Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 19, 1997

APPLICANT: Westinghouse Electric Corporation

PROJECT: AP600

SUBJECT: SUMMARY OF MEETING TO DISCUSS OPERATIONAL ISSUES ASSOCIATED WITH THE AP600 MAIN CONTROL ROOM HABITABILITY SYSTEM

The subject meeting was held on August 7, 1997, at the Rockville, Maryland, offices of the Nuclear Regulatory Commission (NRC) between representatives of Westinghouse and the NRC staff. The purpose of the meeting was to discuss the AP600 Main Control Room (MCR) Habitability System operational parameters of air flow rates, CO_2 levels, temperature, and humidity needed to establish the personnel "habitability" of the design. The NRC staff stated at the beginning of the meeting that the MCR habitability system should provide a habitable operating environment as well as affording the control room operators protection from radiation exposure in accordance with GDC-19. In addition, the staff stated that it was not receptive to opening the control room doors and subjecting the operators to the conditions of the outside environment prior to 72 hours. The MCR habitability system design should be capable of providing radiation protection and habitable conditions for the design basis time period of 72 hours for up to eleven occupants.

Highlights from the meeting include the following items:

- Westinghouse provided an update on its analyses related to steam infiltration into the auxiliary building from spent fuel pool boiling. Bechtel has developed an analysis model which is being used to calculate the expected auxiliary building environment. Based on preliminary results, Westinghouse stated that some steam will penetrate areas of the aux building from the boiling spent fuel pool through room floor drains. However, the temperature excursions are minimal and are within the environmental qualification of the equipment in the exposed rooms. In addition, Westinghouse will examine modifying the floor drains (putting in traps) to further mitigate any potential steam migration. Westinghouse noted that no path has been found which would permit steam from the spent fuel pool to migrate to the control room area via the aux building. Westinghouse also stated that the Bechtel model could also be used to predict humidity and radiation environments in rooms which were subjected to spent fuel pool boil-off steam.

- Westinghouse stated that the design of the spent fuel pool area blow-out panel was being changed to open on temperature rather than pressure. This design change was being implemented to assure that the blow-out panel would open when the spent fuel pool was boiling with very low heat loads which might be insufficient to generate pressures high enough to open the blow-out panel if it were pressure actuated.

- Westinghouse has obtained the official version of the ARCON96 code from Oak Ridge for determining atmospheric dispersion assessments (Chi/Qs) needed for main control room dose rate calculations. Some preliminary calculations indicate that the new results will not be more limiting than previous calculations (even when looking at different MCR orientations at three representative sites).

- The staff raised some issues involving disagreements between the staff and Westinghouse on assumptions used to calculate MCR dose. Specifically, the occupancy factor assumed by Westinghouse is that the control room operators are inside the control room for no more than 12 hours during the first 24 hours of an accident and no more than 12 hours per day thereafter during the entire period of an accident (30 days). The staff wants Westinghouse to assume the operator is in the control room for the entire first 24 hours of an accident, followed by a 0.6 occupancy factor for 1 to 4 days, and 0.4 occupancy factor for the remaining period of an accident (up to 30 days). This is consistent with how MCR dose rate calculations have been calculated for both operating plants and for the evolutionary designs and the standard review plan. The staff and Westinghouse can no longer "agree to disagree" on the methodology used for dose rate calculations (which has been the historical practice). Based on recent understanding by the staff on the licensing bases for a plant, it is no longer sufficient for the staff to independently corroborate dose rate calculations. Instead, the staff must review the Westinghouse dose analysis methodology and evaluate its acceptability since the Westinghouse methodology will become the design basis for any future analyses (such as 10 CFR 50.59 changes). Westinghouse believes this is a significant change to the approach taken to review the evolutionary reactor designs and will have a large impact in other areas of the AP600 design certification review. The NRC staff took an action to define the areas where there are currently differences between the staff and Westinghouse in performing dose calculations which must be reconciled before the final safety evaluation report (FSER) can be acceptably completed.

- Westinghouse gave an update on its design efforts for improving the MCR habitability system operational characteristics

  - Westinghouse believes it can make the design unsusceptible to a single active failure and, consequently, can take credit for both trains of air. This would result in a design based flow rate of 46 standard cubic feet per minute (SCFM) total (4.2 SCFM per person assuming 11 persons for 72 hours).

  - Westinghouse believes that it can demonstrate acceptable temperature and humidity conditions by restricting the upper limit of the normal control room temperature range; taking credit for temperature reductions of the low moisture content compressed air as it expands from the bottles; and refining the heat input and transfer calculations.

- Westinghouse stated that at a flow rate of 4.2 SCFM per person, the MCR CO_2 levels would not exceed 0.4 percent.

- The NRC staff provided feedback to Westinghouse on what it expected from the MCR habitability system design. Specifically:

  - Westinghouse stated that it plans to modify the MCR habitability system design to take credit for both air bottle supply trains. Westinghouse should thoroughly justify the basis for giving credit to both air bottle supply trains in terms of delivering air flow to the MCR (with the assumption of an active single failure). The staff is particularly concerned about any manual operator actions which may be necessary for mitigating an active single failure. In addition, Westinghouse should look at potential consequential single failure mechanisms such as ice blockage of an air line (due to expansion cooling effects).

  - The staff stated that although limiting the CO_2 to less than 0.5 percent was necessary for the design, it was not sufficient. Westinghouse must also confirm that other air contaminants which are listed in ASHRAE Standard 62 (1989) are also kept within limits or, if present, would not result in adverse effects on control room operator performance during the 72 hour design basis period. Analysis for these contaminants should consider MCR inleakage during the 72 hour operational period, contaminants which may exist in the compressed air bottles and supplied to the MCR spaces, and contaminants which may be released from the control room environment (e.g., contaminants from equipment/hardware, MCR physical structures, personnel, etc).

  - Westinghouse did not necessarily have to limit the control room temperature to 85°F. It has to control both the temperature and humidity to give an effective temperature of 85°. A temperature-humidity curve from MIL-STD-1472C was provided to Westinghouse as an example of temperature-humidity conditions that would be acceptable to the staff.

  - The staff's minimum value for a MCR habitability system fresh air replenishment flow rate is normally at least 15 SCFM per MCR occupant to ensure that appropriate human factors habitable environmental conditions are maintained in the control room. This is consistent with the standards in both NUREG-0700 and ASHRAE. However, because this flow rate is related to comfort level more than performance level, the staff would be willing to accept air flow rates lower than 15 SCFM and as low as 5 SCFM per occupant for 72 hours (absolute minimum accounting for all uncertainties). Westinghouse should make every effort to maximize the design fresh air flow rate to establish ample margin above the 5 SCFM minimum acceptable limit. Westinghouse will need to provide rigorous justification, to be documented in the AP600 SSAR, as to why any deviation from the 15 SCFM standard is necessary and acceptable.

- Westinghouse stated that the post-72 hour connections for establishing MCR habitability with use of external air conditioners and fans had been eliminated based on using ancillary fans and opening the control room doors after 72 hours. The staff stated that it would like to see the external connection capability re-established for the design.

- The issue of tracer gas testing the MCR operating envelop was discussed. The staff believes that this test is still necessary on a periodic basis. Westinghouse disagreed. The staff noted that Westinghouse still needs to formally address this issue in response to the staff's post-72 hour comment letter of June 5, 1997.

Attached is the list of meeting attendees.

A draft of this meeting summary was provided to Westinghouse to allow them the opportunity to ensure that the representation of comments and discussion was accurate.

original signed by:

William C. Huffman, Project Manager
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Docket No. 52-003

Attachment: As stated

cc w/att: See next page

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WESTINGHOUSE - NRC MEETING
ON AP600 MAIN CONTROL ROOM HABITABILTY SYSTEM
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AUGUST 7, 1997

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