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ACRS JOINT SUBCOMMITTEES MEETING SUMMARY/MINUTES
FOR CONTAINMENT SYSTEMS/STRUCTURAL ENGINEERING
APRIL 4, 1990
BETHESDA, MARYLAND

PURPOSE

The ACRS Subcommittees on Containment Systems and Structural Engineering held a joint meeting on April 4, 1990 in Bethesda, Maryland. The purpose of this meeting was to continue the discussion in regard to the development of an ACRS paper on containment design criteria for future plants based on present knowledge. A copy of the meeting agenda and selected slides from the presentations are attached. The meeting began at 8:30 a.m. and adjourned at 5:00 p.m., and was held entirely in open session. The principal attendees were as follows:

ATTENDEES

ACRS

D. Ward, Chairman
J. Carroll, Member
I. Catton, Member
W. Kerr, Member
L. Minnick, Member
C. Wylie, Member
M. Bender, Consultant
M. Corradini, Consultant (p/t)
D. Houston, Staff

INVITED SPEAKERS

L. Kovach, NCS
C. Sawyer, GE
B. McIntyre, W
R. Lutz, W
D. Leaver, Tenara/EPRI

REVIEW DOCUMENTS

There were no final documents to be reviewed at this meeting. The ACRS effort on this subject is in response to a Staff Requirements memorandum dated July 28, 1988, which was written following an ACRS meeting with the Commission on July 14, 1988.

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ACTIONS, AGREEMENTS, AND COMMITMENTS

1. During this meeting, D. Ward provided a copy of a matrix describing containment functions/features/issues and giving a preliminary strawman proposal on each for the ACRS to consider. He requested that members and consultants provide written comments regarding the proposal to him within the next couple of weeks.

Discussion

During his opening comments, D. Ward indicated that C. Siess, Chairman of the Structural Engineering Subcommittee, would not be attending. He stated that this was the fifth in a series of meetings to gather information from experts in the field of containment design. He indicated that he had prepared some draft position papers to be discussed during the afternoon session. These papers are intended to be the initial input for the ACRS paper on containment design criteria for future plants.

L. Kovach (Nuclear Consulting Service) discussed the technology applied for the design and construction of containment vent filters and described the detailed aspects of various filtered systems that are being used throughout the world. He indicated that the actual efficiency of filtration is around

April 12, 1990

99% while the NRC only gives credit for 30%. He expressed some reservations about BWR suppression pools as effective scrubbers for soluble gases and submicron particles. He was concerned that USA nuclear plants will install filtered vents before NRC provides the guidance about such systems. He noted that the Swiss position on requirements and criteria for such systems is well advanced and is an example to follow. During the presentation, he discussed the following systems:

- Sweden - FILTRA Design at Barsebaeck: cylindrical gravel bed
- Sweden - Multi Venturi Scrubber System (MNSS): water-scrubbing plus gravel
- France - Sand Bed Filter
- Germany - Stainless Steel Filters, some with scrubbers, sliding pressure adjustment
- Finland - Similar to Sweden
- USA - Sand Filters at Hanford and SRL

L. Kovach indicated that he did not expect the French filters (sand) to work very well. He also noted that FRG had used a silver/zeolite mixture at one time and that this had acted as catalyst for hydrogen ignition. He expressed an opinion that such equipment is currently being used in USA plants in some systems (not containment vent systems). The cost of filtration systems was stated to range from \$5 million to \$25 million.

April 12, 1990

C. Sawyer (GE) discussed the containment design criteria for their passive plant, the Simplified Boiling Water Reactor (SBWR). He presented an overview of the plant design and gave some details about the passive safety features, especially decay heat removal via the isolation condensers. GE had adopted some of the EPRI ALWR requirements for SBWR, namely CDF of less than $1E-05/R\text{-yr}$ (internal/external initiators) and radiation exposure of less than 25Rem for events greater than $1E-06/R\text{-yr}$. The containment is designed to current NRC and code practice. The GE analysis will attempt to demonstrate that a containment vent system is not required. The key issue was indicated as insuring corium cooling capacity.

B. McIntyre and R. Lutz (W) discussed the containment concepts for their passive plant, the AP-600 design. They presented a description of the containment design (free standing steel) and discussed the functioning of various designed passive systems to cool the core and/or containment during an accident. A key aspect for these systems is a number of gravity fed water sources. It was indicated that W had used Level 1 and 2 PRAs in the development of the containment design. They described mitigative features which were designed to prevent early containment failure, impaired containment isolation, and containment bypass. I. Catton expressed a concern regarding hydrogen stratification in their design. He believed that the current design would enhance stratification.

April 12, 1990

R. Lutz indicated that they plan to perform analytical studies to evaluate this issue. W encouraged the interaction between NRC and EPRI in the development of unambiguous design guidance for future plants.

D. Leaver (Tenara) discussed the EPRI position on containment performance for passive plants. This position was mostly an application of the EPRI ALWR requirements to the next tier of future design. The ALWR features have been discussed previously in regard to the ABWR, System 80+, SBWR and AP-600. Numerical design criteria include: $CDF < 10^{-5}/R\text{-yr}$ and radiation exposure of $< 25\text{Rem}$ for events $> 10^{-6}$. One goal of the EPRI approach is to have a simplified emergency plan. D. Leaver indicated that simplification meant that no emergency drills would have to be performed and that prompt notification (by sirens or other methods) would not be required. He proposed a detailed discussion of the containment performance and source term process. He indicated that the EPRI document for passive plants would be available in about a month.

D. Ward discussed the draft documents that he had prepared. These were as follows:

Exhibit A-Summary of Presentations by Invited Speakers

Exhibit B-Summary of Existing NRC Requirements for Containment
Design

Exhibit C-Matrix of Containment Functions/Features/Issues;
Current Position by NRC and Industry
and Proposed ACRS Position

Exhibit D-Comparison of Positions on Implementation of the
Safety Goal Policy

During this discussion, M. Bender focused on the source term issue and indicated that the transport phenomena for fission products should be better specified. In conclusion, D. Ward requested written comments from members and consultants in regard to Exhibit C. These comments will be evaluated in the development of a draft ACRS paper on proposed containment design criteria for future plants.

Future Subcommittee Action

Another Joint Containment Systems/Structural Engineering Subcommittee meeting will be scheduled at an appropriate time to discuss the comments provided on Exhibit C and to develop a final ACRS paper on this matter.

NOTE: Additional meeting details can be obtained from transcript on this meeting available in the NRC Public Document Room, 2120 L Street, NW, Washington, DC 20006, (202) 634-3273, or can be purchased from Ann Riley and Associates, Ltd., 1612 K Street, NW, Suite 1300, Washington, DC 20006, (202) 293-3950.