Westinghouse Electric Company
Nuclear Services

2000 Day Hill Road
Windsor, CT 06095
USA

NRC Project 692

CEOG-00-276
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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Subject: CEOG Topical Report, CE NPSD-1168, "Joint Applications Report for Containment Isolation Valve AOT Extension," Additional Errata

Reference: Stuart A. Richards (NRC) to Ralph Phelps (CEOG), Acceptance for Referencing of Combustion Engineering Owners Group CE NPSD-1168, "Joint Applications Report for Containment Isolation Valve AOT Extension" (TAC No. MA6288), Letter dated June 26, 2000

The purpose of this letter is to submit additional errata in the subject report found subsequent to staff issuance of the reference safety evaluation. These additional errata involve minor typographical changes as shown on the attached replacement pages. CENP plans to incorporate the revised pages, less margin bars, in the approved version of the topical report. We request that the Staff review the changes and concur with this approach.

Westinghouse CE Nuclear Services has evaluated these changes and confirm that it has no impact on the conclusions given in CE NPSD-1168. Please do not hesitate to contact Virgil Paggen at 860-285-4700 or me at 860-285-5494 if you have any questions,

Sincerely yours,

Gordon Bischoff
Project Manager
CE Owners Group

cc: J. S. Cushing (NRC)
R. L. Phelps (OPPD)
R. E. Schneider (W)
V. A. Paggen, (W)
CEOG Library Task 849

Attachment: 1. Change Pages for CE NPSD-1168

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AOV concurrent with failure of the manually operated valve to reseat after opening. The third term in the equation represents random leakage of the SI check valve and the manually operated valve concurrent with failure of the AOV to reseat after opening. The fourth term represents random leakage of the SI check valve and failure of both the AOV and manually operated valves to reseat after opening.

Substituting the above values in Equation 6-5 yields:

ISLOCA = 2.~~19E~~17E-08 per year

Based on the above ISLOCA frequency, the incremental conditional core damage probability or incremental conditional large early release probability is estimated based on a 168 hours exposure (one AOT) as follows:

$$\begin{aligned} ICCDP &= ICLERP = ISLOCA \left[\frac{AOT}{8760}\right] \\ &= 2.17\,E-08\left[\frac{168}{8760}\right] \\ &= 4.16\,E-10 \end{aligned}$$

The calculated conditional probabilities indicate that the level of risk associated with the configuration for Class B penetrations due to the proposed CIV AOT extension is significantly lower than the acceptance criteria of 5.0E-7 and 5.0E-8 for ICCDP and ICLERP, respectively.

6.3.2.3.2 Penetrations Connected to the RCS Sample System

This generic configuration for Class B penetrations represents the containment penetrations with associated piping connected to the RCS and the sample system. This penetration is used to obtain samples from various locations in the RCS. Sampling of the RCS is performed on a daily basis during normal power operation. The piping outside the containment that is associated with the penetration is non-seismically qualified and are relatively small (i.e. less than 1" nominal diameter). Equipment is provided in the sample system for reducing the RCS temperature and pressure before the sample is processed. A typical schematic for this configuration is shown in Figure 6. As shown, the penetration is equipped with two CIVs for providing the isolation function. One CIV is located inside the containment and the other CIV is located outside the containment. Sampling of the RCS via this penetration is not required or needed in order to support or accomplish any of the safety function for core damage mitigation. Therefore, the associated CIVs are designed to close automatically following a design basis event. This is accomplished by the generation of CIAS. Closure of the CIVs also occurs automatically following the loss of motive or control power to the valve actuator.

the affected valve is secured in the open or closed position. The potential impact on CDF associated with securing the motor-operated CIV in the closed position is qualitatively assessed in Section 6.3.2.6-1. In this section, the impact on LERF is assessed by estimating ICLERP for the valve in the open position for the proposed AOT. Retaining the inoperable motor-operated valve in the HPSI line in the closed position will satisfy the containment isolation function for the associated penetration. However, the accident mitigating function that the valve is required to perform will not be accomplished. There are four motor-operated CIVs in each train of the HPSI System. It should be noted that having one of these valves in the closed position does not cause the entire train of HPSI to become unavailable to perform its function.)

In addition to the general assumptions/input provided in Section 6.3.2.1, the following configuration specific assumptions were made in estimating the impact on LERF due to the proposed CIV AOT extension.

1. For this configuration, it is assumed that the piping associated with the penetration is equipped with two check valves that are inside the containment and one motor-operated valve that is located outside the containment.

2. The piping upstream of the motor-operated valve is not designed to accommodate full RCS pressure. Exposure of the low pressure piping to normal operating RCS pressure may cause a catastrophic failure of the low-pressure piping and lead to an ISLOCA. The conditional probability of pipe failure due to exposure to normal operating RCS pressure is conservatively assumed to be 0.1. This is the upper limit used in the sensitivity analysis performed [Appendix G of Reference 13] to assess the impact of pipe break probability on ISLOCA frequency.

3. A pressure transmitter is installed between the check valves in each of the safety injection lines. The effect of the transmitter is to identify when the first (closest) check is in the stuck open position or is experiencing excessive back leakage.

4. The random probability that ~~on~~ a SI check valve will leak is 8.76E-4 per year, and the probability that a SI check valve fails to reseat is 2.81E-4 (Reference 13).

5. It is assumed that there is an average of three cold shutdowns per year for the CE PWRs. The SI check valves are operated once during each cold shutdown. Therefore, each check valve is assumed to operate a total of three (3) times during the fault exposure time (see item 6 below).

6. The fault exposure time for the check valves in this configuration is equivalent to the time that the plant operates in its non-cold shutdown modes. For this configuration, the fault exposure time is assumed to be one year.

Impact on ISLOCA for Securing a CIV in Locked Open Position

Securing the motor-operated CIV in a HPSI line in the open position will not degrade the operability of the HPSI system in performing its mitigating function. However, the number of barriers in place to protect the low pressure piping from being exposed to normal operating temperature and pressure of the RCS will be reduced. The reduction in the number of barriers increases the potential for a catastrophic failure of the low-pressure piping and a resulting ISLOCA. For this case, only the two check valves are available for pressure protection during the AOT. The methodology described in Reference 13 was used to estimate the conditional ISLOCA frequency. The expression for the average frequency of coincident failure of the two check valves in series over time period T is as follows:

$$ISLOCA = \frac{\lambda^2 T}{2} + \lambda \lambda_d \left[\frac{d\,T + 1}{2} \right] \qquad (6\text{-}12)$$

where,

ISLOCA	=	Frequency of ISLOCA (per year)
λ	=	Random leakage rate of a SI check valve [8.76E-4 per year - Assumption (~~8~~4) above]
λ_d	=	The probability of the second check valve failing to reseat [2.81E-4 per demand - Assumption (4) above]
d	=	The number of times the check valve is operated [3 - Assumption (5) above]
T	=	Fault exposure time [1 year - Assumption (6) above]

Equation 6-12 credits the effect of the installed pressure transmitter between the check valves. This is a repeat of Equation 9a of Reference 13. The first term on the right of Equation 6-14 represents random leakage of the check valves during the exposure time. The second term in the equation represents random leakage of the first check valve and failure of the second check valve to reseat after opening. [Note that the first check valve is defined as the check valve closest to the RCS.]

Substituting the above values in Equation 6-12 yields:

$$ISLOCA = \frac{(8.76E-4)^2\,(1)}{2} + (8.76E-4)(2.81E-4)\left[\frac{(3)\,(1)+1}{2} \right]$$

= [3.84E-7] + [4.92E-7]
= 8.76E-7 per year

The above frequency can be conservatively assumed to be the change in the average ISLOCA frequency. In crediting an operable motor-operated CIV in the HPSI line, the above frequency would decrease by at least two orders of magnitude to become 8.76E-9 per year. The difference in ISLOCA frequency with an operable and inoperable CIV is therefore estimated as 8.67E-7 per year (i.e. 8.76E-7– 8.76E-9). The incremental conditional ISLOCA probability during the AOT of 7 days (or 168 hours) is estimated as: