NIST Facilities and Boulder Campus Wildfire Preparedness

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NIST Facilities Overview

1,300+ Acres | 98 Buildings | 4.6M GSF

The Challenge: A multi-billion dollar modernization gap.

The Priority: Targeted infrastructure upgrades using our existing Construction of Research Facilities (CRF) Funding.


Credit: NIST


Credit: NIST

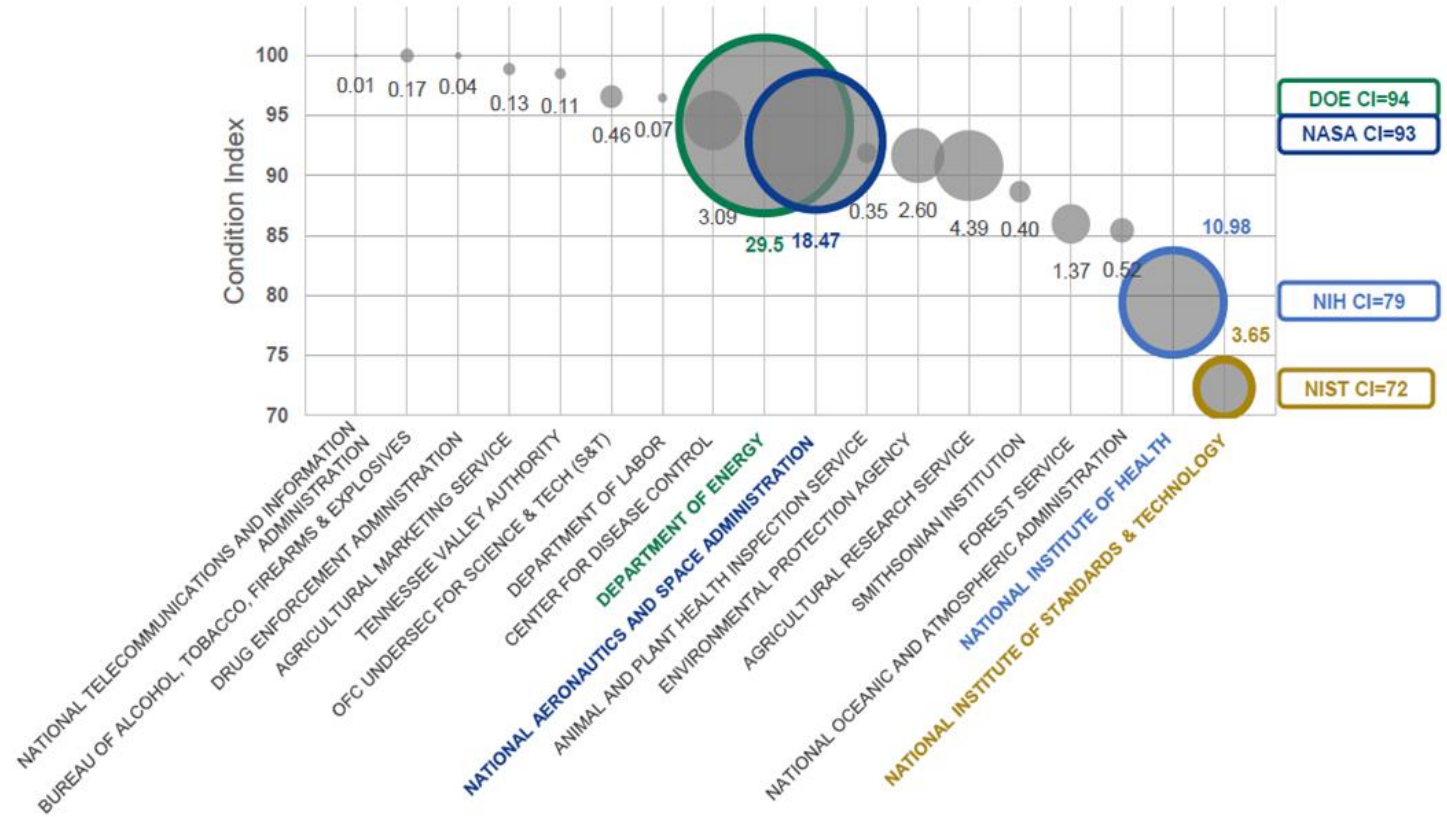
Facility Condition Index Comparison

Condition Index
NIH vs. Other Agencies
Laboratories

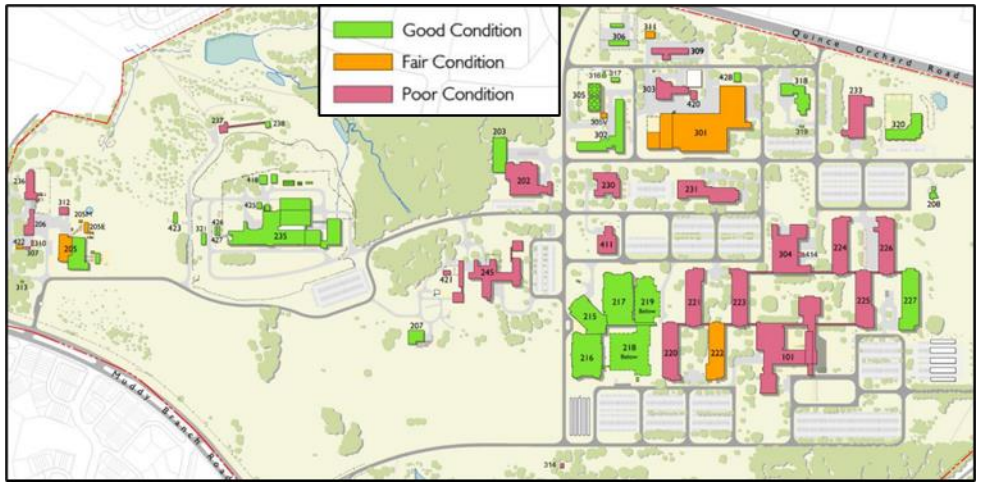
NIH National Institutes of Health
Office of Management

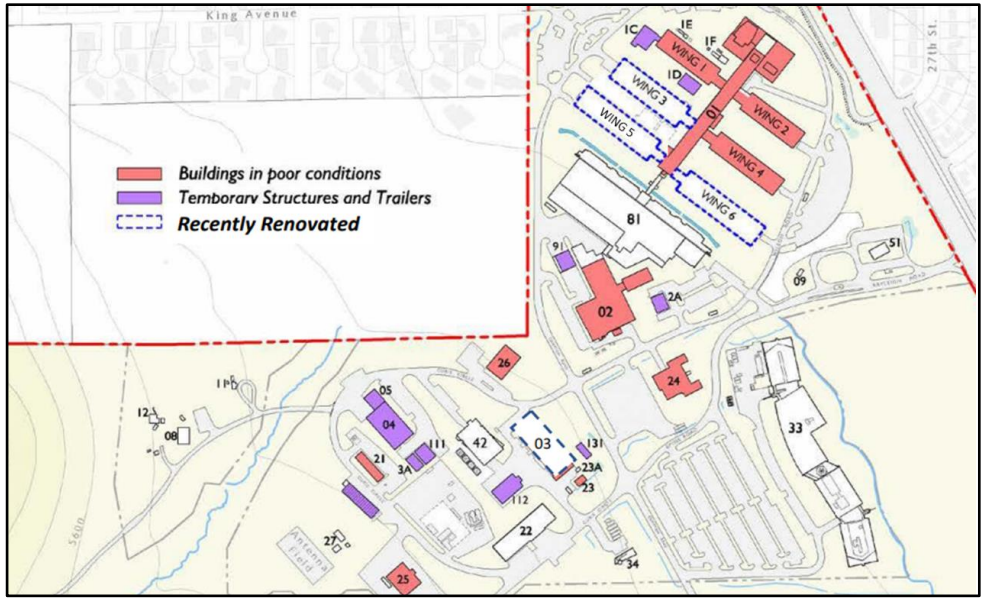
The areas of the bubbles are proportional to the organizations' gross square footage (in millions).

FY23 Organizations – Laboratory*



* Some facilities are exempt from reporting due to security reasons and may not be included in this chart.





Bridging the Gap: Facility Maintenance & Repair

Current State: A $678M Mission-Critical Maintenance Backlog

- **Prioritized Portfolio:** Represents the first wave of essential projects required to stabilize NIST infrastructure.
- **The Goal:** Moving beyond reactive maintenance to proactive risk reduction.

The Growth: FY25 to FY26

- **FY25 Baseline ($87M):** results in only **$34M** available for backlog repairs after maintenance **($53M)**.
- **FY26 Enacted ($128M):** More than doubled our backlog-fighting power to **$75M** after maintenance **($53M)**.
- **Strategic Momentum:** This growth enables us to better address potentially catastrophic infrastructure risks.

Our Path forward

The NASEM Recommendations vs. FY26 Status

- **Maintenance: Target $120M–$150M** **[Status: Aligned]**
  FY26 budget meets the expert threshold for core maintenance and safety.
- **Modernization: Target $300M–$400M** **[Status: Gap Remains]**
  Significant shortfall persists for major renovations and building replacements.
  [NIST last received Construction and Major Renovations Funding in 2018]

Phased Infrastructure Strategy

- **Focus on Continuity:** Prioritizing highest-risk projects to prevent mission-stopping failures. **($48M)**
- **Central Utility Plant (CUP) Upgrades:** Executing phased modernization of the "heart" of our Gaithersburg campus and improvements to chillers in Boulder. **($27M)**
- **Securing the Foundation:** Investing in crosscutting infrastructure first to stabilize the systems that support all research divisions.

Programmatic Alignment

Recapitalization Projects – Alignment with Programmatic Priorities	
Central Utility Plant	Critical for the support of all NIST activities, including work to advance CETs, and deliver core measurement services
Underground Utilities	Critical for the support of all NIST activities, including work to advance CETs, and deliver core measurement services
Building 245 Modernization	Supports research and core calibration services critical for medicine, nuclear energy, and national security
Building 1 Wing 4 Modernization	Supports NIST priorities in CETs, including quantum and advanced communications

In alignment with the Coordinated recovery plan presented to VCAT in 2024, we are first focusing on the Gaithersburg Central Utility Plant. Additional prioritized projects will occur as funding allows.

NIST Wildfire Preparedness Activities

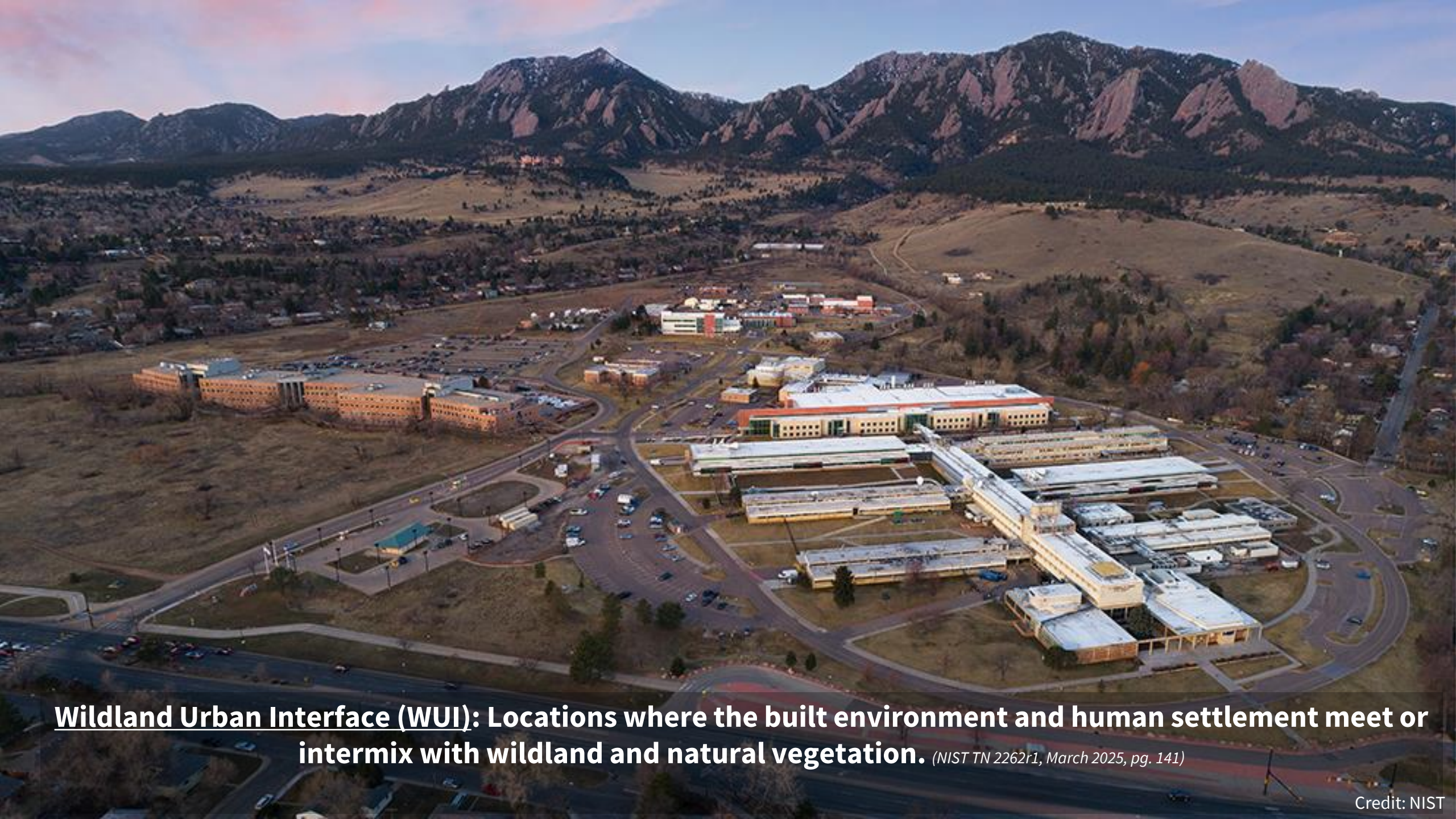
206 Acres | 1,745 staff across three DOC bureaus

The Challenge: The DOC Boulder Campus sits in a location at risk for wildfires

The Priority: Implement a comprehensive campus wildfire plan using the ESCAPE methodology, including improved notifications, preparedness efforts, and response procedures.


Credit: NIST

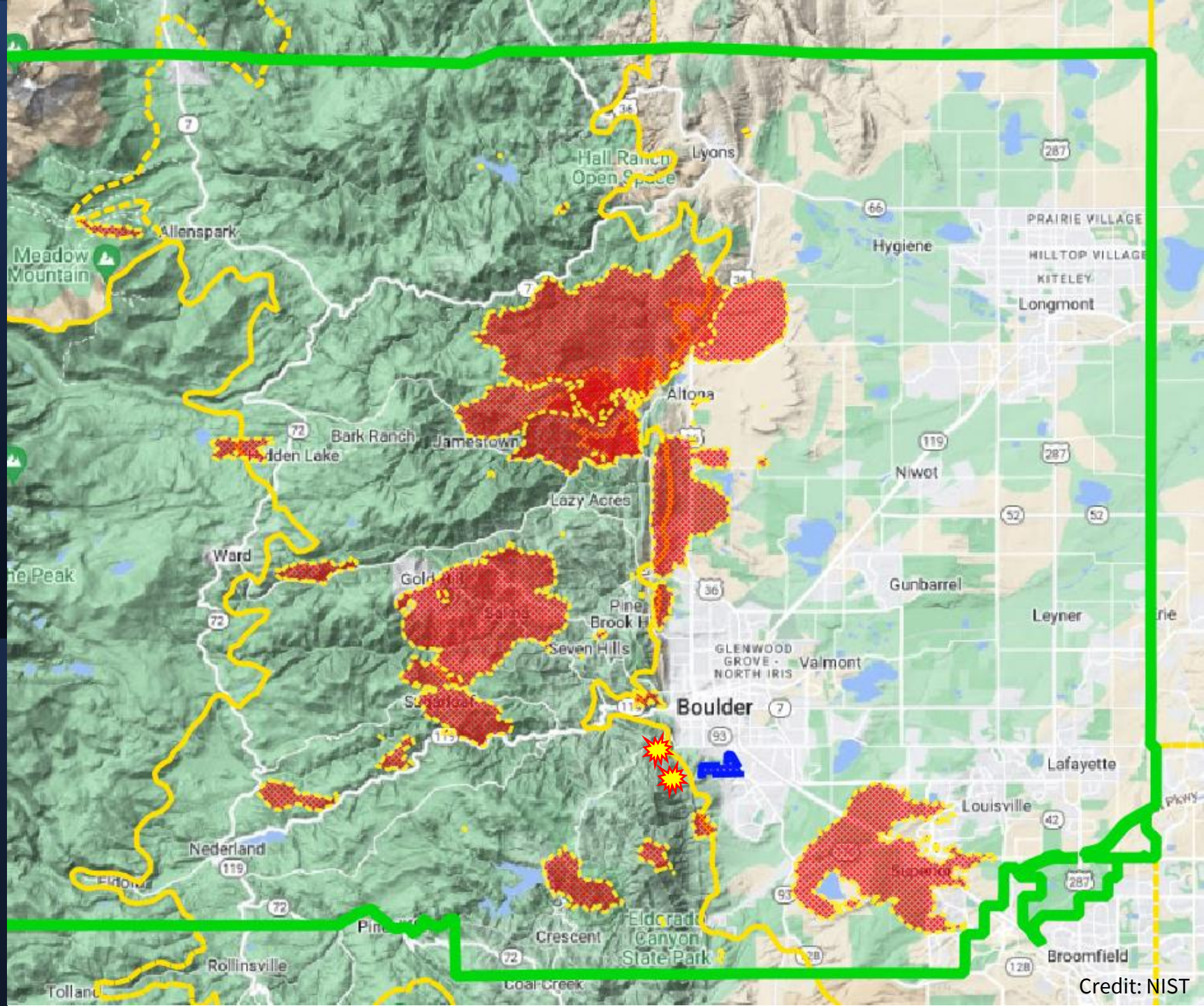

Credit: NIST



Wildland Urban Interface (WUI): Locations where the built environment and human settlement meet or intermix with wildland and natural vegetation. *(NIST TN 2262r1, March 2025, pg. 141)*

Credit: NIST

Boulder County Fires



Credit: NIST

ESCAPE Methodology

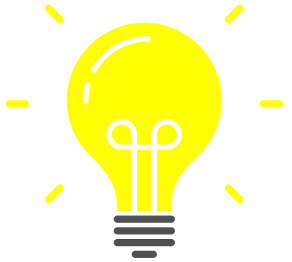
NIST Technical Note 2262 *(r1 released April 2025)*

WUI Fire **E**vacuation and **S**heltering **C**onsideration – **A**ssessment, **P**lanning, and **E**xecution

What is **ESCAPE**?

- *Developed by EL, ESCAPE is "a research-based method for community evacuation planning, developed from case studies of destructive wildfires in the Wildland-Urban Interface (WUI)."*
  (escape.nist.gov)

Want to learn more?



escape.nist.gov

WILDFIRE PREPAREDNESS STATUS AT DOC BOULDER CAMPUS

- If we have sufficient time to evacuate, our procedures work well and will continue to improve over time
- We are implementing a better plan for a "no notice" event without enough time to safely evacuate

Our Approach

Reduce Staff on High-Risk Days

Based on the severity of risk, use the appropriate tool, ranging from optional telework to site closure, to reduce the number of staff on campus

Evacuate Early

If a wildfire is in the area, evacuate the campus prior to mandatory evacuations

Shelter-on-Site

If evacuation is not possible, utilize shelter-on-site locations where staff can safely wait for the risk to pass

Temporary Fire Refuge Areas

If shelter-on-site locations become compromised, have exterior temporary fire refuge areas away from buildings and fuel

Credit: NIST

Our Progress

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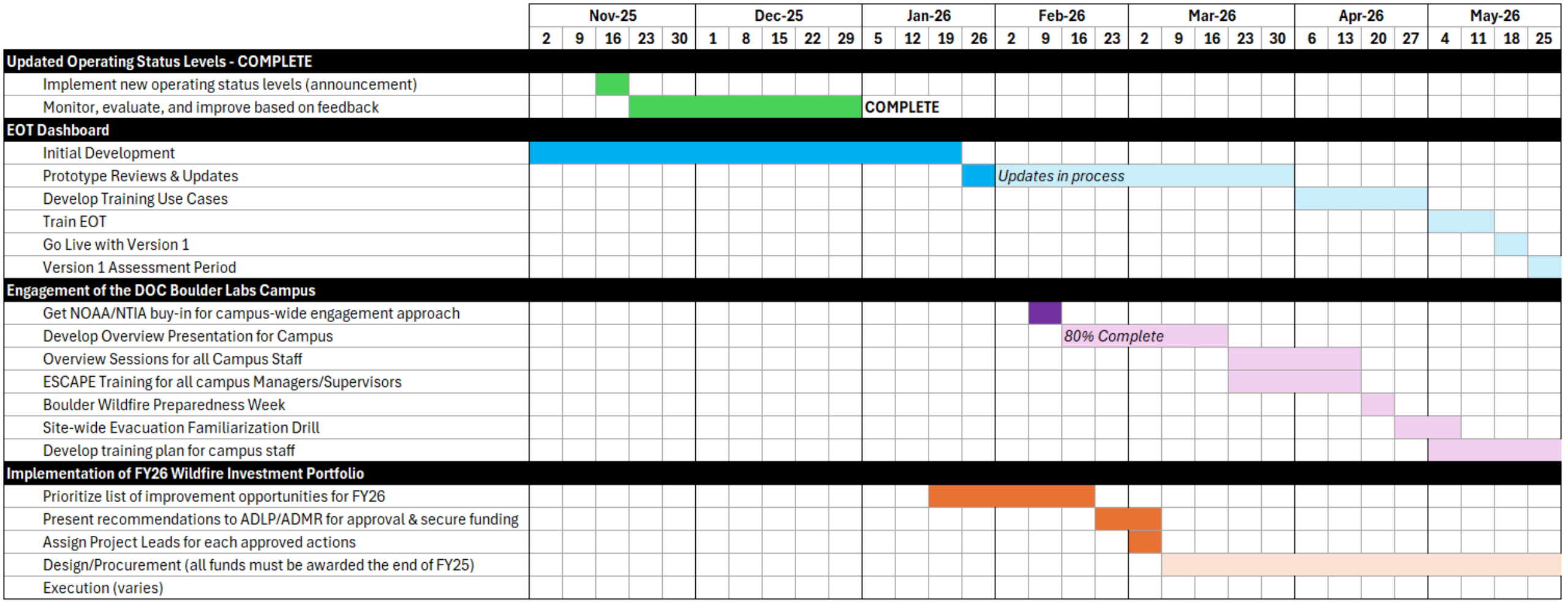
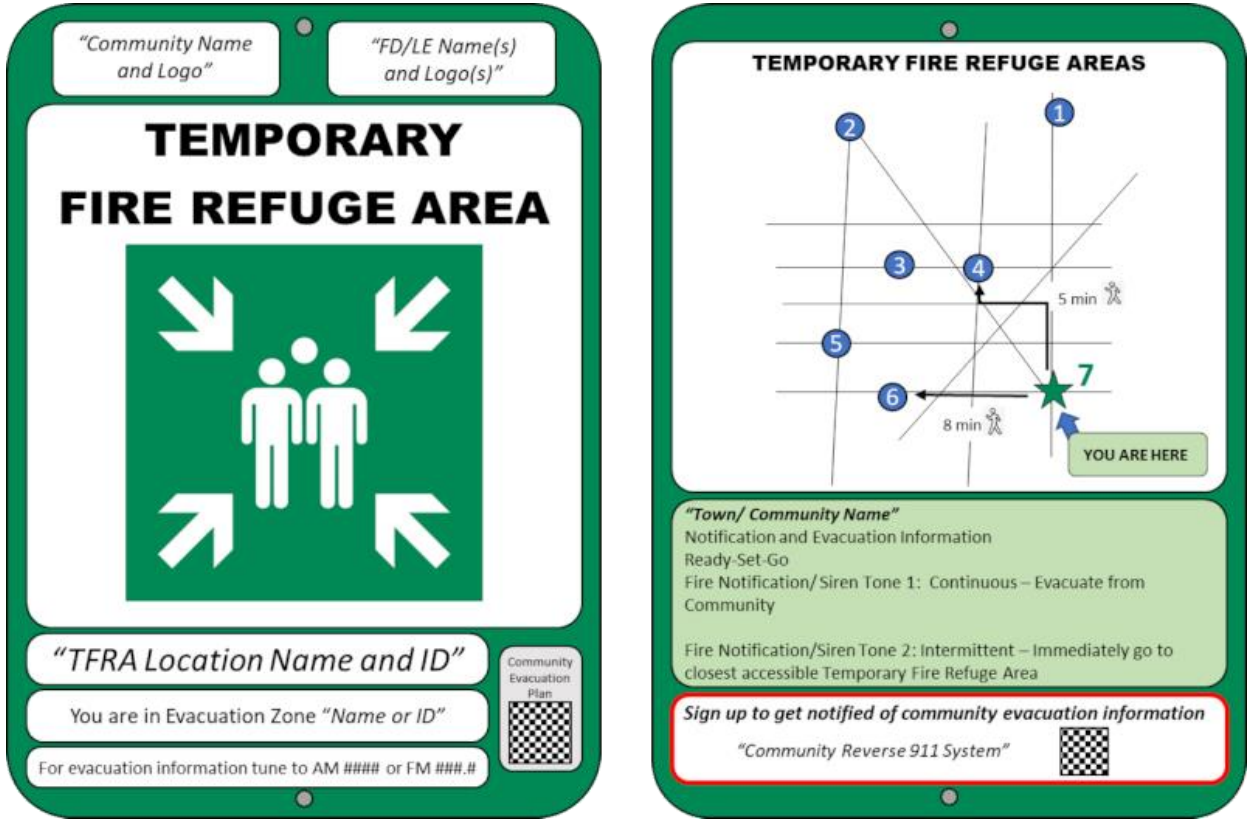
Implementation Schedule



Infrastructure & Capability Enhancements

- Establishing Shelter-on-Site and Temporary Fire Refuge Area
- Hardening Shelter-on-Site locations
- Improving back-up power Capabilities
- Improving onsite emergency communication capabilities
- Enhancing fuel mitigation efforts
- Improving work area emergency shutdown procedures



Example TFRA Signage

NIST Center for Neutron Research Update

Dr. James Adams
Director, NIST Center for Neutron Research

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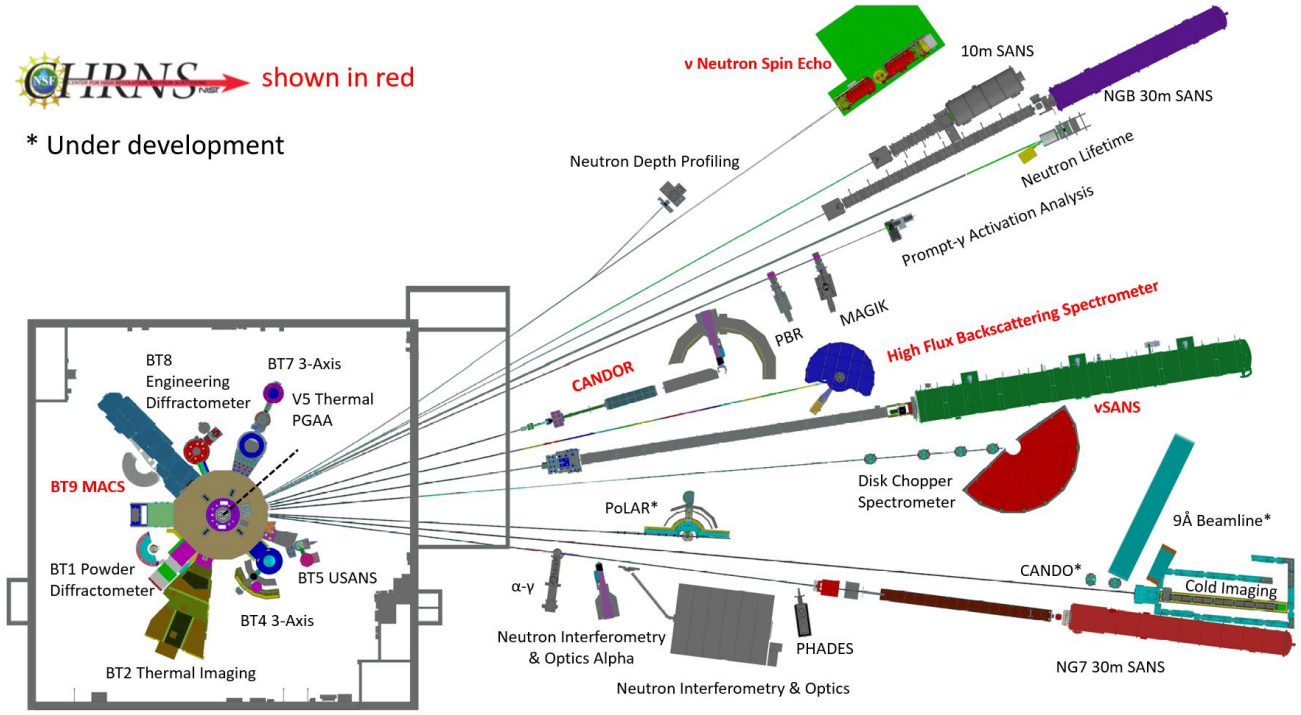
March 2026

NCNR Status Update

Credit: NIST

NCNR: By the Numbers



NCNR Neutron Instruments

- One of two major neutron science centers in the U.S.
- 29 Beam instruments/experiments
- ~ 40% of U.S. scientific productivity in neutron science
- Hosts > 3000 research participants annually, ~ 50 companies/year
- Neutrons supplied by 20 MW reactor

Reactor Recovery Overview

NIST CENTER FOR NEUTRON RESEARCH

Short-term funding was provided for reactor recovery activities and additional base funding for corrective actions

2022	• Initial cleanup efforts
2023	• NRC grants permission to restart • Low-power testing began in March • Nuclear fuel debris remained
2024	• Operations for training • NCNR made decision to shut down for further cleanup efforts • Replacement of three oldest neutron guides (9 instruments)
2025	• 2nd reactor vessel cleanup – Quantity of fissionable debris removed was consistent with the estimated quantity • Completed in-confinement guide replacement • Completed repairs on reactor shielding plug, confinement ventilation closure valves, He-Sweep system leaks

All Photos Credit: NIST

2024-25 Outage & Emergent Issues

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Reactor refueling plug

- Used for shielding and fuel manipulations
- Welding and corrosion issues identified in late 2024
- NCNR staff developed in-house engineered solution
- Fabrication of replacement components put this effort on the critical path for startup
- Improvements for better sealing against He—and fission product—leakage, will greatly reduce He usage and release of radioactive effluent

Refueling plug

Testing and repair

Automatic closure valves

- Twelve ventilation isolation valves needed refurbishment to meet required building specifications

Automatic closure valve

Other major reactor-aging issues that had to be addressed:

- Refueling mechanism repair, reactor shim arm alignment, neutron instrument repair

All Photos Credit: NIST

Return to Operations: 2026

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Spring:

- Reactor refueling
- Operations at low power for reactor testing, and operator training and qualification
- Ascension to high power for further reactor testing and training

Summer:

- Qualification training of non-licensed operators and NRC license exam
- Begin scientific operations

Credit: NIST

Refueling in preparation for reactor restart

Reactor Operator Staffing

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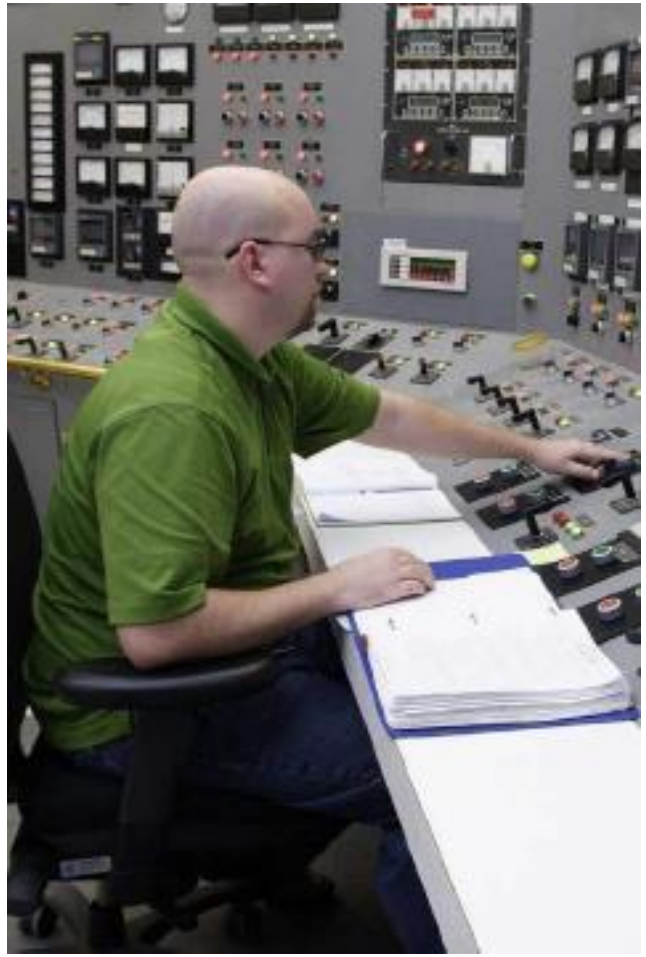
Licensed reactor operator staffing has reached critically low levels

- Requalification training and low-power operations this spring
  - Short-term operations at high power to re-establish proficiency and train non-licensed operators
- Upon successful completion of licensing exams this summer, NCNR will have just enough operators to support 24/7 operations for science
  - Attrition (for any reason) will have an impact
- Hiring of additional operators is top priority in NCNR hiring plan
  - 4 shifts at 3 operators per shift minimum, goal is 4 per shift
  - Fifth shift to promote operator training and prevent shift lock-out
- Government pay scale limits recruitment and retention
  - Operators can make more money elsewhere



Credit: NIST

Science Operations at NCNR

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- Resumption of science operations to commence Summer 2026
  - 29 Instruments: NCNR, PML, MML
  - 5 of the NCNR Instruments constitute NSF / CHRNS
- Recent NIST budget reductions have impacted NCNR, including through shuttering of 5 instruments and minimized neutron instrument development efforts.
- U.S. is severely underserved in neutron measurement capability
  - Significant backlog of experiments at NCNR
  - Neutron instruments at the NCNR are oversubscribed by factors of 2 to 3
  - Only two centers in the U.S. for neutron measurement: ORNL & NCNR
- China has commissioned 3 major neutron sources in the last decade

All Photos
Credit: NIST

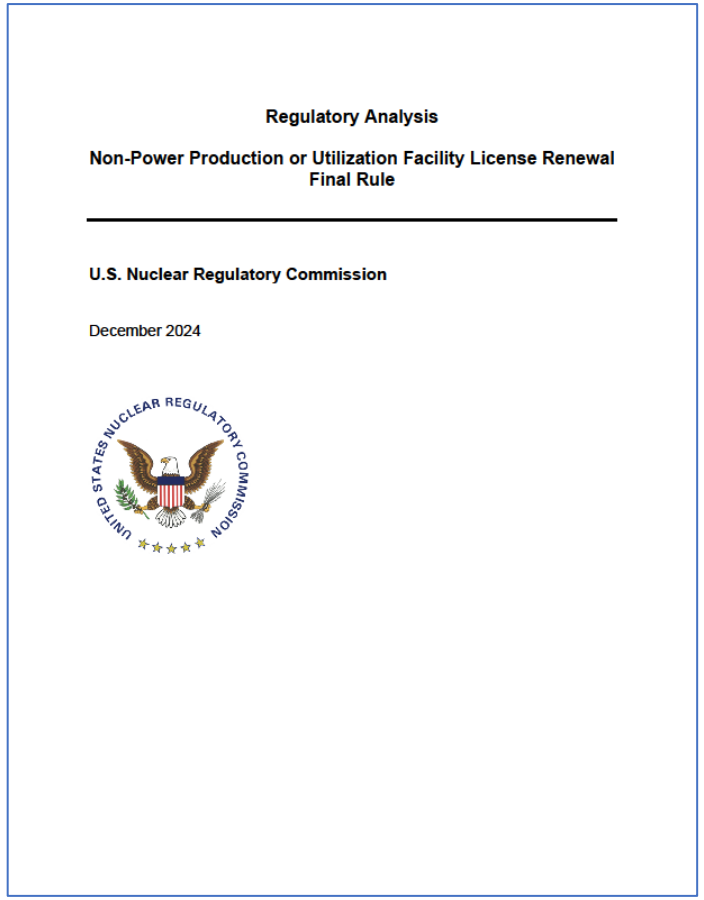
Reclassification

Background: The NBSR license was set to expire in July of 2029

License renewal applications require significant effort (years) to prepare:

As part of an initiative to eliminate license terms for research reactors, in 2017, the NRC proposed the Non-Power Production or Utilization Facility License Renewal rule: "NPUF Rule"

- As the nation's only NRC-licensed "testing facility," NCNR petitioned the NRC to change the definition of testing facility to make it risk-based
- In early 2025, the NRC approved the NPUF rule, including language proposed by the NCNR
- NCNR submitted a License Amendment Request for reclassification to a research reactor, based on its low risk profile
- The license amendment was approved by NRC in March of 2026, removing the expiration term from the NCNR reactor license
    - Safety Analysis Report reviewed on a 5-year periodicity



Regulatory Analysis

Non-Power Production or Utilization Facility License Renewal Final Rule

U.S. Nuclear Regulatory Commission

December 2024

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Questions?