

July 27, 2004

Dr. Sheldon Landsberger, Director
Nuclear Engineering Teaching Laboratory
J. J. Pickle Research Campus, Building 159
The University of Texas at Austin
Austin, TX 78712

**SUBJECT: UNIVERSITY OF TEXAS AT AUSTIN — AMENDMENT RE: SPECIAL
NUCLEAR MATERIAL AND BYPRODUCT MATERIAL POSSESSION LIMITS
(TAC NO. MC2410)**

Dear Dr. Landsberger:

The U.S. Nuclear Regulatory Commission (NRC or Commission) has issued the enclosed Amendment No. 6 to Facility Operating License No. R-129 for the TRIGA research reactor operated by the University of Texas at Austin. This amendment modifies the facility operating license in response to your application of March 22, 2004, as supplemented on June 16 and July 1, 2004.

The amendment increases and modifies the limits for possession of special nuclear material and byproduct material.

A copy of the safety evaluation supporting Amendment No. 6 is also enclosed.

Sincerely,

/RA/

Alexander Adams, Jr., Senior 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. 50-602

Enclosures: 1. Amendment No. 6
2. Safety Evaluation

cc w/enclosures:
See next page

University of Texas

Docket No. 50-602

cc:

Governor's Budget and
Planning Office
P.O. Box 13561
Austin, TX 78711

Bureau of Radiation Control
State of Texas
1100 West 49th Street
Austin, TX 78756

Mr. Roger Mulder
Office of the Governor
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Austin, TX 78711

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

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 6 TO

FACILITY OPERATING LICENSE NO. R-129

THE UNIVERSITY OF TEXAS AT AUSTIN

DOCKET NO. 50-602

1.0 INTRODUCTION

By letter dated March 22, 2004, as supplemented on June 16 and July 1, 2004, the University of Texas at Austin (UT or the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) amend Facility Operating License No. R-129 for the TRIGA Research Reactor. The requested changes would increase and modify the special nuclear material and byproduct material possession limits established by the facility operating license.

2.0 BACKGROUND

The UT is authorized to operate the TRIGA Research Reactor at steady-state power levels not in excess of 1.1 MW(t). The licensee is also authorized to operate the reactor in pulse mode. The reactor is located in the Nuclear Engineering Teaching Laboratory (NETL) on UT's J.J. Pickle Research Campus in suburban Austin, Texas. The licensee has requested increases in the special nuclear material and byproduct material license limits.

The licensee has requested an increase in the license limit for TRIGA reactor fuel. The reason for the request is to allow the licensee to acquire a replacement instrumented fuel element and additional regular fuel elements to compensate for fuel burnup. The fuel used in the UT reactor is owned by the Department of Energy (DOE). Spent fuel is returned to DOE as needed to maintain the fuel inventory at a low level. However, this additional fuel will arrive at the facility before the DOE can remove spent fuel from the NETL, requiring an increase in the license limit.

The licensee has also requested increases in the possession limits of special nuclear material in the form of foils and reference materials. These additional foils and reference materials are needed for expanding research programs.

DOE is planning to provide UT with TRIGA fuel that has been used at other research reactors. This fuel was lightly utilized and has significant life remaining. However, this fuel does contain some special nuclear material and byproduct material that was produced during irradiation at the other research reactors. To accommodate this material, the UT license conditions for special nuclear material and byproduct material need to be modified to include the material.

The licensee has requested authority to possess byproduct material received from other licensees if the material is irradiated in the reactor within 31 days of receipt. The time

2. Accordingly, Facility Operating License No. R-129 is hereby amended, as follows:

a. Paragraph 2.B.(2) of the license shall be amended to read as follows:

(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," in connection with operation of the facility:

(a) to receive, possess and use:

- (i) up to [REDACTED] of contained uranium-235 enriched to less than 20 percent in the isotope uranium-235 in the form of TRIGA reactor fuel;
- (ii) up to [REDACTED] of contained uranium-235 of any enrichment in the form of fission chambers;
- (iii) up to [REDACTED] of uranium-233, [REDACTED] of contained uranium-235 of any enrichment, [REDACTED] of plutonium-240, [REDACTED] of plutonium-239, and [REDACTED] of plutonium-241 in the form of foils;
- (iv) [REDACTED] of plutonium-239, and [REDACTED] of contained uranium-235 of any enrichment in the form of reference materials;
- (v) [REDACTED] of plutonium as mixed oxide pellets contained in stainless steel pins for experimental purposes;

(b) to receive, possess, and use, but not separate, any amount of special nuclear material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities, and

(c) to possess, use, but not separate, such special nuclear material as may be produced by the operation of the facility.

b. Paragraph 2.B.(3) of the license shall be amended to read as follows:

(3) Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," in connection with operation of the facility:

(a) to receive, possess and use:

- (i) a [REDACTED] sealed polonium-beryllium neutron source;
- (ii) a [REDACTED] sealed americium-beryllium neutron source;
- (iii) [REDACTED] of californium-252 encapsulated in stainless steel;
- (iv) [REDACTED] of cobalt-60 in the form of sealed stainless steel pins;

- (v) ████████ of cobalt-60 in the form of sealed sources;
- (vi) up to ████████ of byproduct material, atomic number 3-83, in the form of reactor components transferred from Facility Operating License No. R-92;
- (vii) byproduct material which is to be irradiated in the reactor within 31 days of receipt;

- (b) to receive, possess, and use, but not separate, any amount of byproduct material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities;
- (c) to possess and use any byproduct material produced by operation of the reactor except for byproduct material in TRIGA fuel elements; and
- (d) to possess and use, but not separate, such byproduct material in TRIGA fuel elements as may be produced by operation of the facility.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Patrick M. Madden, Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Date of Issuance: July 27, 2004

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 6 TO

FACILITY OPERATING LICENSE NO. R-129

THE UNIVERSITY OF TEXAS AT AUSTIN

DOCKET NO. 50-602

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The licensee has requested an increase in the license limit for TRIGA reactor fuel. The reason for the request is to allow the licensee to acquire a replacement instrumented fuel element and additional regular fuel elements to compensate for fuel burnup. The fuel used in the UT reactor is owned by the Department of Energy (DOE). Spent fuel is returned to DOE as needed to maintain the fuel inventory at a low level. However, this additional fuel will arrive at the facility before the DOE can remove spent fuel from the NETL, requiring an increase in the license limit.

The licensee has also requested increases in the possession limits of special nuclear material in the form of foils and reference materials. These additional foils and reference materials are needed for expanding research programs.

DOE is planning to provide UT with TRIGA fuel that has been used at other research reactors. This fuel was lightly utilized and has significant life remaining. However, this fuel does contain some special nuclear material and byproduct material that was produced during irradiation at the other research reactors. To accommodate this material, the UT license conditions for special nuclear material and byproduct material need to be modified to include the material.

The licensee has requested authority to possess byproduct material received from other licensees if the material is irradiated in the reactor within 31 days of receipt. The time

restriction is to ensure that material possessed on the reactor license is utilized in the reactor program.

2.0 EVALUATION

Paragraph 2.B.(2) of the UT license concerning receipt, possession and use of special nuclear material currently reads as follows:

- (2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess, and use up to [REDACTED] of contained uranium-235 enriched to less than 20 percent in the isotope uranium-235 in the form of reactor fuel; [REDACTED] of contained uranium-235 of any enrichment in the form of fission chambers; up to [REDACTED] of uranium-233, [REDACTED] of contained uranium-235 of any enrichment, [REDACTED] of plutonium-240, [REDACTED] of plutonium-239, and [REDACTED] of plutonium-241 in the form of foils; [REDACTED] of plutonium-239, and [REDACTED] of contained uranium-235 of any enrichment in the form of reference materials; and [REDACTED] of plutonium as mixed oxide pellets contained in stainless steel pins for experimental purposes; and to possess, but not separate, such special nuclear material as may be produced by the operation of the facility.

The licensee has requested that the license condition be amended to read as follows:

- (2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," in connection with operation of the facility:
 - (a) to receive, possess and use:
 - (i) up to [REDACTED] of contained uranium-235 enriched to less than 20 percent in the isotope uranium-235 in the form of TRIGA reactor fuel;
 - (ii) up to [REDACTED] of contained uranium-235 of any enrichment in the form of fission chambers;
 - (iii) up to [REDACTED] of uranium-233, [REDACTED] of contained uranium-235 of any enrichment, [REDACTED] of plutonium-240, [REDACTED] of plutonium-239, and [REDACTED] of plutonium-241 in the form of foils;
 - (iv) [REDACTED] of plutonium-239, and [REDACTED] of contained uranium-235 of any enrichment in the form of reference materials;
 - (v) [REDACTED] of plutonium as mixed oxide pellets contained in stainless steel pins for experimental purposes;
 - (b) to receive, possess, and use, but not separate, any amount of special nuclear material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities, and

- (c) to possess, use, but not separate, such special nuclear material as may be produced by the operation of the facility.

Paragraph 2.B.(3) of the UT license concerning the receipt, possession, and use of byproduct material currently reads as follows:

- (3) Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," to receive, possess and use a [REDACTED] sealed polonium-beryllium neutron source and a [REDACTED] sealed americium-beryllium neutron source in connection with operation of the facility; [REDACTED] of californium-252 encapsulated in stainless steel in connection with operation of the facility; [REDACTED] of cobalt-60 in the form of sealed stainless steel pins, [REDACTED] of cobalt-60 in the form of sealed sources in connection with operation of the facility; up to [REDACTED] of byproduct material, atomic number 3-83, in the form of reactor components transferred from Facility Operating License No. R-92; and to possess, use, but not separate except for byproduct material produced in reactor experiments, any amount of byproduct material in the form of reactor fuel transferred from Facility Operating License No. R-92 and, such byproduct material as may be produced by operation of the facility.

The licensee has requested that this license condition be amended to read as follows:

- (3) Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," in connection with operation of the facility:
 - (a) to receive, possess, and use:
 - (i) a [REDACTED] sealed polonium-beryllium neutron source;
 - (ii) a [REDACTED] sealed americium-beryllium neutron source;
 - (iii) [REDACTED] of californium-252 encapsulated in stainless steel;
 - (iv) [REDACTED] of cobalt-60 in the form of sealed stainless steel pins;
 - (v) [REDACTED] of cobalt-60 in the form of sealed sources;
 - (vi) up to [REDACTED] of byproduct material, atomic number 3-83, in the form of reactor components transferred from Facility Operating License No. R-92;
 - (vii) byproduct material which is to be irradiated in the reactor within 31 days of receipt;
 - (b) to receive, possess, and use, but not separate, any amount of byproduct material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities;

- (c) to possess and use any byproduct material produced by operation of the reactor except for byproduct material in TRIGA fuel elements; and
- (d) to possess and use, but not separate, such byproduct material in TRIGA fuel elements as may be produced by operation of the facility.

The licensee has requested that the license limit for the receipt, possession, and use of contained uranium-235 enriched to less than 20 percent in the isotope uranium-235 in the form of TRIGA reactor fuel be increased from [REDACTED] to [REDACTED]. The increase in the possession limit permits continued reactor operation by allowing the licensee to acquire additional reactor fuel to compensate for uranium burnup. The increase in the possession limit is also requested to allow the licensee to acquire a replacement instrumented fuel element. The instrumented fuel element contains thermocouples imbedded in the fuel, allowing direct measurement of the fuel temperature, the process variable on which the safety limit is placed. The thermocouples in the instrumented fuel elements occasionally fail and the fuel elements must then be replaced, so it is desirable to have spare instrumented fuel elements on hand.

The increase in the license limit for reactor fuel is also based on the timing of removal of spent reactor fuel from the UT facility. The licensee has spent fuel on site to be returned to the fuel's owner, the DOE. The licensee will receive additional fuel before DOE can remove spent fuel from the site. The increase in the license limit will allow the spent fuel and replacement fuel to be on site until the DOE removes the spent fuel from the site.

The DOE is considering providing the licensee with low-burnup fuel from facilities that are decommissioning. This will allow DOE to efficiently use its resources. The result of this decision is that low-burnup fuel provided by DOE will contain fission products in the form of byproduct material and special nuclear material produced by the reactor where the fuel was formerly used. From a licensing standpoint, this is similar to the fuel transfer that occurred at UT prior to reactor startup. Fuel from the licensee's former reactor (Facility License R-92) was transferred to the current facility. The license has conditions to allow the receipt, possession, and use of the R-92 fuel.

The licensee has proposed byproduct and special nuclear material license conditions to allow the receipt, possession, and use of this low-burnup fuel. A license condition has been proposed "to receive, possess, and use, but not separate, any amount of special nuclear material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities," to license condition 2.B(2) and "to receive, possess, and use, but not separate, any amount of byproduct material produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities" to license condition 2.B.(3).

The licensee has also requested increases in special nuclear material possession limits for foils used in connection with operation of the reactor in license condition 2.B(2). The licensee has requested an increase in possession limits to 1 gram each for uranium-233, contained uranium-235 of any enrichment, and plutonium-239, -240, and -241 in the form of foils. These foils are used to measure reactor operating characteristics in experiments. The increases in possession limits are to support expanding radiochemistry and actinide chemistry programs.

The licensee has requested changes to license condition 2.B(3) concerning byproduct material. The requested changes would allow receipt, possession, and use of byproduct material produced in other reactors that is to be irradiated in the licensee's reactor. The licensee

currently has a specific license condition that allowed byproduct material to be transferred from the licensee's old reactor facility to the current facility.

This issue of how to license byproduct material produced at other facilities was considered and was addressed by the NRC staff in the late 1980s (August 18, 1988, memorandum from Dennis M Crutchfield, Director, Division of Reactor Projects - III, IV, V and Special Projects to Regional Directors of Radiation Safety and Safeguards). The question was how to license byproduct material that was to be irradiated in a licensee's reactor. The staff's concern was the reactor license would become a substitute for a general byproduct material license by allowing the receipt and possession of byproduct material not related to a licensee's reactor operations or research. The NRC staff addressed this issue by allowing licensees to add a license condition allowing receipt, possession, and use of any byproduct material as long as the byproduct material was irradiated in the reactor within 31 days of receipt under the reactor license. The licensee's proposed license condition is consistent with this guidance.

The NRC staff noted that license conditions presented in paragraph form have become increasingly difficult to read as the paragraphs have grown longer. In a request for additional information (RAI) the NRC staff asked the licensee to consider reformatting the license conditions in list format and provided an example of the licensee's proposed license conditions in list format. The licensee agreed to the reformatting and approved the NRC's example. However, the licensee's answers to additional questions asked by NRC were given in paragraph form [with a statement in a reply from the licensee to a RAI question to "incorporate the proposed changes as detailed in the previous items in the proposed format."] On June 24, 2004, the NRC project manager talked with S. O'Kelly, NETL Associate Director, about the licensee's proposed changes and how they would be put into the list format. The format shown above was agreed to. This discussion was followed up by another RAI to the licensee to confirm the NRC's understanding of the reformatted license conditions.

The licensee has not requested any changes to the reactor's technical specifications, security plan, or emergency plan; this indicates that the additional material can be received, possessed, and used under the current terms of the reactor license. The licensing of the additional material will not require additional procedural controls, and safety will be maintained by the existing radioactive material control procedures. The increase in the special nuclear material possession limit does not impact the security requirements for the facility. The licensing of additional material does not change the accident analysis for the facility. The NRC inspection program has found that the licensee has routinely and safely used material similar to that requested.

The security plan at UT is for material of low strategic significance (based on the amount and radiological condition of special nuclear material the licensee possesses). The staff asked the licensee how UT would ensure that they continue to meet possession limits for special nuclear material of low strategic significance. The licensee stated that it is aware of the requirements of the regulations in 10 CFR 73.67 and will inventory and control the amount for special nuclear material on site to maintain the level within the constraints for special nuclear material of low strategic significance. The licensee will request a change in the physical security plan if the facility inventory approaches levels of moderate strategic significance.

The staff has determined that the licensee has demonstrated a need for the requested material under the reactor license. The addition of a license condition for byproduct material to be irradiated in the reactor within 31 days of receipt is in accordance with the NRC staff's guidance

in this area and is therefore acceptable to the staff. The reformatting of the license conditions improves the clarity of the license conditions and is therefore acceptable to the staff. Because the requested materials will be under the terms of the existing license conditions (technical specifications, security and emergency plans, and facility procedures) and, based on experience, can be safely received, possessed, and used by the licensee, the changes in the special nuclear material and byproduct material license limits are acceptable to the staff.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes in inspection and surveillance requirements. The staff has determined that this amendment involves no significant hazards consideration, no significant increase in the amounts, and no significant change in the types, of any effluents that may be released off site, and no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The staff has concluded, on the basis of the considerations discussed above, that (1) the amendment does not involve a significant hazards consideration because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, create the possibility of a new kind of accident or a different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities; and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

Principal Contributor: A. Adams, Jr.

Date: July 27, 2004