

September 2, 2008

Dr. Steven R. Reese
Director, Radiation Center
Oregon State University
100 Radiation Center
Corvallis, OR 97331-5903

SUBJECT: OREGON STATE UNIVERSITY TRIGA REACTOR ENVIRONMENTAL
ASSESSMENT REGARDING RENEWAL OF FACILITY LICENSE
NO. R-106 (TAC NO. MC5155)

Dear Dr. Reese:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact regarding the application submitted by Oregon State University (OSU) dated October 5, 2004, as supplemented on August 8, 2005, May 24, 2006, November 10, 2006, November 21, 2006, July 10, 2007, July 27, 2007, July 31, 2007, August 6, 2007, April 14, 2008, August 6, 2008, and August 11, 2008 for a renewed Facility License No. R-106 for the Oregon State University TRIGA Reactor (OSTR). The proposed action would renew Facility License No. R-106 for twenty years from the date of issuance of the renewed license. If you have any questions regarding this review, please contact William B. Kennedy at 301-415-2784, or me at 301-415-1127.

Also enclosed is the notice of issuance of the Environmental Assessment that is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Alexander Adams, Jr., Senior Project Manager
Research and Test Reactors Branch A
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-243
Enclosures: As stated

cc w/enclosures: See next page

Oregon State University

Docket No. 50-243

cc:

Mayor of the City of Corvallis
Corvallis, OR 97331

Mr. Ken Niles
Oregon Office of Energy
625 Marion Street, N.E.
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Dr. John Cassady, Vice President
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Dr. Todd Palmer, Chairman
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

UNITED STATES NUCLEAR REGULATORY COMMISSION

OREGON STATE UNIVERSITY

DOCKET NO. 50-243

OREGON STATE UNIVERSITY TRIGA REACTOR

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of a renewed Facility License No. R-106, to be held by the Oregon State University (the licensee), which would authorize continued operation of the Oregon State University TRIGA Reactor (OSTR), located in Corvallis, Benton County, Oregon. Therefore, pursuant to 10 CFR Part 51.21, the NRC is issuing this Environmental Assessment and Finding of No Significant Impact.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would renew Facility License No. R-106 for a period of 20 years from the date of issuance of the renewed license. The proposed action is in accordance with the licensee's application dated October 5, 2004, as supplemented on August 8, 2005, May 24, 2006, November 10, 2006, November 21, 2006, July 10, 2007, July 27, 2007, July 31, 2007, August 6, 2007, April 14, 2008, August 6, 2008, and August 11, 2008. In accordance with 10 CFR 2.109, the license remains in effect until the NRC takes final action on the renewal application.

Need for the Proposed Action:

The proposed action is needed to allow the continued operation of the OSTR to routinely provide teaching, research, and services to numerous institutions for a period of twenty years.

Environmental Impacts of the Proposed Action:

The NRC has completed its safety evaluation of the proposed action and concludes there is reasonable assurance that the OSTR will continue to operate safely for the additional period of time specified in the renewed license. The details of the staff's safety evaluation will be provided in the renewed Facility License No. R-106.

The OSTR is located in the OSU Radiation Center complex on the west end of the Oregon State University campus and west of downtown Corvallis, OR. Corvallis and OSU lie in Benton County in the Willamette Valley. The reactor is located approximately 400 yards (0.4 km) northeast of Oak Creek and 1.5 miles (2.4 km) west of the Willamette River. The reactor is housed in the four-story Reactor Building which serves as a confinement. The OSTR site comprises the area bounded by the Reactor Building fence on the north, Jefferson Way on the south, 35th Street on the west, and the east edge of the OSU Radiation Center complex

parking lot on the east. The nearest permanent residence is located 876 feet (267 m) north of the OSTR. The nearest OSU dormitories are Sackett Hall and Reed Hall, both located 1300 feet (0.4 km) east of the OSTR. There are no nearby industrial, transportation, or military facilities that pose a threat to the OSTR.

The OSTR is a tank-type, light water moderated and cooled research reactor licensed to operate at a steady-state power level of 1.1 megawatts thermal power (MW(t)). The reactor is licensed to operate in a pulse mode, with a maximum reactivity insertion of \$2.55. The core is located at the bottom of an aluminum tank with a diameter of 6.5 feet (2.0 m) and a depth of 20.5 feet (6.2 m). The reactor is fueled with standard TRIGA fuel and Fuel Lifetime Improvement Program (FLIP) TRIGA fuel. Reactivity control is provided by 1 shim rod, 1 safety rod, 1 regulating rod, and 1 transient rod. A detailed description of the reactor can be found in the OSTR Safety Analysis Report (SAR). The major modifications to the Facility License were a power uprate to 1.0 MW(t) in June, 1971, the approval of the use of FLIP fuel in 1975, and a power uprate to 1.1 MW(t) in December, 1989.

The licensee has not requested any changes to the facility design or operating conditions as part of this renewal request. The proposed action should not increase the probability or consequences of accidents. No changes are being made in the types of effluents that may be released off site. There should be no increase in occupational or public radiation exposure. Therefore, license renewal should not change the environmental impact of facility operation. Data from the last 8 years of operation was assessed to determine the projected radiological impact of the facility on the environment during the renewal period.

I. Radiological Impact

Gaseous effluents are discharged via a 65.5 ft (19.8 m) stack at a volumetric flow rate of 155 ft³/s (4.4 m³/s). The reactor stack contains a dual-channel airborne radiation monitor capable of detecting gaseous and particulate effluents. The only significant nuclide found in the gaseous effluent stream is Argon-41. Gaseous radioactive releases reported to the NRC were within the limits set by 10 CFR Part 20, Appendix B. The maximum dose rate in the unrestricted area due to Argon-41 was calculated to be approximately 5 mrem/yr (0.05 mSv/yr) using the COMPLY Code of the US Environmental Protection Agency. This is within the limits set by 10 CFR Part 20.1301, and demonstrates compliance with 10 CFR Part 20.1101(d). The calculation assumed a maximum Argon-41 production rate approximately ten times the rate characteristic of routine OSTR operation.

Annual Report Year	Argon-41 Release (Ci)	Argon-41 Release (% 10 CFR 20 Limits)
2006-2007	1.76	0.051
2005-2006	1.96	0.057
2004-2005	1.70	0.049
2003-2004	1.68	0.048
2002-2003	2.14	0.062
2001-2002	2.28	0.066
2000-2001	5.41	0.156
1999-2000	4.90	0.141

Liquid effluents are discharged to the sanitary sewer or released to Oregon State University Radiation Safety for proper disposal. Discharge to the sanitary sewer occurs via a holding tank which is sampled prior to discharge. Release to Oregon State University Radiation Safety occurs only in rare cases when the liquid waste does not meet the requirements for discharge to the sanitary sewer. Licensee policy is to minimize liquid radioactive releases to the environment. The volume, activity, and inventory of both effluent streams are recorded to ensure compliance with applicable regulations. Liquid radioactive releases reported to the NRC were within the limits set by 10 CFR Part 20, Appendix B. During the annual reporting periods from July, 1999, to June, 2007, a single release of 50 gal (190 L) of liquid radioactive waste containing 1.5 pCi/ml of tritium was made to the sanitary sewer in May, 2000. During the same annual reporting periods, 15 gal (57 L) of liquid radioactive waste with a total activity of 1.2 μ Ci was packaged and transferred to OSU Radiation Safety.

Un-compacted solid low-level radioactive waste is transferred to OSU Radiation Safety for compaction and appropriate disposal. The waste consists of items and materials used in the operation of the facility such as ion-exchange resins, filters, laboratory supplies, and cleaning materials. Solid radioactive releases for the annual reporting periods between July, 1999, and June, 2007, totaled 179.75 ft³ (5.10 m³) and had a total activity of 7.13 mCi. The OSTR does not anticipate the need to ship any high-level radioactive waste during the 20-year period of license renewal.

Annual Report Year	Solid Waste Release (ft3)	Solid Waste Activity (mCi)
2006-2007	15.5	2.8
2005-2006	35.5	0.89
2004-2005	15.2	1.13
2003-2004	26.3	0.590
2002-2003	21.5	0.460
2001-2002	17.5	0.058
2000-2001	25.3	0.720
1999-2000	23.0	0.480

Personnel exposures reported to the NRC were within the limits set by 10 CFR 20.1201, and ALARA (As Low As is Reasonably Achievable). No changes in reactor operation that would lead to an increase in occupational dose are expected as a result of license renewal.

Annual Report Year	Average Whole Body Dose (mrem)	Maximum Whole Body Dose (mrem)
2006-2007	93	170
2005-2006	91	202
2004-2005	117	165
2003-2004	16	106
2002-2003	13	92
2001-2002	8	63
2000-2001	33	215
1999-2000	78	208

The licensee conducts voluntary radiation and contamination surveys of the site boundary and surrounding environment to record and track the radiological effect of OSTR operation on the surrounding unrestricted area. The radiation survey program comprises twenty monitoring stations immediately surrounding the OSU Radiation Center, and six monitoring stations within 5 miles (8 km) of the OSTR. The contamination survey program comprises water, soil, and

vegetation sampling performed at twenty-two locations within 1000 feet (300 m) of the OSTR. All surveys are performed quarterly, and indicated radiation and contamination levels for the annual reporting periods from July, 1999, to June, 2007 were consistent with background levels for the region. No changes in reactor operation that would affect off-site radiation and contamination levels are expected as a result of license renewal.

II. Non-Radiological Impact

The OSTR core is cooled by a demineralized, light water primary system consisting of a 5000 gal (19,000 L) tank, a heat removal system, and a processing system. Cooling of the fuel occurs by natural convection, and the bulk coolant temperature is controlled with a forced flow heat removal system. The heat removal system transfers heat to the secondary system via a tube-and-shell heat exchanger. The secondary system uses city water to transport heat to a cooling tower positioned on the roof of the facility. During operation, the secondary system is maintained at a higher pressure than the primary system to minimize the likelihood of primary system contamination entering the secondary system, and ultimately the environment.

Release of thermal effluents from the OSTR will not have a significant effect on the environment. The small amount of waste heat generated, approximately 1.1 MW at operation at full power, is transferred to the atmosphere by means of the roof-mounted cooling tower. This is similar to the air conditioning unit for a large office building. Extensive heat drift will not occur at this heat dissipation rate. Generation of water vapor by the cooling tower is insufficient to cause significant fog buildup in the area.

Evaporative and blowdown losses in the secondary system, approximately 1500 gal (5700 L) per day, are replenished with city water. Given that the water usage for the City of Corvallis is approximately 6,000,000 gal (23,000,000 L) per day, the proposed action will not have a significant impact on the local water supply.

The OSTR uses approximately 2 gal (8 L) of sodium hydroxide per month as a corrosion and scale inhibitor in the secondary coolant system. This is the minimum amount required for effective treatment of the secondary coolant system. The sodium hydroxide is diluted by the approximately 45,000 gal (170,000 L) of secondary water discharged per month. The discharged water is further diluted by the 11,000,000 gal (41,000,000 L) of waste water processed daily by the Corvallis Waste Water Treatment Plant. Consequently, the proposed action will not have a significant chemical impact on the environment during the renewal period.

Environmental Effects of Accidents:

Accident scenarios are discussed in Chapter 13 of the OSTR SAR. The maximum hypothetical accident is the instantaneous release of the noble gasses and halogens contained in one fuel element to the reactor building and then to the uncontrolled environment assuming continuous operation at 1 MW(t) for one year and no decay prior to release. The worst-case occupational doses resulting from this accident would be 505 mrem (5.05 mSv) to the thyroid, and 23 mrem

(0.23 mSv) TEDE for a stay time of 5 minutes. These values are below 10 CFR Part 20 limits. Worst-case doses to members of the general public would be 19 mrem (0.19 mSv) TEDE at the site boundary. These values are below 10 CFR Part 20 limits. The proposed action will not increase the probability or consequences of accidents.

National Environmental Policy Act (NEPA) Considerations:

- I. Endangered Species Act (ESA)
The site occupied by the OSTR does not contain any Federally- or State-protected fauna or flora, nor do the OSTR effluents impact the habitats of any such fauna or flora.
- II. Costal Zone Management Act (CZMA)
The site occupied by the OSTR is not located within any managed coastal zones, nor do the OSTR effluents impact any managed costal zones.
- III. National Historical Preservation Act (NHPA)
The nearest historical site is the College Hill West Historical District, located 0.5 miles (0.8 km) from the OSTR site boundary. Continued operation of the OSTR will not impact this historical site.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to license renewal, the staff considered denial of the proposed action. If the Commission denied the application for license renewal, facility operations would end and decommissioning would be required with no significant impact on the environment. The environmental impacts of license renewal and this alternative action are similar. In addition, the benefits of teaching, research, and services provided by facility operation would be lost.

Alternative Use of Resources:

The proposed action does not involve the use of any different resources or significant quantities of resources beyond those previously considered in the issuance of the original Facility License R-106 for the Oregon State University TRIGA Reactor dated March, 1967; the issuance of Amendment No. 3 to R-106 dated May 28, 1975, which authorized use of FLIP fuel; the power uprate to 1.0 MW(t) dated June, 1971; or the power uprate to 1.1 MW(t) dated December, 1989.

Agencies and Persons Consulted:

In accordance with the agency's stated policy, on April 2, 2007, the staff consulted with the State Liaison Officer, regarding the environmental impact of the proposed action. The State official expressed support for the continued operation of the facility.

Finding of No Significant Impact:

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

Principal Contributors

W. Kennedy, NRC
A. Adams, Jr., NRC
C. Montgomery, NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION
OREGON STATE UNIVERSITY TRIGA REACTOR
DOCKET NO. 50-243
NOTICE OF ISSUANCE OF ENVIRONMENTAL ASSESSMENT
AND FINDING OF NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of a renewed Facility License No. R-106, to be held by the Oregon State University (OSU or the licensee), which would authorize continued operation of the Oregon State University TRIGA Reactor (OSTR), located in Corvallis, Benton County, Oregon. Therefore, pursuant to 10 CFR 51.21, the NRC is issuing an Environmental Assessment and Finding of No Significant Impact.

Description of Proposed Action

The proposed action is approval of the licensee's application for renewal of Facility License No. R-106 for a period of 20 years from the date of issuance of the renewed license. The proposed action is in accordance with the licensee's application dated October 5, 2004, as supplemented on August 8, 2005, May 24, 2006, November 10, 2006, November 21, 2006, July 10, 2007, July 27, 2007, July 31, 2007, August 6, 2007, April 14, 2008, August 6, 2008 and August 11, 2008.

The OSTR is located in the OSU Radiation Center complex on the west end of the Oregon State University campus and west of downtown Corvallis, OR. Corvallis and OSU lie in Benton County in the Willamette Valley. The OSTR site comprises the area bounded by the Reactor Building fence on the north, Jefferson Way on the south, 35th Street on the west, and the east edge of the OSU Radiation Center complex parking lot on the east. The nearest permanent residence is located 876 feet (267 m) north of the OSTR. There are no nearby industrial, transportation, or military facilities that pose a threat to the OSTR.

The OSTR is a tank-type, light water moderated and cooled research reactor licensed to operate at a steady-state power level of 1.1 megawatts thermal power (MW(t)). The reactor is licensed to operate in a pulse mode, with a maximum reactivity insertion of \$2.55. A detailed description of the reactor can be found in the OSTR Safety Analysis Report (SAR). The major modifications to the Facility License were a power uprate to 1.0 MW(t) in June, 1971, and a power uprate to 1.1 MW(t) in December, 1989.

The licensee has not requested any changes to the facility design or operating conditions as part of this renewal request. The proposed action will not increase the probability or consequences of accidents. No changes are being made in the types of effluents that may be released off site. There should be no increase in occupational or public radiation exposure. Therefore, license renewal should not change the environmental impact of facility operation.

Summary of the Environmental Assessment

The NRC staff reviewed the licensee's application which included an Environmental Report. To document its review, the NRC staff has prepared an environmental assessment (EA) which discusses the OSTR site and facility; radiological impacts of gaseous, liquid, and solid effluents; environmental and personnel radiation monitoring; radiation dose estimates for the maximum hypothetical accident (MHA); impacts of the "no action" alternative to the proposed action; alternative use of resources; considerations related to the National Environmental Policy Act (NEPA); and presents the radiological and non-radiological environmental impacts of the proposed action.

Finding of No Significant Impact

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

Publicly available records will be accessible electronically from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the NRC Web site <http://www.nrc.gov/reading-rm/adams.html>. For further details with respect to the proposed action, see the licensee's letter dated October 5, 2004, (ADAMS Accession No. ML043270077 and No. ML071430452), as supplemented by letters dated August 8, 2005 (ADAMS Accession No. ML052290051); May 24, 2006 (ADAMS Accession No. ML061510355); November 10, 2006 (ADAMS Accession No. ML063210182); November 21, 2006 (ADAMS Accession No. ML063320500); July 10, 2007 (ADAMS Accession No. ML072150361 and ML072150362); July 27, 2007 (ADAMS Accession No. ML072150363); July 31, 2007 (ADAMS Accession No. ML 072190043); August 6, 2007 (ADAMS Accession No. ML072340580); April 14, 2008 (ADAMS Accession No. ML081150194); August 6, 2008 (ADAMS Accession No. ML082261409); and August 11, 2008 (ADAMS Accession No. ML082270383). Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. The EA can be found in ADAMS under Accession Number ML061650197. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR Reference staff at 1-800-397-4209, or 301-415-4737, or send an e-mail to pdrc@nrc.gov.

Dated at Rockville, Maryland, this 2nd day of September, 2008.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Daniel S. Collins, Chief
Research and Test Reactors Branch A
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation