Attachment 1 to WM 92-0022

REACTOR CONTAINMENT BUILDING
INTEGRATED LEAK RATE TEST

FOR

WOLF CREEK GENERATING STATION

TABLE OF CONTENTS

INTRODUCTION

The second periodic Integrated Leakage Rate Test (ILRT) (Type "A" Test) was successfully completed for Wolf Creek's reactor containment building during the fifth refueling outage. This test was performed to demonstrate that leakage from the reactor containment building does not exceed the limits stated in the Technical Specifications for Wolf Creek Generating Station. The plant procedure for integrated leakage rate testing was used, and the requirements of 10CFR50 Appendix J were followed. Appendix 1 contains general plant information and technical data.

SUMMARY

A 24 hour duration integrated leakage rate test was performed using the Total Time Analysis in accordance with ANSI N45.4-1972.

Total Time Calculated Leakage Rate	.0559	wt%/day
Leakage Rate of 95% Upper Confidence Limit	.0667	wt%/day
Acceptance Criteria, 0.75 La	.15	wt%/day

The leakage rate at the 95% Upper Confidence Limit plus the total of leakage rate additions met the acceptance criteria also.

95% UCL + Leakage Rate Additions	.0704	wt%/day

The capability of the instrumentation for measuring the integrated leakage rate was verified by imposing a known leakage rate on the containment and confirming that the measured composite leakage rate fell within the calculated limits.

Imposed Leakage Rate	.2	wt%/day
Measured Composite Leakage Rate	.1686	wt%/day
Upper Acceptance Limit	.2745	wt%/day
Lower Acceptance Limit	.1745	wt%/day

The Instrument Selection Guide (ISG) was calculated and it met its acceptance criteria. Pressure transmitter PT-31 failed during the test, this was accounted for in the ISG calculation.

Instrument Selection Guide	.0072	wt%/day
Acceptance Criteria, 0.25 La	.05	wt%/day

CHRONOLOGY

Wolf Creek's second periodic ILRT occurred at the beginning of the fifth refueling outage. System lineups, test instrumentation setup and other preparations were performed from September 23 to September 27, 1991. The containment was inspected prior to the ILRT, and no structural deterioration was discovered that could

affect either the containment structural integrity or leak-tightness. Leak inspections of the containment penetrations were performed during pressurization and no significant leaks were discovered.

15:30	09/27/91	Commenced final containment inspection
16:02	09/27/91	Commenced containment pressurization
04:16	09/28/91	Stopped containment pressurization at a test pressure of 50.2 psig. Commenced stabilization phase
09:00	09/28/91	Started Type "A" test leakage measurement
09:00	09/29/91	Ended Type "A" test
09:04	09/29/91	Imposed a leakage rate on the containment of 13.22 scfm
09:15	09/29/91	Started verification test leakage measurement
13:15	09/29/91	Ended verification test
13:17	09/29/91	Began depressurization of containment
	11/20/91	Completed last Local Leak Rate Test (LLRT) needed to finish calculating leakage savings and penalties

INSTRUMENTATION

Wolf Creek's ILRT instrumentation system consists of 24 platinum Resistance Temperature Detectors (RTD's), six chilled mirror hydrometers, two Mensor precision pressure gauges and two mass flowmeters. These instrument provide data input to the Volumetrics Data Acquisition system. See Appendix 4 for a schematic of the instrumentation system.

METHODOLOGY

Wolf Creek's ILRT procedure provides the option of completing either a full duration test of 24 hours or a short duration test of 6 to 24 hours. Both test methods are described by Wolf Creek's safety analysis report. The data reduction program calculates the containment leakage rate by the total time method for both ANSI N45.4-1972 and Bechtel Topical Report, BN-TOP-1. ANSI N45.4 describes a single-sided confidence limit. The short duration test is performed according to the Bechtel Report BN-TOP-1. For information only, the mass point containment leakage rate is calculated as described by ANSI/ANS 56.8-1981

The leakage rate from the containment is determined by measuring the mass of containment air and calculating its change over time. The ideal gas law is used to calculate the air mass. The containment volume is assumed constant, as is the gas constant for dry air. Pressure and temperature are the only variables.

Temperature data is input from the 24 RTD's and six hygrometers

every 15 minutes to the ILRT computer. The program calculates volume weighted average containment dry bulb and dewpoint temperatures by using the volume fractions assigned to each sensor. The volume fraction assignments are the same as were used for the preoperational ILRT. Volume fractions are listed in Appendix 3.

The containment pressure is an average of the output of the two pressure gauges. The dry air pressure is calculated by subtracting the water vapor pressure from the total containment pressure. The water vapor pressure is the saturation pressure that corresponds to the saturation temperature (dewpoint Temperature) of the containment. From the dry air pressure and the average containment temperature the mass of the dry air in containment is calculated.

The Instrument Selection Guide (ISG) is calculated using the method described in ANSI/ANS 56.8-1981. The ISG is used to evaluate the ability of the ILRT measurement system to measure the integrated leak rate. The formula is a function of sensor errors, number of sensors, pressure, temperature, and time.

Following the integrated leakage rate measurement, a leak is imposed on containment equal to La ± 25%. A verification test is then performed to verify the adequacy of the instrumentation to measure the containment leakage rate. The leak is imposed by throttling the air flow from containment through one of the two mass flowmeters.

TYPE "A" TEST RESULTS, ANALYSIS AND INTERPRETATION

Test results are shown in Appendix 5. A 24 hour duration test was performed in accordance with ANSI N45.4-1972. The leakage rate at the two-sided 95% upper confidence limit (UCL) was decreasing constantly through the test, and it met the acceptance criteria in less than three hours of test time. See figure 1.

The leakage rate at the 95% UCL was .0667 wt%/day. This value is far enough below the acceptance criteria of 0.150 wt%/day to allow for leakage rate additions. Leakage rate additions are made for systems that are left in service during the ILRT and for water levels in containment that show a net increase. From Appendix 6, the total leakage rate addition is .0037 wt%/day. The leakage savings for components that were isolated during the test was calculated to be .1465 wt%/day.

At the end of the 24 hour test, the ISG was calculated to be .0072 wt%/day as shown in Appendix 7. It met the acceptance criteria of less than 0.25% La or 0.050 wt%/day. Pressure Transmitter PT-31 failed during the test. This was accounted for in the final ISG calculation.

A verification test was performed where a leakage rate of 13.22

scfm or 0.1686 wt%/day was imposed on containment. The verification test lasted 4 hours as required. The measured composite leakage rate stabilized within the limits calculated, and the last leakage rate recorded was .2121 wt%/day. See figure 2.

Figures 3,4, and 5 plot the containment air mass, pressure, and temperature, respectively, from the beginning of the stabilization period to the end of the verification test. Other information retained at the plant and available for review includes the ILRT procedure, the Local Leakage Rate testing procedure, system descriptions, instrument calibration documentation, and Quality Assurance audit results. The ILRT procedure includes a chronological log of events, system lineups and all test data.

TYPE "B" AND "C" TEST RESULTS

The results of all Type "B" and "C" tests performed since the first ILRT are listed in Appendix 8.

REFERENCES

1. Wolf Creek Generating Station - Updated Safety Analysis Report.

2. Wolf Creek Generating Station Test Procedure: Containment Integrated Leakage Rate Test, STS PE-018 Rev. 1

3. 10CFR50, Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors."

4. ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors."

5. ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements."

6. Bechtel Topical Report BN-TOP-1, Rev. 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants," November 1, 1972.

Integrated Leakage Rate

Data from 0900 on 09/28/91 to 0900 on 09/29/91

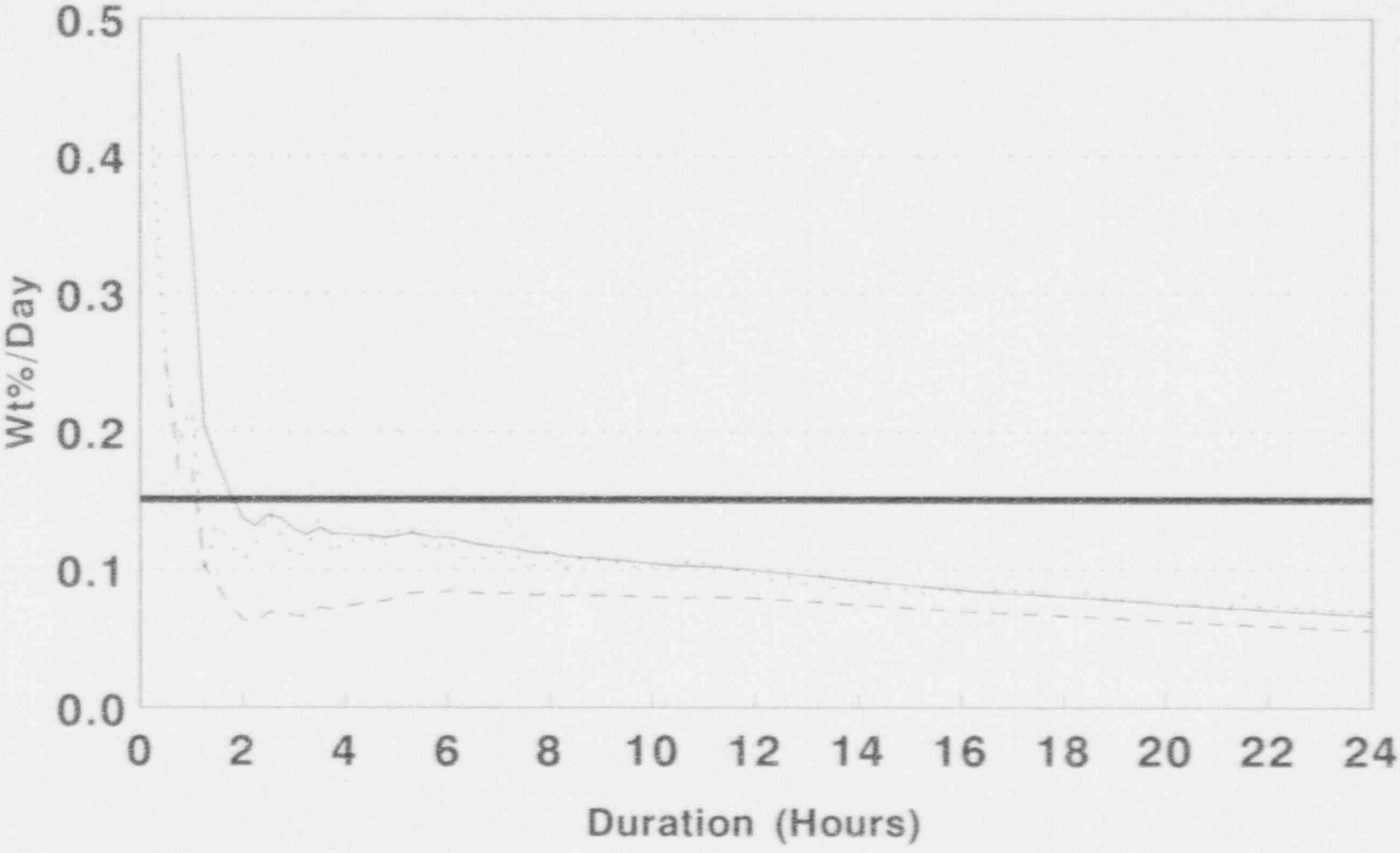


Figure 1

Verification Leakage Rate

Data from 0915 on 09/29/91 to 1315 on 09/29/91

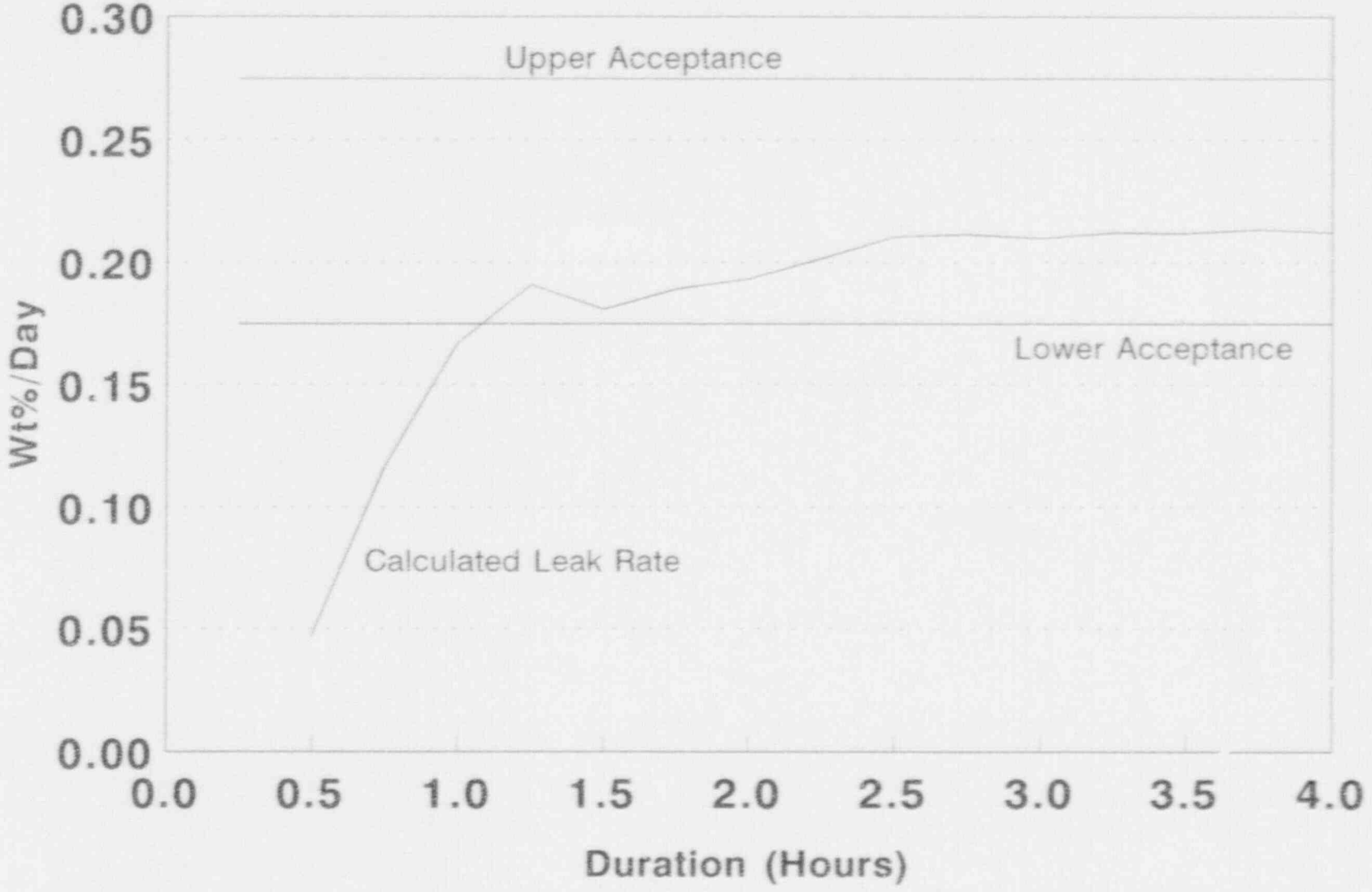


Figure 2

Containment Air Mass

Data from 0430 on 09/28/91 to 1315 on 09/29/91

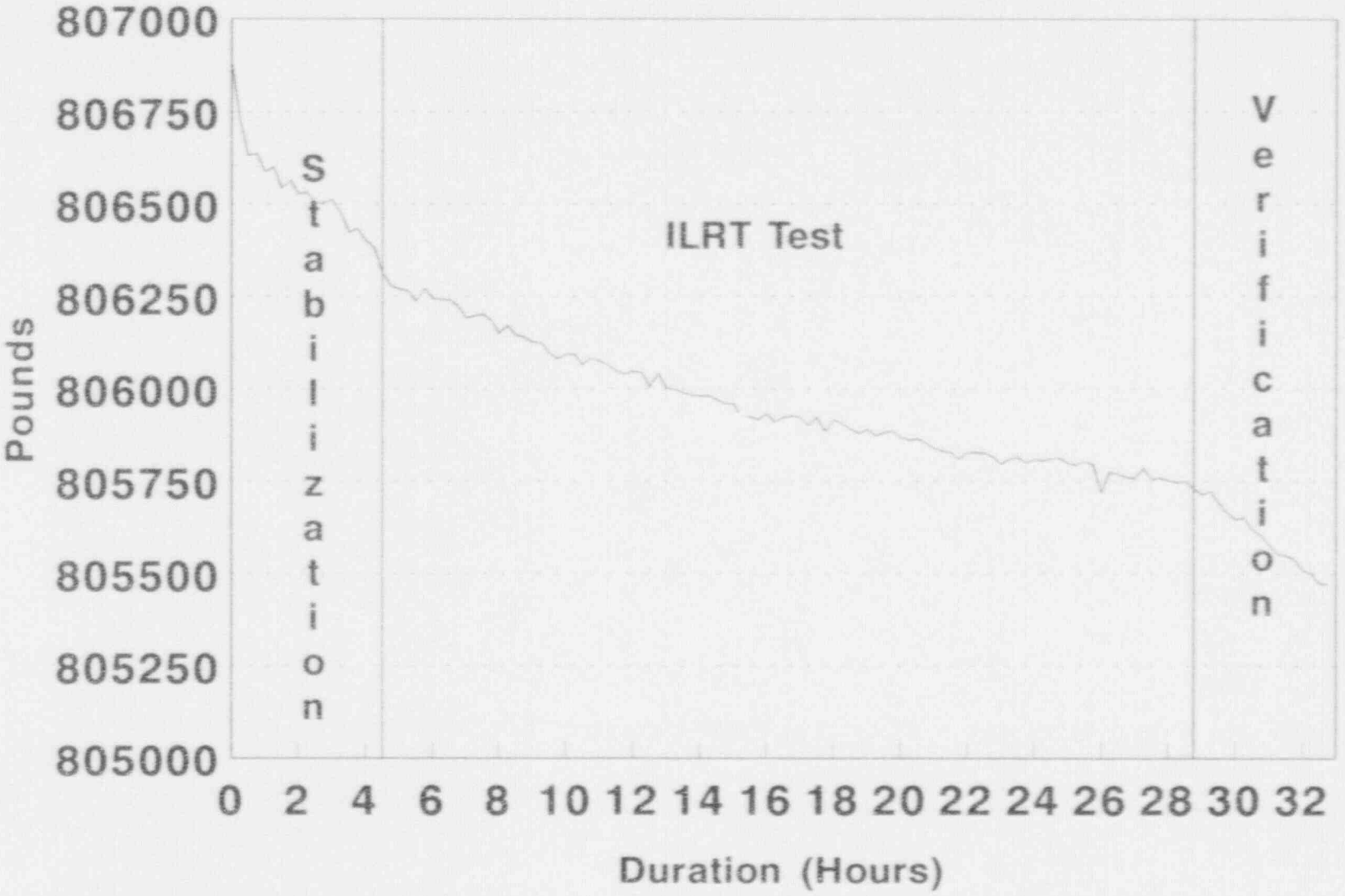


Figure 3

Containment Pressure

Data from 0430 on 09/28/91 to 1315 on 09/29/91

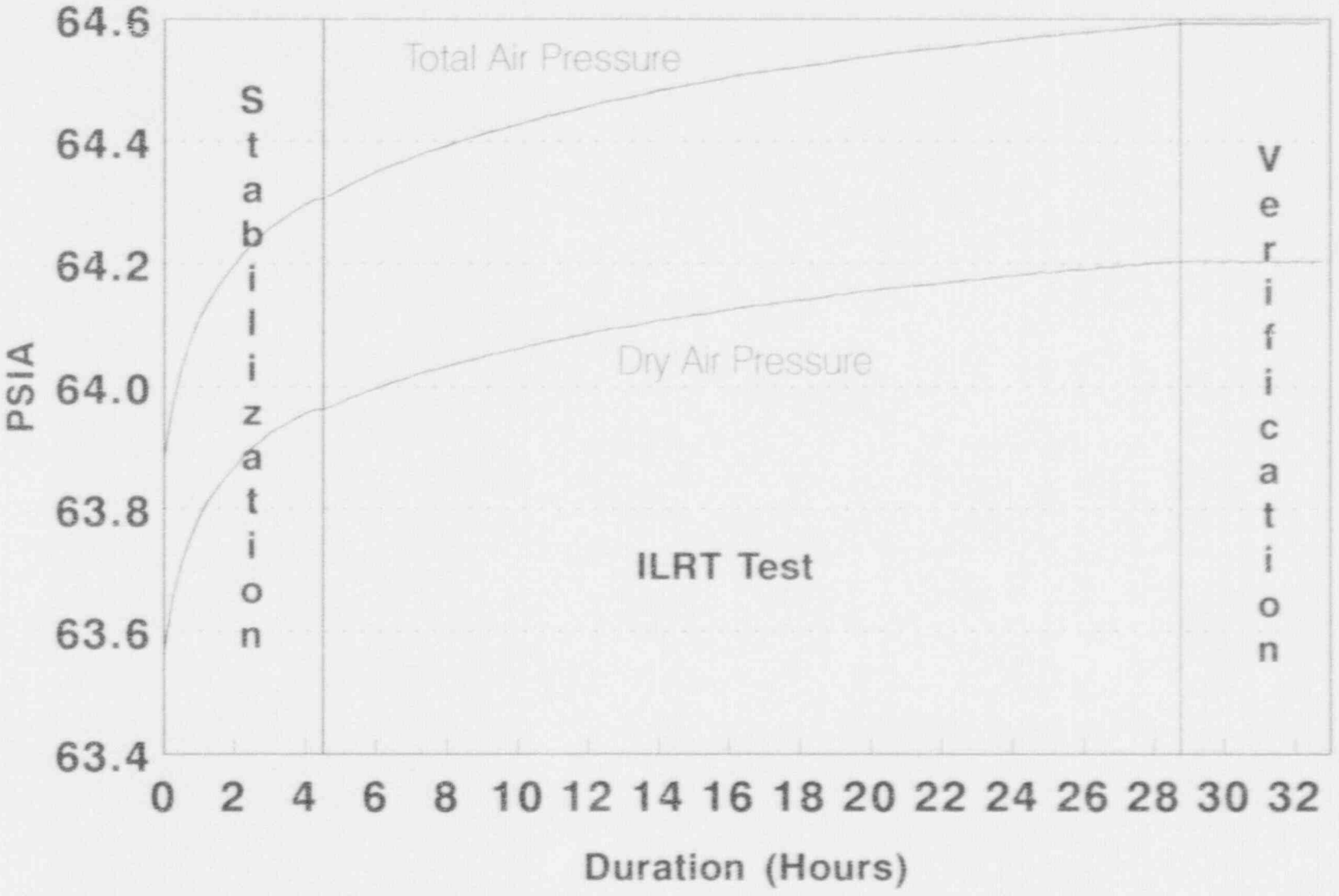


Figure 4

Containment Temperatures

Data from 0430 on 09/28/91 to 1315 on 09/29/91

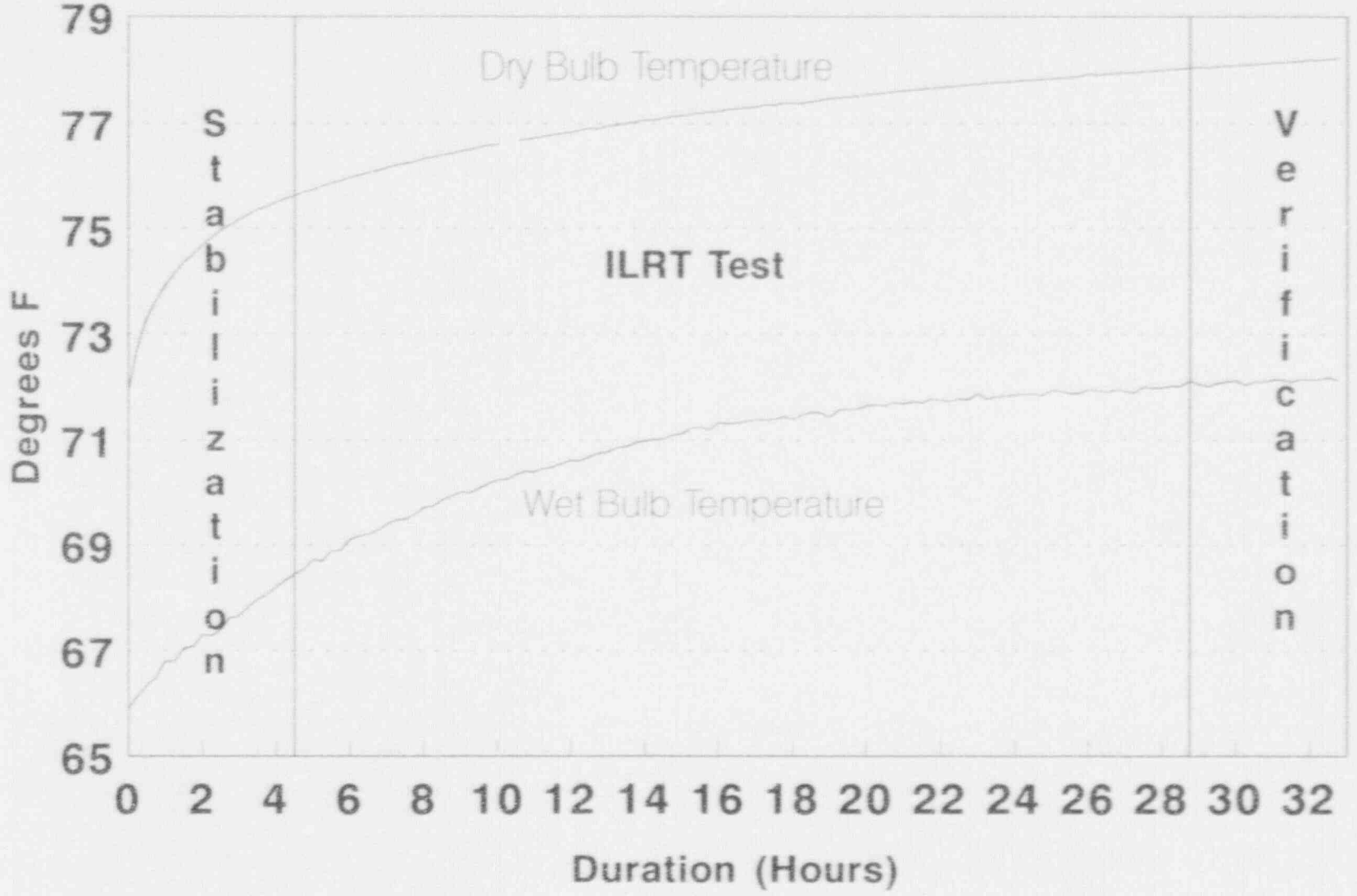


Figure 5

APPENDIX 1

PLANT INFORMATION AND TECHNICAL DATA

A. Plant Information

1.	Owners: a. Kansas Gas and Electric Company b. Kansas City Power and Light Company c. Kansas Electric Power Cooperative	
2.	NRC Docket No:	50-482
3.	Plant:	Wolf Creek Generating Station
4.	Location:	5 miles S. East of Hwy 75, New Strawn, Kansas
5.	Containment Type:	Reinforced, Post Tensioned Concrete
6.	Date Test Completed:	September 30, 1991

B. Technical Data

1.	Containment Net Free Air Volume	2,500,000 cu. ft.
2.	Design Pressure	60 psig
3.	Design Temperature	320°F
4.	Calculated Peak Accident Pressure, Pa	48.1 psig
5.	Peak Accident Temperature	384.9°F

APPENDIX 2

INSTRUMENTATION SPECIFICATIONS

A. Mensor Precision Pressure Gauge

1.	Range:	0-100 psia
2.	Accuracy:	±0.002% F.S.
3.	Sensitivity:	0.001 psia
4.	Repeatability:	0.001 psia

B. 100 Ohm Platinum RTD's

1.	Range:	60-120°F
2.	Accuracy:	±0.1°F
3.	Sensitivity:	0.01°F
4.	Repeatability:	0.01°F

C. Chilled Mirror Hygrometers

1.	Range:	49-100°F
2.	Accuracy:	±0.54°F
3.	Sensitivity:	0.1°F
4.	Repeatability:	0.1°F

C. Mass Flowmeter

1.	Range:	0-15 sccm
2.	Accuracy:	±2% F.S
3.	Sensitivity:	±1% F.S
4.	Repeatability:	0.05% F.S

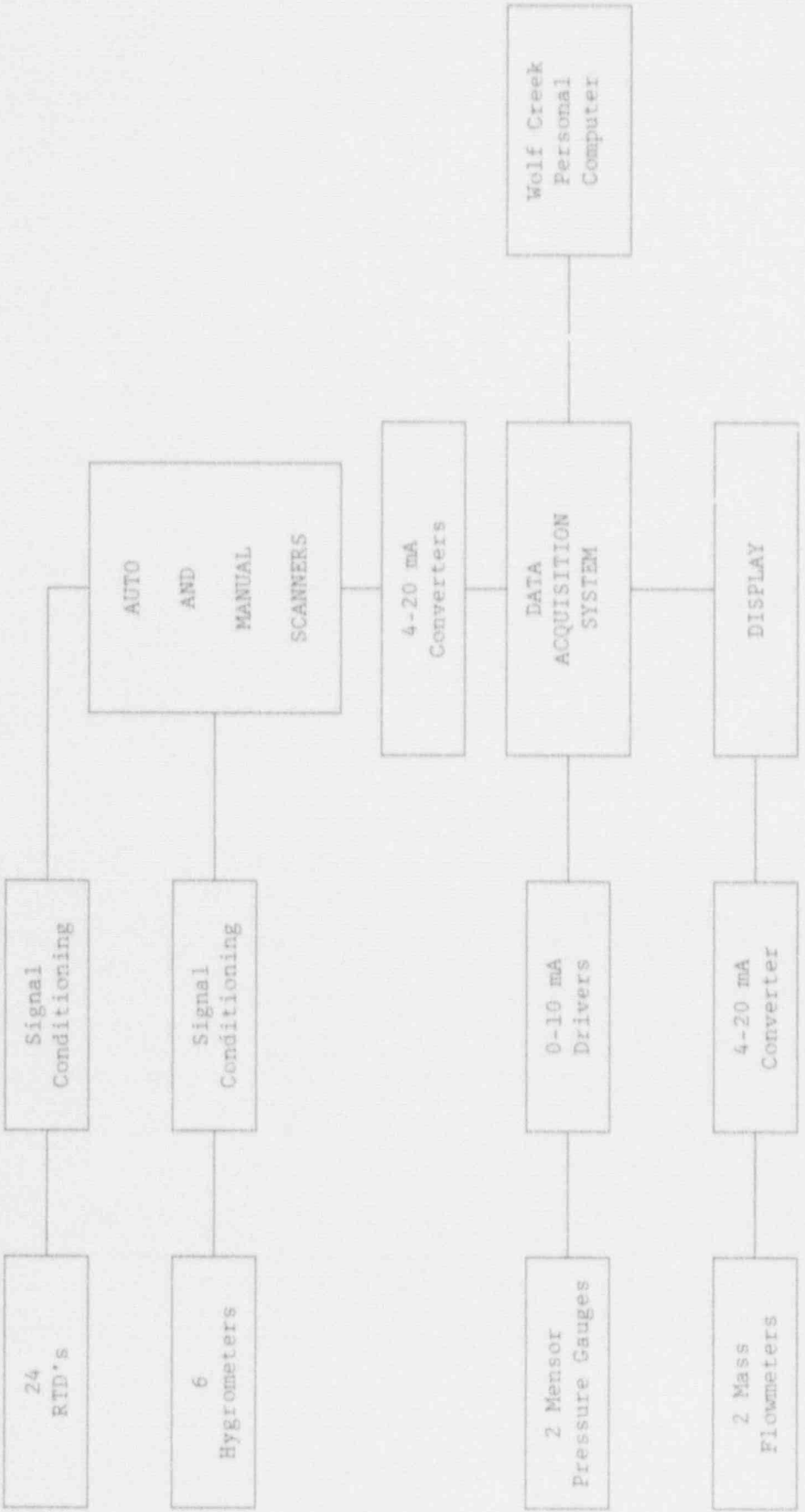
APPENDIX 3

SENSOR LOCATIONS AND VOLUME FRACTIONS

Sensor No.	Elevation (ft)	Azimuth (degrees)	Distance From Center (ft)	Volume Fraction/ Sensor
GP-TE-1	2180	0	28' 0"	0.0327
GP-TE-2	2180	90	28' 0"	0.0327
GP-TE-3	2180	180	28' 0"	0.0327
GP-TE-4	2180	270	28' 0"	0.0327
GP-TE-5	2140	45	35' 0"	0.0553
GP-TE-6	2140	135	35' 0"	0.0553
GP-TE-7	2140	225	35' 0"	0.0553
GP-TE-8	2140	315	35' 0"	0.0553
GP-TE-9	2100	0	35' 0"	0.0530
GP-TE-10	2100	90	35' 0"	0.0530
GP-TE-11	2100	180	35' 0"	0.0530
GP-TE-12	2100	270	35' 0"	0.0530
GP-TE-13	2060	60	56' 0"	0.0405
GP-TE-14	2060	180	56' 0"	0.0406
GP-TE-15	2060	300	56' 0"	0.0405
GP-TE-16	2070	180	15' 0"	0.0406
GP-TE-17	2069	0	22' 0"	0.0406
GP-TE-18	2030	0	61' 0"	0.0380
GP-TE-19	2030	120	59' 0"	0.0380
GP-TE-20	2030	240	61' 0"	0.0380
GP-TE-21	2030	0	27' 0"	0.0380
GP-TE-22	2010	90	33' 0"	0.0380
GP-TE-23	2010	270	22' 0"	0.0380
GP-TE-24	1988	0	22' 0"	0.0052
			Total:	1.0000
GP-ME-19	2180	Center	0' 0"	0.1309
GP-ME-20	2140	Center	0' 0"	0.2213
GP-ME-21	2100	Center	0' 0"	0.2119
GP-ME-22	2060	Center	0' 0"	0.2025
GP-ME-23	2030	120	59' 0"	0.1141
GP-ME-24	2010	0	27' 0"	0.1193
			Total:	1.0000

APPENDIX 4

INSTRUMENTATION SCHEMATIC



VOLUMETRICS INTEGRATED LEAKAGE RATE MEASUREMENT SYSTEM

APPENDIX 5

TYPE "A" TEST RESULTS

A. Accepted Results

1. Test Method, Absolute

2. Data Analysis Technique, Total Time per ANSI N45.4-1972

3. Minimum Test Pressure, 48.1 psig

4. Integrated Test Acceptance Limits
   a. La, 0.2 wt%/day
   b. 0.75 La, 0.15 wt%/day

5. Total Time Integrated Leakage Rates
   a. 95% UCL, 0.109 wt%/day
   b. Calculated (Regression Line), 0.043 wt%/day

6. Verification Test Leakage Rates
   a. Imposed Leakage Rate, 0.175 wt%/day
   b. Measured Composite Leakage Rate, 0.236 wt%/day

7. Verification Test Acceptance Limits

a.	Calculated Leakage Rate	+ 0.043
	Imposed Leakage Rate	+ 0.175
	25% La	+ 0.050
	Upper Limit	= 0.268 wt%/day
b.	Calculated Leakage Rate	+ 0.043
	Imposed Leakage Rate	+ 0.175
	25% La	- 0.050
	Lower Limit	= 0.168 wt%/day

B. Information Only Results

1. Wolf Creek, Mass Point per ANSI 56.8-1981
   a. 95% UCL Leakage Rate, wt%/day
   b. Measured Leakage Rate, wt%/day
   c. Verification Test Composite Leakage Rate, 0.230 wt%/day

APPENDIX 6

ILRT ADDITIONS

A. Leakage Penalties for Systems in Service During ILRT

P-17 Fuel Transfer Tube	400	sccm
P-22 Reactor Coolant Pump Seal Injection	120	sccm
P-28 Essential Service Water	2500	sccm
P-29 Essential Service Water	120	sccm
P-34 ILRT Pressurization Line	300	sccm
P-39 Reactor Coolant Pump Seal Injection	30	sccm
P-40 Reactor Coolant Pump Seal Injection	30	sccm
P-41 Reactor Coolant Pump Seal Injection	130	sccm
P-51 ILRT Instrumentation Lines	75	sccm
P-80 Reactor Coolant System Charging	200	sccm
Total Leakage Rate	3905	sccm
or	0.0019	wt%/day

B. Leakage Rate Due to a Net Increase in Water Level

Net Increase in Water Level	328	gallons/day
Equivalent Leakage Rate	0.0018	wt%/day

C. Leakage Savings of Work Performed On Isolation Components

P-28 Essential Service Water	307311	sccm
P-160 Containment Shutdown Purge Exhaust	400	sccm
Total Leakage Rate	307711	sccm
or	0.1465	wt%/day

APPENDIX 7

INSTRUMENT SELECTION GUIDE, ISG

The ISG is Calculated as Described in ANSI/ANS 56.8-1981.

1. Pressure Instrumentation Error, e_p

$$e_p = \frac{\sqrt{(0.001)^2 + (0.001)^2}}{\sqrt{1}}$$

$$e_p = 0.0014 \; psi$$

2. Temperature Instrumentation Error, e_T

$$e_T = \frac{\sqrt{(0.10)^2 + (0.10)^2}}{\sqrt{24}}$$

$$e_T = 0.0289 \; °F$$

3. Vapor Pressure Instrumentation Error, e_V

Dew point Temperature = °F
Saturation Pressure Change = psi/°F

$$e_V = \frac{\sqrt{(0.10 \times 0.01295)^2 + (0.10 \times 0.01295)^2}}{\sqrt{6}}$$

$$e_V = 0.00075 \; psi$$

4. ISG

$$ISG = \frac{2400}{6.25} \times \sqrt{2} \times \sqrt{\left(\frac{0.0014}{64.592}\right)^2 + \left(\frac{0.0289}{537.677}\right)^2 + \left(\frac{0.00075}{64.592}\right)^2}$$

$$ISG = 0.0072 \; wt\%/day$$

5. ISG Acceptance Criterion

ISG ≤ 25% La
ISG ≤ 0.050 wt%/day

APPENDIX 8

TYPE "B" AND "C" TEST RESULTS

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-14	EJ HV-24	EJ HV-26	
10/26/88	0 ± 4	43 ± 4	
03/26/90	0 ± 4	0 ± 4	
P-15	EJ HV-23	EJ HV-25	
11/07/88	0 ± 4	0 ± 4	
03/26/90	250 ± 20	300 ± 20	
P-17	O-RINGS		
12/14/88	0 ± 4		
03/11/90	220 ± 20		
04/27/90	20 ± 4		
P-22	BB HV-8351B	BB-V148	
10/21/88	0 ± 4	600 ± 20	
11/14/88	0 ± 4		
03/27/90	20 ± 4	280 ± 20	
P-23	BG HV-8152	BG HV-8160	
10/16/88	0 ± 4	0 ± 4	
11/17/88	8000 ± 232	7800 ± 232	
03/26/90	0 ± 4	0 ± 4	
P-24	BG HV-8100	BG HV-8112	BG-V135
10/18/88	0 ± 4	0 ± 4	750 ± 20
11/17/88	0 ± 4	0 ± 4	800 ± 20
03/20/90	2800 ± 232	0 ± 4	190 ± 4
04/06/90		35 ± 4	
P-25	BL-8046	BL HV-8047	
03/15/90	8200 ± 232	8000 ± 230	
P-26	HB HV-7136	HB HB-7176	
10/17/88	0 ± 4	0 ± 4	
03/20/90	0 ± 4	0 ± 4	

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-28	EF HV-32/34		
11/06/88	0 ± 4		
11/12/88	0 ± 4		
12/13/88	0 ± 4		
04/08/90	95 ± 4		
04/13/90	0 ± 4		
P-29	EF HV-46/48/50	EF HV-46	
11/06/88	0 ± 4		
11/12/88	500 ± 20		
04/08/90	0 ± 4		
04/13/90	3000 ± 232		
P-30	KA FV-29	KA-V204	
03/25/90	2050 ± 230	130 ± 4	
09/27/91	1700 ± 230	180 ± 20	
P-32	LF FV-95	LF FV-96	
10/28/88	0 ± 4		
03/22/90	0 ± 4	0 ± 4	
09/21/91	100 ± 4	0 ± 4	
P-34	FLANGE		
11/18/88	0 ± 4		
03/07/90	0 ± 4		
04/05/90	440 ± 20		
09/16/91	300 ± 4		
P-36	FLANGE		
09/26/91	540 ± 20		
P-39	BB HV-8351C	BB-V178	
10/21/88	0 ± 4	0 ± 4	
11/14/88	0 ± 4		
03/27/90	0 ± 4	360 ± 4	
04/12/90	115 ± 4		
P-40	BB HV-8351D	BB-V208	
10/21/88	0 ± 4	0 ± 4	
11/14/88	0 ± 4		
03/27/90	0 ± 4	0 ± 4	
P-41	BB HV-8351A	BB-V118	
10/21/88	0 ± 4	0 ± 4	
11/14/88	0 ± 4		
03/27/90	0 ± 4	0 ± 4	
04/12/90	55 ± 4		

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-43	HD-V016	HD-V017	
10/18/88	0 ± 4	0 ± 4	
03/21/90	0 ± 4	5000 ± 232	
P-44	HB HV-7126	HB HV-7150	
10/17/88	0 ± 4	0 ± 4	
03/20/90	0 ± 4	0 ± 4	
P-45	EP HV-8880	EP-V046	
10/20/88	43 ± 4	0 ± 4	
03/22/90	0 ± 4	0 ± 4	
04/27/90	0 ± 4		
P-51	003-HBB-1	005-HBB-1	
10/19/88	0 ± 4	18 ± 4	
03/07/90	0 ± 4	0 ± 4	
09/16/91	75 ± 4	0 ± 4	
P-53	EC-V083	EC-V084	
10/20/88		420 ± 20	
03/14/90	0 ± 4	160 ± 4	
P-54	EC-V087	EC-V088	
10/20/88	0 ± 4	0 ± 4	
03/14/90	0 ± 4	0 ± 4	
P-55	EC-V095	EC-V096	
10/20/88	0 ± 4	40 ± 4	
03/14/90	0 ± 4	0 ± 4	
P-56	GS HV-8	GS HV-9	
10/31/88	0 ± 4	0 ± 4	
03/13/90	25 ± 4	0 ± 4	
P-56	GS HV-38	GS HV-39	
10/31/88	320 ± 20	0 ± 4	
03/13/90	500 ± 20	0 ± 4	
P-57	SJ HV-131/132	SJ-V111	
10/19/88	0 ± 4	0 ± 4	
03/16/90	0 ± 4	0 ± 4	
P-58	EM HV-8888	EM-V006	
10/26/88	0 ± 4	0 ± 4	
03/22/90	90 ± 4	0 ± 4	

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-62	BB HV-8026	BB HV-8027	
10/20/88	0 ± 4	0 ± 4	
03/29/90	0 ± 4	0 ± 4	
P-63	KA-V039	KA-118	
03/09/90	1900 ± 232	1100 ± 232	
P-64	SJ HV-128	SJ HV-129/130	
03/17/90	4200 ± 232	3400 ± 232	
09/22/91	7000 ± 940	5200 ± 230	
P-65	GS HV-20/21		
10/19/88	± 4		
12/05/88	0 ± 4		
03/12/90	0 ± 4		
04/05/90	0 ± 4		
P-67	KC HV-253	KC-V478	
11/28/88	400 ± 20		
09/07/89	500 ± 20		
03/09/90	300 ± 23	4600 ± 232	
09/25/91	860 ± 20	6000 ± 940	
P-68	FLANGE		
09/26/91	0 ± 4		
P-69	SJ HV-12	SJ HV-13	
03/28/90	40 ± 4	0 ± 4	
09/25/91	460 ± 20	220 ± 20	
P-71	EF HV-31/33	EF HV-33	
10/25/88	0 ± 4		
11/02/88	0 ± 4		
03/21/90	0 ± 4		
03/25/90	0 ± 4		
P-73	EF HV-45/47/49		
10/25/88	9000 ± 232		
11/02/88	10000 ± 936		
11/02/88	24000 ± 936		
12/15/88	75200 ± 5300		
12/19/88	200 ± 20		
03/21/90	6000 ± 232		
03/25/90	1400 ± 232		
04/12/90	120 ± 4		

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-74	EG HV-58/127	EG-V204	
10/17/88	1000 ± 232	900 ± 20	
11/10/88	1200 ± 232		
03/15/90	4600 ± 936	4600 ± 936	
04/06/90	14000 ± 940		
04/09/90	5600 ± 940	5900 ± 936	
P-75	EG HV-60/130	EG HV-59/131	
10/17/88	2000 ± 232	600 ± 20	
11/16/88	1600 ± 232	2600 ± 232	
03/19/90	2100 ± 232	5100 ± 232	
04/06/90		8000 ± 232	
P-76	EG HV-62/132	EG HV-61/133	
10/17/88	60 ± 4	0 ± 4	
11/18/88	0 ± 4	0 ± 4	
12/04/88	360 ± 20		
03/15/90	40 ± 4	40 ± 4	
04/14/90	220 ± 20		
P-78	BM-V045	BM-V046	
10/17/88	0 ± 4	0 ± 4	
03/12/90	400 ± 20	600 ± 20	
P-80	BG-8381	BG HV-8105	
10/26/88	5100 ± 232	200 ± 20	
11/14/88		0 ± 4	
03/28/90	800 ± 20	65 ± 4	
P-92	EM HV-8871	EM HV-8964	
10/20/88	0 ± 4	0 ± 4	
03/14/90	65 ± 4	0 ± 4	
P-93	SJ HV-6/127	SJ HV-5	
03/14/90	2700 ± 232	2200 ± 232	
05/01/90	1000 ± 20		
05/04/90	1000 ± 20		
09/22/91	440 ± 20	580 ± 20	
P-95	SJ HV-18	SJ HV-19	
10/19/88	0 ± 4	0 ± 4	
03/22/90	0 ± 4	0 ± 4	
09/22/91	19 ± 4	19 ± 4	

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-97	GS HV-17	GS HV-18	
10/19/88	35 ± 4	0 ± 4	
03/13/90	25 ± 4	0 ± 4	
P-97	GS HV-33	GS HV-34	
10/19/88	50 ± 4	0 ± 4	
03/13/90	100 ± 4	0 ± 4	
P-98	KR-V001	KR-V002	
10/17/88	165 ± 4	200 ± 20	
03/09/90	3800 ± 232	6000 ± 232	
09/21/91	100 ± 230	8900 ± 232	
P-99	GS HV-3	GS HV-4	GS HV-5
10/30/88	0 ± 4	0 ± 4	0 ± 4
03/14/90	90 ± 4	0 ± 4	220 ± 20
P-99	GS HV-36	GS HV-37	
10/30/88	0 ± 4	0 ± 4	
03/14/90	0 ± 4	0 ± 4	
P-101	GS HV-12	GS HV-13	GS HV-14
10/18/88	45 ± 4	0 ± 4	0 ± 4
03/13/90	0 ± 4	0 ± 4	0 ± 4
P-101	GS HV-31	GS HV-32	
10/18/88	0 ± 4	0 ± 4	
03/13/90	0 ± 4	0 ± 4	
P-160	GT HZ-8	GT HZ-9	GT HZ-11/12
12/16/88	380 ± 20	0 ± 4	3000 ± 232
03/08/89			10000 ± 940
06/12/89			1600 ± 230
09/13/89			5100 ± 232
12/12/89			11500 ± 936
03/08/90			6400 ± 232
03/09/90	1500 ± 232	25000 ± 936	
05/01/90	130000 ± 5300		
05/02/90	550 ± 20	20000 ± 940	
05/03/90		2000 ± 230	2500 ± 230
08/07/90			1800 ± 230
11/14/90			4800 ± 232
02/13/91			3800 ± 232
05/15/91			1700 ± 230
08/21/91			3100 ± 230
09/17/91		22000 ± 940	2400 ± 230
09/20/91	1150 ± 230		

Penetration Number Date	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)	Component Description Leakage Rate (sccm)
P-161	GT HZ-4/5	GT HZ-6	GT HZ-7
12/16/88	3400 ± 232	1000 ± 20	180 ± 4
03/08/89	3400 ± 230		
06/12/89	2900 ± 230		
09/13/89	3000 ± 232		
12/12/89	3000 ± 232		
03/08/90	3900 ± 232		
03/09/90		840 ± 230	320 ± 0
05/01/90		800 ± 20	480 ± 20
05/03/90	3500 ± 232		
08/07/90	2800 ± 230		
11/14/90	3200 ± 232		
02/13/91	3600 ± 232		
05/15/91	3800 ± 230		
08/21/91	3600 ± 230		
09/17/91	3300 ± 230		
09/18/91		1150 ± 230	
09/20/91			600 ± 20
PEN. L-1	PERSONNEL AIR LOCK		
12/17/88	398700 ± 39870		
12/19/88	5400 ± 232		
06/15/89	5200 ± 230		
12/13/89	7000 ± 232		
03/08/90	5000 ± 232		
05/02/90	40000 ± 940		
05/03/90	5400 ± 230		
10/09/90	3475 ± 230		
04/02/91	5615 ± 232		
09/18/91	5300 ± 230		
PEN. L-2	EQUIPMENT HATCH		
12/15/88	0 ± 4		
03/09/90	0 ± 4		
04/30/90	25 ± 4		
09/26/91	90 ± 4		
PEN. L-3	EMERGENCY AIR LOCK		
12/14/88	925 ± 20		
06/07/89	2400 ± 230		
12/04/89	2000 ± 232		
03/07/90	5100 ± 232		
04/26/90	1000 ± 20		
10/02/90	900 ± 20		
03/27/91	1855 ± 232		
09/19/91	2660 ± 230		
ELECTRICAL PENETRATIONS - NORTH ROOM			
06/16/89	520 ± 20		
06/12/91	580 ± 20		

Penetration Number Date	Component Description Leakage Rate (sccm)
ELECTRICAL PENETRATIONS - SOUTH ROOM	
06/16/89	740 ± 20
06/12/91	680 ± 20

ZX03 PERSONNEL AIRLOCK DOOR SEAL LEAKAGE RATES

Date	Inner Door(sccm)	Outer Door(sccm)	Date	Inner Door(sccm)	Outer Door(sccm)
12/19/88	16.70	260.00	06/15/89	6.15	>2100
12/22/88	5.20	226.00	06/16/89	4.86	184.00
12/25/88	8.72	306.00	06/18/89	3.36	1.90
12/27/88	9.04	267.00	06/21/89	4.00	0.04
12/28/88	8.50	210.00	06/24/89	2.66	0.70
12/31/88	9.15	176.50	06/27/89	2.05	1.69
01/03/89	12.80	129.40	06/30/89	0.38	0.38
01/06/89	24.30	151.90	07/03/89	0.65	0.58
01/09/89	3.55	107.00	07/06/89	0.18	0.05
01/12/89	2.60	250.00	07/09/89	0.92	0.46
01/15/89	2.45	220.00	07/12/89	0.86	0.55
01/17/89	6.15	160.00	07/15/89	6.19	0.53
01/19/89	3.45	>2100	07/18/89	1.14	1.22
01/19/89		186.00	07/19/89	5.00	2.00
01/22/89	9.01	65.50	07/21/89	1.13	1.09
01/25/89	5.27	169.00	07/24/89	0.11	0.11
01/28/89	3.80	87.10	07/27/89	20.50	0.60
02/01/89	5.60	173.90	07/30/89	40.10	0.77
02/04/89	341.00	152.00	08/02/89	16.50	0.35
02/06/89	630.00	137.50	08/05/89	22.90	0.65
02/10/89	380.00	144.00	08/08/89	0.80	135.70
02/12/89	501.00	85.00	08/10/89	0.53	1.27
02/15/89	0.05	191.00	08/12/89	1.81	2.07
02/19/89	14.40	134.40	08/16/89	0.61	126.10
02/21/89	6.04	134.50	08/19/89	0.82	122.00
02/24/89	8.50	2.50	08/22/89	0.92	141.00
02/27/89	1.05	2.18	08/25/89	1.81	141.00
03/02/89	4.16	34.00	08/28/89	0.50	142.80
03/04/89	13.20	16.70	08/31/89	11.02	1.01
03/06/89	4.30	15.62	09/03/89	2.75	0.75
03/08/89	2.40	105.30	09/07/89	1.15	0.59
03/11/89	3.41	2.31	09/09/89	9.70	>2100
03/14/89	119.00	1.50	09/10/89	9.80	137.00
03/17/89	53.70	9.60	09/12/89	11.37	156.00
03/20/89	1.60	1.72	09/15/89	4.95	138.00
03/23/89	6.40	253.00	09/18/89	9.20	1.35
03/26/89	1.88	94.00	09/21/89	3.64	0.45
03/29/89	6.12	1.04	09/24/89	4.29	0.45
04/01/89	6.70	1.40	09/27/89	10.13	2.16
04/04/89	9.81	6.38	09/30/89	29.30	111.50
04/07/89	4.51	0.64	10/03/89	17.80	197.60
04/10/89	4.60	0.80	10/06/89	5.80	195.30
04/13/89	6.26	2.70	10/09/89	26.80	174.00
04/16/89	3.10	0.45	10/12/89	6.91	1.69
04/19/89	4.00	1.10	10/16/89	26.10	158.40
04/22/89	7.43	0.25	10/18/89	32.00	225.00
04/25/89	6.70	3.60	10/21/89	6.90	182.00
04/28/89	2.40	0.27	10/24/89	18.20	202.00
05/01/89	11.24	2.80	10/27/89	5.60	174.20
05/04/89	6.82	3.02	10/31/89	37.40	153.60
05/07/89	4.50	0.41	11/02/89	4.00	167.00
05/10/89	8.38	0.63	11/05/89	34.30	205.00
05/13/89	3.92	0.08	11/08/89	13.94	1.37
05/16/89	6.90	0.05	11/11/89	3.55	1.95
05/19/89	8.50	1.80	11/15/89	25.80	106.00
05/22/89	3.75	0.60	11/18/89	15.30	210.00
05/25/89	8.18	0.20	11/20/89	7.70	200.00
05/28/89	3.89	1.25	11/23/89	1.40	185.60
05/31/89	6.86	0.60	11/26/89	1.48	189.50
06/03/89	3.39	0.13	11/29/89	0.98	201.00
06/06/89	5.23	0.68	12/02/89	1.09	208.00
06/09/89	5.33	0.59	12/05/89	1.54	161.60
06/12/89	5.60	0.84	12/08/89	4.65	187.50

Attachment 2 to WM 92-0022

LEAKAGE RATE TEST FAILURES
OCTOBER 1988 TO NOVEMBER 1991

FOR

WOLF CREEK GENERATING STATION

TYPE "A","B" AND "C" TEST FAILURES

This summary report is being provided in accordance with 10CFR50, Appendix J, Section V.B.3. This report provides a summary of the Type A, B, and C leakage test results that failed to meet the acceptance criteria of 10CFR50, Appendix J, Section III.A.5(b), III.B.3, and III.C.3, respectively.

Type "B" and "C" test failures occur when the Combined Leakage Rate for all type "B" and "C" tests exceed 0.6La or 252,028 sccm.

P-32 LF FV-96

LF FV-96 is a normally closed valve on the containment sump discharge line. During the Local Leak Rate Test of LF FV-96, the test volume could not be pressurized to any measurable extent. It was not possible to measure or calculate the leakage through this valve with the available equipment. Therefore, the leakage through LF FV-96 was assumed to be greater than .6La. The valve seat was repaired per a Work Request.

P-28 EF HV-32 AND EF HV-34

EF HV-32 and EF HV-34 are outside and inside Containment Isolation Valves on the Essential Service Water to "B" train Containment Coolers. Normally, these two valves are tested simultaneously by pressurizing the volume between the two valves. However, when the Local Leak Rate Test was performed this way, it was impossible to pressurize the test volume due to excessive leakage. Testing between the valves does not afford us the luxury of knowing which valve is leaking. A temporary procedure was written to allow testing of the valves individually. The second test of these valves revealed that EF HV-32 and EF HV-34 were leaking 281,857 sccm and 265,310 sccm respectively. The valves were repaired per Work Requests.

The dual failure of EF HV-32 and EF HV-34 also caused the Type "A" test "As Found" leakage rate to exceed La. This Essential Service Water line was not drained and vented for the ILRT. The "As Found" ILRT condition was determined by adding the Local Leak Rate test leakage of EF HV-34 to the measured Integrated Leakage Rate at the 95% upper confidence limit. LER 91-020 discusses this event.