Docket No. 50-407

August 24, 1984

Dr. James J. Brophy
Vice President of Research
University of Utah
Salt Lake City, Utah 84112

Dear Dr. Brophy:

We are continuing our review of documentation that has been submitted in support of your application for renewal of the operating license of your reactor facility. An additional review was performed during our visit to your facility in July 1984. 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 September 28, 1984. 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.

Sincerely,

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

Enclosure:
As stated

"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."

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

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UNIVERSITY OF UTAH TRIGA REACTOR (UUTR)
FINAL QUESTIONS

1. What are the principal uses of the UUTR? What is the current use in megawatt-hours per year?

2. Provide a plan view of the current core configuration showing the number and locations of the fuel elements (differentiate between stainless-steel and aluminum elements), the control rods, the D_2O reflector elements, the D_2C reflector tanks, the experimental tubes, the irradiation facilities, the neutron detectors, and the startup source. Also indicate how many and where (if any) the instrumented fuel elements (aluminum or stainless-steel) are in the current core and what type of thermocouples are used.

3. What administrative limits or requirements are placed on fuel loadings?

4. What is the total ^{235}U content in the core? What is the current startup source and what is its strength?

5. What are the measured excess reactivity and control rod worths in the current core configuration?

6. What is β-effective for the UUTR current core configuration?

7 How many spare fuel elements are there? How many have been irradiated? Where are they stored? Describe the fuel handling tools used and fuel storage facilities at the UUTR. Give details of the current inventory of fuels in these storage areas.

9. Provide a summary of the fuel element specifications for the stainless-steel-clad elements that are used in the UUTR. Include a schematic drawing of a stainless-steel-clad fuel element assembly.

9. Describe the facility electrical power system and list all controls and instrumentation that are provided with emergency back-up power. Describe the emergency battery supply system.

10. Provide information on the dimensions of the neutron source holder and the manipulation of the neutron source during startup and power operation.

11. What is the type and form of neutron poison contained in the control rods? What are the dimensions and what is the vertical travel length of the control rods?

12. What is the withdrawal speed of the control rods and what is the accuracy of the rod position indication?

13. Provide information on the scrams and interlocks associated with the four neutron channels. Include set points and automatic actions (if any).

14. What type of signals initiate scrams? Indicate if the meters open circuits, relays, or initiate other actions.

15. Can the UUTR reactor scram on a loss of high voltage signal to the neutron detectors and/or on loss of power to other individual instruments?

16. Are there any rod withdrawal interlocks other than the source level and two "up" switches depressed at the same time? List those, if any, associated with the mode selector switch or the armature or lower rod limit switches.

17. Are there any provisions in the scram logic circuitry and interlocks to exclude a loss of function on a single component failure?

18. What provisions are used to prevent ganged rod withdrawal?

19. Can the control rods be scrammed individually?

20. How is the pool bulk coolant temperature monitored and what is the frequency of temperature monitoring during reactor operation?

21. What is the maximum fuel temperature that has been attained for the UUTR? Indicate in what ring the instrumented element was located and whether the center irradiation facility replacing the B ring elements was installed.

22. What restrictions are placed on the samples that are irradiated in the pneumatic transfer system? Describe the pneumatic transfer irradiation facility (materials of construction, dimensions, terminals, propulsion method, and controls).

23. How is the ^{41}Ar from the irradiation of air in the pneumatic system handled?

24. Please address the following accidents; include all assumptions made, calculative methods used, accident scenarios, and references to any documents.
    (1) Fuel element failure in air
    (2) Rapid insertion of the maximum allowable excess reactivity ($3.00) (step nuclear excursion)
    (3) Loss-of-coolant accident
    (4) Mechanical rearrangement of fuel (the consequences of dropping 1000 lb steel cask into core).

25. Confirm that you have no graphite loaded reflector elements.

26. Provide a schematic drawing of the primary coolant circulation loop and the primary coolant purification system. What are the coolant flow rates through the circulation loop and the purification loop?

27. What is the concentration of tritium in the primary reactor coolant and the D_2O in the reflector tanks and elements? What is the total volume of D_2O now in the reflectors used in the reactor?

28. Describe the current use of a cooling fan to assist evaporative cooling of the reactor pool water. What is the status of the proposed heat exchanger mentioned in your SAR?

29. What are the normal evaporation losses from the pool? Describe the makeup water system at the UUTR.

30. What is the volume of the ion exchangers used in the water purification system? How is the ion exchange material of this system regenerated? What are the procedures for disposing the liquid and solid wastes from the regeneration and/or replacement of the ion exchange resins?

31. How often are the pH and conductivity of the pool water monitored? What are the procedures used to maintain them within the Technical Specifications limits?

32. Describe the heating and cooling devices integrated with the ventilation system in the reactor area.

33. Provide a schematic drawing of the ventilation system for the reactor area, including the emergency filter arrangement and radiation monitors.

34. Describe the system that supplies compressed air to the reactor area.

35. Describe the fire protection system at the reactor facility. Which fire department serves the fire-related emergencies at the reactor facility? Who is responsible for maintaining fire protection equipment at the reactor facility?

36. Describe the central irradiation facility of the reactor and the different types of irradiators now in use at this faciltiy. Provide the dimensions and schematic drawings of these facilities.

37. Describe the wet and dry irradiation facilities at the trapezoidal D_2O reflector tanks. Provide their dimensions.

38. What are the volumes and Curie-contents of the solid and liquid wastes generated annually at the reactor?

39. What is the dose rate at the pool surface attributable to ^{16}N and ^{41}Ar when the reactor is operated continuously at the highest power level?

40. What is the estimated annual release rates of ^{41}Ar from the reactor facility to the enviroment.

41. Describe the administrative organization of the radiation protection program, including the authority and responsibility of each position identified.

42. Describe the responsibilities of the Radiation Safety Office staff at the reactor facility. Identify the radiation safety related tasks that are performed routinely by the reactor staff.

43. Describe any radiation protection training for the non-Health Physics staff. If possible, provide a topic outline of the courses and indicate the normal duration of each course or lecture.

44. Describe your program to ensure that personnel radiation exposure and releases of radioactive material are maintained at a level that is "as low as reasonably achievable" (ALARA). Identify steps taken to implement the ALARA principle.

45. Describe the gaseous effluent monitoring equipment with respect to location, stack flow rate, and probe geometry. For the fixed-position radiation and effluent monitors, specify the generic types of detectors and their efficiencies and operable ranges, and describe the methods and frequency of instrument calibrations and routine operational checks.

46. For the radiation monitors that are alarmed, specify the alarm set points and indicate the required staff response to each alarm.

47. Identify the generic type, number, and operable range of each of the portable Health Physics instruments routinely available at the reactor installation. Specify the methods and frequency of calibration.

48. Describe your personnel monitoring program.

49. Describe your environmental monitoring program and summarize the results for the past 5 yr.

50. Comment on the ability of reactor components and systems to continue to operate safely and withstand prolonged use over the term of the requested license renewal. Include the potential effects of aging on fuel elements, instrumentation, and safety systems.

51. What is the maximum rated capacity of the ventilation system airflow and what is the flowrate when the HEPA filter is in line?

52. Provide a copy of the proposed Technical Specifications with a maximum operation of 100 kW. Provide a more applicable basis than you have for the maximum safe operating power of Al-clad, low-hydride UZrH fuel.

53. What is the effect of radiation damage and aging on the electrical lines that lead to the control rod magnets?

54. What is the capacity of the overhead crane? What are the administrative and physical limitations on its use over the reactor?

55. Where applicable, provide updated information and discussion on demography local industrialization, hydrology, meteorology, etc. Include student population information.

56. In your SAR and Technical Specifications, you have referenced relatively old reports. Please use more up to date references where applicable, and especially where significant differences exist.

57. In your SAR and Technical Specifications, you have quoted predictive parameters. Where available and applicable, provide values obtained by operating experience at your facility.

List of Reproducible Figures Needed for SER

1. Facility Floor Layout
2. Reactor Tank Cutaway View
3. Core Configuration (See Question #2)
4. Stainless-Steel-Clad Fuel Element Assembly
5. Aluminum-Clad Fuel Element Assembly
6. Primary Coolant Circulation and Purification Loops
7. Ventilation System
8. Control Rod Assembly
9. Control Rod Drive Mechanism
10. Block Diagram of Nuclear Instrumentation (Update)
11. Operating Ranges of Incore Nuclear Detector
12. Central Irradiation Facility, with multiple sample loading capability and rotation while being irradiated.