O)	.265	.25	.48	.48	.46	.46
Emer. Vent Flow Rate (cfm)	1000	1000	1600	1600	1600	1600

4.0 Specification

Figure 3.4.1 of the Technical Specifications represents the allowable limit. The differential pressure between the Reactor Building and the external static pressure shall be at least as negative as shown on Figure 3.4.1 for the test condition windspeed and an emergency ventilation fan flow rate of less than 2000 cfm.

5.0 Evaluation of Reactor Building Leak Rate Tests

Leak rate test(s) were performed on the Reactor Building on two separate occasions. In both tests each emergency ventilation fan was tested. The results of both sets of tests show the Reactor Building Leak Rate to be within allowable limits.

7-2-69

The wind conditions existing were low wind speed from the south. The emergency ventilation flow rate necessary to obtain the required ΔP (~-.25" for 1 mph wind and -.260 for a 4 mph wind) was approximately 1000 cfm; this is well below the maximum allowed of 2000 cfm.

10-28-69

The wind conditions existing were average wind speed (~12 mph) from the north. The fan flow rate necessary to obtain the required ΔP (~-.290" H_2O) was below the maximum allowed. A fan flow rate of ~1600 cfm produced a building differential of -0.46" H_2O.

FIGURE 3.4.1

REACTOR BUILDING PRESSURE