Docket

12/7/73

Docket Nos. 50-438
and 50-439

Tennessee Valley Authority
ATTN: Mr. James E. Watson
Manager of Power
818 Power Building
Chattanooga, Tennessee 37401

Gentlemen:

In order that we may continue our review of your application for a license to construct the Bellefonte Nuclear Plant Units 1 and 2, additional information is required. The information requested is described in the enclosure and pertains to Chapters 7, 8 and 15 of the Preliminary Safety Analysis Report.

In order to maintain our licensing review schedule, we will need a completely adequate response to all enclosed questions by January 4, 1974. Please inform us within 7 days after receipt of this letter of your confirmation of the schedule date or the date you will be able to meet. If you cannot meet our specified date or if your reply is not fully responsive to our request, it is highly likely that the overall schedule for completing the licensing review for the project will have to be extended. Since reassignment of the staff's efforts will require completion of the new assignment prior to returning to this project, the extension will most likely be greater than the delay in your response.

Please contact us if you have any questions regarding the information requested.

Sincerely,

/S/

A. Schwencer, Chief
Pressurized Water Reactors
Branch No. 4
Directorate of Licensing

Enclosure:
Request for Additional Information

cc: See Next Page

OFFICE					
SURNAME					
DATE					

Form AEC-318 (Rev. 9-53) AECM 0240 GPO C43 16 81468-1 445-678

cc: Mr. R. H. Marquis
General Counsel
629 New Sprakle Building
Knoxville, Tennessee 37902

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cc"s: William E. Garner, Esquire
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Mr. Lyle A. Taylor
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DATE	12/ 6 /73	12/ 6 /73				

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DEC 7 1973

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Huntsville, Alabama 35810

REQUEST FOR ADDITIONAL INFORMATION
TENNESSEE VALLEY AUTHORITY
BELLEFONTE NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-438 AND 50-439

7.0 INSTRUMENTATION AND CONTROLS

7.15 In your discussion of the Main Steam Line Break Instrumentation and Control and the Auxiliary Feedwater Instrumentation and Control Systems (Section 7.6.1.4 and 7.4.1.2.2, respectively). It is difficult to determine whether these two systems are completely separate and independent with respect to their sensors and logic. Provide additional information to clarify this point. Supplement your discussion with a more detailed logic drawing than the one shown on Figure 7.4-2 that will show all the input variables to both systems.

7.16 Your discussion of Section 7.4.2.3.1 on the Auxiliary Feedwater System states that the design does not provide the means for removing automatically the operating bypass, when permissive conditons are met. We believe that the Auxiliary Feedwater System, as described in Sections 7.4.1.2.2 and 15.1.8 is essential to plant safety and should comply with Section 4.12 of IEEE Std 279-1971. Discuss your intent to comply with this position and describe the necessary design changes, or justify your design by discussing your reasons for concluding that such an exception is in accordance with the requirements of IEEE Std 279-1971.

7.17 In discussing the extent to which safety-related fluid systems are designed against a single failure, it appears that the PSAR does not address the extent to which inadvertent actuation of all electrically-operated passive components are considered in evaluating conformance with the single failure criterion.

The staff generally takes the position that single failure of any component (active or passive) in the electrical systems of valves, pumps, and other components in safety-related fluid systems should be considered in designing against a failure of such fluid systems even though the fluid system component may not be called upon to function in a given safety system operation sequence. Where it is determined that the effects of such electrical system failures are unacceptable (fail to activate or improperly activate a fluid system component) a design that conforms to the following is acceptable to the staff:

a. The requirements of General Design Criteria 17, 21, 35, 38, 41, 44, 54, 55 and 56 should be interpreted as requiring the associated system to be designed to perform the system safety function, assuming a single failure. Included in the single failures to be considered in meeting this requirement are failures of both active and passive components in related electrical systems, regardless of whether such electrical component failures affect active mechanical components or "passive" mechanical components. (Passive is used here in the sense that the component valve, pump, etc., is supposed to remain inactive while the fluid system performs its safety function.)

b. Where it is determined that failure of a single component in a related electric system could cause improper mechanical motion of a "passive" or inactive component (valve, pump, etc.) in a fluid system and that this improper motion could result in total loss of the system safety function, an acceptable solution in lieu of design change that may be acceptable would be to disconnect power to the offending electrical systems of the component provided there is no need to activate the component for any safety-related reason. The plant technical specifications should include a list of the electrically-operated safety-related fluid system components to which the requirement for removal of electric power is applied in order to satisfy the single failure criterion. The list should indicate the required positions of these components as well as identifying the safety system in which they are installed.

c. Electrically-operated fluid system components which are classified as active, but which are manually-controlled, should be operated from the main control room. Such components may not be included among those from which power is removed in order to meet the single failure criterion unless:

(1) Electrical power can be restored from the main control room,

(2) Operation is not necessary for at least 10 minutes following occurrence of the event requiring such operation, and

(3) It is demonstrated that there is reasonable assurance that all necessary operator actions will be performed within the time shown to be adequate by the analysis. The plant technical specification should include a list of the required status (open, closed, on, off) of manually-controlled electrically-operated components and should identify those to which the requirement for removal of electric power is applied in order to satisfy the single failure criterion.

d. When the single failure criterion is satisfied by removal of electric power from passive or active fluid system components meeting the requirements of (c) above, the components should have redundant status indication in the main control room and the status indication system should itself meet the single failure criterion.

e. The phrase "electrically-operated", as applied to safety-related fluid system valves, includes valves operated directly by an electric device (e.g., a motor-operated valve and a solenoid-operated valve) as well as valves operated indirectly by an electric device (e.g., an air-operated valve whose air supply is controlled by an electric solenoid valve).

Discuss the extent to which you intend to comply with this position. Justify any exceptions by demonstrating compliance with the Commission's regulations on some other basis.

7.18 From our review of the Decay Heat Removal (DHR) System (Sections 7.6.1.1, 7.6.1.1.4and Figure 6.1-1), we have concluded that this system is required for safety, i.e., to achieve cold shutdown of the plant. The present design does not meet the single failure criterion with respect to failure (to open) of either of two serially connected isolation valves in the suction line of the (DHR) pumps.

We require that the (DHR) system design meet the single failure criterion and that the associated instrumentation control and electrical systems be designed to conform with IEEE Std 279-1971 and IEEE Std 308-1971. Discuss your intent to meet this requirement or justify your design and any exceptions you may have on some other defined basis.

7.19 Section 7.1.2.4 discusses penetration design conformance to IEEE Std 317-1971. This standard is now obsolete and has been superseded by IEEE Std 317-1972. Please revise this section to show the degree of conformance to IEEE Std 317-1972, and Regulatory Guide 1.63. List all exceptions you may have or justify your design on some other defined basis.

7.20 It is not clear that the design of the control circuit for the motor operated isolation valves between the Core Flooding Tanks and the Primary Coolant System as discussed in Sections 7.5.1.2.1, 7.6.1.2.2 and 7.6.2.2.2 is completely acceptable.

An acceptable design should meet IEEE Std 279-1971 and incorporate the following features:

(a) Automatic opening of the valves when primary coolant system pressure exceeds a preselected value (to be specified in the Technical Specifications).

(b) Visual indication in the control room of open or closed status of the valve, actuated by sensors on the valves.

(c) An audible alarm, independent of item (b), that is actuated by a sensor on the valve when the valve is not in the fully open position.

(d) Utilization of a safety injection signal to automatically remove (override) any bypass feature that may be provided to allow an isolation valve to be closed for short periods of time, when the reactor coolant system is at pressure (in accordance with provisions of the Technical Specifications.)

Discuss your intent to comply with this position fully and describe the necessary design changes, or justify your present design by providing the rationale for concluding that your design provides equivalent assurance that these isolation valves will open when required.

7.21 Based on our review of Chapter 6, we have concluded that the following Engineered Safety Features are required for safety, and therefore, must meet the requirements of IEEE Std 279-1971 and IEEE Std 308-1971:

(a) High-Pressure injection

(b) Low pressure injection

(c) Core-Flooding

(d) Reactor building cooling (by the reactor building emergency cooling units).

(e) Reactor building cooling (by the reactor building spray system)

(f) The removal of fission products in the reactor building atmosphere

(g) Reactor building isolation

(h) Combustible gas control in containment

(i) Secondary containment fission product removal

Although Section 7.3.1.1.7 identifies these systems, your format deviates from that which is requested in Section 7.1.2 of the Standard Format and Content of Safety Analysis Report for Nuclear Power Plants (Revision 1), and it is difficult to determine the degree of conformance of some of these systems (particularly items d through i) to the above mentioned standards. Supplement Section 7.3.1.1.7 by providing in detail your intent to comply with IEEE Std 279-1971 and IEEE Std 308-1971, and justify any exceptions you may have on some other defined basis.

8.0 ELECTRIC POWER

8.10 Diesel generators can fail to perform their intended function if the oxygen content of the intake air to the diesels is sufficiently diluted by the presence of extraneous gases in the vicinity of the engines. Supplement the information presented in Section 8.3.1.1.3 to provide assurance that proper conbustion air is supplied to the diesel generators to furnish required emergency power under all operating conditions. Consider diesel exhaust plumes, activation of gaseous fire extinguishers, and all other potential sources of dilution.

8.11 Provide a summary of the results of your power system stability analysis with respect to loss of (1) this nuclear unit, (2) the largest unit in the system, and (3) the most critical transmission line. Your response should include a brief description of what assumptions were made for your analysis.

8.12 In regard to the on-site d-c power systems, provide the following additional information:

a. Section 8.3.2.1.1 states that with a loss of a-c power to the battery chargers and with one battery out of service, the three remaining batteries assigned to the unit will have sufficient capacity for 30 minutes of continuous operation of loads required for normal or accident condition of that unit. In recently licensed plants, an acceptable design provides batteries of sufficient capacity to carry their respective load for <u>two hours</u> without charger operation. Since your design provides a substantially lower safety margin, modify your design to conform to the above or justify your design on some other defined basis.

b. Indicate the load profile for each battery for the period immediately following the limiting (with respect to battery capacity) design basis accident, assuming loss of the battery charger. This should include battery voltage as a function of time and show the point in time when the design minimum charge condition is reached.

15.0 ACCIDENT ANALYSIS

15.14 GDC 25 requires that the protection system be designed to assure that specified acceptable fuel design limits are not exceeded from an accidental withdrawal of a single rod control cluster (not ejection). In the accident analysis presented in Section 15.1.2 of the PSAR, it is stated that no fuel damage results from the simultaneous withdrawal of all rods (in a group) from any initial power level. However, no analysis is provided for an accidental single rod withdrawal. Supplement the analysis presented to include the above mentioned concern, and discuss how your design meets the requirements of GDC 25.