NSC

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

January 23, 1980

Docket No. 50-148

Dr. William P. Smith, Dean
University of Kansas
School of Engineering
11 Marvin Hall
P. O. Box 2067
Lawrence, Kansas 66044

Dear Dr. Smith:

Your Facility Operating License No. R-78 will expire April 7, 1980. Renewal of your license requires the submission of an application that demonstrates the reactor can continue to be operated safely and that the reactor components and systems will be capable of withstanding prolonged use over the term of the renewal. General requirements are provided in Title 10 Code of Federal Regulations (10 CFR). Parts 50, 51, 55 and 73. Enclosed are specific items that will be reviewed prior to renewal of your license.

You are reminded that if you are planning to renew your license, 10 CFR ?.109 requires a timely filing (at least 30 days prior to expiration of your current license term) of your application. If possible a submittal of at least two months prior to expiration is desired to permit sufficient time to complete the necessary reviews and issuance of required notification prior to the end of your present license period. You are further advised to review 10 CFR 50.51 to assist you in determining the period of the renewal.

The foregoing has been provided as per your request of December 28, 1979 to assist you in the license renewal process.

Sincerely,

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
License Renewal Review Items

cc w/enclosures:
Dr. Russell B. Messler
Nuclear Reactor Supervisor
University of Kansas
Department of Chemical Engineering
Lawrence, Kansas 66044

1950 029

8002120 513

LICENSE RENEWAL REVIEW ITEMS

A. Contents of Application

1. General Information (10 CFR 50.33)

Provide applicable information delineated in the referent regulation. The following 10 CFR 50.33 paragraphs obtain and additional guidance is provided herein:

(e) Include all NRC licenses issued for use on the campus

(f) Financial Considerations - The review process to satisfy 10 CFR 50.33(f) requires information that will show that the licensee possess the funds necessary to cover estimated operating costs or that there is reasonable assurance of obtaining the funds for the period of the license renewal plus the estimated costs of permanently shutting down the facility and maintaining it in a safe condition. To facilitate reviewing the financial aspects, it is requested that the following information be provided in three signed and notarized originals and six additional copies:

(1) The most recent published annual statement. Indicate, or provide separately, that portion of the budget which clearly delineates the sources of funds to be utilized to cover costs of operation of your reactor facility.

(2) The estimated annual costs to operate the reactor for the additional license renewal period and a certification that amounts designated in your application for renewal of the facility will be included in future budgets.

(3) The estimated costs of permanently shutting down the reacor, a listing of what is included in these costs, the assumptions made in estimating the costs, the type of shutdown contemplated, and the source of funds to cover these costs.

(4) An estimate of the annual cost to maintain the shutdown facilities in a safe condition. Indicate what is included in this estimate, assumptions made in determining the cost, any interest rates assumed, and the source of funds to cover this.

a. The following is provided to assist in determining your estimated costs for permanently shutting down your reactor. Choose the option (see Regulatory Guide 1.86) you deem most appropriate. The following is an example for a TRIGA reactor using the mothballing option for decommissioning.

"It is assumed that dismantling of the core structure and other radioactive portions of the reactor system will be performed 3 to 5 years after complete removal of the fuel. The following provides estimated decommissioning costs (1976 $ value):

1950 030

a.	Removal and disposal of fuel @ $2,000.00/fuel element	
	Approx. 150 x $2,000.00	$ 300,000.00
b.	Removal and disposal of core structure	$ 20,000.00
c.	Removal and disposal of reactor tank, beamports, thermal column, etc.	$ 250,000.00
d.	Removal and disposal of reactor exposure room and biological concrete shield	$ 250,000.00
e.	Decontamination	$ 50,000.00
f.	Dismantling of reactor bridge and cooling system	$ 10,000.00
g.	Unexpected expenses	$ 120,000.00
	TOTAL	$1,000,000.00

Three to five (3-5) years cooling period after complete removal of the fuel is necessary before dismantling of the core structure and other radioactive portions of the reactor assembly. During this period the room housing the reactor structure will be maintained as a restricted area under a NRC possession-only license.

It is recommended by the NRC that the same security level be maintained during this period as described in the Texas A&M University TRIGA Research Reactor security plan. Minimum monitoring systems will be such as to insure that the health and safety of the public is not endangered. A facility radiation survey, an environmental survey and an administrative procedure will be established for the notification and reporting of abnormal occurrence.

Estimated cost (1976 $ value) to maintain the shutdown facility in a safe condition:

Personnel

a.	Radiological survey, maintenance and administrative	$ 26,200.00/yr.
b.	Supervisory and to prepare and coordinate detailed plan for dismantling and disposal of structure	$ 20,000.00
	Total amount for a maximum period of 5 years	
	(5 x $26,200.00) + $20,000.00	$151,000.00"

1950 031

The foregoing numbers, would of course, be different for your facility and also changed if you choose a different option. This has been provided because of requests from other licensees on what criteria should be considered.

2. Filing of Applications

Provide applicable information as delineated in 10 CFR 50.30 as follows:

(e) Exempt

(f) Environmental Considerations

Attached is a memorandum, "Environmental Considerations Regarding the Licensing of Research Reactors and Critical Facilities" dated January 28, 1974, from D. Muller to D. Skovholt, that provides the general environmental impact of research reactors and may be used as a reference in developing an Environmental Impact Appraisal (EIA). As a result of the attached memorandum, it was determined that an Environmental Impact Statement (EIS) is not required for research reactors authorized to operate at 2MW(t) and less. However, an EIA is required, and, therefore, sufficient information must be submitted to support and develop the EIA. (See attached MSU EIA for a sample).

3. Technical Information (10 CFR 50.34)

(a) FSAR - (applicable portions) of 10 CFR 50.35(b)

A complete review of your Safety Analysis Report (SAR) will be conducted to ensure no significant safety hazard exists. A preliminary review of your SAR indicates it must be updated to current analysis techniques and information. As the original license was evaluated for a specific term, the fact that some parts obviously have worn and there is some deterioration of the reactor structure; the ability of the facility to operate safely for the requested renewal period is a safety question. Therefore, the SAR should include information that describes the facility and all changes made during the license period; the design basis and limits on its operation; and a safety analysis of the structures; components and systems showing they will be able to perform their intended function; updated information on meteorology, seismic and other natural and unnatural phenomena; analyses of a design bases accident (DBA) and the consequences thereto - for example the DBA for a TRIGA reactor is a single fuel element leaking in air; etc., based on the decision of the Atomic Safety and Licensing Board Hearings in regard to the Columbia University TRIGA reactor, April 6, 1971 and May 18, 1972. The DBA appears to be the single subject that most nonpower reactor licensees have trouble with. The analysis of your DBA should include the total amount of fission products available, the amount of gasses that could be released and how the facility is designed to retain these products. If the DBA did occur what actions would be taken to protect on-site personnel and the public, and what would be the maximum released?

(b) 10 CFR 50.34(b)(6) - Applicable portions

The following pertains to specific items:

1950 032

(v) Emergency Planning

The plan should contain, but not be limited to the elements in Section IV of Appendix E to 10 CFR Part 50. Attached are draft copies of ANS 15.16, "Standard for Emergency Planning for Research Reactors," and Regulatory Guide 2.6 (issued for comment) "Emergency Planning for Research Reactors." These documents are currently being used by staff reviewers to ensure compliance with Appendix B, you are requested to use these documents as guides in preparing your emergency plan.

The attached letter dated October 19, 1979, provided a copy of proposed regulations §50.54(q) and (r) and informed all nonpower reactor licensees that they would be required to submit emergency plans. This proposed rule also makes the emergency plan a condition of the license; therefore, a statement will be included in your new license to that effect similar to the following:

"The licensee shall maintain in effect and fully implement all the provisions of the NRC staff-approved emergency plan, including amendments and changes made pursuant to 10 CFR 50.54(q) and (r). The approved emergency plan consists of documents submitted for review January 18, 1980, contained in Appendix C issued with License Amendment No. 13, is hereby incorporated in the license."

(vi) Proposed Technical Specifications (TS) in accordance with 10 CFR 50.36)

A review of your license and TS reveals that it does not conform in content to current standards. The TS shall include items in the categories delineated in 10 CFR 50.36(c) - "Safety Limits - Limiting Safety System Settings - Limiting Control Settings - Limiting Condition for Operation - Surveillance Requirements - Design Features - Administrative Controls." Each specification shall list the "Applicability - Objective - Statement of the Specification - A Summary Statement of the Bases (or reason for the specifications)." Each specification is derived from the SAR and therefore would include the limiting conditions of operation and surveillance requirements described in the SAR that will substantiate that there are sufficient checks and controls established to provide early detection of deterioration of systems, components and structures and operating limits to ensure safe operation for the renewal period. Attached is a copy of Union Carbide's TS that were recently approved. Although, not specifically of the same design as your facility, it does contain the format and content desired and will provide you guidance in revising your TS.

1950 033

Also attached are a draft copy of ANS 15.18, "Standard for Administrative Controls for Research Reactors," and an administrative control section guidance previously provided to all research reactor facilities. You also are requested to review the administrative sections using this guidance and consider any changes.

The following guidance previously provided should be considered in your review process:

(a) ALARA consideration should be included in the TS, as delineated in 10 CFR 50.36a (see ANS 15.12 attached).

(b) Provision regarding the insertion and irradiation of explosives must be included in the TS or not be handled at all. All research reactor licensees were advised of this requirement June 1971. Previous concerns are reiterated in the following:

"An increasing number of programs being performed at research and testing reactor facilities involving the radiography of explosives. The presence and irradiation of explosives in a reactor facility must be evaluated carefully because the potential for damage to the reactor. The use of explosives within a reactor facility is considered to be an unreviewed safety question pursuant to Section 50.59 of 10 CFR Part 50 unless such usage has been reviewed and approved by the Commission. If you presently receive, or have plans to receive and handle explosives, an evaluation of the consequences of accidental explosions should be made and submitted to the Commission's Director of Reactor Licensing. Proposed operating restrictions that provide for safe usage of explosive materials should be submitted for inclusion in your TS. In this context, "explosives" include all materials that would constitute Class A, Class B, and Class C explosives as described in Title 49, Parts 172 and 173 of the Code of Federal Regulations, regarding transportation of explosives and other dangerous materials.

The TS should contain sufficient information to establish operating restrictions; should indicate the maximum quantity of explosives (in pounds of equivalent TNT) allowed in the facility, the form of the explosives, the controls exercised when handling and storing explosives, the cumulative radiation exposure limits for explosives, the utilization of explosives within the facility, and the maximum quantity of explosives that could be involved in postulated accidents; and should include an assessment of the probability and the potential consequences of an explosion occurring".

1950 034

(c) Many of the research reactors still use abnormal occurrences (AO) as previously used in Regulatory Guide 1.16. It was used to designate any unscheduled or unanticipated operation event reported to the Commission. Included in these reported events were (1) events that would or did have significance from the standpoint of public health or safety and (2) events reported to NRC for performance evaluation and trend determinations. In Section 208 of the Energy Reorganization Act of 1974 (Pub. L. 83-438), an "abnormal occurrence" is defined for the purposes of the reporting requirements of the Act as an unscheduled incident or event which the Commission determines is significant from the standpoint of public health or safety. In order to be consistent with this definition, the events previously designated as "abnormal occurrences" are now designated "reportable occurrences." The decision to change the designation to "abnormal occurrence" rests with the Commission.

(d) Also attached is one set of Regulatory Guides (2.1-2.5) that pertain to research reactors that should be used in developing your TS.

(c) Operator Licenses and Requalification Training Program (10 CFR Part 55)

(10 CFR 50.34(b)(7) and (8).

(d) Physical Security Plan (10 CFR 50.34(c))

Your physical security plan will be reviewed in accordance with 10 CFR Part 73. As you are aware, there have been some new regulations issued during the last year on safeguards. My letters dated July 30, 1979 and January 7, 1980 (attached) and Regulatory Guide 5.59 (attached) provide you sufficient guidance to revise your physical security plan. You are requested to submit six (6) copies of your revised physical security plan (PSP) with your renewal application. Your PSP will become part of the license and referenced as such in the renewal license documentation. The following is an example of a license amendment making the PSP part of the license:

> "The licensee shall maintain in effect and fully implement all provisions of the NRC Staff-approved physical security plan, including amendments and changes made pursuant to the authority of 10 CFR 50.54(p). The approved security plan consists of documents withheld from public disclosure pursuant to 10 CFR 2.790, collectively titled, "Veterans Administration Hospital, Omaha, Nebraska, Security Plan," as follows:
>
> Original, submitted with letter dated May 31, 1973
> Revision 1, submitted with letter dated November 26, 1973
> Revision 2, submitted with letter dated January 14, 1974
> Revision 3, submitted with letter dated March 11, 1974"

1950 035

This, of course, is only an example and does not reflect your actual PSP.

Department of Energy and State have instituted a program to implement the Nonproliferation Act of March 10, 1978, by reducing the enrichment of fuels in nonpower reactors. Concomitant to this, the proposed Regulation §73.74 is designed to implement the US/IAEA Agreement when approved by the Senate. Both of these actions are keyed to the enrichment of fuel and other SNM; therefore, your license, which authorizes certain maximum possession limits of SNM (U^{235}, Pu, U^{233}), should be changed to reflect not only the total amount of SNM, but the percent enrichment of each; the amount of SNM exempt and how exempt (i.e., 10 CFR 73.6(b)); and the amount of SNM nonexempt. This will establish the basis for the level of protection of your PSP. You are requested to review the foregoing with respect to your facility and include your proposed SNM requirements in your application. To reduce this type of information in open literature, you are to include these quantities and enrichments in your PSP, which although an appendix to the license is withheld from public disclosure.

B. Standards and Regulatory Guides

For your information, concomitant to the review of items in A above, all documents will include a persual to ensure you have included references and use of applicable ANS/ANSI standards and NRC Regulatory Guides (2.1 - 2.5) for research reactors.

*Note 1. All items from reference 10 CFR articles not listed above are self-explanatory.

2. Above subparagraphs are keyed to 10 CFR paragraphs.

Attachments:
1. NRC Regulatory Guide 2.1 - 2.5
2. Copy Reg. Guide 2.6 - Emergency Planning (Issued for Comment)
3. Draft ANS 15.12
4. Draft Copy ANS 15.16 - Emergency Planning
5. Draft Copy ANS 15.18
6. NRC Guidance for Administrative Controls
7. Reg. Guide 5.59 - Physical Security Plan
8. Muller/Skovholt Memo dtd. 1/28/74
9. Sample EIA
10. Sample TS
11. July 30, 1979 Memo
12. October 19, 1979 Memo
13. January 7, 1980 Memo

1950 036