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

May 3, 1984

Docket Nos: 50-390
50-391

Mr. H. G. Parris
Manager of Power
Tennessee Valley Authority
500 A Chestnut Street, Tower II
Chattanooga, Tennessee 37401

Dear Mr. Parris:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION CONCERNING STEAM GENERATOR TUBE RUPTURE AT THE WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2

Since the staff first issued the Watts Bar SER, considerable insight has been gained by the staff and industry in the analysis and mitigation of steam generator tube rupture (SGTR) events. Plant experience at Ginna and other PWRs has disclosed inconsistencies between the actual events and FSAR assumptions. In particular, the assumption that the tube leak can be terminated by the operator within 30 minutes may not be valid under loss of offsite power and single failure assumptions. Emergency guidelines have been developed which, under some instances, recommend continued steaming of the ruptured steam generator during the cooldown process.

Members of the NRC staff, Westinghouse technical staff, and several Westinghouse owners (NTOLs) met in Bethesda, Maryland, on February 23, 1984 to discuss plans for resolution of the SGTR issue. The general approach presented and schedule for complete resolution appear promising. The staff made comments which are reflected in the attached meeting minutes (Enclosure 1). In addition, the staff has prepared the attached (Enclosure 2) request for additional information.

We request that your responses to these questions be submitted by May 31, 1984. If you have any questions concerning this matter, please contact the project manager, T. J. Kenyon, at (301) 492-7266.

DESIGNATED ORIGINAL

Certified By B. Hartop

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The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P. L. 96-511.

Sincerely,

Elinor G. Adensam

Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

Enclosures: 8403280122
As stated

cc: w/enclosures
See next page

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WATTS BAR

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

April 23, 1984

Docket Nos: 50-390
and 50-391

Mr. H. G. Parris
Manager of Power
Tennessee Valley Authority
500A Chestnut Street, Tower II
Chattanooga, Tennessee 37401

Dear Mr. Parris:

Subject: Request for Additional Information Regarding Deliberate Ignition Hydrogen Control for the Watts Bar Nuclear Plant, Units 1 and 2

As part of the staff's review of hydrogen control for degraded core accidents in ice condenser plants, the staff has identified a need for additional information. The attached questions should be responded to by May 14, 1984, to support the Watts Bar fuel load date.

If you have any questions concerning this matter, please contact the project manager, T. J. Kenyon, at (301) 492-7266.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

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WATTS BAR

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REQUEST FOR ADDITIONAL INFORMATION

1. Provide a brief description of the igniter system installed in the Watts Bar nuclear plant. Include figures showing an igniter assembly, and the number and location of igniters. Also, provide a brief description of the system design features including electrical division of the system, isolation capability (breakers) and actuation modes and criteria. Identify rooms within containment for which there is no direct coverage by igniters and justify exclusion of these regions.

2. With regard to the CLASIX code, the staff has previously requested clarification of the structural heat sink heat transfer models. The following pertinent points have been derived from the responses:

   i) Heat transfer is based on a temperature difference determined by $(T_{bulk} - T_{wall})$.

   ii) Heat transfer coefficients for degraded core accident analysis are determined from a natural convection (stagnant) correlation applicable to condensation heat transfer.

   iii) CLASIX does not explicitly model mass removal due to condensation heat transfer.

   Based on the description of the CLASIX structural heat sink model, it appears that the CLASIX model differs dramatically from generally accepted approaches and is not, as is claimed, consistent with standard methods such as those used in CONTEMPT. The differences are related to the treatment of the three items cited above. By comparison, previously accepted approaches are characterized by the following:

   i) Heat transfer is based on $(T_{sat} - T_{wall})$, when the surface temperature of the heat sink is less than T_{sat}; i.e., $T_{wall} < T_{sat}$.

ii) Heat transfer coefficients are based on condensation only when $T_{wall} < T_{sat}$.

iii) Condensed mass removal is based on condensation heat transfer with provisions for revaporizing a small fraction of the condensate.

A more detailed description of accepted practice is contained in NUREG-0588 and NUREG/CR-0255.

The effect of the CLASIX models would appear to be the de-superheating of the atmosphere too rapidly thus reducing gas temperatures and possibly altering the combustion characteristics.

Considering the above discussion, provide the results of analyses, with acceptable models. to determine the effectiveness of deliberate ignition for the WATTS BAR plant. The analyses should address the effects of hydrogen combustion on containment integrity and equipment survivability. Furthermore, the analyses should be performed to address a spectrum of appropriate degraded core accidents. Specific items that should be addressed include:

a. Model input and analytical assumptions;

b. Calculated compartment atomsphere pressure, temperature, and gas concentration transients;

c. Equipment temperature response profiles;

d. Differential pressure transients between compartments which will allow for an evaluation of ΔP effects on interior structures and mechanical components (e.g. doors, fans) ; and

e. Considering the capability of the containment shell, crane wall, and the operating deck, perform an analysis to determine the maximum concentration of hydrogen which could be accommodated in a deflagration. Your estimate should consider realistic initial conditions and approximate combustion parameters.

3. Provide a complete evaluation of fan (both air return and hydrogen skimmer as applicable) operability and survivability for degraded core accidents. In this regard discuss the following items:

a. The identification of conditions which will cause fan overspeed, in terms of differential pressure and duration, and hydrogen combustion events.

b. The consequences of fan operation at overspeed conditions. The response should include a discussion of thermal and overcurrent breakers in the power supply to the fans, the setpoints and physical locations of these devices, and the fan loading conditions required to trip the breakers.

c. Indication to the operator of fan inoperability, corrective actions which may be possible, and the times required for operators to complete these actions.

d. The capability of fan system components to withstand differential pressure transients (e.g., ducts, blades, thrust bearings, housing), in terms of limiting conditions and components.

4. Provide an analysis of the pressure differential loading on the ice condenser doors created by hydrogen combustion in the upper plenum and upper compartment. Describe and justify the assumed or calculated door positions. Provide an evaluation of the ultimate capability of the ice condenser doors to withstand reverse differential pressures. Discuss the probable failure modes and the consequences of such failures; including the impact on a) adjacent equipment and structures, b) ice bed integrity, and c) flow maldistribution.

5. Identify the essential equipment needed to function during and after a degraded core accident. Provide the location inside containment for this equipment.