

NEXT

Non-power and Advanced Reactors: Merging of Two Worlds



Dr. Rusty Towell

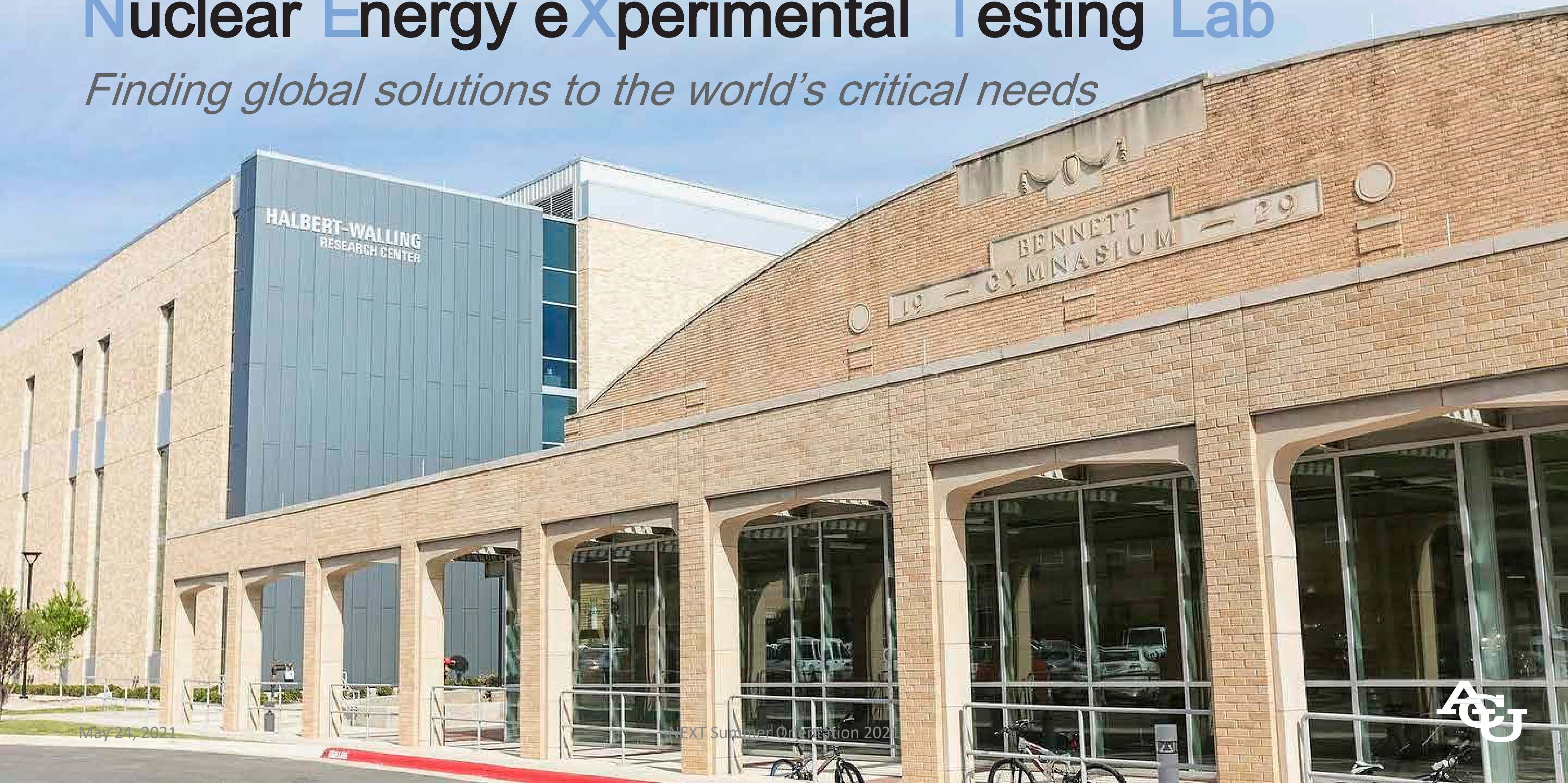


NEXT Lab Director, Abilene Christian University
NRC Project Number 99902088 supporting pre-application licensing activities



Nuclear Energy eXperimental Testing Lab

Finding global solutions to the world's critical needs



May 24, 2021

NEXT Summer Orientation 2021

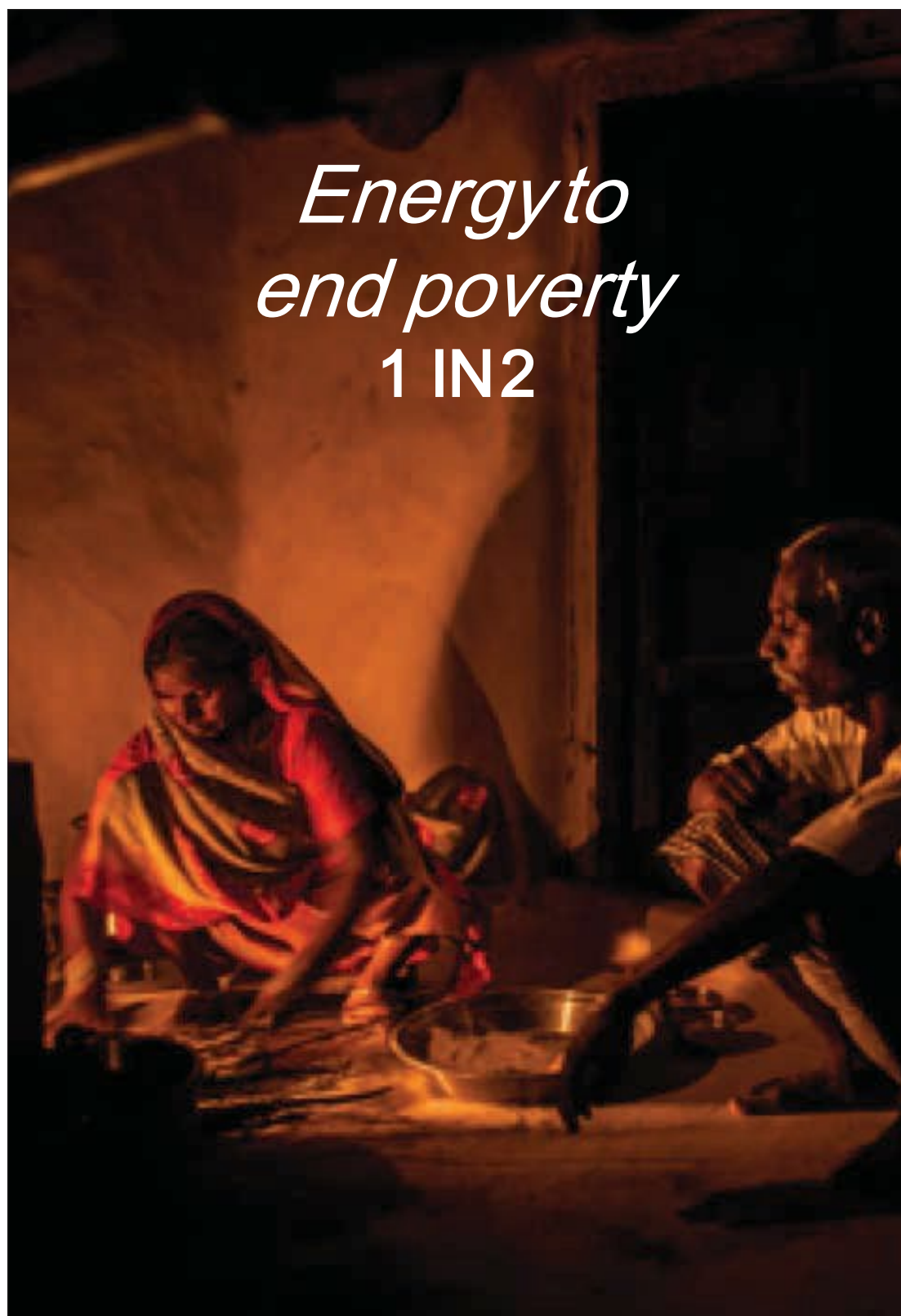


World's Critical Needs

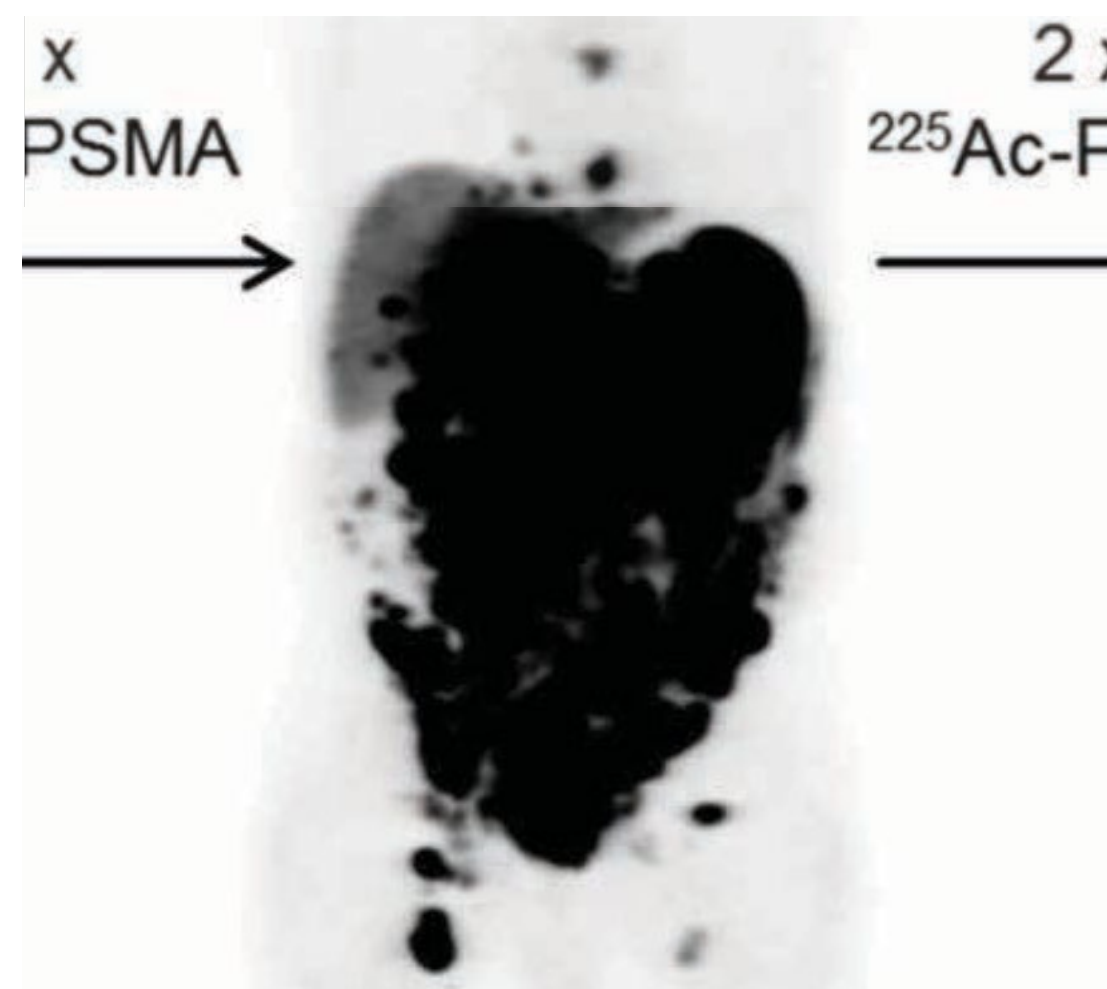
NEXT

Nuclear Energy eXperimental Testing

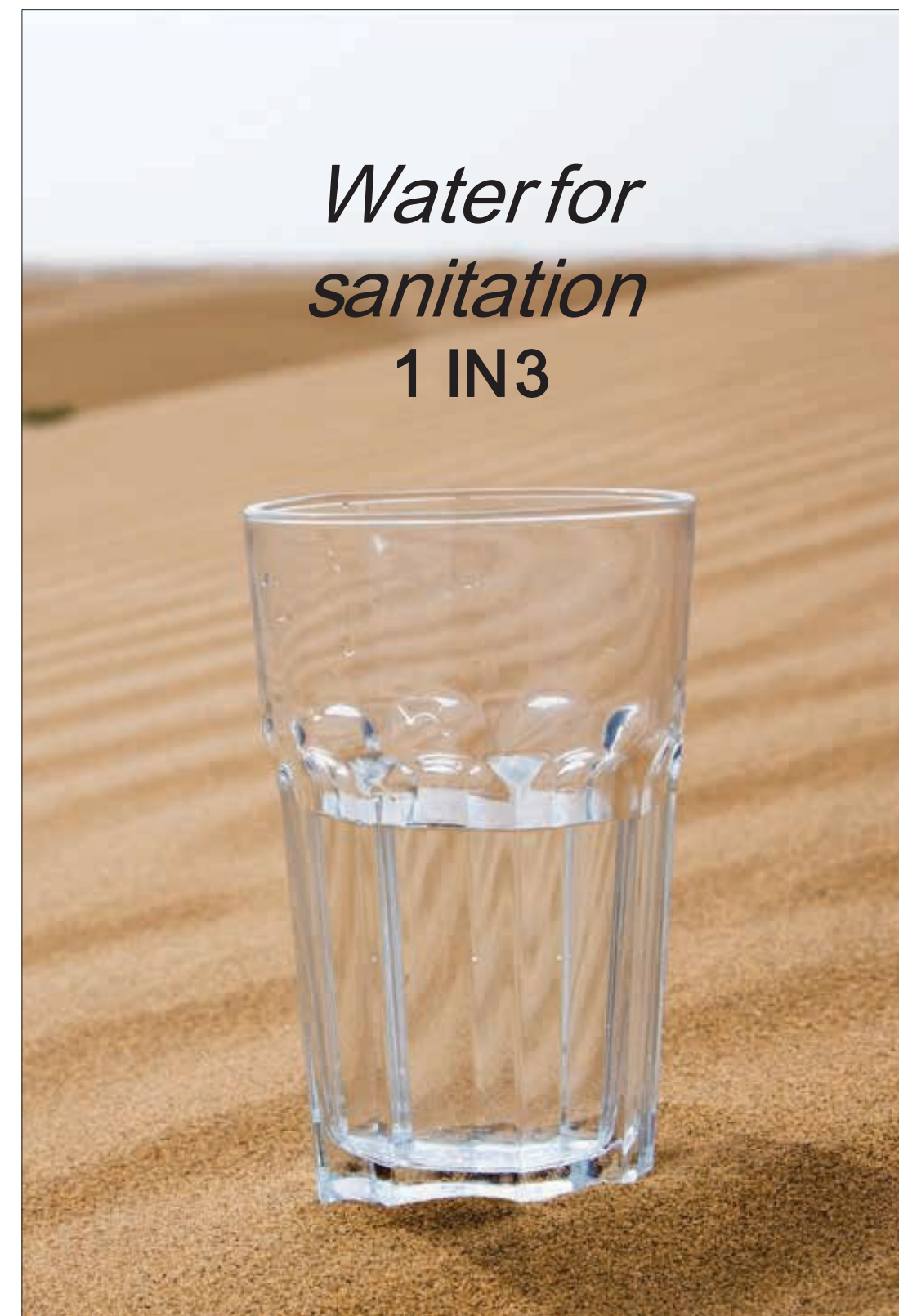
*Energy to
end poverty*
1 IN 2



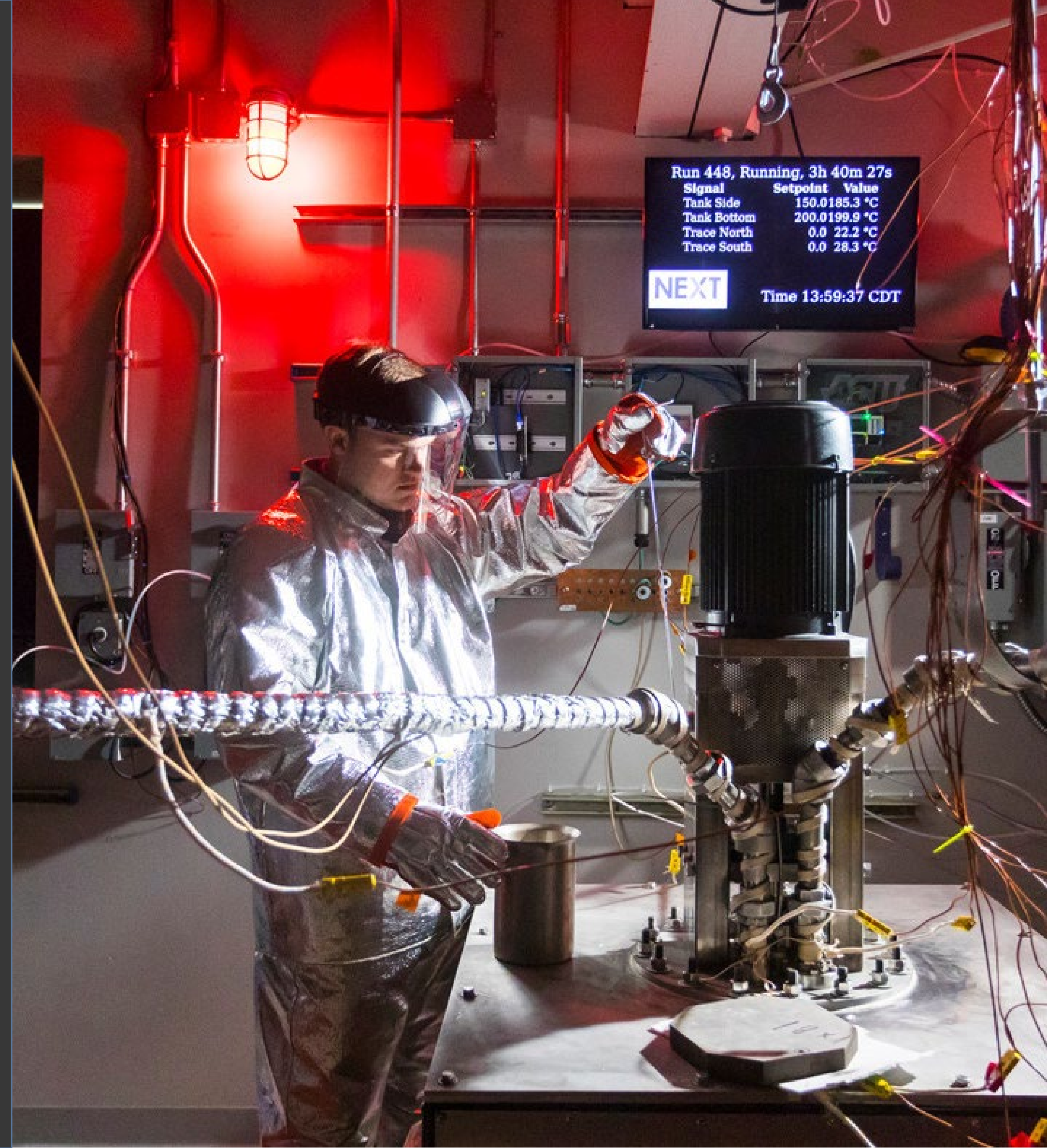
*Medical
Isotopes for
cancer*
1 IN 2



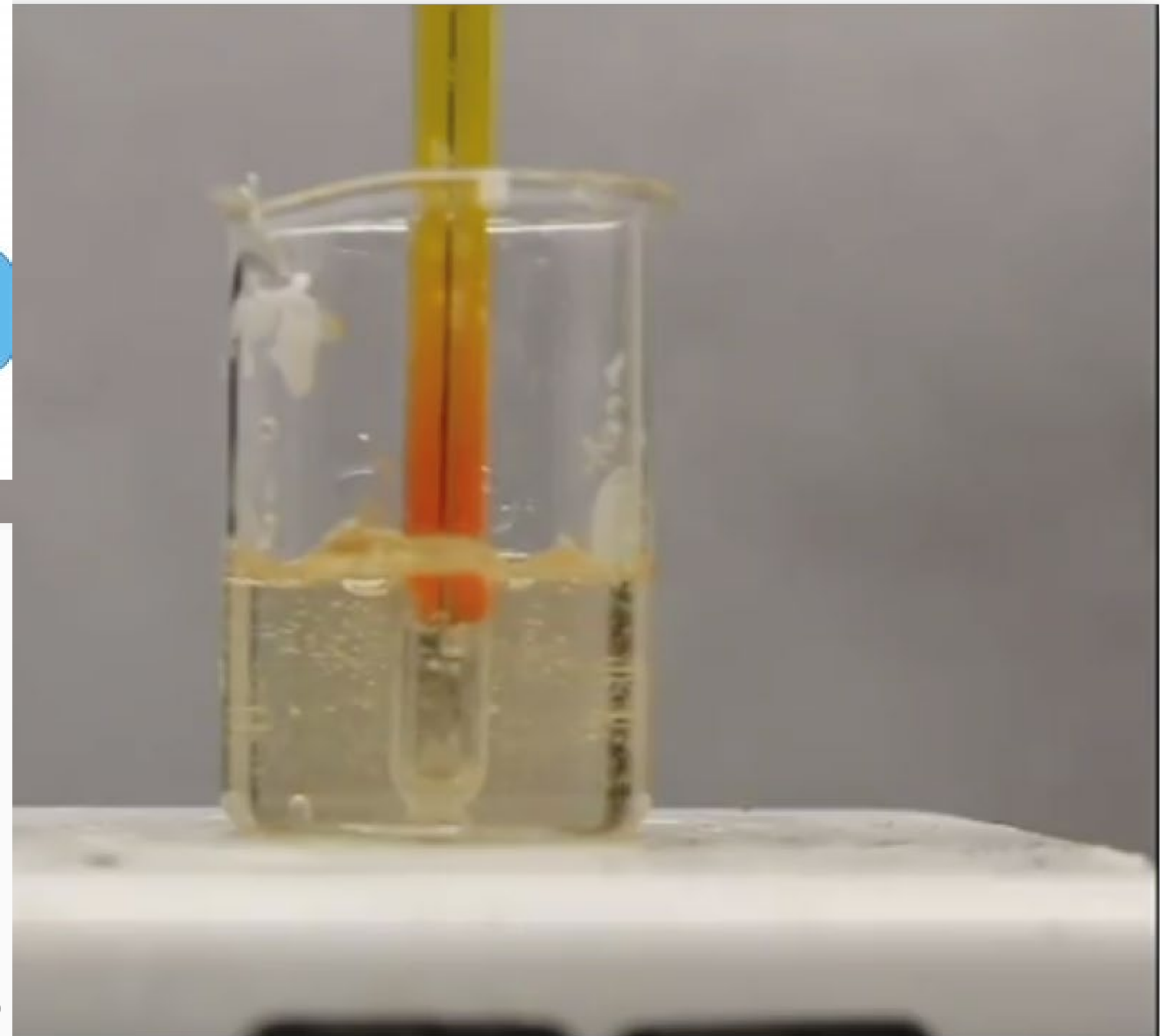
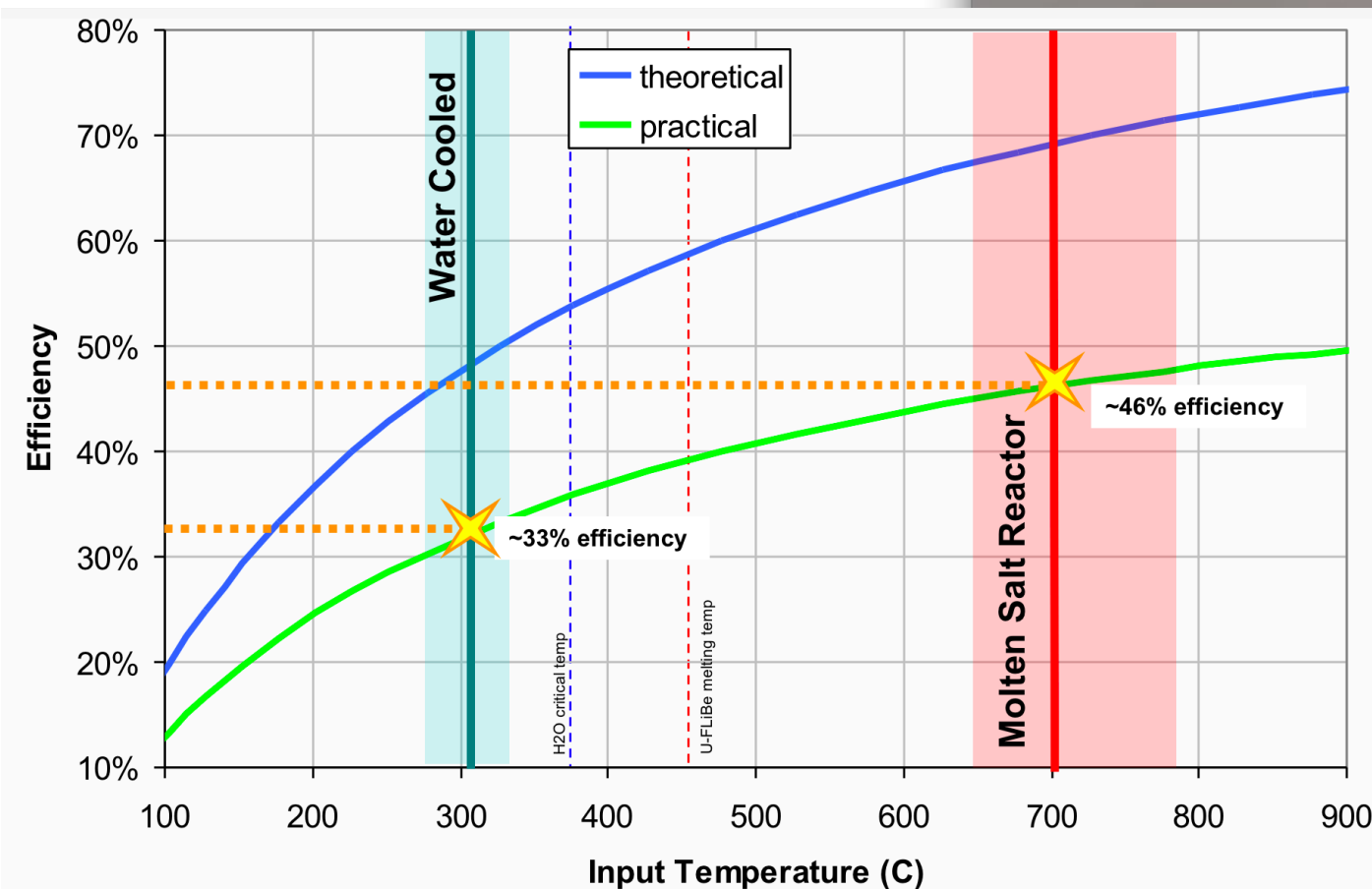
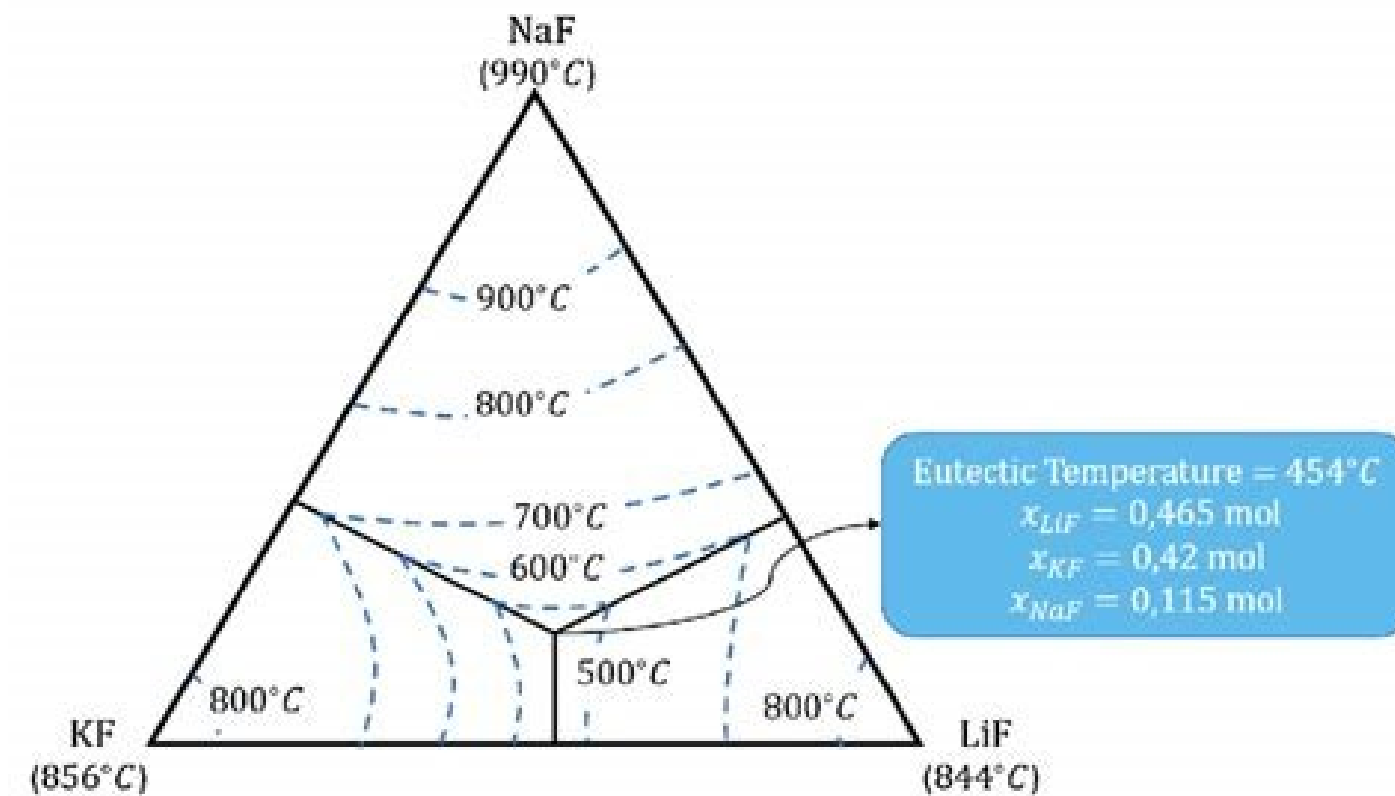
*Water for
sanitation*
1 IN 3



The mission of ACU's NEXT Lab is to provide global solutions to the world's need for energy, water and medical isotopes by advancing the technology of molten salt reactors while educating future leaders in nuclear science and engineering.

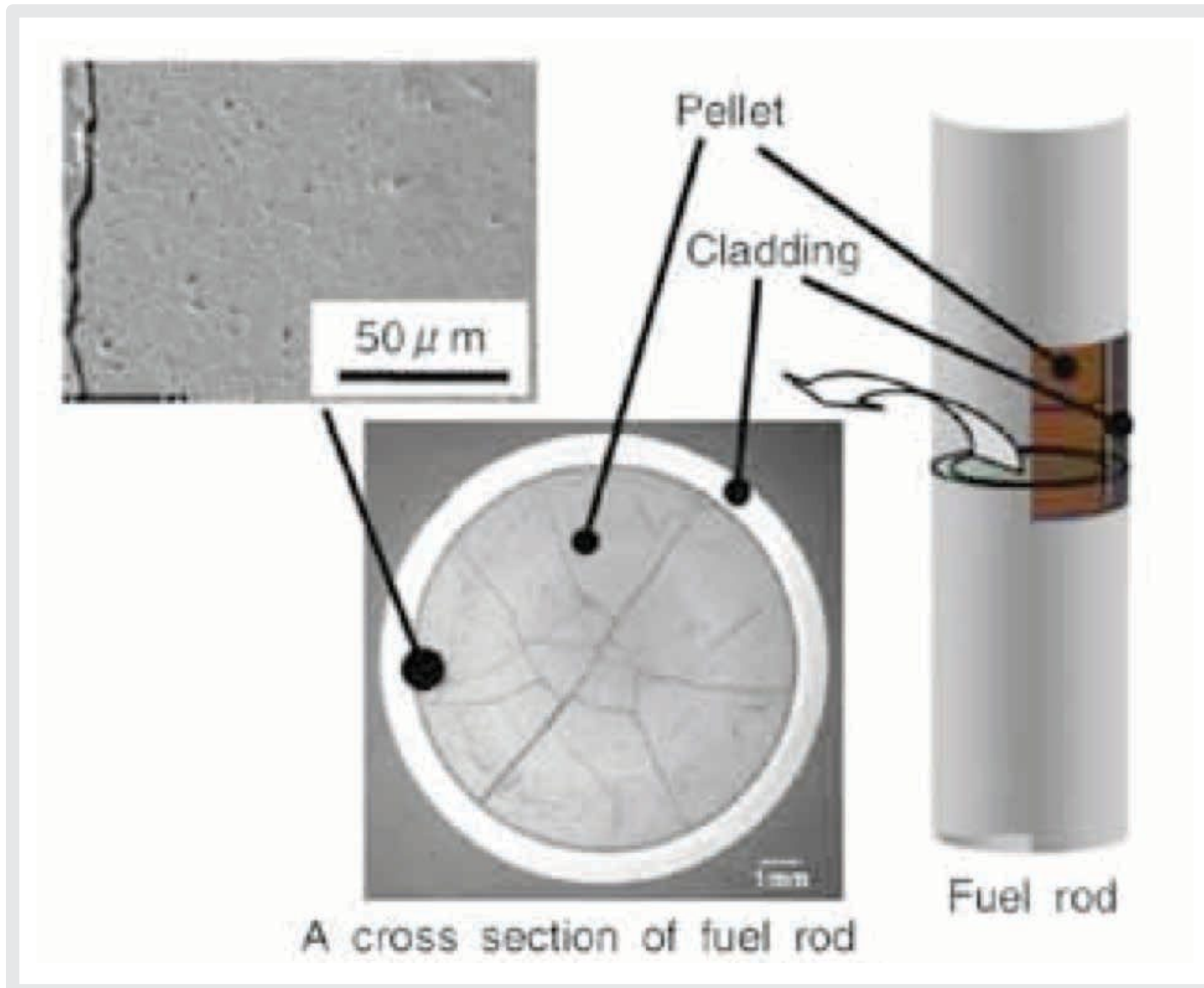


Key Requirement 1: Molten Salt Coolant



Key Requirement 2: Liquid Fuel

Old Solid Fuel Technology



Advantages of Liquid Fuel

- Increased fuel utilization
- Decreased waste
- Access to medical isotopes
- Can not melt down

NEXTRA

Nuclear Energy eXperimental Testing Research Alliance

NEXT

Nuclear Energy eXperimental Testing





NEXT Lab Research Projects

NEXT

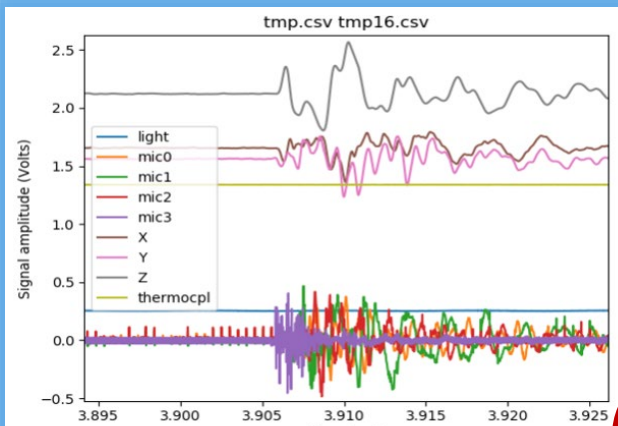
Nuclear Energy eXperimental Testing



Molten Salt Test Loop



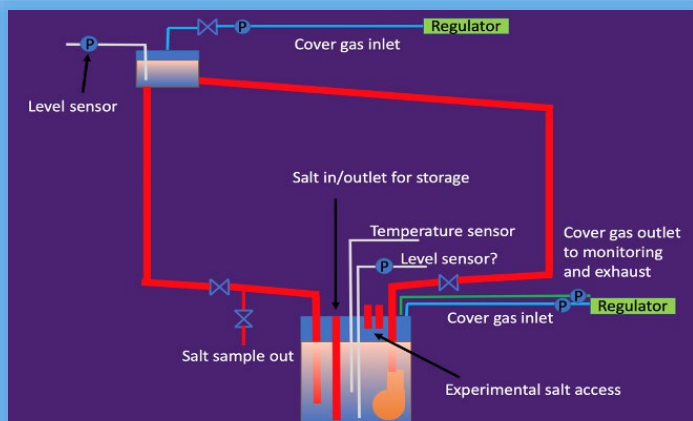
Isotope Extraction & Purification



Instrumentation



Component Test System



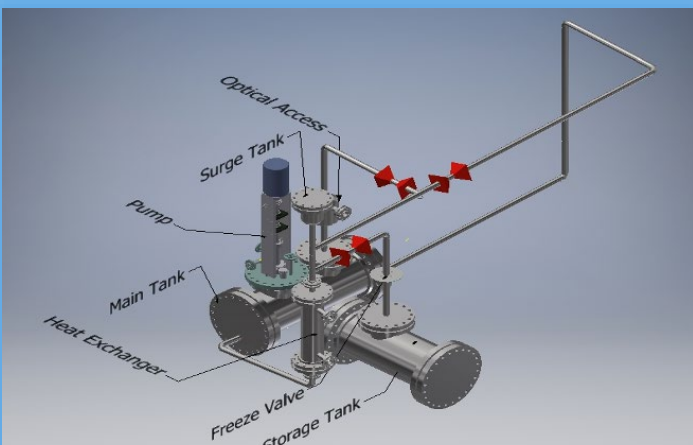
Fluoride Molten Salt Test Loop



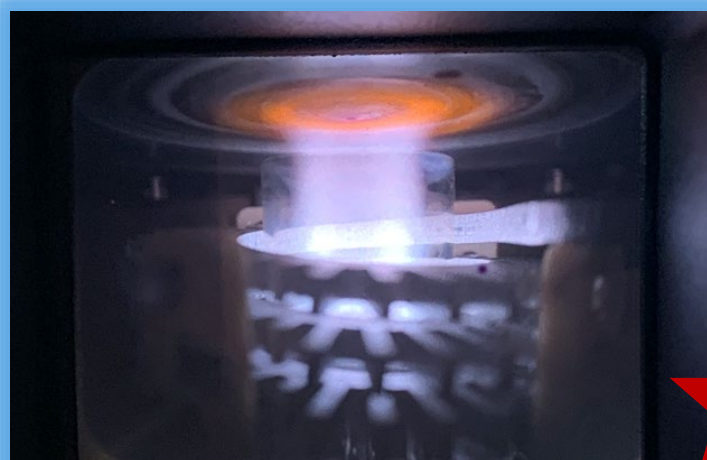
Salt Purification System



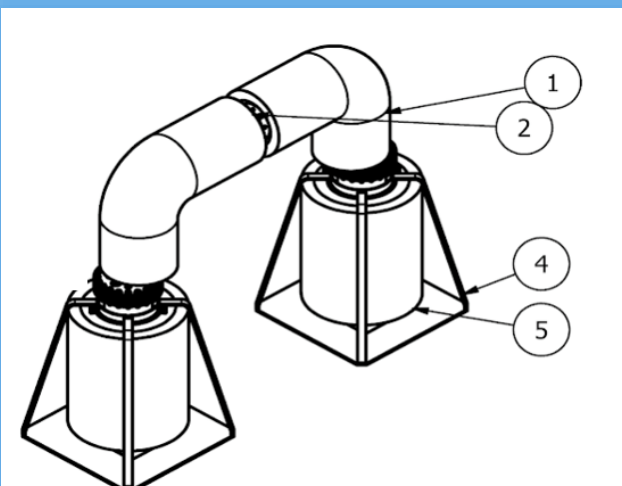
Data Acquisition



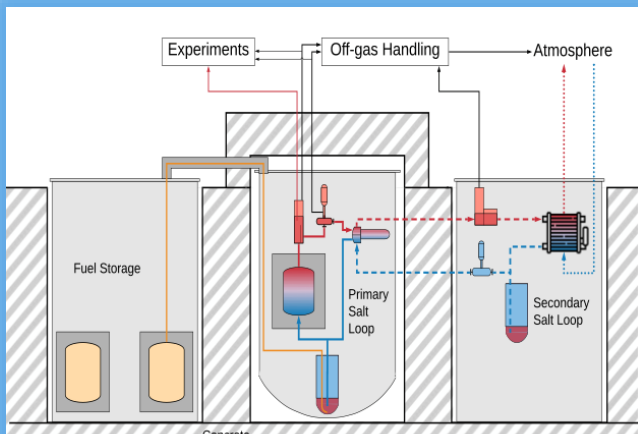
Molten Salt Test System



Chemical Analysis System



Molten Salt Filters



Molten Salt Research Reactor

MSRR is Simplified MSRE

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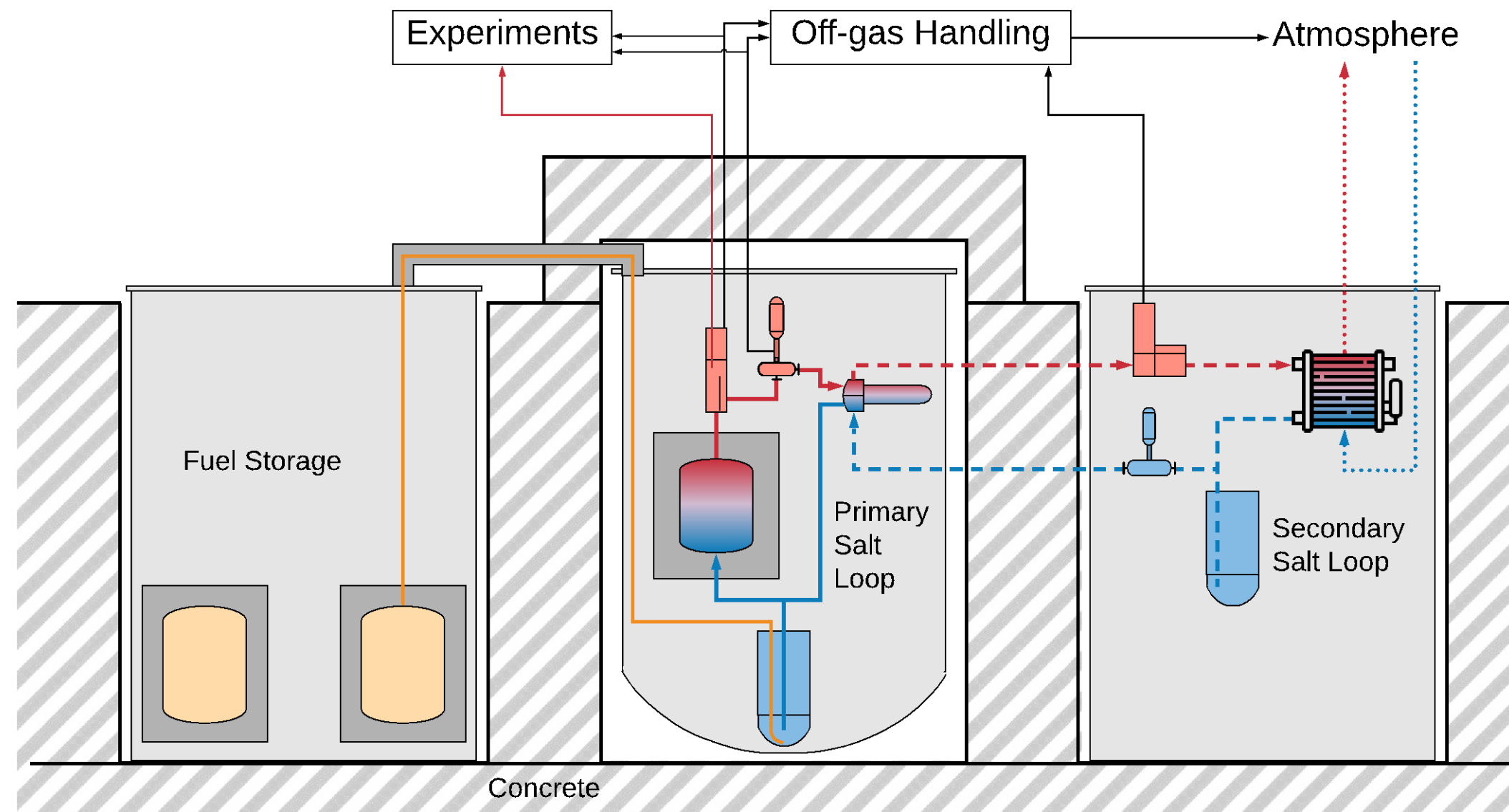
Nuclear Energy eXperimental Testing

There are three major differences between the MSRE and the MSRR

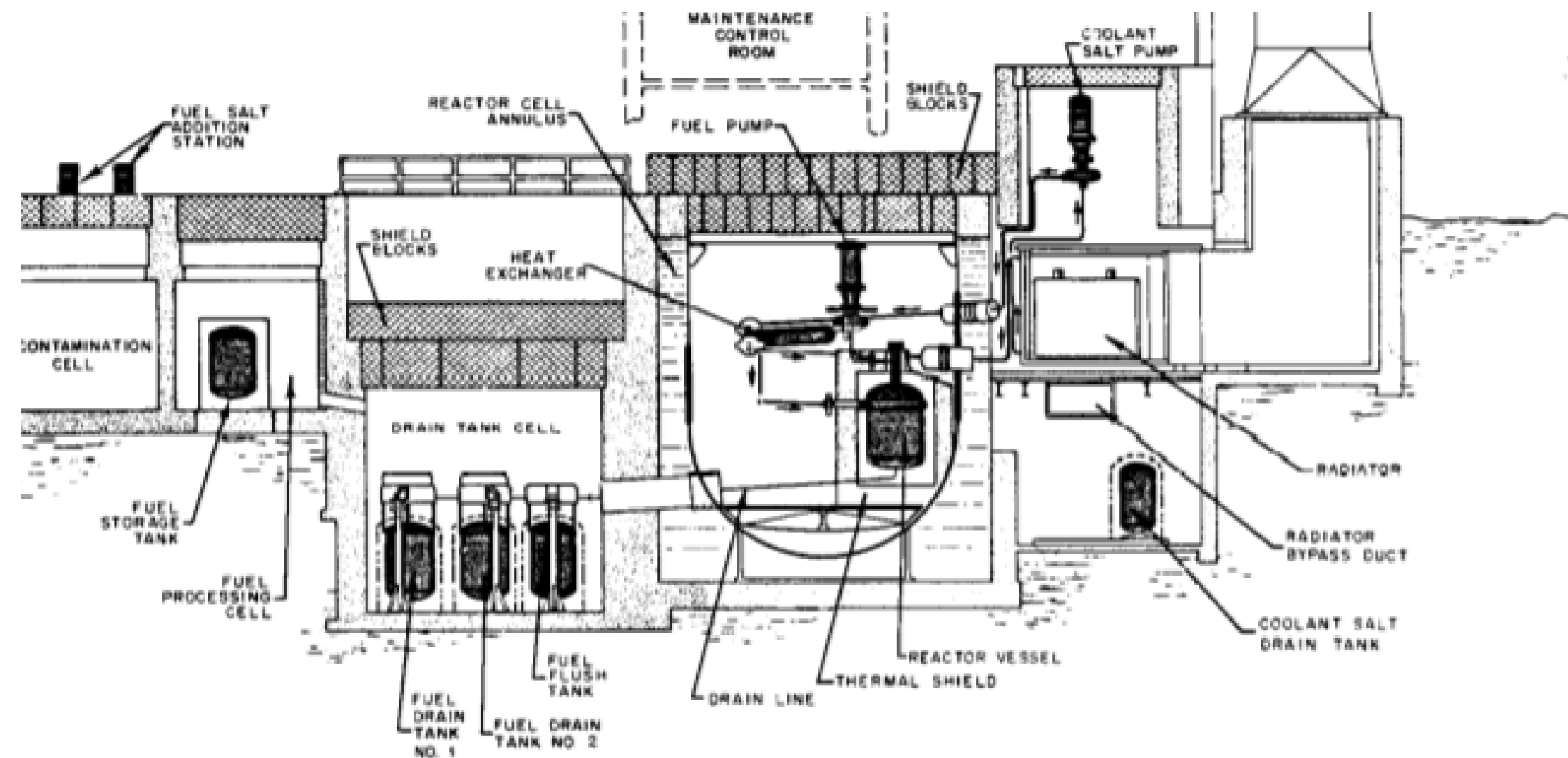
- MSR Fueled with HALEU instead of HEU
- MSR has lower power and power density
- MSR does not require external cooling water



MSRR



MSRE



MSRR to be Licensed as a University Research Reactor



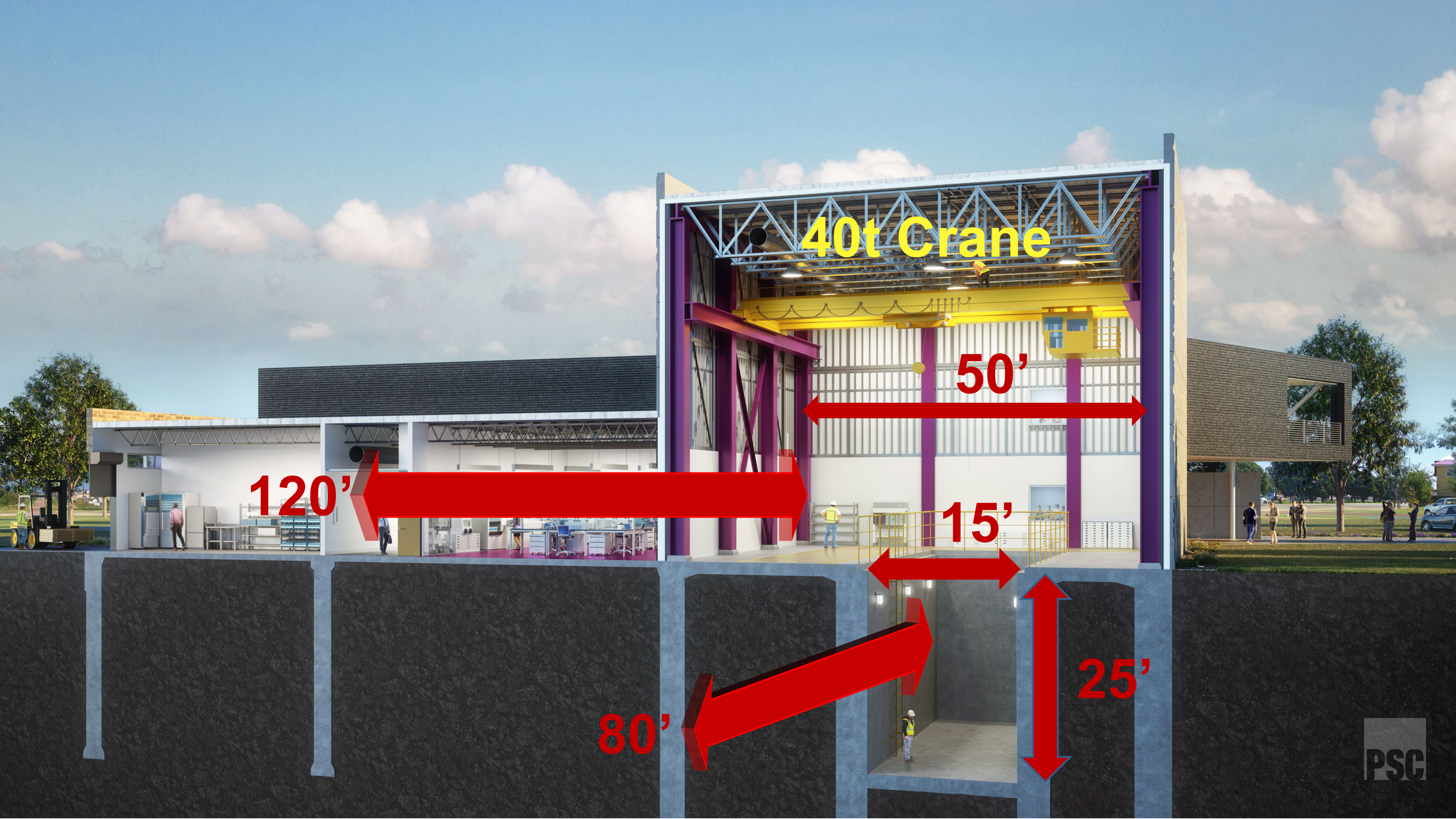
- ACU is seeking a license under AEA Section 104c pursuant to 10 CFR 50.21(c) for a University Research Reactor facility with a maximum licensed power level of 1 MW_{th}.
- The ACU MSRR will be a non-power utilization facility as described in 10 CFR 50.21(c) - “useful in the conduct of research and development activities of the types specified in Section 31 of the Atomic Energy Act (AEA).”
- The MSRR will not be a commercial or industrial facility as specified in paragraph (b) of 10 CFR 50.21 or in 10 CFR 50.22 and MSRR activities will be consistent with licensing under Section 104c of the AEA as amended by NEIMA.



Science and Engineering Research Center

- 28,000 ft² facility
 - 6,000 ft² Research Bay
 - Specialty Research Labs
 - Offices
- Design completed by Parkhill
- Linbeck construction company
- Allowed in 10 CFR 50.10(a)(2)(x)
- Design Completed: 2021
- Begin Construction: 2022
- Completed: 2023





40t Crane

50'

120'

15'

25'

80'



THANK YOU

acunextlab.org



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