March 8, 2017

Dr. Steven R. Reese, Director
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Corvallis, OR 97331-5903

SUBJECT: OREGON STATE UNIVERSITY – ISSUANCE OF AMENDMENT NO. 24 TO RENEWED FACILITY OPERATING LICENSE NO. R-106 TO ALLOW IRRADIATION OF EXPERIMENTS CONTAINING FISSILE MATERIAL

Dear Dr. Reese:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 24 to Renewed Facility Operating License No. R-106 for the Oregon State University TRIGA® Reactor (OSTR). This amendment consists of changes to the facility operating license and technical specifications (TSs) in response to your application dated August 18, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14233A412), as revised and supplemented by letter dated August 3, 2016 (ADAMS Accession No. ML16222A699), and emails dated December 13, 2016 (ADAMS Accession No. ML16350A094), and February 1, 2017 (ADAMS Accession No. ML17038A168). This amendment revises OSTR TSs, Section 3, "Limiting Conditions of Operation," by allowing irradiation of small quantities of fissile material and making minor editorial corrections.

A copy of our safety evaluation is also enclosed. If you have any questions, please contact me at (301) 415-2856, or by electronic mail at Michael.Balazik@nrc.gov.

Sincerely,

/RA/

Michael F. Balazik, Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-243

Enclosures:
1. Amendment No. 24 to Renewed Facility Operating License No. R-106
2. Safety Evaluation

cc: See next page

cc:

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SUBJECT: OREGON STATE UNIVERSITY – ISSUANCE OF AMENDMENT NO. 24 TO RENEWED FACILITY OPERATING LICENSE NO. R-106 TO ALLOW IRRADIATION OF EXPERIMENTS CONTAINING FISSILE MATERIAL DATED: March 8, 2017

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OREGON STATE UNIVERSITY

DOCKET NO. 50-243

OREGON STATE TRIGA REACTOR

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 24
Renewed License No. R-106

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for an amendment to Renewed Facility Operating License No. R-106 filed by Oregon State University (the licensee) on August 18, 2014, as supplemented on August 3, 2016, December 13, 2016, and February 1, 2017, conforms to the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance that (i) the activities authorized by this amendment can be conducted without endangering the health and safety of the public and (ii) such activities will be conducted in compliance with the regulations of the Commission set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;

   E. This amendment is issued in accordance with the regulations of the Commission as stated in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and all applicable requirements have been satisfied; and

   F. Prior notice of this amendment was not required by 10 CFR 2.105, "Notice of proposed action," and publication of a notice for this amendment is not required by 10 CFR 2.106, "Notice of issuance."

2. Accordingly, paragraphs 1.G and 1.H on page 2 of License No. R-106 is hereby deleted. Paragraphs 1.G and 1.H on Page 2 were duplicative and currently remain on page 1 of License No. R-106.

3. Accordingly, paragraphs 2.B.(2)d. and 2.B.(2)e. of License No. R-106 are hereby amended to read as follows:

   d. to receive, possess, use, but not separate, in connection with operation of the facility, such special nuclear material as may be produced by operation of the facility;

   e. to possess, but not use, up to 12.83 kilograms of contained uranium-235 at equal to or greater than 20 percent enrichment in the form of TRIGA fuel until the existing inventory of this fuel is removed from the facility; and

4. Accordingly, paragraph 2.C.(2) of License No. R-106 is hereby amended to read as follows:

   (1) Maximum Power Level

   The licensee is authorized to operate the facility at steady-state power levels not in excess of 1.1 megawatts (thermal), and in the pulse mode, with reactivity insertions not resulting in fuel temperature in excess of 830 degrees Celsius.

5. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C.(2) of License No. R-106 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 24, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

6. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Alexander Adams, Jr., Chief
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating License
and Technical Specifications

Date of Issuance: March 8, 2017

ATTACHMENT TO LICENSE AMENDMENT NO. 24

RENEWED FACILITY OPERATING LICENSE NO. R-106

DOCKET NO. 50-243

Replace the following pages of Renewed Facility Operating License No. R-106 with the revised pages. The revised pages are identified by amendment number and contains marginal lines indicating the area of change.

Renewed Facility Operating License No. R-106

REMOVE	INSERT
Page 2	Page 2
Page 2a	Page 3
Page 3	

Attachment

I. The receipt, possession and use of the byproduct and special nuclear materials as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30 and 70.

2. Renewed Facility License No. R-106 is hereby amended in its entirety to read as follows:

A. The license applies to the TRIGA nuclear research reactor (hereafter, the facility) owned by the Oregon State University. The facility is located in Corvallis, Oregon, and is described in the licensee's application for renewal of the license dated October 5, 2004, as supplemented.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Oregon State University:

(1) Pursuant to Section 104c of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, use, and operate the facility as a utilization facility at the designated location in Corvallis, Benton County, Oregon in accordance with the procedures and limitations described in the application and set forth in this license;

(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material,"

a. to receive, possess and use, in connection with operation of the facility, up to 16.30 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA reactor fuel;

b. to receive, possess and use, in connection with operation of the facility, up to 100 grams of contained uranium-235 of any enrichment in the form of fission chambers and flux foils;

c. to receive, possess, but not use, up to 656 grams of uranium-235 enriched to less than 20 percent in the form of the core from the AGN-201 reactor;

d. to receive, possess, use, but not separate, in connection with operation of the facility, such special nuclear material as may be produced by operation of the facility;

e. to possess, but not use, up to 12.83 kilograms of contained uranium-235 at equal to or greater than 20 percent enrichment in the form of TRIGA fuel until the existing inventory of this fuel is removed from the facility; and

f. to receive, possess, and use, but not separate, in connection with operation of the facility, up to 0.5 kilograms of contained uranium-235 enriched to less than 20 percent in the form of molybdenum-99 production targets.

(3) Pursuant to the Act and 10 CFR Part 30 to receive, possess and use in connection with operation of the facility the following:

a. up to a 7-curie sealed polonium-210 beryllium source which may be used for reactor startup;

b. up to a 3-curie sealed americium-241 beryllium neutron source which may be used for reactor startup;

c. such byproduct material as may be produced by the operation of the facility. Byproduct material cannot be separated except for byproduct material produced in experiments.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Parts 20, 30, 50, 51, 55, 70, and 73; is subject to all applicable provisions of the Act, and to the rules, regulations and orders of the Commission now, or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady-state power levels not in excess of 1.1 megawatts (thermal), and in the pulse mode, with reactivity insertions not resulting in fuel temperature in excess of 830 degrees Celsius.

(2) Technical Specifications

The technical specifications contained in Appendix A, as revised through Amendment No. 24, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the technical specifications.

(3) Physical Security Plan

The licensee shall maintain and fully implement all provisions of the NRC-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 to10 CFR 73.21, entitled “Oregon State University TRIGA Reactor Physical Security Plan,” as revised.

ATTACHMENT TO LICENSE AMENDMENT NO. 24

RENEWED FACILITY OPERATING LICENSE NO. R-106

DOCKET NO. 50-243

Replace the following pages of Appendix A, “Technical Specifications,” with the revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Technical Specifications

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Objective. The objective is to assure that the ventilation system shall be in operation to mitigate the consequences of possible releases of radioactive materials resulting from reactor operation.

Specifications.

a. The reactor shall not be operated unless the facility ventilation system is operating and the reactor bay pressure is maintained negative with respect to surrounding areas, except for periods of time not to exceed two (2) hours to permit repair, maintenance, or testing of the ventilation system.

b. The ventilation system shall be shut down upon a high activity alarm from the Exhaust Particulate Radiation Monitor.

c. Experiments with significant potential for airborne radioactivity release shall not be transferred from an irradiation facility unless the facility ventilation system is operating and the reactor bay pressure is maintained negative with respect to surrounding areas.

Basis. During normal operation of the ventilation system, the annual average ground concentration of ^{41}Ar in unrestricted areas is well below the applicable effluent concentration limit in 10 CFR 20. In addition, the worst-case maximum total effective dose equivalent is well below the applicable annual limit for individual members of the public. This has been shown to be true for scenarios where the ventilation system continues to operate during the maximum hypothetical accident (MHA), where the ventilation system is secured during the MHA, and where the ventilation system and the confinement building are not present during the MHA (SAR 13.2.1). Therefore, operation of the reactor for short periods while the ventilation system is shut down for repair or testing does not compromise the control over the release of radioactive material to the unrestricted area, nor should it cause occupational doses that exceed those limits given in 10 CFR 20 (SAR 11.1.1.1.2). The two hour exception to permit repair, maintenance, or testing should not diminish the effectiveness of the reactor top area radiation monitor or the continuous air particulate radiation monitor. The sampling locations for both of these monitors are located directly above the core. Any fission product release should be detected in the same manner regardless of the status of the ventilation system because of the close proximity of the sampling point to the source term. Moreover, radiation monitors in the building, independent of the ventilation system, will give warning of high levels of radiation that might occur during operation of the reactor while the ventilation system is secured (SAR 11.1.4.2). The exhaust gas and particulate radiation monitors will be affected by the status of the ventilation system as they are designed to monitor the ventilation exhaust directly and are not in close proximity to the source term (i.e., reactor core). However, control of the release into the unrestricted area will be minimally compromised because the ventilation will be by definition off and the leak rate is negligible compared to the ventilation rate.

Furthermore, this situation is bounded by the MHA scenario A (i.e., without the reactor building) and C (i.e., ventilation off) in the SAR (SAR 13.2.1.1). Significant potential for airborne radioactivity is the radioactivity that when released into the reactor bay results in the calculated occupational or general public dose equivalent or committed dose equivalent greater than half that of the corresponding calculated value for the maximum hypothetical accident as described in the Safety Analysis Report (as amended).

3.6 This section intentionally left blank.

3.7 Radiation Monitoring Systems and Effluents

3.7.1 Radiation Monitoring Systems

Applicability. This specification applies to the radiation monitoring information which must be available to the reactor operator during reactor operation.

Objective. The objective is to specify the minimum radiation monitoring channels that shall be available to the operator to assure safe operation of the reactor.

Specifications. The reactor shall not be operated nor shall experiments with significant potential for airborne radioactivity be transferred from an irradiation facility unless the minimum number of radiation monitoring channels listed in Table 4 are operating.

Table 4 - Minimum Radiation Monitoring Channels

Radiation Monitoring Channels	Number
Reactor Top Area Radiation Monitor	1
Continuous Air Particulate Radiation Monitor	1
Exhaust Gas Radiation Monitor	1
Exhaust Particulate Radiation Monitor	1

Exception: When a single required radiation monitoring channel becomes inoperable, operations may continue only if portable instruments, surveys, or analyses may be substituted for the normally installed monitor within one (1) hour of discovery for periods not to exceed one (1) month.

Basis. The radiation monitors provide information to operating personnel regarding routine releases of radioactivity and any impending or existing danger from radiation. Their operation will provide sufficient time to evacuate the facility or take the necessary steps to prevent the spread of radioactivity to the surroundings. Furthermore, calculations show that for both routine operations and under the three accident scenarios

identified in SAR 13.2.1.1, predicted occupational and general public doses are below the applicable annual limits specified in 10 CFR 20 (SAR 11.1.1.1 and SAR 13.2.1). That being the case, we have reasonable assurance that the applicable regulatory limits are being satisfied for the one hour period. Significant potential for airborne radioactivity is the radioactivity that when released into the reactor bay results in the calculated occupational or general public dose equivalent or committed dose equivalent greater than half that of the corresponding calculated value for the maximum hypothetical accident as described in the Safety Analysis Report (as amended).

3.7.2 Effluents

Applicability. This specification applies to the release rate of ^{41}Ar.

Objective. The objective is to ensure that the concentration of the ^{41}Ar in the unrestricted areas shall be below the applicable effluent concentration value in 10 CFR 20.

Specifications. The annual average concentration of ^{41}Ar discharged into the unrestricted area shall not exceed 4×10^{-6} μCi/ml at the point of discharge.

Basis. If ^{41}Ar is continuously discharged at 2.5×10^{-6} μCi/ml (i.e., the concentration produced when the nitrogen purge of the rotating rack is off, all valves on the argon manifold are open, and all beam port valves are open), measurements and calculations show that ^{41}Ar released to the unrestricted areas under the worst-case weather conditions would result in an annual TEDE of 5 mrem (SAR 11.1.1.1.1). This is only 50% of the applicable limit of 10 mrem (Regulatory Guide 4.20). Therefore, an emission of 4×10^{-6} μCi/ml would correspond to an annual TEDE of 8 mrem which is still 20% below the applicable limit.

3.8 Limitations on Experiments

3.8.1 Reactivity Limits

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 experiment failure.

Specifications. The reactor shall not be operated unless the following conditions governing experiments exist:

a. The absolute value of the reactivity worth of any single unsecured experiment shall be less than $0.50; and

b. The sum of the absolute values of the reactivity worths of all experiments shall be less than $2.30.

Basis. The reactivity limit of $0.50 for unsecured experiments is designed to prevent an inadvertent pulse from occurring and maintain a value below the shutdown margin. Unsecured experiments are located in such a way that it is possible for them to be removed from or inserted into an irradiation facility, either accidentally or deliberately, while the reactor is critical. That being said, the value is clearly less than the limit on pulsing.

The reactivity worth limit for all experiments is designed to prevent an inadvertent pulse from exceeding the recommended limit on pulsing. This limit applies to movable, unsecured, and secured experiments. A maximum reactivity insertion of $2.30 will ensure that fuel temperature will not exceed 830°C.

3.8.2 Materials

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 experiment failure.

Specifications. The reactor shall not be operated unless the following conditions governing experiments exist:

a. Explosive materials, such as gunpowder, TNT, nitroglycerin, or PETN, in quantities greater than 25 milligrams shall not be irradiated in the reactor or irradiation facilities. Explosive materials in quantities less than 25 milligrams may be irradiated provided the pressure produced upon detonation of the explosive has been calculated and/or experimentally demonstrated to be less than half the design pressure of the container; and

b. Experiments containing corrosive materials shall be doubly encapsulated. The failure of an encapsulation of material that could damage the reactor shall result in removal of the sample and physical inspection of potentially damaged components.

Basis. This specification is intended to prevent damage to reactor components resulting from failure of an experiment involving explosive or corrosive materials. Operation of the reactor with the reactor fuel or structure potentially damaged is prohibited to avoid potential release of fission products.

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 experiment 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.

3.9 This section intentionally left blank.

3.10 Targets

3.10.1 Permissible In-Core Target Lattice Positions

Applicability. This specification applies to the core at any time when targets are located in any core lattice position.

Objective. The objective is to ensure assumptions made for the neutronic and thermal hydraulic analyses are not compromised.

Specification. Permissible target locations are core positions G32, G33, G34. Targets shall not be placed in any other core lattice positions.

Basis. Analyzed target locations were G32, G33 and G34. Location G34 was found to produce the highest integrated power in a target. Thermal hydraulic analysis was based on power distribution in this hot target.

3.10.2 Pulse or Square Wave Mode Operation with Targets Located in Any Core Lattice Position

Applicability. This specification applies to the reactor at any time when targets are located in any core lattice position.

Objective. The objective is to prevent all pulse activity while targets are present in any core lattice position.

Specification. The reactor shall not be operated in pulse mode or square wave mode while targets are present in any core lattice position.

Basis. Target performance has not been analyzed under rapid transient pulse conditions, therefore pulsing shall not be allowed when targets are present in the core. Pulse mode operation is prohibited. Square wave mode operation is also prohibited because it is possible to add more than $1.00 of reactivity in square wave mode. A rod withdrawal accident will not introduce sufficient reactivity to pulse the reactor.

3.10.3 Allowed Target Storage Locations

Applicability. This specification applies to targets at any time targets are located in the reactor tank and not in transit or in an in-core lattice position.

Objective. The objective is to maintain k-effective of stored targets less than 0.9 under all conditions of moderation.

Specification. The targets shall be stored in the standard in-tank TRIGA storage racks. No other items shall be present in any storage rack containing targets.

Basis. Storage racks are sufficiently far from the core such that the presence of targets in the core will not affect the criticality condition of targets in the storage racks. Criticality analysis assumes no other objects are present in the vicinity of the stored targets. The criticality analysis for the storage of the fuel assumed no other objects (i.e., fuel elements) were stored with the targets. The k-effective was calculated to be less than 0.9 when stored in the storage racks.

3.10.4 Target Fabrication Requirements

Applicability. This specification applies to any target that will be placed in the reactor tank.

Objective. The objective is to ensure that targets placed in the core may be used with a high degree of reliability with respect to their physical and nuclear properties.

Specification.

a. The maximum enrichment of uranium in each target shall not exceed 19.75%.

b. The maximum mass of uranium in a target shall not result in a dose to a member of the general public in excess of 100 mrem from an accident involving a single target.

c. Cladding: aluminum, nominal thickness 0.32 cm.

Basis.

a. Targets must be fabricated with LEU (i.e., less than or equal to 19.75% enriched in ^{235}U). An enrichment of 20% was assumed for the neutronic and the thermal hydraulic analysis for the purpose of bounding the calculations.

b. The dose to the general public from the target cladding failure accident is a function of many variables. Provided all other variables remain constant, the predicted dose should be directly proportional to the mass of uranium in the target. Analysis has shown that the maximum dose to a member of the general public will not exceed 100 mrem given the assumptions made in the calculation of the target cladding failure

accident. Therefore, the mass of uranium in each target is limited by the parameters of the analysis and the dose performance criteria.

c. Cladding of this type provides adequate structural integrity while minimizing parasitic neutron absorption.

3.10.5 Mo-99 Target Irradiation

Applicability. This specification applies to the irradiation of Mo-99 demonstration targets.

Objective. The objective is to ensure that the time that the Mo-99 demonstration targets are irradiated is limited by reactor power history.

Specification. The Mo-99 demonstration targets shall be irradiated in a core lattice position for no more than 7.15-MW days (MWD).

Basis. The predicted radionuclide inventory was based upon a 6.5-day irradiation while the reactor is at full power (i.e., 1.1-MW). The multiple of these two numbers represents the effective full power days for the core while the targets are in the core lattice positions analyzed. This power history creates the source term inventory that was predicted for the accident analysis that could potentially be released from the uranium bearing material within the targets. Limiting the irradiation time to 7.15 MWD will ensure that the potential accident consequences are less than the dose limit for individual members of the general public identified in 10 CFR 20.1301.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 24 TO

RENEWED FACILITY OPERATING LICENSE NO. R-106

OREGON STATE UNIVERSITY

OREGON STATE TRIGA REACTOR

DOCKET NO. 50-243

1.0 INTRODUCTION

By letter dated August 18, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14233A412), as revised and supplemented by letter dated August 3, 2016 (ADAMS Accession No. ML16222A699), and emails dated December 13, 2016, and February 1, 2017 (ML17038A168), Oregon State University (the licensee) requested an amendment to the Technical Specifications (TSs) for the Oregon State training reactor and isotopes production, General Atomics (TRIGA®) Reactor (OSTR). The proposed amendment would allow irradiation of experiments containing fissile material. The licensee proposed to use the airborne limit of iodine-131 activity calculated from the OSTR's maximum hypothetical accident (MHA) as a surrogate for an equivalent limit on these fissile 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. Limiting the generation of certain fission products to the MHA in experiments containing fissile material ensures that the occupational radiation dose to workers as well as dose to the public, due to experiment failure with subsequent fission product release, will be within the limits prescribed in Title 10 of *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection against Radiation."

Specifically, the proposed amendment would:

1. Revise TS 3.5, "Ventilation Systems," to specify that the ventilation system be operating and reactor bay pressure negative with respect to surrounding areas when transferring experiments with significant potential for airborne radioactivity;

2. Revise TS 3.7.1, "Radiation Monitoring Systems," to specify the minimum number of operable radiation monitors when transferring experiments with significant potential for airborne radioactivity; and

3. Revise TS 3.8.3, "Failures and Malfunctions," to specify a limit on iodine-131 for controlling fissile experiments.

4. Revise the OSTR TSs to make minor corrections in format, grammar, punctuation as requested by the licensee by email dated December 13, 2016 (ADAMS Accession No. ML16350A094).

5. Revise the OSTR license to remove duplications and administratively update the reactivity insertion limit in license condition (LC) 2.C.1, "Maximum Power Level."

2.0 BACKGROUND

The OSTR is located on the licensee's campus in Corvallis, Oregon. The OSTR is a natural convection, water-cooled, Mark-II TRIGA® pool-type reactor built by General Atomics. The OSTR can be operated at a maximum steady-state thermal power level of 1.1 megawatt (MW(t)), pulsed up to a peak power of about 2,500 MW(t), or operated in a square-wave mode.

The OSTR is used for student training in reactor engineering theory and operation, nuclear research, and a range of irradiation services. The OSTR has a number of different irradiation facilities including a pneumatic transfer tube, a rotating rack, a thermal column, a thermalizing column, four beam ports (three radial and one tangential), five sample-holding (dummy) non-fuel elements for special in-core irradiations, and an in-core irradiation tube and the cadmium-lined in-core irradiation tube for experiments requiring a high energy neutron flux.

The NRC issued the renewed operating license for the OSTR on September 10, 2008. The NRC's license renewal Safety Evaluation Report (SER) (ADAMS Accession No. ML082540035), Section 10.3, "Experiment Limits," stated that the licensee had requested that limitations on fueled experiments be temporarily removed from the renewed license TSs. The renewal SER also stated that the licensee will develop a TS on fueled experiments based on contemporary calculational techniques and will submit the proposed TS in the future. The purpose of the proposed amendment is to insert requirements governing the conduct of fueled experiments to the reactor license TSs.

3.0 EVALUATION

3.1 Proposed TS limiting conditions for operation (LCOs) revisions

The proposed revision to TS 3.5, TS 3.7.1, and TS 3.8.3 LCOs requested by the licensee are set forth below.

3.1.1 TS LCO 3.5

The proposed new TS LCO 3.5.c states:

> Experiments with significant potential for airborne radioactivity release shall not be transferred from an irradiation facility unless the facility ventilation system is operating and the reactor bay pressure is maintained negative with respect to surrounding areas.

3.1.2 TS LCO 3.7.1

The current TS LCO 3.7.1 states:

> The reactor shall not be operated unless the minimum number of radiation monitoring channels listed in Table 4 are operating.

The proposed TS LCO 3.7.1 states:

> The reactor shall not be operated nor shall experiments with significant potential for airborne radioactivity be transferred from an irradiation facility unless the minimum number of radiation monitoring channels listed in Table 4 are operating.

3.1.3 TS LCO 3.8.3

The proposed new TS LCO 3.8.3.b states:

> 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.

3.2 Evaluation of Proposed Changes to TS LCOs

The proposed TS LCOs described above would require the licensee to use controls in its conduct of fissile experiments. The safety evaluation (SE) in this section focuses on these controls, and on how these controls limit the radiological consequences of fissile experiments.

The provisions of 10 CFR 50.36, “Technical specifications,” require licensees to have TSs. Section 50.36(c)(2) requires, in part, that TSs include LCOs. LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Section 50.36(c)(2)(ii)(B) requires that a TS LCO be established for a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. For the proposed conduct of fissile experiments at the OSTR, a limit on I-131 inventory is such an operating restriction.

Section 50.36(c)(2)(ii)(C) requires that a TS LCO be established for a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. For the proposed conduct of fissile experiments at the OSTR, these structures, systems, or components are the ventilation system and radiation monitors associated with the facility.

NUREG-1537, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors,” issued February 1996 (ADAMS Accession Nos.: ML042430055 (Part 1) and ML042430048 (Part 2)) provides guidance for the review of experimental facilities, including the safety analysis of any accidents which could result from the potential failure of experiments.

NRC Regulatory Guide 2.2, “Development of Technical Specifications for Experiments in

Research Reactors," presents the following three safety-oriented considerations from which TSs for experiments should be developed:

(1) The physical conditions of the design and conduct of experiments;
(2) the materials content of experiments; and,
(3) the administrative controls employed to evaluate, authorize, and carry out experiments.

The NRC staff reviewed the documentation submitted by the licensee supporting the TS amendment request, as supplemented by the request for additional information (RAI) responses, for conformance with the regulatory guidance provided above, and to verify that proposed operations will not expose reactor staff or the public to unacceptable radiological consequences, as determined by the limits specified in 10 CFR Part 20. Additionally, the NRC staff reviewed the safety analysis report (SAR) for fuel conversion in 2007 (ADAMS Accession No. ML080420546) and the associated SE (ADAMS Accession No. ML082390775) since it forms a basis for this license amendment.

3.2.1 TS LCO 3.5.c

The licensee proposed to add TS 3.5.c, which would require that the facility ventilation system to be operating and that reactor bay pressure be maintained negative with respect to surrounding areas whenever experiments with significant potential for airborne radioactivity are transferred from an irradiation facility. Depending on radioactive material content, this could include experiments containing fissile material. This is similar to the ventilation system operating requirements during reactor operation. The licensee proposes a change to the basis for TS 3.5 to explain that experiments with significant potential for airborne radioactivity are those equivalent to greater than half of the occupational, public, or committed dose values for the MHA as described in the SAR. Tables 13-3, 13-4, and 13-5 of the 2007 conversion SAR contain radiation dose values to members of the public for certain analyzed cases. All the analyzed cases demonstrated that doses are within the regulatory limit given in 10 CFR 20.1301 for doses for individual members of the public of 100 mrem. Table 13-2 contains values for occupational dose. These dose values are within the regulatory limit given in 10 CFR 20.1201(a)(1)(i) of 5,000 mrem.

The ventilation system maintains the reactor bay at a negative pressure in relationship to outside ambient air pressure by use of a pressure damper in conjunction with operation of supply and exhaust fans. Ventilation exhaust air is continuously monitored for radioactivity using particulate and gas detectors. Exhaust air exits the confinement to the environment through a stack which ensures dispersion and dilution of effluents before reaching the ground. By controlling the ventilation system, the system provides a controlled and monitored pathway for airflow and helps ensure mitigation of the radiological consequences from possible releases of radioactive material from a possible fissile experiment failure. TS 3.5.b requires that the ventilation system automatically shut down on high alarm from the particulate monitor. This could lead to the evacuation of the reactor staff from the confinement building.

The NRC staff reviewed the information provided by the licensee, as described above, and finds that proposed TS 3.5.c would require ventilation system operation whenever experiments with significant potential for airborne radioactivity are transferred from an irradiation facility. The

NRC staff finds this is similar to the ventilation requirements for reactor operation. The NRC staff also finds this would help to ensure a reduction in effluent concentrations in the confinement and control releases from the confinement to a defined pathway thus minimizing potential doses to the public and the OSTR staff in the event of a possible failure of an experiment with significant potential for radioactive airborne releases. In addition, the NRC staff reviewed the basis for the TS 3.5 and finds that it summarizes the rationale for the revised TS provided in the amendment request, as supplemented. Therefore, based on the information provided, the NRC staff concludes that proposed TS 3.5.c is acceptable.

3.2.2 TS LCO 3.7.1

The licensee proposed to revise TS 3.7.1, which would require that the minimum number of radiation monitoring channels listed the Table 4, "Minimum Radiation Monitoring Channels," are operating prior to transferring experiments with significant potential for airborne radioactivity from an irradiation facility. Depending on radioactive material content, this could include experiments containing fissile material. This is the same as for reactor operation. Table 4 requires a minimum of 4 radiation monitors to be operating which are the reactor top area, continuous air particulate, exhaust gas, and exhaust particulate radiation monitors. These radiation monitors would help to provide information to the OSTR staff regarding routine releases of radioactivity, as well as any danger from radiation resulting from the release of airborne radioactivity following a failure of an experiment with significant potential for airborne radioactivity. Their operation would help to provide sufficient time for OSTR staff to take the necessary steps to prevent the spread of radioactivity from a potential failure of these experiments, such as manually securing the ventilation system and securing the transfer of the experiment. Additionally, their operation also provides sufficient time for the OSTR staff to evacuate the facility, if needed. The licensee proposes a change to the basis for TS 3.7.1 to explain that experiments with significant potential for airborne radioactivity are those equivalent to greater than half of the occupational, public, or committed dose values for the MHA as described in the SAR.

The NRC staff reviewed the information provided by the licensee, and finds that proposed TS 3.7.1 would help to provide assurance that the OSTR staff would be able to monitor radiological dose information from fissile and other experiments to help minimize the release of radioactivity and comply with the limits specified in 10 CFR Part 20. In addition, the NRC staff reviewed the basis for the TS 3.7.1, and finds that it summarizes the rationale for the revised TS provided in the amendment request, as supplemented. Therefore, based on the information provided, the NRC staff concludes that the revision to TS 3.7.1 is acceptable.

3.2.3 TS LCO 3.8.3.c

Current TS 3.8.3 helps ensure that the source term calculations are conservative such that if an experiment failure or malfunction should occur, the gases or aerosols released will not result in exceeding the dose limits of 10 CFR Part 20. The licensee proposed to add a specification, as Specification b, to TS 3.8.3 to use the airborne iodine-131 activity calculated for the MHA in the 2007 conversion SAR as an equivalent limit on fissile experiments. This specification would limit the iodine-131 that could be released in the event of a fissile experiment failure to 0.0141 curies.

The OSTR MHA is defined as a cladding rupture of one highly irradiated low-enriched uranium (LEU) fuel element in air with no radioactive decay, followed by the instantaneous release of the noble gases and halogen fission products directly into the air. Boundary conditions and assumptions include an infinite irradiation time, no credit for iodine absorption in the reactor pool water, released fission products are uniformly distributed in the reactor room air, and 100 percent of the noble gases and 25 percent of the iodine inventory become instantaneously released and airborne. The NRC staff reviewed the 2007 conversion SAR to verify that the calculated iodine-131 airborne activity for the MHA is 0.0141 curies and that the resultant doses were less than the limits in 10 CFR Part 20. The proposed specification helps ensure that the radiological consequences of fissile experiment failure are adequately considered and the quantity of fissile material in experiments is limited and properly controlled by the OSTR staff to limit any potential radiological doses to below the values allowed in 10 CFR Part 20.

As required by current TS 6.5, "Experiments Review and Approval," all new experiments and substantive changes to previously approved experiments are reviewed by the Reactor Operations Committee and approved by the Radiation Center Director (or designated alternate) prior to irradiating the experiment in the reactor or its experimental facilities. As stated in the licensee's RAI 2 response (ADAMS Accession No. ML16222A699), OSTR has written procedures that describe the process for experimental review and approval. The organizational and administrative controls of existing TS 6.5 help ensure that the required reviews and authorizations for experiments are conducted and that implementation of written procedures for conducting experiments occurs. Based on the information above, the NRC staff concludes that the proposed TS 3.8.3, Specification b, is acceptable.

4.0 CORRECTIONS TO LICENSE AND TECHNICAL SPECIFICATIONS

In addition to the proposed changes in Section 3.0 above, the NRC staff is revising several pages of the OSTR TSs to correct grammatical, typographical, and formatting errors as requested by the licensee (ADAMS Accession No. ML16350A094). The NRC staff determined that these minor changes to the TSs are administrative in nature. The licensee has requested the following changes:

1. Add the title "4.0 General" to the table of contents to match the title of TS 4.0. The NRC staff considers this an administrative change and therefore finds the change acceptable.

2. Modify the titles in Section 6.2, "Review and Audit" in the table of contents to match the titles of TS 6.2.1, 6.2.2, 6.2.3, and 6.2.4. The NRC staff considers this an administrative change to the TSs for consistency to match the titles in the table of contents with the TS and therefore finds the change acceptable.

3. Modify the title in Section 6.6.2 in the table of contents from "…Identified in Section 6.6.2…" to "…Identified in Section 6.7.2…" to match the title of TS 6.6.2. The NRC staff finds this change is administrative in nature and therefore acceptable.

4. Modify the title of Sections 6.8.1, 6.8.2, and 6.8.3 in the table of contents to capitalize the word "be". The NRC staff finds that capitalization of the word "be" in the titles of sections 6.8.1, 6.8.2, and 6.8.3 is an administrative change and therefore acceptable.

5. Modify the title of Section 6.8.2 in the table of contents to change “Training Cycle” to “Certification Cycle” to match the title of TS. The NRC staff finds that changing the title in the table of contents to match TS 6.8.2 is an administrative change and therefore acceptable.

6. Modify TS 3.5, Specification a, to add a comma after maintenance. The NRC staff finds this punctuation change is administrative in nature and therefore acceptable.

7. Modify TS 3.5, Specification b, to add a period to the end of the TS. The NRC staff finds this punctuation change is administrative in nature and therefore acceptable.

8. Modify TS 3.5, Basis, to add a comma after “unrestricted area” in line 11 and after “maintenance” in line 13. The NRC staff is not evaluating the change to the basis of TS 3.5, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

9. Modify TS 3.8.1, Basis, to change “movable experiments” in the first sentence to “unsecured experiments”. TS 3.8.1.a limits the absolute value of the reactivity worth of unsecured experiments. The NRC staff is not evaluating the change to the basis of TS 3.8.1, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

10. Modify TS 3.8.1, Basis, by deleting the 2nd sentence “Movable experiments are by their very nature experiments in a position were it is possible for a sample to be inserted or removed from the core while critical.” Add the sentence “Unsecured experiments are located in such a way that it is possible for them to be removed from or inserted into an irradiation facility, either accidentally or deliberately, while the reactor is critical.” TS 3.8.1, Specification a, limits the reactivity worth of unsecured experiments. The NRC staff is not evaluating the change to the basis of TS 3.8.1, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

11. Modify TS 3.8.1, Basis, to add a comma after “unsecured” in the second paragraph. The NRC staff is not evaluating the change to the basis of TS 3.8.1, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

12. Modify TS 3.8.2, Specification a, to remove the period before the semicolon at the end of the paragraph. The NRC staff finds this punctuation change is administrative in nature and therefore acceptable.

13. Modify TS 3.8.2, Basis, to add corrosive materials to the first sentence. TS 3.8.2, Specification b, states that experiments containing corrosive materials shall be doubly encapsulated. The NRC staff is not evaluating the change to the basis of TS 3.8.2, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

14. Modify TS 3.8.2, Basis, to change “potential damages” to “potentially damaged”. The

NRC staff is not evaluating the change to the basis of TS 3.8.2, because the regulations in 10 CFR 50.36(a) require a statement of the bases or reasons for the TS, but it does not become part of the TS.

15. Modify the title in Section 3.10 from “LCO T1, Permissible in-core Target lattice positions.” to “3.10.1 Permissible In-Core Target Lattice Positions”. The NRC staff finds this change is administrative in nature and therefore acceptable.

16. Modify the title in Section 3.10 from “LCO T2, Pulse or square wave mode operation with targets located in any core lattice position.” to “3.10.2 Pulse or Square Wave Mode Operation with Targets Located in Any Core Lattice Position.” The NRC staff finds this change is administrative in nature and therefore acceptable.

17. Modify the title in Section 3.10 from “LCO T3, Allowed Target Storage Locations.” to “3.10.3 Allowed Target Storage Locations.” The NRC staff finds this change is administrative in nature and therefore acceptable.

18. Modify the title in Section 3.10 from “LCO T4, Target Fabrication Requirements.” to “3.10.4 Target Fabrication Requirements.” The NRC staff finds this change is administrative in nature and therefore acceptable.

19. Modify the title in Section 3.10 from “LCO T5, Mo-99 Target Irradiation.” to “3.10.5 Mo-99 Target Irradiation.” The NRC staff finds this change is administrative in nature and therefore acceptable.

20. Modify TS 3.10.1, Applicability, from “Any time when targets are located…” to “This specification applies to the core at any time when targets are located…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

21. Modify TS 3.10.1, Objective, from “To ensure assumptions made…” to “The objective is to ensure that assumptions made…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

22. Modify TS 3.10.2, Applicability, from “Any time when targets are located…” to “This specification applies to the reactor at any time when targets are located…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

23. Modify TS 3.10.2, Objective, from “To prevent all pulse activity…” to “The objective is to prevent all pulse activity…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

24. Modify TS 3.10.3, Applicability, from “Any time targets are located…” to “This specification applies to targets at any time when they are located…”. The NRC staffs finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

25. Modify TS 3.10.3, Objective, from “To maintain k-effective…” to “The objective is to maintain k-effective…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

26. Modify TS 3.10.4, Objective, from “To assure that targets…” to “The objective is to ensure that targets…”. The NRC staff finds this change is a grammatical correction to support general TS consistency and therefore acceptable.

27. Modify TS 3.10.5, Objective, from “…assure that the time…” to “…ensure that the time…”. The NRC staff finds this change is a grammatical correction for proper word usage and therefore acceptable.

Additionally, the licensee requested that LC 2.C.1, “Maximum Power Level,” for Facility Operating License No. R-106 be corrected to reflect the current pulse limit in TS 3.1.4, “Pulse Mode Operation.” TS 3.1.4 requires a limit on the reactivity insertion of a pulse such that fuel temperature does not exceed 830 °C. The existing reactivity pulse limit of $2.55 was not updated in License Amendment No. 22 that authorized the conversion of the OSTR TRIGA from high-enriched uranium (HEU) fuel to LEU fuel. In the fuel conversion SER, the NRC staff evaluated the pulse limit reactivity based on a maximum fuel temperature. The NRC staff concluded that limiting fuel temperature to 830 °C during reactor pulsing is acceptable to minimize hydrogen pressure to prevent fuel bowing. The reactivity pulse limit inadvertently was not administratively updated in the license by the NRC staff when the Order requiring the conversion from HEU- to LEU-fuel was issued in September 2008.

An additional administrative change is to delete LC 1.G and 1.H from page 2 of the license because these LCs are repeated on page 1 of the license.

Therefore, based on the information described above, the NRC staff concludes that these changes to Facility Operating License No. R-106 and the TSs are acceptable.

5.0 ENVIRONMENTAL CONSIDERATION

The NRC’s regulations in 10 CFR 51.22(a) state, in part, that the issuance of an amendment to a 10 CFR Part 50 license is eligible for a categorical exclusion from the requirement that an environmental assessment or environmental impact statement be prepared, if the Commission has declared that the action does not individually or cumulatively have a significant effect on the human environment.

The sections of this amendment adding TS 3.5.c. and TS 3.8.3 and revising TS 3.7.1 involve changes to a requirement in the installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20. This amendment request meets the requirements for the categorical exclusion of 10 CFR 51.22(c)(9) provided that it meets each of the criteria below:

(i) *The amendment involves no significant hazards consideration*; [10 CFR 51.22(c)(9)(i)]

The NRC's regulations in 10 CFR 50.92(c) states that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the proposed amendment, would not:

(1) *Involve a significant increase in the probability or consequences of an accident previously evaluated [10 CFR 50.92(c)(1)];*

The only potential accidents associated with the amendment would be failures of the proposed fissile experiment. Experiment failures, including experiment failures that could result in a release of fission products from the OSTR to the environment, is a kind of accident that has been previously evaluated and that is bounded by the MHA in the 2007 conversion SAR. The MHA, which involves the escape of fission products from a TRIGA® fuel element and release to the unrestricted environment, is the most hazardous radiological accident conceivable at the OSTR. The MHA bounds all credible fission product release accidents. The evaluation of other categories of postulated fission product release accidents at the OSTR show that the MHA is bounding. The maximum consequences of the MHA results in 22 mrem occupational dose and 17 mrem to the public. Furthermore, TS 3.8.1, "Reactivity Limits," limits the absolute value of reactivity worth of any single unsecured experiment to less than $0.50 units of reactivity to help limit peak fuel temperature to less than the safety limit in TS 2.1, "Safety Limit-Fuel Element Temperature." All experiments are required to be conducted in accordance the OSTR TSs. As required by the OSTR TSs, all experiments are reviewed and approved by OSTR senior staff, Senior Health Physicist, and the Reactor Operations Committee to evaluate the design, probability of failure, and release fraction. The OSTR staff perform safety evaluations for experiments as required by 10 CFR 50.59. The OSTR experimental facilities were evaluated in the license renewal SER (ADAMS Accession No. ML082540035) and found acceptable. Therefore, the NRC staff finds that this amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) *Create the possibility of a new or different kind of accident from any accident previously evaluated [10 CFR 50.92(c)(2)];*

The only potential accidents associated with the amendment would be failures of the proposed fissile experiment. Experiment failures, including experiment failures that could result in a release of fission products from the OSTR to the environment, is a kind of accident that has been previously evaluated and that is bounded by the MHA in the 2007 conversion SAR. The MHA, which involves the escape of fission products from a TRIGA® fuel element and release to the unrestricted environment, is the most hazardous fission product release radiological accident conceivable at the OSTR. The MHA bounds all credible fission product release accidents. The evaluation of other categories of postulated fission product release accidents at the OSTR show that the MHA is bounding. Therefore, the NRC staff finds that this amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) *Involve a significant reduction in a margin of safety* [10 CFR 50.92(c)(3)].

The safety limit for the OSTR is fuel temperature. TS 2.1 states that the temperature safety limit for a TRIGA® fuel element is 2,100 °F (1,150 °C). The irradiation of a fissile experiment does not affect fuel element temperature and does not significantly reduce the margin of safety for reactor operation. As required by OSTR TSs, all experiments are reviewed and approved by OSTR senior staff, Senior Health Physicist, and the Reactor Operations Committee to evaluate the design, probability of failure, and release fraction. The OSTR staff perform safety evaluations for experiments as required by 10 CFR 50.59. The OSTR experimental facilities were evaluated in the license renewal SER (ADAMS Accession No. ML082540035) and found acceptable. Therefore, the NRC staff finds that this amendment does not involve a significant reduction in a margin of safety.

(ii) *There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and* [10 CFR 51.22(c)(9)(ii)]

The fission products generated, as limited by the amount of airborne iodine-131 in the MHA, by irradiation of the fissile experiments will not significantly change from the types of fission products generated by operation of the reactor and already present in the reactor fuel. The fissile experiments will have a limited irradiation period and will be reviewed and approved using administrative controls in accordance with TS 6.5, “Experiments Review and Approval.” Also, the amendment does not change potential release paths from the facility. TS 3.5.a, “Ventilation” requires the ventilation system to be in operation and maintain the reactor bay pressure negative with respect to the surrounding areas. TS 3.5.b requires the ventilation systems to be secured upon high activity alarm. The required shut down of the ventilation system if a substantial release of airborne radioactivity occurs helps to minimize the amounts of effluents that may be released offsite. The basis for TS 3.8.3.b is to limit the consequences of any experiment containing fissile material to that of the MHA which has been shown to be protective of the OSTR staff and public. For these reasons, there is no significant change in the types or increase in the amounts of any effluents that may be released offsite due to irradiation of fissile experiments.

(iii) *There is no significant increase in individual or cumulative occupational radiation exposure* [10 CFR 51.22(c)(9)(iii)].

The amendment will permit irradiation of fissile experiments. The iodine-131 limit in TS 3.8.3.b bounds the failure accident dose consequences to that of the MHA dose consequences previously evaluated in the 2007 conversion SAR. The maximum occupational dose as a result of the MHA is 22 mrem. In the OSTR Annual Report 2016 (ADAMS Accession No. ML17038A168), the licensee reports that the annual cumulative exposure at the OSTR is 845 mrem and the maximum individual dose is 229 mrem. The proposed experiment would result in routine, and possible accident, occupational doses that are significantly below 10 CFR Part 20 limits. Additionally, existing TS 6.4 requires administrative controls that would help ensure the adequacy of radiation protection procedures for the proposed experiment, helping to limit individual or cumulative occupational radiation exposure. Furthermore, TS 6.3 requires the implementation of a radiation safety program as required in 10 CFR Part 20. The fissile experiments are not

expected to be handled directly after irradiation until the sample radiation levels have decayed and will only be handled by radiation trained personnel. The OSTR experimental facilities were evaluated in the license renewal SER (ADAMS Accession No. ML082540035) and found acceptable. Therefore, the NRC staff finds that there is no significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the sections of this amendment adding TS 3.5.c. and TS 3.8.3 and revising TS 3.7.1 meets the eligibility criteria for categorical exclusion as set forth in 10 CFR 51.22(c)(9).

The changes to the license and Appendix A to the license, the TSs, discussed in Section 4.0 of this SER are changes in the license that make editorial, corrective or other minor revisions. Accordingly, this section of the amendment meets the eligibility criteria for categorical exclusion as set forth in 10 CFR 51.22 (c)(10)(v).

Accordingly, 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.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public, and (4) the amendment involves no significant hazards consideration.

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