January 17, 1991

Docket No. 50-344

Mr. James E. Cross
Vice President, Nuclear
Portland General Electric Company
121 S.W. Salmon Street
Portland, Oregon 97204

Dear Mr. Cross:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATING TO TROJAN RELOAD USING BABCOCK AND WILCOX (B&W) FUEL (TAC NOS. 77313 AND 77314)

The NRC staff has initiated its review of your application for license amendment dated December 14, 1990 (reference LCA-204). The proposed amendment would allow the use of Babcock and Wilcox (B&W) fuel in the Trojan Nuclear Plant. The staff has retained a contractor, International Technical Services, Incorporated (ITS), to review certain aspects of your application. ITS has completed a preliminary review of Topical Reports BAW-10176, "Mark-BW Reload Analysis for the Trojan Nuclear Unit," and BAW-10178P, "Mark-BW Thermal-Hydraulic Application for the Trojan Nuclear Plant," which you previously submitted in support of the proposed change. In order for ITS to complete its review, additional information is required. The additional information is identified in the enclosure to this letter.

To complete our review on a schedule consistent with the date the amendment is needed, we must have written responses to the enclosed questions within 30 days of issuance of this letter. This schedule was discussed with your staff at our January 10, 1991 meeting on this subject. If you have any questions regarding this issue, please contact me.

This request for information affects fewer than 10 respondents; therefore, OMB clearance is not required under Public Law 96-511.

Sincerely,

Original signed by H. Rood for
Roby B. Bevan, Project Manager
Project Directorate V
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. James E. Cross
Portland General Electric Company

Trojan Nuclear Plant

cc:
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(4)

ENCLOSURE

TROJAN
REQUEST FOR ADDITIONAL INFORMATION

Part I, Questions Regarding BAW-10176

General Information

1. Explain why the Mark-BW fuel has a lower fuel temperature in Figure 2.2 than the W Standard 17x17 fuel for the same linear heat generation rate in light of the BW fuel having a smaller diameter. In addition, justify the value(s) of the fuel gap conductance used in analyses. Discuss whether the selection of value(s) used is transient-dependent.

2. Justify acceptability of extending McGuire Catawba analysis to the Trojan application (p. 4-37). In particular, explain fuel rod heat flux and flow channel characteristics and discuss differences between the Trojan reference and Catawba and McGuire BWFC design.

3. Justify that the set of initial conditions on Table 3.3-1 (including SG and PZR mass inventories) are conservative for each transient. If other initial conditions were used, provide and justify their use. Discuss how the full power evaluation model conditions were obtained and identify those parameters which are computed and those which are input. Explain the difference between RCS flow rate of 135.02 vs. 139.0 E+6 lb/hr in Table 3-3-1.

4. Provide the following specific information;

   a. Justify the statement on p. 3-7 that "the separator bypass model has been shown to produce more realistic results."

   b. Discuss how the SG model was developed; justify the use of two parallel SG secondary side flow paths; explain how the 11.5% reduction due to tube plugging was conservatively modeled.

c. Provide details of sensitivity studies performed to verify use of the Trojan RELAP model for reload and FSAR transients analysis. Demonstrate that RELAP5 nodalization selected for transient analysis is converged for the set of transients analyzed in the submittal and that it produces conservative results. Discuss any modifications besides the SG modeling made to the input deck used in the analyses documented in BAW-10169P for Trojan analysis.

5. Justify use of "BRANCH" component types for the reactor vessel and core components in the Trojan base plant model (Fig. 3-1). Discuss how crossflow between hot channel and average core volumes (loss coefficient, flow area) is modeled and qualified in the base case and justify the predicted transient behavior.

6. Identify and justify transients for which the pressurizer spray was modeled and those for which it was not.

7. Provide discussion of control systems modeled for each transient analyzed in the submittal including the values for actuation setpoints and delay & response times. Identify the source for each such value and state (and provide a reference) any previous approval.

8. On a transient-by-transient basis, discuss any changes in the initial conditions or transient assumptions from those of the FSAR and justify those differences.

9. Some of the transient analyses are discussed without plots to substantiate conclusions. Demonstrate the conclusions reached for these transients by providing event sequences and plots of key plant parameters and explaining the events by reference to those plots.

10. Discuss how the RC pump model was developed and qualified as a plant-specific application to the Trojan unit.

11. Provide justification for the statement on p. 2-6 that "the results of the TFTR test program demonstrate that the total pressure drop of the Mark-BW with a debris-resistant lower nozzle is approximately 3% greater than that of the Westinghouse standard design. For the purposes of hydraulic compatibility evaluations, this is a negligible difference..." Justify the statement in light of the 2.2% core flow uncertainty and 2.5% RSM fitting error used in the SCD analysis.

Steam Line Break

12. With respect to the Main Steam Line Break (MSLB), justify or provide information for the following:

    a. Justify that flow mixing and crossflow modeling in the core used in the analysis for both full power and zero standby conditions are conservative for Trojan.

    b. The plant nodalization does not indicate a line of communication of steam lines from the broken side to intact side. Discuss how the blowdown of the intact SGs was modeled before the MSIVs are fully closed.

    c. Provide other assumptions considered for analysis and results from cases (i) assuming a break upstream of the SG flow restrictor and (ii) assuming loss of offsite power.

    d. Justify the use of 70°F feedwater temperature in the HZP model.

    e. Identify the single worst active component failure as required by the SRP.

Decrease in RCS Flow

13. Justify initiating the loss of forced flow transient from nominal conditions rather than more conservative conditions. Demonstrate that

this set results in the worst DNBR by providing parametric analysis results.

14. Provide the following information for the decrease in RCS flow events:

    a. Results of parametric studies for various power levels, insertion rates, and Doppler and MTC values.

    b. The DNBR response calculated for the single RCCA withdrawal event; a reference of justification for the use of 5% as an upper limit for the number of rods with DNBR less than the limiting DNBR value.

    c. A description or reference for the power excursion used in the rod ejection accident on Figure 4.4.8.1.

    d. A reason for using a delayed neutron fraction of 0.0052 vs. 0.0075 on Table 4.5 and a reference for the 10% fuel failure rate.

<u>Part II</u>, Questions Regarding BAW-10178P

1. The topical report states "for plant specific applications the SDL must either be verified as applicable or recalculated using actual uncertainty values." Therefore justify that the Trojan specific BWCMV statistical design limit (SDL) is bounded by the generic value approved in BAW-10170P-A by providing data used for and results obtained from recalculations.

2. Explain how the uncertainties associated with the core flow and measured average pin power factor were determined. Justify further that other uncertainties have not changed from those used in BAW-10170P-A.

3. How are uncertainties associated with core nodalization (both axial and radial) accounted for in the statistical core design (SCD) method? Justify using the 5-channel model for Trojan instead of the 12-channel model used in the BAW-10170P-A report (we note that B&W also developed a 12-channel model for Trojan).

4. Since DNBR determined using the SCD method and the traditional DNBR are different for the same core, explain how the thermal design limit is determined and justify the definition of the retained thermal margin in the same light.

5. Explain Figure B-3 in detail. What is the relationship between the hot leg boiling limit lines and the DNB limits?

6. Justify the statement on p. 6-6 that "the more detailed models generally produce more accurate, less conservative, predictions."

7. Demonstrate that the uncertainties used in the SCD methods are bounded by those associated with the four transients for which the SCD methods were used. Explain how the boundaries (uncertainties and core conditions) of applicability of the SCD method were determined, delineate those boundaries and those transients (in addition to the steam line break) to which the SCD method will not be applied.

8. Explain why for the non-SCD transients, the predicted DNBR is compared to the correlation design limit instead of the thermal design limit. Is the thermal design limit used only with the SCD methods?

9. Does B&W intend to use the SCD or non-SCD method for determination of the transition core DNB calculation. If the SCD method is used, discuss, in detail, how this is done. Justify the code and core model used for the transition core penalty analysis.

10. Provide detailed results from the transition core analysis focusing on the size of the core model used, fractions of transition fuels in the core, justification of the equation for the bounding penalty during the transition stage (this equation assumed a linear relationship) and the uncertainty due to a transition core to be included in the statistical core design method.