



General Electric Company
175 Curtner Avenue, San Jose, CA 95128

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

Attention: Charles L. Miller, Director
Standardization and Non-Power Reactor Project Directorate

Subject: **Submittal of Responses to Additional Information as Requested
in NRC Letter from Dino C. Scaletti, Dated July 27, 1990**

Reference: Submittal of Responses (Proprietary Information) to Additional
Information as Requested in NRC Letter from Dino Scaletti,
dated July 27, 1990, MFN No. 130-90, dated October 9, 1990

Dear Mr. Miller:

Enclosed are thirty-four (34) copies of the first submittal of Chapter 18 responses to the subject Request for Additional Information (RAI) on the Standard Safety Analysis Report (SSAR) for the Advanced Boiling Water Reactor (ABWR).

Response to Questions 620.3, 620.7, 620.13, 620.16, 620.19, 620.25 & 620.29 contain information that is designated as General Electric Company proprietary information and is being submitted under separate cover.

Responses to the majority of the remaining questions will be provided at the end of October 1990.

It is intended that GE will amend the SSAR with these responses in a future amendment.

Sincerely,

P.W. Marriott, Manager
Regulatory and Analysis Services

cc: F.A. Ross (DOE)
D.C. Scaletti (NRC)
D.R. Wilkins (GE)
J.F. Quirk (GE)

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ABWR

Standard Plant

QUESTION 620.1

Describe GE's human factors design team, the staff's human factors expertise, and its responsibilities for human factors on the ABWR design.

RESPONSE 620.1

The team is responsible for the compliance of the plant design with all regulatory requirements related to Human Factors Engineering and the inclusion of good human factors engineering practice in all aspects of the plant design. The five members of the team have a total of 99 years of human factors engineering, managerial, quality assurance, plant operating and design experience on BWRs.

Descriptions of the individual members of the ABWR human factors team are follows.

Chairman: Twenty seven years of human factors engineering, licensing and Design experience at GE in nuclear energy. Responsible for the development of the man-machine interface design for the ABWR and SBWR projects. Experience includes human factors engineering for the General Electric Emergency Response Information System (SPDS) and GEPAC Plus and NUMAC computer products

Second Team Member: Fifteen years experience at GE in nuclear energy. Developed Human Factors Engineering Plan and documentation system for ABWR Project. Currently technical leader of an international study group working on design optimization for the SBWR Project.

Third Team Member: Thirty one years experience at GE in nuclear energy. Experience includes the evaluation, development and implementation of quality assurance requirements and procedures for the ABWR certification program in the United States and the ABWR Project in Japan, the audit and review of GE quality and management activities both domestical and international and the review and development of both BWR and fast reactor fuel.

Fourth Team Member: Twelve years experience at GE in nuclear energy. Experience includes instrumentation and control system design, human factors engineering of nuclear power plant control rooms, containment transient analysis and program management. Conducted detailed control room design reviews for several domestic and foreign operating and requisition nuclear plants.

Fifth Team Member: Fourteen years experience at GE in nuclear energy. Responsible for preparation of Chapter 18, "Human Factors Engineering", of the ABWR SSAR. Principal contributor to the development of plant automatic operation and control room design. Developed emergency operating procedures, system operating procedures and integrated operating procedures for the ABWR.

ABWR

Standard Plant

QUESTION 620.6

It appears that the workstation design may precede procedure design (which has historically been the case in the nuclear industry). Yet, it seems that GE has the opportunity to follow the potentially valuable path of specifying what the operator has to accomplish in the control room to a great level of detail (via detailed task analyses and implementing procedures) and then design a workstation that will best support those operator tasks. Describe the temporal relationship between the future development of the operating procedures and the design of the workstation.

RESPONSE 620.6:

Early in the design of the ABWR, the need to specify the operator tasks and to develop operating procedures prior to the design of operator interfaces was recognized. Therefore, system level operating procedures were developed concurrent with the development of the ABWR system designs. These procedures consist of normal operating procedures for systems and for integrated plant startup and shutdown operations. In addition, symptom-based emergency procedure guidelines were developed. These procedures were used as inputs for task analyses. Man-machine interface requirements were then specified based upon these task analyses.

The symptom-based emergency procedure guidelines developed for the U.S. ABWR are based on the U.S. BWR/ROG Emergency Procedure Guidelines, Revision 4 and are presented in Appendix 18A. These guidelines specify operator actions for accidents including postulated severe accidents. Section 18.5 specifies requirements for verification and validation of operator interfaces, taking into consideration normal plant operation and emergency plant operation.

QUESTION 620.9

Describe the role of GE in the development of normal, abnormal and emergency operating procedures, including the generic technical basis document and writers guide, the development of procedure generation documents, the verification and validation process, and the procedures maintenance program. Will GE develop sample procedures or offer a package of procedures to be modified based on site-specific technical considerations?

RESPONSE 620.9:

GE has developed normal and emergency operating procedures as inputs for operator task analyses. In addition, GE has developed the ABWR Emergency Procedure Guidelines (EPGs), included in Appendix 18A. Appendix 18D lists all the inputs used for calculation of operation limits and the outputs of those calculations. The results of these calculations have been incorporated into the EPGs in Appendix 18A. The applicant referencing the ABWR design will be required to update some of the calculations based upon specific plant installation details and submit the procedure generation package as required by NUREG-0737 Supplement 1. In essence, GE has developed the plant-specific technical guidelines normally required of an operating utility. The procedure verification, validation, training, writer's guide, and maintenance programs will be the responsibility of the applicant referencing the ABWR design.