May 21, 2007

Dr. Steven R. Reese, Director
Radiation Center
Oregon State University
100 Radiation Center
Corvallis, Oregon 97331-5903

SUBJECT: OREGON STATE UNIVERSITY–REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE RENEWAL REQUEST (TAC No. MC 5155)

Dear Dr. Reese:

We are continuing our review of your request for license renewal for the Oregon State University TRIGA Research Reactor which you submitted on October 5, 2004, as supplemented. During our review of your request, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information within 45 days of the date of this letter. In accordance with 10 CFR 50.30(b), your response must be executed in a signed original under oath or affirmation. Following receipt of the additional information, we will continue our evaluation of your license renewal request.

If you have any questions regarding this review, please contact me at 301-415-1127.

Sincerely,

/RA/

Alexander Adams, Jr., Senior Project Manager
Research and Test Reactors Branch A
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-243
License No. R-106

Enclosure: As stated

cc w/enclosure: see next page

cc:

Mayor of the City of Corvallis
Corvallis, OR 97331

David Stewart-Smith
Oregon Office of Energy
625 Marion Street, N.E.
Salem, OR 97310

Dr. John Cassady, Vice Provost
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Dr. Todd Palmer, Chairman
Reactor Operations Committee
Oregon State University
Radiation Center, A-100
Corvallis, OR 97331-5904

Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING APPLICATION FOR LICENSE RENEWAL

OREGON STATE UNIVERSITY

DOCKET NO. 50-243

The following questions pertain to the facility and site characteristics and are necessary to verify compliance with 10 CFR Part 50.34--Contents of Applications; technical information, 10 CFR Part 50.54 Appendix E--Emergency Planning and Preparedness for Production and Utilization Facilities. As additional guidance, the NRC staff is also relying on the content of NUREG-1537 in conducting its review.

1. Section 2.2.1. Figure 2.2 shows a rail line in the vicinity of the reactor facility. Explain why shipments on this rail line do not pose a threat to the reactor facility.

2. Section 2.3. What would be the source of site meteorology data in case of an emergency situation?

3. Section 3.4. What is the relationship between the UBC 1964 Zone 3 seismic requirements and the maximum ground accelerations given in Table 2-4?

The following questions pertain to neutronics, thermal hydraulics and reactor design and are necessary to verify compliance with 10 CFR Part 50.34--Contents of Applications. As additional guidance, the NRC staff is also relying on the content of NUREG-1537 in conducting its review.

4. Section 4.2.1.9. The discussion of fuel swelling at high burnups refers to the agglomeration of fission gases at temperatures above 1300°F. This swelling is time and temperature dependent. Provide a discussion if there should be a steady-state temperature limit to control this type of swelling.

5. Section 4.3. What is the minimum reactor coolant leakage rate that can be detected from the reactor pool? What is the largest amount of primary coolant that can be lost from the reactor pool without detection? What is the probable leakage path? Discuss the impact that any potential leakage might have on the health and safety of the public or the environment.

6. What is the maximum fuel element power for possible core loadings (#8)? What are the peaking factors? Tables 4-11 and 4-12 only contain average power per element.

7. Section 5.3. Is secondary pressure higher than primary pressure when both pumps are shut down? If not, what is the impact of a primary to secondary heat exchanger leak?

8. Section 5.5. Is there any physical connection between the city water system and the reactor primary system? If so, how is the possibility of syphoning primary water into the city water system eliminated?

Enclosure

9. Section 7.7.3. Is the primary water activity monitor always on line when the reactor is in operation? If not, how would fuel fission product leakage be detected by the reactor operator?

10. Section 9.5. Describe what parts of the Radiation Center are under the jurisdiction of the reactor license. For example, Section 9.1.2 discusses laboratories. However, TS 5.1.a discusses the restricted area.

11. Chapter 9. Verify that the current material possession limits in the license are to be carried over into the renewed license unchanged. Discuss possession and storage of the AGN core. For example, how is sub-criticality of the AGN core assured? Is the AGN core subject to TS 5.4?

12. Chapter 9. Describe the facility compressed air system.

The following questions pertain to technical specifications and are necessary to verify compliance with 10 CFR Part 50.36–Technical Specifications. As additional guidance, the NRC staff is also relying on the content of NUREG-1537 in conducting its review.

13. Section 4.5.3.1.3 reaches a conclusion of a safety limit of 2,012°F (1,100°C) for cladding temperature less than 930°F (500°C). However, your proposed Technical Specifications contain different safety limits. Please clarify.

14. Section 4.6. Provide additional information on neutronic and thermal-hydraulic analysis that demonstrates that sufficient safety margins exist during operation at your licensed power level.

15. Section 7.3.3. Briefly describe the basis for interlocks.

16. Section 7.4.1. Briefly describe the values and basis for scram circuit set points.

17. Section 10.2.7. The rotating rack represents a different type of moving experiment where there can be continuous reactivity changes while the rack is in motion as opposed to a movable experiment where it is assumed that the movement is into and out of the reactor. Discuss if a TS limit is needed (reactivity change per unit time) on moving experiments.

18. Section 10.3. Provide a basis for experimental TS limits.

19. Table 11-4. Provide the alarm basis for TS required radiation monitors.

20. Section 13.2.2.2.2. Does this analysis consider the 2 second TS limit on scram time? If not, please discuss. Also, Section 4.2.2 contains information on reactivity insertion rates that is different from that given in Table 13-12. Please explain.

21. Section 13.2.3.2.2. Discuss your policy on the handling of heavy loads in the reactor room.

22. Section 13.2.6.2. This section contains a discussion of the $3.00 reactivity limit worth of experiments. Your proposed TS contains a minimum shutdown margin of $0.55 while this section of the SAR has a value of $0.57. Please clarify. The statement is made that with all rods inserted, the reactor is shut down by $4.62. Does this value have the transient rod fully withdrawn from the core? If not, show how the shutdown margin is met with the transient rod (or the rod of highest worth if not the transient rod) fully withdrawn.

23. Section 13.2.7.2. This section discusses the use of emergency power at the facility. Is emergency power needed to ensure public health and safety? If not, please explain. If so, discuss the need for emergency power TSs.

24. TS 2.2. Discuss the derivation of the limited safety system setting (LSSS) value of 510°C. Discuss how the LSSS protects fuel from exceeding the safety limit considering issues such as instrumented fuel element placement in the core verses the core hot spot, the thermocouple placement in the instrumented fuel element verses the fuel element hot spot, the accuracy of the measuring instrumentation and transient behavior of the reactor safety system.

25. TS 3.1.3. Discuss the amount of excess reactivity needed for continuing reactor operation. Include values for such uses of excess reactivity as power defect, experiments and burnup.

26. TS 3.2.2. It appears that the requirement for a period-circuit and safety power level measuring channels in the current TSs are removed from your proposed TSs. Please provide a justification for the removal of these measuring channels.

27. TS 3.2.3., Table 2. Please justify the changes made between Table I of your current TSs and Table 2 of your proposed TSs.

28. TS 3.7.1. Your proposed TS allows the reactor to be operated with certain radiation monitors out-of-service if certain conditions are met. Please provide a basis.

29. TS 3.8.2.a. Provide a basis for the irradiation of 0.014 lbs-equivalent of TNT in the laboratory area.

The following questions pertain to radiation protection and are necessary to verify compliance with 10 CFR Part 50.34--Contents of Applications; 10 CFR Part 20 Subpart C–Occupational Dose Limits, and Subpart D–Radiation Dose Limits for Individual Members of the Public. As additional guidance, the NRC staff is also relying on the content of NUREG-1537 in conducting its review.

30. Section 11.1.1.1.1. Is it possible that some one near the fence line could receive exposure from shine from the release cloud passing overhead? If so, how does this dose compare against the dose from cloud immersion?

31. Sections 11.1.3 and 11.1.5.6. Dosimetry issue guidelines are similar to ALARA investigative limits. Should the dosimetry issue guideline be at a lower dose than the ALARA investigative limit? If not, please explain.

32. Section 11.2.3. Describe the liquid waste system. Describe operational or design features to ensure that non-soluble radioactive material is not released into the environment.

33. Section 13.2.1.1. For the Maximum Hypothetical Accident Scenarios B and C, is exposure from building shine from the source term inside the reactor room considered? If not, discuss why this is not a significant contributor to dose outside the reactor room.

34. Section 13.2.1.1. A reactor room leak rate of 1.69×10^4 $cm^3 sec^{-1}$ is used based on the original August 1968 SAR. The original SAR does not contain a basis for the leak rate. Please discuss the basis for the leak rate.

35. Table 11-3. The ninth item on this table is under what license?

The following Questions pertain to financial data and decommissioning and are necessary to verify compliance with 10 CFR Part 50.33(f) and 10 CFR Part 50.75 and Appendix A to 10 CFR Part 30–Criteria relating to Use of Financial Tests and Parent Company Guarantees for Providing reasonable Assurance of Funds for Decommissioning.

36. Section 15.2. Please update your financial information to include FY 2007 to FY 2012. Clearly show projected revenue sources and expenses for each year such that revenue sources cover expenses.

37. Section 15.3. The NRC is treating license renewal as the issuance of a new license. As such, the University must submit new decommissioning financial assurance. The regulations in 10 CFR 50.75(e)(iv) permits licensees to provide assurance of decommissioning funding by “a statement of intent containing a cost estimate for decommissioning, and indicating that funds for decommissioning will be obtained when necessary.” The staff notes that the University has used a statement of intent for decommissioning funding assurance for their current license. The statement of intent must be signed by an official who has the authority to commit to spending the necessary funds to accomplish decommissioning, and it should be clearly asserted in the statement of intent that the signing official has that authority. In addition, the statement of intent should contain a statement that funding will be provided sufficiently in advance of decommissioning to prevent delay of required activities. If decommissioning funding is to continue to be assured by the Oregon State University, submit an updated statement of intent to this effect, signed by an appropriate State official. Otherwise, 10 CFR 50.75(e) provides alternate options for assurance of decommissioning funding.

The following questions are editorial in nature.

38. Section 10.3. Term “unreviewed safety question” is not used anymore. Please update using current terminology.

39. Section 10.1. Reference is made to figures in Chapter 1. Chapter 1 contains no figures. Please clarify.