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August 18, 2014

Mr. William Schuster
U. S. Nuclear Regulatory Commission
Research and Test Reactors Branch A
Office of Nuclear Reactor Regulation
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Reference: Oregon State University TRIGA Reactor (OSTR)
Docket No. 50-243, License No. R-106

Subject: License Amendment for Fueled Experiments

Mr. Schuster:

This letter serves as a request for a license amendment for the purpose of modifying an existing technical specification (TS) to encompass fueled experiments. The proposed modified TS would allow irradiation of small quantities of fissile material, regardless of location. This is different and independent of the request made in 2012 for a fueled experiment for the purpose of demonstrating the production of ^{99}Mo in a small reactor.

The current section of the TS reads as follows:

3.8.3 Failures and Malfunctions

Applicability. This specification applies to experiments installed in the reactor and its irradiation facilities.

Objective. The objective is to prevent damage to the reactor or excessive release of radioactive materials in the event of an experimental failure.

Specifications. Where the possibility exists that the failure of an experiment under normal operating conditions of the experiment or reactor, credible accident conditions in the reactor, or possible accident conditions in the experiment could release radioactive gases or aerosols to the reactor bay or the unrestricted area, the quantity and type of material in the experiment shall be limited such that the airborne radioactivity in the reactor bay or the unrestricted area will not result in exceeding the applicable dose limits in 10 CFR 20, assuming that:

a. 100% of the gases or aerosols escape from the experiment;

b. If the effluent from an irradiation facility exhausts through a holdup tank which closes automatically on high radiation level, at least 10% of the gaseous activity or aerosols produced will escape;

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c. If the effluent from an irradiation facility exhausts through a filter installation designed for greater than 99% efficiency for 0.3 micron particles, at least 10% of these aerosols can escape; and

d. For materials whose boiling point is above 130°F and where vapors formed by boiling this material can escape only through an undisturbed column of water above the core, 10% of these vapors can escape.

Basis: This specification is intended to meet the purpose of 10 CFR 20 by reducing the likelihood that released airborne radioactivity to the reactor bay or unrestricted area surrounding the OSTR will result in exceeding the total dose limits to an individual as specified in 10 CFR 20.

We propose to add one additional specification, specification 3.8.3.b (shown in italics for emphisis below). The other four specificaitons would be renumberated but not changed. The new TS would read as follows:

3.8.3 Failures and Malfunctions

Applicability. This specification applies to experiments installed in the reactor and its irradiation facilities.

Objective. The objective is to prevent damage to the reactor or excessive release of radioactive materials in the event of an experimental failure.

Specifications. Where the possibility exists that the failure of an experiment under normal operating conditions of the experiment or reactor, credible accident conditions in the reactor, or possible accident conditions in the experiment could release radioactive gases or aerosols to the reactor bay or the unrestricted area, the quantity and type of material in the experiment shall be limited such that the airborne radioactivity in the reactor bay or the unrestricted area will not result in exceeding the applicable dose limits in 10 CFR 20, assuming that:

a. 100% of the gases or aerosols escape from the experiment;

b. *Each experiment containing fissile material shall be controlled such that the total inventory of I-131 escaping from the experiment shall not exceed 0.0141 curies;*

c. If the effluent from an irradiation facility exhausts through a holdup tank which closes automatically on high radiation level, at least 10% of the gaseous activity or aerosols produced will escape;

d. If the effluent from an irradiation facility exhausts through a filter installation designed for greater than 99% efficiency for 0.3 micron particles, at least 10% of these aerosols can escape; and

e. For materials whose boiling point is above 130°F and where vapors formed by boiling this material can escape only through an undisturbed column of water above the core, 10% of these vapors can escape.

Basis: This specification is intended to meet the purpose of 10 CFR 20 by reducing the likelihood that released airborne radioactivity to the reactor bay or unrestricted area surrounding the OSTR will result in exceeding the total dose limits to an individual as specified in 10 CFR 20. The limit on fissile material is based on the amount of I-131 estimated to be made available to the reactor bay air during the Maximum Hypothetical Accident found in the Safety Analysis Report.

In summary, the Maximum Hypothetical Accident (MHA) described in the OSTR Safety Analysis Report (SAR) estimated doses from a gap release from the highest power fuel element after an infinite irradiation with no primary water present. The saturated I-131 activity instantaneously available for release into the reactor bay air was estimated to be 0.0141 Ci. That calculation also included other halogens and noble gases and showed that in all the fuel failure accidents analyzed, doses to the general public and occupational workers were all well below the annual dose limits found in 10 CFR 20. We propose to use the airborne I-131 activity calculated for the MHA as a surrogate for an equivalent limit on fueled experiments. Therefore, using the same methodology as the MHA, the consequences of any experiment containing fissile material would be limited to that estimated by the MHA which has been shown to be protective of the public and occupational health and safety.

As outlined in Technical Specification 6.5 of our license, our process for approving an experiment involves submission of a proposed experiment to the reactor staff. After the staff reviews it, the proposed experiment is forwarded to the Reactor Operations Committee (ROC) for review. A significant factor in these reviews will be determining the release fraction assigned to a particular fissile material form. This is an important parameter of the methodology used in the SAR as it, along with the estimated fission rate, establishes the source term used in the accident calculation. The reactor staff and the ROC will use the best available data for the given fissile material form. Where data does not exist, best practices and engineering judgment will be used to determine an appropriately conservative release fraction.

I hereby affirm, state, and declare under penalty of perjury that the foregoing is true and correct.

Executed on: 8/18/14.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Steve Reese
Director

cc: Document Control, USNRC
Dr. Ron Adams, OSU
Dr. Rich Holdren, OSU
Dr. Andy Klein, OSU