

Current Status of the Illinois Microreactor Demonstration Project



2026 National Organization of Test, Research & Training Reactors Annual Meeting
Austin Texas | September 22, 2026



UNIVERSITY OF
ILLINOIS
URBANA-CHAMPAIGN



- University of Illinois Urbana-Champaign (U. of I.)
- Project Team - Department of Nuclear, Plasma & Radiological Engineering
- Project Mission Statement
- Project Missions - Core and Cross-cutting
- Technology and Reactor & Fuel Design
- Siting, Layout & Geotechnical Work
- Licensing Documentation / Assessments / Audits
- Project Timeline

- Public, land-grant university founded in 1867
- Flagship of the University of Illinois system
- \$865M in R&D expenditures in FY2025
- 15 colleges and instructional units
- 150+ centers, labs and research institutes
- 651 buildings within 9.9 square miles
- ~31,000 faculty and staff
- 60,000+ students
(37,000+ undergraduate & 23,000+ graduate)
- #5 nuclear engineering graduate program in the U.S.
- TRIGA Mark II 100 kW reactor from 1960 to 1998



'The University of Illinois Urbana-Champaign is charged by our state to enhance the lives of citizens in Illinois, across the nation and around the world through our leadership in learning, discovery, engagement and economic development.'

Project Team *Department of Nuclear, Plasma & Radiological Engineering*



Dr. C.S. Brooks



Dr. A. Di Fulvio



Dr. T. Kozlowski



Dr. J.F. Stubbins



Dr. R. Uddin



Mr. R. Dobey

Project Team expertise in the following areas:

- Neutronics
- Thermal-hydraulics
- Safety Analyses
- Fuel Materials
- Reactor Operations
- Instrumentation & Control
- Health Physics
- Environmental Review
- Licensing



Mr. L. Foyto



Dr. T. Grunloh



Dr. W.R. Roy

Project Mission Statement



The Illinois Microreactor Demonstration Project's mission is to de-risk advanced reactor deployment and enable a new paradigm of nuclear power through education, research, and at-scale demonstration.

Demonstrate the realizability of advanced nuclear in a representative setting

Seize the moment and cement the coming nuclear resurgence with leadership that only universities can provide

Perform the research and development needed to pave the way for safe and economic operation of advanced reactors

Project Missions – Core and Cross-cutting



Core Mission

Education, Training, & Engagement

engineers and scientists,
operator, installation and maintenance
training,
general public.

**Producing the future workforce &
redeeming public perception of
nuclear power**



Cross-cutting Mission

At-scale Demonstration

electricity,
district heat,
hydrogen production,
integrated thermal storage,
other high value processes.

**Demonstrating the future of
nuclear power**

Core Mission

Research & Development

reactor and component
optimization,
critical enabling technologies,
synergistic applications.

**Enabling a new paradigm of
nuclear**

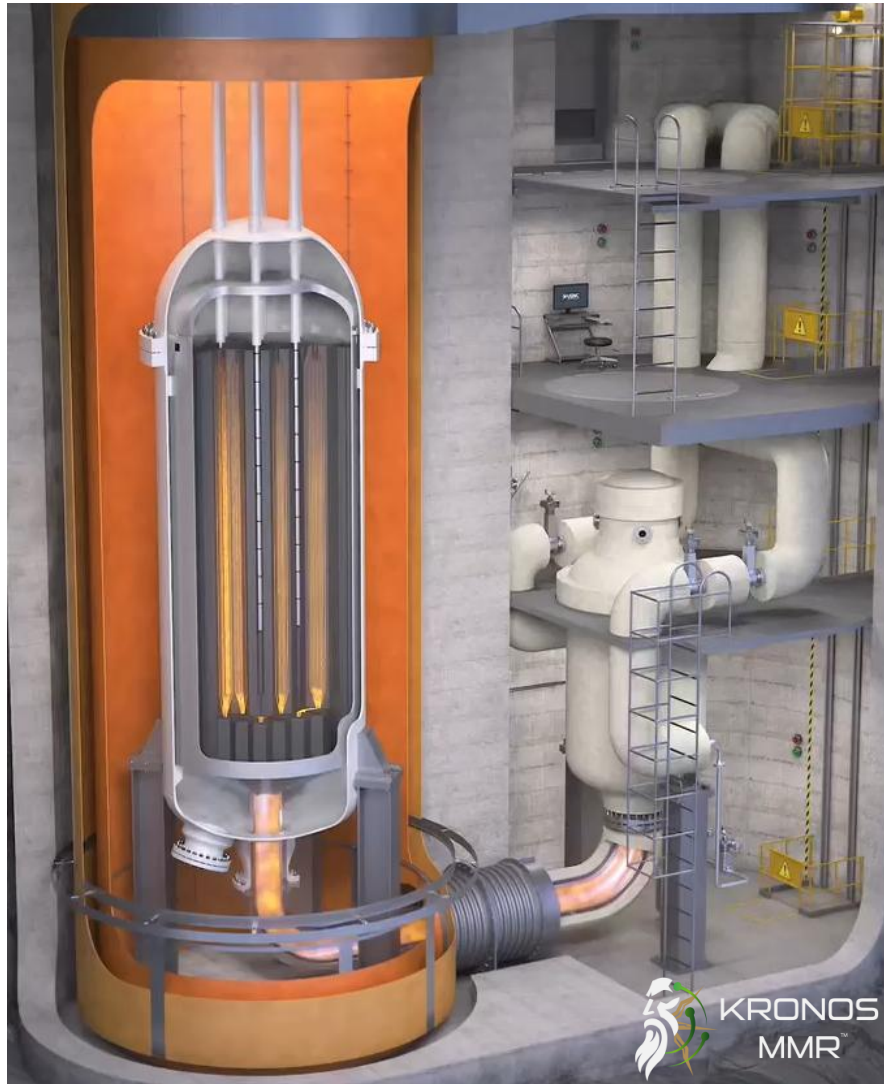


Need: Next Generation Research & Development



- Instrumentation & control, human-machine interface
- Cyber & physical security
- Construction modernization
- Grid security / resiliency
- Micro-grid technology
- Hybrid energy systems
- Advanced power conversion cycles
- Advanced reactor multi-physics validation
- Hydrogen economy
- Advanced materials
- Radiation monitoring & detection
- Agricultural sustainability & food security
- High temperature water purification processes

Technology: High Temperature Gas-Cooled



Fluid Characteristics:

- Primary Coolant Loop – Helium
 - 6 MPa (870 psi)
 - 300°C - 660°C (572°F - 1220°F)
 - Significant margin (hundreds of degrees) between operating and safety limits
- Secondary Coolant Loop – Molten Salt
 - 0.3 MPa (43.5 psi)
 - 275°C - 565°C (527°F - 1049°F)
 - Effectively neutronically decouples the reactor from Abbott power plant

Safety Characteristics:

- Retention of all fission products
- Strong negative fuel temperature coefficient
- Cooling through natural forces (passive)
- Reactor core comprised of thermally robust materials

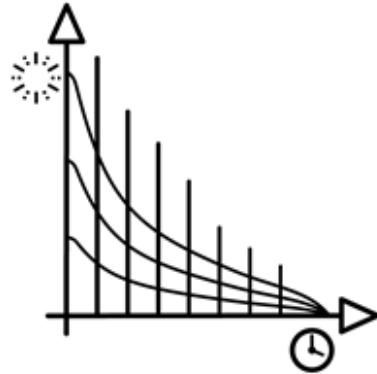


<https://nanonuclearenergy.com>

Technology: Safety in Size and Fuel Form



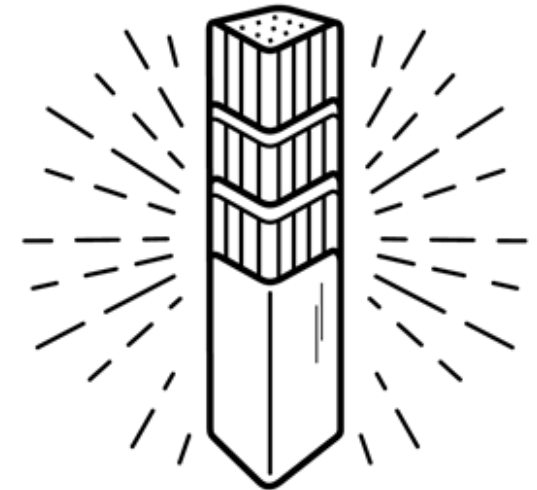
Physics-limited
core temperature



Passive decay heat
removal



Extremely thermally
robust fuel



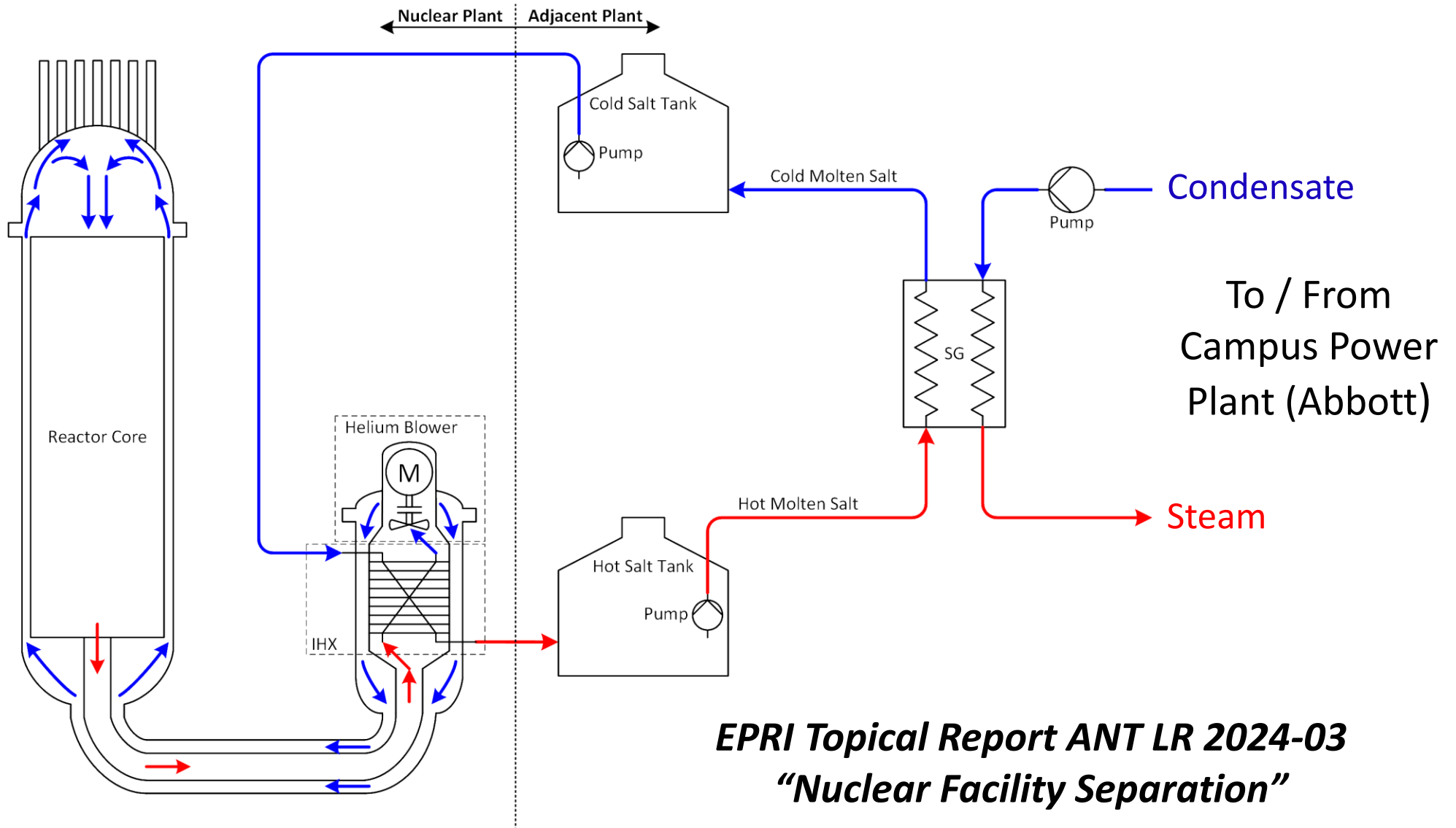
Fission products
retained in any
accident scenario

Reactor: KRONOS MMR™ (Micro-Modular Reactor)



Thermal Power:
 $10 - 45 \text{ MW}_{th}$

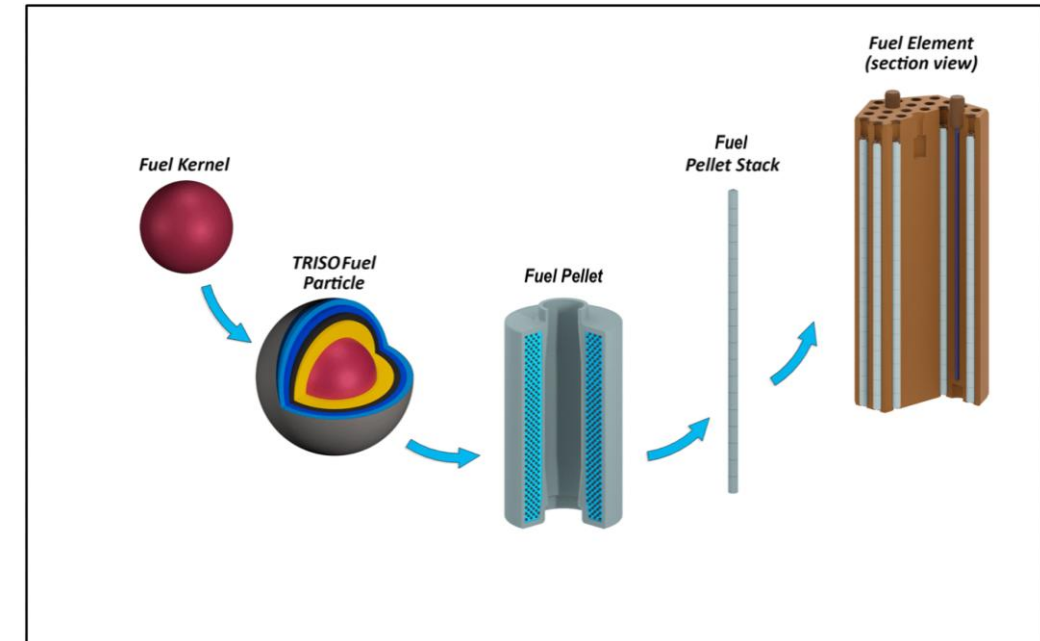
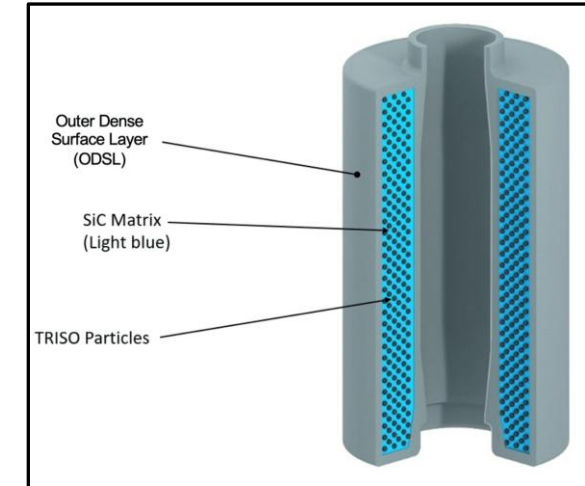
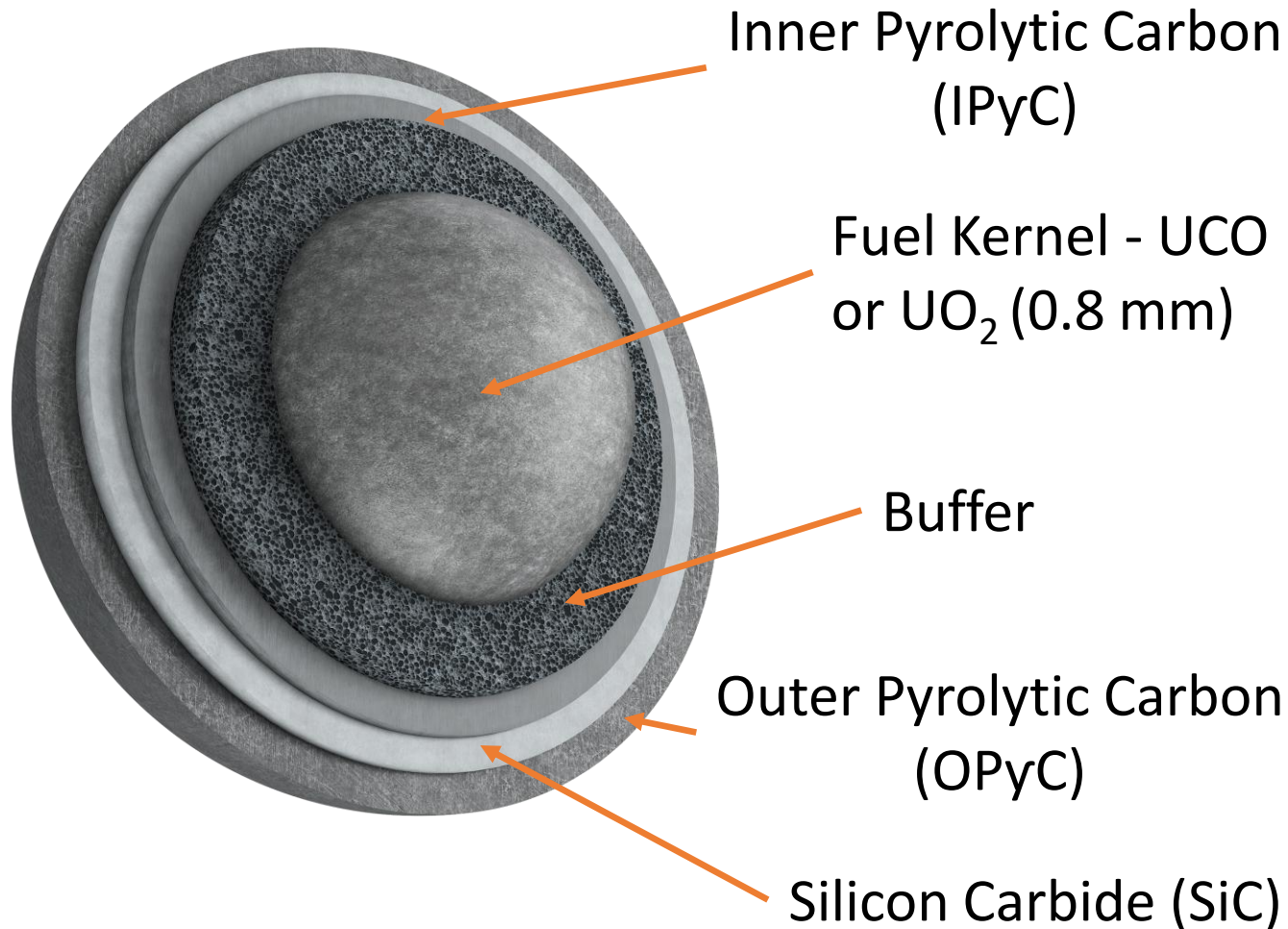
Electrical Power:
 $3.3 - 15 \text{ MW}_e$



***EPRI Topical Report ANT LR 2024-03
“Nuclear Facility Separation”***

KRONOS MMR Fuel: TRISO (TRi-structural ISOtropic) I

TRISO Particle Layers



U. of I. Research Reactor Siting

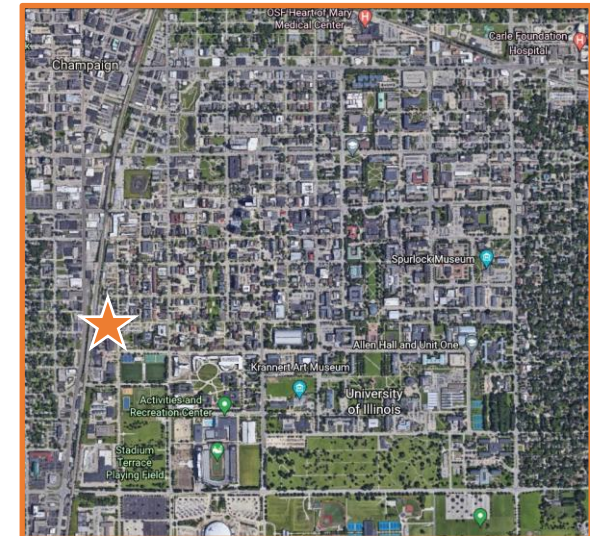


Abbott Power
Plant

U. of I.
Research
Reactor Site

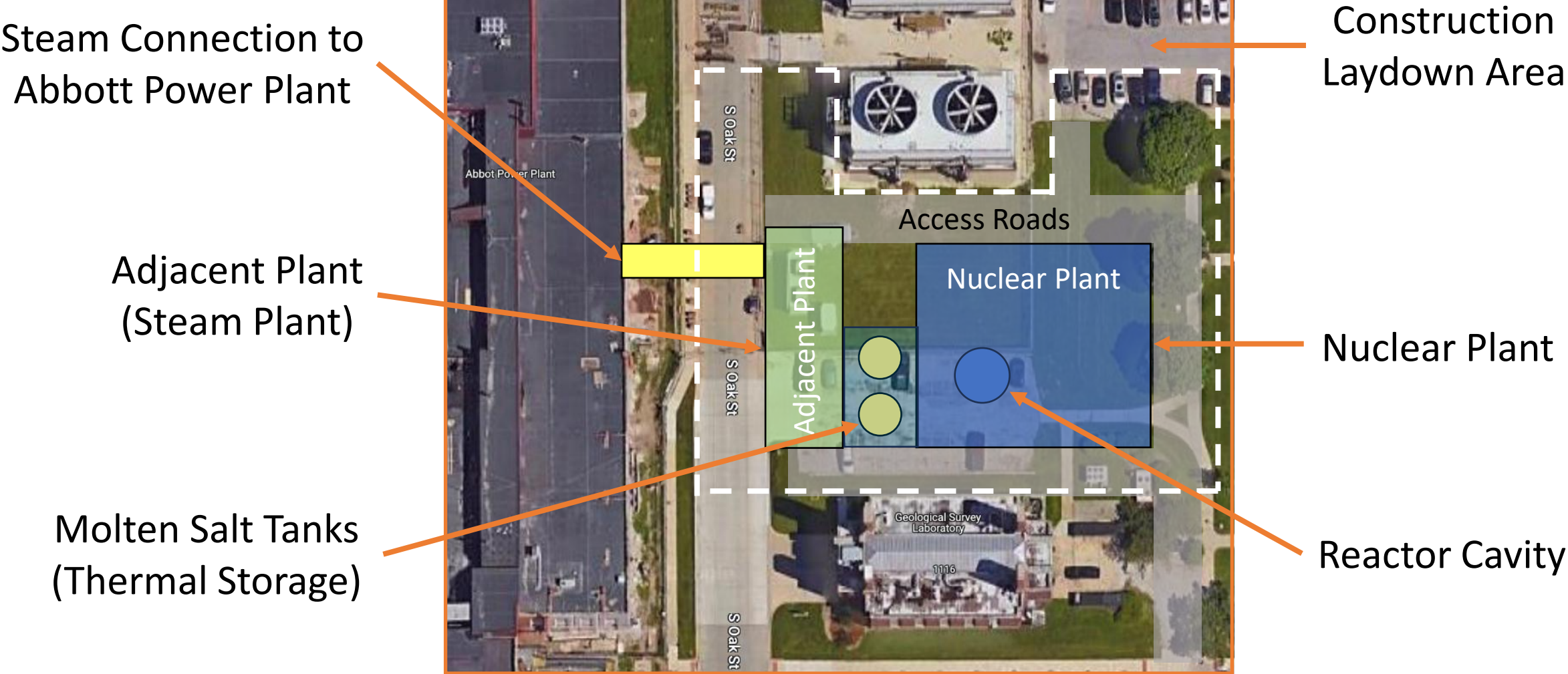


UIUC Campus



★ Abbott Power Plant

Approximate Site Layout



Geotechnical Drilling and Ceremony

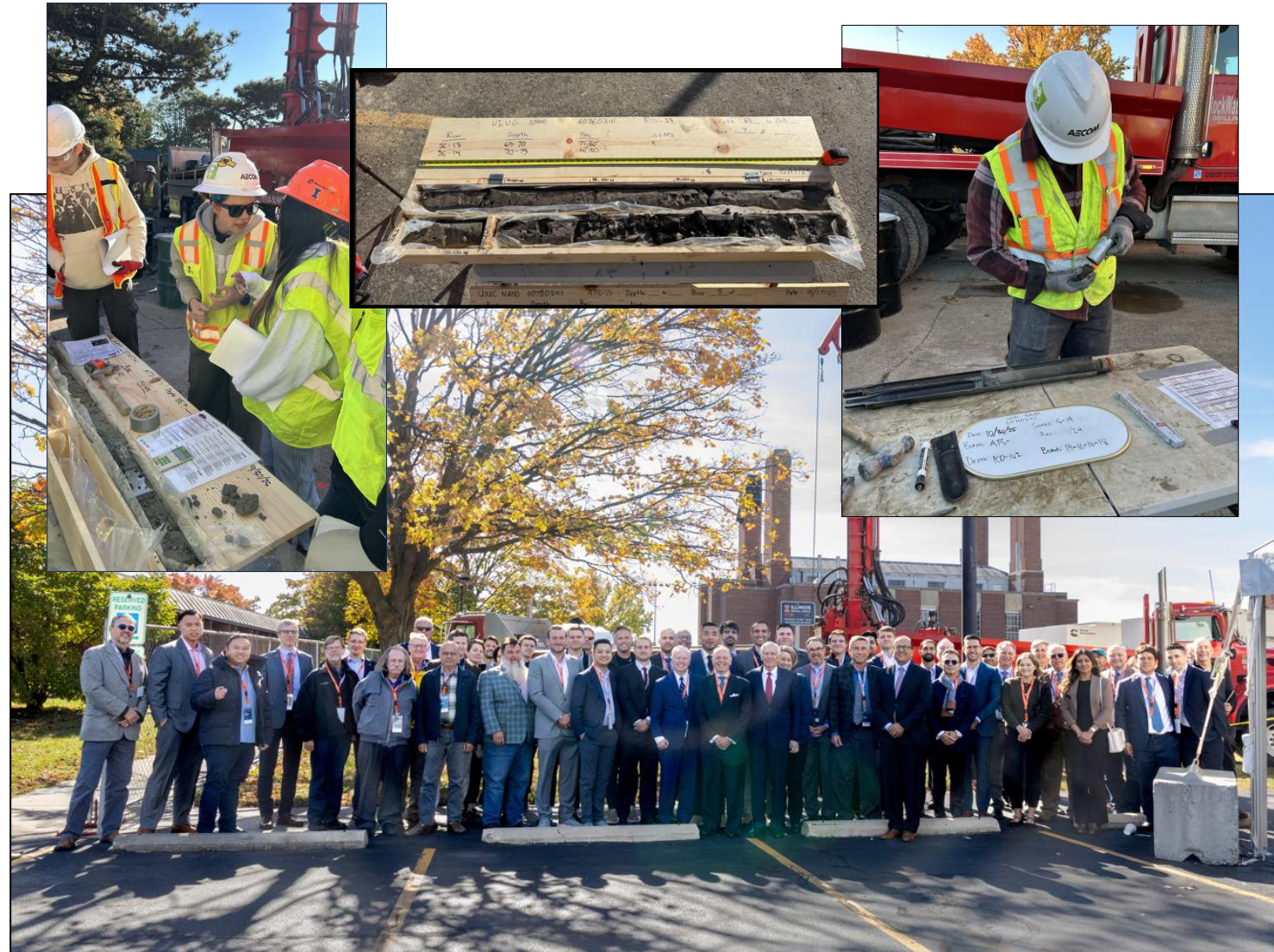


Geotechnical Drilling (mid-October thru mid-November 2025)

- AECOM performed the site characterization
- Required to understand the seismic behaviour and constructability
- Very positive findings

U. of I. / NANO Nuclear Joint Ceremony (October 24th)

- Leaders from State and local community
- Heavy press engagement with very positive response
- Leadership discussions and round table chat with NANO executives



Licensing Documentation / Assessments / Audits



Document / Activity	Type	Dates
Utilizing a Class 104(c) Licensing Pathway for the Proposed UIUC Research & Test Reactor	White Paper	Submitted: June 2022
Proposed Contents of PSAR in Accordance with NUREG-1537	White Paper	Submitted: August 2022
Quality Assurance Program Description	Topical Report	Submitted: October 2022 Approved: May 2023
Applicability of Nuclear Regulatory Commission Regulations	Topical Report	Submitted: December 2022 Approved: July 2024
Safeguards Information-Modified Handling Protection	Plan	Submitted: February 2023 Approved: March 2024
Event Sequence Identification and SSC Safety Classification Methodology	Topical Report	Submitted: September 2023 Approved: March 2024
MMR Principal Design Criteria	Topical Report	Submitted: November 2023 Approved: July 2024
Fuel Qualification Methodology	Topical Report	Submitted: February 2024 Approved: April 2025
Pre-Application Readiness Assessment (LIC-116, "Pre-Application Readiness Assessment")	Audit	Requested: December 1, 2025 Final Report: April 24, 2026
Construction Permit (10 CFR 50.33 General Information, PSAR and Environmental Report)	Application	Submitted: March 31, 2026 Accepted: May 18, 2026 Audit Start: May 20, 2026

Project Timeline – Construction Permit Audit



Safety Review Milestones	Estimated Completion
Draft Safety Evaluation ¹	February 2027
Final Safety Evaluation	September 2027

Note 1: SE sections drafted and information gaps identified.

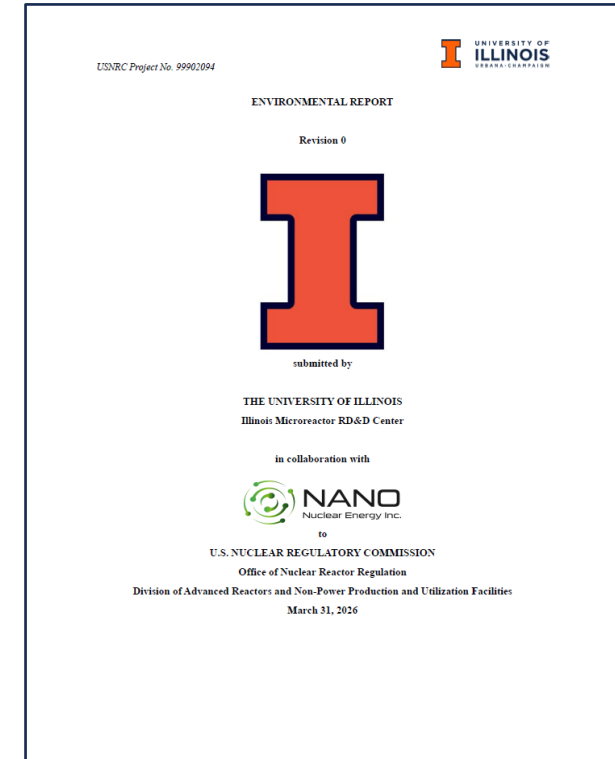
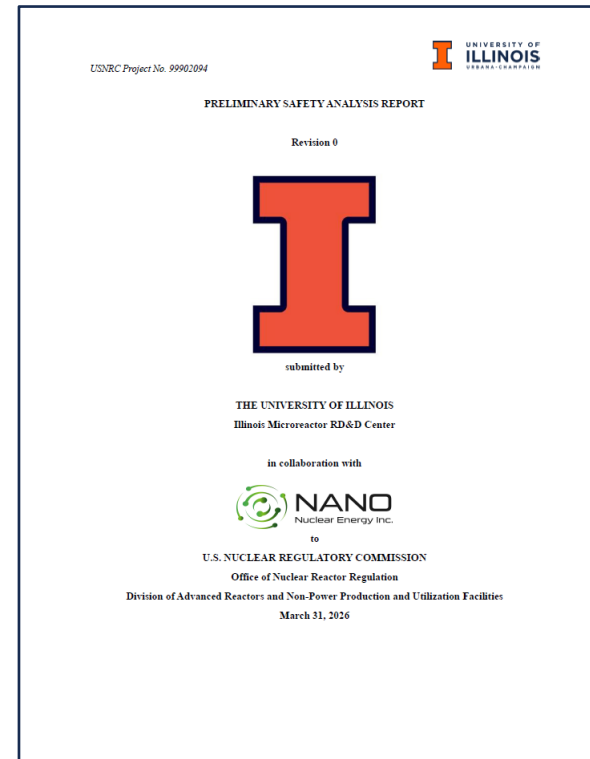
Environmental Review Milestones	Estimated Completion
Draft Environmental Assessment ²	February 2027
Final Environmental Assessment	May 2027

Note 2: Upon completion of the EA, the NRC staff will determine whether to prepare an environmental impact statement (EIS) or a finding of no significant impact on the proposed action. If an EIS is needed, the NRC staff will work to mitigate impacts to the overall schedule.

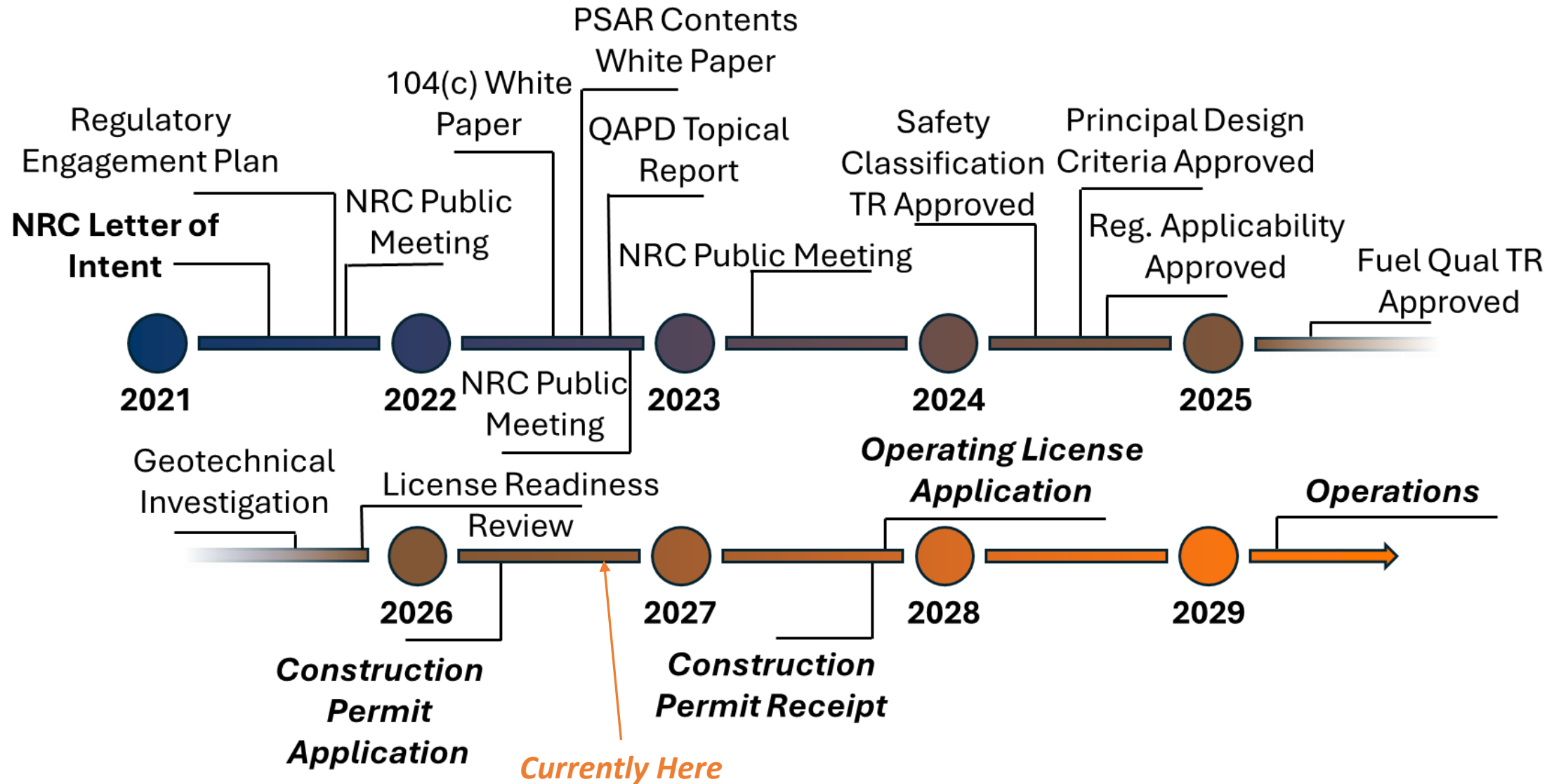


Photo courtesy of the USNRC

CP Audit Kickoff Meeting June 23, 2026, at NRC HQ



Project Timeline – Overall





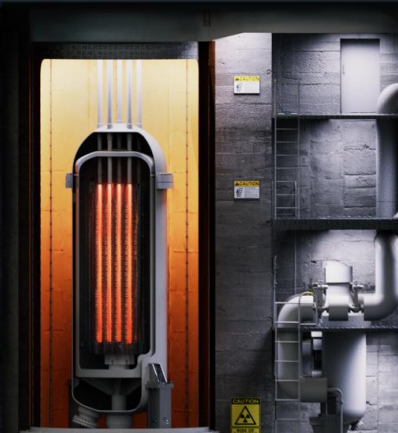
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ILLINOIS
URBANA-CHAMPAIGN



PROJECT WEBSITE



Thank you for your attention,
Questions?



Section 31 of the Atomic Energy Act of 1954, as Amended



SEC. 31. RESEARCH ASSISTANCE.— a. The Commission is directed to exercise its powers in such manner as to insure the continued conduct of research and development and training activities in the fields specified below, by private or public institutions or persons, and to assist in the acquisition of an ever-expanding fund of theoretical and practical knowledge in such fields. To this end the Commission is authorized and directed to make arrangements (including contracts, agreements, and loans) for the conduct of research and development activities relating to—

- (1) nuclear processes;
- (2) the theory and production of atomic energy, including processes, materials, and devices related to such production;
- (3) utilization of special nuclear material and radioactive material for medical, biological, agricultural, health, or military purposes;
- (4) utilization of special nuclear material, atomic energy, and radioactive material and processes entailed in the utilization or production of atomic energy or such material for all other purposes, including industrial or commercial uses, the generation of usable energy, and the demonstration of advances in the commercial or industrial application of atomic energy; and
- (5) the protection of health and the promotion of safety during research and production activities.