RADIATION CENTER *and* TRIGA® REACTOR ANNUAL REPORT

JULY 1, 2024 - JUNE 30, 2025

Oregon State University

Submitted by:
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To satisfy the requirements of :

A. U.S. Nuclear Regulatory Commission, License No. R-106 (Docket No. 50-243), Technical Specification 6.7(e).

B. Battelle Energy Alliance, LLC; Subcontract Award No. 00074510.

C. Oregon Department of Energy, OOE Rule No. 345-030-010.

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Executive Summary

The data from this reporting year shows that the use of the Radiation Center and the Oregon State TRIGA® reactor (OSTR) has returned to pre-COVID levels across nearly every metric.

Of the work performed, seventy-four percent (78%) of the OSTR research hours were in support of off-campus research projects reflecting the use of the OSTR nationally and internationally. Radiation Center users published or submitted 120 articles this year and made 45 presentations on work that involved the OSTR or Radiation Center. The number of samples irradiated in the reactor during this reporting period was 2,152. Funded OSTR use hours comprised 83% of the research use. The Radiation Center supported 34 different courses during the academic year, with the OSTR being utilized in 11 of those courses.

Personnel at the Radiation Center conducted 103 tours of the facility, accommodating 839 visitors. The visitors included elementary, middle school, high school, and college students; relatives and friends; faculty; current and prospective clients; national laboratory and industrial scientists and engineers; and state, federal, and international officials. The Radiation Center is a significant positive attraction on campus because visitors leave with a good impression of the facility and of Oregon State University.

The Radiation Center's projects database continues to provide a useful way of tracking the many different aspects of work at the facility. The number of projects supported this year was 197. Reactor related projects comprised 72% of all projects. The total research dollars in some way supported by the Radiation Center, as reported by our researchers, was $12.5 million. The actual total is likely higher. This year, the Radiation Center provided service to 78 different organizations/institutions of which 46% were from other states and 32% of which were from outside the U.S. and Canada. So, while the Center's primary mission is local, it is also a facility with a national and international clientele.

The Radiation Center's website provides an easy way for potential users to evaluate the Center's facilities and capabilities as well as to apply for a project and check use charges. The address is http://radiationcenter.oregonstate.edu.

Introduction

The current annual report of the Oregon State University Radiation Center and TRIGA® Reactor follows the usual format by including information relating to the entire Radiation Center rather than just the reactor. However, the information is still presented in such a manner that data on the reactor may be examined separately, if desired. It should be noted that all annual data given in this report covers the period from July 1, 2024 through June 30, 2025. Cumulative reactor operating data in this report relates only to the LEU fueled core. This covers the period beginning July 1, 2008 to the present date. For a summary of data on the reactor's two other cores, the reader is referred to previous annual reports.

In addition to providing general information about the activities of the Radiation Center, this report is designed to meet the reporting requirements of the U.S. Nuclear Regulatory Commission and the Oregon Department of Energy. Because of this, the report is divided into several distinct parts so that the reader may easily find the sections of interest.

Overview of the Radiation Center

The Radiation Center is a unique facility which serves the entire OSU campus, all other institutions within the Oregon University System, and many other universities and organizations throughout the nation and the world. The Center also regularly provides special services to state and federal agencies, particularly agencies dealing with law enforcement, energy, health, and environmental quality, and renders assistance to Oregon industry. In addition, the Radiation Center provides permanent office and laboratory space for the OSU School of Nuclear Science and Engineering, the OSU Institute of Nuclear Science and Engineering, and for the OSU nuclear chemistry, radiation chemistry, geochemistry, and radiochemistry programs. There is no other university facility with the combined capabilities of the OSU Radiation Center in the western half of the United States.

Located in the Radiation Center are many items of specialized equipment and unique teaching and research facilities.

They include a TRIGA® Mark II research nuclear reactor; a ^{60}Co gamma irradiator; a large number of state-of-the art computer-based gamma radiation spectrometers and associated high purity germanium detectors; and a variety of instruments for radiation measurements and monitoring. Specialized facilities for radiation work include teaching and research laboratories with instrumentation and related equipment for performing neutron activation analysis and radiotracer studies; laboratories for plant experiments involving radioactivity; a facility for repair and calibration of radiation protection instrumentation; and facilities for packaging radioactive materials for shipment to national and international destinations.

Also housed in the Radiation Center is the Advanced Thermal Hydraulics Research Laboratory (ATHRL) which is used for state-of-the-art two-phase flow experiments. Within ATHRL is located the NuScale Integral Systems Test-2 (NIST-2) facility, a nuclear power plant test facility that is instrumental in the design certification of the NuScale small modular reactor. The NIST-2 facility is constructed of all stainless-steel components and is capable of operation at full system pressure (1500 psia) and full system temperature (600°F).

All components are 1/3 scale height and 1/254.7 volume scale. The current testing program is examining methods for natural circulation startup, helical steam generator heat transfer performance, a wide range of design basis, and beyond design basis, accident conditions.

The Advanced Nuclear Systems Engineering Laboratory (ANSEL) is the home to two major thermal-hydraulic test facilities: the High Temperature Test Facility (HTTF) and the Hydro-mechanical Fuel Test Facility (HMFTF). The HTTF is a 1/4 scale model of the Modular High Temperature Gas Reactor. The vessel has a ceramic lined upper head and shroud capable of operation at 850°C (well mixed helium). The design will allow for a maximum operating pressure of 1.0MPa and a maximum core ceramic temperature of 1600°C. The nominal working fluid will be helium with a core power of approximately 600 kW (note that electrical heaters are used to simulate the core power). The test facility also includes a scaled reactor cavity cooling system, a circulator, and a heat sink in order to complete the cycle. The HTTF can be used to simulate a wide range of accident scenarios in gas reactors to include the depressurized conduction cooldown and pressurized conduction cooldown events. The HMFTF is a testing facility which will be used to produce a database of hydro-mechanical information to supplement the qualification of the prototypic ultrahigh density U-Mo Low Enriched Uranium fuel which will be implemented into the U.S. High Performance Research Reactors upon their conversion to low enriched fuel. This data in turn will be used to verify current theoretical hydro- and thermo-mechanical codes being used during safety analyses. The maximum operational pressure of the HMFTF is 600 psig with a maximum operational temperature of 450°F.

The Radiation Center staff regularly provides direct support and assistance to OSU teaching and research programs. Areas of expertise commonly involved in such efforts include nuclear engineering, nuclear and radiation chemistry, neutron activation analysis, radiation effects on biological systems, radiation dosimetry, environmental radioactivity, production of short-lived radioisotopes, radiation shielding, nuclear instrumentation, emergency response, transportation of radioactive materials, instrument calibration, radiation health physics, radioactive waste disposal, and other related areas.

In addition to formal academic and research support, the Center’s staff provides a wide variety of other services including public tours, instructional programs, and professional consultation associated with the feasibility, design, safety, and execution of experiments using radiation and radioactive materials.

PEOPLE

This section contains a listing of all people who were residents of the Radiation Center or who worked a significant amount of time at the Center during this reporting period.

It should be noted that not all of the faculty and students who used the Radiation Center for their teaching and research are listed. Summary information on the number of people involved is given in Table VI.1 while individual names and projects are listed in Table VI.2.

Radiation Center Staff

Steven Reese, Director

Nicole Thompson, Office Manager

Erica Alvey Aguilera, Receptionist

Zane Tucker, Reactor Administrator/Assistant Director, Senior Reactor Operator

Celia Oney, Reactor Supervisor, Senior Reactor Operator

Anthony Coke, Senior Reactor Operator

Scott Menn, Senior Health Physicist

Adam Stricker, Health Physicist

Leah Minc, Neutron Activation Analysis Manager

Steve Smith, Development Engineer, Senior Reactor Operator

Dan Sturdevant, Custodian

Matthew Berry, Business Manager

Christopher Thompson, Director Info-Technology

Bhavya Singh, Network Administrator

Oden Armstrong, Reactor Operator (Student)

Annie Givens, Reactor Operator (Student)

Ian Kessler, Reactor Operator (Student)

Drake Martin, Reactor Operator (Student)

Gregory McCoy, Reactor Operator (Student)

Nathaniel McNichols, Reactor Operator (Student)

Robert Riley, Reactor Operator (Student)

Paul Sprague, Reactor Operator (Student)

Samuel Stein, Reactor Operator (Student)

Quinton Williams, Reactor Operator (Student)

Silas Barton, Health Physics Monitor (Student)

Anastasia Kaurova, Health Physics Monitor (Student)

Erin McGee, Health Physics Monitor (Student)

Alexander Spurling, Health Physics Monitor (Student)

Reactor Operations Committee

Samuel Briggs
OSU School of Nuclear Science and Engineering

Abi Tavakoli Farsoni
OSU School of Nuclear Science and Engineering

Dan Harlan
OSU Radiation Safety

Trevor Howard
OSU School of Nuclear Science and Engineering

Jere Jenkins
Texas A&M University

Scott Menn
OSU Radiation Center

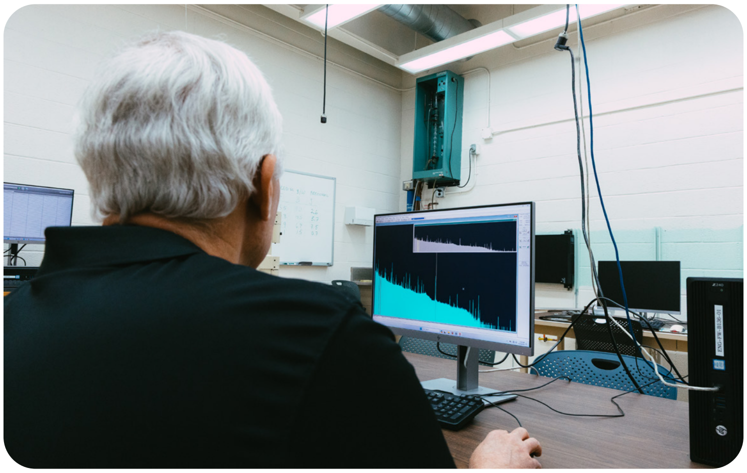
Celia Oney ***(not voting)***
OSU Radiation Center

Steven Reese ***(not voting)***
OSU Radiation Center

Julie Tucker
OSU Mechanical, Industrial, and Manufacturing Engineering

Zane Tucker
OSU Radiation Center

Haori Yang
OSU School of Nuclear Science and Engineering



Faculty

Samuel Briggs
Associate Professor, Nuclear Science and Engineering

Alexander Chemey
Assistant Professor, Nuclear Science and Engineering

Tianyi Chen
Assistant Professor, Nuclear Science and Engineering

Abi Tavakoli Farsoni
Associate Professor, Nuclear Science and Engineering

Mark Galvin
Associate Professor (Senior Research), Nuclear Science and Engineering

Izabela Gutowska
Assistant Professor, Nuclear Science and Engineering

David Hamby
Professor Emeritus, Nuclear Science and Engineering

Kathryn Higley
Distinguished Professor, Nuclear Science and Engineering

Trevor Howard
Assistant Professor, Nuclear Science and Engineering

Walter Loveland
Professor Emeritus, Chemistry

Wade Marcum
Senior Associate Dean, College of Engineering
Professor, Nuclear Science and Engineering

Devin McGlamery
Postdoctoral Scholar, Nuclear Science and Engineering

Scott Menn
Senior Health Physicist, Radiation Center

Guillaume Mignot
Assistant Professor (Senior Research), Nuclear Science and Engineering

Leah Minc
Professor, Anthropology
Professor (Senior Research), Radiation Center

Alena Paulenova
Professor Emeritus, Nuclear Science and Engineering

Leila Ranjbar
Director Online Programs, Nuclear Science and Engineering
Senior Instructor, Nuclear Science and Engineering

Steven Reese
Director, Radiation Center
Associate Professor, Nuclear Science and Engineering

Gurpreet Singh
Facilities Engineer 2, Nuclear Science and Engineering

Zane Tucker
Reactor Administrator/Assistant Director, Radiation Center

Aaron Weiss
Senior Faculty Research Assistant, Nuclear Science and Engineering

Brian Woods
School Head and Professor, Nuclear Science and Engineering

Qiao Wu
Professor, Nuclear Science and Engineering

Haori Yang
Associate Professor, Nuclear Science and Engineering

FACILITIES

Research Reactor

The Oregon State University TRIGA Reactor® (OSTR) is a water-cooled, swimming pool type research reactor which uses uranium/zirconium hydride fuel elements in a circular grid array. The reactor core is surrounded by a ring of graphite which serves to reflect neutrons back into the core. The core is situated near the bottom of a 22-foot deep water-filled tank, and the tank is surrounded by a concrete bioshield which acts as a radiation shield and structural support. The reactor is licensed by the U.S. Nuclear Regulatory Commission to operate at a maximum steady state power of 1.1 MW and can also be pulsed up to a peak power of about 2500 MW.

The OSTR has a number of different irradiation facilities including a pneumatic transfer tube, a rotating rack, a thermal column, four beam ports, five sample holding (dummy) fuel elements for special in-core irradiations, an in-core irradiation tube, and a cadmium-lined in-core irradiation tube for experiments requiring a high energy neutron flux.

The **pneumatic transfer facility** (called a Rabbit) enables samples to be inserted and removed from the core in four to five seconds. Consequently, this facility is normally used for neutron activation analysis involving short-lived radionuclides. On the other hand, the **rotating rack** is used for much longer irradiation of samples (e.g., hours). The rack consists of a circular array of 40 tubular positions each of which can hold two sample tubes. Rotation of the rack ensures that each sample will receive an identical irradiation.

The reactor's **thermal column** consists of a large stack of graphite blocks which slows down neutrons from the reactor core in order to increase thermal neutron activation of samples. Over 99% of the neutrons in the thermal column are thermal neutrons. Graphite blocks are removed from the thermal column to enable samples to be positioned inside for irradiation.

The **beam ports** are tubular penetrations in the reactor's main concrete shield which enable neutron and gamma radiation to stream from the core when a beam port's shield plugs are removed. The neutron radiography facility utilized the tangential beam port (beam port #3) to produce ASTM E545 category I radiography capability. The other beam ports are available for a variety of experiments.

If samples irradiated require a large neutron fluence, especially from higher energy neutrons, they may be placed in the **in-core irradiation tube (ICIT)**, located in one of several in-core lattice positions.

The **cadmium-lined in-core irradiation tube (CLICIT)** enables samples to be irradiated in a high flux region near the center of the core. The cadmium lining in the facility eliminates thermal neutrons and thus permits sample exposure to higher energy neutrons only. The cadmium-lined end of this air-filled aluminum irradiation tube is inserted into an inner grid position of the reactor core which would normally be occupied by a fuel element. It is the same as the ICIT except for the presence of the cadmium lining.

Instructional Uses of the OSTR

Instructional use of the reactor is twofold. First, it is historically used for classes in Nuclear Engineering, Radiation Health Physics, and Chemistry at both the graduate and undergraduate levels to demonstrate numerous principles which have been presented in the classroom. Basic neutron behavior is the same in small reactors as it is in large power reactors. Many demonstrations and instructional experiments can be performed using the OSTR which cannot be carried out with a commercial power reactor. Shorter-term demonstration experiments are also performed for many undergraduate students in Physics, Chemistry, and Biology classes, as well as for visitors from other universities and colleges, from high schools, and from public groups.

The second instructional application of the OSTR involves educating reactor operators, operations managers, and health physicists. The OSTR is in a unique position to provide such education since curricula must include hands-on experience at an operating reactor and in associated laboratories. The many types of educational programs that the Radiation Center provides are more fully described in Part VI of this report.

During this reporting period, the OSTR accommodated a number of different OSU academic classes and other academic programs. In addition, portions of classes from other Oregon universities were also supported by the OSTR.

Research Uses of the OSTR

The OSTR is a unique and valuable tool for a wide variety of research applications and serves as an excellent source of neutrons and/or gamma radiation. The most commonly used experimental technique requiring reactor use is instrumental neutron activation analysis (INAA). This is a particularly sensitive method of elemental analysis which is described in more detail in Part VI.

The OSTR's irradiation facilities provide a wide range of neutron flux levels and neutron flux qualities which are sufficient to meet the needs of most researchers. This is true not only for INAA, but also for other experimental purposes such as the ^{39}Ar/^{40}Ar ratio and fission track methods of age dating samples.

Analytical Equipment

The Radiation Center has a large variety of radiation detection instrumentation. This equipment is upgraded as necessary, especially the gamma ray spectrometers with their associated computers and germanium detectors. Additional equipment for classroom use and an extensive inventory of portable radiation detection instrumentation are also available.

Radiation Center nuclear instrumentation receives intensive use in both teaching and research applications. In addition, service projects also use these systems, and the combined use often results in 24-hour per day schedules for many of the analytical instruments. Use of Radiation Center equipment extends beyond that located at the Center, and instrumentation may be made available on a loan basis to OSU researchers in other departments.

Radioisotope Irradiation Sources

The Radiation Center is equipped with a Gammacell 220 ^{60}Co irradiator which is capable of delivering high doses of gamma radiation over a range of dose rates to a variety of materials.

Typically, the irradiator is used by researchers wishing to perform mutation and other biological effects studies; studies in the area of radiation chemistry; dosimeter testing; sterilization of food materials, soils, sediments, biological specimen, and other media; gamma radiation damage studies; and other such applications. In addition to the ^{60}Co irradiator, the Center is also equipped with a variety of smaller ^{60}Co, ^{137}Cs, ^{226}Ra, plutonium-beryllium, and other isotopic sealed sources of various radioactivity levels which are available for use as irradiation sources.

During this reporting period, there was a diverse group of projects using the ^{60}Co irradiator. These projects included the irradiation of a variety of biological and botanical materials.

In addition, the irradiator was used for sterilization of several media and the evaluation of the radiation effects on different materials. Table III.1 provides use data for the Gammacell 220 irradiator.

Laboratories and Classrooms

The Radiation Center is equipped with a number of different radioactive material laboratories designed to accommodate research projects and classes offered by various OSU academic departments or off-campus groups.

Instructional facilities available at the Center include a laboratory especially equipped for teaching radiochemistry and a nuclear instrumentation teaching laboratory equipped with modular sets of counting equipment which can be configured to accommodate a variety of experiments involving the measurement of many types of radiation. The Center also has two student computer rooms.

In addition to these dedicated instructional facilities, many other research laboratories and pieces of specialized equipment are regularly used for teaching. In particular, classes are routinely given access to gamma spectrometry equipment located in Center laboratories. A number of classes also regularly use the OSTR and the Reactor Bay as an integral part of their instructional coursework.

There are two classrooms in the Radiation Center which are capable of holding about 35 and 18 students. In addition, there are two smaller conference rooms and a library suitable for graduate classes and thesis examinations. As a service to the student body, the Radiation Center also provides an office area for the student chapters of the American Nuclear Society and the Health Physics Society.

All of the laboratories and classrooms are used extensively during the academic year. A listing of courses accommodated at the Radiation Center during this reporting period along with their enrollments is given in Table III.2.

Instrument Repair and Calibration Facility

The Radiation Center has a facility for the repair and calibration of essentially all types of radiation monitoring instrumentation. This includes instruments for the detection and measurement of alpha, beta, gamma, and neutron radiation. It encompasses both high range instruments for measuring intense radiation fields and low range instruments used to measure environmental levels of radioactivity.

The Center's instrument repair and calibration facility is used regularly throughout the year and is absolutely essential to the continued operation of the many different programs carried out at the Center. In addition, the absence of any comparable facility in the state has led to a greatly expanded instrument calibration program for the Center including calibration of essentially all radiation detection instruments used by state and federal agencies in the state of Oregon. This includes instruments used on the OSU campus and all other institutions in the Oregon University System plus instruments from the Oregon Health Division's Radiation Protection Services, the Oregon Department of Energy, the Oregon Public Utilities Commission, the Oregon Health and Sciences University, the Army Corps of Engineers, and the U.S. Environmental Protection Agency.

Table III.1

Gammacell 220 ^{60}Co Irradiator Use

Purpose of Irradiation	Samples	Dose Range (rads)	Number of Irradiations	Use Time (hours)
Biological Studies	mold, human cells	2.5×10^{2} to 1.0×10^{5}	24	5.18
Botanical Studies	cuttings, seeds, stolon	2.5×10^{3} to 1.0×10^{4}	11	0.30
Dosimeter Analysis	dosimeter materials	5.0×10^{5} to 5.0×10^{6}	32	355.53
Material Evaluation	propylene glycol, carbon nanotubes, chemicals, plastic material	2.0×10^{6} to 1.0×10^{8}	12	2,227.78
Other	electronic components, crystals	1.1×10^{8} to 1.2×10^{8}	2	1,140.13
Sterilization	wood, clay minerals, fish food, ground flower, medical devices, nanofibers, PHA, scaffolds, soil	1.5×10^{6} to 3.0×10^{6}	57	668.75
Totals			**138**	**4,397.67**

Table III.2

Student Enrollment in Courses Taught or Partially Taught at the Radiation Center

			NUMBER OF STUDENTS			
COURSE #	CREDITS	COURSE TITLE	Summer 2024	Fall 2024	Winter 2025	Spring 2025
NSE 236*	4	Nuclear Radiation Detection and Instrumentation				46
NSE 401/501/601	1-16	Research	5	20	17	14
NSE 405/505/605	1-16	Reading and Conference	1	2		
NSE 406/506/606	1-16	Projects			6	1
NSE 407/507	1	Seminar/Occupational Experiences				15
NSE 435/535	4	Radiation Shielding and External Dosimetry				37
NSE 446/546	4	Microstructure Characterization of Structural and Energy Materials				9
NSE 455/555**	3	Reactor Operator Training I		20		
NSE 457/557**	2	Nuclear Reactor Laboratory				34
NSE 467/567	4	Nuclear Reactor Thermal Hydraulics		38		
NSE 474	4	Nuclear Systems Design I			32	
NSE 475	4	Nuclear Systems Design II				32
NSE 481*	4	Radiation Protection		37		
NSE 499	3	ST/Actinides				14
NSE 499/599	3	ST/Radiation Damage in Metals				13
NSE 503/603*	1-16	Thesis/Dissertation	24	44	41	40
NSE 531	3	Radiophysics		12		
NSE 536*	4	Advanced Radiation Detection and Measurement			13	
NSE 565	3	Applied Thermal Hydraulics			9	

Table III.2 (continued)

Student Enrollment in Courses Taught or Partially Taught at the Radiation Center

			NUMBER OF STUDENTS			
COURSE #	**CREDITS**	**COURSE TITLE**	**Summer 2024**	**Fall 2024**	**Winter 2025**	**Spring 2025**
NSE 599	**3**	ST/Computational Credibility			**8**	
NSE 667	**3**	Advanced Thermal Hydraulics				**10**

Courses from Other OSU Departments:

COURSE #	CREDITS	COURSE TITLE	Summer 2024	Fall 2024	Winter 2025	Spring 2025
ANTH 425*	4	Ceramic Analysis in Archaeology			4	
CH 462*	3	Experimental Chemistry II			26	
ECE 530*	4	Contemporary Energy Applications		11		
ME 552*	4	Measurements in Fluid Mechanics and Heat Transfer			13	
SUS 103*	4	Introduction to Climate Change		44		

ST Special Topics
* *OSTR used occasionally for demonstration and/or experiments.*
** *OSTR used heavily*

REACTOR

Operating Statistics

During the operating period between July 1, 2024 and June 30, 2025, the reactor produced 1,371 MWH of thermal power during its 1,474 critical hours.

Experiments Performed

At the end of the reporting period there were five approved reactor experiments available for use in reactor-related programs. They are:

A-1 Normal TRIGA Operation (no sample irradiation)
B-3 Irradiation of Materials in the Standard OSTR Irradiation Facilities
B-29 Reactivity Worth of Fuel
B-31 TRIGA Flux Mapping
B-36 Irradiation of Fissionable Materials in the OSTR

Of these available experiments, four were used during the reporting period. Table IV.4 provides information related to the frequency of use and the general purpose of their use.

Inactive Experiments

Presently, 39 experiments are in the inactive file. This consists of experiments which have been performed in the past and may be reactivated. Many of these experiments are now performed under the more general experiments listed in the previous section. The following list identifies these inactive experiments.

A-2 Measurement of Reactor Power Level via Mn Activation
A-3 Measurement of Cd Ratios for Mn, In, and Au in Rotating Rack
A-4 Neutron Flux Measurements in TRIGA
A-5 Copper Wire Irradiation
A-6 In-core Irradiation of LiF Crystals
A-7 Investigation of TRIGA's Reactor Bath Water Temperature Coefficient and High Power Level Power Fluctuation
B-1 Activation Analysis of Stone Meteorites, Other Meteorites, and Terrestrial Rocks
B-2 Measurements of Cd Ratios of Mn, In, and Au in Thermal Column
B-4 Flux Mapping
B-5 In-core Irradiation of Foils for Neutron Spectral Measurements
B-6 Measurements of Neutron Spectra in External Irradiation Facilities
B-7 Measurements of Gamma Doses in External Irradiation Facilities
B-8 Isotope Production
B-9 Neutron Radiography
B-10 Neutron Diffraction
B-11 Irradiation of Materials Involving Specific Quantities of Uranium and Thorium in Standard OSTR Irradiation Facilities (Discontinued Feb. 28, 2018)
B-12 Exploratory Experiments (Discontinued Feb. 28, 2018)
B-13 This experiment number was changed to A-7
B-14 Detection of Chemically Bound Neutrons
B-15 This experiment number was changed to C-1
B-16 Production and Preparation of ^{18}F
B-17 Fission Fragment Gamma Ray Angular Correlations
B-18 A Study of Delayed Status (n, γ) Produced Nuclei
B-19 Instrument Timing via Light Triggering
B-20 Sinusoidal Pile Oscillator
B-21 Beam Port #3 Neutron Radiography Facility
B-22 Water Flow Measurements Through TRIGA Core
B-23 Studies Using TRIGA Thermal Column (Discontinued Feb. 28, 2018)
B-24 General Neutron Radiography
B-25 Neutron Flux Monitors
B-26 Fast Neutron Spectrum Generator
B-27 Neutron Flux Determination Adjacent to the OSTR Core

B-28	Gamma Scan of Sodium (TED) Capsule
B-30	NAA of Jet, Diesel, and Furnace Fuels
B-32	Argon Production Facility
B-33	Irradiation of Combustible Liquids in LS (Discontinued Feb. 28, 2018)
B-34	Irradiation of Enriched Uranium in the Neutron Radiography Facility (Discontinued Feb. 28, 2018)
B-35	Irradiation of Fissile Materials in the Prompt Gamma Neutron Activation Analysis (PGNAA) Facility (Discontinued Feb. 28, 2018)
C-1	Pu-O_2 Transient Experiment

Unplanned Shutdowns

There were eight unplanned reactor shutdowns during the current reporting period. Table IV.5 details these events.

Activities Pursuant to 10 CFR 50.59

There was one safety evaluation performed in support of the reactor this year. It was:

25-01 Minor Updates to Experiments A-1, B-31, and B-36

Amended Experiment A-1 to remove a reference to square wave operations. Amended B-31 to add powders to the allowed materials for flux measurement. Amended B-36 to replace a reference to the PGNAA with BP1.

There were 10 new screens performed in support of the reactor this year. They were:

24-08 Revisions to OSTROPs 4, 10, and 22

Minor revisions to the procedures for reactor operations, experimental facilities, and emergency power system.

24-09 Skimmer Replacement

Replaced the skimmer in the primary tank with a new model and updated disassembly instructions in OSTROP 7.

24-10 Revisions to Emergency Response Implementing Procedures (ERIPs)

Updated names to reflect staffing changes plus other minor updates.

24-11 Revisions to OSTROP 16

Minor revisions to the procedure for annual surveillance and maintenance.

25-01 Revisions to RCHPPs 1 and 5

Minor revisions to the procedures for the OSU radiation protection program and for receipt of radioactive materials.

25-02 Revisions to OSTROPs 2, 4, 13, and 26

Minor revisions to the procedures for the startup checklist, reactor operations, monthly surveillance and maintenance, and background investigations.

25-03 Addition of Neutron Shielding to the NRF

Added borated polyethylene shielding in front of the NRF shutter with a removable stepped plug in front of the shutter opening.

25-04 Revisions to RCHPPs 15 and 37

Minor revisions to the procedures for the environmental TLD program and dosimetry.

25-05 OSTROP 10 Update for NRF Shielding

Updated the experimental facilities procedure to reflect the additional NRF shielding added under Screen 25-03.

25-06 Revisions to RCHPP 6

Minor revisions to the procedure for shipping radioactive materials.

Surveillance and Maintenance

Non-Routine Maintenance

July 2024

- Made repairs to door controls for Neutron Radiography Facility.
- Cleaned the cooling tower water level sensor.

August 2024

- Replaced fuse in cooling tower fan variable frequency drive (VFD).
- Replaced pool skimmer in reactor tank.
- Cleaned cooling tower and greased the cooling fan bearings.

September 2024

- Replaced demineralizer resin.

October 2024

- Replaced the detector for Area Radiation Monitor #2.
- Replaced the oxidation-reduction potential (ORP) pump on the secondary water chemical addition system.
- Replaced the rod position indicator for the shim rod.

November 2024

December 2024

- Replaced belt on ventilation supply fan.

January 2025

- Installed radio repeaters throughout the building to improve reception for two-way radios.

February 2025

- Repositioned NRF shutter slightly while investigating dose rates in the facility.

March 2025

April 2025

- Added additional borated polyethylene neutron shielding over the NRF shutter.
- Replaced the electromagnet for the regulating rod.

May 2025

- Replaced the rod position indicator for the regulating rod.

June 2025

Table IV.1
Present OSTR Operating Statistics

Operational Data For LEU Core	Annual Values (2024/2025)	Cumulative Values
MWH of Energy Produced	1,371	21,334
MWD of Energy Produced	57.1	888.9
Grams ^{235}U Used	76	1,215
Number of Fuel Elements Added to (+) or Removed (-) from the Core	0	91
Number of Pulses	39	509
Hours Reactor Critical	1,474	22,706
Hours at Full Power (1 MW)	1,361	21,099
Number of Startup and Shutdown Checks	250	3,857
Number of Irradiation Requests Processed	300	4,122
Number of Samples Irradiated	2,243	32,830

Table IV.2
OSTR Use Time in Terms of Specific Use Categories

OSTR Use Category	Annual Values (hours)	Cumulative Values (hours)
Teaching (departmental and others)	63	13,986
OSU Research	581	27,266
Off Campus Research	2,309	67,821
Facility Time	85	8,043
Total Reactor Use Time	3,038	117,116

Table IV.3
OSTR Multiple Use Time

Number of Users	Annual Values (hours)	Cumulative Values (hours)
Two	473	13,170
Three	230	7,514
Four	119	4,073
Five	42	1,783
Six	22	606
Seven	1	183
Eight or more	4	33
Total Multiple Use Time	891	27,362

Table IV.4
Use of OSTR Reactor Experiments

Experiment Number	Research	Teaching	Facility Use	Total
A-1	0	5	6	11
B-3	259	6	19	284
B-29	0	0	0	0
B-31	0	0	3	3
B-36	2	0	0	2
Total	261	11	28	300

Table IV.5
Unplanned Reactor Shutdowns and SCRAMS

Type of Event	Number of Occurrences	Cause of Event
Manual Shutdown	1	Cooling tower fan failure
Manual SCRAM	1	Loss of off-site electrical power
Manual Shutdown	2	Low secondary flow
Manual SCRAM	3	Reg rod drop
Manual Shutdown	1	Reg rod drop

Figure IV.1

Monthly Surveillance and Maintenance (Sample Form)

OSTROP 13, Rev. LEU-12 Surveillance & Maintenance for the Month of __________________ in the year 20_______

	SURVEILLANCE & MAINTENANCE [SHADE INDICATES LICENSE REQUIREMENT]	LIMITS		AS FOUND		TARGET DATE	DATE NOT TO BE EXCEEDED *	DATE COMPLETED	REMARKS & INITIALS
1	REACTOR TANK HIGH AND LOW WATER LEVEL ALARMS	MAXIMUM MOVEMENT ± 3 INCHES		HIGH:__________INCHES LOW: _________INCHES ANN:_______________					
2	REACTOR TANK TEMPERATURE ALARM CHECK	FUNCTIONAL		Tested @______					
3.A	CHANNEL TEST OF STACK CAM GAS CHANNEL	8.5E4± 8500 cpm	Ann.?	___cpm	___Ann.				
3.B	CHANNEL TEST OF STACK CAM PARTICULATE CHANNEL	8.5E4± 8500 cpm	Ann.?	___cpm	___Ann.				
3.C	CHANNEL TEST OF REACTOR TOP CAM PARTICULATE CHANNEL	8.5E4± 8500 cpm	Ann.?	___cpm	___Ann.				
4	MEASUREMENT OF REACTOR PRIMARY WATER CONDUCTIVITY	<5 μmho\cm							
5	CHANGE LAZY SUSAN FILTER	FILTER CHANGED					N/A		
6	REACTOR TOP CAM OIL LEVEL CHECK	OSTROP 13.8		NEED OIL?______			N/A		
7	STACK CAM OIL LEVEL CHECK	OSTROP 13.9		NEED OIL?______			N/A		
8	EMERGENCY DIESEL GENERATOR CHECKS	> 50%	Oil ok?				N/A		
		Visual	Hours				N/A		
9	RABBIT SYSTEM RUN TIME	Total hours/Hours on current brushes		/			N/A		
10	OIL TRANSIENT ROD BRONZE BEARING	WD-40					N/A		
11	CRANE INSPECTION	Hooks	Hoist Rope				N/A		
12	WATER MONITOR CHECK	RCHPP 8 App. F.4					N/A		
13	EMERGENCY LIGHT TESTING	30 seconds?					N/A		

* Date not to be exceeded is only applicable to shaded items. It is equal to the time completed last month plus six weeks.

Figure IV.2

Quarterly Surveillance and Maintenance (Sample Form)

OSTROP 14, Rev. LEU-8

Surveillance & Maintenance for the 1st / 2nd / 3rd / 4th Quarter of 20_______

<table>
<tr><th colspan="14">SURVEILLANCE & MAINTENANCE
[SHADE INDICATES LICENSE REQUIREMENT]</th><th>LIMITS</th><th>AS FOUND</th><th>TARGET DATE</th><th>DATE NOT TO BE EXCEEDED*</th><th>DATE COMPLETED</th><th>REMARKS & INITIALS</th></tr>
<tr><td>1</td><td colspan="13">REACTOR OPERATION COMMITTEE (ROC) AUDIT</td><td>QUARTERLY**</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td colspan="13">INTERNAL AUDIT OF OSTROPs</td><td>QUARTERLY</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td colspan="13">PERIODIC ROC MEETING</td><td>QUARTERLY**</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td colspan="13">ERP INSPECTIONS</td><td>QUARTERLY</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td colspan="13">ROTATING RACK CHECK FOR UNKNOWN SAMPLES</td><td>EMPTY</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6</td><td colspan="13">WATER MONITOR ALARM CHECK</td><td>FUNCTIONAL</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.A</td><td colspan="13">CHECK FILTER TAPE SPEED ON STACK MONITOR</td><td>1”/HR ± 0.2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.B</td><td colspan="13">CHECK FILTER TAPE SPEED ON CAM MONITOR</td><td>1”/HR ± 0.2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8</td><td colspan="13">INCORPORATE 50.59s INTO DOCUMENTATION</td><td>QUARTERLY</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td colspan="13">EMERGENCY CALL LIST</td><td>QUARTERLY</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">10</td><td colspan="13">ARM SYSTEM ALARM CHECKS</td><td rowspan="6">FUNCTIONAL</td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td></tr>
<tr><td>ARM</td><td>1</td><td>2</td><td>3S</td><td>3E</td><td>4</td><td>5</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>AUD</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>LIGHT</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>PANEL</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>ANN</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>11</td><td colspan="13">OPERATOR LOG</td><td>QUARTERLY</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

* Date not to be exceeded is only applicable to shaded items. It is equal to the time completed last quarter plus four months.

**ROC meetings are generally performed when school is in session, thus 3rd quarter may not have a meeting.

Figure IV.3

Semi-Annual Surveillance and Maintenance (Sample Form)

OSTROP 15, Rev. LEU-12

Surveillance & Maintenance for the 1st / 2nd Half 20______

SURVEILLANCE & MAINTENANCE [SHADE INDICATES LICENSE REQUIREMENT]			LIMITS	AS FOUND	TARGET DATE	DATE NOT TO BE EXCEEDED*	DATE COMPLETED	REMARKS & INITIALS
1	CHANNEL TESTS OF REACTOR INTERLOCKS	NEUTRON SOURCE COUNT RATE INTERLOCK	NO WITHDRAW					
			≥5 cps					
		TRANSIENT ROD AIR INTERLOCK	NO PULSE					
		PULSE MODE ROD MOVEMENT INTERLOCK	NO MOVEMENT					
		MAXIMUM PULSE REACTIVITY INSERTION LIMIT	≤ $2.25					
		TWO ROD WITHDRAWAL PROHIBIT	1 ONLY					
		PULSE PROHIBIT ABOVE 1 kW	≥1 kW					
2	TEST PULSE	PREVIOUS PULSE DATA FOR COMPARISON: PULSE # __________ $__________________ _______________ MW	≤20% CHANGE	PULSE # ______ $______________ ___________MW				
3	CLEANING & LUBRICATION OF TRANSIENT ROD CARRIER INTERNAL BARREL							
4	LUBRICATION OF BALL-NUT DRIVE ON TRANSIENT ROD CARRIER							
5	LUBRICATION OF THE ROTATING RACK BEARINGS		WD-40					
6	CONSOLE CHECK LIST		OSTROP 15.VI					
7	STANDARD CONTROL ROD MOTOR CHECKS		LO-17 BODINE OIL					
8	FUNCTIONAL CHECK OF HOLDUP TANK WATER LEVEL ALARMS		OSTROP 15.1X	HIGH_______ FULL_______				
9	INSPECTION OF THE PNEUMATIC TRANSFER SYSTEM		BRUSH INSPECITON					
			SAMPLE INSERTION AND WITHDRAWAL TIME CHECK	OBSERVED INSERTION/ WITHDRAWAL TIME				

*Date not to be exceeded is only applicable to shaded items. It is equal to the date last time plus 7.5 months.

Figure IV.4

Annual Surveillance and Maintenance (Sample Form)

<table>
<tr><td colspan="7">OSTROP 16, Rev. LEU-15</td><td colspan="6">Annual Surveillance and Maintenance for 20______</td></tr>
<tr><th colspan="7">SURVEILLANCE AND MAINTENANCE
[SHADE INDICATES LICENSE REQUIREMENT]</th><th>LIMITS</th><th>AS FOUND</th><th>TARGET DATE</th><th>DATE NOT TO BE EXCEEDED*</th><th>DATE COMPLETED</th><th>REMARKS & INITIALS</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">BIENNIAL INSPECTION OF CONTROL RODS:</td><td colspan="5">FFCRs</td><td rowspan="2">OSTROP 12.0</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">TRANS</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td colspan="6">STANDARD CONTROL ROD DRIVE INSPECTON</td><td>OSTROP 16.2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td colspan="6">CONTROL ROD CALIBRATION</td><td>OSTROP 9</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">CONTROL ROD WITHDRAWAL INSERTION & SCRAM TIMES</td><td></td><td>TRANS</td><td>SAFE</td><td>SHIM</td><td>REG</td><td rowspan="2">≤2 sec</td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr>
<tr><td>SCRAM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>W/D</td><td></td><td></td><td></td><td></td><td>≤50 sec</td></tr>
<tr><td>INSERT</td><td></td><td></td><td></td><td></td><td>≤50 sec</td></tr>
<tr><td>5</td><td colspan="6">FUEL ELEMENT INSPECTION FOR SELECTED ELEMENTS</td><td>≥ 20% FE’s inspected.
No damage,
deterioration or swell.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6</td><td colspan="6">REACTOR POWER CALIBRATION</td><td>OSTROP 8</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>7</td><td colspan="6">CALIBRATION OF REACTOR TANK WATER TEMPERATURE METERS</td><td>OSTROP 16.8</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">CONTINUOUS AIR MONITOR CALIBRATION</td><td colspan="5">Particulate Monitor</td><td rowspan="2">RCHPP 18</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Gas Monitor</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td colspan="6">CAM OIL/GREASE MAINTENANCE</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">STACK MONITOR CALIBRATION</td><td colspan="5">Particulate Monitor</td><td rowspan="2">RCHPPs
18 & 26</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td colspan="5">Gas Monitor</td></tr>
<tr><td>11</td><td colspan="6">STACK MONITOR OIL/GREASE MAINTENANCE</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td colspan="6">AREA RADIATION MONITOR CALIBRATION</td><td>RCHPP 18</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

* Date not be exceeded is only applicable to shaded items. It is equal to the date completed last year plus 15 months.
For biennial license requirements, it is equal to the date completed last time plus 2 1/2 years.

Figure IV.4 (continued)

Annual Surveillance and Maintenance (Sample Form)

OSTROP 16, Rev. LEU-15

Annual Surveillance and Maintenance for 20______

SURVEILLANCE AND MAINTENANCE [SHADE INDICATES LICENSE REQUIREMENT]			LIMITS	AS FOUND	TARGET DATE	DATE NOT TO BE EXCEEDED*	DATE COMPLETED	REMARKS & INITIALS
13	CORE EXCESS		≤$7.55	$_______				
14	REACTOR BAY VENTILATION SYSTEM SHUTDOWN TEST		DAMPERS CLOSE IN ≤60 SECONDS	1^{ST} FLOOR ___ 4^{TH} FLOOR ___				
15	CRANE INSPECTION							
16	SNM PHYSICAL INVENTORY		N/A	N/A	OCTOBER			
17	MATERIAL BALANCE REPORTS		N/A	N/A	NOVEMBER			
18	EMERGENCY RESPONSE PLAN	CFD TRAINING						
		GOOD SAM TRAINING						
		ERP REVIEW	MEMO					
		ERP DRILL						
		CPR CERT FOR:						
		CPR CERT FOR:						
		FIRST AID CERT FOR:						
		FIRST AID CERT FOR:						
		EVACUATION DRILL						
		AUTO EVAC ANNOUNCEMENT TEST						
		ERP EQUIPMENT INVENTORY						
		BIENNIAL SUPPORT AGREEMENTS						
19	PHYSICAL SECURITY PLAN	PSP REVIEW	MEMO					
		PSP DRILL						
		PART 37 PLAN REVIEW						
		PART 37 PLAN DRILL						
		DPS TRAINING						
		LOCK/SAFE COMBO CHANGES						
		AUTHORIZATION LIST UPDATE						

* Date not be exceeded is only applicable to shaded items. It is equal to the date completed last year plus 15 months.
For biennial license requirements, it is equal to the date completed last time plus 2 1/2 years.

Figure IV.4 (continued)

Annual Surveillance and Maintenance (Sample Form)

OSTROP 16, Rev. LEU-15

Annual Surveillance and Maintenance for 20______

SURVEILLANCE AND MAINTENANCE [SHADE INDICATES LICENSE REQUIREMENT]			LIMITS	AS FOUND	TARGET DATE	DATE NOT TO BE EXCEEDED*	DATE COMPLETED	REMARKS & INITIALS
20	ANNUAL REPORT		NOV 1		OCT 1	NOV 1		
21	ANNUAL INVENTORY OF SCANNED RECORDS		ANNUAL					
22	KEY INVENTORY		ANNUAL					
23	REACTOR TANK AND CORE COMPONENT INSPECTION		NO WHITE SPOTS					
24	EMERGENCY LIGHT LOAD TEST							
25	BEAM PORT #1 IRRADIATION FACILITY INTERLOCKS							
26	NEUTRON RADIOGRAPHY FACILTIY INTERLOCKS							
27	WATER CONDUCTIVITY	PRIMARY	≤ 5 µmhos					
		BULK SHIELD TANK	≤ 5 µmhos					
28	EXPERIMENTS REVIEW		MEMO					
29	REACTOR OPERATOR LICENSE CONDITIONS							

* Date not be exceeded is only applicable to shaded items. It is equal to the date completed last year plus 15 months.
For biennial license requirements, it is equal to the date completed last time plus 2 1/2 years.

RADIATION PROTECTION

Introduction

The purpose of the radiation protection program is to ensure the safe use of radiation and radioactive material in the Radiation Center's teaching, research, and service activities, and in a similar manner to the fulfillment of all regulatory requirements of the State of Oregon, the U.S. Nuclear Regulatory Commission, and other regulatory agencies. The comprehensive nature of the program is shown in Table V.1 which lists the program's major radiation protection requirements and the performance frequency for each item.

The radiation protection program is implemented by a staff consisting of a Senior Health Physicist, a Health Physicist, and several part-time Health Physics Monitors (see Part II). Assistance is also provided by the reactor operations group, the neutron activation analysis group, the Scientific Instrument Technician, and the Radiation Center Director.

The data contained in the following sections have been prepared to comply with the current requirements of Nuclear Regulatory Commission (NRC) Facility License No. R-106 (Docket No. 50-243) and the Technical Specifications contained in that license. The material has also been prepared in compliance with Oregon Department of Energy Rule No. 345-030-010 which requires an annual report of environmental effects due to research reactor operations.

Within the scope of Oregon State University's radiation protection program, it is standard operating policy to maintain all releases of radioactivity to the unrestricted environment and all exposures to radiation and radioactive materials at levels which are consistently "as low as reasonably achievable" (ALARA).

Environmental Releases

The annual reporting requirements in the OSTR Technical Specifications state that the licensee (OSU) shall include "a summary of the nature and amount of radioactive effluents released or discharged to the environs beyond the effective control of the licensee, as measured at, or prior to, the point of such release or discharge." The liquid and gaseous effluents released, and the solid waste generated and transferred are discussed briefly below. Data regarding these effluents are also summarized in detail in the designated tables.

Liquid Effluents Released

Liquid Effluents

Oregon State University has implemented a policy to reduce the volume of radioactive liquid effluents to an absolute minimum. For example, water used during the ion exchanger

resin change is now recycled as reactor makeup water. Waste water from Radiation Center laboratories and the OSTR is collected at a holdup tank prior to release to the sanitary sewer. Liquid effluent are analyzed for radioactivity content at the time it is released to the collection point. For this reporting period, the Radiation Center and reactor made two liquid effluent releases to the sanitary sewer. All Radiation Center and reactor facility liquid effluent data pertaining to this release are contained in Table V.2.

Liquid Waste Generated and Transferred

Liquid waste generated from glassware and laboratory experiments is transferred by the campus Radiation Safety Office to its waste processing facility. The annual summary of liquid waste generated and transferred is contained in Table V.3.

Airborne Effluents Released

Airborne effluents are discussed in terms of the gaseous component and the particulate component.

Gaseous Effluents

Gaseous effluents from the reactor facility are monitored by the reactor stack effluent monitor. Monitoring is continuous (i.e., prior to, during, and after reactor operations). It is normal for the reactor facility stack effluent monitor to begin operation as one of the first systems in the morning and to cease operation as one of the last systems at the end of the day. All gaseous effluent data for this reporting period are summarized in Table V.4.

Particulate effluents from the reactor facility are also monitored by the reactor facility stack effluent monitor.

Particulate Effluents

Evaluation of the detectable particulate radioactivity in the stack effluent confirmed its origin as naturally-occurring radon daughter products within a range of approximately $3x10^{-11}$ µCi/ml to 1×10^{-9} µCi/ml. This particulate radioactivity is predominantly ^{214}Pb and ^{214}Bi which is not associated with reactor operations.

There was no release of particulate effluents with a half life greater than eight days, and therefore, the reporting of the average concentration of radioactive particulates with half lives greater than eight days is not applicable.

Solid Waste Released

Data for the radioactive material in the solid waste generated and transferred during this reporting period are summarized in Table V.5 for both the reactor facility and the Radiation Center. Solid radioactive waste is routinely transferred to OSU Radiation Safety. Until this waste is disposed of by the Radiation Safety Office, it is held along with other campus radioactive waste on the University's State of Oregon radioactive materials license.

Solid radioactive waste is disposed of by OSU Radiation Safety by transfer to the University's radioactive waste disposal vendor.

Personnel Doses

The OSTR annual reporting requirements specify that the licensee shall present a summary of the radiation exposure received by facility personnel and visitors. The summary includes all Radiation Center personnel who may have received exposure to radiation. These personnel have been categorized into six groups: facility operating personnel, key facility research personnel, facilities services maintenance personnel, students in laboratory classes, campus police and security personnel, and visitors.

Facility operating personnel include the reactor operations and health physics staff. The dosimeters used to monitor these individuals include quarterly TLD badges, quarterly track-etch/albedo neutron dosimeters, monthly TLD (finger) extremity dosimeters, pocket ion chambers, and electronic dosimetry.

Key facility research personnel consist of Radiation Center staff, faculty, and graduate students who perform research using the reactor, reactor-activated materials, or other research facilities present at the Center. The individual dosimetry requirements for these personnel will vary with the type of research being conducted, but they will generally include quarterly TLD film badge and TLD (finger) extremity dosimeters. If the possibility of neutron exposure exists, researchers are also monitored with a track-etch/albedo neutron dosimeter.

Facilities Services maintenance personnel are normally issued a gamma sensitive electronic dosimeter as their basic monitoring device.

Students attending laboratory classes are issued quarterly Xß(γ) TLD badges, TLD (finger) extremity dosimeters, and track-etch/albedo or other neutron dosimeters, as appropriate.

Students or small groups of students who attend a one-time lab demonstration and do not handle radioactive materials are usually issued a gamma sensitive electronic dosimeter. These results are not included with the laboratory class students.

OSU police and security personnel are issued a quarterly Xß(γ) TLD badge to be used during their patrols of the Radiation Center and reactor facility.

Visitors, depending on the locations visited, may be issued gamma sensitive electronic dosimeters. OSU Radiation Center policy does not normally allow people in the visitor category to become actively involved in the use or handling of radioactive materials.

An annual summary of the radiation doses received by each of the above six groups is shown in Table V.6. There were no personnel radiation exposures in excess of the limits in 10 CFR 20 or State of Oregon regulations during the reporting period.

Facility Survey Data

The OSTR Technical Specifications require an annual summary of the radiation levels and levels of contamination observed during routine surveys performed at the facility. The Center's comprehensive area radiation monitoring program encompasses the Radiation Center as well as the OSTR, and therefore, monitoring results for both facilities are reported.

Area Radiation Dosimeters

Area monitoring dosimeters capable of integrating the radiation dose are located at strategic positions throughout the reactor facility and Radiation Center. All of these dosimeters contain at least a standard personnel-type beta-gamma film or TLD pack. In addition, for key locations in the reactor facility and for certain Radiation Center laboratories, a CR-39 plastic track-etch neutron detector has also been included in the monitoring package.

The total dose equivalent recorded on the various reactor facility dosimeters is listed in Table V.7 and the total dose equivalent recorded on the Radiation Center area dosimeters is listed in Table V.8. Generally, the characters following the Monitor Radiation Center (MRC) designator show the room number or location.

Routine Radiation and Contamination Surveys

The Center's program for routine radiation and contamination surveys consists of daily, weekly, and monthly measurements throughout the TRIGA reactor facility and Radiation Center. The frequency of these surveys is based on the nature of the radiation work being carried out at a particular location or on other factors which indicate that surveillance over a specific area at a defined frequency is desirable.

The primary purpose of the routine radiation and contamination survey program is to assure regularly scheduled surveillance over selected work areas in the reactor facility and in the Radiation Center in order to provide current and characteristic data on the status of radiological conditions. A second objective of the program is to assure frequent on-the-spot personal observations (along with recorded data) which will provide advance warning of needed corrections and thereby help to ensure the safe use and handling of radiation sources and radioactive materials. A third objective, which is really derived from successful execution of the first two objectives, is to gather and document information which will help to ensure that all phases of the operational and radiation protection programs are meeting the goal of keeping radiation doses to personnel and releases of radioactivity to the environment "as low as reasonably achievable" (ALARA).

The annual summary of radiation and contamination levels measured during routine facility surveys for the applicable reporting period is given in Table V.9.

Environmental Survey Data

The annual reporting requirements of the OSTR Technical Specifications include "an annual summary of environmental surveys performed outside the facility."

Gamma Radiation Monitoring

On-site Monitoring

Monitors used in the on-site gamma environmental radiation monitoring program at the Radiation Center consist of the reactor facility stack effluent monitor described in Section V and nine environmental monitoring stations.

During this reporting period, each fence environmental station utilized an LiF TLD monitoring packet supplied and processed by Mirion Technologies, Inc., Irvine, California. Each packet contained three LiF TLDs and was exchanged quarterly for a total of 108 samples during the reporting period (9 stations x

3 TLDs per station x 4 quarters). The total number of TLD samples for the reporting period was 108. A summary of the TLD data is also shown in Table V.10.

From Table V.10 it is concluded that the doses recorded by the dosimeters on the TRIGA facility fence can be attributed to natural back-ground radiation which is about 110 mrem per year for Oregon (Refs. 1, 2).

Off-site Monitoring

The off-site gamma environmental radiation monitoring program consists of twenty monitoring stations surrounding the Radiation Center (see Figure V.1) and six stations located within a 5 mile radius of the Radiation Center.

Each monitoring station is located about four feet above the ground (MRCTE 21 and MRCTE 22 are mounted on the roof of the EPA Laboratory and National Forage Seed Laboratory, respectively). These monitors are exchanged and processed quarterly, and the total number of TLD samples during the current one-year reporting period was 240 (20 stations x 3 chips per station per quarter x 4 quarters per year). The total number of TLD samples for the reporting period was 240. A summary of TLD data for the off-site monitoring stations is given in Table V.11.

After a review of the data in Table V.11, it is concluded that, like the dosimeters on the TRIGA facility fence, all of the doses recorded by the off-site dosimeters can be attributed to natural background radiation which is about 110 mrem per year for Oregon (Refs. 1, 2).

Soil, Water, and Vegetation Surveys

The soil, water, and vegetation monitoring program consists of the collection and analysis of a limited number of samples in each category on an annual basis. The program monitors highly unlikely radioactive material releases from either the TRIGA reactor facility or the OSU Radiation Center and also helps indicate the general trend of the radioactivity concentration in each of the various substances sampled. See Figure V.1 for the locations of the sampling stations for grass (G), soil (S), water (W) and rainwater (RW) samples. Most locations are within a 1,000 foot radius of the reactor facility and the Radiation Center. In general, samples are collected over a local area having a radius of about ten feet at the positions indicated in Figure V.1.

There are a total of 22 sampling locations: four soil locations, four water locations (when water is available), and fourteen vegetation locations.

The annual concentration of total net beta radioactivity (minus tritium) for samples collected at each environmental soil, water, and vegetation sampling location (sampling station) is listed in Table V.12. Calculation of the total net beta disintegration rate incorporates subtraction of only the counting system background from the gross beta counting rate followed by application of an appropriate counting system efficiency.

The annual concentrations were calculated using sample results which exceeded the lower limit of detection (LLD), except that sample results which were less than or equal to the LLD were averaged in at the corresponding LLD concentration.

As used in this report, the LLD has been defined as the amount or concentration of radioactive material (in terms of μCi per unit volume or unit mass) in a representative sample which has a 95% probability of being detected.

Identification of specific radionuclides is not routinely carried out as part of this monitoring program, but would be conducted if unusual radioactivity levels above natural background were detected. However, from Table V.12 it can be seen that the levels of radioactivity detected were consistent with naturally occurring radioactivity and comparable to values reported in previous years.

Radioactive Material Shipments

A summary of the radioactive material shipments originating from the TRIGA reactor facility, NRC license R-106, is shown in Table V.13. A similar summary for shipments originating from the Radiation Center's State of Oregon radioactive materials license ORE 90005 is shown in Table V.14. A summary of radioactive material shipments exported under Nuclear Regulatory Commission general license 10 CFR 110.23 is shown in Table V.15.

References

1. U. S. Environmental Protection Agency, "Estimates of Ionizing Radiation Doses in the United States, 1960-2000," ORP/CSD 72-1, Office of Radiation Programs, Rockville, Maryland (1972).

2. U. S. Environmental Protection Agency, "Radiological Quality of the Environment in the United States, 1977," EPA 520/1-77-009, Office of Radiation Programs; Washington, D.C. 20460 (1977).

Table V.1

Radiation Protection Program Requirements and Frequencies

Frequency	Radiation Protection Requirement
Daily/Weekly/Monthly	Perform routine area radiation/contamination monitoring.
Monthly	Collect and analyze TRIGA primary, secondary, and make-up water Exchange personnel dosimeters and review exposure reports Inspect laboratories Calculate previous month's gaseous effluent discharge
As Required	Process and record solid waste and liquid effluent discharges Prepare and record radioactive material shipments Survey and record incoming radioactive materials receipts Perform and record special radiation surveys Perform thyroid and urinalysis bioassays Conduct orientations and trainings Issue radiation work permits and provide health physics coverage for maintenance operations
Quarterly	Prepare, exchange, and process environmental TLD packs Conduct orientations for classes using radioactive materials Collect and analyze samples from reactor stack effluent line Exchange personnel dosimeters and inside area monitoring dosimeters and review exposure reports
Semi-Annual	Leak test and inventory sealed sources Conduct floor survey of corridors and reactor bay
Annual	Calibrate portable radiation monitoring instruments and personnel pocket ion chambers Calibrate reactor stack effluent monitor, continuous air monitors, remote area radiation monitors, and air samplers Measure face air velocity in laboratory hoods and exchange dust-stop filters and HEPA filters as necessary Inventory and inspect Radiation Center emergency equipment Conduct facility radiation survey of the ^{60}Co irradiators Conduct personnel dosimeter training Update decommissioning logbook Collect and process environmental soil, water, and vegetation samples

Table V.2

Monthly Summary of Liquid Effluent Released to the Sanitary Sewer[1]

Date of Discharge (Month and Year)	Total Quantity of Radioactivity Released (Curies)	Detectable Radionuclide in the Waste	Specific Activity for Each Detectable Radionuclide in the Waste where the Release Concentration was >1 x 10^{-7} (µCi ml^{-1})	Total Quantity of Each Detectable Radionuclide Released in the Waste (Curies)	Average Concentration of Released Radioactive Material at the Point of Release (µCi ml^{-1})	Percent of Applicable Monthly Average Concentration for Released Radioactive Material (%)[2]	Total Volume of Liquid Effluent Released Including Diluent (gal)
10/31/2024	3.61×10^{-6}	Th-232		3.61×10^{-6}	7.08×10^{-8}	24	13,465
05/26/2025	9.67×10^{-5}	H-3, Th-232	2.60×10^{-6} H-3	9.50×10^{-5} H-3, 1.84×10^{-6} Th-232	2.60×10^{-6} H-3, 5.01×10^{-8} Th-232	2.60×10^{-2} H-3, 16.7 Th-232	9,724
TOTAL	**1.00×10^{-4}**	**H-3, Th-232**	**2.60×10^{-6} H-3**	**9.50×10^{-5} H-3, 5.45×10^{-6} Th-232**	**2.60×10^{-6} H-3, 1.21×10^{-7} Th-232**	**2.60×10^{-2} H-3, 40.7 Th-232**	**23,189**

(1) The OSU operational policy is to subtract only detector background from the water analysis data and not background radioactivity in the Corvallis city water.

(2) Based on values listed in 10 CFR 20, Appendix B to 20.1001 – 10.2401, Table 3, which are applicable to sewer disposal.

Table V.3

Annual Summary of Liquid Waste Generated and Transferred

Origin of Liquid Waste	Volume of Liquid Waste Packaged(1) (gallons)	Detectable Radionuclides in the Waste	Total Quantity of Radioactivity in the Waste (Curies)	Dates of Waste Pickup for Transfer to the Waste Processing Facility
TRIGA	40	H-3	1.0×10^{-6}	08/16/2024
Radiation Center Laboratories	2.3	H-3, C-14, Th-232	3.87×10^{-5}	08/16/2024, 12/30/2024
TOTAL	**42.3**	**See above**	**3.97×10^{-5}**	**-**

(1) OSTR and Radiation Center liquid waste is picked up by the Radiation Safety Office for transfer to its waste processing facility for final packaging.

Table V.4

Monthly TRIGA Reactor Gaseous Waste Discharges and Analysis

Month	Total Estimated Activity Released (Curies)	Total Estimated Quantity of Argon-41 Released(1) (Curies)	Estimated Atmospheric Diluted Concentration of Argon-41 at Point of Release (µCi/cc)	Fraction of the Technical Specification Annual Average Argon-41 Concentration Limit (%)
July	1.65	1.65	1.28×10^{-7}	3.21
August	1.77	1.77	1.38×10^{-7}	3.45
September	1.39	1.39	1.12×10^{-7}	2.80
October	3.39	3.39	2.64×10^{-7}	6.60
November	3.27	3.27	2.63×10^{-7}	6.57
December	1.84	1.84	1.43×10^{-7}	3.59
January	2.34	2.34	1.82×10^{-7}	4.55
February	3.25	3.25	2.80×10^{-7}	7.00
March	3.40	3.40	2.64×10^{-7}	6.61
April	3.55	3.55	2.85×10^{-7}	7.12
May	3.35	3.35	2.61×10^{-7}	6.51
June	2.82	2.82	2.27×10^{-7}	5.66
TOTAL (2023-2024)	**32.03**	**32.03**	**2.12×10^{-7}(2)**	**5.30(2)**

(1) Routine gamma spectroscopy analysis of the gaseous radioactivity in the OSTR stack discharge indicated the only detectable radionuclide was argon-41.

(2) Annual average

Table V.5

Annual Summary of Solid Waste Generated and Transferred

Origin of Solid Waste	Volume of Solid Waste Packaged[1] (Cubic Feet)	Detectable Radionuclides in the Waste	Total Quantity of Radioactivity in Solid Waste (Curies)	Dates of Waste Pickup for Transfer to the OSU Waste Processing Facility
TRIGA Reactor Facility	20	Sc-46, Cr-51, Mn-54, Se-75, Co-58, Co-60, Fe-59, Zn-65, Sb-124, Eu-152, Hf-181	3.087×10^{-3}	08/16/2024, 12/30/2024, 04/15/2025
Radiation Center Laboratories	32	Co-60, Nat U, DU, U-235, Pu-239, H-3, Eu-152, Eu-154, Am-241, Cs-134, Pu-241, Cf-249, Np-237	2.41×10^{-5}	08/16/2024, 12/30/2024, 04/15/2025
TOTAL	**52**	**See above**	**3.11×10^{-3}**	

(1) OSTR and Radiation Center lab waste is picked up by OSU Radiation Safety for transfer to its waste processing facility for final packaging.

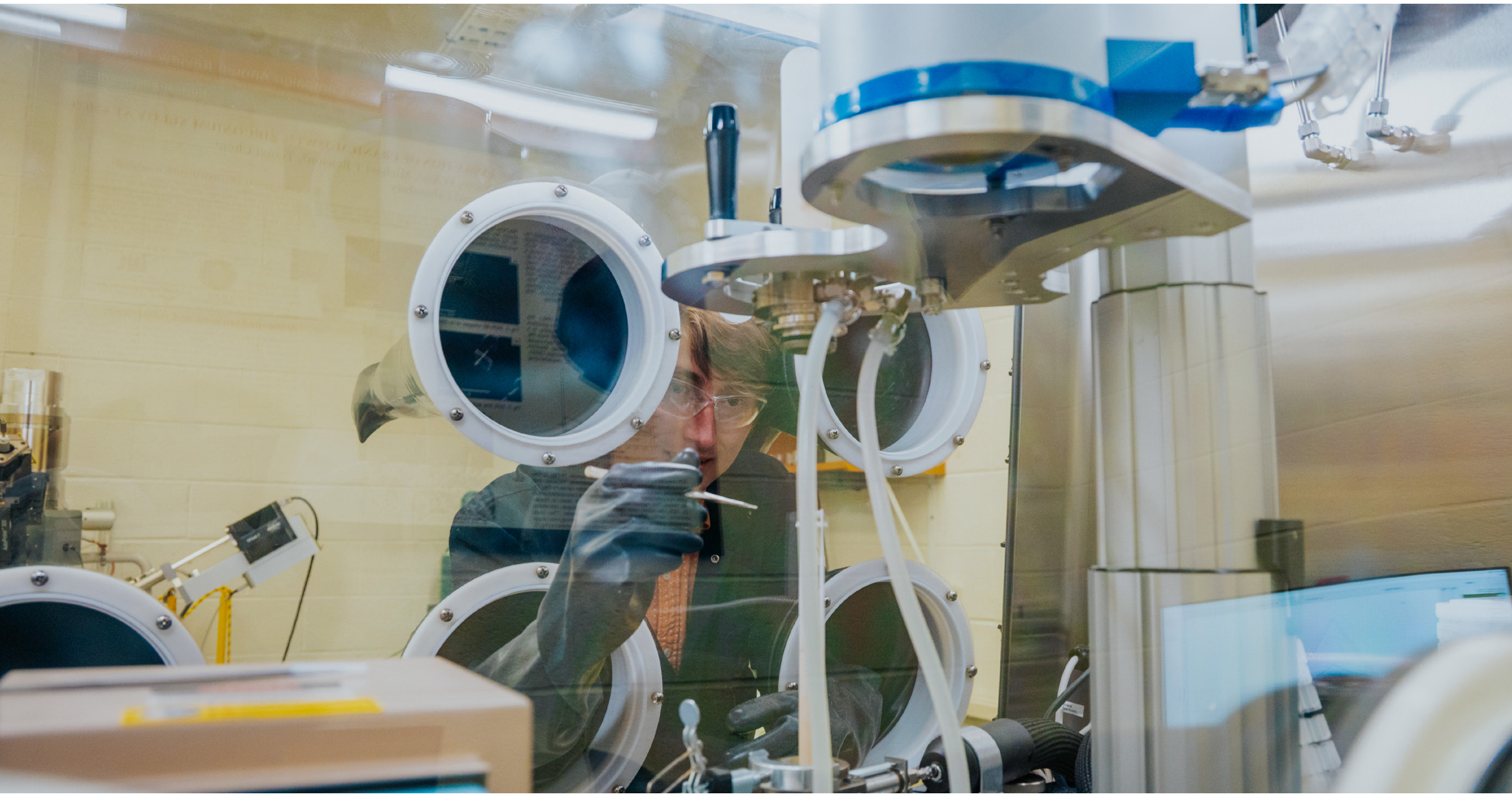


Table V.6

Annual Summary of Personnel Radiation Doses Received

	Average Annual Dose(1)		Greatest Individual Dose(1)		Total Person-mrem for the Group(1)	
Personnel Group	**Whole Body (mrem)**	**Extremities (mrem)**	**Whole Body (mrem)**	**Extremities (mrem)**	**Whole Body (mrem)**	**Extremities (mrem)**
Facility Operating Personnel	150	211	364	833	1,053	1,689
Key Facility Research Personnel	0	100	0	168	0	604
Facilities Services Maintenance Personnel	0	N/A	0	N/A	0	N/A
Laboratory Class and Students	11	34	144	244	704	1,197
Campus Police and Security Personnel	0	N/A	0	N/A	0	N/A
Visitors	1	N/A	4.7	N/A	76.5	N/A

(1) "N/A" indicates that there was no extremity monitoring conducted or required for the group.

Table V.7

Total Dose Equivalent Recorded on Area Dosimeters Located within the TRIGA Reactor Facility

Monitor I.D.	TRIGA Reactor Facility Location (See Figure V.1)	Total Recorded	Dose Equivalent[(1)(2)]
		Xß(γ) (mrem)	Neutron (mrem)
MRCTNE	D104: North Badge East Wall	187	ND
MRCTSE	D104: South Badge East Wall	137	ND
MRCTSW	D104: South Badge West Wall	420	ND
MRCTNW	D104: North Badge West Wall	256	ND
MRCTWN	D104: West Badge North Wall	261	ND
MRCTEN	D104: East Badge North Wall	251	ND
MRCTES	D104: East Badge South Wall	2,250	ND
MRCTWS	D104: West Badge South Wall	730	ND
MRCTTOP	D104: Reactor Top Badge	1,207	ND
MRCTHXS	D104A: South Badge HX Room	507	ND
MRCTHXW	D104A: West Badge HX Room	334	ND
MRCD-302	D302: Reactor Control Room	441	27
MRCD-302A	D302A: Reactor Supervisor's Office	162	ND
MRCBP1	D104: Beam Port Number 1	189	22
MRCBP2	D104: Beam Port Number 2	205	ND
MRCBP3	D104: Beam Port Number 3	1,310	ND
MRCBP4	D104: Beam Port Number 4	1,183	ND

(1) The total recorded dose equivalent values do not include natural background contribution and reflect the summation of the results of four quarterly beta-gamma dosimeters or four quarterly fast neutron dosimeters for each location. A total dose equivalent of "ND" indicates that each of the dosimeters during the reporting period was less than the vendor's gamma dose reporting threshold of 10 mrem or that each of the fast neutron dosimeters was less than the vendor's threshold of 10 mrem. "N/A" indicates that there was no neutron monitor at that location.

(2) These dose equivalent values do not represent radiation exposure through an exterior wall directly into an unrestricted area.

Table V.8

Total Dose Equivalent Recorded on Area Dosimeters Located within the Radiation Center

Monitor I.D.	Radiation Center Facility Location (See Figure V.1)	Total Recorded Dose Equivalent(1)	
		Xß(γ) (mrem)	Neutron (mrem)
MRCA100	A100: Receptionist's Office	0	ND
MRCBRF	A102H: Front Personnel Dosimetry Storage Rack	0	ND
MRCA120	A120: Stock Room	71	ND
MRCA120A	A120A: NAA Temporary Storage	181	ND
MRCA126	A126: Radioisotope Research Laboratory	105	ND
MRCCO-60	A128: ^{60}Co Irradiator Room	572	ND
MRCA130	A130: Shielded Exposure Room	0	ND
MRCA132	A132: TLD Equipment Room	11	ND
MRCA138	A138: Health Physics Laboratory	0	ND
MRCB100	B100: Gamma Analyzer Room (Storage Cave)	585	ND
MRCB114	B114: Lab (^{226}Ra Storage Facility)	0	ND
MRCB119-1	B119: Source Storage Room	131	ND
MRCB119-2	B119: Source Storage Room	371	ND
MRCB119A	B119A: Sealed Source Storage Room	14,509	3,027
MRCB120	B120: Instrument Calibration Facility	0	ND
MRCB122-2	B122: Radioisotope Hood	0	ND
MRCB122-3	B122: Radioisotope Research Laboratory	0	ND
MRCB124-1	B124: Radioisotope Research Laboratory (Hood)	0	ND
MRCB124-2	B124: Radioisotope Research Laboratory	0	ND
MRCB124-6	B124: Radioisotope Research Laboratory	0	ND
MRCB128	B128: Instrument Repair Shop	0	ND
MRCB136	B136: Gamma Analyzer Room	0	ND
MRCC100	C100: Radiation Center Director's Office	0	ND
MRCC106A	C106A: Office	0	ND
MRCC106B	C106B: Custodian Supply Storage	0	ND

(1) The total recorded dose equivalent values do not include natural background contribution and, reflect the summation of the results of four quarterly beta-gamma dosimeters or four quarterly fast neutron dosimeters for each location. A total dose equivalent of "ND" indicates that each of the dosimeters during the reporting period was less than the vendor's gamma dose reporting threshold of 10 mrem or that each of the fast neutron dosimeters was less than the vendor's threshold of 10 mrem. "N/A" indicates that there was no neutron monitor at that location.

Table V.8 (continued)

Total Dose Equivalent Recorded on Area Dosimeters Located within the Radiation Center

Monitor I.D.	Radiation Center Facility Location (See Figure V.1)	Total Recorded Dose Equivalent[(1)]	
		Xß(γ) (mrem)	Neutron (mrem)
MRCC106-H	C106H: East Loading Dock	0	ND
MRCC118	C118: Radiochemistry Laboratory	0	ND
MRCC120	C120: Student Counting Laboratory	0	ND
MRCF100	F100: APEX Facility	0	ND
MRCF102	F102: APEX Control Room	0	ND
MRCB125N	B125: Gamma Analyzer Room (Storage Cave)	0	ND
MRCN125S	B125: Gamma Analyzer Room	0	ND
MRCC124	C124: Classroom	0	ND
MRCC130	C130: Radioisotope Laboratory (Hood)	0	ND
MRCD100	D100: Reactor Support Laboratory	0	ND
MRCD102	D102: Pneumatic Transfer Terminal Laboratory	291	ND
MRCD102-H	D102H: 1st Floor Corridor at D102	57	ND
MRCD106-H	D106H: 1st Floor Corridor at D106	483	ND
MRCD200	D200: Reactor Administrator’s Office	98	ND
MRCD202	D202: Senior Health Physicist’s Office	193	ND
MRCBRR	D200H: Rear Personnel Dosimetry Storage Rack	0	ND
MRCD204	D204: Health Physicist Office	281	ND
MRCATHRL	F104: ATHRL	0	ND
MRCD300	D300: 3rd Floor Conference Room	168	33
MRCA144	A144: Radioisotope Research Laboratory	0	ND
B132X	B132X: X-ray Diffraction	0	ND
B132	B132: Radioisotope Research Laboratory (Hood)	0	ND
B104	B104: SEM/FIB Laboratory	0	ND

(1) The total recorded dose equivalent values do not include natural background contribution and, reflect the summation of the results of four quarterly beta-gamma dosimeters or four quarterly fast neutron dosimeters for each location. A total dose equivalent of “ND” indicates that each of the dosimeters during the reporting period was less than the vendor’s gamma dose reporting threshold of 10 mrem or that each of the fast neutron dosimeters was less than the vendor’s threshold of 10 mrem. “N/A” indicates that there was no neutron monitor at that location.

Table V.9

Annual Summary of Radiation and Contamination Levels Observed within the Reactor Facility and Radiation Center during Routine Radiation Surveys

Accessible Location (See Figure V.1)	Whole Body Radiation Levels (mrem/hr)		Contamination Levels[(1)] (dpm/cm^2)	
	Average	Maximum	Average	Maximum
TRIGA Reactor Facility:				
Reactor Top (D104)	3.86	110	<500	<500
Reactor 2nd Deck Area (D104)	6.97	60	<500	<500
Reactor Bay SW (D104)	<1	16	<500	<500
Reactor Bay NW (D104)	<1	46	<500	<500
Reactor Bay NE (D104)	<1	74	<500	<500
Reactor Bay SE (D104)	<1	3.7	<500	<500
Class Experiments (D104, D302)	<1	<1	<500	<500
Demineralizer Tank & Make Up Water System (D104A)	<1	8	<500	<500
Particulate Filter--Outside Shielding (D104A)	<1	1.2	<500	<500
Radiation Center:				
NAA Counting Rooms (A146, B100)	<1	<1	<500	<500
Health Physics Laboratory (A138)	<1	<1	<500	<500
^{60}Co Irradiator Room and Calibration Rooms (A128, B120, A130)	<1	3.8	<500	<500
Radiation Research Labs (A126, A136, B108, B114, B122, B124, C126, C130, C132A)	<1	1	<500	<500
Radioactive Source Storage (B119, B119A, A120A, A132A)	1.05	29	<500	<500
Student Chemistry Laboratory (C118)	<1	<1	<500	<500
Student Counting Laboratory (C120)	<1	<1	<500	<500
Operations Counting Room (B125, B136)	<1	<1	<500	<500
Pneumatic Transfer Laboratory (D102)	<1	80	<500	<500
RX Support Room (D100)	<1	<1	<500	<500

(1) <500 dpm/100 cm2 = Less than the lower limit of detection for the portable survey instrument used.

Table V.10

Total Dose Equivalent at the TRIGA Reactor Facility Fence

Fence Environmental Monitoring Station (see Figure V.1)	Total Recorded Dose Equivalent (including background) Based on Mirion TLDs[1, 2] (mrem)
MRCFE-1	86 ± 01
MRCFE-2	81 ± 03
MRCFE-3	81 ± 02
MRCFE-4	88 ± 02
MRCFE-5	84 ± 02
MRCFE-6	90 ± 01
MRCFE-7	85 ± 02
MRCFE-8	84 ± 02
MRCFE-9	85 ± 02

(1) Average Corvallis area natural background using Mirion TLDs totals 80 ± 5 mrem for the same period.

(2) ± values represent the standard deviation of the total value at the 95% confidence level.

Table V.11

Total Dose Equivalent at the Off-Site Gamma Radiation Monitoring Stations

Off-Site Radiation Monitoring Station (See Figure V.1)	Total Recorded Dose Equivalent (including background) Based on Mirion TLDs(1, 2) (mrem)
MRCTE-2	83 ± 02
MRCTE-3	83 ± 02
MRCTE-4	81 ± 02
MRCTE-5	95 ± 03
MRCTE-6	83 ± 02
MRCTE-7	84 ± 05
MRCTE-8	98 ± 02
MRCTE-9	87 ± 03
MRCTE-10	76 ± 02
MRCTE-12	93 ± 04
MRCTE-13	87 ± 03
MRCTE-14	81 ± 02
MRCTE-15	76 ± 03
MRCTE-16	86 ± 08
MRCTE-17	79 ± 01
MRCTE-18	82 ± 03
MRCTE-19	77 ± 02
MRCTE-20	79 ± 03
MRCTE-21	71 ± 02
MRCTE-22	77 ± 02

(1) Average Corvallis area natural background using Mirion TLDs totals 80 ± 5 mrem for the same period.

(2) ± values represent the standard deviation of the total value at the 95% confidence level.

Table V.12

Annual Average Concentration of the Total Net Beta Radioactivity (minus ^{3}H) for Environmental Soil, Water, and Vegetation Samples

Sample Location (See Fig. V.1)	Sample Type	Annual Average Concentration of the Total Net Beta (Minus ^{3}H) Radioactivity(1)	LLD	Reporting Units
1-W	Water	<LLD	5.70x10^{-8}	µCi ml^{-1}
4-W	Water	<LLD	5.70x10^{-8}	µCi ml^{-1}
11-W	Water	<LLD	5.70x10^{-8}	µCi ml^{-1}
19-RW	Water	<LLD	5.70x10^{-8}	µCi ml^{-1}
3-S	Soil	3.46x10^{-5} ± 1.07x10^{-5}	2.31x10^{-5}	µCi g^{-1} of dry soil
5-S	Soil	<LLD	2.53x10^{-5}	µCi g^{-1} of dry soil
20-S	Soil	<LLD	1.74x10^{-5}	µCi g^{-1} of dry soil
21-S	Soil	<LLD	2.19x10^{-5}	µCi g^{-1} of dry soil
2-G	Grass	<LLD	3.44x10^{-5}	µCi g^{-1} of dry ash
6-G	Grass	<LLD	3.12x10^{-5}	µCi g^{-1} of dry ash
7-G	Grass	1.98x10^{-4} ± 2.85x10^{-5}	5.30x10^{-5}	µCi g^{-1} of dry ash
8-G	Grass	1.21x10^{-4} ± 2.80x10^{-5}	5.76x10^{-5}	µCi g^{-1} of dry ash
9-G	Grass	3.32x10^{-5} ± 1.45x10^{-5}	3.23x10^{-5}	µCi g^{-1} of dry ash
10-G	Grass	1.11x10^{-4} ± 2.01x10^{-5}	3.96x10^{-5}	µCi g^{-1} of dry ash
12-G	Grass	2.24x10^{-4} ± 2.71x10^{-5}	4.82x10^{-5}	µCi g^{-1} of dry ash
13-G	Grass	2.29x10^{-4} ± 2.98x10^{-5}	5.41x10^{-5}	µCi g^{-1} of dry ash
14-G	Grass	1.06x10^{-4} ± 2.32x10^{-5}	4.73x10^{-5}	µCi g^{-1} of dry ash
15-G	Grass	1.43x10^{-4} ± 2.82x10^{-5}	5.64x10^{-5}	µCi g^{-1} of dry ash
16-G	Grass	9.69x10^{-5} ± 1.94x10^{-5}	3.90x10^{-5}	µCi g^{-1} of dry ash
17-G	Grass	2.45x10^{-4} ± 2.85x10^{-5}	5.00x10^{-5}	µCi g^{-1} of dry ash
18-G	Grass	1.14x10^{-4} ± 1.99x10^{-5}	3.90x10^{-5}	µCi g^{-1} of dry ash
22-G	Grass	1.30x10^{-4} ± 2.30x10^{-5}	4.49x10^{-5}	µCi g^{-1} of dry ash

(1) ± values represent the standard deviation of the value at the 95% confidence level.

Table V.13

Annual Summary of Radioactive Material Shipments Originating from the TRIGA Reactor Facility's NRC License R-106

		Number of Shipments				
Shipped To	**Total Activity (TBq)**	**Exempt**	**Limited Quantity**	**Yellow II**	**Yellow III**	**Total**
Arizona State University Tucson, AZ USA	$2.39\text{x}10^{-6}$	1	1	1	0	3
Auburn University Auburn, AL USA	$5.98\text{x}10^{-6}$	0	1	1	0	2
Berkeley Geochronology Center Berkeley, CA USA	$7.47\text{x}10^{-8}$	3	0	0	0	3
C.O.R.D. University of Wisconsin-Madison Madison, WI USA	$1.26\text{x}10^{-7}$	0	1	0	0	1
Columbia University Palisades, NY USA	$3.06\text{x}10^{-6}$	2	3	0	0	5
Idaho National Laboratory Idaho Falls, ID USA	$1.82\text{x}10^{-2}$	0	0	5	2	7
Indiana University Bloomington, IN USA	$3.42\text{x}10^{-8}$	2	0	0	0	2
Lawrence Livermore National Lab Livermore, CA USA	$4.00\text{x}10^{-3}$	0	0	1	0	1
Lehigh University Bethlehem, PA USA	$5.71\text{x}10^{-7}$	0	2	0	0	2
ManTech Sunol, CA USA	$9.51\text{x}10^{-8}$	2	0	0	0	2
Materion Corporation Elmore, OH USA	$2.08\text{x}10^{-2}$	0	0	0	3	3
Materion Natural Resources Delta, UT USA	$1.29\text{x}10^{-1}$	0	0	0	24	24
New Mexico Geochronology Research Lab Socorro, NM USA	$1.12\text{x}10^{-5}$	1	1	4	0	6
Oregon State University Corvallis, OR USA	$7.87\text{x}10^{-7}$	2	2	0	0	4
Pacific Northwest National Lab Richland, WA USA	$4.88\text{x}10^{-3}$	9	0	0	0	9
Rutgers University Piscataway, NJ USA	$1.20\text{x}10^{-8}$	1	0	0	0	1
Stanford University Stanford, CA USA	$9.72\text{x}10^{-8}$	1	0	0	0	1
University of Alaska Fairbanks, AK USA	$2.27\text{x}10^{-6}$	1	2	0	0	3
University of Arizona Tucson, AZ USA	$4.74\text{x}10^{-7}$	4	0	0	0	4
University of Florida Gainesville, FL USA	$2.58\text{x}10^{-6}$	0	0	2	0	2
University of Nevada, Las Vegas Las Vegas, NV USA	$3.59\text{x}10^{-7}$	0	2	0	0	2
University of Wisconsin- Madison Madison, WI USA	$2.83\text{x}10^{-6}$	0	0	1	0	1
USGS CA Menlo Park, CA USA	$1.07\text{x}10^{-6}$	2	2	0	0	4
USGS CO Denver, CO USA	$1.45\text{x}10^{-6}$	2	1	0	0	3
TOTAL	**$1.76\text{x}10^{-1}$**	**33**	**18**	**15**	**29**	**95**

Table V.14

Annual Summary of Radioactive Material Shipments Originating from the Radiation Center's State of Oregon License ORE 90005

Shipped To	Total Activity (TBq)	Number of Shipments				
		Exempt	Limited Quantity	White I	Yellow II	Total
TOTAL	0	0	0	0	0	0

Table V.15

Annual Summary of Radioactive Material Shipments Exported under NRC General License 10 CFR 110.23

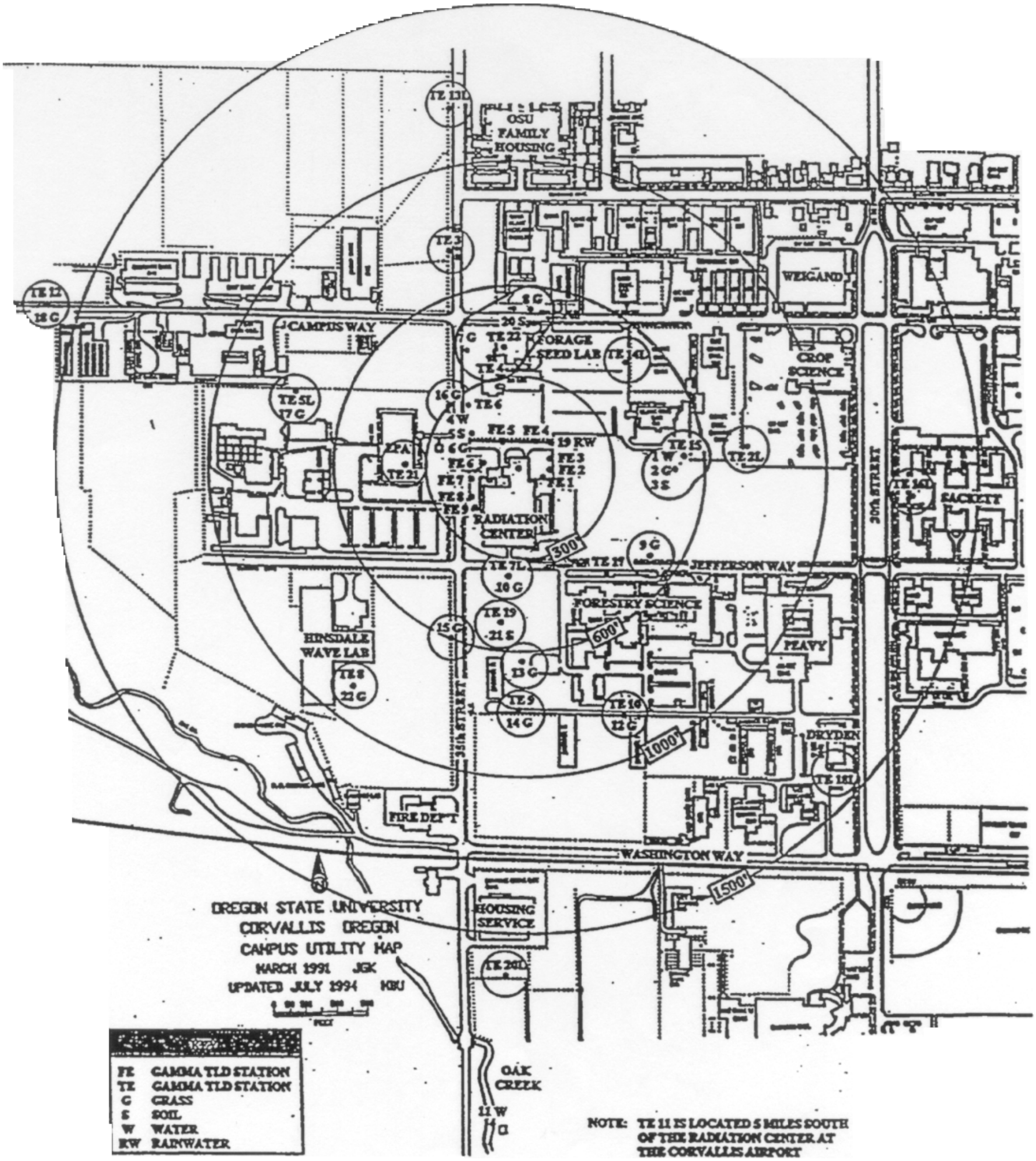
Shipped To	Total Activity (TBq)	Number of Shipments			
		Exempt	Limited Quantity	Yellow II	Total
Albert-Ludwigs-Universitaet Freiburg, GERMANY	$1.03x10^{-8}$	1	0	0	1
China Earthquake Administration Beijing, CHINA	$1.87x10^{-8}$	1	0	0	1
Curtin University of Technology Bentley, Western Australia, AUSTRALIA	$1.47x10^{-5}$	0	1	1	2
Dalhousie University Halifax, Nova Scotia, CANADA	$1.64x10^{-8}$	1	0	0	1
Geological Survey of Japan Ibaraki, JAPAN	$1.22x10^{-8}$	1	0	0	1
Institute of Tibetan Plateau Research Beijing, CHINA	$3.16x10^{-7}$	1	0	0	1
ISTO Orleans, FRANCE	$2.78x10^{-8}$	1	0	0	1
Korean Basic Science Institute Cheongju-si, Chungcheongbuk-do, KOREA	$1.00x10^{-7}$	3	0	0	3
Lanzhou University Lanzhou, Gansu, CHINA	$2.07x10^{-7}$	2	0	0	2

Table V.15 (continued)
Annual Summary of Radioactive Material Shipments Exported under NRC General License 10 CFR 110.23

		Number of Shipments			
Shipped To	**Total Activity (TBq)**	**Exempt**	**Limited Quantity**	**Yellow II**	**Total**
LSCE-CNRS Gif-Sur-Yvette, FRANCE	$2.95x10^{-7}$	2	0	0	2
Northwest University XiAn, CHINA	$1.97x10^{-8}$	1	0	0	1
Polish Academy of Sciences Krakow, POLAND	$2.05x10^{-8}$	1	0	0	1
QUAD-Lab, Natural History Museum of Denmark Copenhagen, DENMARK	$2.31x10^{-7}$	1	0	0	1
Scottish Universities Research & Reactor Centre East Kilbride, SCOTLAND	$3.76x10^{-6}$	3	2	0	5
Universidade de Sao Paulo Sao Paulo, BRAZIL	$8.79x10^{-8}$	2	0	0	2
Universitat Potsdam Potsdam, GERMANY	$1.05x10^{-7}$	2	0	0	2
University of Grenoble Alps Grenoble, FRANCE	$7.44x10^{-10}$	1	0	0	1
University of Geneva Geneva, SWITZERLAND	$8.13x10^{-8}$	2	0	0	2
University of Innsbruck Innsbruck, AUSTRIA	$8.40x10^{-10}$	2	0	0	2
University of Manitoba Winnipeg, CANADA	$4.52x10^{-6}$	1	3	0	4
University of Melbourne Parkville, Victoria, AUSTRALIA	$2.22x10^{-6}$	0	4	0	4
University of Padova Padova, ITALY	$3.13x10^{-9}$	1	0	0	1
University of Salzburg Salzburg, AUSTRALIA	$1.23x10^{-9}$	1	0	0	1
Vrije Universiteit Amsterdam, THE NETHERLANDS	$4.52x10^{-8}$	1	0	0	1
Wadia Institute of Himalayan Geology Dehradun, Uttarakhand, INDIA	$9.25x10^{-9}$	1	0	0	1
Zhejiang University Hangzhou, CHINA	$1.36x10^{-8}$	1	0	0	1
TOTAL	**$2.68x10^{-5}$**	**34**	**10**	**1**	**45**

Figure V.1

Monitoring Stations for the OSU TRIGA Reactor



WORK

Summary

The Radiation Center offers a wide variety of resources for teaching, research, and service related to radiation and radioactive materials. Some of these are discussed in detail in other parts of this report. The purpose of this section is to summarize the teaching, research, and service efforts carried out during the current reporting period.

Teaching

An important responsibility of the Radiation Center and the reactor is to support OSU's academic programs. Implementation of this support occurs through direct involvement of the Center's staff and facilities in the teaching programs of various departments and through participation in University research programs. Table III.2 plus the "Training and Instruction" section (see next page) provide detailed information on the use of the Radiation Center and reactor for instruction and training.

Research and Service

Almost all Radiation Center research and service work is tracked by means of a project database. When a request for facility use is received, a project number is assigned and the project is added to the database. The database includes such information as the project number, data about the person and institution requesting the work, information about students involved, a description of the project, Radiation Center resources needed, the Radiation Center project manager, status of individual runs, billing information, and the funding source.

Table VI.1 provides a summary of institutions which used the Radiation Center during this reporting period. This table also includes additional information about the number of academic personnel involved, the number of projects, and the number of uses logged for each organization.

The major table in this section is Table VI.2. This table provides a listing of the research and service projects carried out during this reporting period and lists information relating to the personnel and institution involved, the type of project, and the funding agency. Projects which used the reactor are indicated by an asterisk. In addition to identifying specific projects carried out during the current reporting period, Part VI also highlights major Radiation Center capabilities in research and service. These unique Center functions are described in the following text.

Neutron Activation Analysis

Neutron activation analysis (NAA) stands at the forefront of techniques for the quantitative multi-element analysis of major, minor, trace, and rare elements. The principle involved in NAA consists of first irradiating a sample with neutrons in a nuclear reactor such as the OSTR to produce specific radionuclides. After the irradiation, the characteristic gamma rays emitted by the decaying radionuclides are quantitatively measured by suitable semiconductor radiation detectors, and the gamma rays detected at a particular energy are usually indicative of a specific radionuclide's presence. Computerized data reduction of the gamma ray spectra then yields the concentrations of the various elements in samples being studied. With sequential instrumental NAA, it is possible to measure quantitatively about 35 elements in small samples (5 to 100 mg), and for activable elements, the lower limit of detection is on the order of parts per million or parts per billion depending on the element.

The Radiation Center's NAA laboratory has analyzed the major, minor, and trace element content of tens of thousands of samples covering essentially the complete spectrum of material types and involving virtually every scientific and technical field.

While some researchers perform their own sample counting on their own or on Radiation Center equipment, the Radiation Center provides a complete NAA service for researchers and others who may require it. This includes sample preparation, sequential irradiation and counting, and data reduction and analysis.

Irradiations

As described throughout this report, a major capability of the Radiation Center involves the irradiation of a large variety of substances with gamma rays and neutrons. Detailed data on these irradiations and their use are included in Part III as well as in the "Research & Service" text of this section.

Radiological Emergency Response Services

The Radiation Center has an emergency response team capable of responding to all types of radiological accidents. This team directly supports the City of Corvallis and Benton County emergency response organizations and medical facilities. The team can also provide assistance at the scene of any radiological incident anywhere in the state of Oregon on behalf of the Oregon Radiation Protection Services and the Oregon Department of Energy.

The Radiation Center maintains dedicated stocks of radiological emergency response equipment and instrumentation. These items are located at the Radiation Center and at the Good Samaritan Hospital in Corvallis.

During the current reporting period, the Radiation Center emergency response team conducted several training sessions and exercises, but was not required to respond to any actual incidents.

Training and Instruction

In addition to the academic laboratory classes and courses discussed in Parts III and VI, and in addition to the routine training needed to meet the requirements of the OSTR Emergency Response Plan, Physical Security Plan, and operator requalification program, the Radiation Center is also used for special training programs. Radiation Center staff are well experienced in conducting these special programs and regularly offer training in areas such as research reactor operations, research reactor management, research reactor radiation protection, radiological emergency response, reactor behavior (for nuclear power plant operators), neutron activation analysis, nuclear chemistry, and nuclear safety analysis.

Special training programs generally fall into one of several categories: visiting faculty and research scientists; International Atomic Energy Agency fellows; special short-term courses; or individual reactor operator or health physics training programs. During this reporting period, there were a large number of such people as shown in the People section.

As has been the practice since 1985, Radiation Center personnel annually present a HAZMAT Response Team Radiological Course. This year a course was held at Oregon State University, and also, another course was held in La Grande, Oregon on the hazards and shipping regulations of UF_6 and TRU packages.

Radiation Protection Services

The primary purpose of the radiation protection program at the Radiation Center is to support the instruction and research conducted at the Center. However, due to the high quality of the program and the level of expertise and equipment available, the Radiation Center is also able to provide health physics services in support of OSU Radiation Safety and to assist other state and federal agencies. The Radiation Center does not compete with private industry, but it supplies health physics services which are not readily available elsewhere. In the case of support provided to state agencies, this definitely helps to optimize the utilization of state resources.

The Radiation Center is capable of providing health physics services in any of the areas which are discussed in Part V. These include personnel monitoring, radiation surveys, sealed source leak testing, packaging and shipment of radioactive materials, calibration and repair of radiation monitoring instruments (discussed in detail in Part VI), radioactive waste disposal, radioactive material hood flow surveys, and radiation safety analysis and audits.

The Radiation Center also provides services and technical support as a radiation laboratory to the State of Oregon Radiation Protection Services (RPS) in the event of a radiological emergency within the state of Oregon. In this role, the Radiation Center will provide gamma ray spectrometric analysis of water, soil, milk, food products, vegetation, and air samples collected by RPS radiological response field teams. As part of the ongoing preparation for this emergency support, the Radiation Center participates in inter-institution drills.

Radiological Instrument Repair and Calibration

While repair of nuclear instrumentation is a practical necessity, routine calibration of these instruments is a licensing and regulatory requirement which must be met. As a result, the Radiation Center operates a radiation instrument repair and calibration facility which can accommodate a wide variety of equipment.

The Center's scientific instrument repair facility performs maintenance and repair on all types of radiation detectors and other nuclear instrumentation. Since the Radiation Center's own programs regularly utilize a wide range of nuclear instruments, components for most common repairs are often on hand and repair time is therefore minimized.

In addition to the instrument repair capability, the Radiation Center has a facility for calibrating essentially all types of radiation monitoring instruments. This includes typical portable monitoring instrumentation for the detection and measurement of alpha, beta, gamma, and neutron radiation, as well as instruments designed for low-level environmental monitoring. Higher range instruments for use in radiation accident situations can also be calibrated in most cases. Instrument calibrations are performed using radiation sources certified by the National Institute of Standards and Technology (NIST) or traceable to NIST.

Figure VI.1 is a summary of the instruments which were calibrated in support of the Radiation Center's instructional and research programs and the OSTR Emergency Plan. Table VI.3 shows instruments calibrated for other OSU departments while Table VI.4 shows instruments calibrated for non-OSU agencies.

Consultation

Radiation Center staff are available to provide consultation services in any of the areas discussed in this Annual Report, but in particular, on the subjects of research reactor operations and use, radiation protection, neutron activation analysis, radiation shielding, radiological emergency response, and radiotracer methods.

Records are not normally kept of such consultations, as they often take the form of telephone conversations with researchers encountering problems or planning the design of experiments. Many faculty members housed in the Radiation Center have ongoing professional consulting functions with various organizations in addition to sitting on numerous committees in advisory capacities.

Table VI.1
Institutions, Agencies, and Groups which Utilized the Radiation Center

Institutions, Agencies, and Groups	Number of Projects	Number of Times of Faculty Involvement	Number of Uses of Center Facilities
*Albert-Ludwigs-Universitaet Freiburg, GERMANY	1	0	1
*Arizona State Univeristy Tempe, AZ USA	1	0	5
*Atomos Space Broomfield, CO USA	1	1	3
*Auburn University Auburn, AL USA	1	1	2
*Berkeley Geochronology Center Berkeley, CA USA	1	0	4
BWX Technologies Lynchburg, VA USA	1	0	3
CDM Smith Edison, NJ USA	1	0	1
CleanMark Labels Portland, OR USA	1	0	32
*Columbia University Palisades, NY USA	1	0	5
*Dalhousie University Halifax, Novia Scotia CANADA	1	2	1
Department of Chemistry Corvallis, OR USA	1	1	2
*Environmental and Molecular Toxicology Corvallis, OR USA	1	3	1
Florida State University Tallahassee, FL USA	1	0	6

Table VI.1 (continued)
Institutions, Agencies, and Groups which Utilized the Radiation Center

Institutions, Agencies, and Groups	Number of Projects	Number of Times of Faculty Involvement	Number of Uses of Center Facilities
Gemoftheamericas.com Myrtle Creek, OR USA	1	0	1
*Geological Survey of Japan/AIST Tsukuba, Ibaraki, JAPAN	1	0	1
*Georgia Institute of Technology Atlanta, GA USA	1	0	27
Hemingway Designs, LLC Oregon City, OR USA	1	0	1
*Idaho National Laboratory Idaho Falls, ID USA	2	0	6
*Indiana University Bloomington, IN USA	1	0	2
*Institute of Geology, China Earthquake Administration Beijing, CHINA	1	0	2
*INSU-CNRS - Universite d’Orleans Orleans, FRANCE	1	1	1
*Korea Basic Science Institute Cheongwon-gun, Chungcheongbuk-do, SOUTH KOREA	1	1	3
*Lanzhou Center of Oil and Gas Resources, CAS Lanzhou, CHINA	1	1	1
*LanzhouUniversity Lanzhou City, Gansu Province CHINA	1	0	1
*Lanzhou University Lanzhou, CHINA	1	0	1
*Lawrence Livermore National Laboratory Livermore, CA USA	1	0	2
*Lehigh University Bethlehem, PA USA	1	0	2
*LSCE-CNRS Gif-Sur-Yvette Cedex, FRANCE	1	0	2
*ManTech - Vallecitos Laboratories - AEM Sunol, CA USA	1	0	2
*Materion Brush Inc. Elmore, OH USA	1	0	4
*Materion Natural Resources Delta, UT USA	1	0	12
*New Mexico Institute of Mining & Technology Socorro, NM USA	1	0	7
*Northwest University Xi’An, CHINA	1	0	1

Table VI.1 (continued)
Institutions, Agencies, and Groups which Utilized the Radiation Center

Institutions, Agencies, and Groups	Number of Projects	Number of Times of Faculty Involvement	Number of Uses of Center Facilities
Oregon Health Sciences University Portland, OR USA	1	2	2
*Oregon State University[(1)] Corvallis, OR USA	10	52	67[(2)]
*Oregon State University - Educational Tours Corvallis, OR USA	1	0	11
*Oregon State University Radiation Center Corvallis, OR USA	1	1	18
*Pacific Northwest National Laboratory Richland, WA USA	1	0	9
Phylos Bioscience Portland, OR USA	1	0	1
*Polish Academy of Sciences Krakow, POLAND	1	0	1
*Quaternary Dating Laboratory København K, DENMARK	1	0	2
Radiation Protection Services Portland, OR USA	1	0	8
Rocket Lab Albuquerque, NM USA	1	0	1
*Rutgers University Piscataway, NJ USA	1	0	1
*Scottish Universities Environmental Research Centre East Kilbride, UK	1	0	6
Self - Individual Hillsboro, OR USA	1	0	1
*Stanford University Stanford, CA USA	1	1	1
Terra Nova Nurseries, Inc. Canby, OR USA	1	0	4
*U.S. Geological Survey Denver, CO USA	2	0	8
*U.S. Geological Survey Menlo Park, CA USA	2	0	8
*U.S. Geological Survey Moffett Field, CA USA	2	0	8
*Universita' Degli Studi di Padova Padova, ITALY	1	2	1
*Universitat Potsdam Potsdam, GERMANY	1	0	1

Table VI.1 (continued)
Institutions, Agencies, and Groups which Utilized the Radiation Center

Institutions, Agencies, and Groups	Number of Projects	Number of Times of Faculty Involvement	Number of Uses of Center Facilities
*Université Grenoble Alpes Grenoble, Isere FRANCE	1	1	1
University of Alaska Anchorage Anchorage, AK USA	1	1	4
*University of Alaska Fairbanks Fairbanks, AK USA	1	0	3
*University of Arizona Tucson, AZ USA	2	3	5
*University of Florida Gainesville, FL USA	1	1	2
*University of Geneva Geneva, SWITZERLAND	1	1	3
University of Illinois Urbana-Champaign Urbana, IL USA	1	1	1
*University of Innsbruck Innsbruck, AUSTRIA	1	1	2
*University of Manitoba Winnipeg, Manitoba CANADA	1	1	4
*University of Melbourne Melbourne, Victoria AUSTRALIA	1	1	4
*University of Michigan Ann Arbor, MI USA	1	1	12
*University of Nevada, Las Vegas Las Vegas, NV USA	2	2	3
*University of Potsdam Potsdam, GERMANY	1	0	1
*University of Rome Rome, ITALY	1	1	10
*University of Salzburg Salzburg, AUSTRIA	1	1	1
*University of Sao Paulo Sao Paulo, BRAZIL	1	0	1
University of Texas at Austin Austin, TX USA	1	1	6
*University of Wisconsin Madison, WI USA	1	1	2
US National Parks Service Crater Lake, OR USA	1	0	3
VivoTex Newberg, OR USA	1	0	1
*Vrije Universiteit Amsterdam, THE NETHERLANDS	1	1	1

Table VI.1 (continued)
Institutions, Agencies, and Groups which Utilized the Radiation Center

Institutions, Agencies, and Groups	Number of Projects	Number of Times of Faculty Involvement	Number of Uses of Center Facilities
*Washington State University Pullman, WA USA	2	1	4
*Western Australian Argon Isotope Facility Perth, Western Australia, AUSTRALIA	1	0	6
Western States Physics Stevenson, WA USA	1	0	1
*Zhejiang University Hangzhou, CHINA	1	0	1
Totals	**94**	**89**	**386**

* Project which involves the OSTR.

(1) Use by Oregon State University does not include any teaching activities or classes accommodated by the Radiation Center.

(2) This number does not include ongoing projects being performed by residents of the Radiation Center such as the APEX project, others in the School of Nuclear Science and Engineering, Radiation Health Physics program, Department of Chemistry, or projects conducted by Dr. Walt Loveland which involve daily use of the Radiation Center facilities.

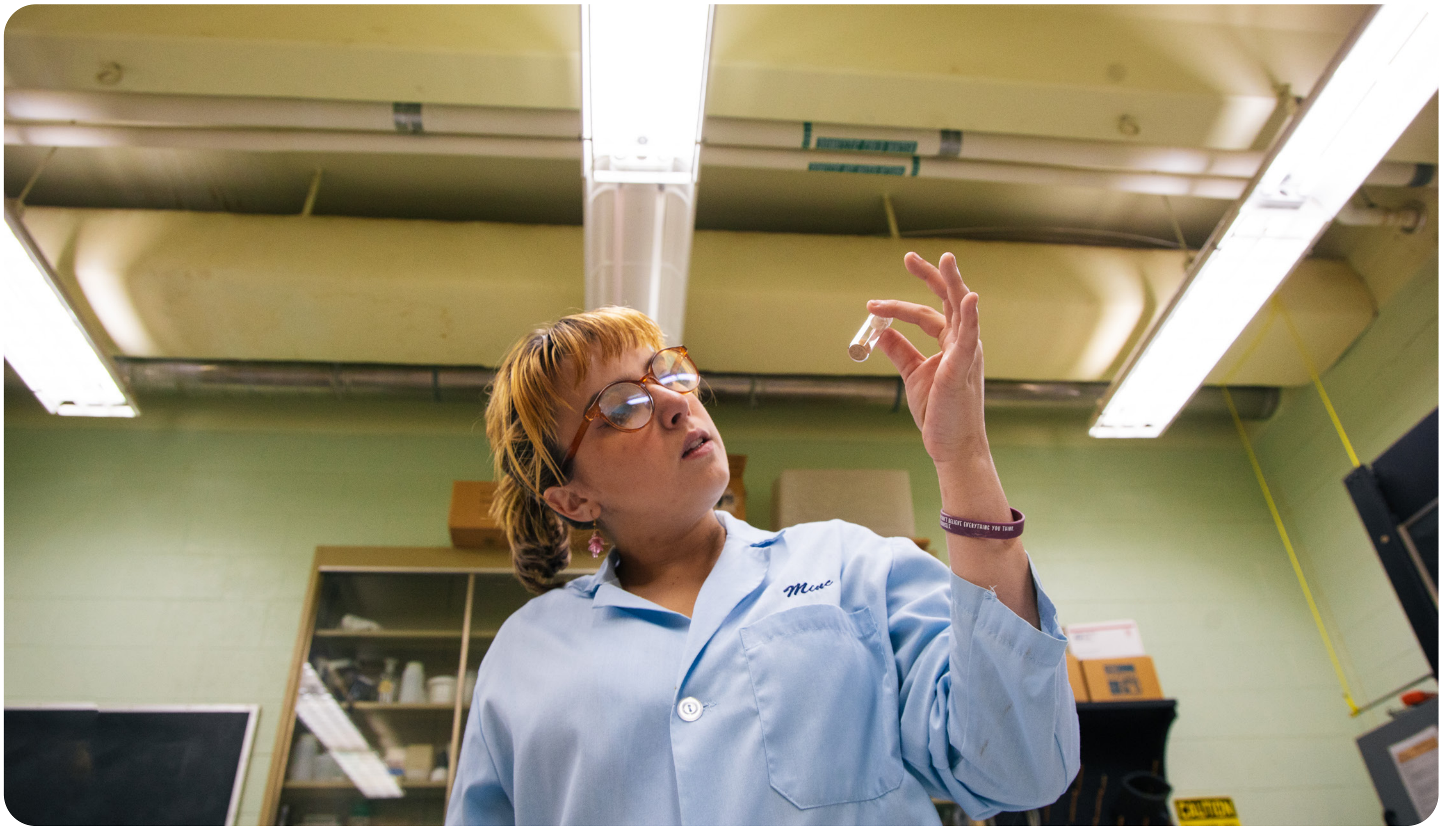


Table VI.2
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
444	Koppers	Oregon State University	Ar/Ar Dating of Oceanographic Samples	Production of Ar-39 from K-39 to measure radiometric ages on basaltic rocks from ocean basins.	OSU Oceanography Department
815	Presley	Oregon State University	Sterilization of Wood Samples	Sterilization of wood samples to 2.5 Mrads in Co-60 irradiator for fungal evaluations.	OSU Forest Products
920	Becker	Berkeley Geochronology Center	Ar/Ar Age Dating	Production of Ar-39 from K-39 to determine ages in various anthropologic and geologic materials.	Berkeley Geochronology Center
932	Dumitru	Stanford University	Fission Tracking Dating	Fission track dating of the mineral apatite extracted from rock samples. This is a well-established method for constraining the time-temperature histories experienced by rocks over geologic time, to evaluate the geologic history of parts of the Earth, and the geologic processes involved. Thermal neutron irradiations are used to measure the concentration of trace natural uranium present in apatite (typically 1 to 200 parts per million), a parameter necessary for age (time) calculations.	Stanford University Geology Department
1074	Kuiper	Vrije Universiteit	Ar/Ar Dating of Rocks and Minerals	Ar/Ar dating of rocks and minerals.	Vrije Universiteit, Amsterdam
1191	Vasconcelos	University of Queensland	Ar/Ar Age Dating	Production of Ar-39 from K-39 to determine ages in various anthropologic and geologic materials.	Earth Sciences, University of Queensland
1465	Singer	University of Wisconsin	Ar/Ar Dating of Lavas	Irradiation of geological materials such as volcanic rocks from sea floor, etc. for Ar-40/Ar-39 dating.	University of Wisconsin
1504	Teaching and Tours	Oregon State University - Educational Tours	Academic Tours	Covers irradiations necessary to support academics, classes, student research, and tours.	N/A
1514	Sobel	Universitat Potsdam	Apatite Fission Track Analysis	Age determination of apatites by fission track analysis.	Universitat Potsdam
1523	Zattin	Università degli Studi di Padova	Fission Track Analysis of Apatites	Fission track analysis of apatites.	N/A
1555	Fitzgerald	Syracuse University	Fission Track Thermochronology	Irradiation to induce U-235 fission for fission track thermal history dating, especially for hydrocarbon exploration. The main thrust is towards tectonics, in particular the uplift and formation of mountain ranges.	Syracuse University

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
1568	Zanetti	University of Nevada, Las Vegas	Ar/Ar Dating of Rocks and Minerals	Irradiation of rocks and minerals for Ar/Ar dating to determine eruption ages, emplacement histories, and provenance studies.	Univerity of Nevada, Las Vegas
1595	Rahn	Albert-Ludwigs-Universitaet	Fission Track Dating of the Mid-European Rhine Graben Shoulder	Dating of the shoulder uplift along the Mid-European Rhine graben shoulders by the fission track technique.	German Science Foundation
1617	Spikings	University of Geneva	Ar/Ar Geochronology and Fission Track Dating	Argon dating of Chilean granites.	University of Geneva
1623	Blythe	Occidental College	Fission Track Analysis	Fission track Thermochronology of geological samples.	Occidental College
1660	Reactor Operations Staff	Oregon State University Radiation Center	Operations Support of the Reactor and Facilities Testing	Operations use of the reactor in support of reactor and facilities testing.	N/A
1745	Girdner	U.S. National Parks Service	C14 Measurements	LSC analysis of samples for C14 measurements.	U.S. National Parks Service
1767	Korlipara	Terra Nova Nurseries, Inc.	Genera Modifications Using Gamma Irradiation	Use of gamma and fast neutron irradiations for genetic studies in genera.	Terra Nova Nurseries, Inc.
1768	Bringman	Materion Brush Inc.	Antimony Source Production	Production of Sb-124 sources.	Materion Brush Inc.
1777	Storey	Quaternary Dating Laboratory	Quaternary Dating	Production of Ar-39 from K-39 to determine radiometric ages of geological materials.	Quaternary Dating Laboratory
1778	Chuen How	Genis, Inc.	Gamma Exposure of Chitosan Polymer	This project subjects chitosan polymer in 40 and 70% DDA formulations to 9 and 18 Kgy, boundary doses for commercial sterilization for the purpose of determining changes in the molecular weight and product formulation properties.	Genis, Inc.
1785	Minc	Oregon State Univesity	INAA of Maya Ceramics	Trace-element analysis of ancient Maya ceramics from Pulltrouser Swamp, Belize.	
1818	Smith	Materion Natural Resources	Antimony Source Production (Utah)	Source production for use in mining assaying.	Materion Natural Resources
1831	Thomson	University of Arizona	Fission Track	Fission track thermochronometry of the Patagonian Andes and the Northern Apennines, Italy.	Yale University
1847	Higley	Oregon State University	Ultra-Trace Uptake Studies for Allometric Studies	NAA of ultra-trace elements in plant samples for application in allometric studies.	NERHP CRESP Grant
1855	Anczkiewicz	Polish Academy of Sciences	Fission Track Services	Verification of AFT data for illite-mechte data.	Polish Academy of Sciences
1860	Minc	Oregon State University	INAA of Archaeological Ceramics	Trace-element analysis of archaeological ceramics.	N/A

Table VI.2 (continued)

Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
1864	Gans	University of California at Santa Barbara	Ar/Ar Sample Dating	Production of Ar-39 from K-40 to determine radiometric ages of geologic samples.	University of California at Santa Barbara
1865	Carrapa	University of Arizona	Fission Track Irradiations	Apatite fission track to reveal the exhumation history of rocks from the ID-WY-UY postion of the Sevier fold and thrust belt, Nepal, and Argentina.	University of Arizona
1882	Bray	Wayne State University	INAA of Archaeological Ceramics from South America	Trace-element analysis of Inca-period ceramics for provenance determination.	Wayne State University
1884	Contreras	Oregon State University	Mutation Breeding of Woody Plants	The current project is designed to identify the LD50 rate of gamma irradiation so that large seed lots may be irradiated in order to develop novel phenotypes that exhibit reduced fertility or sterility.	OSU Horticulture
1886	Coutand	Dalhousie University	Fission Track Irradiation	Fission track irradiations of apatite samples.	Dalhousie University
1887	Farsoni	Oregon State University	Xenon Gas Production	Production of xenon gas.	OSU NERHP
1889	Paulenova	Oregon State University	Hydrolysis and Radiolysis of Synergistic Extractants	The goal of this project is to determine the effects of hydrolysis and radiolysis on the extraction ability of a diamide and chlorinated cobalt dicarbollide (CCD). CCD and the diamide are synergistic extractants and will be together in solution for hydrolysis and radiolysis experiments. Effects will be measured with IR spectroscopy and extraction distribution ratios.	Oregon State Univeristy NSE
1898	Fayon	University of Minnesota	Fission Track Services	Use of fission tracks to determine location of 235U, 232Th in natural rocks and minerals.	University of Minnesota
1905	Fellin	ETH Zurich	Fission Track Analysis	Use of fission tracks to determine location of 235U, 232Th in natural rocks and minerals.	Geologisches Institut, ETH Zurich
1914	Barfod	Scottish Universities Environmental Research Centre	Ar/Ar Geochronology	Ar/Ar age dating.	Scottish Universities Research and Reactor Centre
1927	Seward	Victoria University of Wellington	Fission Track Dating	Fission track dating of apatite samples.	Victoria University of Wellington
1939	Wang	Lanzhou University	Lanzhou University Fission Track	Fission track dating.	Lanzhou University
1957	Phillips	University of Melbourne	Radiometric Age Dating of Geologic Samples	Ar/Ar age dating.	University of Melbourne
1965	Webb	University of Vermont	Ar/Ar Age Dating	Irradiation with fast neutrons to produce Ar-39 from K-39 for Ar/Ar geochronology.	University of Vermont

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
1975	Wildman	University of Glasgow	Samuel Jaanne	Use of fission tracks to determine last heating event of apatites.	School of Geographical and Earth Sciences
1980	Carpenter	Radiation Protection Services	Sample Counting	Sample counting.	State of Oregon Radiation Protection Services
1995	Camacho	University of Manitoba	Ar/Ar Dating	Production of Ar-39 from K-39 to determine radiometric ages of geological materials.	University of Manitoba
2001	Derrick	Branch Engineering	Densitometer Leak Test	Wipe counts for leak test of densitometer sources.	Branch Engineering
2004	Sudo	University of Potsdam	Ar/Ar Geochronological Studies	Ar/Ar dating of natural rocks and minerals for geological studies.	
2007	van Soest	Arizona State University	Argon-Argon Geochronology	Fast neutron irradiation of mineral and rock samples for 40Ar/39Ar dating purposes.	Arizona State University
2010	Helena Hollanda	University of Sao Paulo	Ar/Ar Geological Dating	Ar/Ar geologic dating of materials.	University of Sao Paulo
2017	Jourdan	Western Australian Argon Isotope Facility	Age Dating of Geological Material	Ar/Ar geochronology.	Curtin University
2023	Beaumont	Lawrence Livermore National Laboratory	Ar/Ar Dating	Production of neutron induced 39Ar from 39K for Ar/Ar dating.	Lawrence Livermore National Laboratory
2028	Minc	Oregon State University	INAA of Ceramics from the Ancient Near East	Provenance determination of ceramics from the Ancient Near East via trace-element analysis.	OSU Anthropology
2029	Kim	Korea Basic Science Institute	Ar/Ar Geochronology	Ar/Ar analysis for age dating of geological samples.	Korea Basic Science Institute
2031	Malusa	University of Milano-Bicocca	Fission Track Dating	Use of fission tracks fron U-235 to determine age of rocks.	Università degli Studi di Milano-Bicocca
2034	Presley	Oregon State University	Sterilization of Wood Products	Sterilization of wood to 2.0 Mrad for fungal experiments.	OSU Forest Products
2035	Wang	Lanzhou Center of Oil and Gas Resources, CAS	Fission Track	Fission track dating of rock samples.	Lanzhou Center of Oil and Gas Resources, CAS

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2039	Gombart	Oregon State University	Prevention of Infections Associated with Combat-Related Injuries by Local Sustained Co-Delivery	Prevention of Infections Associated with Combat-Related Injuries by Local Sustained Co-Delivery of Vitamin D3 and Other Immune-Boosting Compounds Award Mechanism. We are preparing nanofiber wound dressings that contain compounds that will be released over time to induce the immune response in wounds to help prevent infection and speed wound healing. The nanofibers must be irradiated so that they are sterile. These experiments will be performed in cell culture and in animal models.	
2048	Christensen	Oregon State University	INAA of IV Fluids	INAA to determine trace metals in TPN and additives.	OSU College of Pharmacy
2060	Ishizuka	Geological Survey of Japan/AIST	Ar/Ar Geochronology	Ar/Ar geochronology of volcanic and igneous rocks associated with subduction initiation of oceanic island arc.	Geological Survey of Japan
2061	Weiss	Oregon State University	Neutron Radiography Imaging of Concrete	Investigation into the applicability of neutron radiography for evaluating concrete curing processes.	
2064	Schaefer	CDM Smith	Abiotic Dechlorination of Chlorinated Solvents in Soil Matrices	We will be performing bench scale microcosm studies to measure the abiotic dechlorination in different soil matrices. Gamma irradiation will be used to sterilize the samples.	CDM Smith
2067	Reese	Oregon State University	Neutron Radiography of Long-Term Concrete Curing	Use of neutron radiography and tomography imaging in long-term studies of concrete curing used in civil construction.	Oregon State University CCE
2069	Scaillet	INSU-CNRS-Universite d’Orleans	Ar/Ar Dating of Geologic Samples	Ar/Ar analysis for age dating of geologic samples (solid rock chips and minerals).	INSU-CNRS-Universite d’Orleans

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2070	Lowell	Colorado Gem and Mineral Co.	Gamma Irradiation Induced Change of Color in Tourmaline from a Pegmatite in the Oban Massif, Nigeria	The purpose of this experiment is to determine what color a nearly colorless Tourmaline will turn with dosages of 5, 10, and 20 Mr of Gamma irradiation. Two Pakistan Beryl crystals are also part of this experiment to see the color change as well as 2 pieces of Four Peaks Amethyst that may have been faded by sunlight. For the Tourmaline, color possibilities are brown, yellow, and pink to red. The commercial value of colorless gem Tourmaline is very low, but other colors of gem Tourmaline, especially pink and red results, would stimulate mining of this material in Nigeria. 20 Mr is usually a dosage that will saturate the visible color, and lower dosages may be preferable if the Gamma rays cause a new color other than pink or red which is the desirable result.	Colorado Gem and Mineral Co.
2084	Spirkowyc	Charlotte Pipe and Foundry Co.	ABS Antimony Testing	Testing for trace antimony in ABS compounds via INAA according to ASTM E3063.	Charlotte Pipe and Foundry Co.
2085	He	Lanzhou University	Apatite Fission Track	Use of fission track analysis to determine U content in the sedimentation of Xining Basin.	Lanzhou University
2092	Jianqiang	Northwest University	Fission Track Dating of Qaidam Basin	Fission track dating of Qaidam Basin, China to determine its age.	
2097	Boyt	Boyt Veterinary Lab	Donor Bovine Serum Irradiation	Project is designed to irradiate liquid donor bovine serum contained in vinyl bags to a minimum level of 25 kGy to inactivate any adventitious agents that may be present in 0.2 um sterile filtered product.	Boyt Veterinary Lab
2098	Pang	Institute of Geology, China Earthquake Administration	Fission-Track Dating	Studying the thermal history of the northeast Tibet Plateau by the fission-track dating method.	China Earthquake Administration
2101	Yang	Zhejiang University	Fission-Track Thermochronometry	Fission-track analysis for dating geological materials.	Zhejiang University
2111	Turrin	Rutgers	Ar/Ar Geochronology	Lunar/solar system chronology.	NASA
2115	Scao	LSCE-CNRS	Age Dating of Geologic Materials	Ar/Ar analysis for age dating of geologic materials.	LSCE-CNRS

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2116	Nyman	Department of Chemistry	Determine if the Oligomerization of Uranyl Peroxide can be Driven by Radiation	We would like to determine if the oligomerization of uranyl peroxide can be driven by radiation in solution. We will prepare solutions of lithium uranyl triperoxide monomers and apply different radiation doses (time of radiation) until change is observed by visual inspection and spectroscopic characterization. We estimate three samples, irradiated for one day, and TBD for the other two samples. Irradiation of all will start simultaneously.	Department of Chemistry
2120	Li	Institute of Tibetan Plateau Research, Chinese Academy of Sciences	Alpha-Particle Induced Annealing Effects on Fission Tracks in Apatite	Using the in situ TEM ion irradiation facility at Argonne National Laboratory, we already observed He ions (simulating alpha-particles) induced annealing effects on 80 MeV ion tracks (simulating fission tracks) in apatite. For the next step, we are planning to use chemical etching to further confirm the alpha-annealing effects on real fission tracks. Neutron-induced fission tracks are essential to the etching experiments because neutron-induced fission tracks, as compared to naturally occurring fission tracks, have no thermal history (or thermal annealing effects).	Chinese Academy of Sciences
2121	Jia	Beijing Research Institute of Uranium Geology	Fission Track Analysis to Determine U Content in South China	Fission track dating of areas of South China.	Beijing Research Institute of Uranium Geology
2122	Jia	Beijing Research Institute of Uranium Geology	Ar-Ar Analysis for Age Dating of Geologic Materials	Ar-Ar analysis for age dating of geologic materials (solid rock grains and minerals).	
2135	Pomella	University of Innsbruck	Apatite Fission Track	Apatite fission track, standards for zeta calibration.	University of Innsbruck
2136	Higley	Oregon State University	INAA of Mining Site Soils	Soil analysis by INAA for Uranium/Thorium concentration assessment.	

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2138	Hames	Auburn University	40Ar/39Ar Dating of Mineral Samples from Orogenic Belts and Mineral Deposits	This project will result in new geological age determinations by the 40Ar/39Ar method for potassium-bearing silicate minerals (including hornblende, muscovite, biotite, and orthoclase), along with basalt whole rock samples, in the Auburn Noble Isotope Mass Analysis Laboratory (ANIMAL). This project is for scientific investigation of Earth's history and has applications to mining industries.	Auburn University
2142	Ricci	New Mexico Institute of Mining & Technology	Irradiation of Samples for 40Ar/39Ar Geochronology for NM Tech	Fast neutron irradiation of geological samples to primarily transmute 39K to 39Ar for the purposes of rock and mineral dating. Samples are for academic geological investigations requiring knowledge of age and/or thermal history.	NM Bureau of Geology
2144	Hemming	Columbia University	Ar Geochronology for the Earth Sciences (AGES)	We analyze a variety of geological samples for their 40Ar/39Ar ages, including samples for external collaborators and for internal grant-supported research.	Columbia Univeristy
2145	Morgan	U.S. Geological Survey	40 Ar/39Ar Geochronology	Neutron irradiation requested for 40Ar/39Ar geochronology. Will use 39K (n,p) 39Ar reaction to determine ages on rocks and minerals.	USGS Argon Geochronology
2146	Calvert	U.S. Geological Survey	40 Ar/39Ar Geochronology	Menlo Park Geochronology uses 40Ar/39Ar techniques to date materials for geologic hazards, mapping, tectonic, and mineral resource projects. The method requires fast-neutron irradiation of separates from volcanic, plutonic, sedimentary, and metamorphic rocks to convert 39K to 39Ar.	Menlo Park Geochronology
2149	Vanderstelt	Nray Services, Inc.	Titanium Turbine Blade Radiography	Examination of titanium turbine blades via neutron radiography.	Nray Services, Inc.
2150	McAleer	U.S. Geological Survey	U.S. Geological Survey-Reston Ar/Ar Geochronology Laboratory	Irradiation of potassium-bearing minerals that will be dated by the Ar/Ar method at the USGS Reston Argon Geochronology Laboratory. The samples are from diverse localities and of diverse age.	U.S. Geologigcal Survey
2153	Quinn	Solidia Technologies	Neutron Radiography to Image Carbon Dioxide in Concrete	Using neutron radiography to look at pressurized CO2 in concrete that is curing.	Solidia Technologies
2157	Fawcett	University of Manchester	MN2019a	Neutron irradiation of geologic material for noble gas analysis and dating.	University of Manchester

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2160	Schaen	Department of Geosciences, University of Arizona	University of Arizona 40Ar/39Ar Geochronology	Irradiation rock and mineral samples for 40Ar/39Ar dating.	University of Arizona
2161	Turina	Museo Egizio	NAA of Clays	NAA of clays to determine radioactivity level for future neutron radiography work. This will determine/estimate how long the samples will need to be held prior to free release.	
2162	Jump	Oregon State University	Role of Microbiota in the Effects of Polyunsaturated Fatty Acids (PUFA) on Liver	To address the role of microbiota in fatty liver disease and in beneficial effect of PUFA on liver.	Oregon State University
2163	Sathuvalli	Department of Horticulture	Gamma Irradiation of Potatoes	The main idea is to introduce gamma rays to tissue cultures of three potato varieties in a bid to induce mutations to the plants. There are certain qualities/characteristics we hope will be mutated, and so, upon inducement with gamma radiation, we will evaluate the plants (if they survive the mutation) for those qualities. The first stage is to ascertain the optimum radiation dosage for the three varieties under evaluation. A second stage will come up where the potatoes will be evaluated based on information from the first, i.e. the optimum radiation dosage.	Oregon State University Horticulture
2165	Caffrey	NASA Marshall Space Flight Center	Nuclear Propulsion Polymer Tests	A set of five polymers (EPDM, PTFE, PCTFE, PFA, PAI) used in common spaceflight applications are to be exposed to the mixed neutron/gamma field of the OSTR in order to evaluate changes in material properties. The current test includes a total of 60 ‘microdogbone’ ASTM D638 Type V tensile specimens.	NASA
2166	Kampfer	Materion Corp.	Trace-Element Analysis of Be Powder	INAA to determine U content of Be powder.	Materion Corp.
2167	Reese	Oregon State University	Neutron Radiography of Artifacts, Articles, and Instruments	Use of neutron radiography to examine archaeological artifacts, samples of interest, and instrumentation.	

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2168	Radniecki	Oregon State University CBEE	The Effects of Biofilms in CLM Testing of Sorbents for Removal of Cu, Zn, and PFAS's from Stormwater	We are trying to isolate the effects that biofilm growth and fouling has on sorption kinetics, breakthrough, and desorption in packed columns of two different proprietary adsorbents. By looking at the data for triplicate columns with and without biofilms enriched from the OGSIR facility in Avery Park, we hope to isolate the effects that naturally occuring biofilms have on sorption removal of PFASs, zinc, and copper in stormwater.	Oregon State University CBEE
2169	Field	Environmental and Molecular Toxicology	PFAS Compounds in the Environment	INAA to determine total fluorine content in consumer products and the environment.	OSU Toxicology
2170	Howe	Howe Industries	Thermoelectric Cooler Conductivity Experiment	Testing electrical conductivity changes of materials while monitoring temperatures of device and ambient conditions. Power will be stepped at various levels to determine these parameter changes.	Howe Industries
2171	Tiwari	Department of Plant Science and Landscape Architecture	Gamma Induced Chromosomal Breaks in CS and MOV Wheats	We would like to get these seeds irradiated for inducing gamma irradiation-induced chromosomal breaks in CS and MOV-wheats. It will allow us to map targeted candidate genes in low recombination regions and will help in overall wheat improvement.	University of Maryland, College Park
2172	Graziano	University of Alaska, Anchorage	Control of Invasive Plants at High Latitudes with Persistent Herbicides	The project is looking at positive and negative consequences of using persistent herbicides for invasive species management at high latitudes. The irradiated soils will be used to develop soil herbicide isotherms for aminopyralid and clopyralid. The soils originate from two field sites (Fairbanks and Palmer) where these herbicides were applied. We will determine if the isotherms help predict the persistence of these herbicides at the field sites.	University of Alaska
2173	Lee	University of Oregon	INAA of Ancient Korean Ceramics	Trace-element analyses of Neolithic and Bronze Age ceramics from Korea.	University of Oregon
2174	Horvath	Fusion Energy Solutions	Fast Neutron Detection	The scope of this project is to run tests and calibrate our fast neutron detector through the D(T,n)alpha reactions and calibration by F18 decay from O16+T reactions to be measured on an OSU HPGe detector.	Fusion Energy Solutions, Inc.

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2175	Gess	Oregon State University MIME	Neutron Radiography of Two Phase Flow	Use of neutron radiography to evaluate two phase flow conditions during TREAT irradiations.	
2176	Phelps	Adhezion Biomedical	Various Ampoule Gamma-Feasibility Run	Adhezion Biomedical is interested in the effect of Gamma on various applicator parts and materials. The purpose of this feasibility run is to provide ampoules from three different product lines to understand the process and ensure your facility can stay within the range of 8-12 kGy. Once we get the samples returned, if all testing on our end results as expected, we will most likely send a second round of samples for further investigation of material compatibility with Gamma-irradiation.	Adhezion Biomedical
2177	Phelps	Adhezion Biomedical	PVDF Ampoule Gamma-Feasibility Run	Adhezion Biomedical is interested in the effect of Gamma on PVDF ampoules and the stability of the product post-irradiation. Analytical testing shall follow on our end after Gamma-irradiation to determine if this is a good sterilization method to move into a larger scale sterilization for our medical device product line.	Adhezion Biomedical
2178	Weiss	Oregon State University	BASF Additive Concrete Curing Investigation	Examination of a BASF additive to concrete mixtures and its effect upon curing under pressure.	
2179	Weiss	Oregon State University	ACI Investigation of Environmental Factors on Concrete Curing	American Concrete Institute examination of atmospheric effects, particularly humidity and pressure, upon concrete curing.	
2180	Meqbel	Hi-Tech Precious Metals Refinery	INAA of Mine Tailings	INAA to determine precious metal (gold and PGE) content of mine tailings.	Hi-Tech Precious Metals Refinery
2181	Singh	Wadia Institute of Himalayan Geology	Geo-Thermochronological Investigation of Lesser Himalayan Crystalline of Garhwal Region, NW-Himalaya	To study the shallow crust exhumation history of the lesser Himalayan crystalline and metasedimentary sequence of Garhwal region.	Wadia Institute of Himalayan Geology
2182	Reese	Oregon State University	Use of D2O as a Contrast Enhancement for Neutron Radiography	Examination of the improvement in contrast gained by using D2O instead of H2O in the analysis of concrete curing.	
2183	Sprain	Department of Geological Sciences, University of Florida	Irradiation for 40Ar/39Ar Geochronology	This project is for the irradiation of geological materials with a high flux of fast neutrons to facilitate the 39K(n,p)39Ar reaction. Irradiated geological materials will subsequently be analyzed for 40Ar/39Ar geochronological analysis to determine the age of the geological materials.	Department of Geological Sciences, University of Florida

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2184	Bernet	Université Grenoble Alpes	Apatite Fission Track Irradiations	The apatite samples are for three different projects for studying the exhumation of the Himalayas, Andes, and European Alps.	Université Grenoble Alpes
2185	Taylor	University of Minnesota	Pioneer Mountains AFT	Suite of apatite crystals to be irradiated for fission track dating.	University of Minnesota
2186	Cao	Oregon State University	Fluorine Content in PFAS Standards	INAA to determine fluorine content in PFAS standards.	Department of Chemistry
2187	Stevens Goddard	Indiana University	Fission Track Analysis	Irradiation of geologic materials (minerals apatite and zircon) for fission track analysis (age dating of thermal events) using the external detector method.	Indiana University
2188	Orme	Montana State University	AFT Irradiation - MSU	Irradiation of apatite grains mounted in epoxy for fission track analysis at Montana State University.	Montana State University
2189	Kasparek	Pacific Northwest National Laboratory	Cerenkov In-Pool Noise Characterization	This project will develop and build a custom UV probe and spectrophotometer to map the UV spectrum in spent fuel ponds and identify and quantify light noise contributions within the pool.	Pacific Northwest National Laboratory
2191	Hulbert	Silicon Designs Inc.	Sensor Performance vs Total Ionizing Dose (TID)	The sensor is an industrial grade accelerometer which consists of a silicon sensor and ASIC hermitically sealed in a 0.35” square ceramic package. This project will irradiate several groups of sensors over a range of TID and compare the before and after results of a variety of electrical and dynamic measurements to determine the effect(s) of the radiation.	Silicon Designs Inc.
2192	Frame	Yale University	INAA of Archaeological and Geological Materials	Trace-element analysis via INAA of fired clay, brick, and stone.	Yale University
2193	Arató	Institute for Nuclear Research, Hungary	Pannonian Basin Provenance II	In this project, we investigate the provenance of Quaternary-Miocene basin-fill sediments in the Pannonian Basin. For this purpose, we carry out fission-track analysis on apatite and zircon crystals. The uranium content of these crystals will be determined via the external detector method, which requires the irradiation of our samples with thermal neutrons.	Institute for Nuclear Research, Hungary

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2194	Carter	Pacific Northwest National Laboratory	Lexan Slides for Fission Track Irradiation	Support the 69981 Program (Child Project XYZ – 70039) at Pacific Northwest National Laboratory by providing the ability to perform fission track irradiation on Lexan slide targets in the thermal column facility.	Pacific Northwest National Laboratory
2195	Liang	Florida State University	Carbon Nanotube Properties Enhancement by E-beam and Gamma-Ray Irradiation	Carbon nanotube (CNT) has high mechanical and electrical properties and widely used for nanocomposite applications as reinforcement materials. Highly aligned CNT sheet or yarn showed significant properties improvement due to high alignment degree over 0.7. High energy electron beam or gamma ray irradiation increased the crosslink between CNTs, hence the resulting CNT/epoxy or CNT/BMI composite mechanical properties will be enhanced.	Florida State University
2196	Iwaniec	Oregon State University	Housing Temperature: An Important Variable for Simulated Spaceflight Studies Using Mice	These studies will explore the individual and combined effects of (1) mild chronic cold stress (induced by room temperature housing) and (2) hindlimb unloading (HLU) on premature bone loss in C57BL/6 (B6) mice, a strain commonly used in spaceflight/simulated spaceflight studies.	
2197	Prausnitz	Gerogia Institute of Technology	Gamma Sterilization Effects on Drug Loaded Patches	We are developing drug delivery systems using transdermal delivery systems. In one of our projects, we are interested in gamma sterilization for terminal sterilization of our product which is basically a drug/polymer mixture.	Georgia Institute of Technology
2198	Tiwari	Department of Plant Science and Landscape Architecture	Gamma Irradiation-Induced Chromosomal Breaks	We would like to get these seeds irradiated for inducing gamma irradiation-induced chromosomal breaks in varieties MD315 and PJT RIL 74-wheats. It will allow us to map targeted candidate genes in low recombination regions and will help in overall wheat improvement.	University of Maryland, College Park
2199	Brown	Stark Street Materials Corp.	85 wt% Bi-Silicone Gamma Irradiation	85 wt% Bi-Silicone will be irradiated using a GammaCell 220 for 24 hours at Oregon State University to better understand the material property changes after irradiation.	Stark Street Materials
2200	Brown	Stark Street Materials Corp.	Bi-Si Attenuation Coefficient Determination	Determination of attenuation coefficients for various gamma energies.	Stark Street Materials

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2201	Ocamb	Oregon State University	Fusarium Diseases in Hop, Vegetables, and Seed Crops	Fusarium species are economically important pathogens of a wide range of crops across the globe. These soilborne fungal pathogens are even more important as their populations are increasing reaching higher levels in the soil. Research activities are focused on monitoring the fungal populations in soil and plant parts for the development of mitigation strategies.	Oregon State University
2202	Weiss	Oregon State University	NSF 3D Printed Samples	Studying sorptivity of 3D printed samples with respect to printing directionality.	NSF
2203	Phelps	Adhezion Biomedical	SecurePortIV App with COC Ampoule Gamma-Feasibility Run	Adhezion Biomedical is interested in the effect of gamma on COC ampoules and the stability of the product post-irradiation. Analytical testing shall follow on our end after gamma-irradiation to determine if this is a good sterilization method to move into a larger scale sterilization for our medical device product line.	Adhezion Biomedical
2204	Reese	Oregon State University	INL Flash Radiography Camera Development	Development of prototype neutron radiography camera for use in the OSTR Neutron Radiography Facility. The prototype camera system will be used as part of the INL flash radiography facility at TREAT.	
2205	Privitera	Kavli Institute for Cosmological Physics	Irradiation of Sb to 5 mCi of Sb-124 for DAMIC-M	Our goal is to irradiate antimony pellets in order to achieve 5 mCi activity. Up to 5 grams of pellets are available. Pellets will be housed in 0.5 in diameter x 1 in length polyethylene vial during irradiation.	University of Chicago
2206	Langtry	Avalanche Energy	Compact Neutron Generator	Avalanche Energy is a VC backed startup developing a small compact deuterium-deuterium fusion device which has applications as a high-flux neutron source and longer term potentially for energy generation. This small plasma device (12 cm diameter) combines aspects of an ion trap (electrostatic ion confinement) with a cylindrical magnetron for ExB electron confinement. First proof of concept experiments are underway at our lab in Seattle, and we would like to calibrate our neutron detection equipment at Oregon State's facilities.	Avalanche Energy
2208	Chemey	Oregon State University	Medical Isotope Feasiblity Studies	Determination of feasibility making different medical isotopes using the TRIGA reactor.	

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2209	Galindo	Rosebud Sioux Tribe Historic Preservation Office	INAA of Fired Clay Samples	Multielement analysis of fired clay samples via INAA.	
2210	Wu	Peking University	Tectonic Thermal Evolution History of Junggar Basin	Use of fission track analysis to determine U content in the sedimentation of Junggar Basin. To study the thermal history of the basin.	Peking University
2211	Rogers	Greentree Synergy	INAA of Metal Products	Elemental analysis via INAA of finely divided elemental metals.	
2212	Hosmer	102nd Oregon Civil Support Unit	Isotope Production of Various Sources	Production of various sources for training purposes.	
2213	Pang	Institute of Geology, China Earthquake Administration	Extending the Time-Temperature Ranges of Apatite Fission Track Annealing	The apatite fission track time-temperature modeling is constructed on the laboratory annealing data sets and controlled by empirical Arrhenius equations and time and temperature ranges. Improvement of the annealing ranges would result more comprehensive extrapolations parameters from the lab annealing to the geological time scales.	China Earthquake Administration
2214	Gordon	Redwood Materials	Trace Impurities in Copper Foils	INAA and LSC to detect trace impurities in copper foils.	
2215	Lang	Georgia Institute of Technology	Ongoing Fission Track Irradiations	Regular irradiations for fission track dating. Common minerals include: apatite embedded in epoxy and zircon embedded in PFA Teflon. All mineral samples are wrapped in Scotch Magic tape with a piece of low-U mica, labeled with a Sharpie and bound together with Parafilm.	Georgia Institute of Technology
2218	Mutin	Benjamin Mutin	INAA of Iranian Pottery	INAA to quantify chemical composition of archaeological ceramics from ancient Iran to determine provenance.	
2219	Dyrdahl	Pontificia Universidad Católica del Ecuador	Ceramic Sourcing in N. Highland Ecuador	Chemical analysis of ceramics via INAA to determine provenance.	Pontificia Universidad Católica del Ecuador
2220	Arató	Georg-August Universität Göttingen	FTAIGE	In this project, we study fission tracks in standard apatite and zircon crystals. For the so-called external detector method, the thermal irradiation of the samples is necessary.	Georg-August Universität Göttingen

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2221	Williams	Kop-Coat	KCPP Gamma Treatment of Soil Blocks	Soil blocks and wafers are to be gamma sterlized and returned to Kop-Coat to evaluate gamma sterilization as alternate to autoclave sterilization. ASTM D1413 recommends “a radiation level of 2.0 to 2.5 Mrad when using radioisotopes or 2.0 to 5.0 Mrad if electron accelerators are used."	Kop-Coat
2223	Apigo	Oregon State University	Litter Decomposition by Fungal Endophytes	This project will examine how fungi that live inside leaves control the decomposition rate of Populus trichocarpa leaves. Leaves will be sterilized of existing microorganisms using the Gamma cell 220 60Co gamma irradiator. We will inoculate specific communities of fungi onto the sterilized leaves to understand how specific fungal species affect litter mass loss over time.	Department of Botany and Plant Pathology
2225	Werth	University of Texas at Austin	Abiotic TCE Reactions in Clay Soil	We want to sterilize our soil with gamma irradiation to prevent microbial processes from interfering with our abiotic reactions of interest. The sterilized clay soil will be used in batch experiments to measure its reactivity toward TCE under varying conditions.	University of Texas
2226	Reese	Oregon State University	ODOT Concrete Curing	Testing concrete curing for Oregon Department of Transportation using neutron radiography. Imaging specimens in a dry and saturated state.	ODOT
2227	Alden	University of Michigan	INAA of Archaeological Ceramics from Iraqi Kurdistan	Provenance determination of ceramics from Iraqi Kurdistan via trace-element analysis.	OSU Radiation Center, Minc
2228	Gaspich	Oregon State University	Detection of Sodium Content in Biological Materials	INAA to track sodium content in fish cells as a proxy for cell lysis.	Oregon State University - FST
2229	Adlakha	Wadia Institute of Himalayan Geology	Fission Track Thermochronology	These samples are sent for thermal neutron irradiation for fission track dating purposes to understand the exhumation history of various rocks exposed along Lohit and Dibang Valley region, NE India.	Wadia Institute of Himalayan Geology
2231	Jackson	CleanMark Labels	Gamma Activation Test	CleanMark to provide indicating ink material via Gamma (Material # 500) to OSU to sterilize and validate at what point in range of sterilization application does the material start to indicate with a different color (yellow to pink).	CleanMark Labels

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2232	Heberer	University of Salzburg	Thermochronology Along the Insubric Line	This project uses various thermochronometers to trace the cooling and exhumation history along and across the most important fault system of the European Alps. Among these thermochronometers are apatite and zircon fission track dating, which is carried out in collaboration with Hannah Pomella from the University of Innsbruck.	University of Salzburg
2233	Wallace	Andluca Technologies	Trace Halogen Detection by INAA	Detection of trace halogens (Cl, Br, I) in organic materials by Neutron Activation Analysis.	Andluca
2234	Reese	Oregon State University	NRF Camera Development	Development of a digital camera system for the NRF.	
2235	Weiss	Oregon State University	Neutron Imaging of Calcium Aluminate Cements	Neutron imaging will be used to determine drying behavior of CAC-based pastes among these methods. Within minutes of mixing, the CAC-based pastes will be placed in the beam in sealed and drying environments. The effect of the drying behavior on the transport, mechanical, and physical properties of the fresh CAC-based ternary mixtures.	
2237	Adams	Nu Planet Pharmaceutical Radioisotopes, Inc.	Nu Planet Thorium Validation	Analysis of 0.98 g Th(NO3)4·4H2O dissolved in 20 mL water via HPGe to determine the activities of thorium and associated daughter products (actinium and lead) for validation purposes.	Nu Planet Pharmaceutical Radioisotopes, Inc.
2239	Hagen	ClearMark Labels	Gamma Activation Test	CleanMark to provide indicating ink material via Gamma to OSU to sterilize and validate if processed at a full 30 kGy dose range of sterilization application does the material indicate with a different color (yellow to pink).	CleanMark Labels
2240	Rafieri-Alavi		INAA of Archaeological Ceramics from Central Iran	INAA of ceramic shards from the Zayandeh-rud drainage basin in central Iran dating to the 4th-3rd millennium BC.	
2244	Hofmann	University of Alaska, Fairbanks	Neutron Irradiation for 40Ar/39Ar Dating at UAF	We plan to neutron-irradiate natural mineral samples, including hornblende, feldspar, and mica, at OSTR (CLICIT) in preparation for routine 40Ar/39Ar dating at the University of Alaska, Fairbanks. Most individual irradiation periods will likely be 6 h.	University of Alaska, Fairbanks

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Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2247	Mais	Northrop Grumman Corporation	Neutron Radiography of Components	Use of neutron radiography to explore the capability to determine the seating of rubber gaskets in metal components.	Northrop Grumman Corporation
2251	Beveridge	Atomos Space	Heating Experiment	Irradiation of Mn-55 to produce radioactive source that will be used to measure decay heat with.	Atomos Space
2254	Chemey	Oregon State University	Development of BP1 PGNAA Facility	Characterization of the beam and capabilities on the PGNAA system located on Beam Port 1.	
2255	Chemey	Oregon State University	Irradiation of Unknown Materials	Short runs to determine elements of unknown matrix.	
2256	Thrower	ManTech - Vallecitos Laboratories - AEM	Vallecitos Laboratories AEM	Irradiation services as part of our sample processing.	ManTech
2257	Stelten	U.S. Geological Survey	Argon Geochronology	The Argon Geochronology lab run by the U.S. Geological Survey in Moffett Field, CA conducts geochronologic investigations primarily on the eruptive history of volcanic system using 40Ar/39Ar geochronology.	USGS
2258	Idleman	Lehigh University	Ar/Ar Geochronology	Basement and metamorphic cover rocks from the northern Appalachians with the goal of clarifying the long-term low-temperature evolution of the terrain.	Lehigh University
2259	Volpi	University of Rome	INAA of Ceramics from Tepe Zurghul	Elemental analysis via INAA to determine provenance of ancient ceramics.	
2260	Reese	Oregon State University	Surface Imaging of Metal Buttons	Use of neutron radiography to look at surface of SS sample buttons.	
2261	Minc	Oregon State University	Tepe Godin	Elemental characterization via INAA to determine provenance of ancient ceramics from Godin Tepe, Iran.	Monash University, Australia
2262	Beveridge	Atomos Space	Determination of Neutron Flux in Various Irradiation Facilities	Irradiation of foils and standards to determine flux in the ICIT, LS, and TC.	Atomos Space
2263	Stein	Emory Umiversity	INAA of Artifacts from the Michael Carlos Museum	Elemental analysis via INAA of ceramic artifacts of Hellenstic age from the museum's collections.	Emory University, Michael C. Carlos Museum
2264	Bergman	BWX Technologies	BWXT Geotextile Gamma Irradiation	Gamma Cell irradiation of three (3) sealed samples, each sample containing four (4) types of geotextile fabrics. Each sample will be 6 in. x 6 in. Requested irradiation doses: 20kGy for sample 1, 60 kGy for sample 2, and 100 kGy for sample 3.	BWX Technologies
2265	Chemey	Oregon State University	Chemical Separation of Fission Products	Irradiation of materials to produce fission products for testing of non-traditional separation methods.	OSU NSE

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2266	Reese	Oregon Department of Energy	Instrument Calibration Activities	Working on ODOE and HazMat instrument capabilities, calibrations, and issues.	Oregon Department of Energy
2267	Stanevich	Rocket Lab	Diode LAT	This is a test to show that our diodes can survive in a gamma radiation environmnet. Oregon State will provide a gamma radiation dose >50rad/s for a total dose to 120Mrad.	Rocket Lab
2268	Reese	Oregon State University	Neutron Radiography of the Instrumental Fuel Element	Use of neutron radiography to look at the status of the thermal couples in the instrumented fuel element.	
2269	Tyler	Phylos Bioscience	2024-08GC	Cobalt-60 gamma irradiation of ground flower for Colombia export.	Phylos Bioscience
2270	Sherman	Idaho National Laboratory	INAA of Cement	Characterization of aggregates and cement powders for potential reactor shielding concrete designs.	Idaho National Laboratory
2271	Chemey	Oregon State University	UF Separation Project	Irradiation of metal oxides for combination with uranium oxide to simulate spent fuel separation scenarios.	OSU NSE
2272	Yasar	University of Florida	Ar/Ar Age Dating Analysis	This project is for the irradiation of geological materials with a high flux of fast neutrons to facilitate the 39K(n,p)39Ar reaction. Irradiated geological materials will subsequently be analyzed for 40Ar/39Ar geochronological analysis to determine the age of the geological materials.	University of Florida
2273	Reese	Oregon Department of Energy	Hanford Emergency Response Report	Support of ODOE for responses to emergencies at Hanford.	
2274	Higley	Oregon State University	Metabolic Response of Irradiated Eumelanin Pigmented Fungi	This project is intended to experimentally investigate the presence of a hypothetical metabolic pathway utilized by eumelanin pigmented fungi responsible for the conversion of ionizing radiation directly into cellular energy. Fungi cultures grown on (sealed) Sabourand Dextrose Agar plates will be irradiated to 100, 500, and 1,000 Gy prior to further experimental procedures.	OSU NSE
2275	Bertassoni	Oregon Health Sciences University	OHSU - bTCP Lego Scaffold	Modular, 3D-printed bTCP scaffolds loaded with microgels for enhanced bone regeneration. The modular scaffolds allow for customizable shapes to fit any defect.	Oregon Health Sciences University

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2276	Hausrath	University of Nevada, Las Vegas	Exobiology Project	The goal of this project is to understand whether clay minerals are capable of preserving biosignatures through the interaction of clay minerals and microorganisms. Various clay minerals with different microorganisms will be investigated.	University of Nevada, Las Vegas
2279	Brandell	Hemingway Designs, LLC	Hemingway Designs PHA Simulated Sterilization	Hemingway Designs is exploring the use of polyhydroxyalkanoate (PHA) as a more sustainable material for use in a "transient contact" medical device application in the home diagnostics and therapeutics area. Nearly all such devices are sterilized via 60Co gamma irradiation at a dose of 25kGy to achieve a projected sterility assurance level (SAL) of 10-6. Most devices of these types advertise shelf lives up to five years, so we will conduct mechanical testing following sterilization and accelerated aging includes tensile testing (ASTM D638) and flexural strenth testing (ASTM D790).	Hemingway Designs, LLC
2280	Joddar	Oregon State University	Gamma Irradiation Studies for Human Neuronal Cells to Determine Differential Gene Alterations	Researchers will conduct gamma irradiation studies (using 2.5 Gy and 5 Gy) on human neuronal cells to anaylze gene expression changes. Their findings will reveal differential gene alterations in response to radiation exposure. These results will contribute to a deeper understanding of how neuronal cells react to gamma irradiation at the genetic level.	Oregon State University
2281	Glathar	VivoTex	Measurement of a Sample	We have some 3D printed plastics that we want to gamma irradiate with a 20kGy dose, so that we can measure their mechanical properties. We would need to send some small plastic samples for irradiation within a 24-well cell culture plate which has an approximate size of 15 x 10 x 2 cm (l x w x h).	VivoTex
2282	Smith	Self	Speedster Dating	Determine if the piece of steel was manufactured before or after the above ground testing of nuclear bombs	Self

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2283	Neff	Washington State University	Bermudagrass Irradiation	Co60 gamma irradiation of bermudagrass stolon (small plant pieces) with 90Gy to induce mutations.	Washington State University
2284	Cooper	Idaho National Laboratory	Short-Lived Isotope Production	Irradiation of copper and potassium bromide sol-gels for short-lived isotope production.	Idaho National Laboratory
2285	Pantana	BWXT	Propylene Glycol Radiation Test - BWXT	This project is a material properties study of propylene glycol after exposre to gamma radiation. A gamma cell will be used at OSU to irradiate three 500ml samples of propylene glycol. One sample to 1 MGy, 2 MGy, and 3 MGy.	BWXT
2287	Gaulke	University of Illinois, Urbana-Champaign	Gaulke Zebrafish Food Gamma Irradiation	Gnotobiotic experiments in zebrafish requires a source of high-quality sterile feed. We have previously demonstrated that 20kGy dose of gamma irradiation is sufficient to produce sterile feed without significantly altering animal growth rates. This project will treat customer provided zebrafish feed with 20kGy dose of gamma irradiation for use in downstream gnotobiotic zebrafish experiments.	Univeristy of Illinois, Urbana-Champaign
2288	Reese	Oregon Department of Energy	Columbia Generating Station Support	The purpose of this agreement is to develop and maintain Oregon State University procedures to prepare and participate in exercises and drills, and if necessary, actual emergencies related to the Energy NW-Columbia Generating Station nuclear power plant.	Oregon Department of Energy
2290	Slauson	Western States Physics	Central Oregon Humane Society	Identify isotope and determine specific activity (uCi/gram) of three concrete samples that are known to contain a long-lived radioisotope (possibly thorium or radium). Count two steel samples for radioactivitiy. If radioactive isotope is contained within steel, determine isotope and specific activity.	Western States Physics
2291	Yates	Self - Individual	INAA for Trace-Element Characterization of Geological Samples	INAA for trace-element characterization of geological materials of potential commercial interest.	
2292	Parsons-Davis	Lawrence Livermore National Laboratory	Fission Product Production	Irradiation of highly enriched and highly depleted foils for nuclear forensics.	Lawrence Livermore National Laboratory
2294	Pope	Washington State University	INAA of Apatite	Bulk chemical analysis of apaptite samples via INAA.	Washington State University

Table VI.2 (continued)
Listing of Major Research and Service Projects Performed or in Progress at the Radiation Center and their Funding Agencies

Project	Users	Organization Name	Project Title	Description	Funding
2295	Ogden	Gemoftheamericas.com	The Effects of Irradiation on Topaz, Beryl, and Xonotlite	The purpose of this project is to analyze the economic and commercial benefits of irradiation on gem quality pieces of topaz, beryl, and xonotlite.	Gemoftheamericas.com

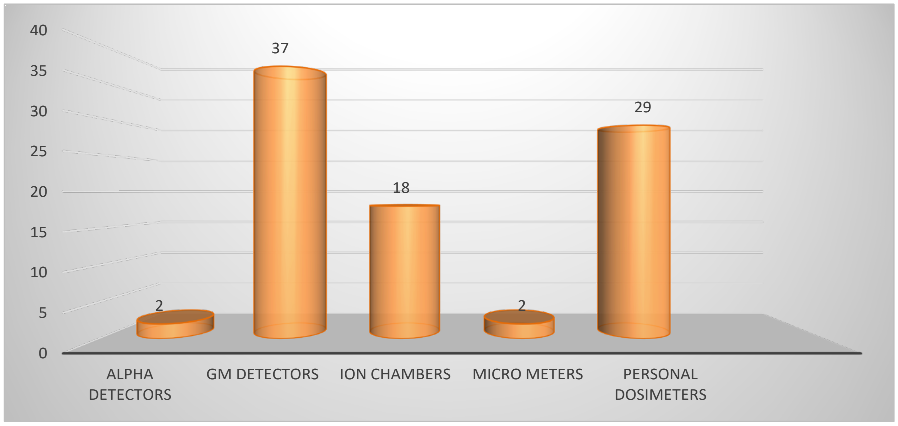
Table VI.3
Summary of Radiological Instrumentation Calibrated to Support OSU Departments

OSU Department	**Number of Calibrations**
Chemistry	1
Radiation Safety Office	11
Vet Med	1
TOTAL	**13**

Table VI.4
Summary of Radiological Instrumentation Calibrated to Support Other Agencies

Agency	**Number of Calibrations**	**Agency**	**Number of Calibrations**
Columbia Memorial Hospital	2	Oregon Lottery	1
EPA	1	Oregon State Fire Marshal	8
Hillsboro Medical Center	10	Radiation Protection Services	122
Knife River	3	Salem Health	21
NETL, Albany	4	Salem Radiology Consultants	2
ODOT	4	Samaritan Health	41
Oregon Health Sciences University	77	Vancouver Fire Department	44
		TOTAL	**340**

Figure VI.1
Summary of the Types of Radiological Instrumentation Calibrated to Support the OSU TRIGA Reactor and Radiation Center



WORDS

Documents Published or Accepted

Abdeina, E. H., Jourdan, F., Chazot, G., Bertrand, H., & Le Gall, B. (2024). How old is the Eye of Africa? A polyphase history for the igneous Richat Structure, Mauritania. Lithos, 482-483.

Ahn, U. S., et al. (2024). Geologic map and explanation (Hallasan, 1:25,000) (346 p.). Jeju World Heritage Office.

Amato, V., Ciarcia, S., Galli, P., Cicchella, D., Galderisi, A., Monaco, L., Fernandez, G., Isaia, R., Nomade, S., Pereira, A., & Giaccio, B. (2025). Unveiling the hidden source of major historical earthquakes: A multi-scale, trans-disciplinary approach to the 1456 and 1688 Sannio earthquakes (Mw 7.0, southern Italian Apennines). Quaternary Science Review. https://doi.org/10.1016/j.quascirev.2025.109282

Arriga, G., Marchegiano, M., Peral, M., Hu, H., Cosentino, D., Shen, C., Dalton, H., Brilli, M., Aldega, L., Claeys, P., & Rossetti, F. (2024, accepted). Long-term tectono-stratigraphic evolution of a propagating rift system, L’Aquila intermontane basin (Central Apennines). Tectonics, 43(12). https://doi.org/10.1029/2024TC008548

Barnes, C. J., Larson, K., Button, M., & Camacho, A. (Accepted, pending revisions). Coupled K/Ca and Rb/Sr geochronology of potassic mica and comparison with U/Pb geochronometers: A case study from the Scandinavian Caledonides. Geostandards and Geoanalytical Research.

Baudry, A., Singer, B. S., Jicha, B. R., Jilly Rehak, C. E., Vázquez, J. A., & Keller, C. B. (2024). A Bayesian age from dispersed plagioclase and zircon dates in the Los Chocoyos ash, Central America. Earth and Planetary Science Letters, 643, 118826. https://doi.org/10.1016/j.epsl.2024.118826

Bennett, S. E. K., Darin, M. H., Dorsey, R. J., Hausback, B., Grandy, S., Heizler, M. T., Stelten, M. E., Pecha, M. E., Schmitt, A., & Dolby, G. A. (2025). Neogene volcano-tectonic evolution of the central Baja California Peninsula, México: Transition from subduction to rifting and marine incursion. Geological Society of America Abstracts with Programs, 57(4). https://doi.org/10.1130/abs/2025CD-409916

Billstrom, K., Bergman, S., Mark, C., & Barfod, D. N. (2025). New 40Ar/39Ar mineral ages of Archaean to early Proterozoic rocks in northern Sweden and implications for the 1.8–1.5 Ga tectonothermal history of northernmost Fennoscandia. International Journal of Earth Sciences. https://doi.org/10.1007/s00531-024-02488-6

Bineli Betsi, T., Kelepile, T., Shindo, K., Mapeo, R. B., & Camacho, A. (2025). Ar/Ar geochronology of hydrothermal K-feldspar from the Mowana Cu Mine and implications for geotectonothermal evolution and Cu mineralisation in the Archean Matsitama Greenstone Belt, Zimbabwe Craton, northeastern Botswana. Journal of African Earth Sciences, 223, 105521.

Boschetti, L., Mouthereau, F., Schwartz, S., Rolland, Y., Bernet, M., Balvay, M., Cogné, N., & Lahfid, A. (2025). Thermochronology of the Western Alps (Pelvoux massif) reveals the longterm multiphase tectonic history of the European paleomargin. Tectonics, 44, e2024TC008498. https://doi.org/10.1029/2024TC008498

Boschetti, L., Rolland, Y., Mouthereau, F., Schwartz, S., Milesi, G., Munch, P., Bernet, M., Balvay, M., Thiéblemont, D., Bonno, M., Martin, C., & Monié, P. (2025). Thermochronology of the Maures-Tanneron crystalline basement: Insights for SW Europe Triassic to Miocene tectonic history. Swiss Journal of Geosciences, 118, 14. https://doi.org/10.1186/s00015-025-00485-8

Bulian, F., Jicha, B., Komen, R., Marra, F., Mazzini, I., Scarponi, D., Seijmonsbergen, H., Sevink, J., Vannoli, P., Anzidei, M., Monaco, L., & Palladino, D. M., Sposato, A. (2025). The MIS 5 marine terraces on the Tyrrhenian Sea coast of central Italy between Civitavecchia and the Fiora river. Catena, 251, 108817. https://doi.org/10.1016/j.catena.2025.108817

Bulian, F., Marra, F., Monaco, L., Palladino, D. M., Scarponi, D., Sevink, J., Vannoli, P., Cervellieri, M., Jicha, B., & Mazzini, I., Nomade, S., Pereira, A., & Sposato, A. (2024). 40Ar/39Ar geochronologic and paleo environmental constraints to the glacial termination III and MIS 7e, 7c, and 7a sea level fluctuations on the Tyrrhenian Sea coast of Italy. Global and Planetary Change, 242, 104594. https://doi.org/10.1016/j.gloplacha.2024.104594

Cluzel, D., A. Montanini, A. Secchiari, E. Ferrari, M. Heizler, F. Jourdan, S. Meffre, R. Zhou, and C. Teyssier. (2024). New geochemical and age constraints (40Ar/39Ar and U–Pb) on forearc intrusive rocks from the New Caledonia Ophiolite (SW Pacific): diversity of melts generated at hot subduction inception. Journal of the Geological Society, 181(1). doi:10.1144/jgs2023-145

Colby, D. J., Pyle, D. M., Fontijn, K., Mather, T. A., Nomade, S., Melakue, A. A., Mengesha, M. A., & Yirgu, G. (2024). Magma storage conditions beneath a peralkaline caldera in the Main Ethiopian Rift. Journal of Volcanology and Geothermal Research. https://doi.org/10.1016/j.jvolgeores.2024.108165

Conde, et al. (submitted). Geochronological and geochemical characterisation of the Mesozoic margin of northwestern South America. Lithos.

Coudun, C., Basile, C., Bernet, M., Balvay, M., Léger, J., Lanson, B., Patriat, M., Gaillot, J., & Loncke, L. (in revision). Dating the two staged-rifting of the Equatorial Atlantic from the sediments of the Buteur Ridge, Demerara Plateau (French Guiana). Basin Research.

Cucciniello, C., A. P. le Roex, R. de' Gennaro, F. Jourdan, C. Grifa, V. Morra, and L. Melluso. (2024). "Geochemistry of Cenozoic mafic potassic and sodic volcanic rocks in southwestern Madagascar: Long-lived lithospheric mantle heterogeneities in an extensional tectonic setting. Lithos, 482-483.

Cui, X., Zhu, W., Jourdan, F., Liu, H., & Zhang, L. (2025). First identification of Late Permian mafic dykes in the nucleus of Yangtze Craton: Emeishan large igneous province doubled? International Geology Review, 67(9), 1196-1216. doi:10.1080/00206814.2024.2429178

Di Buduo, G. M., Gaeta, M., Marra, F., Nomade, S., Palladino, D. M., & Pereira, A.
(2025). Glacio-eustatic forcing on Middle Pleistocene fluvial-lacustrine depositional processes: A case-history from the Tyrrhenian Sea margin of central Italy. International Journal of Earth Sciences. https://doi.org/10.1007/s00531-025-02494-2

Dongwi, D. H., et al. (2025). Remeasurement of the 239Pu(n,f)/235U(n,f) cross-section ratio with the NIFFTE fission time projection chamber using vapor-deposited targets. Nuclear Data Sheets, 202, 30–56.

Drayson, D., Pehrsson, S., Camacho, A., Larson, K., Berman, R. G., & Cutts, J. (2025). Tectonometamorphic history across the Chesterfield Fault Zone: Implications for tectonic evolution of the Rae Craton, Nunavut, Canada. Precambrian Research, 418, 107679.

Fairey B.J., Kerrison A., Meere P.A., Mulchrone K.F., Zieger-Hofmann M., Gärtner A., Sonntag B.-L., Linnemann U., Kuiper K.F., Ennis M., Mark C., Cogné N., Chew D. (2024). Sedimentary provenance of the Upper Devonian Old Red Sandstone of southern Ireland: an integrated multi-proxy detrital geochronology study. Journal of the Geological Society, 181(6), jgs2023-110. doi:10.1144/jgs2023-110

Finzel, E. S., Thomson, S. N., Pearson, D., Horkley, K., Garber, K., & Gardner, C. (2025). First cycle or polycyclic? Combining apatite and zircon detrital U–Pb geochronology and geochemistry to assess sediment recycling and effects of weathering. Earth and Planetary Science Letters, 650, 119131. https://doi.org/10.1016/j.epsl.2024.119131

Fioraso, M., Sternai, P., Olivetti, V., Balestrieri, M. L., Zattin, M., & Cornamusini, G. (2024). Miocene climate cooling and aridification of Antarctica may have enhanced syn-extensional magmatism in the western Ross Sea. Global and Planetary Change, 240, 104538. https://doi.org/10.1016/j.gloplacha.2024.104538

Fukai, R., T. Usui, W. Fujiya, Y. Takano, K. I. Bajo, A. Beck, E. Bonato, N. L. Chabot, Y. Furukawa, H. Genda, and 17 more contributors. (2024). Curation protocol of Phobos sample returned by Martian Moons eXploration. Meteoritics and Planetary Science, 59(2), 321-337. doi:10.1111/maps.14121

Garcia, M. O., Norman, M. D., Jicha, B. R., Lynn, K., & Jiang, P. (2024). Re examining the Honolulu Volcanics: Hawai‘i’s classic case of rejuvenation volcanism. Journal of Petrology, 65, egae093. https://doi.org/10.1093/petrology/egae093

Gates, J. M., et al. (2024). Toward the discovery of new elements: Production of livermorium (Z = 116) with 50Ti. Physical Review Letters, 133, 172502.

Gemignani, L., Sobel, E. R., Zucali, M., Albino, I., Stellato, M., Glodny, J., & Kuiper, K. (2025). Oligocene Slab Break-Off and Pleistocene Glacial Erosion Shaped the Tectonic Evolution of the Dent Blanche Tectonic System, Western Alps. Tectonics, 44(5), e2024TC008731. doi:10.1029/2024TC008731

Genge, M. C., Witt, C., Zattin, M., Bosch, D., Bruguier, O., & Mazzoli, S. (2025). Are long-lasting isotope trends independent from slab dynamics, upper-plate stress regime and crustal thickness? Insights from central Patagonia. Earth and Planetary Science Letters, 653, 119229. https://doi.org/10.1016/j.epsl.2024.119229

Genge, M. C., Witt, C., Zattin, M., Bosch, D., Bruguier, O., & Mazzoli, S. (2025). Are long-lasting isotope trend independent from slab dynamics, upper-plate stress regime and crustal thickness? Insights from central Patagonia. Earth and Planetary Science Letters, 653, 119229.

Giaccio, B., Wagner, B., Zanchetta, G., Bertini, A., Cavinato, G. P., de Franco, R., Florindo, F., Hodell, D. A., Neubauer, T. A., Nomade, S., Pereira, A., Sadori, L., Satolli, S., Tzedakis, P. C., Albert, P., Boncio, P., De Jonge, C., Francke, A., Heim, C., Masi, A., Marchegiano, M., Roberts, H. M., Noren, A., & MEME team (2024). International Continental Scientific Drilling Program (ICDP) workshop on the Fucino paleolake project: The longest continuous terrestrial archive in the Mediterranean recording the last 5 million years of Earth system history (MEME). Scientific Drilling, 33, 249–266. https://doi.org/10.5194/sd-33-249-2024

Gianchiglia, F., Ballirano, P., Giaccio, B., Koutsodendris, A., Nomade, S., Pacella, A., Palladino, D. M., Pross, J., Veres, D., Sotilli, G. (2025). Characterization of the volcanic ash from the Campanian ignimbrite super-eruption: New insights into dispersal mechanisms and health hazards. Scientific Reports. https://doi.org/10.1038/s41598-025-01100-4

Gillerman, Virginia S; Morgan, Leah E; Hofstra, Albert H; Wintzer, Niki E; Vikre, Peter G; Bennett, Mitchell M; Holm-Denoma, Christopher S; Benowitz, Jeff A; Schmitz, Mark D; Konyshev, Sergey A; Layer, Paul W. (2024). Timing of Hydrothermal Alteration and Au-Sb-W Mineralization, Stibnite-Yellow Pine District, Idaho. Economic Geology. doi:10.5382/econgeo.5061

Grenet, L., Maia, M., Hamelin, C., Briais, A., Guillou, H., Scao, V., & Brunelli, D.

(2025). A deep dive into a ridge-transform fault intersection: Volcano-tectonic relationships in an enhanced cold-edge effect at the Romanche Fracture Zone. Journal of Geophysical Research: Solid Earth, 130(4). https://doi.org/10.1029/2024jb030688

He, P. J., Song, C. H., Meng, Q. Q., Zhou, Z. Y., & Wang, Y. D. (2024). Spatiotemporal development of Cenozoic tectonic deformation in the Qilian Shan, northeastern Tibetan Plateau: A review of low-temperature thermochronologic evidence. Palaeogeography, Palaeoclimatology, Palaeoecology, 648, 112316. https://doi.org/10.1016/j.palaeo.2024.112316

Herrero Bervera, E., & Jicha, B. R. (2025). First terrestrial geomagnetic record of the Norwegian Greenland Sea excursion in the Kaupo flow, Koolau Volcano, Oahu, Hawaii: Insights from 40Ar/39Ar, NRM and absolute paleointensity determinations. Physics of the Earth & Planetary Interiors, 362, 107314. https://doi.org/10.1016/j.pepi.2025.107314

Honarmand M., van der Boon A., Neubauer F., Heberer B., Li Q., Kuiper K.F., Mason P.R.D., Krijgsman W. (2024). Geochemical constraints on the geodynamic setting of Alborz-Azerbaijan Cenozoic magmatism. Chemical Geology, 645, 121889. doi:10.1016/j.chemgeo.2023.121889

Huseynov, A. O., Wijbrans, J., Kuiper, K., & Van Der Lubbe, J. (2025). 40Ar = 39Ar age constraints on the formation of fluid-rich quartz veins from the NW Rhenohercynian zone (Rursee area, Germany). Geochronology, 7(2), 173-197. doi:10.5194/gchron-7-173-2025

Jiang, Q., & Jourdan, F. (2024). Obtaining accurate ages of basaltic rocks using 40Ar/39Ar techniques. In Methods and Applications of Geochronology (pp. 345-366).

Jiao, X., Zattin, M., Olivetti, V., Wang, J., Peng, H., Catto', S., & Chew, D. (2024). Sourcing of the Oligocene to Pliocene sediments of the Ningnan Basin: Evidence for Tibetan Plateau growth and local faulting unravelled by detrital apatite fission-track and U–Pb double dating. Basin Research, 36/6, e70004.

Jiao, X., Zattin, M., Olivetti, V., Wang, J., Peng, H., Catto', S., & Chew, D. (2024). Sourcing of the Oligocene to Pliocene sediments of the Ningnan Basin: Evidence for Tibetan Plateau growth and local faulting unravelled by detrital apatite fission-track and U–Pb double dating. Basin Research, 36(6), e70004. https://doi.org/10.1111/bre.12704

Jourdan, F., Kennedy, T., Forman, L., Mayers, C., Eroglu, E., & Yamaguchi, A. (2024). A slowly cooled deep crust on asteroid 4 Vesta and the recent impact history of rubble pile vestoids recorded by diogenites. Geochimica Et Coscmochimica Acta, 365, 35-52.

Julian, F., Cervellieri, M., Marra, F., Mazzini, I., Monaco, L., Palladino, D., Scarponi, D., Sevink, J., Sposato, A., Vannoli, P., Jicha, B., Nomade, S., & Pereira, A.

(2024). 40Ar/39Ar geochronologic and paleoenvironmental constraints to glacial termination III and MIS 7e, 7c, and 7a sea level fluctuations on the Tyrrhenian Sea coast of Italy. Global and Planetary Change. https://doi.org/10.1016/j.gloplacha.2024.104594

Karátson, D., Lahitte, P., Portnyagin, M., et al. (2025). A 13.06 Ma widespread ignimbrite in the Pannonian Basin captured a snapshot of shallow marine to coastal environment in Central Paratethys. Scientific Reports, 15, 23528. https://doi.org/10.1038/s41598-025-07002-9

Kearney, R. J., Goff, J., Smith, V., Ozdemir, Y., Schwab, M. J., Karaoglu, O., Thirlwall, M., Barfod, D. N., Appelt, O., Guenter, C., Fietzke, J., Pickarski, N., Neugebauer, I., Tjallingii, R., & Brauer, A. (2025). Glass geochemistry and tephrostratigraphy of key tephra layers in and around Lake Van, Eastern Anatolian Volcanic Province (EAVP). Quaternary Science Reviews. https://doi.org/10.1016/j.quascirev.2024.109165

Kumar, G., Valocchi, A. J., Dai, S., Shih, C.-Y., Zheng, Z., Schaefer, C. E., & Werth, C. J. (2025). Simultaneous abiotic oxidation and reduction of trichloroethylene by reduced iron minerals in low-permeability zones. ACS ES&T Water, 5(9).

Larson, K. P., Cottle, J. M., Shrestha, S., Button, M., Camacho, A., Steele-MacInnis, M., Lageson, D., & Creighton, S. (2025). Geochronology and thermal history of the Mount Everest massif. Journal of the Geological Society, 182. https://doi.org/10.1144/jgs2024-188

Lauretta, D. S., H. C. Connolly, J. E. Aebersold, C. M. O. D. Alexander, R. L. Ballouz, J. J. Barnes, H. C. Bates, C. A. Bennett, L. Blanche, E. H. Blumenfeld, and 44 more contributors. (2024). Asteroid (101955) Bennu in the laboratory: Properties of the sample collected by OSIRIS-REx. Meteoritics and Planetary Science, 59(9), 2453-2486. doi:10.1111/maps.14227

Lazarev S., Alçiçek M.C., Rausch L., Stoica M., Kuiper K., Neubauer T.A., Abels H.A., Hoyle T.M., van Baak C.G.C., Foubert A., Bista D., Sangiorgi F., Wesselingh F.P., Krijgsman W. (2024). Early Pleistocene invasion of Pontocaspian Fauna into the Denizli Basin (SW Anatolia): New stratigraphic constraints and implications for Aegean–Pontocaspian hydrological exchange. Quaternary Science Reviews, 346, 109050. doi:10.1016/j.quascirev.2024.109050

Lee, T. H., Kwon, C. W., Ahn, U. S., et al. (2024). A comparative study of different radiometric dating techniques applied to Quaternary volcanic rocks from Jeju Island, South Korea. Geosciences Journal, 28, 733–746. https://doi.org/10.1007/s12303-024-0024-2

Li, Y., Singer, B. S., Takashima, R., Schmitz, M. D., Podrecca, L., Sageman, B. B., Selby, D., Yamanaka, T., Mohr, M. T., Hayashi, K., Toaru, T., & Savatic, K. (2024). Radioisotopic chronology of Aptian ocean anoxic event 1a: Framework for analysis of driving mechanisms. Science Advances. https://www.science.org/doi/full/10.1126/sciadv.adn8365

Long, Z. -. Y., F. Moynier, T. F. J. Bögels, L. Fang, R. Caracas, M. Paquet, F. Jourdan, T. -. H. Luu, D. Rigoussen, K. -. F. Qiu, and 2 more contributors. (2025). Impact-induced sublimation drives volatile depletion in carbonaceous meteorites. Nat Commun, 16(1). doi:10.1038/s41467-025-61115-3

Marchev, P., Raicheva, I., Jicha, B. R., Peyetcheva, I., (I think continuing authors) (2025). Age and genesis of the largest Phanerozoic Mn deposits in the Paratethys: Inferences from 40Ar/39Ar and U/Pb ages in NE Bulgaria and NW Turkey. Journal of Geochemical Exploration, 274, 107764. https://doi.org/10.1016/j.gexplo.2025.107764

Marchev, P., Raicheva, I., Jicha, B., Guillong, M., Ivanova, R., Bachmann, O., Spikings, R., Okay, A., & Ozsvárt, P. (2024). The large Rupelian Rhodope Massif eruptions as the source of airfall tuffs in SE, S and Central Europe: 40Ar/39Ar and U–Pb age constraints. International Journal of Earth Sciences. https://doi.org/10.1007/s00531-024-02457-z

Marchev, P., Raicheva, R., Jicha, B., et al. (2024). The large Rupelian Rhodope Massif eruptions as the source of airfall tuffs in SE, S and Central Europe: 40Ar/39Ar and U–Pb age constraints. International Journal of Earth Sciences (Geologische Rundschau), 113, 1619–1641. https://doi.org/10.1007/s00531-024-02457-z

Marino, G., Marra, F., Jicha, B., Bulian, F., Florindo, F. (2025). The timing of the Middle Pleistocene glacial terminations based on 40Ar/39Ar detrital sanidine dating. Paleoceanography and Paleoclimatology, 40, e2024PA005050. https://doi.org/10.1029/2024PA005050

Marra, F., Rosa, C., Silvestri, D., Bordoni, P., Bulian, F., Florindo, F., Jicha, B. R., Cara, F., Famiani, D., & Salvini, R. (2024). Predict: Assessing the seismic response in the city of Rome, Part 1. New Data for a geologic overview. Annals of Geophysics, 67(S325). https://doi.org/10.4401/ag-9116

Mazza, P. P. A., Marra, F., Di Buduo, G. M., Bellucci, L., Bonechi, M., Goemans, E., Bonechi, C., Costantini, L., Nomade, S., Palladino, D. M., & Pereira, A. (2024). Geological, paleoenvironmental, and depositional dynamics at the Middle Pleistocene Palaeoloxodon antiquus-bearing site of Campo della Spina, Central Italy. Quaternary International, 714, 109582. https://doi.org/10.1016/j.quaint.2024.10.014

Mazzarini, F., Bracciali, L., Musumeci, G., Wijbrans, J. R., Kuiper, K., & Horstwood, M. A. (2024). Coupled U–Pb and 40Ar/39Ar chronology of late-stage intrusions at Elba Island (Italy) supports late Miocene long-lived magma reservoirs in the Tyrrhenian upper crust. Terra Nova, 36(4), 258-265. doi:10.1111/ter.12706

McCoy, T. J., S. S. Russell, T. J. Zega, K. L. Thomas-Keprta, S. A. Singerling, F. E. Brenker, N. E. Timms, W. D. A. Rickard, J. J. Barnes, G. Libourel, and 56 more contributors. (2025). An evaporite sequence from ancient brine recorded in Bennu samples. Nature, 637(8048), 1072-1077. doi:10.1038/s41586-024-08495-6

McGlamery, D., Augustine, V., Gibbs, T., Espinoza, E., Riley, R., Bach, K., Nyman, M., & Chemey, A. T. (2025). Optimization of zirconium carbide production via molten salt synthesis. Chemistry of Materials, 37, 6203–6212.

Mercader, J., Akuku, P., Boivin, N., Camacho, A., Carter, T., Clarke, S., Cueva-Temprana, A., Favreau, J., Galloway, J., Hernando, R., Haiping, H., Hubbard, S., Larter, S., Magohe, S., Mohamed, A., Mwambwiga, A., Oladele, A., Petraglia, M., Roberts, P., Saladie, P., Shikoni, A., Silva, R., Soto, M., Stricklin, D., Mekonnen, D. Z., & Zhao, W., Durkin, P. (2025). Homo erectus adapted to steppe-desert climate extremes one million years ago. Nature Geoscience. https://doi.org/10.1038/s43247-024-01919-1

Mershon, R. B., Pietruszka, A. J., Garcia, M. O., Jicha, B. R., Steiner, A. R., Jiang, P., Rhodes, J. M., Vollinger, M. J., & Moore, G. F. (2025). The Detroit Volcanic Province and the Early Evolution of the Hawaiian Mantle Plume. Earth & Planetary Science Letters, 666, 119484. https://doi.org/10.1016/j.epsl.2025.119484

Miller, D. M., Stelten, M. E., Buesch, D. C., & Felger, T. J. (2025). Preliminary age and description of the latest Miocene Ash Hill basalt field southeast of Ludlow, California. In D. M. Miller & S. M. Rowland (Eds.), Desert archeology and extensional tectonics: Desert Symposium (pp. 145–146). Desert Symposium, Inc. IP-175173.

Minc, L. (2024). Pottery production and exchange in the Valley of Oaxaca from Rosario Phase through Xoo Phase (700 BCE – 850 CE): Results of chemical & petrographic analyses of ceramics and clays. Final technical report submitted to the Consejo de Arqueología del Instituto Nacional de Antropología e Historia, México (English version), 265 & appendix.

Minc, L. (2024). Proyecto de investigaciones técnicas: La producción y el intercambio de la alfarería en el Valle de Oaxaca desde Fase Rosario a Fase Xoo (700 a.C. – 850 d.C.) – Resultados de análisis químicos de arcillas y cerámicas. Informe técnico final al Consejo de Arqueología del Instituto Nacional de Antropología e Historia, México, 299 & apéndices.

Moreno Yaeger, P., Singer, B. S., Alloway, B. V., Townsend, M., Cuzzone, C., Nachlas, W. O., Edwards, B. R., Jicha, B. R., & Marcott, S. A. (2025, under review). Evolution of magma storage beneath Mocho Choshuenco influenced by ice loading and unloading. Journal of Geophysical Research.

Moreno Yaeger, P., Singer, B. S., Edwards, B. R., Jicha, B. R., Nachlas, W. O., Breunig, R., Fustos Toribio, I., Antipán, D. V., Piegrossi, E. (2024). Pleistocene to recent evolution of Mocho Choshuenco volcano during growth and retreat of the Patagonian Ice Sheet. Geological Society of America Bulletin. https://doi.org/10.1130/B37514.1

Natale, J., Vitale, S., Giordano, G., Jicha, B., & Morra, V. (2025). Uncovering the Slip History of Garigliano Graben Faults and Its Impact on the Construction and Collapse of the Roccamonfina Volcano, Italy. Geological Society of London, Special Publications, 560. https://doi/abs/10.1144/gslspecpub2024-54

Neofitu, R., Mark, C., O'Connell, S., Zack, T., Rosel, D., Mark, D., Barfod, D., Flowerdew, M. J., Kelley, S., & Daly, J. S. (2024). Dynamic collapse and regrowth of the Antarctic Ice Sheet in the Weddell Sea sector during the middle Miocene: A novel multi-proxy sedimentary provenance approach using in-situ 87Rb/87Sr dating of detrital K-feldspar. Earth and Planetary Science Letters. https://doi.org/10.1016/j.epsl.2024.118824

Paulsen, T. S., Benowitz, J. A., Thomson, S. N., Encarnación, J. P., Grunow, A. M., Layer, P. W., & Young, M. (2025). Antarctic Phanerozoic landscape evolution along the Transantarctic basin from thermochronology. Earth and Planetary Science Letters, 664, 119445. https://doi.org/10.1016/j.epsl.2025.119445

Popov, D., Spikings, R., Paul, A. N., Ovtcharova, M., Chiaradia, M., Kutzschbach, M., Ulianov, A., O'Sullivan, G., Chew, D., Kouzmanov, K., Badenszki, E., Daly, J. S., & Davies, J. H. F. L. (2024). Excess 40Ar in Alkali Feldspar and 206,207Pb in Apatite Caused by Fluid-Induced Recrystallisation in a Semi-Closed Environment in Proterozoic (Meta)Granites of the Mt Isa Inlier, NE Australia. Geosciences, 14(12), 358. https://doi.org/10.3390/geosciences14120358

Prieto-Torrell, C., Fernandez-Turiel, J. L., Rodriguez-Gonzalez, A., Aulinas, M., Beamud, E., Cabrera, M. C., Criado, C., Guillou, H., Vidal-Matutano, P., & Perez-Torrado, F. J. (in press). Reconstructing the Holocene volcanic past of El Hierro, Canary Islands. Quaternary Geochronology.

Prokešová, R., M. Danišík, M. Fiebig, F. Jourdan, C. Lüthgens, J. Procházka, J. Holec, and J. Minár. (2024). Late Cenozoic alkali basalts and their interactions with the paleo-Hron River (Western Carpathians): New insights from geochronology and fluvial morphometric indices. Geomorphology, 463.

Randazzo, N., Wu, T., Bhattacharya, J. P., Kim, S. T., Jicha, B. R., & Singer, B. S. Distinguishing tectonic versus eustatic controls in Turonian strata of the Western Interior Seaway. Geological Society of America Bulletin.

Rivera, T. A., Jicha, B. R., Kirby, S., & Peacock, H. B. (2024). Temporal, spatial, and chemical evolution of Quaternary high silica rhyolites in the Mineral Mountains, Utah. U.S. Geological Survey Professional Paper, 1890, chap. K. https://doi.org/10.3133/pp1890K

Rivera, T., & Jicha, B. R. (2025). Not so mush: Discrete pulses of high silica melt generation in the Mineral Mountains, Utah. Contributions to Mineralogy and Petrology, 180(56). https://doi.org/10.1007/s00410-025-02243-3

Rivera, T., Holliday, M., Jicha, B., Malone, D., Braunagel, M., Bonilla Franco, V. A., Biek, R., Griffith, W. A., & Hacker, D. (2025). Emplacement age of the Sevier Gravity Slide, Utah, USA. Geochronology, 7, 35 44. https://doi.org/10.5194/gchron-7-35-2025

Roberts, C. A., Zanchetta, G., Giaccio, B., Nomade, S., Mannella, G., Sadori, L., Drysdale, R., Maselin, M. A., Albert, P. G., Smidt, C., Smith, V. C., Flynn, M., Sottili, G., Wagner, B., & Tzedakis, P. C. (2025). A radiometrically-constrained reference record of the last interglacial climate and vegetation changes from the Fucino Basin, Central Italy. Quaternary Science Reviews. https://doi.org/10.1016/j.quascirev.2025.109377

Rout, S. S., Wörner, G., Wegner, W., & Singer, B. S. (2024). Heat pulse dominated magmatic storage: The 33 ka dacite dome eruption at Taápaca volcano (Central Andes). Geology, 52, 683 688. https://doi.org/10.1130/G52173.1

Rozefelds, A., Milroy, A., Carpenter, R., Douglas, A., Fabillo, M., Savelkouls, A., & Dalton, H. (2024, submitted). Silicified Melastomataceae fruits preserved by intraplate volcanism from an early Oligocene Capella Flora, Eastern Australia.

Rybár, S., Šarinová, K., Jourdan, F., Mayers, C., & Sliva, L. (2024). Middle Miocene volcanic flare up preceding and synchronous with the Langhian/Serravallian sea-level decline in the North Pannonian Basin: Insights from 40Ar/39Ar dating, geo-seismic analysis and 3D visualization of the subterranean Kráľová stratovolcano. Basin Research, 36(1).

Samim, S., Dalton, H., Phillips, D., & Hergt, J. (2025, accepted). High-resolution tephrochronology resolves stratigraphic complexities in archaeologically significant Nariokotome tuffs, Turkana Basin. Proceedings of the National Academy of Sciences of the United States of America, 122(38), e2424142122. https://doi.org/10.1073/pnas.2424142122

Sanfilippo, A., Ligi, M., Avanzinelli, R., et al. (2025). Magmatic underplating and crustal intrusions accommodate extension during Red Sea continental rifting. Nature Communications, 16, 6488. https://doi.org/10.1038/s41467-025-61598-0

Savelkouls, A., Dalton, H., & Phillips, D. (2024, submitted). High resolution 40Ar/39Ar geochronology of the Koobi Fora Tuff Complex, Omo-Turkana Basin, Kenya. Quaternary Geochronology.

Shan, P. F., M. J. Cao, N. J. Evans, P. Hollings, F. Jourdan, L. Wang, and K. Z. Qin. (2024). In-situ geochronology combined with geochemical and isotopic signatures record mineralization and fluid characteristics at the Xiaoxi'nancha porphyry Au-Cu deposit, NE China. Mineralium Deposita, 59(8), 1703-1719. doi:10.1007/s00126-024-01294-z

Shang, S., Uunk, B. A., Kuiper, K. F., Brouwer, F. M., & Wijbrans, J. R. (2025). Early Cretaceous to Miocene Tectonic Evolution of the NW Cyclades Based on 40Ar/39Ar Multiple Single Crystal Dating of White Mica From Andros. Tectonics, 44(6), e2024TC008590. doi:10.1029/2024TC008590

Singer, B. S., Baudry, A., Keller, C. B., Jicha, B. R., Jilly Rehak, C. E., & Vázquez, J. A. (2025). Response to comment on: A Bayesian age from dispersed plagioclase and zircon dates in the Los Chocoyos ash, Central America. Earth and Planetary Science Letters. https://doi.org/10.1016/j.epsl.2025.119215

Singer, B. S., Jicha, B. R., Sawyer, D., Walaszczyk, I., Landman, N., Sageman, B. B., & McKinney, K. C. (2025). A ^{40}Ar/^{39}Ar and U Pb time scale for the Cretaceous Western Interior Basin, North America. Geological Society of London, Special Publications Series, 544: Cretaceous Project 200: Volume 1 The Cretaceous World, SP544 2023 76. https://doi.org/10.1144/SP544-2023-76

Singer, B. S., Moreno Yaeger, P., Townsend, M., Huber, C., Cuzzone, J., Edwards, B. R., Romero, M., Orellana Salazar, J., Marcott, S., Breunig, R. E., Ferrier, K. L., Scholz, K., Coonin, A. N., Alloway, B. V., Tremblay, M. M., Stevens, S., Fustos Toribio, I., Moreno, P. I., Vera, F., & Amigo, A. (2024). New perspectives on ice forcing in continental arc magma plumbing systems. Journal of Volcanology and Geothermal Research. https://doi.org/10.1016/j.jvolgeores.2024.108187

Spikings, R., Betancur, S., Vallejo, C., Chiaradia, M., Ulianov, A., de Haller, A., Forti, S., Winkler, W., & Beate, B. (2024). New constraints on the tectonic history of the basement of the Western Cordillera and coastal forearc of Ecuador. Lithos, 488–489, 107821. https://doi.org/10.1016/j.lithos.2024.107821

Stojadinovic, U., Pomella, H., Krstekanić, N., Kostić, B., Maleš, M., Randjelovic, N., & Radonjić, M. (2024). Exhumation history of the Juhor Mts. in central Serbia, the Northern Serbo–Macedonian Subunit. Geologica Carpathica, 75(3), 213–223. https://doi.org/10.31577/GeolCarp.2024.12

Su, F., Zhang, X., Li, Y., Jicha, B. R., Joy, K. H., Li, Q., Chen, Y., Cai, S., Liu, R., Zhou, Q., Yang, S., Li, X., Yang, L., Chen, W., Li, J., Zhang, W., Qiu, H., He, H. (2025). Constraining 2.0 Ga volcanism on the moon via 40Ar/39Ar dating of Chang'e 5 basalts. Journal of Geophysical Research: Planets, 130, e2024JE008495. https://doi.org/10.1029/2024JE008495

Sun, X., Ding, W., Kuiper, K. F., Tian, Y., Zhang, Z., Guo, R., & Wijbrans, J. R. (2024). New early Oligocene age for the Mouding Basin, Southwestern China: Source and paleoenvironment. Palaeogeography, Palaeoclimatology, Palaeoecology, 636, 111983. doi:10.1016/j.palaeo.2023.111983

Tan, F., Yin, J., Xiao, W., Thomson, S. N., Eizenhöfer, P. R., Chen, W., Wang, T., Huang, H., Wang, Y., Zhao, Y., & De Grave, J. (2025). Meso-Cenozoic episodic uplift and exhumation of the Zhangguangcai Range, Northeast China: Insight from low-temperature thermochronology. Geological Society of America Bulletin. https://doi.org/10.1130/B38074.1

Teodoro, M. A. M., A. C. Dos Santos, L. C. Bertolino, P. A. D. S. Rosa, C. R. Bezerra, L. G. P. Monteiro, J. C. L. da Silva, M. B. Fagundes, M. C. Geraldes, L. M. D. C. Cardoso, and 1 more contributor. (2025). Poços de Caldas – Cabo Frio Alignment: a Petrochronological Review of an Unconventional Plume Model. Anuario do Instituto De Geociencias, 48. doi:10.11137/1982-3908_2025_48_65281

Tortelli, G., Gioncada, A., Pagli, C., Barfod, D. N., Corti, G., Sani, F., Mark, D. F., Dymock, R. C., Gebru, E. F., & Keir, D. (2025). Volcanism records plate thinning driven rift localization in Afar (Ethiopia) since 2–2.5 million years ago. Communications Earth & Environment. https://doi.org/10.1038/s43247-025-02356-4

Totaro, F., Petrosino, P., Valente, E., Arienzo, I., D'Antonio, M., Di Vito, M. A., Giaccio, B., Jicha, B. R., Petrelli, M., Santangelo, N., Santo, A., & Zanchetta, G. (2024). Last interglacial paleoshoreline location and tectono-stratigraphic evolution of the peri Tyrrhenian Sarno basin, southern Italy, constrained by tephrostratigraphy. Earth Surface Processes & Landforms. https://doi.org/10.1002/esp.6039

Tremblay, M. M., Mark, D. F., Barfod, D. N., Cohen, B. E., Ickert, R. B., Lee, M. R., Tomkinson, T., & Smith, C. L. (2024). Dating recent aqueous activity on Mars. Geochemical Perspectives Letters. https://doi.org/10.7185/geochemlet.2443

Tropper, P., Klotz, T., Pomella, H., & Dunkl, I. (2024). Visible and invisible complexities in low-to medium grade metamorphic rocks: Mineralogical and petrological constraints on the Variscan metamorphic gradient in the Southalpine metamorphic basement (Brixen quartzphyllites, Northern Italy). In EGUsphere: EGU - General Assembly 2024 - Book of Abstracts (No. EGU24-1731). Vienna, Austria & Online | 14–19 April 2024. Göttingen: Copernicus. https://doi.org/10.5194/egusphere-egu24-1731

Uguagliati, F., Zattin, M., Waldschlaeger, K., & Ghinassi, M. (2024). Optimising microplastic polyethylene terephthalate fibre extraction from sediments: Tailoring a density-separation procedure for enhanced recovery and reliability. Science of the Total Environment, 957, 177483. https://doi.org/10.1016/j.scitotenv.2024.177483

Uguagliati, F., Zattin, M., Waldschlaeger, K., & Ghinassi, M. (2024). Optimising microplastic polyethylene terephthalate fibre extraction from sediments: Tailoring a density-separation procedure for enhanced recovery and reliability. Science of the Total Environment, 957, 177483.

van Grinsven, L., Béguin, A., Kuiper, K., & de Groot, L. V. (2025). The evolution of a Mid-Miocene geomagnetic reversal. Earth and Planetary Science Letters, 667, 119464. doi:10.1016/j.epsl.2025.119464

Vranjković A., Gierlowski-Kordesch E., de Leeuw A., Mandic O., Aljinović D., Dragičević I., Harzhauser M., Kuiper K., Brčić V., Pavelić D. (2025). Sedimentology and palaeoenvironmental analysis of a karstic shallow carbonate lake (Early-Middle Miocene, Sinj Basin, Croatia). Depositional Record, 11(1), 121-146. doi:10.1002/dep2.292

Walker, L., Shire, J., Jaffe, J., Sprando, P., Olinger, J., & Chemey, A. (2025). Development and benchmarking of JANOGFETT: A novel Geant4-operated fission event tracking tool. Nuclear Instruments and Methods in Physics A, 1082, Article 170948.

Wallace, P. A., Otieno, V., Godec, P., Njoroge, R. W., Tubula, M. S., Cappelli, L., Kamau, P. M., Nomade, S., Mariita, N. O., & Fontijn, K. (2025). Temporal and spatial evolution of explosive silicic peralkaline eruptions at the Olkaria Volcanic Complex and Longonot volcano in the Southern Kenya Rift. Journal of Volcanology and Geothermal Research. https://doi.org/10.1016/j.jvolgeores.2025.108275

Wang, J., Peng, H., Ding, L., Liu, C., Zattin, M., & Wang, L. (2024). Middle Triassic transcontinental connection between the North China Craton and the Paleo-Tethys Ocean. Communications Earth & Environment, 5, 775. https://doi.org/10.1038/s43247-024-01276-w

Wang, J., Peng, H., Ding, L., Liu, C., Zattin, M., & Wang, L. (2024). Middle Triassic transcontinental connection between the North China Craton and the Paleo-Tethys Ocean. Communications Earth & Environment, 5, 775.

Wang, Y., Wei, Z., Yuan, S., & Rui, Y. (2025, under review). Tectonic uplift of western East Kunlun Mountains since early Miocene: Constraints from detrital zircon fission track geochronology and subsurface data. Palaeogeography, Palaeoclimatology, Palaeoecology.

Wang, Y., Yin, J., Xiao, W., Sobel, E. R., Thomson, S. N., Wang, Y., He, Z., Chen, W., Cai, K., & De Grave, J. (2025). Multi-stage differential exhumation of the West Junggar and adjacent regions, NW China, revealed by regional low-temperature thermochronology. Earth-Science Reviews, 267, 105154. https://doi.org/10.1016/j.earscirev.2025.105154

Wei, X; Chen, H; Garzanti, E; Zheng, H; Wang, P; Jourdan, F; Shi, X; Zhu, K. (2025). Isochronous Miocene volcaniclastic horizon in the SW Tarim Basin: Composition, ages, origins, and implications for tephrochronology. Bulletin of the Geological Society of America, 137(5-6), 2191-2215. doi:10.1130/B37521.1

Wei, Z., Wang, Y., & Yuan, S. (2025). Cenozoic initial widespread uplift of the Eastern Kunlun Mountains onset at approximately 20 Ma: Evidence from low-temperature thermochronology. Acta Sedimentologica Sinica. https://doi.org/10.14027/j.issn.1000-0550.2025.012

Wilde, S. A., Jourdan, F., Frewer, L., & Kusiak, M. A. (2025). Precise 40Ar/39Ar dating of multiple potassic minerals constrain the age and rapid cooling history of the Walgidee Hills lamproite pipe, Kimberley Region, Western Australia, at 17.49 Ma. Chemical Geology, 680. doi:10.1016/j.chemgeo.2025.122698

Xia, W., Yin, J., He, Z., Thomson, S. N., Tan, F., & Wang, Y. (2025). Meso–Cenozoic tectonic and thermal history of the Kuqa Depression, Tarim Basin: Insights from low-temperature thermochronology and vitrinite reflectance. Journal of Earth Science. https://doi.org/10.1007/s12583-025-2027-y

Zech, R. F., Onken, C. T., Sartori, G., Simon, S. J., Shipandeni, A., Galli, A., Spikings, R. A., & Schmidt, M. W. (2025). The age and source of Cambrian post-orogenic magmatism in the Kuboos-Bremen Igneous Province (Southern Namibia). Journal of African Earth Sciences, 226, 105592. https://doi.org/10.1016/j.jafrearsci.2025.105592

Zhang, L., Huang, F., Xu, J., Liu, X., Yang, X., Zhang, Z., . . . Zattin, M. (2024). Continental crustal growth in the post-collisional setting: insights from the Late Triassic high-Mg andesites in the eastern Central Asian Orogenic Belt. GSA Bulletin. doi:10.1130/B37578.1

Zhang, L., Huang, F., Xu, J., Liu, X., Yang, X., Zhang, Z., . . . Zattin, M. (2025). Continental crustal growth in the post-collisional setting: insights from the Late Triassic high-Mg andesites in the eastern Central Asian Orogenic Belt. Bulletin of Geological Society of America, 137, 1521-1537.

Zhang, L., Huang, F., Xu, J., Liu, X., Yang, X., Zhang, Z., Zhang, M., Zeng, Y., & Zattin, M. (2025). Continental crustal growth in the post-collisional setting: Insights from the Late Triassic high-Mg andesites in the eastern Central Asian Orogenic Belt. Bulletin of the Geological Society of America, 137, 1521–1537.

Zhang, W. F., D. W. Zheng, F. Jourdan, A. Frew, C. Mayers, Y. G. Xu, H. Y. He, Y. Q. Zhang, J. J. Wang, Y. D. Jiang, and 3 more contributors. (2024). ZMT04 muscovite: a potential Paleoproterozoic reference material for 40Ar/39Ar dating. Journal of Analytical Atomic Spectrometry, 39(9), 2173-2182.

Presentations

Adkins, R., Taylor, J. M., Siddoway, C. S., Thomson, S. N., & Teyssier, C. (2024). Unveiling the geologic history of Marie Byrd Land, West Antarctica: Insights from thermo-kinematic modeling and low-temperature thermochronology. Geological Society of America Abstracts with Programs, 56(5). https://doi.org/10.1130/abs/2024AM-402995

Arslan Azizoğlu, G. (2024, September 17–18). Development of a microneedle patch for long-acting contraception [Invited presentation]. Microneedle & Intradermal Delivery Forum 2024, Philadelphia, PA, USA.

Augustine, V., et al. (2024). Molten salt synthesis of transition metal and lanthanide nitride surrogates for actinide nitride fuels. ANS Transactions, 131, 550–553.

Bennett, S. E. K., Darin, M. H., Dorsey, R. J., Stelten, M. E., Sawlan, M. G., Hagstrum, J. T., Thompson, L. A., Gardner, K., Morebeck, C., & Switzer, B. (2024). Geología de la Sierra de San Jorge, margen occidental de la rift del Golfo de California, península central de Baja California, México. GSA Connects 2024 Meeting, Anaheim, California, 22-25 September, Paper No. 94-9.

Brunig, D., Soreghan, G. S., Dulin, S., Thomson, S. N., & de Aguinaco, H. L. (2024). Exploring the buried bedrock surface of Unaweep Canyon to assess landform origin. American Geophysical Union, Fall Meeting 2024, Abstract, Session EP13B-1337.

Cardello, G. L., Rahn, M., Fellin, G., Bernasconi, S., & Mancktelow, N. (9 November 2024). New geochronological constraints from the Simplon-Rhône Fault and the SW Helvetic nappes, Switzerland. Swiss Geoscience Meeting, S. 4.

Chemey, A. (2024, August). Alternative syntheses of metal ceramics for nuclear technologies. Contributed talk at the National Meeting of the American Chemical Society, Denver, CO.

Colburn, B., Hausrath, E. M., Cycil, L. M., Picard, A., Huang, S., & Duggan, B. (2025). Potential biosignatures in Mars-relevant clay minerals: A key to uncovering past life on Mars (Abstract #2574). In 56th Lunar and Planetary Science Conference (LPSC 2025). Lunar and Planetary Institute. https://www.hou.usra.edu/meetings/lpsc2025/pdf/2574.pdf

Dalton, H., et al. (2024). Isotopic fingerprinting of the Plio-Pleistocene Turkana Tuffs. Geological Society of America (GSA) Connects, Anaheim.

Dalton, H., et al. (2025). Assigning an eruption age: The challenges of dispersed single crystal Ar-Ar ages and insights from geochemistry. International Association of Volcanology and Chemistry of the Earth's Interior, Geneva.

Dalton, H., et al. (2025). Episodic eruptions in the Turkana Basin, Kenya: An isotopic perspective. Goldschmidt, Prague.

Dimaggio, et al. (2024). Geochronology of Late Miocene Fossil Sites in the Southern Kenya Rift. American Geophysical Union Fall Meeting. Retrieved from https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1663185

Dorsey, R. J., Darin, M., Bennett, S. E. K., Hausback, B., Garner, K., Niemi, T., Busby, C., Graettinger, A. H., Salgado Munoz, V. O., Martinez Gutierrez, G., Morebeck, C., Usher, E., Heizler, M. T., Pecha, M. E., Stelten, M. E., Schmitt, A. K., & Dolby, G. (2024). Miocene tectonic and stratigraphic evolution of the central Baja California peninsula and rapid marine flooding into the Gulf of California at ca. 6.3 Ma. GSA Connects 2024 Meeting, Anaheim, CA, 22-25 September, Paper No. 72-13. (Invited Presentation)

Downs, D. T., Deligne, N. I., & Stelten, M. E. (2025). Volcanic mapping, geochemistry, and geochronology from caldera to coast within the American Samoa archipelago. American Geophysical Union Chapman Conference on Caldera-Forming Eruptions at Basaltic Volcanoes, Hilo, Hawaii, USA.

Evers, C., Park, J. G., Vondrasek, B., Johnson, C., Martin, T., Czabaj, M., Odegard, G., & Liang, R. (2025). Electron beam and gamma ray radiation treatments to achieve high strength in carbon nanotube laminates. Proceedings of the International Conference on Composite Materials (ICCM 24), Baltimore, MD, August 4–8, 2025.

Finzel, E., Thomson, S. N., Pearson, D. M., Horkley, L. K., Garber, K., & Gardner, C. (2024). First cycle or polycyclic? Combining apatite and zircon detrital U-Pb geochronology and geochemistry to assess sediment recycling in the southwestern Montana foreland basin, North American Cordillera. Geological Society of America Abstracts with Programs, 56(5). https://doi.org/10.1130/abs/2024AM-401321

Flores, J. I., Witt, C., Poma, O., Bruguier, O., Bosch, D., Bosse, V., Zattin, M., Seyler, M., Hernandez, M. J., Chanier, F., & Averbuch, O. (2025, April 27–May 2). Geochronology and geochemistry of Cenozoic magmatic intrusions in the north-western Ecuadorian Andes: The role of crustal thickness [Conference presentation]. EGU General Assembly, Vienna, Austria.

Franz, B., Geiger, H., Rahn, M., Todd, A., & Zwingmann, H. (9 November 2024). Age, origin and exhumation history of a Variscan dike along the Upper Rhine Graben Vosges shoulder. Swiss Geoscience Meeting, S. 105.

Gibbs, T., & Chemey, A. T. (2024). Fluoride salt separation of uranium from fission products. ANS Transactions, 131, 238–240.

Heberer, B., Rahn, M., Gerdes, A., Neubauer, F., Dunkl, I., Holzner, E., & Czepl, A. (23-27 September 2024). Deciphering the 4-D evolution along and across the Insubric Line using a multi-method geo- and thermochronological approach. Pangeo/DEUQUA, S. 74.

Jakobsson, V., et al. (2024, November). Tectonic implications of geological mapping and Rb-Sr isotopic dating for the timing and duration of the early Alpine top-to-the-W imbrication and exhumation of the Austroalpine-Pennine boundary region. Swiss Geoscience Meeting.

Jakobsson, V., et al. (2025, July). Assessing intragrain chemical heterogeneities in white mica and their impact on 40Ar/39Ar and Rb-Sr dates. Goldschmidt Geochemistry Conference, Prague.

Kaplan, M. R., Martini, M. A., Cunningham, M., Rupper, S., Thomson, S. N., Nóbile, J. C., Flores, E., Romero, M., & Schaefer, J. M. (2024). Understanding glacial-geomorphic-climatic changes in the arid Andes: Cordillera Oriental as a case study. American Geophysical Union, Fall Meeting 2024, Abstract, Session EP23C-1336.

Kelhofer, N., Arslan Azizoğlu, G., Zheng, T., Dalvi, A., Schwendeman, S. P., & Prausnitz, M. R. (2025, January). 6-month sustained contraceptive delivery from a gamma-sterilized microneedle patch [Poster presentation, recipient of 2nd place award]. MEdX at Carle Illinois.

McGlamery, D., et al. (2024). Molten salt synthesis of functional carbide materials. ANS Transactions, 131, 554–557.

Mouthereau, F., Boschetti, L., Schwartz, S., Rolland, Y., Bernet, M., Cogné, N., ... (2025). Evolution of the Iberia-Adria-Europe plate boundary revealed by the Meso-Cenozoic thermal history of the European paleomargin in SE France. European Geosciences Union General Assembly 2025 (EGU25), EGU25-16940.

Phillips, D., et al. (2024). High precision 40Ar/39Ar dating of Pliocene Turkana Tuffs. Geological Society of America (GSA) Connects, Anaheim.

Phillips, D., et al. (2025). Unravelling the Plio-Pleistocene history of the paleontologically significant Turkana Basin, Kenya. Goldschmidt, Prague.

Pomella, H. (2024, September 18). The complex thermotectonic history of the Eastern Southern Alps [Conference presentation]. 16th Emile Argand Conference on Alpine Geological Studies, Siena, Italy. Co-authors: Klotz, T., Sieberer, A.-K., & Dunkl, I.

Pomella, H. (2024, September 26). The Subpenninic units in the western Tauern Window [Conference presentation]. Pangeo / DEUQUA 2024, Salzburg, Austria. Co-authors: Hinterwirth, S., Rudmann, J., & Burger, U.

Samim, S., et al. (2024). Unravelling stratigraphic complexities in the Nariokotome Tuff Complex using a combination of high-resolution tephrochronological tools. Geological Society of America (GSA) Connects, Anaheim.

Samim, S., et al. (2025). Contrasting styles of silicic magma mixing dynamics in Turkana Basin, Kenya: Insights from high-resolution tephrochronological tools. International Association of Volcanology and Chemistry of the Earth's Interior, Geneva.

Samim, S., et al. (2025). High-resolution tephrochronological tools reveal geochemical complexity in volcanic products: Examples from the Turkana Basin, Kenya. Goldschmidt, Prague.

Savelkouls, A., et al. (2024). High-resolution stratigraphy and 40Ar/39Ar geochronology of the Okote Tuff Complex. Geological Society of America (GSA) Connects, Anaheim.

Savelkouls, A., et al. (2025). Application of tephrochronology in the Omo-Turkana Basin; using 40Ar/39Ar-geochronology to develop a high-resolution stratigraphic framework for the Okote Tuff Complex. International Association of Volcanology and Chemistry of the Earth's Interior, Geneva.

Siddoway, C. S., Thomson, S. N., Hemming, S. R., & Brachfeld, S. A. (2024). Multichronometer dating of dropstones and ice-rafted debris (latest Miocene through Pliocene) recovered from IODP drill cores offshore West Antarctica, to extend knowledge of bedrock geology and past ice sheet extent. American Geophysical Union, Fall Meeting 2024, Abstract, Session T51D-3177.

Siddoway, C. S., Thomson, S. N., Taylor, J. M., & Teyssier, C. P. (2025, September 14-20). Thermochronology of glacially transported clasts from the marine shelf and slope of West Antarctica (Marie Byrd Land/ Amundsen Sea). Thermo2025, 19th International Conference on Thermochronology, Kanazawa, Japan.

Singer, B. S. (2024, September 13). The Quaternary Southern Andean Volcanic Zone: Geologic, geochronologic, and petrologic perspectives. Fulbright Scholar Orientation, Fulbright Chile Office, Las Condes/ Santiago, Chile.

Taylor, J. M., Siddoway, C. S., Thomson, S. N., & Teyssier, C. (2024). Differential exhumation in western Marie Byrd Land, West Antarctica, exposed through low-temperature thermochronology and thermo-kinematic modeling. Geological Society of America Abstracts with Programs, 56(5). https://doi.org/10.1130/abs/2024AM-403473

Volcanic and Magmatic Studies Group. (n.d.). A critical appraisal of the interrogation of sedimentary archives to investigate the proposed forcing of drainage network reorganisation by plateau uplift in Southeast Tibet. Poster presentation at EGU.

Volcanic and Magmatic Studies Group. (n.d.). Dating recent aqueous activity on Mars. Poster presentation at AGU.

Volcanic and Magmatic Studies Group. (n.d.). Eruption history of the Columbia River Basalt Group constrained by high-precision U-Pb and 40Ar/39Ar geochronology. Poster presentation at GSA.

Volcanic and Magmatic Studies Group. (n.d.). Progress on supergene mineral dating via the 40Ar/39Ar technique and terrestrial weathering in Great Britain and Ireland. Poster presentation at the Geological Society of London: Chemical Weathering & Climate Change Conference.

Volcanic and Magmatic Studies Group. (n.d.). Where did the ice reach the sea? The utility of coupled K-feldspar Rb-Sr, Ar-Ar, and Pb-isotope analysis applied to mid-Miocene ice-rafted debris in Antarctic marine sediment. Poster presentation at EGU.

Werth, C. J., Berns, E. C., Kearney, K., You, X., Sanford, R. A., Valocchi, A. J., Strathmann, T. J., & Schaefer, C. E. (2022, October 4–6). Iron cycling and the role of reduced iron species in promoting abiotic transformations of chlorinated ethenes in groundwater. REMTEC and Emerging Contaminants Summit, Denver, CO.

Students

Andersen, Rohan. MS, University of Melbourne. "Geochemistry and age of the Silbo Tuff, Turkana Basin." Advisor(s): Hayden Dalton, Saini Samim.

Boschetti, L. Ph.D. student. Advisors: Frederique Moutherau (Toulouse), Stéphane Schwartz (Grenoble), Yann Rolland (Chambéry).

Chalid, Intan. PhD student, Vrije Universiteit Amsterdam.

Chen, Jonathan. PhD candidate, University of Illinois Urbana-Champaign. "Development and clinical translation of microneedle patches for long-term contraception and cystic fibrosis diagnosis." Supervisor: Mark Prausnitz.

Chibuko, Chizimuzo. PhD candidate, University of Illinois Urbana-Champaign. "Effects of microneedle design and skin physiology on interstitial fluid collection." Supervisor: Mark Prausnitz.

Colburn, Baylee. PhD, Geoscience Department, University of Nevada Las Vegas. "Seeking signs of life on Mars." Advisor: Prof. Elisabeth Hausrath.

Conde, Camilo. MSc student. "Geochronological and Geochemical Characterisation of the Quebradagrande Complex, Colombia." Advisor: Richard Spikings.

Coudun, Charline. Ph.D. student. Advisor(s): Christophe Basile.

Craig, Jason. PhD student, Stanford University. "Ancient and active tectonics of Arctic Alaska: Structural framework of the south-central Brooks Range and geothermal potential of the Kigluaik Mountains, Seward Peninsula." Advisor: Elizabeth Miller. Expected completion: Dec. 2025.

Dai, Shenyi. MS student, University of Texas at Austin. "Quantifying the distribution of abiotic transformation rate constants in low permeability clay zones for improved assessment of TCE impacts to groundwater at DoD field sites."

Drayson, D. PhD, Department of Earth Sciences, University of Manitoba. "Isotopic and Petrologic Constraints on Intracontinental Deformation and Metamorphism, Churchill Province, Nunavut." Advisor: A. Camacho.

Fioraso, Marco. PhD student, Department, University of Siena. "Erosion Antarctica: Looking into erosional processes and uplifting of the Transantarctic Mountains (Southern Victoria Land) through low-temperature thermochronology and numerical modeling of landscape evolution." Advisor(s): Dr. Valerio Olivetti.

Huseynov, Akbar. PhD student, Vrije Universiteit Amsterdam.

Iglesias Flores, Jorge Andres. PhD student, University of Lille. "Arc-forearc interactions in the Northern Peruvian Andes." Advisor(s): Prof. Massimiliano Zattin.

Jakobsson, Vidar. PhD student. "Assessing the mechanisms of Ar redistribution and loss from white mica." Advisor: Richard Spikings.

Martinez, Eduardo. PhD, Geoscience Department, University of Nevada Las Vegas. "Phosphate and implications for Mars." Advisor: Prof. Elisabeth Hausrath.

Moreno-Yaeger, Pablo. PhD student, Department of Geoscience, University of Wisconsin–Madison. Advisor: Brad Singer.

Okyere, Lydia. PhD, Department of Pathobiology (Veterinary Medicine), University of Illinois Urbana-Champaign. “Microbiome-Mediated Modulation of Herbicide Toxicity and Host Detoxification Pathways.” Advisor: Prof. Christopher Gaulke.

Rosenberger, A. PhD student, Washington State University. Advisor: Prof. Sean Long. Collaborating with the University of Arizona Fission Track Laboratory as part of the NSF AGeS2 Program.

Samim, Saini. PhD, University of Melbourne. "Geochronology and Geochemistry of Nachukui Tuffs, Omo-Turkana Basin, Kenya." Advisor(s): David Phillips, Janet Hergt, Hayden Dalton.

Sandoval Espinel, Leidy Carolina. PhD student, University of Padova. "Thermotectonic history of the southernmost Northern Andes." Advisor: Prof. Massimiliano Zattin.

Savelkouls, Ashley. PhD, University of Melbourne. "Constraining the volcanic–magmatic history of the Koobi Fora Formation in the Omo–Turkana Basin using precise 40Ar/39Ar dating to improve the current stratigraphy." Advisor(s): David Phillips, Hayden Dalton.

Shang, Shijie. PhD student, Vrije Universiteit Amsterdam.

Stalla, Jack. MS student, Department of Geoscience, University of Wisconsin–Madison. Advisor: Brad Singer.

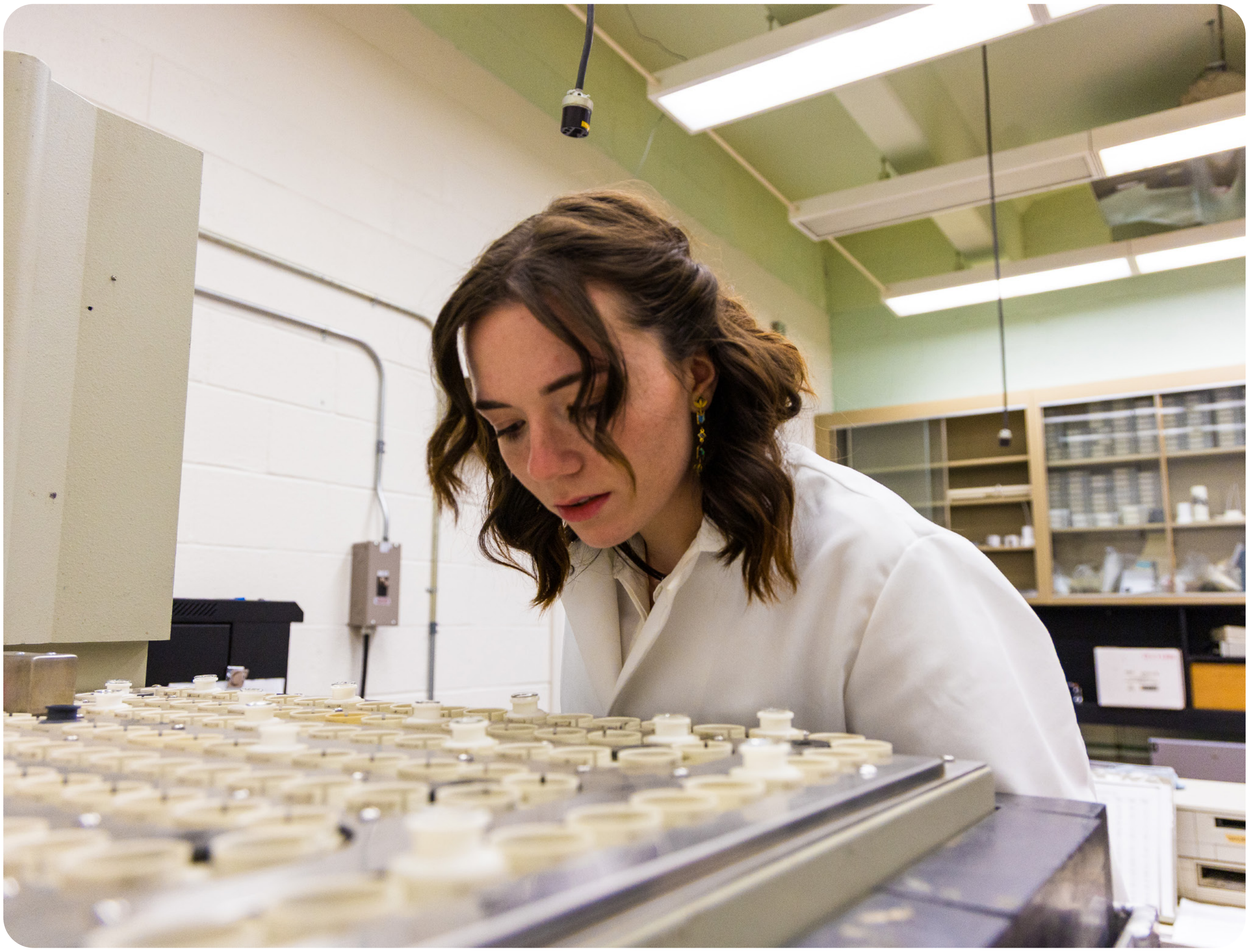
van den Bosch, Thomas. MS student, Vrije Universiteit Amsterdam.

Wu, Yang. PhD student, Vrije Universiteit Amsterdam.

Zhang, Dongdong. PhD student, University of Padova. "Anthropogenic impact on sediment transfer in the Yellow River catchment detected by detrital geochronology." Advisor: Prof. Massimiliano Zattin.

Zhang, Liying. PhD student, China University of Geosciences, Beijing. "Tectonic evolution of the Great Xing’an Range and its relationships with climatic and surface processes." Advisor(s): Prof. Massimiliano Zattin.

Zhou, Wei. MSD student. "Cenozoic initial widespread uplift of the Eastern Kunlun Mountains as constrained by low-temperature thermochronology." Advisor: Associate Professor Yadong Wang.



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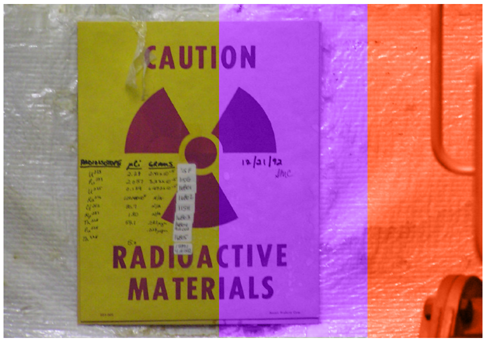

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