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ILLINOIS POWER COMPANY

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

10CFR50.34

April 18, 1988

Docket No. 50-461

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station
<u>Containment Design</u>

Dear Sir:

On March 30, 1988, Illinois Power Company (IP) met with members of the Office of Nuclear Reactor Regulation and Region III to discuss the appropriateness of the Clinton design for primary containment integrity as presented in the Final Safety Analysis Report and as accepted by the NRC Staff in the Safety Evaluation Report. Additionally, telephone discussions were held on April 11 and 12, 1988, to address the March 30, 1988 questions and NRC questions pertaining to the Inservice Testing (IST) program.

As a result of the meeting and subsequent discussions, the NRC Clinton Project Manager requested IP to supply additional information relating to questions on pneumatic and hydrostatic testing of containment isolation valves and pressure isolation valves. This information is provided in Attachment 1. Included too, as Attachment 2, are the stroke times of certain valves to be evaluated by the NRC. The listing corresponds to a list of valves provided by your Mr. M. Huber.

If you have any questions or require additional information, please contact me.

Sincerely yours,

F. A. Spangenberg

F. A. Spangenberg, III
Manager - Licensing and Safety

RFP/ckc

Attachments

cc: NRC Resident Office
NRC Region III Regional Administrator
NRC Clinton Licensing Project Manager
M. Huber, Region III

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Attachment 1

In conversation during the March 30, 1988 meeting, certain questions were raised which required IP to provide additional information. These questions and responses are listed below.

1. Identify the testable check valves that are Pressure Isolation Valves (PIVs) but not Containment Isolation Valves (CIVs).

   The applicable valves are as follows:

   1E12-F041A LPCI RHR A Testable Check
   1E12-F041B LPCI RHR B Testable Check
   1E12-F041C LPCI RHR C Testable Check
   1E21-F006 LPCS Testable Check
   1E21-F005 HPCS Testable Check
   1E51-F066 RCIC Testable Check

2. Provide a calculation comparing a 1000 psi PIV test to an Appendix J Type "C" test. Discuss surface tension differences and leak rate differences between the two tests. Also compare the calculation results to actual test results on the valves which have been tested by both methods.

   The results of the PIV to CIV correlation are provided in the enclosed Sargent & Lundy Calculation No. 01ME114, Rev. 2.

3a. Provide tolerances for the test equipment used for the closed loop and pressure isolation valve leakage tests.

   Closed Loop
   - Pressure ±2% full scale accuracy
   - Flow ±1% full scale accuracy

   Pressure Isolation Valve
   - Pressure ±.5% full scale accuracy
   - Leakage estimated to be ±.05 gpm due to leakage is collected in barrel then measured in a beaker or graduated cylinder

3b. Provide test results for all 1000 psig PIV testing.

   The test results are provided on page 13 of the enclosed Sargent & Lundy Calculation No. 01ME114, Rev. 2 (Exhibit A).

3c. Provide Appendix J results for PIV's that are tested.

   The test results are provided in the enclosed Sargent & Lundy Calculation No. 01ME114, Rev. 2 (Exhibit A).

Comparison of Pressure Isolation Tests with Type "C" Testing
Safety Related
Illinois Power Company
Clinton Power Station
Proj. No. 7685

Calc. No. 01ME114
Rev. 2 Date 4-11-88

Prepared by [signature] 4-11-88
Reviewed by [signature] 4-11-88
Approved by [signature] 4-11-88

OBJECT:

This calculation will use published methods to correlate the amount of leakage found in Pressure Isolation Valve Tests (PIV) with water at 1000 psi to Appendix J Type "C" Tests for Containment Isolation Valves (CIV) with air at 9.0 psi. This correlation will then be compared to leakages measured by both methods on valves in the plant. If the correlation provides conservative predictions of the CIV test results, this correlation will be used to predict the CIV test results for the ECCS injection check valves and the RCIC injection check valve based on the PIV testing which has already been performed. These calculated leakages will be compared to the remaining margin between the sum of the measured Type B and C tests and the allowed sum of type B and C tests. We will determine whether or not the addition of these leakages would raise the sum of the Type B and C above the allowable.

METHOD:

The standard correlation between velocity squared and pressure drop is assumed. The flow coefficient "K" however is not assumed to be constant under all flow conditions. Instead it is assumed to be a function of both Reynolds number and the flow area to passage length ratio. It is found experimentally and presented in "Lyon's Valve Designer's Handbook", reference 1. By assuming that "K" varies with geometry and Reynolds number, the differences in fluid, fluid velocity, passage size, and passage shape are considered.

In determining a correlation, we first consider the geometry of the valve seats. We can model a leakage path in one of two ways. The first is to consider a scratch in the seat and model it as an orifice as long as the seat is wide. The diameter of the orifice would be as necessary to produce the leakage seen in the PIV test. The second method would be to model it as a thin clearance between the seat and the disk. The length would be the seat width. The width of the clearance would be the circumference of the seat. The height of the clearance would be as required to produce the leakage measured during the PIV testing.

In determining the model to use we need to consider the past history of the valves. If the valves had scratched seats, we would expect the leakage to remain at the same level or increase over time. If the leakage were occurring due to lack of tight seating, we would expect that the leakage would be subject to erratic change from one test to the next. From the attached summary of PIV testing, Exhibit A, we can see that the valves show low and erratic leakage during the PIV testing. Because of this we will model the valves as clearance between the seat and the disk.

After determining the shape of the passage we must determine its size. The seat diameter is assumed to be equal to the nominal pipe size for these full ported gate and check valves. The seat width is given by the vendor. The clearance between the disk and the seat is calculated from the results of the PIV tests.

After the geometry and size of the passage is determined, we use the same methodology for predicting the leakage that we would obtain in the CIV tests. We use the formula for compressible isentropic flow to determine the air leakage during the CIV test. These results are then compared to those found during actual tests on valves in the plant. This comparison will show that these methods are either accurate, conservative or nonconservative. In the event that the method is accurate or conservative, we can use the method to conservatively predict the leakage expected during a CIV test from the results of the current PIV test.

The method described above is based on testing with both air and water and is sensitive to the difference in the viscosity between air and water. The method above is similar to the Kozeny-Carmen methods used to predict flow in mixed beds in that the flow is a function of flow passage geometry, viscosity and pressure drop. Surface tension is not considered in either method. This is due to the fact that the same fluid is assumed to occupy the area leading to the passage, the passage itself and the area beyond the passage.

The assumption that surface tension does not affect the flow rate during a leak test is then only valid where there is the same media on both sides of the valve. It would not be valid where a PIV test was performed using water upstream of the valve and venting the piping downstream of the valve. A PIV test performed in this manner may show no leakage of water due to the fact that there may be insufficient pressure to force the surface of the water to expand from the small area of the passage to wet a larger area of the valve downstream of the seating area. A prediction based on this type of test may conclude that there would not be any air leakage from a CIV test performed on the same valve. This might prove to be incorrect because an air test would not have an air to water interface, no pressure would be required to stretch the surface area of the interface and air leakage might result.

At Clinton, the PIV test is conducted with water on both sides of the seating area. Leakage is collected by overflow on the downstream side of the valve. Therefore, there is no air to water interface and no pressure is required to overcome surface tension. The CIV test is performed with air on both sides of the valves. Therefore, surface tension considerations need not be included in the correlation between air and water tests at Clinton.

REFERENCES:

1) Lyon's Valve Designer's Handbook. Pages 165 through 170 Van Nostrand Reinhold Co. ISBN: 0-442-24963-2

2) Crane Technical Paper No. 410, 17th. printing

3) XTP-00-07 Clinton initial ILRT/LLRT (Type A and Type C) test procedure and results

4) Clinton Procedure CPS 9861.02 results for Type C testing

5) Clinton Procedure CPS 9843.01 results for PIV testing

6) AIR 1909

CALCULATION :

We must first find the relation between passage size and the leakage rate measured during PIV testing. Such a relation is defined in reference 1. Since PIV testing is performed with water we will use the equations for incompressible flow. This section will rearrange the incompressible flow equations into a convenient form for our further use.

CALCULATE THE CLEARANCE REQUIRED TO PROVIDE THE LEAKAGE RATES MEASURED DURING THE PIV TESTING

FROM REFERENCE 1, PAGE 167

FOR INCOMPRESSIBLE FLUID WITH D >> L (seat width)

$V = K[(2g_c \Delta P)/\rho]^{.5}$

$W = \rho V\pi DC = \pi DCK[2g_c\rho\Delta P]^{.5}$ Equation (1)

$Re = (2WC)/(A\mu g_c) = (2WC)/(\pi DC\mu g_c) = (2W)/(\pi D\mu g_c)$ where W is known Equation (2)

$Re = (2CK[2\rho\Delta P]^{.5})/(\mu[g_c]^{.5})$ where W is unknown but C is known Equation (3)

C = Clearance between surfaces (ft.)
D = Seat diameter (ft.)
ρ = Density (lb_m/ft^3)
P = Test pressure (psf)
μ = Viscosity (lb.-sec/ft^2)
W = Mass flow rate (lb/sec)

SUBSTITUTE THE VALUES FOR ρ, P, μ and g_c INTO EQUATIONS 1, 2, & 3 ABOVE.

P = 1000 psi = 144000 psf
ρ = 62.4 lb/ft^3
μ = 1.00 centipoise (Crane T.P. 410 A-3) or
6.72 x 10^{-4} lb-sec/ft^2
g_c = 32.2 ft/sec^2

W = lb./sec q = gpm $W = .1390q$

$W = \pi DCK[2g_c \rho \Delta P]^{.5} = DCK\pi[64.4(62.4)(1000)(144)]^{.5} = 75573DCK$

$Re = (2W)/(\pi D \mu g_c) = 2W/[(\pi)(6.72 \times 10^{-4})(32.2)(D)] = 29.4W/D = 4.087q/D$

$CK = W/75{,}573(D) = 1.839 \times 10^{-6} q/D$

FOR A SEATING SURFACE OF 1 = 1/8" $L = 1/[(8)(12)] = 1/96$ ft

$C/L = 96C$

$(C/L)K = 96(1.839 \times 10^{-6})(q/D)$

$(C/L)K = 1.765 \times 10^{-4}(q/D)$

THE FOLLOWING SUMMARIZES THE RESULTS OF THE PIV TESTS:

VALVE	DIA.	q(gpm)	Re	(C/L)K
1E12-F042C	12"	.0044	.0180	7.78×10^{-7}
1E21-F005	12"	.00018	.000737	3.18×10^{-8}
1E22-F004	10"	.000079	.00039	1.67×10^{-8}
1E51-F013	6"	.00026	.00213	9.18×10^{-8}
1E12-F009	18"	.0121	.0330	1.42×10^{-6}
1E12-F053A	10"	.095	.466	2.01×10^{-5}
1E12-F053B	10"	.0095	.0466	2.01×10^{-6}

THE VALUES FOR Re ARE BELOW THOSE SHOWN IN REFERENCE 1, PAGE 168, CHART I

WE WILL ASSUME THAT THESE CHARTS CAN BE INTERPOLATED BETWEEN THE Re=5 LINE AND THE Re=0, K=0 LINE USING LINEAR REGRESSION OF THE VALUES FOR K AT VARIOUS C/L VALUES AND Re LINES 5, 10, 20, 50, 100, & 200.

THE FOLLOWING VALUES OF K WERE EXTRACTED FROM REFERENCE 1, PAGE 168 FOR VARIOUS VALUES OF C/L AND Re:

Re | C/L	.01	.05	.10	.20	.30	.03
5	.020	.066	.093	.135	.150	.049
10	.031	.100	.143	.200	.227	.071
20	.075	.150	.200	.259	.302	.122
50	.136	.231	.303	.372	.439	.193
100	.175	.330	.407	.492	.539	.271
200	.270	.428	.508	.580	.625	.360

USING LINEAR REGRESSION TO FIT K AS A FUNCTION OF Re FOR EACH OF THE ABOVE C/L VALUES WE FIND THE FOLLOWING:

$K = b(Re)^m$ with the square of the correlation (r^2)

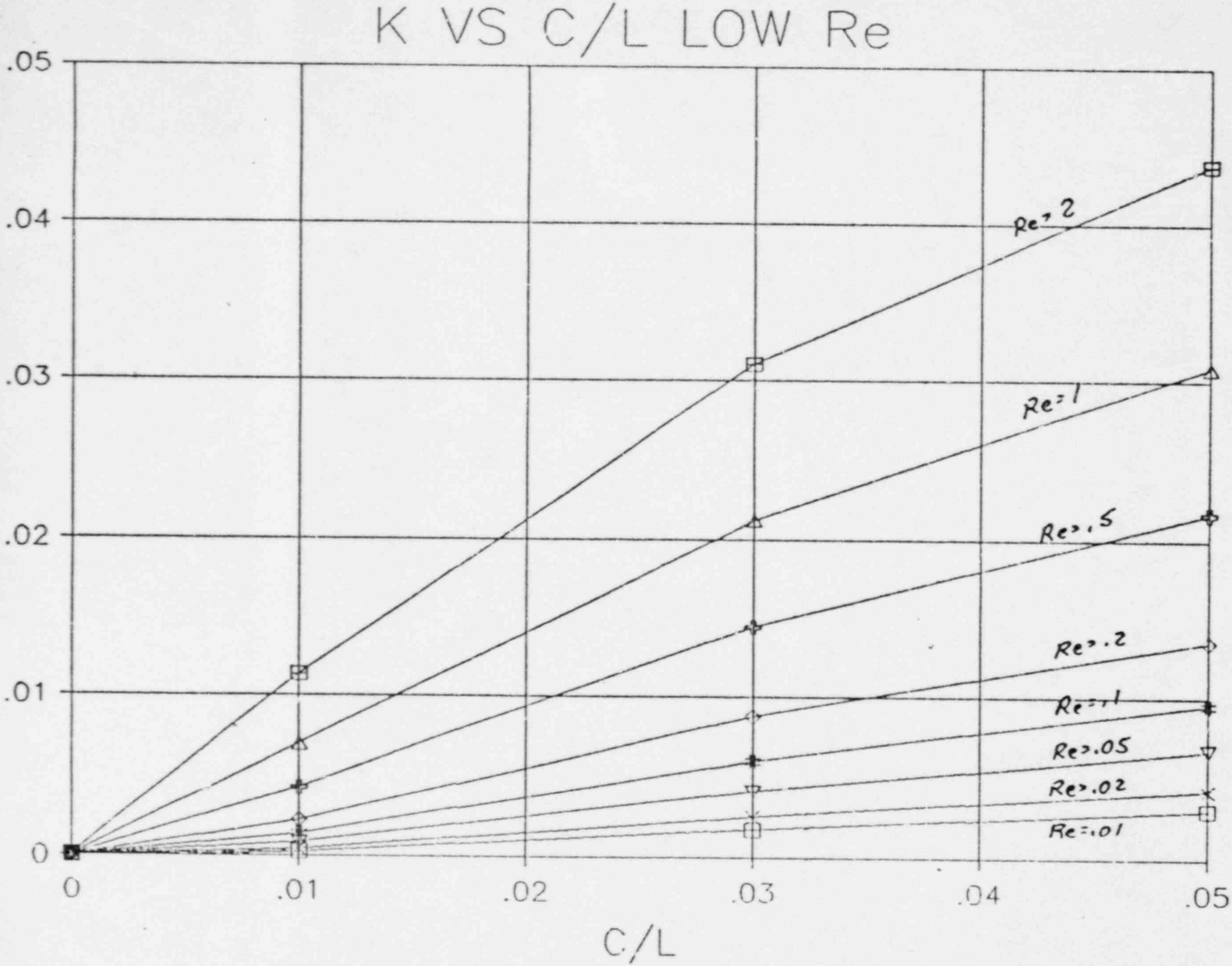
C/L	b	m	r^2
.01	.00691	.7155	.973
.03	.0212	.5499	.991
.05	.0308	.5084	.995
.1	.0482	.4584	.991
.2	.0772	.3940	.990
.3	.0898	.3874	.978

USING THE ABOVE EQUATIONS FOR VARIOUS Re's WE HAVE:

Re | C/L	0	.05	.1	.2	.3	.01	.03
2	0	.0438	.0662	.101	.117	.0113	.0310
1	0	.0308	.0482	.0772	.0898	.0069	.0212
.5	0	.0217	.0351	.0588	.0687	.0042	.0145
.2	0	.0136	.0230	.0409	.0481	.0022	.0087
.1	0	.010	.0168	.0312	.0368	.0013	.0060
.05	0	.0067	.0122	.0237	.0281	.0008	.0041
.02	0	.0042	.0080	.0165	.0197	.0004	.0025
.01	0	.0030	.0058	.0126	.0151	.0003	.0017

These are plotted on pages 6 and 7 of this calculation.

SOLVING FOR C AND K IS DONE ITERATIVELY. A VALUE OF C/L IS SELECTED, THE CORRESPONDING VALUE OF K FOR THE GIVEN Re IS FOUND. C/L AND K ARE MULTIPLIED TOGETHER TO FIND (C/L)K AND THIS IS COMPARED TO SUMMARY OF THE PIV TESTS. VALVE 1E12-F053A IS BEING SHOWN AS AN EXAMPLE.



Comparison of Pressure Isolation Tests
with Type "C" Testing
Safety Related
Illinois Power Company
Clinton Power Station
Proj. No. 7685

Calc. No. 01ME114
Rev. 1 Date ______
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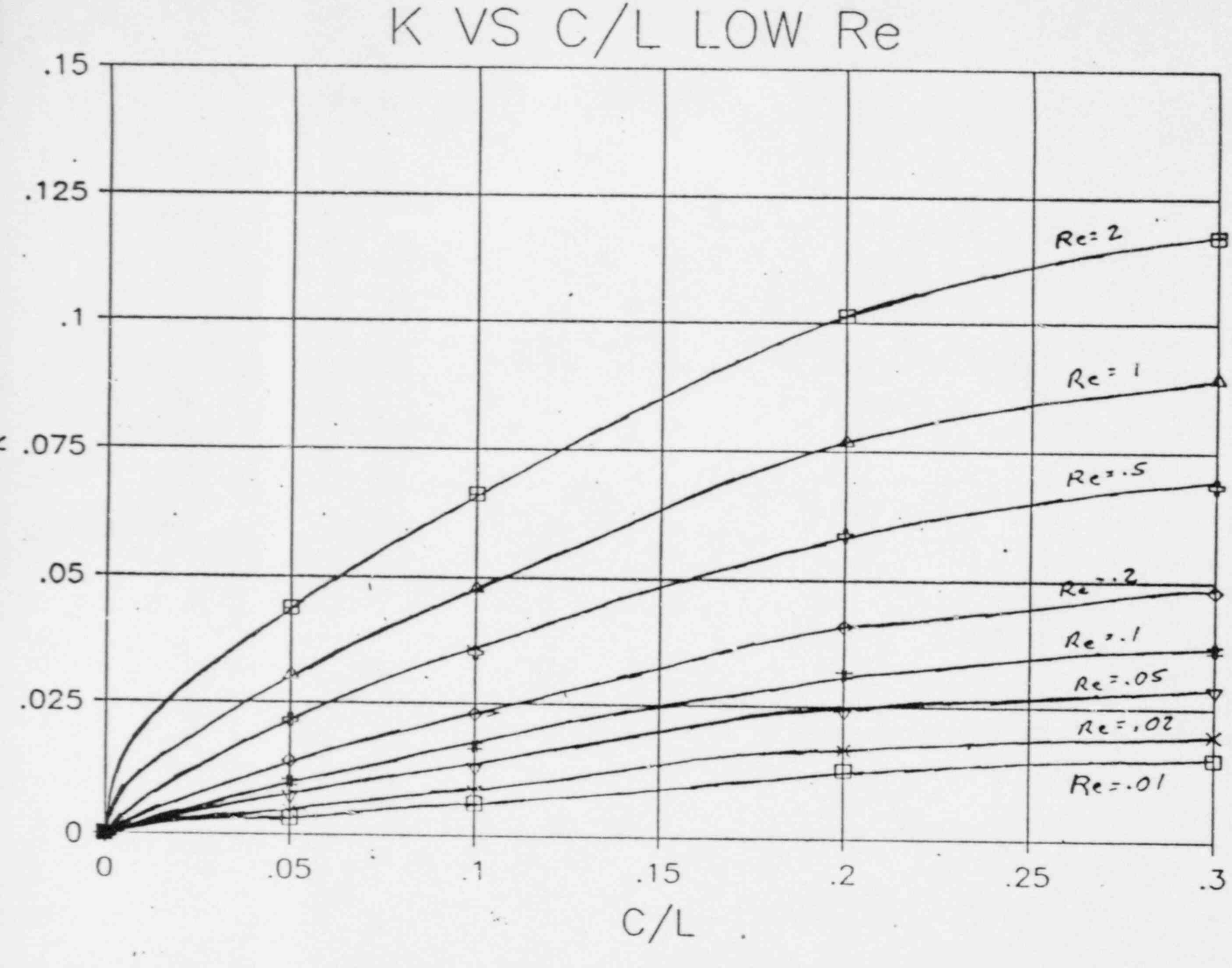

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Re = .466 $(C/L)K = 2.01 \times 10^{-5}$

Try	K	(C/L)K
C/L = .01	.004	4.0×10^{-5}
C/L = .006	.0025	1.5×10^{-5}
C/L = .0071	.0028	1.99×10^{-5}

$C = (C/L)(1/96) = 7.4 \times 10^{-5}$

NOTE THAT LINEAR INTERPOLATION OF THE TABLE WAS USED IN MANY CASES INSTEAD OF READING FROM THE GRAPH. FOR SMALL VALVES THIS ALLOWED FOR MORE ACCURATE RESULTS.

THE SAME PROCESS IS USED FOR ALL OTHER VALVES. THE RESULTS ARE SUMMARIZED BELOW:

VALVE	Re	(C/L)K	C/L	K	C
1E12-F042C	.0180	7.78×10^{-7}	.0045	1.7×10^{-4}	4.7×10^{-5}
1E12-F009	.0330	1.42×10^{-6}	.0049	2.9×10^{-4}	5.1×10^{-5}
1E12-F053A	.466	2.01×10^{-5}	.0071	2.8×10^{-3}	7.4×10^{-5}
1E12-F053B	.0466	2.01×10^{-6}	.0051	3.9×10^{-4}	5.3×10^{-5}

THIS FIXES THE SEAT GEOMETRY. WE WILL NOW DEVELOP THE FORMULA NEEDED FOR PREDICTING THE AIR LEAKAGE FROM THE CIV TEST BASED ON THE GEOMETRY. FROM THE SAME LOCATION IN REFERENCE 1, WE HAVE EQUATIONS FOR COMPRESSIBLE FLOW. SINCE THE VALVE SEAT IS RELATIVELY SHORT, WE WILL ASSUME ISENTROPIC FLOW. CIV TESTING IS PERFORMED WITH AIR AT AMBIENT TEMPERATURE USING AN UPSTREAM PRESSURE OF 9.0 PSI AND A DOWNSTREAM PRESSURE EQUAL TO ATMOSPHERIC. REFERENCE 1, PAGE 166 PROVIDES A FORMULA FOR CALCULATING THE AIR LEAKAGE.

$$W = \frac{K\pi DCP_1}{R} \left(\frac{(2g_c JC_p)}{T_1} \left(\left(\frac{P_2}{P_1}\right)^{2/n} - \left(\frac{P_2}{P_1}\right)^{(n+1)/n} \right) \right)^{.5}$$

P_1 = Upstream pressure - 23.7 psi (3412.8 psf)
P_2 = Downstream pressure - 14.7 psi
J = Mechanical equivalent of heat - 778 ft-lb$_f$/BTU
C_p = Constant pressure heat capacity - 0.24 BTU/lb$_m$
T_1 = Inlet temperature °R = 70+459=529°R
R = Gas constant for air - 53.3 $\frac{\text{ft-lb}}{\text{lb-°F}}$

n = 1.4

$$W = \frac{(3412.8)}{53.3}\left(\frac{2(32.2)(778)}{529}\,(0.24)\left(\left(\frac{14.7}{23.7}\right)^{2/1.4} - \left(\frac{14.7}{23.7}\right)^{2.4/1.4}\right)\right)^{.5}(KDC)$$

W = 243.5KDC

$$Re = \frac{2W}{\pi D \mu g} = \frac{2(243.5)KDC}{\pi D(1\times10^{-5})(32.2)} = 481,000KC$$

FOR THOSE VALVES THAT WE HAVE CALCULATED GEOMETRIES FOR:

VALVE	D	C	Re	W	C/L
1E12-F042C	1ft.	4.7×10^{-5}	22.6K	.011K	.0045
1E12-F009	1.5ft.	5.1×10^{-5}	24.5K	.019K	.0049
1E12-F053A	.833ft.	7.4×10^{-5}	35.6K	.015K	.0071
1E12-F053B	.833ft.	5.3×10^{-5}	25.5K	.011K	.0051

The solution for K is again iterative. C/L is known, a reynolds number is guessed. K is found from the chart, reynolds number is then calculated and compared to the original guess. This iterative process is shown below for 1E12-F053A. The chart on page 6 and the table on page 5 are interpolated to arrive at these numbers.

We know C/L = .0071 Re = 35.6K

Re(GUESS)	K	Re(CALCULATED)
.05	.00013	.005
.01	<.0001	

The chart is unreadable below this point but K is less than .0001. The upper limit on mass flow rate can then be found. This is also true for valves 1E12-F009, 1E12-F042C, and 1E12-F053B.

$$Q = \frac{60\ sec.}{min.}\ \frac{13.2\ ft^3}{lb.}\ \frac{1728\ in^3}{ft^3}\ \frac{16.39\ cc}{in^3}\ W = (2.24\times10^{-7})W$$

VALVE	W lb./sec	K	W lb./sec	Q(sccm)
1E12-F042C	.011	<.0001	$<1.1 \times 10^{-6}$	<25
1E12-F009	.019	<.0001	$<1.9 \times 10^{-7}$	<43
1E12-F053A	.015	<.0001	$<1.5 \times 10^{-6}$	<34
1E12-F053B	.011	<.0001	$<1.1 \times 10^{-6}$	<25

Using the above equations we will predict the CIV leakage from the ECCS injection check valves based on the latest PIV test results.

Valve 1E51-F006 was PIV tested with 1.27 gpm leakage.

First find the geometries required to give the above leakages.

From page 4, $Re = 4.087(q/D)$, $C/LK = 1.766 \times 10^{-4}(q/D)$, and $C = 1/96(C/L)$

For the 10" and 12" ECCS checks 1E12-F041A, B & C, 1E21-F006 and 1E22-F005 use D= 1 ft., q = .05 gpm. Since the lowest measurable leakage is .05 gpm and these valves showed no leakage, use q = .05 gpm. Since the equations predict higher air leakage for a given water leakage in larger valves, use 12" rather than 10" for diameter.

$Re = 4.087 \frac{(.05)}{1} = .204 \qquad (C/L)K = 1.766 \times 10^{-4} \frac{(.05)}{1} = 8.83 \times 10^{-6}$

TRY	K =	(C/L)K =
C/L = .01	2.22×10^{-3}	2.22×10^{-5}
.006	1.33×10^{-3}	8×10^{-6}
.0063	1.4×10^{-3}	8.8×10^{-6}

$C = 6.6 \times 10^{-5} \qquad C/L = .0063$

For RCIC valve 1E51-F066, use D= (4/12) = .333 and q = 1.27 gpm

$Re = 4.087 \frac{1.27}{.333} = 15.6$

$(C/L)K = 1.766 \frac{1.22 \times 10^{-4}}{.333} = 6.73 \times 10^{-4}$

Try C/L =	K=	(C/L)K=
.01	.056	5.6×10^{-4}
.011	.058	6.39×10^{-4}
.012	.060	7.2×10^{-4}

$C = 1.15 \times 10^{-4} \qquad C/L = .011$

Predict the air leakage for these valves under CIV conditions, using equations from page 8:

$W = 243.5$ KDC
$Re = 481.000$ KC

For ECCS valves:

$W = 243.5\ KC = 243.5(6.6 \times 10^{-5})K = .016K$

$Re = 481{,}000(6.6 \times 10^{-5})K = 31.7K$

C/L = .0063 TRY	Re = .02	K = .0003	Re = .008
	Re = .01	K = .0002	Re = .006

The chart becomes unreadable with K < .0001

Therefore K < .0001

Use K = .0001 to find upper leakage limit.

$W = .016K = .016 \times 10^{-4}$ lb./sec

$q(sccm) = (1.6 \times 10^{-6})(2.24 \times 10^{7}) = 36$ sccm

For the RCIC valve:

$Re = 481,000(1.15 \times 10^{-4})K = 55.3K$

$W = 243.5(.33)(1.15 \times 10^{-4}) = (9.32 \times 10^{-3})K$

C/L = .011 TRY	Re = .1	K = .0015	Re = .083
	Re = .05	K = .00097	Re = .054
	Re = .075	K = .00124	Re = .068
	Re = .07	K = .00118	Re = .065
	Re = .06	K = .00108	Re = .0595

$W = (9.32 \times 10^{-3})K = (9.32 \times 10^{-3})(.00108) = 1.007 \times 10^{-5}$

$q(sccm) = (2.24 \times 10^{7})W = (2.24 \times 10^{7})(1.007 \times 10^{-5}) = 226$ sccm

CONCLUSION:

The method used is reasonable to provide an expected upper limit on the air leakage from a CIV test based on the results from a PIV test on the same valve. A statistically valid correlation between the predicted valve of CIV leakage (based on measured PIV leakage) and the measured CIV leakage could not be shown for the following reasons:

1) Current tight sealing of the PIV's with less than measurement threshold leakage (0.05 gpm) result in too low Re number and flow coefficient for accurate CIV prediciton.

2) PIV and CIV tests are not performed on these valves at the same time.

3) The measured leakages appear to flucuate randomly around the minimal measurable leakage rate.

4) PIV testing measures the leakage of the seats of the PIV valve where CIV testing measures the leakage across all the valves in the penetration boundary.

The lack of trendable test results does not invalidate the calculation it merely provides no input into the validity of the calculation.

The minimum leakage which would be found by this method, even if no leakage was found in the ECCS injection check valves, would be 40 sccm. Since these valves have been found to seal with less than measurable leakage under the PIV test, the minimum leakage must be assumed for them. The predicted leakage for valves 1E12-F041A, B, & C, 1E21-F006 and 1E22-F005 would be less than 40 sccm each. The leakage from 1E51-F066 which leaked 1.27 gpm under the PIV test would be less than 300 sccm.

In comparing these predicted leakages with the sum of the measured Type B & C test and the total allowed sum of the Type B & C tests there are certain assumptions which could be made to lessen the impact of including these predicted leakages. These include addition of only the leakages from those ECCS check valves which would see containment pressure as a result of the one single active failure of a divisional power supply to the outboard isolation valve; and the addition of only the difference between the predicted leakage from the check valve and the measured leakage from the outboard containment barrier. In our comparison we will not include these assumptions but will be extra conservative and heap the predicted leakages on top of those already measured for the outside penetration barrier.

At the beginning of our April, 1988 outage the total of the measured Type B & C tests is 76.26' .98 scfh or 36,460 sccm. The allowable total is 222,280 sccm. This leaves a margin of 185,820 sccm. The total additional leakage that we would expect is 500 sccm from the 5 ECCS injection checks at 40 sccm each and the 1 RCIC check at 300 sccm. This provides a safety margin between the amount of leakage which would cause failure of the Type B & C tests of over 370 times that which would be predicted for the ECCS and RCIC injection check valves.

EXHIBIT A

CURRENT TEST DATA

	PIV Leakage in GPM* (DATE)		CIV Leakage in SCCM (DATE)		
1E12-F042A (12" Gate)	<.01 (6-20-86)	<.05 (10-19-87)	403±20 (11-15-85)	<20±5 (8-26-86)	
1E12-F042B (12" Gate)	<.01 (7-11-86)	<.05 (10-28-87)	2490±201 (10-22-85)	4000±201 (8-27-86)	
1E12-F042C (12" Gate)	<.01 (8-08-86)	<.05 (4-02-88)	<20±5.14 (10-19-85)	<20±5.14 (8-15-86)	
1E12-F023 (4" Gate)	<.01 (6-25-86)		<20±5.14 (12-06-85)	300±22.5# (10-21-86)	
1E21-F005 (12" Gate)	<.01 (5-09-86)	<.05 (10-18-87)	429±20 (11-05-85)	50.2±2 (3-07-86)	<20±5.14 (10-19-87)
1E22-F004 (10" Gate)	<.01 ~~(6-25-86)~~ 5-12	<.05 (11-01-87)	36.8±2 (1-11-86)	116±2 (4-07-86)	<20±5.14 (8-19-86)
1E51-F013 (6" Gate)	<.01 (6-25-86)		<20±5.14 (12-06-85)	300±22.5# (10-21-86)	
1E12-F008 (18" Gate)	<.01 (6-05-86)	<.05 (11-05-87)	39.3±2 (10-08-85)	<20±5.14 (6-24-86)	<20±5.14 (10-02-86)
1E12-F009 (18" Gate)	.012 (6-05-86)	<.05 (11-05-87)	475±20 (4-02-86)	<20±5.14 (6-24-86)	180±5.14 (10-02-86)
1E12-F053A (10" Gate)	.095 (6-12-86)	<.05 (10-18-87)	260±5.14 (12-09-85)	<20±5.14 (9-12-86)	
1E12-F053B (10" Gate)	<.01 (6-13-86)	<.05 (10-28-87)	43.2±2 (12-22-85)	<20±5.14 (9-11-86)	
1E12-F041A (Check)	<.01 (6-20-86)	<.05 (10-19-87)			
1E12-F041B (Check)	<.01 (7-11-86)	<.05 (10-28-87)			
1E12-F041C (Check)	<.01 (8-07-86)	<.05 (4-02-88)			
1E51-F066 (Check)	1.27 (11-14-86)				
1E22-F005 (Check)	<.01 (7-12-86)	<.05 (11-01-87)			
1E21-F006 (Check)	<.01 (7-10-86)	<.05 (10-18-87)			

* PIV test threshold of measurement is .01 gpm for tests performed prior to 1987 and .05 for tests performed during and after 1987
# Shared penetration total = 600 sccm

Attachment 2

In the meeting with members of the Office of Nuclear Reactor Regulation and NRC Region III conducted on March 30, 1988, Mr. M. Huber provided a list of valves for which IP was requested to provide the associated stroke times. Enclosure 2 is a list of those valves with stroke times provided.

In terms of Clinton Power Plant operation, if the determined stroke time for a particular valve exceeded the most conservative of the stroke times listed in the system design specification, ISI program, FSAR or Technical Specifications, consideration must given to declaring the valve inoperable and taking appropriate corrective action. (Clinton Power Station Inservice Inspection Manual, Appendix 5, Item 3.c).

VALVE MAXIMUM ISOLATION TIMES

Valve Number	*FSAR (Amend. 38)	/USAR**	Technical Specifications***	ISI**** Open	ISI**** Closed	Design Requirement
1E12-F008	39	53	54	52	52	53
1E12-F009	39	53	54	53	53	53
1E12-F003A	#	#	#	135	135	135
1E12-F003B	#	#	#	127	127	135
1SF001	240	Same	68	68	68	68
1SF002	240	Same	68	68	68	68
1SF004	240	Same	84	84	84	85
1VP004A, B	240	Same	74	NA	70,69	70,69
1VP005A, B	240	Same	74	NA	70,70	70,70
1VP014A, B	240	Same	74	NA	71,70	71,70
1VP015A, B	240	Same	74	NA	70,72	70,73
1VQ004A, B	6	Same	10	6,6	6,6	Open 30 Close 6
1VQ006A, B	10	Same	16	NA	NA	10
1VR002A, B	10	Same	16	NA	NA	10
1WO001A, B	240	Same	44	NA	42,43	42,43
1WO002A, B	240	Same	44	NA	41,43	41,44
1WX019	240	Same	2	NA	2	2
1WX020	240	Same	2	NA	2	2
0MC009	240	Same	35	NA	35	35
0MC010	240	Same	35	NA	34	34
0RA026	7	Same	NA	NA	2	NA
0RA027	7	Same	NA	NA	2	NA
0RA028	#	#	#	NA	2	NA
0RA029	#	#	#	NA	2	NA

Valve Number	*FSAR (Amend. 38)/USAR**		Technical Specifications***	ISI****		Design Requirement
				Open	Closed	
1CC054	240	Same	89	NA	81	81
1CC071	240	Same	35	32	32	32
1CC072	240	Same	35	30	30	34
1CC073	240	Same	35	33	33	34
1CC074	240	Same	35	34	34	34
1CY017	240	Same	44	NA	43	43
1FP050	240	Same	48	NA	44	44
1FP051	240	Same	66	NA	65	66
1FP052	240	Same	87	NA	87	87
1FP053	240	Same	68	NA	65	65
1FP054	240	Same	68	NA	66	66
1FP092	240	Same	48	NA	47	47
1FC036	240	Same	59	NA	57	57
1FC037	240	Same	59	NA	58	58
1IA005	67	Same	20	NA	15	45
1IA006	67	Same	20	NA	14	45
1RE021	240	Same	16	NA	9	45
1RE022	240	Same	16	NA	5	45
1RF021	240	Same	16	NA	9	45
1RF022	240	Same	16	NA	7	45
1SA029	67	Same	16	NA	15	45
1SA030	67	Same	16	NA	10	45
1HG001	80	112	117	112	112	112
1HG004	80	88	117	88	88	88
1HG005	80	118	117	117	117	118
1HG008	80	95	117	95	95	95

Valve Number	*FSAR (Amend. 38)/USAR**		Technical Specifications***	ISI**** Open	ISI**** Closed	Design Requirement
1E12-F004A, B	NA	Same	NA	142,144	142,144	144
1E12-F006A, B	#	#	#	114,115	114,115	115
1E12-F014A, B	#	#	#	117,116	117,116	117
1E12-F024A, B	240	Same	117	114,117	114,117	117
1E12-F026A, B	#	#	#	33,34	33,34	34
1E12-F027A, B	NA	Same	NA	91,93	91,93	100
1E12-F042A, B, C	NA	Same	NA	29,30,30	29,30,30	30
1E12-F047A, B	#	#	#	115,117	115,117	117
1E12-F048A, B	#	#	#	130,133	130,133	133
1E12-F053A, B	240	Same	65	64,63	64,63	64
1E12-F064A, B, C	NA	Same	NA	63,63,63	63,63,63	64
1E12-F068	#	#	#	117,117	117,117	117
1E12-F094A, B	#	#	#	35	NA	36
1E12-F096	#	#	#	36	NA	36
1E12-F105	NA	Same	NA	137	137	137

NOTES:

* This column represents those stroke times listed in the latest amendment (No. 38) to the Final Safety Analysis Report (FSAR) issued prior to receiving an Operating License. These times were provided in accordance with the guidance of Regulatory Guide 1.70, subsection 6.2.4.2.

** This column represents those stroke times which will be listed in the Updated Safety Analysis Report (USAR). Changes in these times are representative of changes in design which have been evaluated for both system operation and containment integrity.

*** The BASES for these times is provided in the Clinton Power Station Technical Specifications B3/4.6.4.

****The Inservice Inspection Time, determined in accordance with the ASME Code Section XI, IWV-3413(a).

\# The valve listed is not a Primary Containment Isolation Valve (CIV).