D920616

The Honorable Ivan Selin
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Selin:

SUBJECT: INTERIM REPORT ON THE USE OF DESIGN ACCEPTANCE CRITERIA IN THE CERTIFICATION OF THE GE NUCLEAR ENERGY ADVANCED BOILING WATER REACTOR DESIGN

During the 386th meeting of the Advisory Committee on Reactor Safeguards, June 4-5, 1992, we continued our discussions with the NRC staff on the use of the design acceptance criteria (DAC) process in the certification of the GE Nuclear Energy (GE) Advanced Boiling Water Reactor (ABWR) design. Our Ad Hoc Subcommittee on DAC, which was established to review the DAC process as requested by the Commission in the April 1, 1992 Staff Requirements Memorandum, met with representatives of the NRC staff and GE on May 6, 1992, and with the NRC staff on June 3, 1992, to discuss this matter. We also had the benefit of the documents referenced.

In general, we are satisfied with the progress that the staff and GE are making in the development of the four DACs (each consisting of a set of DAC/ITAACs - Inspections, Tests, Analyses, and Acceptance Criteria) presently envisioned for use in the certification of the GE ABWR design. (The staff has indicated that it expects these same four DACs, with some modification in scope, will be used in the certification of the ABB-CE System 80+ design.) The staff views these DAC/ITAACs as a form of Inspections, Tests, Analyses, and Acceptance Criteria that commits the Combined Operating License (COL) holder to a design process with appropriate acceptance criteria that would be applied at various milestones during the design process (as contrasted to the normal ITAACs that will be used to confirm that a certified design has been constructed and tested by the COL holder in accordance with design commitments). These DACs are intended to provide the necessary and sufficient commitments on design processes that will be employed by the COL holder in implementing Tier 1 functional design requirements. These functional design requirements will be a part of the design certification.

The four DACs proposed by GE for use in the certification of the ABWR design appear to be consistent with the recommendations in our February 14, 1992 report to the Commission regarding the use of the DAC process. We note that each of these DACs poses different problems in specifying "practical and technically unambiguous acceptance criteria" in the absence of detailed design information. Because of this, it is our intent to review each of these DACs in detail in order to obtain a fuller understanding of the issues presented by the DAC process. Our final comments and recommendations will be made following our receipt and review of the individual Commission papers that the staff plans to prepare on

these four DACs.

Based on our review to date, we have the following comments on the ABWR DACs currently under consideration:

Radiation Protection

The radiation protection DAC, which the staff believes to be near completion, deals with the adequacy of the ABWR's radiation shielding, ventilation systems for airborne radioactivity areas, and airborne radioactivity monitoring systems. These DAC/ITAACs represent a subset of the staff's overall review of the ABWR radiation protection design features which, in aggregate, are intended to maintain radiation exposures for both plant personnel and the general public well below acceptable limits. GE's position is that it is not possible at this stage in the design to provide the level of detail specified in the applicable regulations, regulatory guidance, and the Standard Review Plan (SRP) for these three aspects of the ABWR's radiation protection design.

"As procured" information is not yet available for components that (1) will be radiation sources and will require shielding or (2) will be potential sources of leakage of radioactive fluids which will establish ventilation system requirements to limit concentrations of airborne radioactivity and the basis for suitable continuous airborne radioactivity monitoring systems. GE has proposed DAC/ITAACs to deal with these issues. These DAC/ITAACs would require the COL holder, following procurement of these components, to perform analyses to verify the adequacy of the plant shielding and the ventilation system design in airborne radioactivity areas and to identify those plant areas requiring continuous monitoring of airborne radioactivity and to provide appropriate monitoring systems. In each case, the DAC/ITAACs provide acceptance criteria that the staff believes are consistent with applicable regulatory requirements, regulatory guidance, and the SRP. The staff believes that compliance with this version of these DAC/ITAACs is acceptable as a basis for design certification pending its review and acceptance of the final version of these DAC/ITAACs.

We discussed these DAC/ITAACs (Tables 3.7a and 3.7b of GE's March 1992 Tier 1 Certification Material) and the staff's draft Safety Evaluation Report (SER) with the NRC staff during our meetings and suggested a number of clarifications to the language of these DAC/ITAACs. We believe that these DAC/ITAACs (with appropriate modification) can provide an acceptable basis for the staff's final safety determination needed for design certification.

Piping Systems

The piping systems DAC, which the staff also believes to be near completion, deals with code-related design and analysis of ABWR piping systems important to safety.

We note that the staff and GE agree that the analysis of such piping-related issues as flooding and compartment pressurization resulting from pipe breaks and the environmental effects of pipe breaks on other equipment in the vicinity of the break need to be explicitly included in the Tier 1 certified design commitments and their associated ITAACs. (The issue of flooding is already included as a Tier 1 commitment.) As such, these issues will not be a part of the piping systems DAC. We were also told by the staff that it will use the SRP as a basis for making its safety determination on these issues.

We have two concerns regarding these issues. First, we continue to have difficulty envisioning how the staff will be able to make a final safety determination on the issues of compartment pressurization and the environmental effects of pipe breaks without having additional information on piping and equipment layouts beyond that presently available in the GE Standard Safety Analysis Report (SSAR). Secondly, we are concerned that these important issues remain to be resolved at this late date in the design certification schedule.

With respect to the code-related piping systems DAC, GE's position is that it is not possible at this stage in the design to provide the level of detail specified in the applicable regulatory requirements because "as procured" information needed for piping analysis is not yet available for components (such as valves, pressure vessels and heat exchangers) that will be a part of these piping systems. GE has proposed DAC/ITAACs to deal with this issue. These DAC/ITAACs would require the COL holder, following procurement of components, to perform analyses of agreed-upon piping systems to show that the design meets the certified design commitments. In each case, the DAC/ITAACs provide acceptance criteria that the staff believes are consistent with applicable regulatory requirements, including conformance with ASME Section III, regulatory guidance, and the SRP. The staff believes that compliance with this version of these DAC/ITAACs is acceptable as a basis for design certification pending its review and acceptance of the final version of these DAC/ITAACs.

We discussed these DAC/ITAACs (Table 3.5 of GE's March 1992 Tier 1 Certification Material) and the staff's draft SER dated May 1, 1992, with the representatives of the NRC staff and GE during our meetings. As a result of these discussions, we suggested a number of clarifications to the language of these DAC/ITAACs. We believe that these DAC/ITAACs (with appropriate modification) can provide an acceptable basis for the staff's final safety determination needed for design certification on the issue of code-related design and analysis of ABWR piping systems important to safety.

Man/Machine Interface

The man/machine interface (MMI) DAC deals with the implementation of a systematic approach to the incorporation

of human factors principles in the detailed design of operator workstations in the control room and at the remote shutdown panel. Unlike the two DACs discussed above, this set of DAC/ITAACs has not been developed to a point where we can offer an opinion as to its acceptability as a basis for the staff's final safety determination needed for design certification.

We did express a concern to the staff regarding the minimum inventory of fixed alarms, displays and controls that is being developed as a part of the Tier 1 design certification. Operator actions shown to be important based on the ABWR PRA are one basis for this inventory. In our letter of April 13, 1992 to the EDO we indicated that the ABWR PRA appeared to have a number of shortcomings. It is not clear when, or if, GE will redress these PRA shortcomings. This leads to the possibility that misleading information could be used in making control room MMI design decisions.

We also expressed two concerns to the staff regarding the scope of these DAC/ITAACs under development: (1) these DAC/ITAACs should include the influence of transmission switchyard workstations, because of the importance of offsite power to the safety of nuclear power plant operation, and (2) the scope of these DAC/ITAACs should be expanded to include the incorporation of human factors principles in the design of local panels where instrumentation and controls important to safety are located.

Control and Protection Systems

The control and protection systems design (I&C) DAC deals with the implementation of digital system designs to meet the functional specifications for those systems that will be established as part of the Tier 1 certification. Again, this set of DAC/ITAACs has not been developed to a point where we can offer an opinion as to its acceptability as a basis for the staff's final safety determination.

We expressed a concern to the staff regarding the scope of these DAC/ITAACs in that they do not appear to include criteria for instrumentation and control systems hardware or hardware/software integration. The staff believes that these issues will be covered by the formal verification and validation program for the safety-related portions of the system and will clarify this point in a future revision of the Tier 1 material.

Sincerely,

David A. Ward
Chairman

References:

1. SECY-92-196, dated May 28, 1992, from James M. Taylor, Executive Director for Operations, for the Commissioners, Subject: Development of Design Acceptance Criteria (DAC) for the Advanced Boiling Water Reactor (ABWR)
2. Staff Requirements Memorandum (SRM-M920305A) dated April 1, 1992, Subject: Staff Requirements Periodic Meeting with the Advisory Committee on Reactor Safeguards
3. GE Nuclear Energy, Stage 2 Submittal, regarding Tier 1 Design Certification Material for the GE ABWR Design, dated March 30, 1992
4. Report dated February 14, 1992, from David A. Ward, Chairman, Advisory Committee on Reactor Safeguards, to Ivan Selin, Chairman, NRC, Subject: Use of Design Acceptance Criteria During 10 CFR Part 52 Design Certification Reviews
5. Letter dated April 13, 1992, from David A. Ward, Chairman, Advisory Committee on Reactor Safeguards, to James M. Taylor, Executive Director for Operations, Subject: Review of the Draft Safety Evaluation Reports on the GE Advanced Boiling Water Reactor Design