

May 30, 2001

Dr. John A. Bernard, Director
Nuclear Reactor Laboratory
Massachusetts Institute of Technology
138 Albany Street
Cambridge, MA 02139-4296

SUBJECT: SECOND PARTIAL REQUEST FOR ADDITIONAL INFORMATION,
RE: LICENSE RENEWAL (TAC NO. MA6084)

Dear Dr. Bernard:

We are continuing our review of your license renewal request for Amended Facility Operating License No. R-37 for the Massachusetts Institute of Technology Research Reactor which you submitted on July 8, 1999, as supplemented. During our review of your request, questions have arisen for which we require additional information and clarification. This letter represents a second partial request for additional information. The due date for responses to the enclosed questions will be the due date of the last set of partial questions, which will be sent to you in the near future. 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 amendment request.

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

Sincerely,

/RA/

Alexander Adams, Jr., Senior Project Manager
Events Assessment, Generic Communications and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-20

Enclosure: As stated

cc w/enclosure: Please see next page

Massachusetts Institute of
Technology

Docket No. 50-20

cc:

City Manager
City Hall
Cambridge, MA 02139

Assistant Secretary for Policy
Executive Office of Energy Resources
100 Cambridge Street, Room 1500
Boston, MA 02202

Department of Environmental
Quality Engineering
100 Cambridge Street
Boston, MA 02202

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

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SECOND PARTIAL REQUEST FOR ADDITIONAL INFORMATION
MASSACHUSETTS INSTITUTE OF TECHNOLOGY RESEARCH REACTOR
DOCKET NO. 50-20

34. Section 4.2.1, "Reactor Fuel," Page 4-6. Please discuss the thickness and the conductivity of the corrosion film that is used in the determination of the SLs, LSSSs, and the accident analyses. Please provide the thermal conductivity that is used for the corrosion film. Will the elements that have approached the previous fission density limit be placed back in service if the increased fission density limit is approved? Please discuss. If the increased fission density limit is approved and used what is the expected increase in the percentage of elements taken out of service for incipient excess outgassing or other types of failure? Please discuss.
35. Section 5.1, "Summary Description," Page 5-1. Describe what is meant in the first sentence by the phrase "...multiple failures."
36. Section 5.2.1.3, "Heat Removal Considerations," Page 5-6. Discuss how the bypass flow is verified to be less than that assumed in the safety analysis.
37. Section 5.2.1.11, "Coolant Radioactivity and Sampling," Page 5-12. In relation to the statement, "Operation with 'out of specification' chemistry is acceptable for a short interval," what is a "short interval" and are there any quantitative limits to "out-of-specification" chemistry?
38. Section 5.2.2.8, "Prevention of Loss of Coolant," Page 5-16. Please quantify the amount of leakage that will cause a measurable decrease in the level of the primary storage tank.
39. Section 5.3.2.8, "Prevention of Loss of Coolant," Page 5-35. Please quantify the amount of leakage that will cause a measurable decrease in the level of the dump tank.
40. Section 5.4.2.4, "Instrumentation," Page 5-43. Where is the location of the remote read-out for the conductance probe, PC-1?
41. Section 5.5.1.5, "Radiation Monitors," Page 5-47. Please discuss the amount of radioactive material that could enter the secondary system due to a potential heat exchanger failure before detection by the radiation monitors or sampling. What would be the path of the radioactive material to the environment and what would the maximum potential dose be to a member of the public?
42. Section 6.2, "Natural Convection Valves," Page 6-3. The statement that there is enough capacity to remove the decay heat during a loss of flow following operation at 6 MW seems to be in conflict with the information supplied in section 5.2.4. In section 5.2.4 the implication is that forced convection must remain in operation for 3 hours before natural circulation can handle the decay heat. Please discuss. Please discuss how reference [6-1] applies to decay heat removal following 6 MW steady state operation.
43. Section 6.4, "Emergency Core Cooling System," Page 6-5. The reference citation for DKPOWER appears to be incorrect. Please clarify.

44. Section 6.5.3.1, "Aluminum Window," Page 6-12. Please discuss the 4-inch aluminum window in relation to isolation capability.
45. Section 7.2.1, "Design Criteria," Page 7-6, Part (e)(i). Is cable routing the only possible source of common mode failure? Please discuss any other possible sources of common mode failure that were considered.
46. Section 7.3.2.2, "Blade and Rod Position Indication," Page 7-18. Does the proximity switch provide indication of the blade position or the mechanism position?
47. Section 7.3.2.3, "Run-Down Relays," Page 7-18. Consider the phrase "...the mechanism of the affected shim will drive in automatically thereby assuring that the absorber is fully inserted." Does not the blade-in light assure "...that the absorber is fully inserted?"
48. Section 7.3.2.4, "Mechanisms to Decrease Reactivity," Page 7-19. If the dump valve is opened by operating the emergency air bleed valve will a minor scam automatically occur?
49. Section 7.4.2, "Non-Nuclear Safety System," Page 7-24. Please explain the theory of operation of the low level D₂O reflector probe.
50. Section 7.6.2, "Channel 8," Page 7-28. Please provide further explanation for the phrase "...by comparing the previous channel 8 equilibrium value with the equilibrium thermal power."
51. Section 7.6.3, "Thermal Power Indicator," Page 7-28. Please discuss the acceptance criterion for the comparison of the calculated thermal power with the nuclear instruments. What is the required response if the acceptance criterion is not met?
52. Section 7.7, "Radiation Monitoring System," Page 7-32. Please list and discuss the exemptions to 10 CFR Part 20 if the exemptions are different than those asked about in question 4.
53. Section 7.7.1.2, "Control Units," Page 7-36. This section discusses the impact of turning a unit off or removing a unit for maintenance. It appears that these actions impact the alarm capability of the other units unless bypasses are installed. Are there any failures that could occur to a unit such that the alarm capability of the other units would be impaired?
54. Section 9.1.3 and Table 9-1, "Operational Analysis and Safety Function," Page 9-9. Table 9-1 lists various ventilation system interlocks. However, the functionality of only three of these interlocks appear to be technical specification (TS 4.5) required surveillances. Please discuss any testing performed to verify the functionality of the other interlocks listed in this table.

55. Section 9.2.2.1, "Spent Fuel Storage Pool," Page 9-14. Please discuss the possibility that siphoning will cause draining of the spent fuel storage pool if there is a pipe break.

56. Section 9.3.3, "Prevention Components," Page 9-17. Please discuss any interlocks between fire and smoke alarms and the containment building ventilation.
57. Section 9.4, "Communications Systems," Page 9-18. Are there any two-way radios used for communication purposes?
58. Section 9.5.1, "Byproduct Material," Page 9-18. Please discuss the use (under the reactor license) of byproduct material produced by the reactor. At what point is this material transferred to the campus byproduct license?