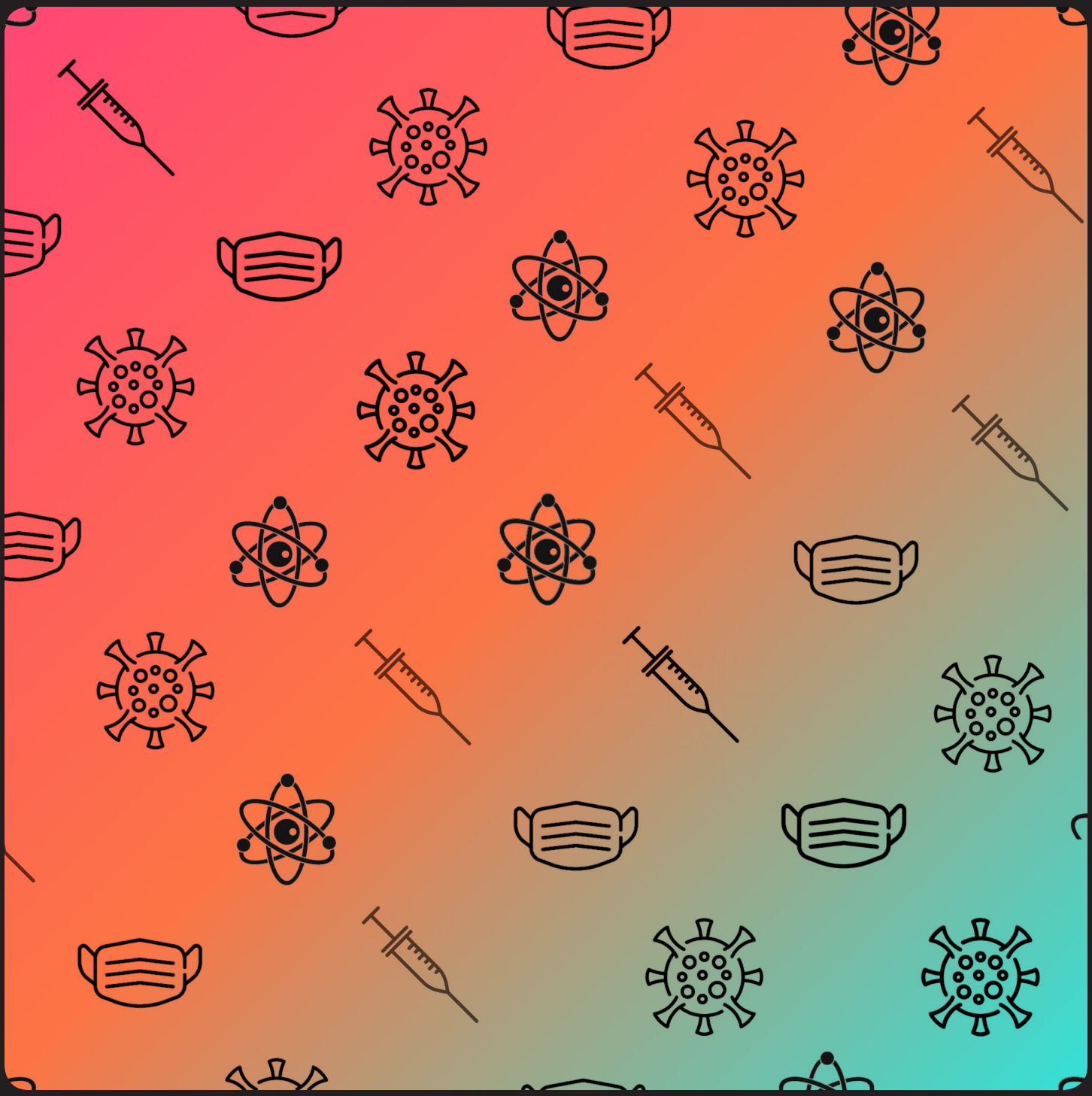
TRTR

Newsletter

2021 Quarter 1



Letter
from the Chair

Ayman I. Hawari
Distinguished Professor & Director
Nuclear Reactor Program
North Carolina State University
ayman.hawari@ncsu.edu
https://www.ne.ncsu.edu/people/aihawari

Dear TRTR Members,

As 2021 progresses, we hope that some light at the end of the tunnel is emerging for the COVID-19 situation. The vaccination effort seems to be moving forward and we may anticipate positive developments over the next couple of months. Several of the TRTR institutions should be initiating their COVID-19 vaccination campaigns.

Consequently, preparations for an onsite meeting remain underway for TRTR 2021, which is to be held in Raleigh, North Carolina during the period of August 22-26, 2021. The venue is the Marriott hotel in downtown Raleigh. Please save the dates on your calendars. I anticipate that a conference website and the related announcement are forthcoming by the end of March. Nonetheless, preparations for a virtual meeting are also ongoing in case the situattion continues to call for such a format.

During the past quarter major activities continued within TRTR to address several issues of interest to the wellbeing of our facilities. Much of that was reflected in the quarterly call between the TRTR Executive Committee and NRC. Updates were given by NRC on several items including status of the NPUF rule and the related update of NUREG 1537, the review of NUREG 1478, and the status of NRC's feedback on TRTR's 50.59 white paper. In addition, the RROAR initiative was discussed and TRTR point of contacts were identified for collaboration with NRC. More details of the call with NRC are given in this newsletter.

Additionally, during the past quarter, news circulated about the desire of some universities to build micro research reactors on their campuses. Some discussions were initiated to explore any role that TRTR facilities may play in this effort. The discussions will continue as more details emerge. Furthermore, the TRTR/NEDHO coordination continues. A primary focus has been exploring the opportunity for enhanced funding for our facilities to meet their missions. We are currently planning to join NEDHO in any upcoming communications with congressional delegations.

Finally, the TRTR executive committee has decided to have expanded meetings during the year that include the community at large. The first expanded meeting will be in May. Please plan to participate and voice your opinions about issues that are of concern to our facilities.

Letter from the Editor

Inside this Edition

Hello TRTR Community,

Hopefully everything is going well at your facility. In this issue, we tried to capture the initial costs associated with purchasing an RTR. Most information was found on your websites but if you have any corrections, please let us know!

Continue to stay safe and healthy. I look forward to seeing everyone as soon as it is safe to do so!! As always, reach out with any comments or suggestions for the newsletter.

Best regards,
Amber

Amber Johnson
Director
Radiation Facilities
University of Maryland

Luke Gilde
Reactor Manager
Radiation Facilities
University of Maryland

Upcoming Events

ANS Student Conference

April 8-10, 2021
Raleigh, North Carolina
http://studentconf.ans.org/

American Nuclear Society Annual Meeting

June 14-16, 2021
Virtual
http://www.ans.org/meetings/c_1

International Conference on Advancements in Nuclear Instrumentation Measurement Methods and their Applications

June 21-25, 2021
Prague, Czech Republic
https://indico.utef.cvut.cz/event/23/

International Group on Research Reactor

May 30 - June 4, 2021
Kazan-Russian Federation
https://igorr2020.org

Training Workshop on Integrated Management Systems for Research Reactors

June 21-25, 2021
Vienna, Austria
https://www.iaea.org/events/evt2004105

Technical Meeting on Good Practices for the Operation and Maintenance of Research Reactors

August 2-6, 2021
Vienna, Austria
https://www.iaea.org/events/evt1904070

TRTR 2021

August 22-26, 2021
Raleigh, North Carolina
http://www.trtr.org

Technical Meeting on Upgrades to Digital Instrumentation and Control Systems for Research Reactors

August 23-27, 2021
Vienna, Austria
https://www.iaea.org/events/evt2004112

The European Research Reactor Conference

September 26-30, 2021
Helsinki, Finland
https://www.euronuclear.org/european-research-reactor-conference-2021/

Technical Meeting on Risk Informed In-Service Inspection and Decision Making for Research Reactors

October 4-8, 2021
Vienna, Austria
https://www.iaea.org/events/evt2004111

American Nuclear Society Winter Meeting

October 31-November 4, 2021
Washington D.C.
http://www.ans.org/meetings/c_1

International Symposium on Reactor Dosimetry

November 16-20, 2021
Lausanne, Switzerland
http://isrd17.reactordosimetry.org/

News

DOE Selects Advanced Reactor Concepts for Funding

The DOE has announced the selection of three US-based teams to receive Advanced Reactor Concepts-20 (ARC-20) funding:
- Advanced Reactor Concepts will deliver a conceptual design of a seismically isolated advanced sodium-cooled reactor.
- General Atomics will develop a fast modular reactor conceptual design.
- Massachusetts Institute of Technology will mature the Modular Integrated Gas-Cooled High-Temperature Reactor (MIGHTR) concept from a per-conceptual stage to a conceptual stage.

Read more

Whistleblowers Speak Out About Exposure to Radioactivity on Fracking Jobs

Fracking for oil and natural gas may be causing widespread radioactive contamination.

Read more

Levels of Contamination at Fukushima

Levels of radiation at the Fukushima reactors are higher than previously anticipated and may complicate cleanup efforts.

Read more

Radiation Used to Modify Seeds

Since the 1950s, radiation has been used to induce mutations in a variety of plants, some of which have become commonly used.

Read more

Human-Made Bubble Surrounding Keeps Radiation Away

A bubble of VLF radio frequencies created by human activities surrounds the earth and helps to prevent cosmic rays from reaching the earth.

Read more

Tiny Nuclear Reactors Can Save American Energy

Popular Mechanics discusses several small modular reactor designs.

Read more

China Begins Functional Testing of HTR-PM Reactors

Hot functional testing of the demonstration HTR-PM plant - which features two small reactors that will drive a single 210 MWe turbine began in January 2021.

Read more

School Evacuated After Student Brings Uranium Glass Plate

A school in New Jersey after a student brought a uranium glazed plate.

Read more

China's First Hualong One Nuclear Reactor Starts Commercial Operation

China's first domestically designed and built power reactor began operation this year.

Read more

India Debuts Largest Domestic Reactor with More Planned

India's largest domestically built nuclear reactor has been connected to the grid.

Read more

MU Research Reactor Enters Agreement for Treatment

The University of Missouri Research Reactor will supply Lu-177 for medical treatments.

Read more

Contract Signed for Swedish Processing of Norwegian Reactor Fuel

The fuel from the decommissioning JEEP-1 reactor in Norway will be transported to Sweden for reprocessing, then returned to Norway for disposal.

Read more

NIST Clarifies Structure of Prospective Vaccine for Respiratory Virus

The NIST Center for Neutron Research Reactor has been used to help clarify the structure of the RSV virus.

Read more

Training NuScale SMR operators

NEI reports on NuScale's training program.

Read more

Workers Exposed to Radiation at NIST Research Reactor in Gaithersburg

An incident at the NIST Center for Neutron Research led to a release of fission products and the contamination of 10 workers. The causes of the incident are under investigation.

Read more

Construction Licence Issued for Russia's BREST Reactor

The reactor will be the world's first experimental demonstration power unit featuring a lead-cooled fast neutron reactor.

Read more

Research Reactors to Help in Search for Amelia Earhart's Plane

The Penn State Breazeale Reactor will perform tests on a scrap of metal believed to be from Amelia Earhart's plane.

Read more

Nuclear-Powered Rockets Could Be the Best Option for Bringing Humans to Mars

NPR reports on nuclear powered rockets for potential interplanetary space travel.

Read more

Rhode Island Nuclear Science Center Used to Show Radiation Increased Growth of Undersea Microbes

A team of researchers from the University of Rhode Island's Graduate School of Oceanography and their collaborators have revealed that the abundant microbes living in ancient sediment below the seafloor are sustained primarily by chemicals created by the natural irradiation of water molecules.

Read more

NRC Inspections

Aerotest Research Reactor

August 11-12, 2020. The inspection included a review security. One Severity Level IV violation was found. The notification of the inspection is ML20237F588.

University of New Mexico

September 21-23, 2020.
The inspection included a review of organization and staffing, procedures, health physics, design changes, committees, audits and reviews, and transportation activities. No violations were identified. The complete inspection report is ML20273A305.

November 30- December 2, 2020. The inspection included a review security. One Severity Level IV violation was found. The notification of the inspection is ML20352A452.

University of Texas at Austin

November 16-18, 2020. The inspection included a review of procedures, experiments, health physics, design changes, committees, audits and reviews, and transportation activities. No violations were identified. The complete inspection report is ML20356A159.

Armed Forces Radiobiology Research Institute

29, 2020, to October 1, 2020. The inspection included a review of procedures, experiments, health physics, design changes, committees, audits and reviews, and transportation activities. One inspection follow-up item (IFI) was opened related to the logging of makeup water addition to the pool. The inspection also included a follow up to the reactive inspection related to a lost fission chamber. All follow up items related to the lost fission chamber have been closed. The complete inspection report is ML20303A309.

Purdue University

October 27 – November 6, 2020. A special inspection was conducted regarding the operation of the PUR-1 at powers above its maximum licensed level. Two apparent violations and one Severity Level IV violation were identified. The Severity Level IV violation is for improper posting of a radiation area. The apparent violations are for operating the reactor in excess of its maximum licensed power

level and for not properly performing a power calibration following a change in the reactor configuration. The apparent violations were later determined to be Level III violations, but no fines were assessed. The complete inspection report is ML20332A083.

University of Florida Training Reactor

November 30, 2020, to December 2, 2020. The inspection included a review of health physics, design changes, committees, audits and reviews, emergency planning, maintenance, fuel handling, and transportation activities. No violations were identified. The complete inspection report is ML20349A142.

NRC Quarterly Call Summary

February 23, 2021
3:00-4:00 pm EST
ML21032A327

Greg Casto has retired from the NRC.

NUREG 1478 rev 3 schedule- Division review expected to be completed by March 2021. Public comments by May 2021.

NRC has assigned a project manager to work with the community on a response to our RROAR Operator Medical Licensing Examination submission from May 2020. ML20128J340

NUREG 1537 revision is unable to go out for public comment until the NPUF rule is finalized with the Commission ML18031A001.

Progress continues on the 50.59 white paper. Goal is endorsement by the end of the fiscal year.

Reactor Relicensing

North Carolina State University
R-120

- 2/24/2017
  Renewal Application
  Power upgrade to 2.5 MW
- 10/18/2018
  RAIs - 6 questions
- 11/5/19
  Regulatory Audit

Texas A&M AGN
R-23

- 7/22/1997
  Renewal Application
  Reactor later moved to new building
- 9/23/1997
  Renewal Acceptance
  No target date given
- 5/22/1998
  RAIs - 25 questions
- 10/9/2009
  RAIs - 7 questions
- 6/25/2011
  RAIs - 37 questions

University of California – Davis
R-130

- 6/28/2019
  Renewal Application
  Downgrade to 1 MW, removal of pulsing

University of Massachusetts at Lowell
R-125

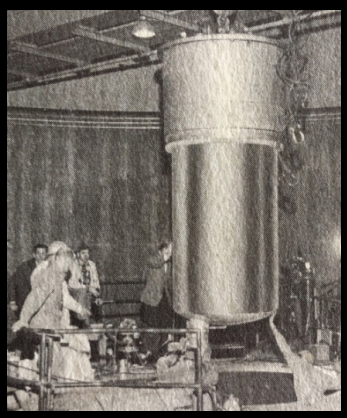
- 10/20/15
  Renewal Application
  No major changes
- 11/2/2016
  RAIs - 5 questions
- 11/30/2016
  RAIs - 9 questions
- 6/21/2017
  RAIs - 1 question
- 7/14/2017
  RAIs - PSP questions
- 11/7/2017
  RAIs - 8 questions
- 11/5/2018
  RAIs - 106 questions
- 7/19/2019
  RAIs - 17 questions
- 4/27/2020
  Regulatory Audit
- 12/17/2020
  Regulatory Audit

University of Texas
R-129

- 12/12/2011
  Renewal Application
  No significant changes
- 6/25/2012
  RAIs - 40 questions
- 11/1/2016
  RAIs - 26 questions
- 4/5/2018
  RAIs - PSP Questions
- 7/26/2018
  RAIs - 3 Questions
- 7/23/2020
  Regulatory Audit

Research Reactor Costs

OVER TIME



OSU Is Given $217,100 For A-Reactor Use

A $217,100 grant for Ohio State University's small-scale atomic reactor was announced by the Atomic Energy Commission in Washington Thursday.

The OSU reactor, considerably smaller than the Battelle Memorial Institute reactor located near West

Left: Can you identify the car AND the reactor in this photo?
Center: MIT (1958), Right: Ohio State University (1960)

Left: Texas A&M Console (1962), Center: NIST (1962), Right: Oregon State University reactor pool (1967)

KNOW MORE NUKES

UNIVERSITY OF NEW MEXICO

Carl Willis
Chief Reactor Supervisor
Department of Nuclear Engineering

What year did your reactor first go critical?

Our reactor is an AGN-201M (the "M" referring to higher-power modification of the original design). Serial #112 was delivered to UC-Berkeley in 1957 and was sold onward to the University of New Mexico, where first criticality occurred in October 1966. It was later moved to its current location in the Nuclear Engineering Laboratory on the southwest corner of UNM Main Campus, and attained first criticality in this location on April 3, 1969. In 2019 we held a celebration and symposium in honor of its 50th anniversary at UNM.

What is the reactor license number? Power level?

Our license is R-102, power level five watts.

What is your position at the reactor? How long have you held that position?

I am the Chief Reactor Supervisor, a role I have held since July 1, 2020, when I replaced Bob Busch (emeritus).

Have any major changes/modifications, such as conversion, power upgrade, etc..., been done?

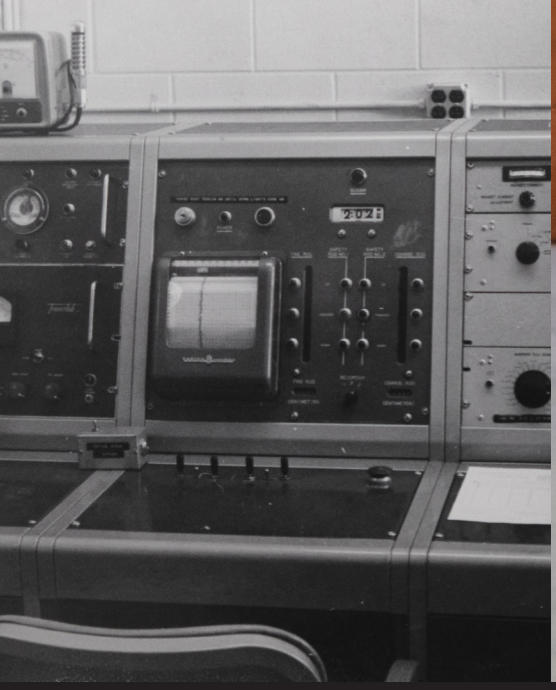
External shielding (concrete) was added when the reactor was installed in its current location, enabling operation at five watts. The console was upgraded twice: first in 1970, when the original vacuum tube instrumentation was replaced, and then in 1993 to its current configuration.

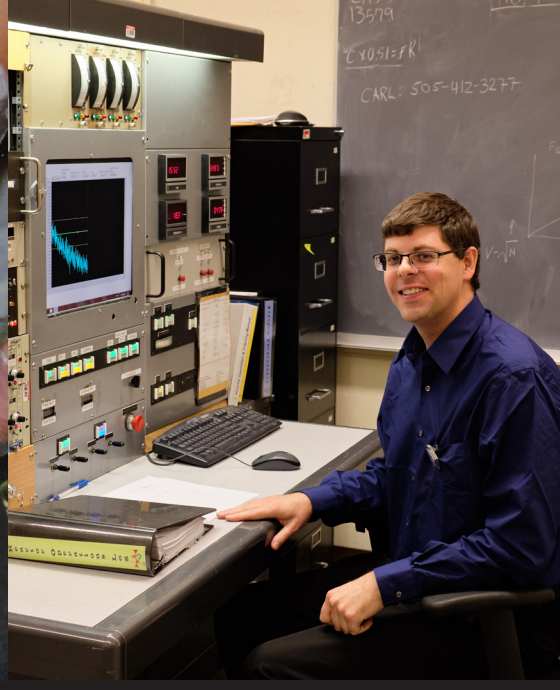
What is a unique feature of your reactor?

The AGN-201 reactors (of which two are currently operating in the United States) share some unique features not encountered in other reactors. Firstly, our control rods are fueled and add positive reactivity on insertion--the opposite behavior of most systems. Another unique capability enabled by the design and the low fuel irradiation is the ease of directly handling the nuclear fuel, which enables exciting teaching experiments such as a hand-loading approach to critical in which students assemble the core, piece by piece, by hand, and measure a 1/M curve as multiplication increases. This hands-on laboratory experience brings to mind the old-fashioned thrill of what Richard Feynman called "tickling the dragon's tail". A truly unique feature of Serial #112 at UNM, as currently licensed, is the absence of a period trip.

What is a fun fact about your reactor?

Our fuel is made out of plastic! Most of it is polyethylene (loaded with uranium dioxide), but a key component called the thermal fuse is made from lower-melting polystyrene. Melting of the thermal fuse causes controlled disassembly of the core and protects the fuel from exceeding the safety limit temperature in the event of a power excursion.





Original UNM Console. Handling the reactor fuel by hand. Carl in the new console.

Our reactor's fuel was shipped to UNM in a "Presto" pressure cooker. I'm not sure how common that convention was back in the '60s, but I kind of like it.

What is the biggest challenge facing your reactor?

I suspect my answer here will be familiar at most TRTR facilities. We have aging hardware that needs to be maintained, and like-for-like replacements are sometimes rare. A second, more temporary issue (I hope!) is staffing. We are losing three SROs to retirement, and will need to hire at least one replacement in the near term. Training and licensing are taking longer than they used to because of the ongoing pandemic.

What is the most unusual request someone has had tto use your reactor?

A photographer for National Geographic brought a gamma camera to the facility in an attempt to image the reactor's gamma radiation signal. This is pretty challenging to do, as our gamma field at power is dominated by very high-energy (2-10 MeV) prompt neutron-capture radiation. Nevertheless, we saw some interesting images on the camera.

What drew you to your current position?

I am a strong believer in the educational mission, and particularly the "hands-on imperative"--the understanding that useful knowledge is developed most effectively by working with real equipment. Reactors--particularly those that are oriented toward educational and training usage--are steadily diminishing in number to the point of becoming endangered. I believe in curating the technology we have at UNM and continuing to use it far into the future to deliver a unique and effective experience to our undergraduate students.

What has been your favorite project?

Training new ROs has certainly been the most rewarding aspect of my work at UNM.

Before working at your reactor, what was the most unusual or interesting job you've ever had?

My first job out of grad school was working for a mom-and-pop particle accelerator company in Albuquerque. I lived in the lab (literally, with a bedroom and shower installed in an alcove there), drove a $300 car, and designed neutron source equipment for boron neutron capture therapy. More than a decade hence, a number of accelerator-based neutron sources with target systems based on this design are installed for clinical use in Japan.

What do you find the most challenging at

UMN Fuel delivered in a pressure cooker.

reactor?

My biggest challenge as a new chief supervisor has been coming up to speed on the voluminous paper record associated with our reactor. This includes hunting down schematic diagrams and mechanical drawings when components need maintenance, and following the meandering history of regulatory orders that have shaped our current procedures over the years. I am hopeful that my understanding becomes usefully complete in time to begin license renewal!

What advice would you give to new reactor operators?

Being an operator is an accomplishment that looks good on a resume and attests to a significant degree of dedication, enthusiasm, and skill. But I encourage new operators to build on that background as quickly as they can--for example, by becoming involved in improving their facility's training and requalification programs or taking a leading role in maintenance. Even on a system as simple as the AGN-201, a vast wealth of understanding comes from managing a facility change, or helping teach RO candidates, or planning emergency drills. Competency in these matters is the purview of SROs, but also cultivates a healthy habit of life-long learning and helps keep our crucial, rare TRTR facilities running for the next generation's benefit.

What are three career lessons you've learned thus far?

Be a life-long learner! I came to the UNM reactor from a background in particle accelerator applications (in which I retain a foothold through a second job where I work on a large dense plasma focus), and am very happy to have the opportunity to expand my understanding in the reactor domain.

Ask for help! (I sometimes hold out too long on this, I confess.) I am surrounded by people with a vast wealth of skills and knowledge gained over decades of involvement, and have come to appreciate all they do to keep my facility running smoothly. This includes the folks in the Radiation Safety office, the Mechanical Engineering machine shop (which has made a bunch of replacement parts for me), the emeritus and soon-to-be-retiring NE Department staff, and of course the community of people in the TRTR world. Expect to hear more from me in the future!

Don't suffer a toxic workplace--go somewhere else quickly and on your own terms. My career has taken me many places, and they have all been wonderful (especially UNM!) with one notable exception. I remained optimistic about that job despite insufferable tribalism and massive turnover (four managers in a year). In retrospect, I should have heeded these signs and parted ways in my first week. Have self-respect and work for good people!

Name that Reactor

___ The second research reactor at Oregon State University after an AGN-201 reactor which began operation in 1959.

___ The highest power TRIGA reactor built in the US, built to perform neutron radiography on aircraft wings.

___ The first reactor in the US licensed with a digital control system.

___ An 8 MW experimental nuclear reactor located at Los Alamos National Laboratory operated from 1956 to 1992.

___ The highest power university research reactor in the US at 10 MW, and one of only 3 pressurized water research reactors in the US.

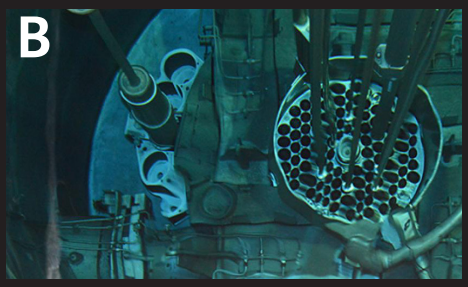
___ One of only 2 research reactors in the US with a true containment building.

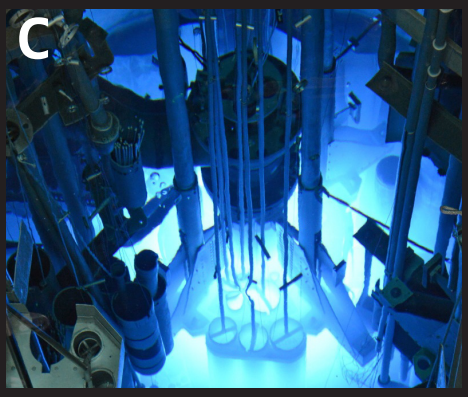
___ The newest research reactor in the US.

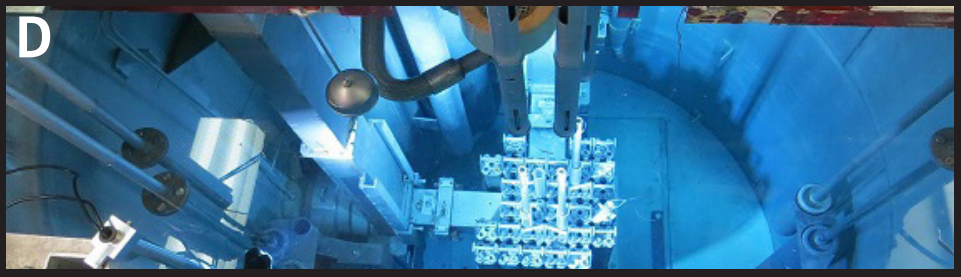
___ A fast burst reactor used to test the effects of radiation on the human body and other organisms.

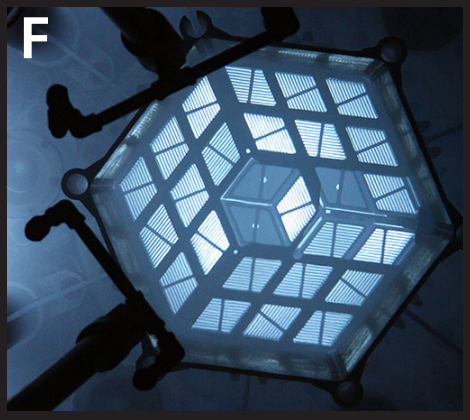
___ The NRAD reactor was originally built as a 2 MW reactor in Puerto Rico before being moved to Idaho and set up for neutron radiography of irradiated reactor fuel.

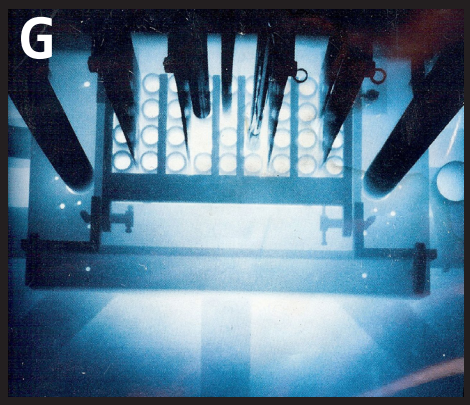
___ This 60 MW research reactor was the only reactor ever operated by NASA.

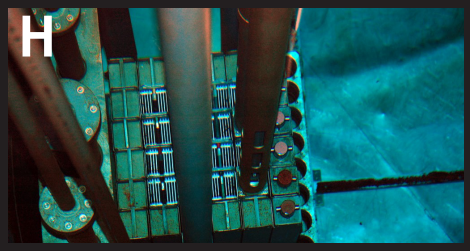


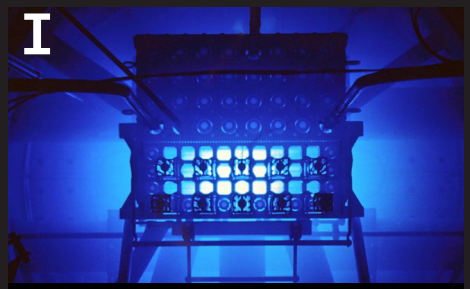












Answers (from top-left): E (Oregon State), B (UC Davis), H (Purdue), G (Omega West), C (MURR), F (MIT), J (Texas A&M), A (Oak Ridge Health Physics Reactor), D (Neutron Radiography Reactor), I (Plum Brook Reactor)