Docket No. 50-5

Dr. William C. Richardson
Executive Vice President and Provost
The Pennsylvania State University
201 Old Main
University Park, Pennsylvania 16802

Dear Dr. Richardson:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION

We are continuing our review of documentation that has been submitted in support of your application for renewal of the operating license of your PSBR TRIGA reactor facility. An additional review was performed during our visit to your facility the week of July 8, 1985. During these reviews, several questions have arisen for which we require answers. You are requested to provide written responses to the enclosed questions no later than August 16, 1985. Following receipt of this information we will continue our safety evaluation.

If you have any questions concerning this request, please contact our Project Manager for your facility, Robert Carter, at (301) 492-9795.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P. L. 95-511.

Sincerely,
Original signed by

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

Enclosure:
As stated

cc: See next page

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

July 24, 1985

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Enclosure:
As stated

cc: See next page

cc: Governor's Office of State Planning
and Development
ATTN: Coordinator, Pennsylvania
State Clearinghouse
Post Office Box 1323
Harrisburg, Pennsylvania 17120

Dr. S. Levine, Director
Breazeale Nuclear Reactor
College of Engineering
Pennsylvania State University
207 Old Main Building
University Park, Pennsylvania 16802

Attorney General
Department of Justice
Capitol Annex
Harrisburg, Pennsylvania 17120

Enclosure

PENNSYLVANIA STATE UNIVERSITY FORMAL QUESTIONS

1. What is the metal-to-water ratio of the core? Including the ZrHx matrix, what is the average H/U-235 ratio in the core?

2. What is β effective for the Pennsylvania State Breazeale Reactor (PSBR)?

3. For the PSBR current core, what are the reactivity worths of the individual control rods (shim, safety, regulating, and transient) for a typical PSBR care loading? What is the total number of fuel elements for that core loading? Are your shutdown margin and total excess reactivity consistent?

4. In addition to the reactor scrams required by your Technical Specifications, describe any other scrams you have at the PSBR.

5. What are the relative pressures of the primary and secondary cooling systems in the heat exchangers? What is the heat exchanger tube material?

6. What are the flow rates of the normal and emergency ventilation systems?

7. How are the floor drains within the reactor pool closed so that inadvertent draining of the pools is precluded.

8. Discuss the sensitivity of the fission product monitor. How is it calibrated to quantify fission product leakage from fuel?

9. What is the maximum potential radiation exposure rate in an external radiation beam? What measures are taken to prevent exposure of personnel?

10. Discuss the inadvertent flooding of a beam port air void. What is the maximum potential change in reactivity that would occur?

11. Provide information about Health Physics Office involvement in the review and approval process for experiments. That is, how is it assured that health physics concerns are appropriately addressed by researchers using the reactor facility?

12. Explain how it is assured that radiation control activities are performed properly. Include information about how requirements for the performance of these activities are integrated into reactor (license R-02) procedures and information about how it is determined that these activities are performed consistently and acceptably.

13. Provide a summary of the annual personnel exposures (the number of persons receiving a total annual exposure within the designated exposure ranges, similar to the report described in 10 CFR 20.407(b)) for the last 5 yr. of operation.

14. How is it assured that radiation detection instrumentation performs acceptably? That is, what standards are used to establish and implement calibration and operability - check procedures.

15. In figure 7.2, (SAR), what are the functions of the CALIBRATE switches. Compare these functions with the definition of "Calibration" in ANSI/ANS 15.1 (1982).

16. In table 7-1 (SAR), some detector ranges and settings are given in C/m. Discuss and give relationship between C/m and some exposure or dose parameter, or MPC.

17. What are the minimum qualifications for such positions as the PSBR Director, and the head of the health physics services? Please include appropriate wording in the Technical Specifications.

18. At what level of administration is the ALARA policy established. How is it promulgated? Please provide a copy.

19. Explain the purpose and scope and frequency of the facility audits, and compare with ANSI/ANS 15.1 (1982). Please include appropriate wording in the Technical Specifications to show frequency of audits, scope, by what office are they established, to whom are results reported, etc.

20. Discuss the thermalhydraulics significance of arranging the PSBR fuel elements in a hexagonal pattern as indicated in Section 3 of your SAR (page III-3).

21. On page IX-41 of your SAR, you reference a 1960 report (reference 20) for fission product radioactivity. Please compare the relevant data from that report with more recent data.

22. There are certain sections of your Technical Specifications (section 6, for example) that are not yet fully consistent with ANSI/ANS 15.1 (1982). Please compare, and include appropriate changes in your Technical Specifications.

23. What is the minimum required distance from the top of the pool water level to the top (or bottom) of the core? What is the basis for this limit?

24. Please analyze the maximum step insertion of reactivity available to the reactor operator at the maximum licensed power level.

25. Your current Technical Specifications allow for the maximum total worth of all experiments at one time to be limited to ≥ 2.00$. Justify the deletion of this limit from your new proposed Technical Specifications, or retain it.

26. What is the maximum steady power level possible with the transient rod inserted?

27. Please respond to the questions about your Operator Requalification Program given in Attachment A.

ATTACHMENT A

REQUEST FOR ADDITIONAL INFORMATION
PENNSYLVANIA STATE UNIVERSITY
OPERATOR AND SENIOR OPERATOR
REQUALIFICATION TRAINING PROGRAM

SECTION C - WRITTEN EXAMINATION

C.1.a

This section of the program states only that "Principles of Reactor Operation," is one of the subject areas to be covered in a comprehensive written examination. Both 10 CFR 55, Appendix A and ANSI/ANS 15.4 state that course content shall include Nuclear Theory and Principle of Operation. It is not clear whether or not Nuclear Theory is included in licensee's course content.

C.1.f

Licensee does not state what type of procedures are included in subject areas for examination. Both review documents require that normal, abnormal, and emergency procedures be part of the course content for requalification programs.

C.3

This section of the program description states that licensees receiving a grade of less then 70% (overall) shall be given an accelerated training program to remedy deficiencies. There is no indication of what form this accelerated program takes. Licensee should state how the accelerated program is carried out, e.g., lecture, tutoring, or self-study.

SECTION E - ON-THE-JOB TRAINING

E.1

Although this section states that operators shall perform at least ten reactivity changes during the two year requalification program, and senior operators shall perform or supervise ten reactivity changes, there is nothing to indicate what is included in these reactivity changes. Both review documents require that these reactivity changes include startups, shutdowns, and significant reactivity changes. Licensee must include this information in the description of on-the-job training for the requalification program.