NEWSLETTER

TRTR

Q3 2023

Trajectories in a bubble chamber

Message from the Chair

Hello!

Mark Twain famously said, "There is no sadder thing than a young pessimist, except an old optimist." I must admit that it makes me cringe a bit to realize that it aptly describes me at the moment (the older part, not the younger).

As I see more of my career behind me rather than in front of me, I find myself excited for the future of research and test reactors in this country. Early in my career was a time when many research reactors were shutting down and decommissioning. Today though, not only are our existing facilities thriving but we are on the cusp of witnessing new builds for the first time since the 1980's. The next few years could be one of the best times to be a part of the research and test reactor community that we have seen in some time.

For my initial message to you as Chair of this wonderful organization I would like to begin with this thought: I would encourage facilities of all types, powers, and missions, both old and new, to embrace robust reviews and audits from individuals outside your organization on a routine basis. All of us have some sort of technical specification required safety committee that reviews and approves various aspects of a facility's operation. However, a constant theme that has revealed itself during the many times I have been asked to look at an organization that is struggling to recover from a violation or series of violations is a weak safety committee. By this I mean a committee that contains individuals that either "rubber stamp" or do not question the materials placed before them for review, either because they cannot be bothered, are intimidated by other members of the committee, or who are too familiar with the facility. Regardless of the reason, it is not healthy for the organization. We must strive to nominate members to our safety committees that have a questioning attitude. Additionally, they ideally should be smart and inquisitive, willing to examine areas/topics that they are not experts in. Sometimes the best reviews I've seen are from people who are new to a particular subject trying to figure out a procedure and ask a simple question, "Why is it done this way?"

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The safety committee should, ideally, be the best way to look at yourself critically, in a professional and respectful manner, to identify issues early. Reviews and audits from outside reviewers, both as part of these committees or outside individuals, are an excellent way to do just this. Doing this will make us all better.

Steve Reese, PhD
TRTR Chair
Director, Radiation Center
Associate Professor, School of Nuclear Science and Engineering
Oregon State University

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Bubble chamber event. Photograph taken December 16, 1958. Bubble Chamber-315B

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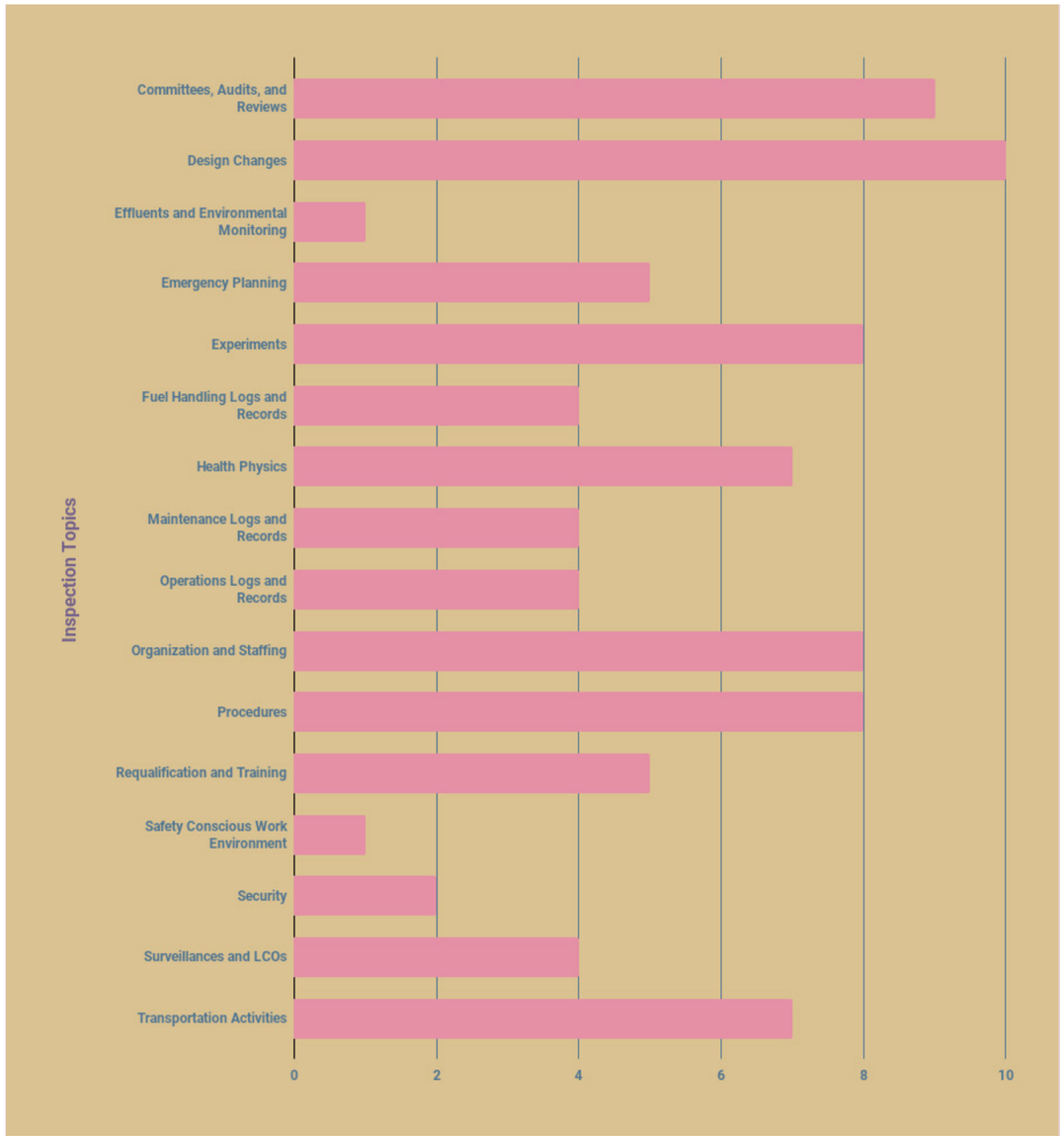
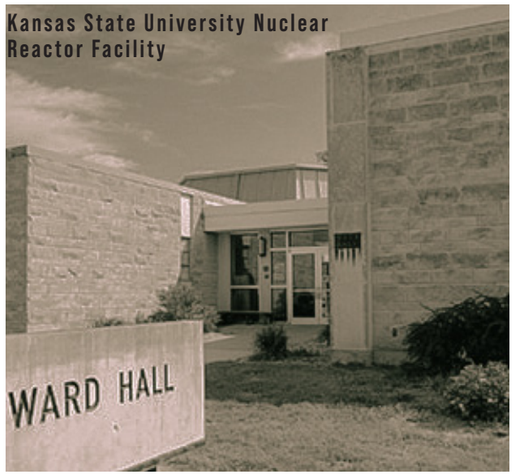
Inspection Reports

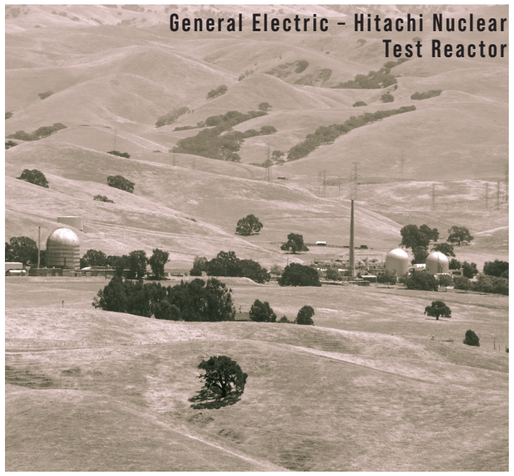


Kansas State University Nuclear Reactor Facility



April 24-28, 2023. The inspection included a review of procedures, requalification, experiments, health physics, design changes, committees, audits and reviews, transportation of radioactive materials, and security compliance. **No violations were identified.** ML23152A147 & ML23151A646

General Electric - Hitachi Nuclear Test Reactor



April 18 – 20, 2023. The inspection included a review of procedures, experiments, health physics, design changes, committees, audits and reviews, maintenance logs and records, and transportation. **No violations were identified**. ML23159A013

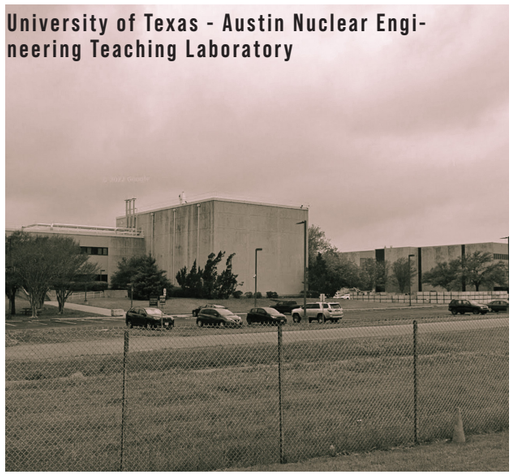
Washington State University Nuclear Science Center

March 27 – 30, 2023. The inspection included a review of organization and staffing, operations logs and records, requalification training, surveillance and limiting conditions for operation, experiments, design changes, committees, audits and reviews, emergency planning, maintenance logs and records, fuel handling logs and records, and safety conscious work environment. **No violations were identified.** ML23137A414

Reed Research Reactor

April 17–20, 2023. The inspection included a review of organization and staffing, operations logs and records, requalification training, surveillance and limiting conditions for operation, experiments, emergency planning, maintenance logs and records, and fuel handling logs and records. **No violations were identified.** ML23186A133

University of Texas - Austin Nuclear Engineering Teaching Laboratory



April 11-14, 2023. The inspection included a review of procedures, experiments, health physics, design changes, committees, audits and reviews, transportation of radioactive materials, and security compliance. **No violations were identified.** ML23193B029 & ML23193B033

Maryland University Training Reactor

May 1-4, 2023. The inspection included a review of organization and staffing, operations logs and records, procedures, requalification training, surveillance and limiting conditions for operation, design changes, committees, audits and reviews, maintenance logs and records, and fuel handling logs and records. **No violations were identified.** ML23199A020

Missouri University Research Reactor

May 15-18, 2023. The inspection included a review of effluent and environmental monitoring, review and audits, design change functions, emergency preparedness, radiation protection, and transportation activities. **No violations were identified.** ML23199A024

Missouri University of Science and Technology Research Reactor

May 16-18, 2023. The inspection included a review of organization and staffing, procedures, experiments, health physics, committees, audits and reviews, and transportation of radioactive materials. **No violations were identified.** ML23193B043

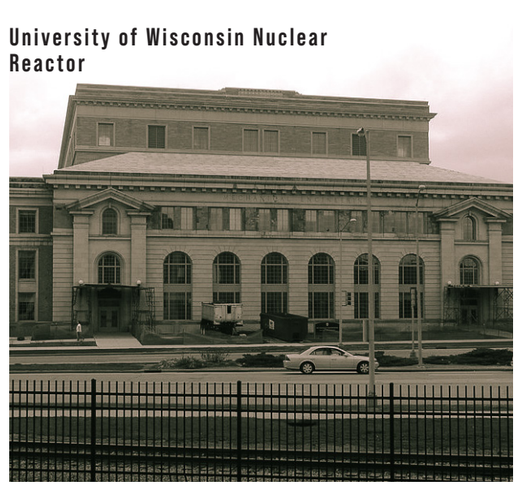
Dow TRIGA Research Reactor

May 30 – June 1, 2023. The inspection included a review of organization and staffing, procedures, experiments, health physics, design changes, emergency planning, and inspection of transportation activities. **No violations were identified**. ML23205A030

Oregon State TRIGA Reactor

June 12-15, 2023. 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.** ML23213A006

University of Wisconsin Nuclear Reactor



June 12 - 15, 2023. The inspection included a review of organization and staffing, operations logs and records, procedures, requalification training, surveillance and limiting conditions for operation, experiments, design changes, committees, audits and reviews, maintenance logs and records, and fuel handling logs and records. **No violations were identified.** ML23205A084

Aerotest Radiography and Research Reactor

June 27, 2023. An inspection was conducted by the Reactor Decommissioning Branch; Two Level IV violations, one minor violation, and one unresolved item were identified. One violation was for failure to have qualified Certified Fuel Handlers and implement the ARRR CFH Training/Requalification Program. Another violation was identified for failure to service a neutron survey meter as required by the TS. ML23219A188

Reportable Occurences

NC State University PULSTAR Reactor - Event Number 56553

The NC State University PULSTAR Reactor had a Reportable Occurrence on 6/2/2023 when a failure of a power monitoring safety channel (faulty high voltage power supply) was observed during an operation leading to a violation of Technical Specification 3.3.b. The power supply was promptly replaced, and NC State is applying for an LAR to allow credit for prompt operator actions to correct deviations, so that in the future, this would no longer be a reportable occurrence. A Follow-up Report (ML23163A190) was submitted on 6/12/2023.

Missouri University Research Reactor

The Missouri University Research Reactor reported (ML23157A214) a violation of Technical Specification 3.2.b when, during a reactor startup, Control Blade heights differed by more than 1 inch while the reactor power was in excess of 100 kw (while the reactor was still subcritical). There were no adverse consequences to the event, and MURR implemented several corrective actions including training and a review of possible Technical Specification changes.

Texas A&M University TRIGA Reactor - Event Number 56595

The Texas A&M University TRIGA reactor reported a fuel element that failed to pass inspection due to swelling on 6/28/2023. The entire core was inspected following this finding.

UC Davis McClellan Nuclear Research Center - Event Number 56643

The UC Davis McClellan Nuclear Research Center reported a fuel element found with unusual pitting and discoloration during a fuel inspection. All fuel elements that had not been inspected within the last year will be inspected. A Follow-up Report (ML23222A187) was submitted on 8/10/2023 where UC Davis states that this element had been only infrequently inspected over the last 20 years. During a public meeting on 8/30/2023 UC Davis stated that the element failure was believed to be due to a manufacturing defect.

University of New Mexico AGN-201 Reactor - Event Number 56602

The University of New Mexico AGN-201 Reactor reported a Technical Specification Violation on 6/30/2023 due to failure to complete alarm testing within the required 7.5 month interval. The reactor will remain shutdown until the alarm testing is completed.

GAO Report

The Government Accountability Office (GAO) has released a report on the NRC's preparedness for licensing advanced reactors which was requested by House Energy and Commerce Committee Chair Cathy McMorris Rodgers and U.S. Senator Shelley Moore Capito, Ranking Member of the Environment and Public Works (EPW) Committee. The GAO found that while the NRC has made modifications to the licensing process that better prepare the agency to license advanced reactors, it has not fully addressed ongoing challenges related to hiring and retaining the staff necessary to license advanced reactors.

The report, titled "NRC Needs to Take Additional Actions to Prepare to License Advanced Reactors" makes 4 recommendations to the Nrc Chairman:

1. The Chairman of NRC should direct staff to develop procedures for establishing and managing a review schedule for an incomplete application, including applications for first-of-a-kind designs.
2. The Chairman of NRC should direct staff to finalize draft pre-application guidance to clarify the extent to which advanced reactor developers should participate in pre-application activities.
3. The Chairman of NRC should direct staff to establish benchmarks and measures to assess its recruitment, relocation, and retention incentives and strategies to determine their effectiveness to help NRC retain and hire the staff necessary to license advanced reactors.
4. The Chairman of NRC should direct staff to clarify in information provided to advanced reactor developers how and when they should engage with the ACRS during the licensing process.

The Independent Third Party Nuclear Safety Culture Assessment of the NIST Center for Neutron Research (NCNR) prepared by Advanced Technologies and Laboratories International was recently released (ML23207A041). The report, required by the Confirmatory Order, is an independent and critical assessment of the NCNR's performance against INPO 12-012: Traits of a Healthy Nuclear Safety Culture and NUREG 2165: Safety Culture Common Language. The assessment covered the 10 traits of Nuclear Safety Culture:

Leadership Safety Values and Actions - Leaders demonstrate a commitment to safety in their decisions and behaviors

Problem Identification and Resolution - Issues potentially impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance

Personal Accountability - All individuals take personal responsibility for safety

Work Processes - The process of planning and controlling work activities is implemented so that safety is maintained

Continuous Learning - Opportunities to learn about ways to ensure safety are sought out and implemented

Environment for Raising Concerns - A safety-conscious work environment (SCWE) is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment, or discrimination

Effective Safety Communication - Communications maintain a focus on safety

Respectful Work Environment - Trust and respect permeate the organization

Questioning Attitude - Individuals avoid complacency and continuously challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action

Decision Making - Decisions that support or affect nuclear safety are systematic, rigorous, and thorough

SCWE

The data, gathered by functional analysis, document review, interviews and focus groups, surveys, and program reviews, was used to make 12 core recommendations for the NCNR organization:

1. Designate Operations and the I & C portion of the Aging Reactor Management section as priority groups and develop communications and team building strategies to better clarify and address the quality of the safety culture environment and implement corrective actions.
2. Develop and deliver a competence-based understanding of Nuclear Safety Culture.
3. Mitigate the staffing and resource shortage in the Operations Department.
4. Develop policies to attract and maintain Operations Staff and expand the Aging Reactor Management Group.
5. Complete the PI&R Assessment as soon as practicable. Continue with plans to implement a right-sized PI&R process. In the interim, prioritize the following immediate actions:
6. Conduct behavioral assessments of the Operations Crew Chiefs to assess attitudes, alignment, leadership capabilities, and provide targeted development feedback.
7. Develop a behavior-based mentoring/coaching program focused on safety culture attributes, leadership, and process improvements.
8. Complete the Training and Procedures Assessments as soon as practical.
9. Establish and maintain housekeeping/combustibles and gas cylinder loading that reflect OSHA standards.
10. Complete the planned development and implementation of an Employee Concerns Program (ECP).
11. Develop and implement a problem-solving approach for emergent issues.
12. Develop a comprehensive improvement plan that addresses Cross-Cutting, Distributed Function Programs.

NIST submitted the report to the NRC on 6/26/2023 (ML23207A040) and included a number of follow-up actions for the recommendations which it expects to have in place by the second quarter of 2024.

Newsletter

News

High Level of Support for Nuclear in US: The National Nuclear Energy Public Opinion Survey found that 76% of respondents said they strongly or somewhat favored the use of nuclear energy, higher than historic values.

50 years of the PULSTAR Reactor at NC State: The NC State PULSTAR realtor celebrates 50 years of operation.

New Czech Subcritical Reactor: The VR-2 subcritical reactor has been commissioned at the Czech Technical University in Prague. The new subcritical reactor is located in the same building as the VR-1, a zero-power reactor and is the 4th research reactor in the Czech Republic.

Australia's Nuclear Research Facility: The Open Pool Australian Lightwater is the centerpiece of the Australian Nuclear Science and Technology Organisation's nuclear science campus.

IAEA Research Reactor School in Morocco: The IAEA hosted its 3rd Research Reactor School in Africa at the National Centre for Nuclear Energy, Sciences and Technology of Morocco. The school focuses on reactor physics, safe operation and utilization.

Korea Acts To Limit Airline Crew Radiation Exposure: Korea has enacted a new regulation to limit radiation doses to flight attendants to not more than 6 mSv per year, as well as requiring regular radiation education and health checks.

NRC Advisory Committee on Reactor Safeguards Recommends Permit for Hermes Reactor: The NRC's Advisory Committee on Reactor Safeguards has recommended the issuance of a Construction Permit for Kairos Power's Hermes Test Reactor to be built in Oak Ridge.

Construction of MBIR Reactor Building Roof Begins: Construction of the roof of the building for the MBIR Reactor in Russia has begun. The MBIR will be a 150MW - sodium cooled - fast reactor.

QSAM Biosciences Uses the Nuclear Reactor at the University of Texas at Austin to Produce Isotopes: QSAM Biosciences Inc., a clinical stage biotechnology company, has added the UT-Austin TRIGA reactor as a producer of Sm-153. Sm-153 is being developed as a treatment for bone cancer.

1st International School on Simulation of Nuclear Reactor Systems: The Nuclear Energy Agency organized the first International School on Simulation of Nuclear Reactor Systems where 31 participants were provided with hands-on training on reactor single- and multi-physics simulations with a specific focus on state-of-the-art best estimate and uncertainty methodologies.

USNC Provides TRISO Fuel for NASA: The Ultra Safe Nuclear Corporation has delivered TRISO fuel to NASA's Space Nuclear Power and Propulsion Program from its Pilot Fuel Manufacturing Facility.

Podcast: Reed College Reactor: The Reed Research Reactor was featured by the Atlas Obscura Podcast.

Centrus HALEU Plant Receives Regulatory Approval: Centrus has received approval to begin enriching uranium in its HALEU demonstration production plant.

Project Advances to Build New Research Reactor in Japan: The Japan Atomic Energy Agency is working on a plan to build a new 10 MW neutron beam reactor at the site of the Monju fast breeder reactor that is currently being decommissioned.

Low Power Research Reactor in Saudi Arabia: Saudi Arabia is working to build a 100 kW pool type research reactor. This will be the first reactor in the country.

Refurb of MARIA Reactor Approved: Poland's only research reactor, MARIA, will be modernized in a $23 million project expected to be completed in 2027.

École Polytechnique de Montréal's SLOWPOKE-2 Reactor Operating License Renewed: The Canadian Nuclear Safety Commission issued a new 10 year license for the SLOWPOKE-2 reactor at École Polytechnique de Montréal which has operated since 1976.

Royal Military College of Canada's SLOWPOKE-2 SLOWPOKE-2 Reactor Operating License Renewed: The Canadian Nuclear Safety Commission issued a new 20 year license for the SLOWPOKE-2 reactor at the Royal Military College of Canada which has operated since 1985.

New Ac-225 Methods: Serva Energy has developed a new research reactor based method for producing Ac-225, a promising isotope for radiopharmaceuticals.

McMaster University Part of $35M Award: The Canadian Government issued a $35 million grant to create the Canadian Medical Isotope Ecosystem which includes Bruce Power, the Saugeen Ojibway Nation, BWXT Medical, Canadian Nuclear Laboratories, the Centre for Probe Development and Commercialization, McMaster University and TRIUMF Innovations.

ANS Works with NC State to Promote K-12 Nuclear Education Program: The American Nuclear Society is collaborating with the Kenan Fellows Program for Teacher Leadership at North Carolina State University to introduce a nuclear science curriculum including a tour of NC State's PULSTAR reactor.

RA-10 Research Reactor Expected to be Operational in 2025: Argentina's 30 MW RA-10 reactor is nearing completion, and expected to be operational by 2025.

Penn State joins DOE NSUF: The Penn State Radiation Science and Engineering Center joined the DOE's Nuclear Science User Facilities (NSUF) as a partner institution.

Virtual Tours of IAEA Laboratories: The IAEA has released 14 virtual tours of their laboratories.

Matt Sanford Named Executive Director for University of Missouri's Research Reactor: Matt Sanford has been appointed the Executive Director for MURR. He has been serving as the interim director since November 2022.

'Chicago Pile' at University of Chicago Recognized as Historic Site: The American Physical Society has designated Chicago Pile-1 and Stagg Field at the University of Chicago as a historic site. It will receive a plaque acknowledging its exemplary contributions to physics.

Kairos Applies for Construction Permit for Two-unit Hermes Plant: Kairos Power has applied for a construction permit to build a 2 unit Hermes demonstration plant. The plant will have 2 reactors sharing a single turbine, and will be built alongside the proposed single unit Hermes demonstration plant.

NRC Escalated Enforcement Increased in 2022: The NRC's Office of Enforcement published its Enforcement Program Annual Report for Calendar Year 2022. In 2022, the NRC issued 73 escalated enforcement actions, an increase of 13 over 2021. This includes the Confirmatory Orders issued to NIST for exceeding a Safety Limit in February 2021.

Joyo Reactor Passes Screening for Restart: Japan's Joyo fast breeder reactor has received approval from the Nuclear Regulatory Authority for completing required safety upgrades introduced after the 2011 accident at the Fukushima Daiichi nuclear power plant. The Japan Atomic Energy Agency aims to restart it by March 2025 after getting approval from local residents and putting safety measures in place.

NRU Reactor Recognized for Outstanding Contributions: The National Research Universal reactor received the World Council of Isotopes President's Award for over 60 years of service in the research, production and delivery of isotopes. NRU was shut down in 2018.

BWXT to Provide Nuclear Reactor Engine and Fuel for Space: BWXT announced that it will provide a reactor and fuel for the world's first nuclear powered demonstration spacecraft.

New Reactor Enters Commercial Operation: Vogtle Unit 3, has entered commercial operation.

IAEA Integrated Research Reactor Utilization Review Missions Solutions: IAEA teams completed two IAEA Integrated Research Reactor Utilization Review missions at the Massachusetts Institute of Technology and INL.

SHINE Demonstrates Cherenkov Radiation: SHINE Technologies has demonstrated visible cherenkov radiation from fusion for what is believed to be the first time.

Events

Undergrad Operators at University of Wisconsin Reactor: 90 Undergraduate Students have been licensed as Reactor Operators at the University of Wisconsin Nuclear Reactor.

Final Environmental Assessment Issued for Reactor Experiment: The DOE has released a final environmental assessment for the Molten Chloride Reactor Experiment to be built at INL.

Apsara Reactor to be Converted Into Museum: The ASPARA reactor in Trombay, the first nuclear reactor in India, will be converted into a museum.

SHINE Lays off 59 Workers: SHINE Technologies has laid off 59 people from its Mo-99 production division.

Russia Sends Reactor Components to Bolivia: Russia has sent the first components of the nuclear reactor it is building in El Alto in Bolivia. The 200 kW pool reactor will be the first reactor above 4000m of elevation.

Zachry Nuclear for Design of ACU's Research Reactor: Zachry Nuclear Engineering has been awarded the contract to complete the engineering and design of the 1-MWt molten salt reactor to be built at Abilene Christian University.

Centrus and Oklo Partner on HALEU Fuel Cycle: Centrus intends to enter into one or more definitive agreements to buy power from Oklo's Aurora powerhouses planned in Piketon Ohio.

Oklo Chosen for Air Force Nuclear Reactor: The Defense Logistics Agency Energy has selected Oklo's Aurora microreactor to site at Alaska's Eielson Air Force Base.

UMass Lowell Awarded RENEW Grant: UMass Lowell was awarded $315,000 under the DOE's Research Training Opportunities for Students and Faculty from Historically Underrepresented Institutions. UMass Lowell will begin the Nuclear Recruitment Through Undergraduate Research program where a cohort of six minority students from local community colleges will spend 10 weeks gaining hands-on nuclear science experience.

October 2-5, 2023
Aix-en-Provence, France
Workshop on the Safety of Experiments for Research Reactors

November 5-8, 2023
Denver Colorado, United States
Reduced Enrichment for Research and Test Reactors

November 12-15, 2023
Washington DC, United States
2023 ANS Winter Meeting and Technology Expo

November 27-December 1, 2023
Dead Sea, Jordan
International Conference on Research Reactors: Achievements, Experience and the Way to a Sustainable Future

April 4-6, 2024
State College, PA, United States
2024 ANS Student Conference

April 21-24, 2024
San Francisco, California, United States
International Conference on Physics of Reactors

September 29 – October 3, 2024
Albuquerque, New Mexico, United States
TRTR Annual Meeting

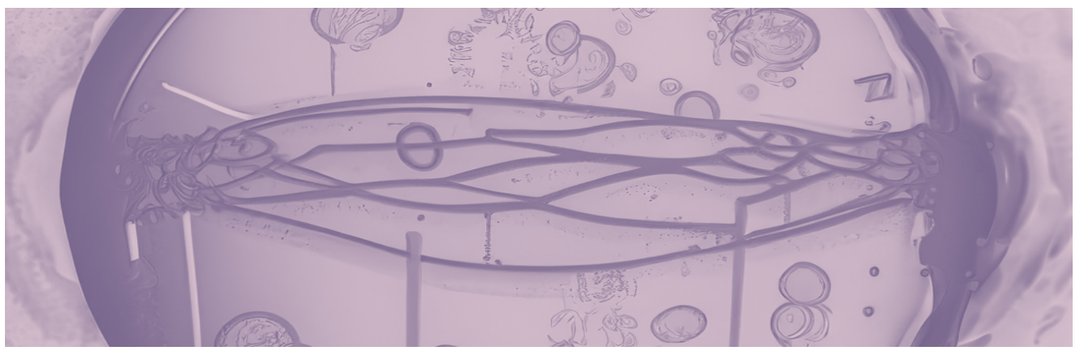
June 2025
Mito, Japan
21ST IGORR Meeting

NEUP Awards

In mid-June the 2023 Nuclear Energy University Program (NEUP) Infrastructure Awards were announced. 7 Research Reactor projects were funded, totalling **$3.7 million**:

Facility	Award Amount	Project Description
University of Maryland, College Park	$1,465,001	A complete overhaul of the Primary and Secondary Coolant Systems will enable the reactor to operate continuously at its full licensed power.
Oregon State University	$416,405	Improvements to the reliability and safety of the operational condition of the Reactor ventilation system.
Washington State University	$740,121	Replacing and simultaneously upgrading the research reactor cooling system secondary loop with equipment sized appropriately for heat removal and operation during summer heat.
Ohio State University	$87,158	Update replacement/spare custom facility components to enhance the institutions' availability to perform R&D.
Missouri University of Science and Technology	$25,865	Procure spare digital recorders for the MSTR control console, a new portal monitor, and a pool lighting system.
Pennsylvania State University	$78,531	Purchase two Alpha/Beta Continuous Air Monitors (Mirion iCAM) to replace the several decades old AMS-3 units, two new hand, cuff, and foot surface contamination monitors, one for reactor bay and the other in the new reactor beam hall exit area, and a spare control rod servo drive and motor mechanism.
Massachusetts Institute of Technology	$898,769	Replacing and expanding the existing area radiation monitor system with updated technology and equipment.

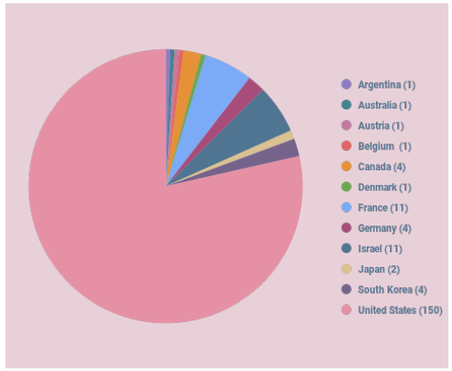
Since 2011, NEUP has funded 107 Research Reactor projects with awards totaling over $30 million; the total amount of this year's awards was the highest ever!



TRTR-IGORR 2023

This year's Tawfik Raby scholarship winner is Hope Palmer. Hope serves in many leadership roles as an SRO at Reed College.

The meeting hosted by by University of Maryland from June 18th-22nd at The Hotel in College Park, Maryland. included 200 participants from 41 facilities in 12 countries.



Some highlights included presentations from Dr. Kathryn Huff, Assistant Secretary, Office of Nuclear Energy, Dr. Danas Ridikas, Head of the IAEA Physics Section, and 2 NRC Sessions. The meeting agenda and presentations are available here.

Student attendees presented research and helped to make sure sessions ran smoothly!

Anaylze bubble chamber tracks from CERN: https://scoollab.web.cern.ch/bubble-chamber-pictures-classroom

QUARTERLY CALL SUMMARY

The Q3 2023 TRTR-NRC Quarterly Public Meeting was held on September 12, 2023. Travis Tate commented on the anticipated release of NUREG 1478 Revision 3 for public comment near the end of 2023. New revisions of NRC Form 396 and Form 398 were released in July for use. The NRC also anticipates a revision of ANSI 15.4 being led by Jere Jenkins.

Beth Reed stated that the "Options Paper" on Physical Protection Requirements for Category I, Category II, and Category III Quantities of Special Nuclear Material and Physical Protection and Safeguards Requirements for Alternate Nuclear Material continues to move forward with no changes. Reg Guides 5.62 and 5.87 have been released to provide guidance for implementing 10 CFR 73.1200: Physical Security Event Notifications, 10 CFR 73.1210: Physical Security Event Recordkeeping, and 10 CFR 73.1215: Suspicious Activity Reporting. Revisions to these Reg Guides are expected later this year.

The NRC will be scheduling inspections with licensees; these inspections will include a focus on the activities of Safety Committees at research reactors.

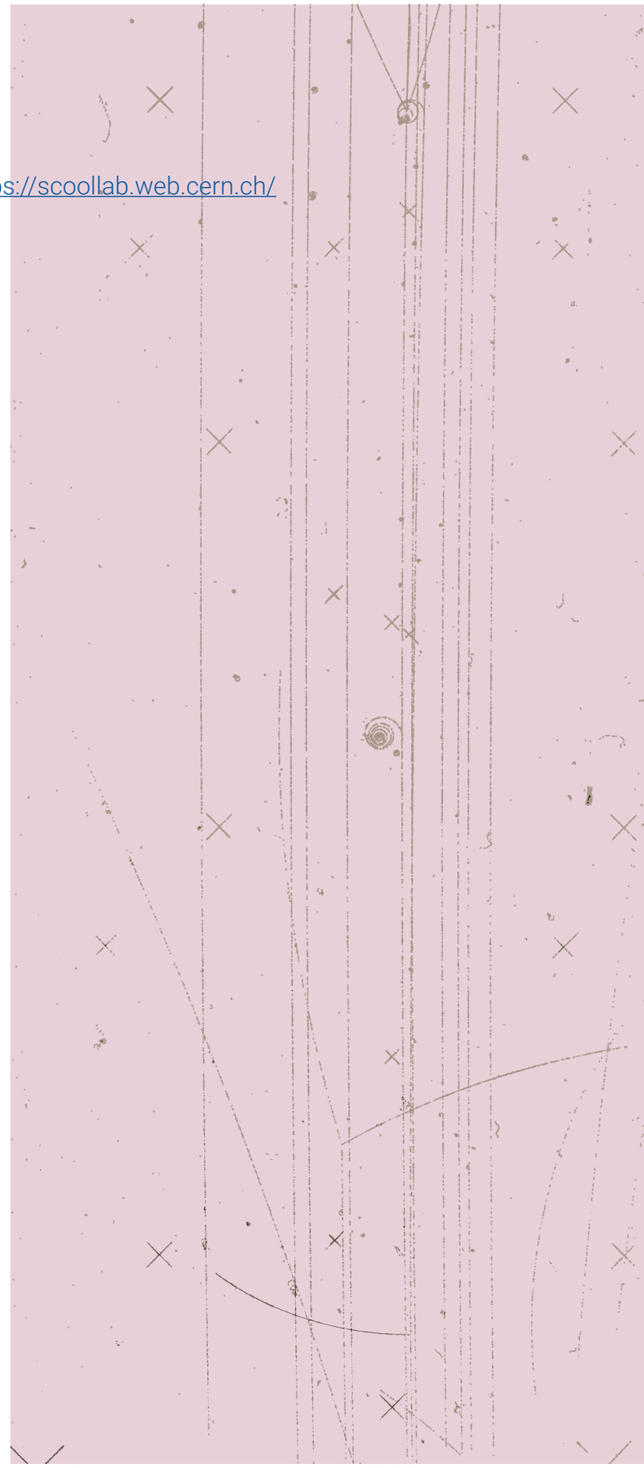
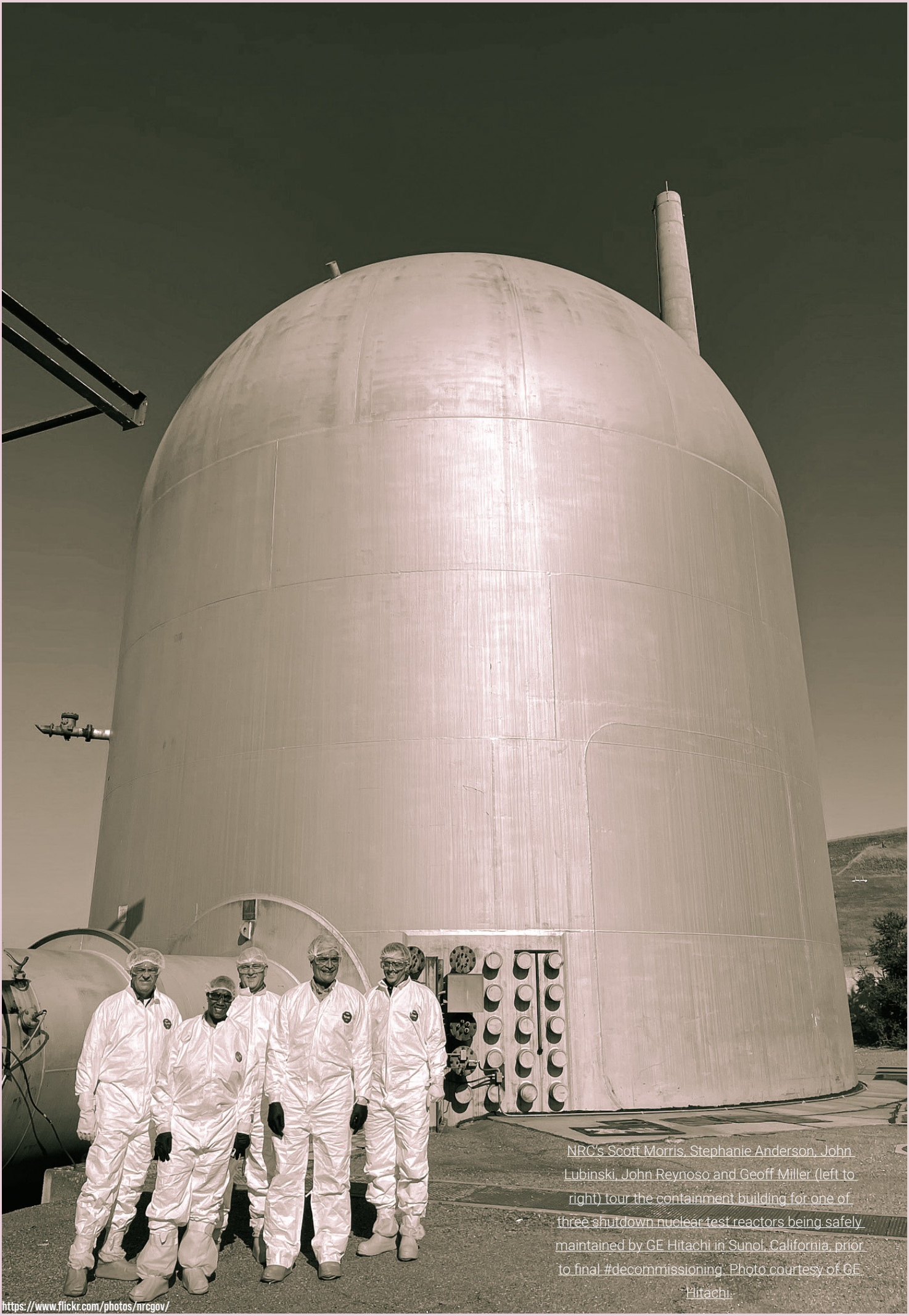


Image Credit: https://cds.cern.ch/record/2307419



NRC's Scott Morris, Stephanie Anderson, John Lubinski, John Reynoso and Geoff Miller (left to right) tour the containment building for one of three shutdown nuclear test reactors being safely maintained by GE Hitachi in Sunol, California, prior to final #decommissioning. Photo courtesy of GE Hitachi.

https://www.flickr.com/photos/nrcgov/