

NCNR Status Update

NIST



02.09.2022

Photo credit: Brian Renegar

Recent Progress

OFFICE OF NUCLEAR REACTOR REGULATION

REGULATORY AUDIT PLAN

REGARDING REVIEW OF THE RESTART REQUEST

FACILITY OPERATING LICENSE NO. TR-5

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

NATIONAL BUREAU OF STANDARDS TEST REACTOR

DOCKET NO 50-184

Background

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its review of the National Institute of Standards and Technology (NIST, the licensee) request to resume operation of the National Bureau of Standards test reactor (NBSR, the facility), Facility Operating License No. TR-5. The requested action would allow the NBSR to resume operations after exceedance of the cladding temperature safety limit (SL) per Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Section 50.36 "Technical specifications." This regulatory audit is intended to assist the NRC staff in making an independent assessment regarding the decision to permit the restart of the NBSR. This audit will continue the review of the information request in the NRC letter dated November 18, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21294A277).

Regulatory Bases for the Audit

The purpose of this audit is to determine if the licensee's proposed corrective actions, inspections, evaluations, test results, and acceptance criteria conducted in response to the events on February 3, 2021, which resulted in the NBSR exceeding the cladding temperature SL are consistent with the regulation in 10 CFR Part 50 and addresses applicable guidance provided in NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," Part 2, "Standard Review Plan and Acceptance Criteria," (ADAMS Accession No.: ML042430048).

Regulatory Scope for the Audit

The NRC staff will conduct initial teleconference and/or video conference supported discussions with NIST. As facilitated in part by the online portal discussed below, the NRC staff will also audit inspection and review documents to gain a better understanding of the information related to the restart request. Additionally, NRC staff will visit and tour (as necessary) the NBSR in Gaithersburg, Maryland, to gain further understanding of the proposed corrective actions, review the NBSR test results and acceptance criteria to ensure safe operations, and review processes and procedures for the safe operation of the NBSR. The NRC may request access to the contractor facility where testing and evaluations are conducted.

Submitted documents and request to restart to NRC (10.01)

→ NRC regulatory audit (restart decision) kickoff (12.01)

→ Currently responding to audit questions

Significant progress on implementing corrective actions

License amendment submitted (12.27.21)

Two town halls to scientific community since last VCAT meeting

Bulk debris cleanup completed Feb 6



Feb 02

What's Next?



Filter elements received

cleanup

Filter primary coolant system (Mar)
Inspect/clean fuel elements (Mar)

Implement corrective actions (some depend on funding availability)
External review (reports due to Jim 03.02.2022)
NRC will close out the special inspection and issue report
Restore reactor to operational readiness
NRC authorizes restart
Schedule user experiments

External Review (kickoff Dec 2nd)

NIST



Dr. Julia Phillips

Vice President & CTO, Sandia National Laboratory (retired), Executive Emeritus National Science Board



Dr. Eric Kaler

President, Case Western Reserve University



Dr. Thom Mason

Director, Los Alamos National Laboratory, President and CEO of Triad National Security, LLC (Triad)



Alexander Adams, Jr.

Chief, U.S. Nuclear Regulatory Commission Research and Test Reactors Licensing Branch (retired)

Uncertainties potentially affecting 2022 restart



Risk item	Probability	Potential impact
Cleanup of reactor vessel and primary does not go as planned	Medium	High
Fuel elements cannot be reused	Low	High
Procedure revisions required for startup delayed	Medium	Low
Additional corrective actions from external review impacts restart	Medium	Medium
Thermal column survey impacts restart	Medium	Low
Insufficient funds to implement corrective actions	Low	High
Protracted license amendment disposition	Medium	Medium
NRC does not authorize restart <ul style="list-style-type: none">• Not satisfied with corrective actions• Not satisfied with progress towards corrective actions	Medium	High

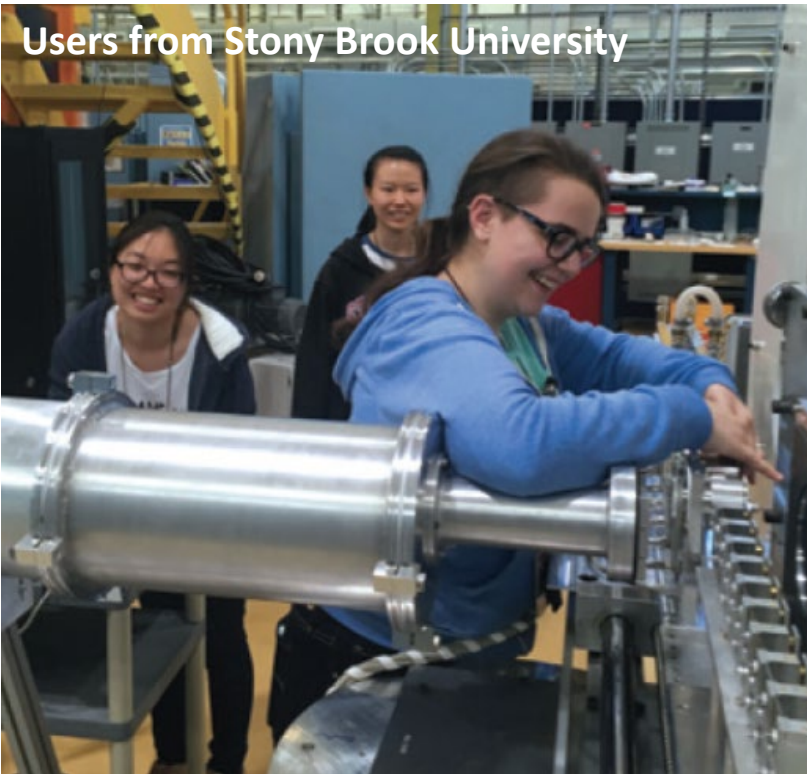
Note: COVID continues to be a risk that could lead to delays in several of the items above

REACTOR RESTART IN 2022

Funding is required for all the items in FY22 to best position NIST to restart the reactor in 2022

Without additional funds, NIST cannot start the reactor in 2022

Users from Stony Brook University



Why NIST should restart the reactor in 2022

- U.S. is severely underserved in neutron measurements;
- Neutron measurement time oversubscribed by factor of 2 to 3;
- The U.S. must fully utilize its limited resources;
- For every month we don't operate → ~~250~~ scientists, ~~25~~ publications, ~~2~~ patents;
- Huge backlog of experiments at NIST;
- If restart delayed, operations would be reduced by at least 15% in the first year of operations due to operator training requirements;
- Many partnerships with U.S. companies and other agencies are endangered;
- China has commissioned 3 major neutron sources in the last decade;
- NIST must demonstrate operational readiness and completion of certain corrective actions to NRC to obtain permission for restart.

NCNR – A National User Facility

NIST

30 beam instruments/experiments | ~40% of U.S. scientific productivity in neutrons



>3000 research participants/year



demand >> supply (2-3X)



~50 companies/year

NCNR – A National User Facility

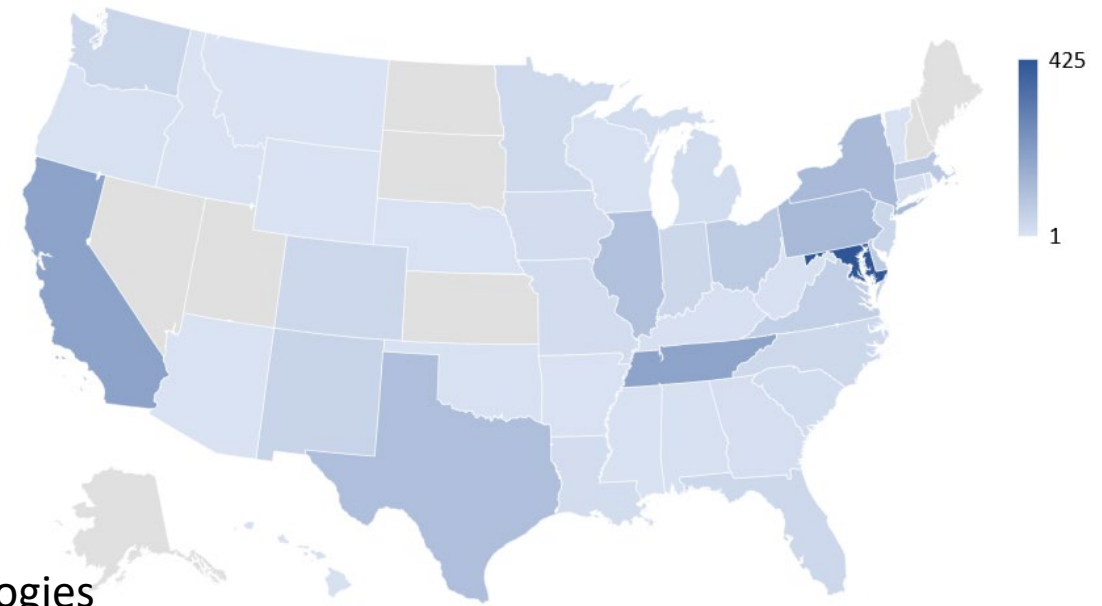


2019 NCNR Research Participants

US technologies supported by NCNR

Critical emerging technologies

- Advanced Computing
- Advanced Engineering Materials
- Advanced Manufacturing
- Advanced Sensing
- Aero-Engine Technologies
- Agricultural Technologies
- Biotechnologies
- Chemical, Biological, Radiological, and Nuclear Mitigation Technologies
- Communication and Networking Technologies
- Data Science and Storage
- Energy Technologies
- Medical and Public Health Technologies
- Quantum Information Science
- Semiconductors and Microelectronics
- Space Technologies



Industry sectors supported by research at the NCNR

- Aerospace
- Automotive
- Chemical
- Pharmaceutical
- Electronics
- Computer
- Energy
- Food
- Mining
- Petroleum
- Oil shale
- Telecommunications
- Water