FEB 0 1 1983

Westinghouse Electric Corporation
ATTN: Mr. E. P. Rahe, Manager
Nuclear Safety Department
P. O. Box 355
Pittsburgh, Pennsylvania 15230

Dear Mr. Rahe:

Subject: Request Number 1 for Additional Information on WCAP-10021

We are currently reviewing Westinghouse Electric Corporation licensing topical report WCAP-10021 entitled "Westinghouse Wet Annular Burnable Absorber Evaluation Report".

The initial review reveals the need for the additional information indicated in the enclosure.

This information is necessary to complete the review - its expeditious submittal will, therefore, be to Westinghouse's advantage. Please advise us, as soon as possible, of your planned submittal date to permit us to develop a review schedule.

Sincerely,

Cecil O. Thomas, Chief
Standardization & Special
Projects Branch
Division of Licensing

8302090532 830201
PDR TOPRP EMVWEST
C PDR

Enclosure:
As stated

cc: Mr. Bruce Lorenz
Westinghouse Electric Corp.
Nuclear Safety Department
P. O. Box 355
Pittsburgh, Pennsylvania 15230

"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."

RD8-2
W

DISTRIBUTION:
Central File
NRC PDR
L PDR
NSIC
PRC
JBerggren
PAnderson
COThomas
FMiraglia
SSPB Rdg.

OFFICE	SSPB:DL	SSPB:DL	SSPB:DL				
SURNAME	JBerggren:kab	PAnderson	COThomas				
DATE	2/ 1 /83	2/ 1 /83	2/ 1 /83				

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-960

QUESTIONS AND STAFF POSITIONS ON WESTINGHOUSE WET
ANNULAR BURNABLE ABSORBER REPORT
WCAP-10021, REVISION 1

1. The total number of Wet Annular Burnable Absorber (WABA) rods irradiated to date for one full cycle of operation in a commercial PWR (Indian Point 3) is 8, and only 4 rods are being irradiated currently for a second cycle. Although performance has reportedly been good ("no anomalies, no rod distortions, and the cladding was in good condition"), these are not statistically significant numbers. Accordingly, we will require surveillance of a representative number of rods discharged after the 1st and 2nd cycles of irradiation in each of the 1st two plants to utilize WABA rods. Such surveillance should be typical of that required for new fuel designs (see page 4.2-12 of the Standard Review Plan) and should include a program that would enable an acceptable statistical inference to be made regarding the number of leaker WABA rods at the end of each cycle. If leaking WABA rods are present, the amount of B_4C leached from some rods should be estimated from GAMMA scans or other measurements.

2. The maximum design temperature of the WABA is said to be 1200°F for normal operation or an overpower transient. Inasmuch as temperature is an important parameter affecting various performance-related phenomena, please indicate how this temperature was determined (with what code or analytical model) and how this analytical method has been verified. For what transient is the maximum temperature predicted?

3. Helium release is stated to be a strong function of temperature and numerical values were presented to quantify the temperature dependence. Please cite the data that support that temperature dependence.

4. It is stated in the report that "WABA rod moisture content will be consistent with moisture specification levels for fuel rods...." Please provide the numerical limit for WABA moisture level and describe how the moisture content will be controlled.

5. It is stated in the report that if the B_4C in breached rods were leached out early in life, incore instruments could detect peaking factor changes. Provide numerical examples of this capability.

6. A two-tiered cladding strain limit is proposed as a function of strain rate. Describe the operating conditions (normal operation, transients and accidents) that correspond to specific strain rates and show that the calculated strains will be below the proposed strain limits. For Conditions I and II is there a cladding design limit for stress (e.g., the unirradiated yield strength) or a strain limit--see page 5-1, which contains some confusing wording.

7a. Because of the unique shape and relative fragility of the B_4C thin-walled annular pellets, special care is needed to prevent gross pellet disintegration that could lead to axial redistribution of the absorber material. The description of the design features that are intended to preclude such disintegration and accomodate growth are not complete enough for us to understand these features and how they operate. Accordingly, please provide further information on (1) how the pellet microstructure and B_4C particle sizes "minimize" the possibility of potential absorber redistribution and (2) how the WABA design "physically limits movement of the absorber material."

7b. With respect to the pellet hold-down device (C-shaped polygonal ring clip), mechanical tests are referred to, and it is stated that the clip will slip to accommodate pellet stack growth. Either provide a reference that describes these tests or otherwise discuss them in further detail. Provide a drawing of the clip and describe how it can accomodate pellet stack growth.

8. In the discussion of pellet/cladding interaction (PCI) on page 5-3, pellet swelling, cladding flattening, and PCI are addressed, and pellet-to-cladding initial and full contact is predicted at 8,000 and 10,000 EFPH, respectively. Stresses in the cladding are said to be "well below allowable." What model or code was used for these predictions, and how was it verified? What is the "allowable" stress for this consideration (is it the unirradiated yield strength or does the strain limit supercede the need for a stress limit). What stresses are calculated in the cladding at full contact (stress calculated by what model?).

9. We note that Section 5.2 of the report contains the equivalent of a design basis statement for cladding creep, rod internal pressure, fretting wear (flow-induced vibration), etc. However, cladding fatique is not addressed even though fatique would seem to be a very relevant concern, considering the potential contribution to vibration that might ensue due to the passage of coolant through the interior holes of the WABA rods. Please provide the design basis and limit, and discuss the analysis for fatique of WABA rods.

For creep collapse and related phenomena that affect whether collapse will occur (e.g., rod internal pressure as a function of the level of prepressurization and helium gas release from the pellets, cladding creep rate, pellet swelling rate), please provide some detail regarding the calculations that are referred to on pages 5-2 and 5-3. For example, how was cladding creep strain calculated (with what model or input assumptions), how is pellet swelling calculated, and how was it determined that the inner cladding will not contact the pellets (what is the pellet swelling rate as compared with the cladding creep rate, and what model is used to make the calculations that show that contact will not occur)?

10. Provide a detailed WABA thermal and hydraulic design diagram showing the geometric location and size of the thimble screw holes, thimble holes, thimble tube annulus, and the guide thimble dashpot in relation to the coolant flow path and the temperature gradient described in Section 6.0.

11. Provide the following including assumptions and results:

a. A description of the analysis to show that dryout will not occur for a burnable poison rodlet in a hot channel with the thimble screw hole plugged.

b. A description of the analysis to show that the maximum core bypass flow through the guide thimble tubes and instrumentation tubes will be satisfied for the maximum number of WABA rods needed in Table 7.2.