STATEMENT SUBMITTED FOR THE RECORD

BY

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UNITED STATES NUCLEAR REGULATORY COMMISSION

TO THE

SUBCOMMITTEE ON ENERGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

CONCERNING

NUCLEAR ENERGY RESEARCH AND DEVELOPMENT AND
ADVANCED REACTORS

SUBMITTED: APRIL 29, 1993

TESTIMONY BY THE DEPUTY EXECUTIVE DIRECTOR FOR NUCLEAR REACTOR REGULATION, REGIONAL OPERATIONS AND RESEACH ON ADVANCED REACTORS
SUBCOMMITTEE ON ENERGY
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
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Thank you, Madam Chairman, for the opportunity to discuss NRC's activities regarding the evolutionary and advanced reactor designs.

Evolutionary and Passive Designs Under Review

The Nuclear Regulatory Commission is currently reviewing four applications for standard design certification under Part 52 of Title 10 of the Code of Federal Regulations. The Commission believes this rule provides a sensible and stable procedural framework for the consideration of future designs and will make it possible to resolve safety issues before plants are built, rather than after. The commitment of resources by both the industry and the NRC has resulted in significant progress toward attaining the objectives of Part 52. In fact, by the end of next year the staff expects to have completed the design reviews for two reactor designs and to have begun design certification rulemaking activities.

The applications we are reviewing include two evolutionary designs, the General Electric Nuclear Energy (GE) Advanced Boiling Water Reactor (ABWR) and the Asea Brown Boveri/Combustion Engineering (ABB-CE) System 80+, and two passive designs, the Westinghouse Electric Corporation AP600 design and the GE

Simplified Boiling Water Reactor (SBWR). In addition, the staff has conducted safety evaluations of the Electric Power Research Institute's Utility Requirements Documents for evolutionary and passive designs.

The NRC staff has completed draft safety evaluation reports on both the ABWR and the System 80+ designs. These designs are improved versions of existing light water reactors (LWR) in operation today. The NRC staff and the vendors are working to resolve the open issues identified in these reports in preparation for issuing the final safety evaluation of these designs. A listing of these open issues has been provided to the Subcommittee staff, and I will be pleased to provide them for the record, if you desire. Design certification rulemaking will follow issuance of the final safety evaluation report and the associated final design approval.

The Westinghouse AP600 and General Electric SBWR advanced light water reactor designs use passive systems that rely on natural forces such as density differences and gravity to perform operational and safety functions. The initial applications for both of these designs contained incomplete information; however, they have subsequently been supplemented by the vendors. The staff is currently conducting an initial review of design information for both the AP600 and SBWR designs.

Despite significant interaction between the NRC staff and the industry, difficulties have been experienced in reaching final resolution of some key aspects of the 10 CFR Part 52 design certification and licensing process. In particular, the development of the inspections, tests, analyses, and acceptance criteria (ITAAC) has required significantly more time and resources on the part of the industry and the NRC than originally anticipated. ITAAC define up-front the requirements for verification of acceptable construction and will provide reasonable assurance that a plant which references the NRC certified design is built and will operate in accordance with the design certification and the NRC's rules and regulations.

The NRC technical reviewers and their management have discussed ITAAC submittals with the industry during over 30 public meetings both at NRC Headquarters and the offices of the vendors. The staff found that the initial ITAAC submittals for the ABWR were not technically sufficient, and considerable effort has been expended working with the vendors to produce an acceptable product. In addition, the NRC staff has expended significant effort on the development and review of prototype ITAAC for the System 80+ design. To achieve resolution on this matter, the NRC developed written guidance for the form and content of ITAAC, and reviewed and discussed the guidance with the vendors. NRC senior management has taken an active role in resolving ITAAC issues, including periodic senior management meetings with the industry.

Applicants for design certification of passive reactor designs and the NRC staff are incorporating the lessons learned from the ITAAC reviews conducted to date in an effort to improve the efficiency and quality of on-going and future reviews. Although a considerable amount of work still is required to fully resolve the ITAAC issue, the staff believes that it is not an obstacle to completing design certification for the evolutionary designs.

In a May 1991, Commission Paper, SECY-91-161, the NRC staff provided its initial estimates of the schedules for reviewing the evolutionary and passive reactor designs to the Commission. These review schedules were based on an assumption that the NRC would receive complete design information from the vendors. Delayed receipt of technically sufficient design and safety related information from the vendors and difficulties in final resolution of some key policy aspects of the Part 52 design certification and licensing process, such as ITAAC, have impacted the schedules which were developed in May 1991. These contributed to schedule extensions of 17 months for the ABWR and 9 months for the System 80+. Likewise, based upon lessons learned from evolutionary reactor design reviews, the review schedules for the AP600 and SBWR design certifications have been extended approximately 8 months. The NRC staff provided the Commission with revised schedules for the evolutionary and passive LWR projects in SECY-93-097, entitled "Integrated Review Schedules for the Evolutionary and Advanced Light Water Reactor

Projects," issued on April 14, 1993. The following is a summary of these revised estimates:

Project	Final Safety Evaluation Issued	Final Design Approval Issued	Design Certification
ABWR	March 1994	May 1994	November 1995
System 80+	June 1994	August 1994	February 1996
AP600	November 1995	January 1996	July 1997
SBWR	March 1996	May 1996	November 1997

We consider this schedule to be ambitious; however, we also consider it to be achievable, assuming timely, technically complete submittals of information and data required from the applicants.

Early Reviews of Advanced Reactor Designs

The NRC also has been performing preapplication reviews of other advanced light water and non-light water reactor designs. Preapplication reviews are being conducted on the Modular High Temperature Gas-Cooled Reactor, the Advanced Liquid Metal Reactor, the PIUS (Process Inherent Ultimate Safety) Reactor, and the CANDU-3 reactor. These reviews are being conducted to identify significant policy and technical issues early in the

development of the designs before they are submitted for design certification under 10 CFR Part 52.

I should note that the Commission has been requested to make reductions in its budget requests to meet guidelines established by the Administration. In addition, the Department of Energy (DOE), which sponsors both the liquid-metal and gas-cooled advanced reactor designs, has announced changes in its priority and level of support for these advanced reactor programs. In light of these developments, the Commission is reassessing the resources to be applied to these preapplication reviews.

It is expected that the Commission will devote the resources to these projects at the level necessary to support the final decision of the sponsors regarding proceeding with these designs.

First-of-a-Kind-Engineering

I would like to briefly discuss first-of-a-kind-engineering (FOAKE) and the agency's involvement with this initiative. FOAKE is an effort sponsored by the Department of Energy (DOE) and the nuclear industry to bring NRC-certified designs to commercial reality. The FOAKE effort encompasses design activities by the vendors to a level of detail sufficient to support practical commercial standardization. The FOAKE effort will provide additional engineering, generally beyond the design certification scope, that utilities have indicated is a prerequisite for

nuclear plant construction. Although this program does not include equipment procurement or construction engineering, it will provide a mechanism whereby a utility will be able to select from optimal designs, and will help ensure that competitive forces in the market for nuclear generation supply are maintained.

The NRC is following the progress of FOAKE, but is not directly involved in reviewing these activities at this stage of advanced reactor development. However, any portion of this industry engineering effort subsequently used to support a combined operating license application may be subject to review or inspection by the NRC to ensure that the effort and subsequent results are in accordance with the Commission's regulations.

The Advanced Reactor Corporation (ARC), a corporate structure that manages the FOAKE program, has established a committee of utility executives (the Project Management Board) from those utilities who have made funding commitments to provide the oversight role for the program. Two designs have been selected for funding by ARC. The evolutionary design selected by ARC was General Electric's ABWR and the passive design selected was Westinghouse Electric Corporation's AP600.

The NRC believes that FOAKE is an important project because this effort should lead to further standardization of the designs. The

effort should not only provide the industry with a better estimate of the costs that a prospective customer and investors would incur should a utility decide to construct a nuclear power plant, but also provides the NRC additional insights as to the resources needed to support combined license applications.

NRC Resources

The NRC's commitment to the timely and thorough review of evolutionary and advanced reactor designs is reflected by the resources which we have been and are continuing to devote to this effort. In FY 1993, the staff expects to devote 192 staff-years and $42.4 million and in FY 1994 and 1995 we expect to devote a level of effort commensurate with DOE sponsorship of various aspects of the advanced reactor program. These resources include the technical review efforts associated with individual advanced light water reactor designs, the research required to develop sound technical bases for evaluating safety issues associated with advanced reactor designs, and the preparation of guidance necessary for the NRC to license and certify advanced reactor designs.

Closing

That completes my prepared statement, Madam Chairman. I will be pleased to answer any questions you or the members of the Subcommittee may have.

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