



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

MAR 1 1977

MEMORANDUM FOR: Thomas Ippolito, Chief, Instrumentation and Control
Systems Branch, DSS

THRU: Thomas M. Novak, Chief, Reactor Systems Branch, DSS *TM*

FROM: Gerald R. Mazetis, Section Leader, Reactor Systems Branch, DSS

SUBJECT: ECCS AND DECAY HEAT REMOVAL SYSTEM REVIEWS IN THE EI&C AREAS
FOR B-SAR-205

The attached guidelines have been utilized in the past by your branch to ensure conformance to ECCS Appendix K single failure criteria. It is requested that the acceptability of B-SAR-205 to this guideline be confirmed.

In addition, it is requested that you confirm that the B-SAR-205 Decay Heat Removal System meets the single failure acceptance criteria described in Standard Review Plan 5.4.7. (As you know, additional criteria associated with the cooldown of a plant are still under development.)

To maintain the present schedule, your response by March 16 is requested.

G. R. Mazetis, Section Leader
Reactor Systems Branch
Division of Systems Safety

Enclosure:
Guideline

cc: D. Ross
T. Novak
S. Israel
G. Mazetis
T. Cox *e*
S. Newberry

Contact:
S. Newberry, NRR
x27911



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

MAR. 12 1976

W...
Frabm

R. A. Purple, Chief, Operating Reactors Branch 1, OR
D. L. Ziemann, Chief, Operating Reactors Branch 2, OR
G. E. Lear, Chief, Operating Reactors Branch 3, OR
R. W. Reid, Chief, Operating Reactors Branch 4, OR
R. L. Baer, Chief, Reactor Safety Branch, OR
THRU: D. G. Eisenhut, Assistant Director for Operational Technology, OR

ECCS REVIEWS IN THE ELECTRICAL, INSTRUMENTATION AND CONTROLS AREAS

The attached "Generic Information Request for Reviews of ECCS in the Electrical Instrumentation and Control Areas" defines the information requirements for and the scope of PSS review in these areas. The development of this information request was coordinated with the Reactor Safety Branch and the Electrical, Instrumentation and Control Systems Branch, DSS. Its purpose is to insure a complete and uniform ECCS single failure review in the areas indicated.

The information request addresses the following specific concerns:

1. ECCS actuation system conformance to single failure criterion.
2. Onsite Emergency Power System conformance to single failure criterion.
3. Environmental and seismic qualification of electrical equipment.
4. Submerged electrical equipment (due to LOCA).
5. Critical single electrically-operated fluid system components, including manually-controlled electrically-operated valves.
6. Interlocks between redundant portions of ECCS and supporting subsystems.
7. Electrical and physical separation criteria
8. Proposed modifications.
9. Required drawings.

copy of
200214000

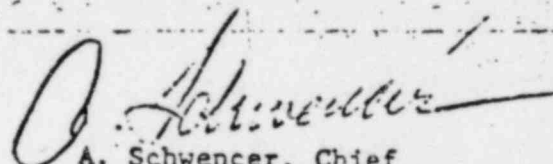
MAR 12 1975

R. A. Purple
D. L. Ziemann
G. E. Lear
R. W. Reid
R. L. Baer

2

The PSB reviewer will require this information to be available from the licensee.

It should be understood that a response to this information request which references (and thus verifies the validity of) information presently on the docket is acceptable as a basis for our review. Therefore, if there is any doubt with regard to the completeness or validity of existing docketed information, the complete information request should be transmitted to the licensee.



A. Schwencer, Chief
Plant Systems Branch
Division of Operating Reactors

Enclosure:
As stated

cc: V. Stello
R. Tedesco
D. Ross
T. Ippolito (4)
T. Novak (4)
F. Rosa
P. Atherton
J. Knight
D. McDonald
P. Shemanski

The Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors, 10 CFR Part 50.46, requires that an analysis of possible failure modes of ECCS equipment and of their effects on ECCS performance be performed. This analysis should demonstrate that your ECCS and supporting subsystems meet the single failure criterion. We require that documentation of this analysis be provided in sufficient detail to enable the staff to (1) verify that the analysis demonstrates that the ECCS and supporting subsystems meet the single failure criterion as defined in IEEE Std 279-1971, and (2) determine the acceptability and verify the implementation of any proposed design modification required as a result of your analysis. Therefore, we require that the following information be submitted to support the single failure analysis of the ECCS and supporting subsystems:

1. Describe the design of the ECCS actuation system. Identify any non-conformance of this design with the single failure requirements of IEEE Std 279-1971. Describe any changes proposed for meeting these requirements.
2. Describe the design of the onsite emergency power system, a-c and d-c. Identify any non-conformance of this design with the single failure requirements of IEEE Std 279-1971. Describe any changes proposed for meeting these requirements.
3. Identify all the electrical equipment required for the ECCS and supporting subsystems to enable performance of the ECCS safety function. Define the qualification status (ability to withstand the design basis seismic and environmental conditions) of this equipment, and the basis for such qualification, to provide reasonable assurance that the equipment will be capable of performing its safety function. Describe

any proposed design modifications, analyses, or test programs for meeting the environmental and seismic qualification requirements.

4. Identify all electrical equipment, both safety and non-safety, that may become submerged as a result of a LOCA. For all such equipment that is not qualified for service in such an environment, provide an analysis to determine the following: (1) the safety significance of the failure of the equipment (e.g., spurious operation, loss of function, loss of accident/post-accident monitoring, etc.) as a result of flooding, (2) the effects on Class IE electrical power sources serving this equipment as a result of such failures, and (3) the proposed design changes resulting from your analysis. Your response to item (2) should specifically address breaker and fuse coordination and the isolation capabilities of this aspect of your design.
5. Identify any single electrically operated fluid system component, including manually-controlled electrically-operated valves, whose failure could result in loss of capability of the ECCS to perform its safety function. Failure in both the "fail to function" sense and in the "undesirable function" sense should be considered, and this should apply even though the component may not be required to function in a given safety operational sequence.
6. With regard to the equipment identified in item (5), provide a detailed description of any proposed design changes deemed necessary by your analysis for meeting the single failure criterion. Your response should specifically address but should not be limited to changes made to meet the single failure criterion by conformance to Branch Technical Position EICSB 18, "Application of the Single Failure Criterion to

Manually-Controlled Electrically-Operated Valves", of Appendix 7A of the Regulatory Standard Review Plan. This position establishes the acceptability of disconnecting power to the electrical components of a fluid system as one means of meeting the single failure criterion.

7. Identify any electrical interlocks between redundant portions of the ECCS and supporting subsystems. Define the consequence of failure of any interlock on the capability of the ECCS to perform its safety function. Describe any proposed design modifications resulting from this review.
8. Provide the electrical and physical separation criteria for your design of redundant safety equipment and functions. Include the features in your design that minimize the vulnerability of the ECCS and supporting subsystems to common failure modes.
9. Provide the following drawings for the ECCS and supporting subsystems:
 - a. Piping and Instrument Diagrams (P&ID).
 - b. Electrical Control Schematic Diagrams.
 - c. One Line Diagram of the Onsite AC Power Distribution System.
 - d. One Line Diagram of the DC Power Distribution System.
 - e. One Line Diagram of the Vital Instrument Power Distribution System.