



NextGen MURR
University of Missouri

The Vision of NextGen MURR

9-22-2026

**National Organization of Test, Research & Training Reactors
Annual Conference 2026**



NextGen MURR

University of Missouri

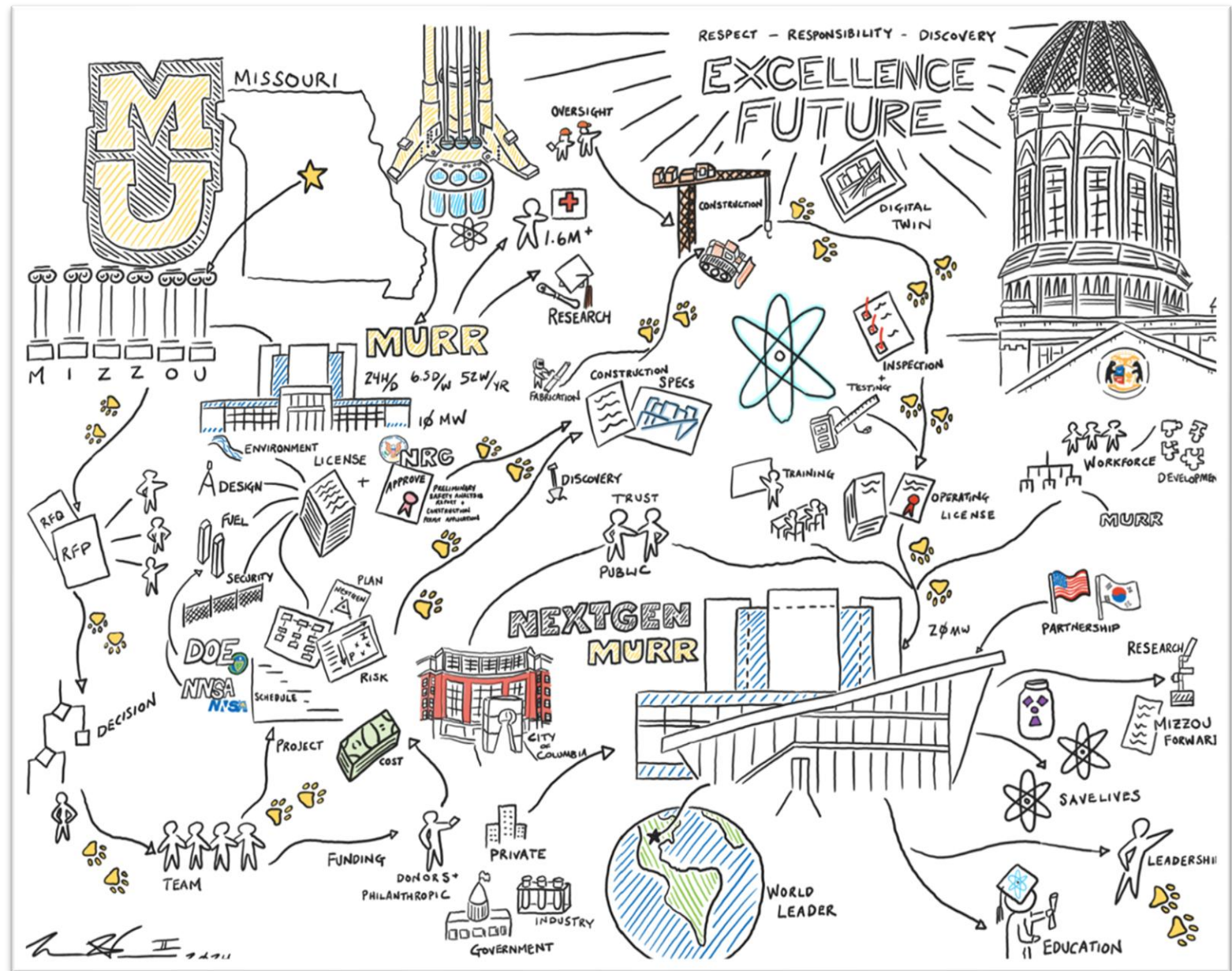
VISION:

The Nation's Center for Nuclear Excellence

Securing the world's most valued destination for nuclear science and technology opportunities and expanding the supply of critical materials for generations to come

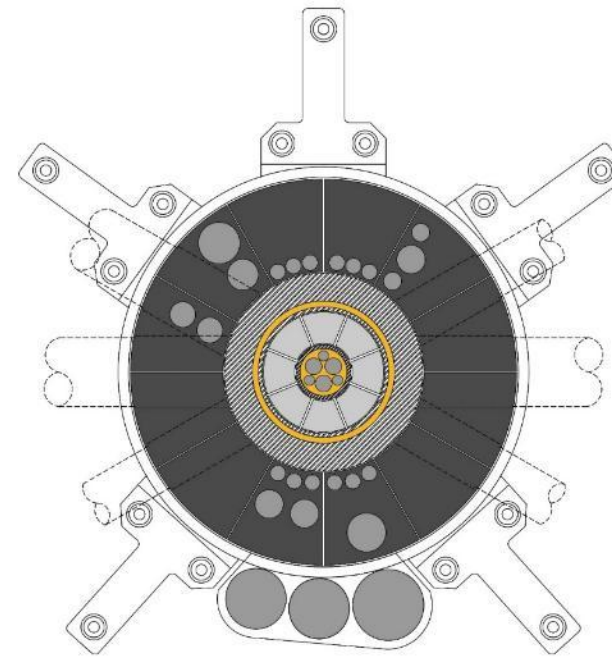
MISSION:

To establish a world-class center for nuclear excellence - advancing MURR's mission to positively impact society through leadership in nuclear science research, education, production of critical materials, and strategic partnerships to improve and save lives across Missouri, the nation, and the world.



MURR is Unique in the World

- Operating power & design
 - 10 MW - Largest U.S. University Research Reactor
 - High peak flux (neutron intensity)
- Schedule
 - 24 hours a day
 - 6.5 days a week
 - 52 weeks per year
- Radioisotope Expertise
- Neutron Beam Science Capability
 - 6 thermal beam ports, 4 instruments





MURR >>> NextGen MURR

NextGen MURR

- Higher power (20 MW+)
- Higher capacity for isotope production
- State-of-the-art neutron guide hall
- Expandable ecosystem concept

MURR

- Reliable reactor operating 52 weeks/year at 10MW
- Strong position as only US supplier of multiple medical isotopes with vibrant nuclear medicine ecosystem
- Strong position in neutron beam and other research

1. US medical isotope leader

Save and improve lives through expanded nuclear medicine pipeline and production

2. National nuclear science and research facility

Expand neutron beam and nuclear science research capabilities

3. Secure new US supply chains

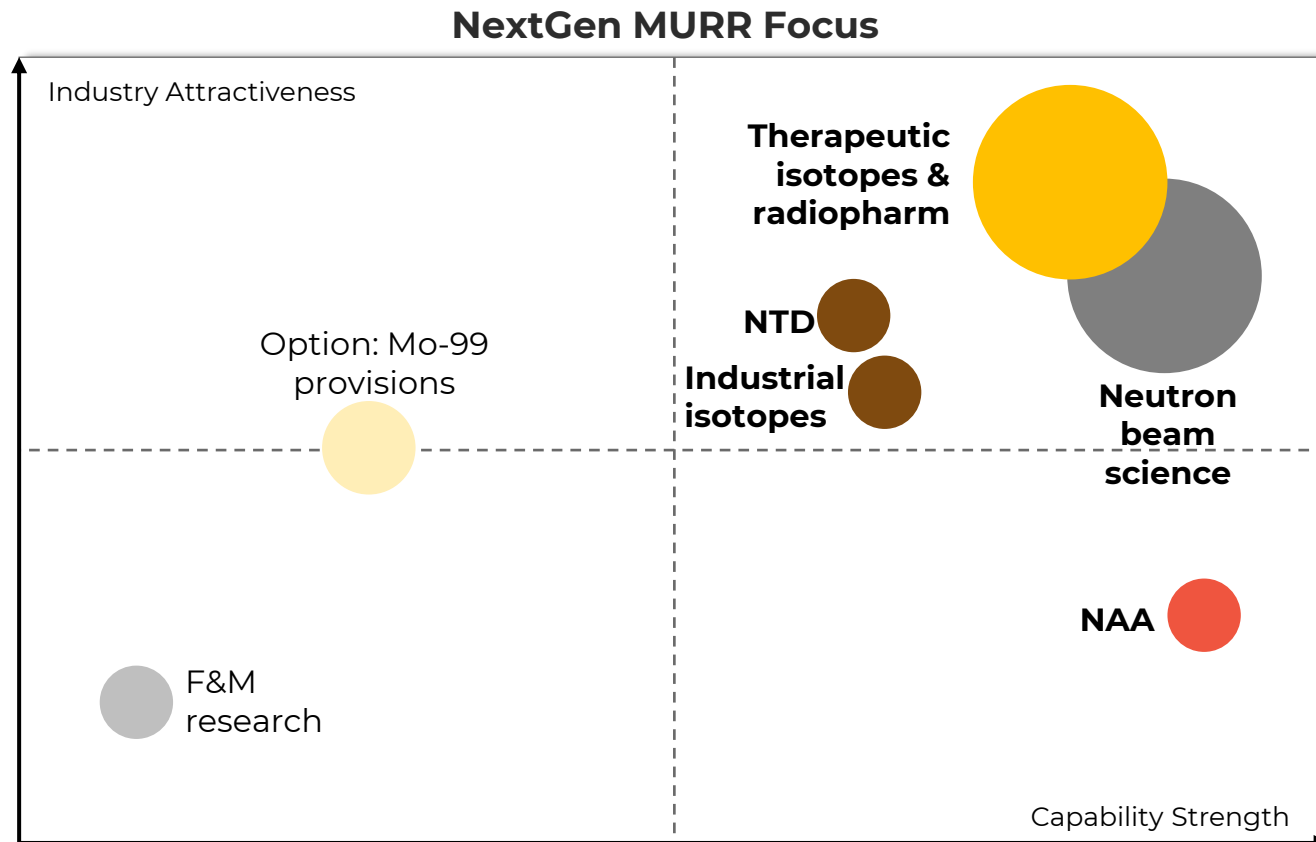
Expanded industry collaboration with new silicon + industrial isotope production capabilities

4. Developing the next generation nuclear leaders

Through education, research and workforce development

“NextGen MURR represents our commitment to research that changes lives. It will allow Mizzou to lead the nation in producing critical medical isotopes while opening new frontiers in science, engineering and patient care.” – President Mun Choi

NextGen MURR Focus Areas : Capabilities Analysis



Therapeutic isotopes & radiopharm

- Secure US-based supply for growing demand
- Partner for radiopharm companies along life cycle

Neutron beam science

- Largest national user facility on university campus

Industrial isotopes

- US supplier for non-destructive testing sector

Neutron Transmission Doping

- US supplier in strategically important sector

Neutron Activation Analysis

- Support wide range of research applications and development of new energy solutions and therapies

Fuel & Materials research

- Research will be in scope as opportunities emerge
- Post Irradiation Examination included in Ecosystem

Molybdenum-99

- Minimum provisions for industry / government partners

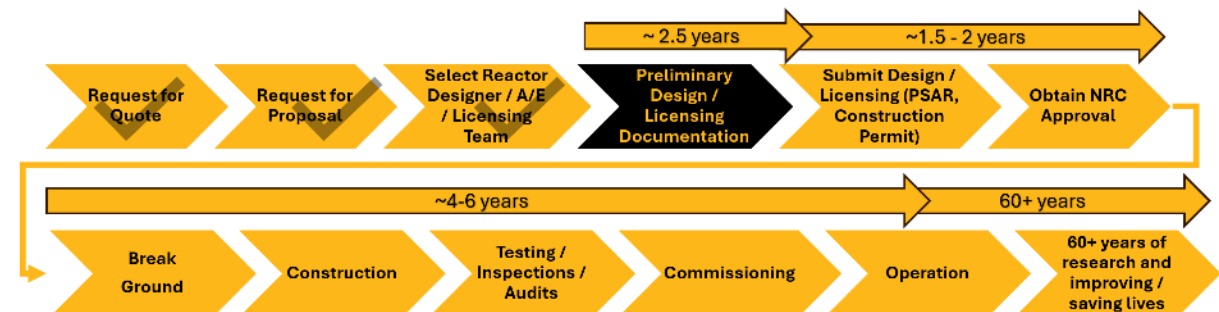


NextGen MURR amongst Research Reactors

	Small University Research Reactors	Isotope Production Reactor	Multipurpose Research Reactors Isotopes + neutron beam	Multipurpose Research Reactors Isotopes + F&M research	Materials Testing Reactors
Typical thermal power	1 kW – 5 MW	5-15 MW	10-30 MW	20-50 MW	50-150 MW
Typical capex	\$ 100-300 million+	\$ 300-700 million+	\$ 500-1,500 million+	\$ 750-1,500 million+	\$ 1,000-3,000 million+
Full Power Days	100-200	300+	150-300+	200-300+	100-250
Scope	- Fundamental physics and material science research, - Neutron beam research - Small quantities of isotopes - Education	Production of Mo-99 and other isotopes	- Full-scale production of isotopes - Neutron transmutation doping - Beam hall (NAA, neutron scattering, ..)	- Full-scale production of isotopes - Fuel and materials research for nuclear energy technologies	- Fuel and materials research – advanced (loop-based) experiments - Some isotope production
Operational reactors (examples)	- McMaster (Canada) - RA-6 (Argentina) JRTR (Jordan) MSTR (US) - OSU (US) RID / TU Delft (NL) > 200 other	(none)	- OPAL (Australia) - FRM II (Germany) - MARIA (Poland) - LVR15 (Czechia) - Safari (South Africa) MURR (US) - RA-3 (Argentina)	- HFR (Netherlands) - LVR15 (Czechia) - BR2 (Belgium)	- ATR (US) - HFIR (US) - Russian reactors HANARO (South Korea) - CARR (China)
Planned	-	- Coqui (US) stopped Kijang (South Korea)	- RA-10 (Argentina) - RMB (Brazil) NextGen MURR (US)	- RMB (Brazil) - PALLAS (Netherlands)	- Jules Horowitz Reactor (France) - ARR (China)

NextGen MURR – Pre-Conceptual Design

- 20 MW+ Research Reactor
 - Risk Informed 104(c) Licensing
- High Peak Thermal Flux
 - $>5 \times 10^{14}$ n/cm²/s
- At least 2x+ high flux capacity of MURR
- 52-week operation schedule
 - Short Outage Duration
- Neutron Guide Hall
 - 15-20 Neutron Beam Instruments
- Conservative design with HALEU fuel
 - Higher density Flat Plate U₃Si₂
- Integrated Nuclear Ecosystem
 - 220+ Acre Site Secured
 - Site Partner Opportunities





NextGen MURR Design Studies Phase



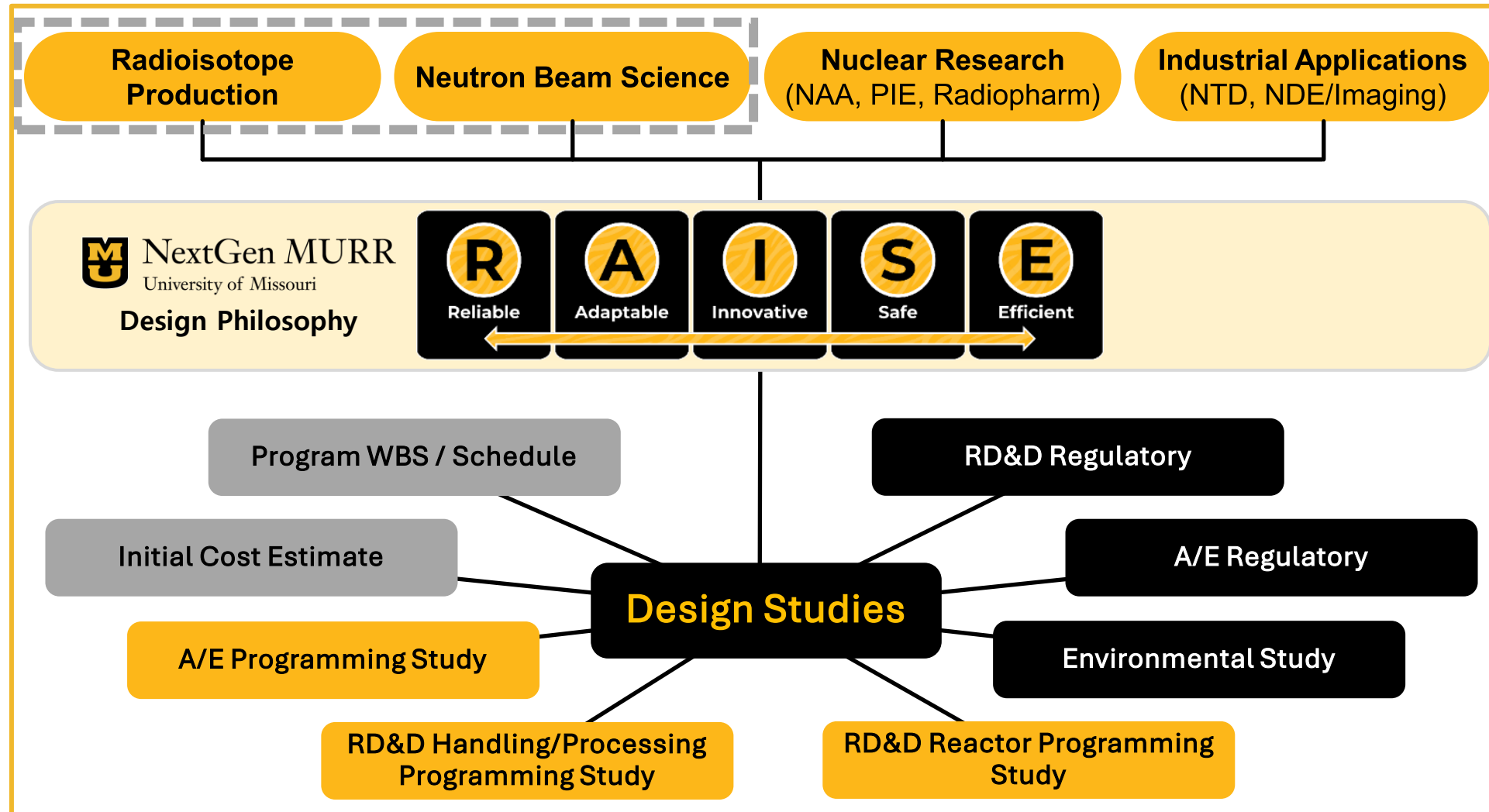
Design Studies Phase: Overview

- NextGen MURR Consortium
 - Hyundai Engr America (HEA)
 - Korea Atomic Energy Research Institute (KAERI)
 - Hyundai Engineering Co., Ltd. (HEC)
 - MPR Associates Inc.
- Scope – NextGen MURR Roadmap:
 - Programming Studies
 - Preliminary Site Evaluations
 - Develop Cost/Schedule Estimate



“The new reactor will be designed to meet the needs of the future...it’s a strategic national asset in the making.”

NextGen MURR – Design Studies Approach



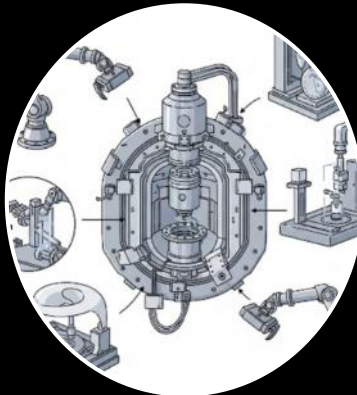
RAISE

- **R**eliable
- **A**daptable
- **I**nnovative
- **S**afe
- **E**fficient



Reliable

- Operate ~52 Weeks / Year
- Redundancy / Diversity
- Maintainability
- Replaceability



Adaptable

- Ability to Modify / Alter
- Focus on Future-Proofing
- Minimum Provisions
- Expandable



Innovative

- Integrated Research
- Education / Training Focus
- New Technologies
- Digital Twin
- Advanced Capabilities
- High Flux
- Neutron Scattering



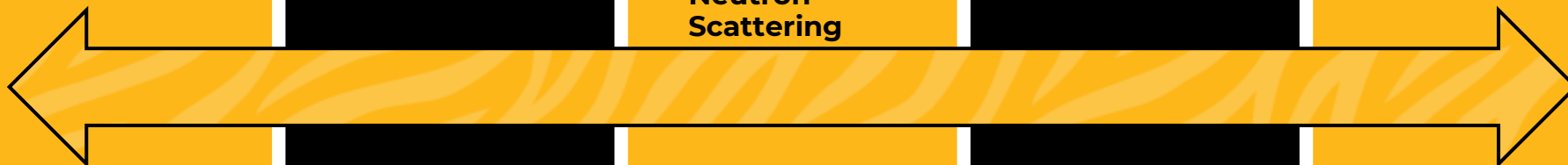
Safe

- Nuclear Safety = Top Priority
- Health and Safety of the Public
- ALARA design principles



Efficient

- Economical / Affordable
- Optimized Work-Flows
- Increased Automation
- Design Simplicity
- Optimal Fuel Usage

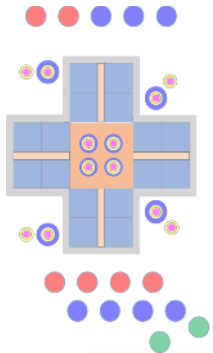




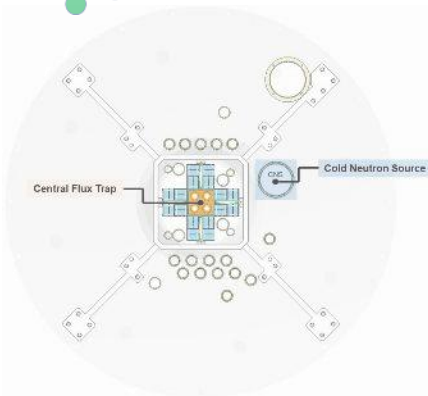
NextGen MURR: Integrated Nuclear Ecosystem



HALEU Fuel
(5.3 g/cm³ U₃Si₂)



Reactor Position Optimization:
Radioisotope + NTD
Silicon Production +
Nuclear Science



High Thermal Flux Volumes
(>MURR)



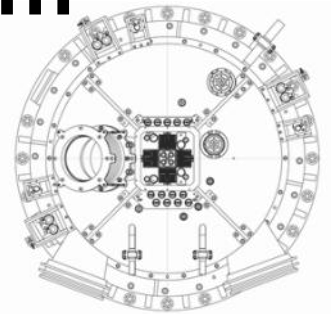
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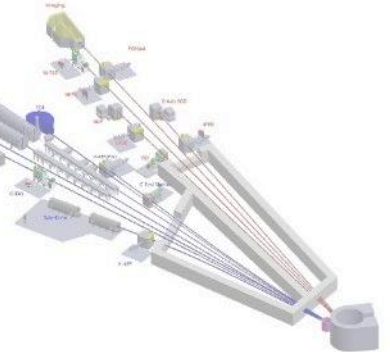
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**20+ MWth
104(c) License
8-10 Year Timeline**

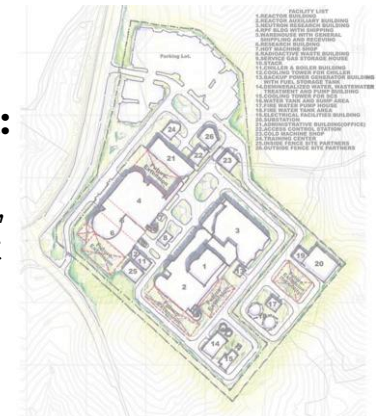
Cold and Thermal Guides
15-20
Instruments



Neutron Guide Hall:
National Neutron Beam Science Facility



Optimized Site Layout:
Research, Guide Hall,
Radioisotope Processing,
Workforce Development



NextGen MURR will serve as an asset of national strategic significance in both radioisotope supply and research excellence.



NextGen MURR Ecosystem Layout

- 35-50 acre layout
- Neutron Research Building
- Radioisotope Processing Facility
- Research Building
- Workforce Training Center
- Dedicated Nuclear Support Utilities



Facility List

1. Reactor Building
2. Reactor Auxiliary Building
3. Neutron Research Building
4. Radioisotope Processing Facility (RPF) Building with Shipping
5. Warehouse with General Shipping and Receiving
6. Research Building
7. Hot Machine Shop
8. Radioactive Waste Building
9. Service Gas Storage House
10. Stack
11. Chiller & Boiler Building
12. Cooling Tower for Chiller
13. Backup Power Generator Building with Fuel Storage Tank
14. Demineralized Water, Wastewater Treatment, and Pump Building
15. Cooling Tower for Secondary Coolant System
16. Water Tank and Sump Area
17. Fire Water Pump House
18. Fire Water Tank Area
19. Electrical Facilities Building
20. Substation
21. Administrative Building
22. Access Control Station
23. Cold Machine Shop
24. Training Center
25. Inside Fence Site Partner Space
26. Outside Fence Site Partner Space
27. Tornado Shelter



NextGen MURR VISION:

The Nation's Center for Nuclear Excellence

Securing the world's most valued destination for nuclear science and technology opportunities and expanding the supply of critical materials for generations to come

NextGen MURR will serve as an asset of national strategic significance

Strengthening national security of supply for the future

Develop the next generation nuclear workforce.

Ensure life-improving treatments for U.S. patients

Establish new domestic supply chains for semiconductors

Advance the U.S. research portfolio in technology and medicine

