



REED COLLEGE

REACTOR FACILITY

3203 Southeast

Woodstock Boulevard

Portland, Oregon

97202-8199

telephone

503/777-7222

fax

503/777-7274

email

reactor@reed.edu

web

<http://reactor.reed.edu>

October 21, 2010

ATTN: Document Control Desk
U S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Docket: 50-288

License No: R-112
Subject: RAI TAC NO. ME4086


Attached are the answers to the subject RAI dated September 27, 2010. We have ^{out} revised our proposed amendment to allow us to use fuel we receive ^{as} allowed under our current License and Technical Specifications.

The response and attachments do not contain any security sensitive information.

Please contact us if you have any questions. Thank you.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10-21-10


Stephen G. Frantz
Director, Reed Research Reactor

ADZD
NRR

1. Your proposed changes to license condition 2.B. would restrict special nuclear material (SNM) to low-enriched uranium (LEU) and only allow SNM in the form of TRIGA fuel. Do you possess any SNM of other forms or enrichments such as fission chambers or flux foils? If so, please revise your proposed license condition to specify the amount, enrichment and form of the material.

See revised submittal that includes fission chambers. Note also that we have removed the reference to the 1-Curie PuBe source which was removed from the reactor decades ago.

2. During its review, the U. S. Nuclear Regulatory Commission staff has noted some corrections and updates that need to be made to license condition 2.B. The reference to "Chapter 1" in the license condition should be "Chapter I." The title of "Title 10 of the Code of Federal Regulations (10 CFR) Part 70" has been revised since license condition 2.B. was originally written. The title of 10 CFR Part 70 is now "Domestic Licensing of Special Nuclear Material." The license condition does not contain authority for SNM produced during operation of the reactor which was common for license conditions written during the 1960s. License condition 2.B. should contain authority to receive, possess, use, but not separate, such special nuclear material as may be produced by operation of the reactor. Please address these issues or explain why these revisions to the license condition are not needed.

See revised submittal that includes these changes.

3. The fuel you are to receive from the University of Arizona (UA) contains SNM and byproduct material produced by operation with the fuel in the UA reactor. Please propose changes to your license condition to receive and possess, but not use this material.

See revised submittal that includes these changes.

4. Please discuss the similarities and differences between the UA fuel and the current Reed Research Reactor fuel. Discuss dimensions, uranium content and density, burn up, built-in poisons if any, materials of construction, etc.

The fuel currently at the Reed Research Reactor is shown in Table 1 and compared to the Arizona fuel we are receiving. Note that other than burn up, it is identical to the stainless steel clad fuel we are using.

Table 1: Fuel Elements for Use

	Installed Al Clad	Installed SS Clad	Arizona SS Clad
Uranium content [mass %]	8.55	8.55	8.5
BOL U-235 enrich. [mass %] U]	19.89	19.75	19.75
Fuel alloy outer diameter [mm]	35.82	36.45	36.45
Fuel alloy length [mm]	355.6	381	381
Cladding material	Al	304 SS	304 SS
Cladding thickness [mm]	0.83	0.51	0.51
Cladding outer diameter [mm]	37.47	37.47	37.47
Overall length [mm]	720	734	734
Built in poisons	None	Sm/Mo	Sm/Mo
Average MW-hrs	21.31	12.53	87.41
Maximum MW-hrs	27.47	23.34	174.84
Number	58	10	95

Some of the fuel from Arizona will not be used at Reed. It is listed in Table 2. We will possess but not use the 2898, 4058, and the follower elements, until the US-DOE removes them for ultimate disposal.

Table 2: Fuel Elements for Possession Only

	Total U (g)	U-235 (g)	Comments
2898 D	180.8500	36.1700	Can be disassembled
4058 X	190.0000	38.0000	Damaged
SHIM ROD FF	160.0000	32.0000	Control Rod Follower
REG ROD FF	160.0000	32.0000	Control Rod Follower

5. Your application states that storage of the UA fuel in fuel storage racks will meet the technical specification (TS) requirements for fuel storage. Please provide your basis for reaching this conclusion (please show compliance with TS H.1, and H.2).

This RAI is no longer applicable since the fuel that is allowed in the reactor is already covered under our current License and Technical Specifications. The fuel from Arizona that we will not be using will be stored in the US-DOE supplied transfer baskets in the reactor pool until such time as the US-DOE removes it from the site.

Revised February 17, 1992 to reflect the NRC License Authority File Copy as amended through Amendment No. 5 issued January 16, 1992.

THE REED INSTITUTE (REED COLLEGE)
DOCKET NO. 50-288
FACILITY LICENSE

License No. R-112

The Atomic Energy Commission ("The Commission") having found, with respect to the application for license of The Reed Institute (Reed College) (hereinafter "Reed College" or "the licensee"), that:

- a. The application for license complies with the requirements of the Atomic Energy Act of 1954, as amended (hereinafter "the Act"), and the Commission's regulations set forth in Title 10, Chapter 1, CFR;
- b. The reactor has been constructed in conformity with Construction Permit No. CRRR-101 and will operate in conformity with the application and in conformity with the Act and the rules and regulations of the Commission;
- c. There is reasonable assurance that the reactor can be operated at the designated location without endangering the health and safety of the public;
- d. Reed College is technically and financially qualified to engage in the proposed activities in accordance with the Commission's regulations;
- e. The issuance of this license will not be inimical to the common defense and security or to the health and safety of the public; and
- f. Reed College is a nonprofit educational institution and will operate the reactor for the conduct of educational activities. Reed College is therefore exempt from the financial protection requirements of Section 170 of the Act.

Facility License No. R-112 effective as of the date of issuance, is issued as follows:

1. This license applies to the TRIGA Mark I type nuclear reactor (herein "the reactor"), owned by Reed College and located on its campus in Portland, Oregon, and which is described in the application for license dated April 15, 1967, and supplements thereto dated July 5 and August 22, 1967, and March 13 and April 26, 1968 (herein referred to as "the application"), and authorized for construction by Construction Permit No. CRRR-101.

2. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses Reed College:

- A. Pursuant to Section 104 c of the Act and Title 10, Chapter 1, CFR, Part 50, "Licensing of Production and Utilization Facilities", to possess, use and operate the reactor as a utilization facility in accordance with the procedures and limitations described in the application and in this license;
- B. Pursuant to the Act and Title 10, Chapter I, CFR 50, Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess and use up to 7000 grams of contained uranium-235 in the form of TRIGA[®] fuel, and to possess, but not to separate, such special nuclear material and byproduct material as may be produced by operation of the reactor: and
- C. Pursuant to the Act and Title 10, Chapter I, CFR, Part 30, "Rules of General Applicability to Licensing of Byproduct material", to receive, possess and use a 1.64-curie sealed americium-beryllium neutron startup source for the operation of the reactor: and
- D. Pursuant to the Act and Title 10, Chapter I, CFR 50, Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess and use up to 11 grams of contained highly enriched uranium-235 in the form of fission chambers; and
- E. Pursuant to the Act and Title 10, Chapter I, CFR 50, Part 70, "Domestic Licensing of Special Nuclear Material," to receive and possess but not to use up to 300 grams of contained uranium-235 in the form of TRIGA[®] fuel from the University of Arizona reactor, and to possess, but not to separate, such special nuclear material and byproduct material that may be contained in the fuel.

3. The license shall be deemed to contain and be subject to the conditions specified in Part 20, Section 30.34 of Part 30, Sections 50.54 and 50.59 of part 50, and Section 70.32 of Part 70 of the Commission's regulations; is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

The licensee may operate the reactor at steady-state power levels up to a maximum of 250 kilowatts (thermal).

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Change No. 4, are hereby incorporated in this license. The licensee shall operate the reactor in accordance with these Technical Specifications. No changes shall be made in the Technical Specifications unless authorized by the Commission as provided in Section 50.59 of 10 CFR Part 50.

C. Records

(This entire section deleted as per amendment of 10-3-72. See Section K of the Technical Specifications.)

D. Reports

In addition to reports otherwise required by applicable regulations:

- (1) The licensee shall inform the Commission of any incident or condition relating to the operation of the reactor which prevented or could have prevented a nuclear system from performing its safety function as described in the Technical specification or in the safety analysis report. For each such occurrence, Reed College shall promptly notify by telephone or telegraph the Director of the appropriate Atomic Energy Commission Regional Compliance Office listed in Appendix D of 10 CFR Part 20 and shall submit within ten (10) days a report in writing to the Director, Division of Reactor Licensing (hereinafter, "Director, DRL"), with a copy to the Regional Compliance Office.
- (2) As promptly as practicable, but no later than sixty (60) days after the initial criticality of the facility, Reed College shall submit a written report to the Director, DRL, describing the measured values of the operating conditions or characteristics listed below and evaluating any significant variation of a measured value from the corresponding predicted value:
 - (a) Maximum excess reactivity of the facility, not including the worth of control rods or other control devices such as burnable poison strips or soluble poison, or any experiments;
 - (b) Total control rod reactivity worth;
 - (c) Minimum shutdown margin both at room and operating temperatures;
 - (d) Maximum worth of the single control rod of highest reactivity value; and

- (e) Maximum total and individual reactivity worth of any fixed or movable experiments inserted in the facility.
- (3) The licensee shall report to the Director, DRL, in writing within thirty (30) days of its occurrence any substantial variance disclosed by operation of the reactor from performance specifications contained in the safety analysis report or in the Technical Specifications.
- (4) The licensee shall report to the Director, DRL, in writing within thirty (30) days of its occurrence, any significant change in the transient or accident analysis, as described in the safety analysis report.

E. Physical Security Plan

The licensee shall maintain and fully implement all provisions of the Commission-approved physical security plan, including amendments and changes made pursuant to the authority of 10 CFR 50.54(p). The approved physical security plan entitled "Physical Security Plan for Reed College Reactor Facility" dated June 1983, submitted by letter dated November 10, 1983, as supplemented by letter dated February 22, 1984, consists of documents withheld from public disclosure pursuant to 10 CFR 2.790(d).

- F. Until completion of the Recovery Plan in response to the Commission's Confirmatory Action Letter of November 25, 1991, the time periodicity requirements for Technical Specifications surveillances E.3, F.2, F.9, and F.10 will be waived. However, these surveillance requirements must be completed prior to return to routine reactor operations.
4. This license is effective as of the date of issuance and shall expire at midnight, October 3, 2007.

FOR THE ATOMIC ENERGY COMMISSION

Donald J. Skovholt
Assistant Director for Reactor Operations
Division of Reactor Licensing

Date of issuance: July 2, 1968