Department of Energy
Washington, D.C. 20545
Docket No. 50-537
HQ:S:82:166

DEC 29 1982

Mr. Paul S. Check, Director
CRBR Program Office
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Check:

PRELIMINARY SAFETY ANALYSIS REPORT (PSAR) UPDATE FOR CHAPTER 3.11

The purpose of this letter is to provide the revision to PSAR Chapter 3.11 to incorporate resolution items discussed between the Nuclear Regulatory Commission and the Clinch River Breeder Reactor project on December 20, 1982. Enclosure 1 provides revised PSAR Section 3.11. Enclosure 2 provides revised response to Question 270.1. These revisions complete resolution of commitments for items 1 and 3 from the November 23, 1982, discussions.

Any questions regarding the information provided or further activities can be addressed to A. Meller (FTS 626-6355) or R. Wishau (FTS 626-6378) of the Project Office Oak Ridge staff.

Sincerely,

J. E. Stader for

John R. Longenecker
Acting Director, Office of
Breeder Demonstration Projects
Office of Nuclear Energy

2 Enclosures

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## 3.11 ENVIRONMENTAL DESIGN OF MECHANICAL AND ELECTRICAL EQUIPMENT

### 3.11.1 Equipment Identification

The safety-related systems which are required to function during and following an accident are identified in Section 3.2. Worst case environmental conditions including temperature, pressure, humidity, sodium aerosol and radiation exposure which result from a postulated design basis accident have been defined for each location. The accident environments and the appropriate time of operation applicable to safety-related mechanical equipment will be incorporated into the Equipment Specifications. Reference 13, PSAR Section 1.6, describes the environmental qualification basis for 1E electrical equipment and the program that will be followed to assure the basis is satisfied. The objective of this qualification basis and this qualification program is to conform to IEEE Standard-323-1974 "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations" and NUREG-0588, Rev. 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment." Differences in CRBRP Reactor Technology and Plant Configuration exist and result in deviations from the specific LWR requirements delineated in NUREG-0588 for electrical equipment. These differences are: the use of liquid metal sodium for the reactor coolant and the resulting sodium combustion product aerosol environmental parameter; a low pressure coolant system with no mechanism for a highly pressurized containment; the absence of steam, containment spray and the mechanism for water flooding within the containment; environmental separation of the upper containment from the lower containment; and placement of redundant heat transport loops in separate cells resulting in independent loop environmental conditions. (Environments in one loop do not propagate to the cells of another loop.)

NUREG-0588 specifies the worst radiation environment as an instantaneous release from the fuel to the atmosphere of 100 percent of the noble gases, 50 percent of the iodines, and 1 percent of the remaining fission products. As specified in NUREG-0588, CRBRP uses the normally expected radiation environment over the equipment qualified life plus that associated with the most severe design basis accident during or following which that equipment must remain functional. The worst case radiation DBAs are the sodium tank failure during maintenance, the cover gas release, and the application of Site Suitability Source Term (SSST). For the Containment Isolation System, CRBRP uses the source term defined in NUREG 0588 modified to include 1 percent plutonium for qualifying Class 1E required to mitigate the consequences of any SSST radiation environment. In NUREG-0588, minimum qualification time of 1 hour is specified. CRBRP requires that equipment be qualified for the environment in which it must perform its safety function for the time duration specified for the safety response plus time margin per IEEE 323-1974. CRBRP is in general compliance with the one hour time margin requirement, however, CRBRP expects that specific exceptions to the one hour time margin will be necessary. Each exception will be justified on a case by case basis. Failure of any equipment after its qualification (whether longer or shorter than 1 hour) will not result in unsafe plant conditions.

### 3.11.2 Qualification Tests and Analyses

The CRBRP has a program for environmental qualification of Safety-Related Electrical Equipment which is consistent with the objectives and requirements delineated in NUREG-0588, Rev. 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," except as noted above.

This program is described in Reference (13) of PSAR Section 1.6, "CRBRP Requirements for Environmental Qualification of Class 1E Equipment." This document establishes the qualification program which will be conducted to qualify Class 1E equipment located in different areas of the CRBRP and sets forth the documentation to be completed for qualification. The entire program is designed to conform to the IEEE Standard 323-1974 as endorsed by NUREG-0588.

For safety-related mechanical equipment, the capability of the equipment to perform its safety function will be demonstrated by design, analysis, testing, prior operating experience, or a combination of these. When it is determined that design and/or analysis is not adequate, environmental testing will be performed. In addition, the safety-related mechanical equipment designs will be reviewed to ensure material compatibility with the accident environments and the maintenance and testing required to ensure operability throughout the lifetime of the plant will be defined.

### 3.11.3 Qualification Test Results

The results of the electrical equipment qualifiction tests will be documented as specified in Reference 13 of PSAR Section 1.6 and summarized, as appropriate, in the PSAR. The mechanical equipment qualification results will be contained with the Equipment Specification data package.

# CRBRP RESPONSE ONE HOUR TIME MARGIN

Question QCS 270.1 (3.11)

The NRC staff position of environmental qualification of electrical equipment is discussed in NUREG-0588. Discuss your compliance with these requirements. If you intend to use WARD-D-0165, "CRBRP Requirements for Environmental Qualification of Class 1E Equipment", identify any differences between IEEE 323,1974 and the NUREG-0588 Category 1 requirements and dicuss how the CRBR design compiles with the NUREG-0588, Category I requirements.

Response

The CRBRP program for environmental qualification of safety-re ated electrical equipment, WARD-D-0165, is consistent with the objectives and requirements delineated in NUREG-0588, Rev. 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment", except as noted below.

Differences in CRBRP reactor technology and plant configurations exist, and, as a result, some specific LWR requirements delineated in NUREG-0588 are not applied to CRBRP. These differences are: the use of liquid metal sodium for the reactor coolant; a low pressure coolant system with no mechanism for a highly pressurized containment; the absence of steam, containment spray, and the mechanism for water flooding within the containment; environmental separation of the upper containment from the lower containment; and placement of redundant heat transport loops in separate cells resulting in independent loop environment conditions (environments in one loop do not propagate to the cells of another loop).

Paragraph 2.4 of the NUREG-0588, Category 1 requirements, discuss "Other Qualification Methods". In this regard, CRBRP requirements permit type testing, analysis, prior operating experience and/or a combination of these techniques for equipment qualification. An evaluation of the adequacy of the proposed method would be done before using analysis or operating experience in lieu of testing. Also, an evaluation would be done to determine the necessary extent of any partial type tests required to be provided in support of these methods.

NUREG-0588 specifies the worst radiation environment as an instantaneous release from the fuel to the atmosphere of 100 percent of the noble gases, 50 percent of the iodines, and 1 percent of the remaining fission products. As specified in NUREG-0588, CRBRP uses the normally expected radiation environment over the equipment qualified life plus that associated with the most severe design basis accident during or following which that equipment must remain functional. The worst case radiation DBAs are the In-Containment Primary Sodium Storage Tank failure during maintenance, the cover gas release, and the application of Site Suitability Source Term (SSST). The second exception concerns the application of time margin to safety-related equipment which performs its safety function within a short time period into the event (i.e., less than 10 hours). In NUREG-0588, a minimum qualification time margin of 1 hour is specified. CRBRP requires that equipment be qualified for the environment in which it must perform its safety function for the time duration specified for the safety response plus time margin per IEEE 323-1974. 1P

CRBRP is in general compliance with the 1 hour time margin requirement. However, CRBRP expects that specific exceptions to the 1 hour time margin will be necessary. Each exception will be justified on a case by case basis. Failure of any equipment after its qualification (whether longer or shorter than 1 hour) will not result in unsafe plant conditions. P