Docket No. 50-274

March 11, 1994

Dr. Carl Hedge, Reactor Administrator
United States Department of the Interior
Geological Survey
Box 25046, M.S. 973
Denver Federal Center
Denver, Colorado 80225

Dear Dr. Hedge:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION

We are continuing our review of your amendment request for Facility Operating License No. R-113 for the U.S. Geological Survey TRIGA Research Reactor which you submitted on May 5, 1993. During our review of your amendment request, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed Request for Additional Information within 60 days of the date of this letter. Following receipt of the additional information, we will continue our evaluation of your amendment request. If you have any questions regarding this review, please contact me at (301) 504-1127.

In accordance with 10 CFR 50.30(b), your response must be executed in a signed original under oath or affirmation.

This requirement affects nine or fewer respondents and, therefore, is not subject to Office of Management and Budget review under P. L. 96-511.

Sincerely,

Original signed by:

Alexander Adams, Jr., Senior Project Manager
Non-Power Reactors and Decommissioning
Project Directorate
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Enclosure:
As stated

cc w/enclosure:
See next page

cc:

Mayor
City Hall
Denver, Colorado 80202

Mr. Robert M. Quillin, Director
Radiation Control Division
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

Mr. Timothy DeBey
Reactor Director
U.S. Geological Survey
Box 25046 - Mail Stop 424
Denver Federal Center
Denver, Colorado 80225

REQUEST FOR ADDITIONAL INFORMATION

U.S. GEOLOGICAL SURVEY TRIGA RESEARCH REACTOR

LICENSE AMENDMENT REQUEST

DOCKET NO. 50-274

1. Please give the basis that supports your statement on pg. 1: "..reaches the onset of film boiling (reduced heat transfer) at a power density of 43 kW per element."

2. Please give the basis for your statement on pg. 1: "TRIGA 12 w% fuel would have a radial peaking factor of 1.55 and an axial peaking factor of 1.25." Show that these peaking factors are valid limits for any core-size and fuel composition that would be allowed by the license amendment.

3. Please give the basis that supports your statement on pg. 2: "A core made entirely of new 12 w% fuel elements is estimated to require 60 elements." Is this the projected size of an operating core? Discuss the average and peak powers per rod in such a core, comparing with the answers to question No. 2.

4. Please give the basis for your statement on pg. 2: "A 35% increase in power density would give a measured fuel temperature in a 12 w% element of approximately 619°C for a 3.00$ pulse."

5. Please give the basis for your statement on pg. 3: "A 35% increase in power density would give a fuel temperature in a 12 w% element of approximately 430°C."

6. For both questions No. 4 and No. 5, the technical specification of measured fuel temperatures are to ensure that the fuel at the point of maximum temperature anywhere in the entire core always remains below the safety limits. The current T.S. limits were intended to be applicable for both pulsing and steady power in the limiting case of your present 8.5 w% fuel.

   a. Show the peak fuel temperature, whether in rod center or periphery, for the limiting core configuration and combination of fuel types allowed by the license amendment, for both pulsing and steady power. Include temperatures in your fuel-follower shim-safety rods in limiting configurations.

   b. Compare the temperature at the thermo-couples in instrumented fuel with the peak fuel temperature in the core for the limiting core. Discuss whether the instrumented elements consist of 8.5 w% or 12 w% fuel, and discuss effects of burn-up both in the instrumented fuel and in the rest of the core.

c. Discuss and give the basis for the value of the temperature coefficient of reactivity that will be applicable to pulsing operations in your reactor for combinations of 12 w% and 8.5 w% fuel rods allowed by your proposed license amendment.

d. Provide any proposed changes in technical specifications on fuel temperature measurements or pulse sizes that may be necessary to ensure that no fuel temperature will reach a safety limit for any mode of operation, core size, and fuel composition allowed by the amended license.

7. Please give the basis for your statement on pg. 3: "The following table gives a list of important gaseous fission products that are produced in the GESTR." This reference should support the amount of each respective fission product listed in the Table on pg. 4 as "Activity (Ci) in Core." Explain briefly why the majority of the fission products are not listed, and explain any significant differences between this table and the fission product inventories in your FSAR.

8. A 120 element core was used for determination of the fission product inventory in a 12 w% element shown in the Table on pg. 4. This inventory was used in the subsequent consequence analysis of an airborne fission product release. Please discuss whether the assumption of "a 120 element core" is a bounding one, based on the answers to the previous questions. Make any necessary changes to the fission product release accident analysis.

9. Please give the basis for your statement on pg. 4: "The reactor room emergency ventilation system gives an effective decay constant of 2.2×10^{-2} per minute." Explain how the ventilation system is designed to function throughout your postulated accident scenario.

10. Please show how the activity of Xe-135 (see Table on pg. 4) was determined.

11. For the analyzed case of an accidental fission product release, please explain in a stepwise manner how the thyroid doses from I-131 and I-133 were determined for both the staff and general public. Explain what data and tables of R.G. 1.109 were used, their applicability to the scenario you have postulated, and your best estimate of how realistic and how conservative your tabulated dose results are. Discuss how you have applied ALARA principles in planning the release of the fission products to the unrestricted environment.

12. The reactor room emergency ventilation system is the major system to mitigate consequences of an airborne fission product release. Its function is even more important for 12 w% fuel and small cores. What are the specific surveillance/test requirements for this system to ensure operability?

13. Please discuss why you have analyzed the potential doses inside the reactor room with the assumption of 6 hours stay-time.