

1984 REFUELING OUTAGE TYPE B AND C

LOCAL LEAK RATE TEST SUMMARY

As part of the 1984 refueling outage, local leak rate tests were performed on the reactor containment building penetrations in accordance with the Fort Calhoun Station Technical Specifications, (Section 3.5) and 10CFR50 Appendix J. The testing is performed to identify, measure and if required, initiate maintenance on potential reactor containment leakage paths; and to ensure the total measured leakage does not exceed the Technical Specifications limit of 0.6La, (La = Leakage allowable and .6La = 62,951 standard cubic centimeters per minute.) The initial "as found" local leakage which contributes toward the .6La limit and as measured from all local leakage paths was 29,520.79 sccm. (The individual leak rates for each penetration are tabulated on the attached TABLES I thru IV.) The final "after maintenance" leak rate was 7,684.33 sccm.

The Type B tests were conducted by pressurizing the local containment penetration boundaries with air or nitrogen (air for the mechanical penetrations - nitrogen for the electrical penetrations) to Pa, 60 psig accident pressure, and measuring the flow rate which is required to maintain the test volume at Pa. This flow rate is assumed to be the local containment leak rate. The leak rate measurement system uses a series of calibrated rotameters to determine the leakage.

The Type B tests are conducted to measure the leakage through the containment mechanical and electrical penetration seals, and containment building resilient sealed penetrations. These tests are conducted as part of the Fort Calhoun Station Surveillance test program. All tests by which the following leak rate data was obtained, are filed at the Fort Calhoun Station as Q.A. documents.

The Fuel Transfer Tube leak rate test (ST-CONT-2, F.4) was conducted on 3/21/84, 4/28/84 and on 4/29/84. The measured results are tabulated on TABLE I (attached.) Measured leakage of the Fuel Transfer Tube does contribute to the .6La leakage limit.

The Electrical Penetrations were leak tested in accordance with ST-CONT-2, F.5. Results are tabulated on TABLE IV (attached.) These penetrations do contribute to the .6La maximum allowable leakage limits.

The Mechanical Penetration sleeving was leak tested in accordance with ST-CONT-2, F.6. Results are tabulated on TABLE V (attached.) This sleeving does contribute to the .6La maximum allowable leakage limit.

The Equipment Hatch leak rate was tested as outlined in surveillance test ST-CONT-2, F.3. Tests were performed prior to its initial removal and following each replacement; results are tabulated in TABLE II (attached.) This leakage does contribute towards the .6La maximum allowable leakage limit.

The Personnel Air Lock leak rate was tested in accordance with ST-CONT-2, F.1 (the reduced pressure test); these daily tests are on file at the Fort Calhoun Station. The personnel air lock (P.A.L.) was also tested two times since the previous refueling outage (once each six months per ST-CONT-2, F.2.) Leakage is tabulated in TABLE III and does contribute towards the .6La leakage limit.

Type C tests were performed to measure the leakage of containment isolation valves. (Refer to surveillance tests ST-CONT-3, F.1, F.2, and F.3.) These tests are conducted using air as the test medium; with the exception of Penetrations M-9, M-12, M-16, M-91, M-93, M-94, M-96, and M-97, which use water as the test medium. Results of leak rates performed are tabulated on TABLE VI (attached.) Leak rates which do not contribute towards the .6La leakage limit are also outlined in TABLE VI.

The Mechanical Sleeves, valves or other containment penetrations which required significant maintenance are as follows: Sleeve M-383-4, and valve penetrations M-10, M-14, M-22, M-24, M-30, M-51, M-69, M-87, M-88, M-93, M-94, M-95, and M-96. The maintenance performed on each of the penetrations is listed below:

M-383-4 (Safety Injection Recirculation "Submarine Hull" Mechanical Sleeve.) Measured leakage at the sleeve was found to be 1380 sccm on 3/5/84. M.O.841106 was issued to lower leakage. A subsequent leak rate measured on 3/19/84 verified "0" sccm leakage at this sleeve.

M-10 (Steam Generator RC 2B Blowdown.) Initial leak rate measured through this penetration (3/9/84) was found to be 3000 sccm. M.O.841100 and 841101 were written to rebuild blowdown valves HCV-1387A and HCV-1387B. M-10 was retested (4/2/84) and "0" sccm was found.

M-14 (RC Drain Tank Vent to WDS.) Initial leak rate measured through this penetration (3/17/84) was found to be 10,052.5 sccm. This exceeds the maximum allowable leakage specified in TABLE I of ST-CONT-3, F.1 for penetration M-14. M.O.841168 was written and new diaphragms were installed on HCV-507A and HCV-507B. M-14 was retested on 5/1/84 and found to have 6.67 sccm leakage.

M-22 (SI to and from Leakage Coolers.) Initial leak rate measured through this penetration (3/27/84) was found to be 2300 sccm. M.O.840803 was written and it was found that valve needed packaging adjustment. Leakage was to the equipment drain header through a packing bleed-off line. M-22 was retested and found to have "0" sccm leakage on 3/9/84.

M-24 (Pressurizer Quench Tank Sample Line.) Initial leak rate measured through this penetration (3/7/84) was found to be "0" sccm. However, the diaphragm had signs of acid build-up, so M.O.841752 was written to replace the diaphragm. The penetration M-24 was retested 5/7/84 and found to have "0" sccm leakage.

M-30 and M-69 (Hydrogen Purge.) Initial leak rate measured through penetrations M-30 and M-69 was "0" sccm (3/10/84.) New valves were installed as part of a modification and the subsequent test showed excessive leakage. After maintenance, the valves were retested on 5/10/84 and found to have "0" leakage.

M-51 (Containment Pressure Signal.) Initial leak rate measured through this penetration on 3/14/84 was found to be 2250 sccm. M.O.841169 was written to install new diaphragm. Penetration M-51 was retested 4/26/84 and found to have 13.7 sccm leakage.

M-87 (Containment Purge Exhaust.) Initial leak rate measured through this penetration on 2/24/84 was found to be 2200 sccm. M.O.841109 was written to adjust seals on PCV-742C. Leakage was found to be 102 sccm on 5/9/84. Purge valves were again used so another leak rate had to be performed. Leakage was 2700 sccm on 6/29/84.

M-88 (Containment Purge Inlet.) The initial leak rate on penetration M-88 was 2250 sccm (2/24/84.) After the valves were reclosed, the leak test on M-88 (5/9/84) showed 750 sccm. The valves had to be used again for continued outage due to the steam generator's repair. Excessive leakage was found so M.O.842223 was written to change the seal on PCV-742C. The leak rate on M-88 showed "0" leakage on 7/1/84.

M-93 and M-96 (Feedwater.) On 3/14/84 and 3/10/84, the initial leak rate test on penetrations M-93 and M-96, respectively, was 2250 sccm and .94 scfm. M.O.841846 was written to adjust the limitorque on valves HCV-1103, HCV-1104, HCV-1385, and HCV-1386. On 5/9/84 leak rate was 145 sccm for M-93 and 850 sccm for penetration M-96. These valves do not contribute to the .6La maximum allowable leakage limit.

M-94 and M-95 (MSIV's.) On 3/9/84 and 3/11/84, the initial leak rates were 1800 sccm for M-94 and unmeasurable for M-95. M.O.841097 and M.O.840353 were written to repair valves. M-95's MSIV was not closing completely. After maintenance, the penetrations M-94 and M-95 were retested on 5/8/84 and found with "0" sccm leakage.

The Fort Calhoun Station Unit No. 1 reactor containment building was subjected to a third integrated leak rate test (Type A) during the period from January 6, 1983 to January 10, 1983. The purpose of this test was to demonstrate the acceptability of the containment building leakage rate at a design basis accident internal pressure of 60.0 psig. Testing was performed in conformance with the requirements of 10 CFR Part 50, Appendix J, and Fort Calhoun Station Unit No. 1 Technical Specifications. In addition, the recommendations of ANSI 56.8 - 1981 and ANSI N45.4 - 1972, were considered where appropriate.

Leakage rate testing was accomplished at the pressure level of 60.0 psig for a period of 10 hours. The 10 hour period was followed by a 4 hour supplemental test for a verification of test instrumentation. The Type A integrated test results equal 52,826.29 scc/min.

TABLE I
TYPE B TEST

Fuel Transfer Tube Leak Rate Test - (ST-CONT-2, F.4)

As found leakage measured 3-21-84 = 2 sccm

As found leakage measured 4-28-84 = 3000 sccm

As found leakage measured 4-29-84 = 1 sccm

TABLE II
TYPE B TEST

Equipment Hatch "O" Seal Test - (ST-CONT-2, F.3)

<u>As Found</u>	<u>As Left</u>
3- 5-84 - 0 sccm	0 sccm
3-29-84 - 2 sccm	2 sccm
4- 5-84 - 0 sccm	0 sccm
5- 7-84 - 0 sccm	0 sccm

TABLE III
TYPE B TEST

Personnel Air Lock Leak Rate Test (ST-CONT-2, F.2)

<u>Date Tested</u>	<u>Leakage Measured</u>
1-25-84	3800 sccm
<u>7-14-84</u>	<u>1950 sccm</u>

TABLE IV

TYPE B TEST

Electrical Penetrations - (ST-CONT-2, I.5)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
A-1	0	0
A-2	0	0
A-4	0	0
A-5	0	0
A-6	0	0
A-7	0	0
A-8	0	0
A-9	0	0
* A-10	0	0
A-11	0	0
B-1	0	0
B-2	0	0
** B-4	0	0
B-5	0	0
B-6	0	0
B-7	0	0
B-8	0	0
B-9	0	0
B-10	0	0
** B-11	0	0

TABLE IV (Continued)

TYPE B TEST

Electrical Penetrations - (ST-CONT2, F.5)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
C-1	0	0
C-2	0	0
C-4	0	0
** C-5	0	0
C-6	0	0
C-7	0	0
C-8	0	0
C-9	0	0
** C-10	0	0
C-11	0	0
D-1	0	0
D-2	0	0
D-4	0	0
D-5	0	0
D-6	0	0
D-7	0	0
D-8	0	0
D-9	0	0
D-10	0	0
* D-11	0	29.67

TABLE IV (Continued)

TYPE B TEST

Electrical Penetrations - (ST-CONT-2, F.5)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
E-1	0	0
E-2	0	0
E-4	0	0
E-5	0	0
E-6	0	0
E-7	0	0
E-8	0	0
E-9	0	0
E-10	0	0
** E-11	0	0
F-1	0	0
F-2	0	0
F-4	0	0
F-5	0	0
F-6	0	0
F-7	0	0
F-8	0	0
F-9	0	0
F-10	0	0
F-11	12.9	12.9
G-1	0	0
G-2	0	0
G-3	0	0
G-4	0	0

TABLE IV (Continued)

TYPE B TEST

Electrical Penetrations - (ST-CONT-2, F.5)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>Gas Left (sccm)</u>
H-1	0	0
H-2	0	0
H-3	0	0
H-4	0	0
E-HCV-383-3A	4.33	4.33
E-HCV-383-3B	0	0
E-HCV-383-4A	0	0
E-HCV-383-4B	0	0
TOTALS =	17.23	46.9

* These penetrations were tested per ST-CONT-2, F.5 and also tested after installation of the penetrations installed as part of modification MR-FC-81-99 Part III.

** These penetrations were tested per ST-CONT-2, F.5 and also as per part of modification MR-FC-80-19, after Eddy Current testing of Steam Generators A & B. However, in both cases leakage was 0 sccm.

TABLE V

TYPE B TEST

Mechanical Sleeve Leak Rate (ST-CONT-2, F.6)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-1	0	0
M-2	0	0
M-3	0	0
M-4	0	0
M-5	0	0
M-6	0	0
M-7	0	0
M-8	0	0
M-9	0	0
M-10	0	0
M-11	0	0
M-12	0	0
M-13	0	0
M-14	0	0
M-15	0	0
M-16	0	0
M-17	0	0
M-18	0	0
M-19	0	0
M-20	0	0
M-21	0	0
M-22	0	0

TEBLE V (Continued)

TYPE B TEST

Mechanical Sleeve Leak Rate (ST-CONT-2, F.6)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-23	0	0
M-24	0	0
M-25	0	0
M-26	0	0
M-27	0	0
M-28	0	0
M-29	0	0
M-30	0	0
M-31	0	0
M-32	0	0
M-33	0	0
M-34	0	0
M-35	0	0
M-36	0	0
M-37	0	0
M-38	0	0
M-39	0	0
M-40	0	0
M-41	0	0
M-42	0	0
M-43	0	0
M-44	0	0

TABLE V (Continued)

TYPE B TEST

Mechanical Sleeve Leak Rate (ST-CONT-2, F.6)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-45	0	0
M-46	0	0
M-47	0	0
M-48	6.66	6.66
M-49	0	0
M-50	0	0
M-51	0	0
M-52	43.2	43.2
M-53	0	0
M-54	0	0
M-55	0	0
M-56	0	0
M-57	0	0
M-58	0	0
M-59	0	0
M-60	0	0
M-61	0	0
M-62	0	0
M-63	0	0
M-64	0	0
M-65	0	0
M-66	0	0

TABLE V (Continued)

TYPE B TEST

Mechanical Sleeve Leak Rate (ST-CONT-2, F.6)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-67	0	0
M-68	0	0
M-69	0	0
M-70	0	0
M-71	0	0
M-72	0	0
M-73	0	0
M-74	0	0
M-75	0	0
M-76	0	0
M-77	0	0
M-78	0	0
M-79	0	0
M-80	0	0
M-81	0	0
M-82	0	0
M-83	0	0
M-84	0	0
M-85	11.5	11.5
M-86	0	0
M-87	0	0
M-88	0	0

TABLE V (Continued)

TYPE B TEST

Mechanical Sleeve Leak Rat (ST-CONT-2, F.6)

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left (sccm)</u>
M-89	0	0
M-90	0	0
M-91	0	0
M-92	0	0
M-93	0	0
M-94	0	0
M-95	520	520
M-96	0	0
M-97	0	0
M-98	0	0
M-99	0	0
M-383-3	0	0
M-383-4	1380	0
	<hr/>	<hr/>
TOTALS =	1961.36	581.36

TABLE VI

TYPE C TEST

Piping

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left/ After Maintenance (sccm)</u>
M-2	0	0
M-7	0	0
M-8	0	0
** M-9	0	0
** M-10	3000	0
M-11	0	0
** M-12	0	0
** M-13	120	0
M-14	10,052.5	6.67
M-15	0	0
M-16	70	70
M-18	0	0
M-19	0	0
M-20	0	0
M-22	2300	0
M-24	0	1
M-25	0	0
M-30	0	0
M-31-1	0	0
M-31-2	0	0
M-38-1	0	0
M-38-2	2.6	2.6
M-39	0	0
M-40-1	0	0
M-40-2	0	0
M-42	0	0

TABLE VI (Continued)

<u>Penetration</u>	TYPE C TEST Piping	
	<u>As Found (sccm)</u>	<u>As Left/ After Maintenance (sccm)</u>
M-43	0	0
M-44	0	0
M-45	900	0
M-46-1	9.6	9.6
M-46-2	0	0
M-47-1	0	0
M-47-2	0	0
M-48-1	250	250
M-48-2	4.5	4.5
** M-49	0	5.6
M-50-1	0	0
M-50-2	0	0
M-51-1	2250	13.7
M-51-2	150	48
M-52-1	0	0
M-52-2	200	0
M-53	0	0
M-57-1	0	0
M-57-2	0	0
M-58-1	0	0
M-58-2	1100	0
** M-63	90	0
M-69	0	0
M-72	N/A	N/A
M-73	0	0
M-74	0	0
M-79	0	0
M-80	0	0

TABLE VI (Continued)

TYPE C TEST
Piping

<u>Penetration</u>	<u>As Found (sccm)</u>	<u>As Left/ After Maintenance (sccm)</u>
M-86	2000	2000
M-87	2200	2700
M-88	2250	0
M-89	0	0
** M-91	26	26
** M-93	2150	145
** M-94	1800	0
** M-95	MAX	0
** M-96	.94 scfm	850
** M-97	300	6.54
HCV 383-3	0	0
HCV 383-4	0	0
TOTALS =	23,739.2	5,106.07

** Penetration leak rates referenced to this mark do not contribute towards the .6La maximum allowable leakage.

NOTE: The totals listed above only include those leakages contributing towards the .6La leakage limit.

Omaha Public Power District
1623 Harney Omaha, Nebraska 68102
402/536-4000

September 10, 1984
LIC-84-283

Mr. James R. Miller, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

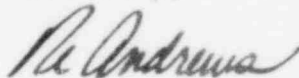
Reference: Docket No. 50-285

Dear Mr. Miller:

1984 Refueling Outage Type B and C
Local Leak Rate Test Summary

Pursuant to the requirements of Fort Calhoun Station Unit No. 1 Technical Specification 5.9.3.e and 10 CFR 50, Appendix J, the Omaha Public Power District submits the attached report which summarizes the Type B and Type C Local Leak Rate Tests conducted during the 1984 refueling outage.

Sincerely,



R. L. Andrews
Division Manager
Nuclear Production

RLA/DJM/rh-w

Attachment

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

Mr. E. G. Tourigny, NRC Project Manager

Mr. L. A. Yandell, Senior Resident Inspector

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