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SUBJECT: Summarizes 890103 telcon w/NRC,Westinghouse & AEPSC re questions on WCAP 11908, "Containment Integrity...."

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AEP:NRC:1024F
TAC NO. 64962

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
ADDITIONAL INFORMATION ON CONTAINMENT
LONG TERM PRESSURE ANALYSIS

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Attn: T. E. Murley

January 12, 1989

Dear Dr. Murley:

This letter and its attachment summarize a phone conversation held on January 3, 1989, among members of your staff, Westinghouse Electric Corporation, and AEPSC. The meeting was held to respond to NRC questions regarding WCAP 11908, entitled "Containment Integrity Analysis for Donald C. Cook Nuclear Plant Units 1 and 2 July 1988." The analysis was submitted for NRC review in our letter AEP:NRC:1024D, dated August 22, 1988.

At the conclusion of the meeting, the NRC staff informed us that their questions were satisfactorily answered. At the staff's request, Westinghouse Electric Corporation has summarized the response to those questions, in writing. The summary is contained in the attachment to this letter.

This document has been prepared following Corporate procedures that incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

M. P. Alexich
Vice President

MPA/eh

A001
1/1

Attachment

cc: D. H. Williams, Jr.
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
G. Bruchmann
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

ATTACHMENT TO AEP:NRC:1024F

ADDITIONAL INFORMATION ON CONTAINMENT

LONG TERM PRESSURE ANALYSIS

Westinghouse Electric Corporation **Energy Systems**

Nuclear and Advanced Technology Division

Box 355
Pittsburgh Pennsylvania 15230-0355

January 11, 1989

AEP-89-101
NATD/SI-794/89

RW 1/11/89

Mr. R. B. Bennett
1 Riverside Plaza
P.O. Box 16631
Columbus, Ohio 43216-6631

American Electric Power Service Corporation
D.C. Cook Units 1 & 2 Rerating Program
Responses to NRC Reviewers' Questions on WCAP-11908

Dear Mr. Bennett:

As agreed to in the telephone conference of January 3, please find attached the formal responses to the NRC reviewers' questions on WCAP-11908, regarding the long term containment integrity analysis for the Donald C. Cook Units. The responses incorporate the comments you telecopied to us on January 9.

Please contact me or Deborah Augustine if you have any further questions or comments on these responses or if you require any further assistance in this area.

Sincerely yours,

H. C. Walls

H. C. Walls
Mid-America Area
U.S. Nuclear Projects

HCW:DBA/sm

cc: D. H. Malin/T. G. Lewis
V. Vanderburg
R. P. Leonard
D. B. Black
P. B. Schoepf
B. A. Svennson (D.C. Cook Site)
K. R. Baker (D.C. Cook Site)
D. Karnes (D.C. Cook Site)

Attachment

NRC QUESTIONS AND WESTINGHOUSE RESPONSES RELATING TO THE AEP RTP LICENSING SUBMITTAL (WCAP-11908)

Q1: The report indicates that current operating conditions are bounding - not reduced temperature and pressure. What impact does RTP have on the containment analysis? What inputs are affected, and why?

A1: For this analysis, the upper bound primary temperature and pressure conditions associated with the D. C. Cook Rerating Program (i.e., slightly higher operating temperature than currently licensed) represent the most conservative set of initial conditions for the long term mass and energy release transient, not reduced temperature and pressure. For this reason, the rerating parameters were used in the analysis by virtue of maximizing the available mass and energy release to containment. The inputs primarily affected are the initial pressure and enthalpy arrays input to the SATAN blowdown code.

Q2: What physically happens when you close the RHR cross-ties, and how does it impact the analysis?

A2: The double-ended pump suction break with minimum safeguards has been established previously and confirmed via this analysis to be the limiting break with respect to the containment integrity peak pressure calculation. The effect of closing of the RHR crossties is that there is a net reduction in total pumped safety injection flow, and in addition, the number of loops receiving injection changes from 4 to 2. This represents a reduction in safety injection flow from the minimum safeguards case. The result is that there is less steam condensation in the RCS, with more steam being released to the containment atmosphere. Thus, operation with the RHR crossties closed represents a more conservative mode of operation with respect to the containment integrity calculation.

Q3: If the steam/water mixing data from reference 4 are discussed in reference 1, why is it an exception to the model?

In a response to a request for additional information from the NRC to Westinghouse regarding the review of WCAP-10325, Westinghouse stated that, although the model as described in WCAP-10325 does not explicity exclude broken loop steam/water mixing, the implementation of the model documented in a memo from E. P. Rahe of Westinghouse (memo NS-EPR-2948, dated October 4, 1984), does exclude this. The same memo states that steam water mixing is assumed to occur in the intact loops. The exception to the implementation of the mass and energy release model described in WCAP-10325 is that for the D. C. Cook analysis documented in WCAP-11908, Westinghouse has included the effects of steam-water mixing in the broken loop in WREFLOOD. While assuming broken loop mixing is less conservative than the previous analyses, Westinghouse believes that this exception to the application of the model is technically correct and is supported by test data, by virtue of the break being located in the pump suction leg of the RCS. This discussion follows:

In order to be able to take credit for inclusion of the additional steam/water mixing effects in the broken cold leg, the 1/3 scale W/EPRI steam/water mixing data was examined (WCAP-8423). The experiments showed that for the range of conditions tested, the incoming superheated steam was desuperheated to the saturation temperature and some of the steam was condensed within three cold leg diameters of the experiment (see Appendix D of WCAP-8423).

The ratio of steam energy flow to injected flow energy sink capability for the plant was calculated for different transient times. Similar parameters were determined from the experimental results. Use of the energy ratio eliminates the need to incorporate a scaling factor when comparing the experimental results to the plant responses.

The values of the energy ratio for the plant are bounded by the experimental values. The peak ratio calculated for the plant analysis was 0.256. The ratios determined from the experimental data ranged from 0.013 to 0.957 and therefore bound the plant condition.

The mixing experiments demonstrated equilibrium conditions within three pipe diameters of the mixing zone. This corresponds to a length of 30 inches. The experiments were devised and conducted such that the length of the mixing zone for the experiments and that for the plant would be equivalent and not subject to a scaling factor. The available distance in the plant for mixing the broken cold leg, from the injection point through the pump to the weld at the pump suction, is approximately 110 inches. Since thermodynamic equilibrium was achieved during the experiments within 30 inches for more limiting conditions than the plant is subject to, the calculation of equilibrium effluent from the plant's broken loop pump suction is justified.

Another point is that in the experiment, the mixing is occurring in a horizontal pipe whereas in the PWR, the mixing would occur within the cold leg pipe, but also within the pump diffuser section where the axial flow areas are even more limiting. The reduced flow areas will force improved mixing of the two streams in the plant relative to the experiment. Therefore, again the use of an equilibrium calculation for the two-phase effluent is justified for this application.