

March 18, 2004

Mr. P. Michael Whaley
Nuclear Reactor Manager
Kansas State University
112 Ward Hall
Manhattan, KS 66506-2506

SUBJECT: KANSAS STATE UNIVERSITY — REQUEST FOR ADDITIONAL
INFORMATION RE: LICENSE R-88 RENEWAL (TAC NO. MB7966)

Dear Mr. Whaley:

We are continuing our review of your request for license renewal for the Kansas State University research reactor which you submitted on September 12, 2002. During our review of your license renewal request, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information within 90 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 301-415-1631.

Sincerely,

/RA by Patrick M. Madden Acting for/

Daniel E. Hughes, Project Manager
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-188

Enclosure: As stated

cc w/enclosure: Please see next page

Kansas State University

Docket No. 50-188

cc:

Office of the Governor
State of Kansas
Topeka, KS 66612

Mayor of Manhattan
P.O. Box 748
Manhattan, KS 66502

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

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ADAMS LETTER ACCESSION NO.: ML040780231

TEMPLATE #: NRR-088

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REQUEST FOR ADDITIONAL INFORMATION
KANSAS STATE UNIVERSITY RESEARCH REACTOR
DOCKET NO. 50-188

No.	SAR Page	SAR Section/Table/ Figure	Request or Question
1	1-16	Table 1.3	The bottom of this table is missing. In particular footnote 1 is missing. Please provide the complete table.
2	4-7	Section 4.2.2	Please discuss the construction of the control rods. Are they located within guide tubes? Are the control rods constructed with followers?
3	4-13	Section 4.5.3.b (Bullet 6)	The value of $\pi/2$ appears to be in error.
4	4-17	Section 4.7	Please discuss how arbitrarily declaring the fuel temperature safety limit as 1000°C "...ensures that the maximum temperature limits indicated in the analysis cannot be achieved."
5	4-17	Section 4.7	Please discuss the need for two different fuel temperature safety limits (i.e., 1150°C with the clad <500°C and 950°C with the clad temperature equal to the fuel temperature). Under what conditions would the latter limit be valid?
6	4-18	Section 4.8.2	If power level is the Limited Safety System (LSS) during steady state (SS) operation and peak fuel temperature is the Safety Limit parameter please provide the correlation between power level and peak fuel temperature SS operation. What is the expected highest peak measured fuel temperature during 500 kW steady state (SS) operation?
7	4-18	Section 4.8.2, Table 4.5	Please discuss how the Limiting Safety System Setting (LSSS) during SS operation (Power Level) was determined. Please clarify the correlation between the licensed power level, the max SS operation power level, and the LSSS.
8	4-18	Section 4.8.2, Table 4.5	Is the instrumented fuel element used with the Limited Safety System Setting (LSSS) safety instrumentation always located in the B-ring? If not, please discuss how operation below the LSSS is assured. Please discuss how the radial location of the thermocouple in the instrumented element affects the ratio of measured peak fuel temperature/actual peak fuel temperature during SS vs. pulse operation.

9	4-18	Section 4.8.2, Table 4.5	Please discuss how the LSSS of 600°C provides assurance that the safety limit is not exceeded. How was the LSSS value of 600°C determined?
10	4-18	Table 4.5	This table indicates that the LSSS is for the steady state mode, however, the Technical Specification (TS), Section 2.2.1, Applicability, states that the LSSS applies only in the pulse mode. In addition TS, Section 3.4.3, Table 1 indicates that the fuel element temperature measuring channel is not applicable during SS mode. Please discuss.
11	7-12	7.3.4	This section indicates that four control rods are required for 500 kW operation. Is this also the case for operation for up to 250 kW? Please justify not having a LCO for the number of control rods.
12	7-12	7.3.4	The second sentence in this section states that three control rods have identical circuitry. In the next sentence there is the statement that two rod drives are original analog systems. Then it is stated that one drive uses a stepper motor. Please provide a simple circuit diagram showing the stepper motor circuit and interface.
13	7-12	7.3.4	Please describe the drive that utilizes the stepper motor. In particular describe the limitations on rate of speed, position indication of the control rod to the operator, and failure modes and effects of the drive.
14	11-3	1 st line of text	The value of $6 \times 10^{-4} \mu\text{Ci hr ml}^{-1}$ appears to be incorrect.
15	11-13	Table 11.5	What is the reference for this table? Please discuss how the information in this table will be used in radiation and waste management.
16	11.A-5	2 nd sentence	The value of $6 \times 10^{-3} \mu\text{Ci hr ml}^{-1}$ appears to be incorrect.
17	11.A-7	1 st sentence	The calculation of the dose appears to be in error low.
18	12-6	Section 12.1.2.b	The RSO has veto power in the Reactor Safeguards Committee. Is there a process established to overrule a veto?
19	12-13	Section 12.5.2	What is the reason to restrict the 14-Day report to within 10 days.
20	12-15	Section 12.6.3	Please including the updated, corrected and as-built facility drawings in this section as indicated in TS Section 6.10.b)6.

- | | | | |
|----|-------|---|---|
| 21 | 13-16 | Section 13.2.3(3)
Case 1 and
Table 13.4 | Please discuss the calculation of the peak to average core temperature ratio equal to π or provide a reference. π appears to be too high a value for this parameter for your reactor. |
| 22 | 13-16 | Section 13.2.c
Case II | Please discuss the limitation of the initial power for Case II to 94 kW. Please discuss the possibility of an experiment reactivity change while at a power greater than that analyzed. Please correct the inconsistency between this analysis and TS Section 3.1.5 with regard to the initial power. |
| 23 | 13-16 | Section 13.2.3(3)
Case 1 & II | Please discuss the conclusion that the core power rise will be the same for 2.1% and 0.7% insertion of reactivity. |
| 24 | 13-16 | Also TS
Section 5.3 | Justify not analyzing a ramp accident and using the results as bases for the LSSS and the reactivity change rate limits for movable experiments and control rod motion. How are the consequences of such accidents limited? |

REQUEST FOR ADDITIONAL INFORMATION
KANSAS STATE UNIVERSITY RESEARCH REACTOR
DOCKET NO. 50-188

No.	TS Page	TS Section	Request or Question
25	TS-6		Please justify to not bring the definition of "Reactor Secured Mode" in agreement with ANSI/ANS 15.1 -1990, The Development of Technical Specifications for Research Reactors, Section 1.3.
26	TS-10	Section 2.2.5	Considering the time constant of the thermocouple in combination with the safety instrumentation response time, please discuss how a peak fuel temperature "...LSSS will prevent operating in violation of the Safety Limit" while operating in the pulse mode.
27	TS-13	Section 3.1.5	The reference (Table 13.2.1.4) appears to be incorrect.
28	TS-30	Section 3.9.4	Please define an "ASAP" completion time.
29		Sections 3.4 and 3.5	Please revisit the proposed Technical Specifications (TS) and compare them to your present TSs and instrumentation system. If you are not proposing to implement a SCRAM or an interlock that already exists in the instrumentation as a TS please provide justification. If you are proposing not to carry over a TS from the existing TSs to the proposed TSs please justify.
30	TS-12	Section 3.1.3(2)	Please discuss the reactivity budget for 500 kW operation. Is \$4.00 excess reactivity sufficient for operational conditions anticipated?
31	TS-46	Section 6.1 f)	Is the RSO deputy equal to the RSO in experience, responsibility, and authority?
32	TS-48	Section 6.3 a)	Please justify not including SAR Section 12.3.2 as required procedures.
33	TS-50	Section 6.7 and SAR Section 12.8	Please discuss the consistency of these statements with the License Amendment No. 11, dated October 28, 1998.
34	TS-53	Section 6.11a)3	The reference to Section 1.1 for the definitions of reportable occurrences is apparently incorrect.
35		General	Please justify not specifying the staffing requirements for the various work scenarios (i.e., operation, shutdown, fuel handling, etc.).
36	TS-53		This page and the TSs appear to end mid-sentence. Please provide the completion page(s).

