

NEXT

Molten Salt Research Reactor

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ABILENE CHRISTIAN
UNIVERSITY

Nuclear Energy eXperimental Testing Lab

Finding global solutions to the world's critical needs



Humanitarian Focus

1 in 2 do not have access to the **energy** needed to lift them out of poverty



1 in 2 will develop **cancer**



1 in 3 do not have access to clean drinking **water**

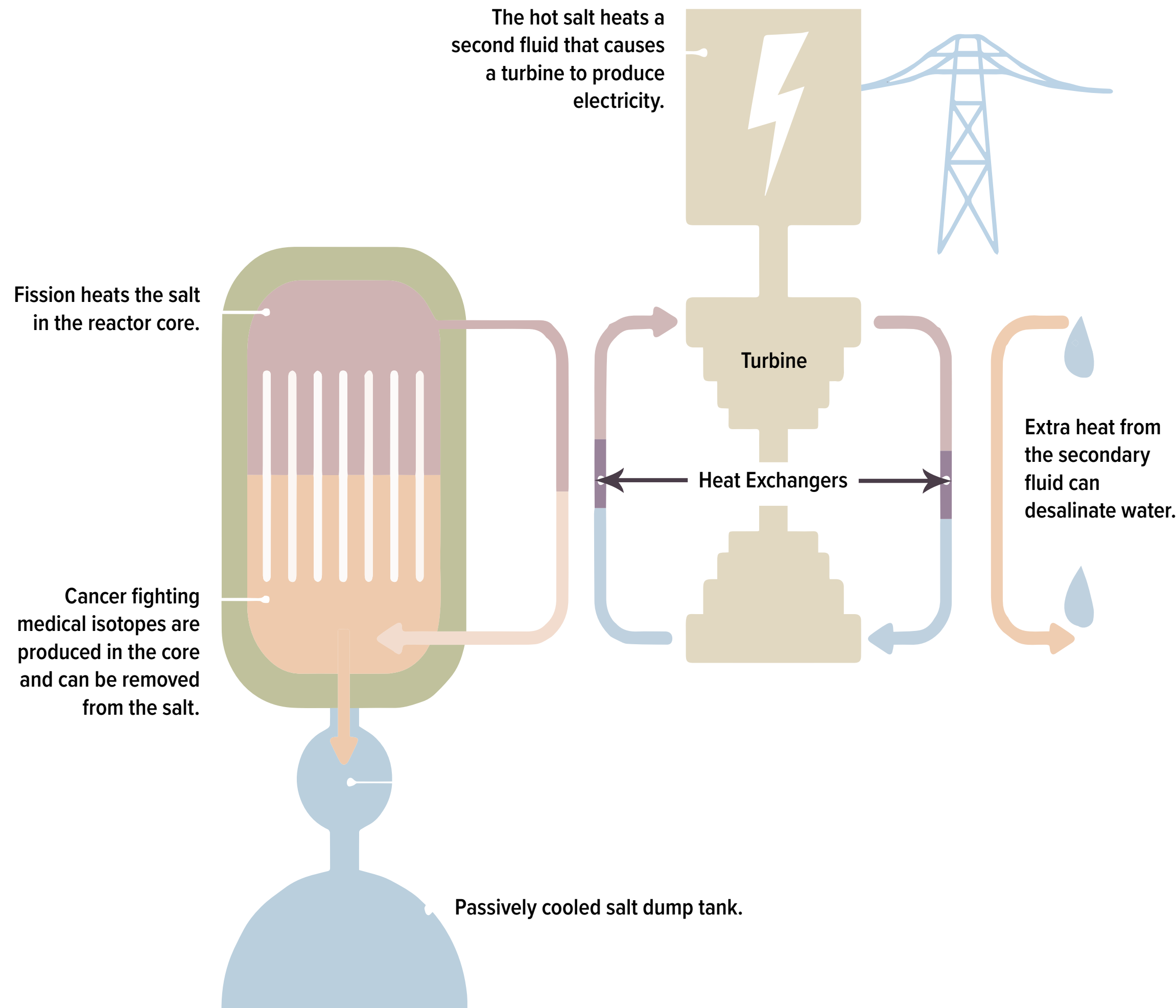


*"Nuclear energy is indispensable for achieving global sustainable development and has a crucial role in decarbonizing the energy sector, as well as **eliminating poverty, ending hunger, providing clean water, affordable energy, economic growth, and industry innovation.**" - United Nations Economic Commission for Europe (UNECE) Expert Group on Resource Management (EGRM)*

Molten Salt Reactors (MSRs) provide answers to critical global needs

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.



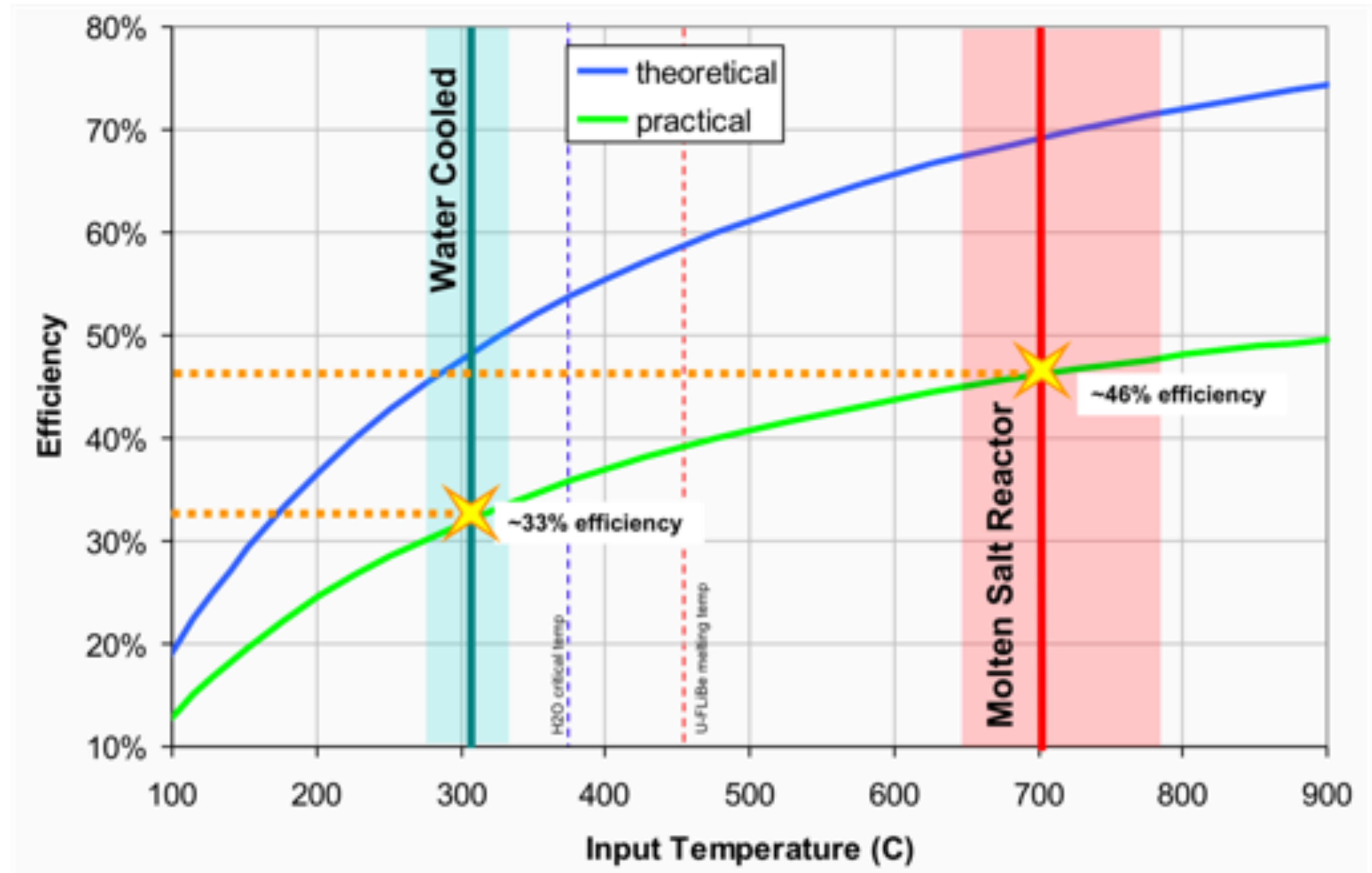


Molten Salt Reactor

- **Safe**
- **Clean**
- **Efficient**
- **Multi-functional**
- **Scalable**
- **Carbon-free**
- **Reliable**
- **Can use SNF**

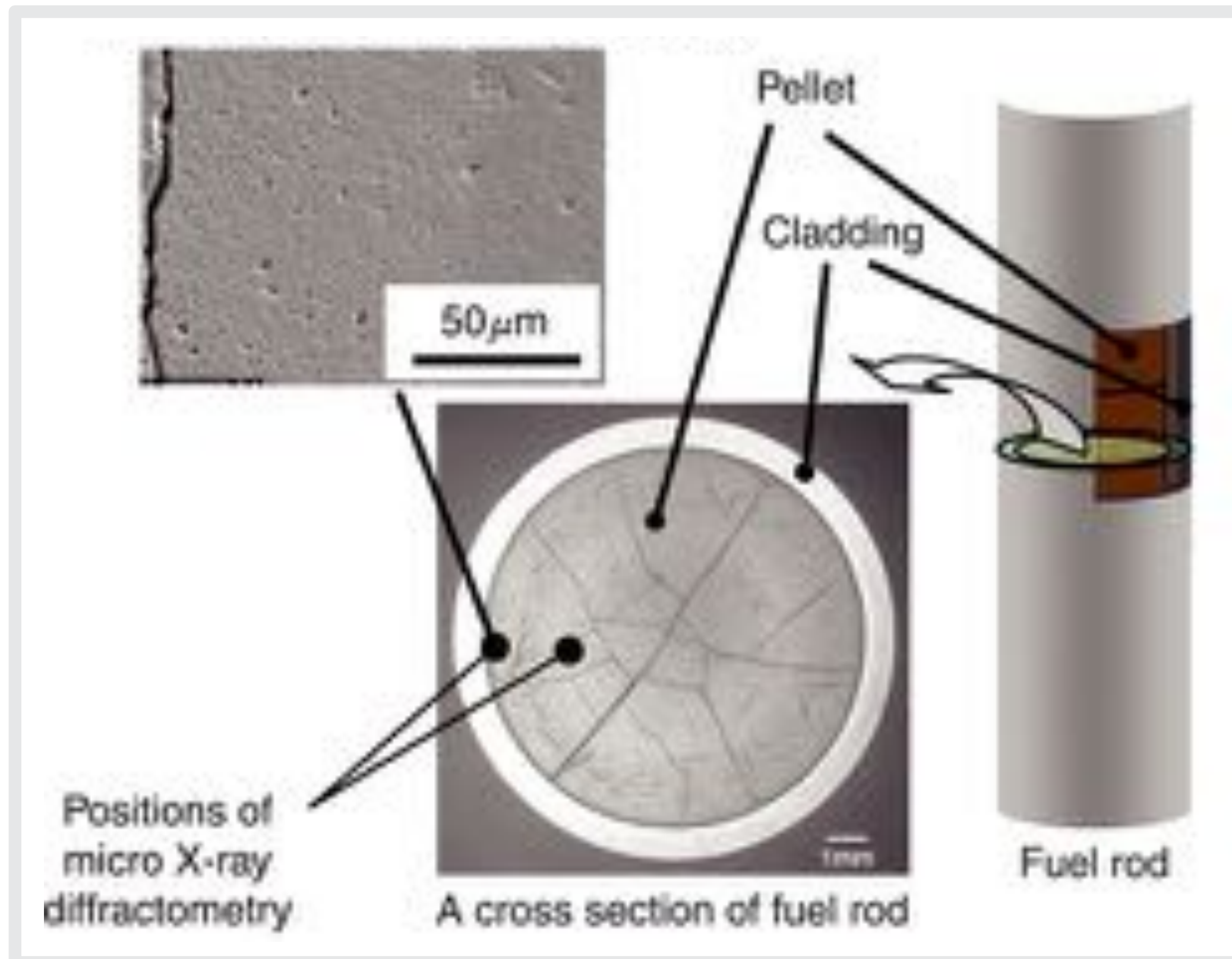
Key Requirement 1: Molten Salt Coolant

- High Temperature:
 - Improved efficiency
 - Industrial heat
- Safe
 - No phase transition to a vapor
 - Walk-away-safe



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



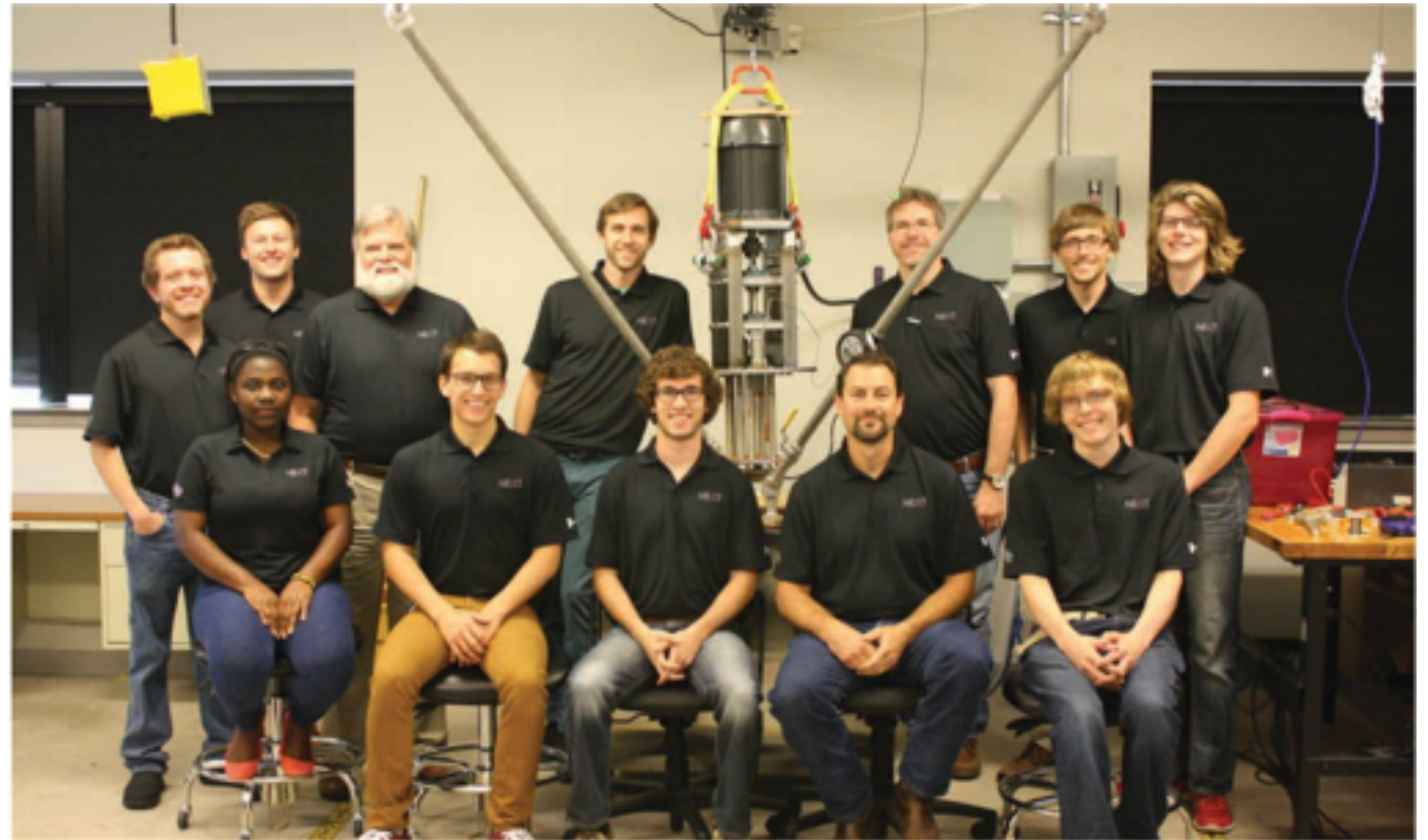
Natura Resources, LLC is committed to answering the world's increased demand for **reliable energy**, **medical isotopes**, and **clean water**, by developing **commercially deployable** molten salt reactors (MSRs)

NEXT Team (2017)

NEXT

Nuclear Energy eXperimental Testing

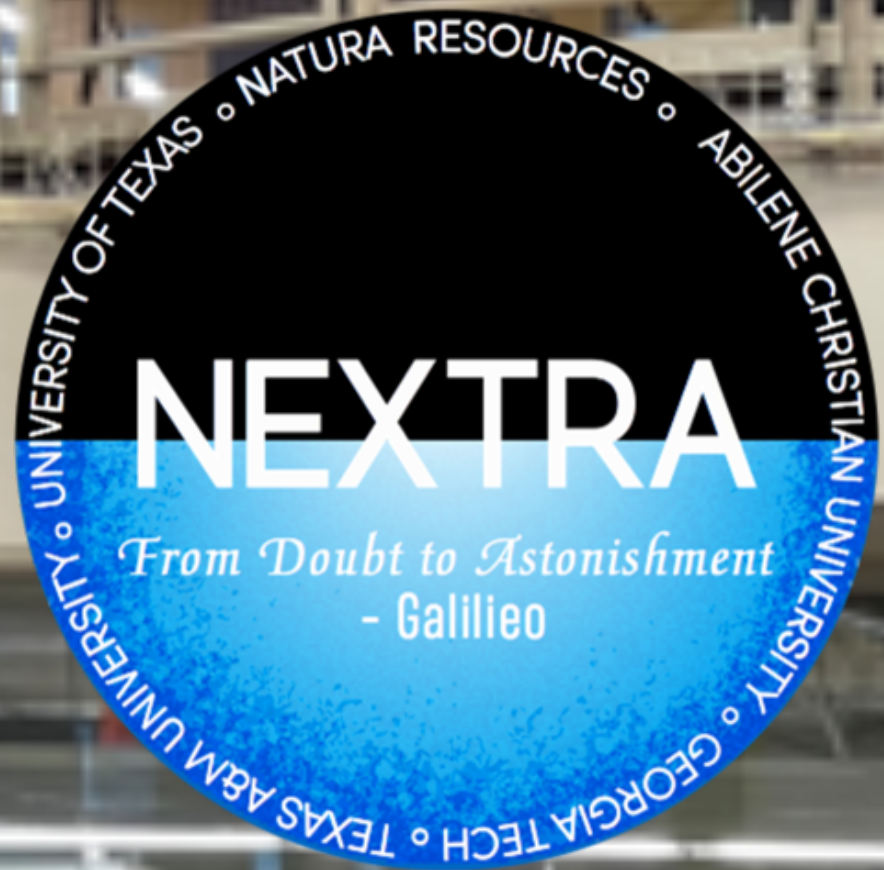
- 5 faculty/staff members
- 7 students
- 2 lab rooms
- Advisory Board



Summer 2022 NEXT Team

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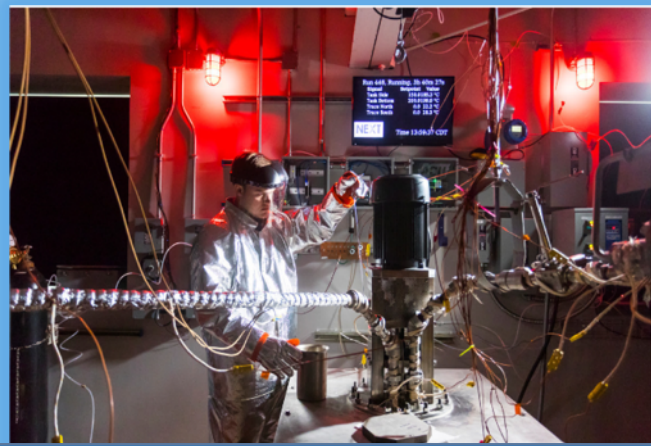




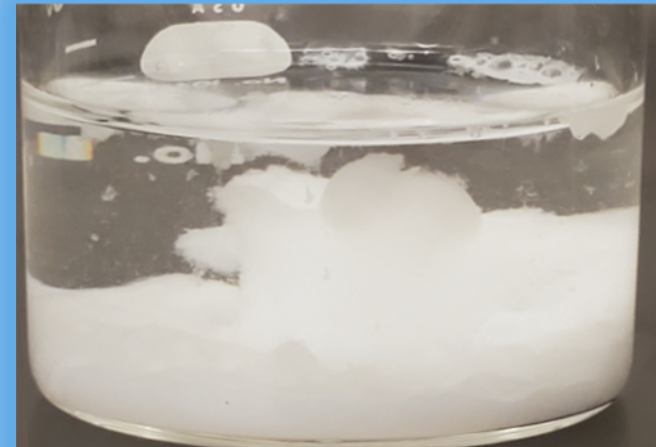
NEXTRA

Faculty & Staff

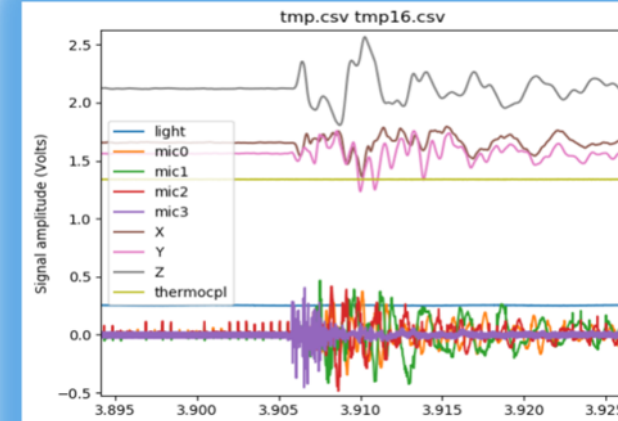
NEXT Lab Research Projects



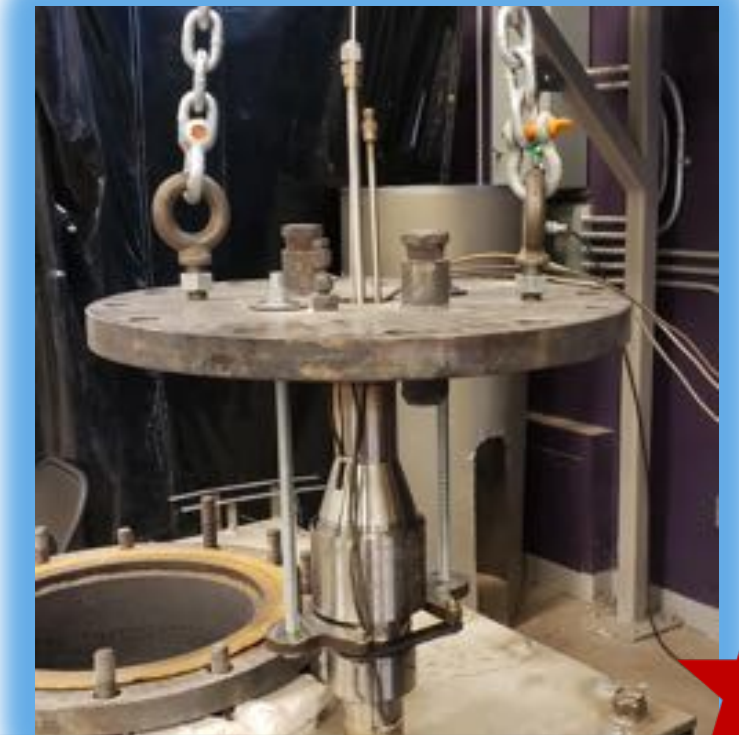
Molten Salt Test Loop



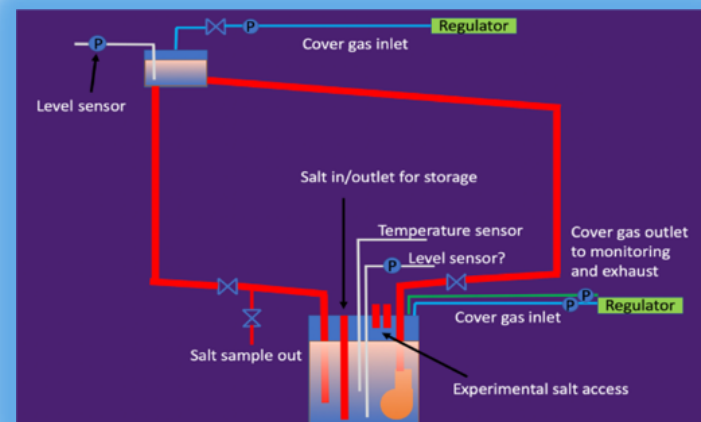
Isotope Extraction & Purification



Instrumentation



Component Test System



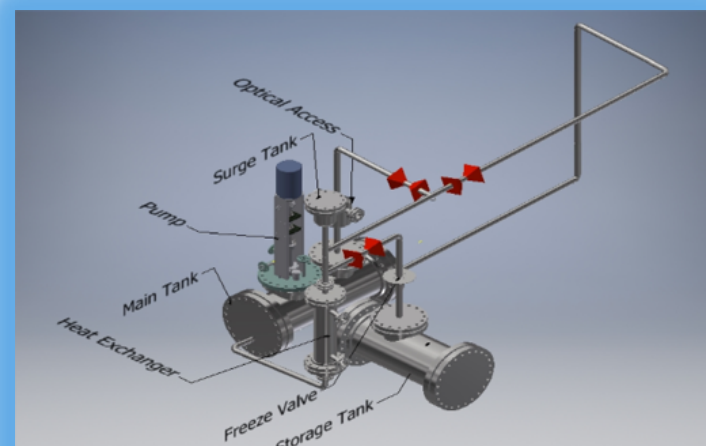
Fluoride Molten Salt Test Loop



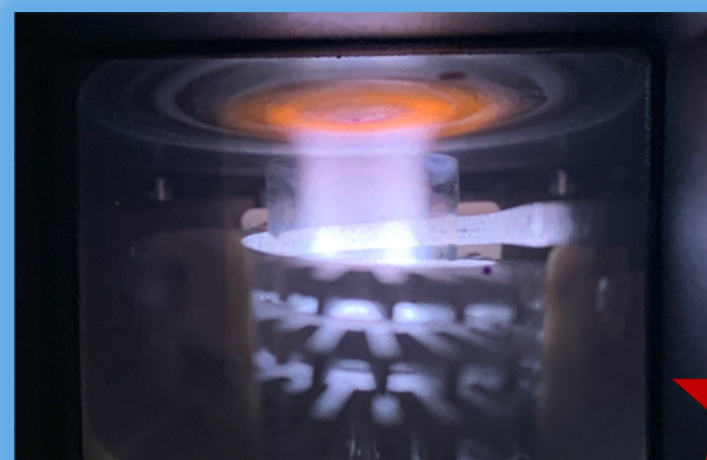
Salt Purification System



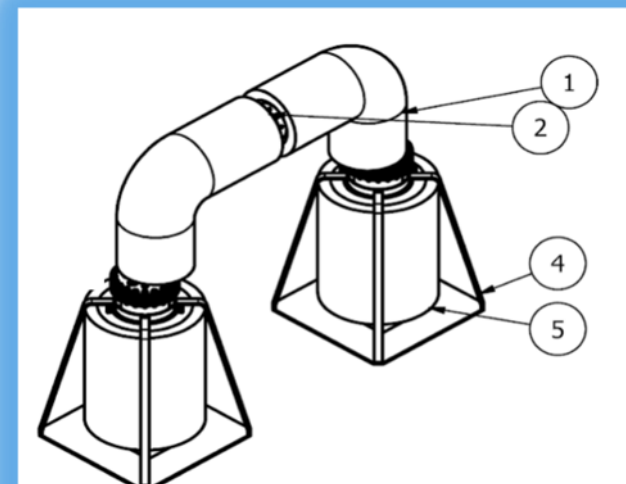
Data Acquisition



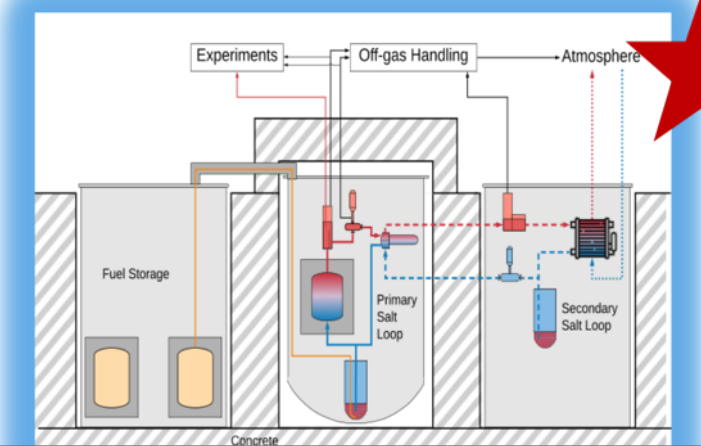
Molten Salt Test System



Chemical Analysis System



Molten Salt Filters



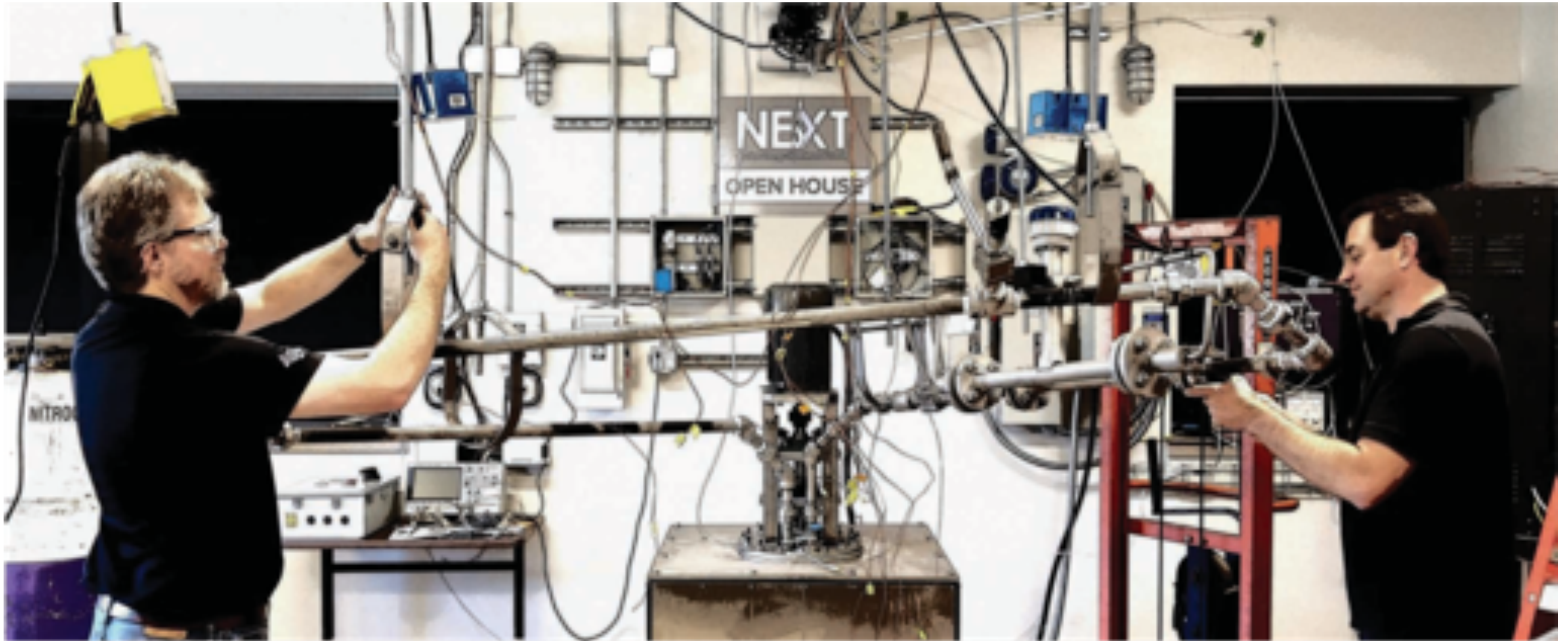
Molten Salt Research Reactor



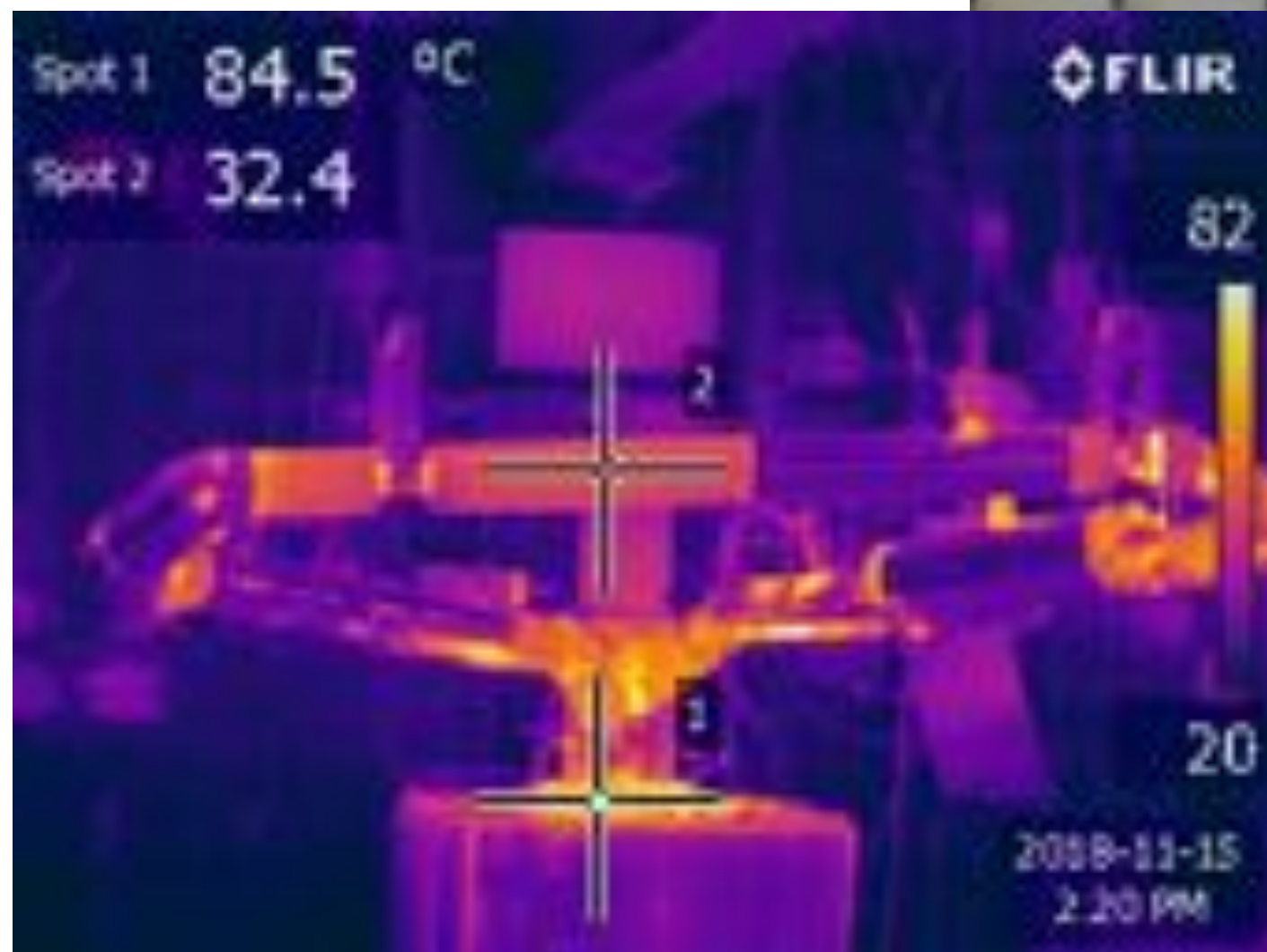
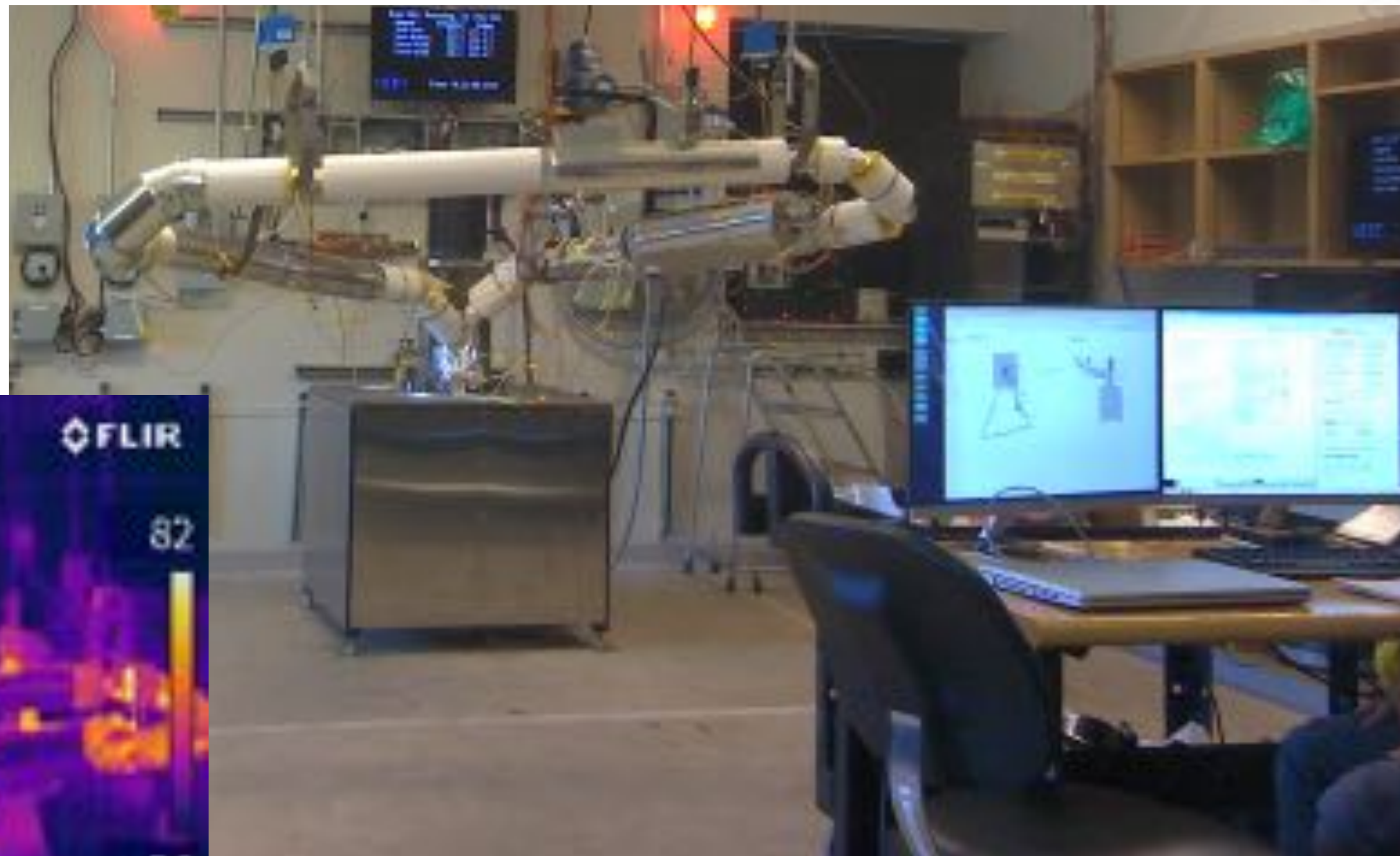
Molten Salt Test Loop

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Nuclear Energy eXperimental Testing



Molten Salt Test Loop

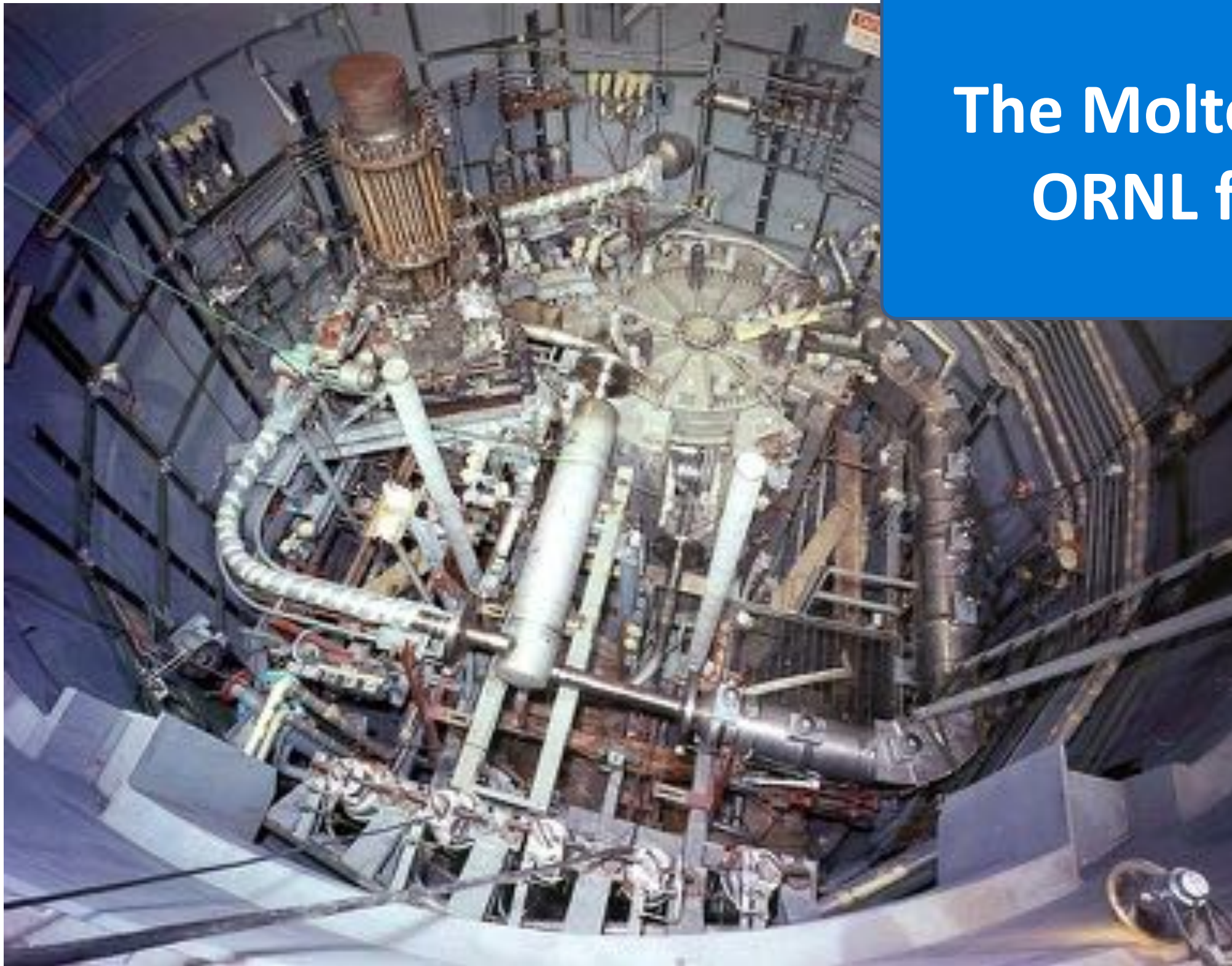


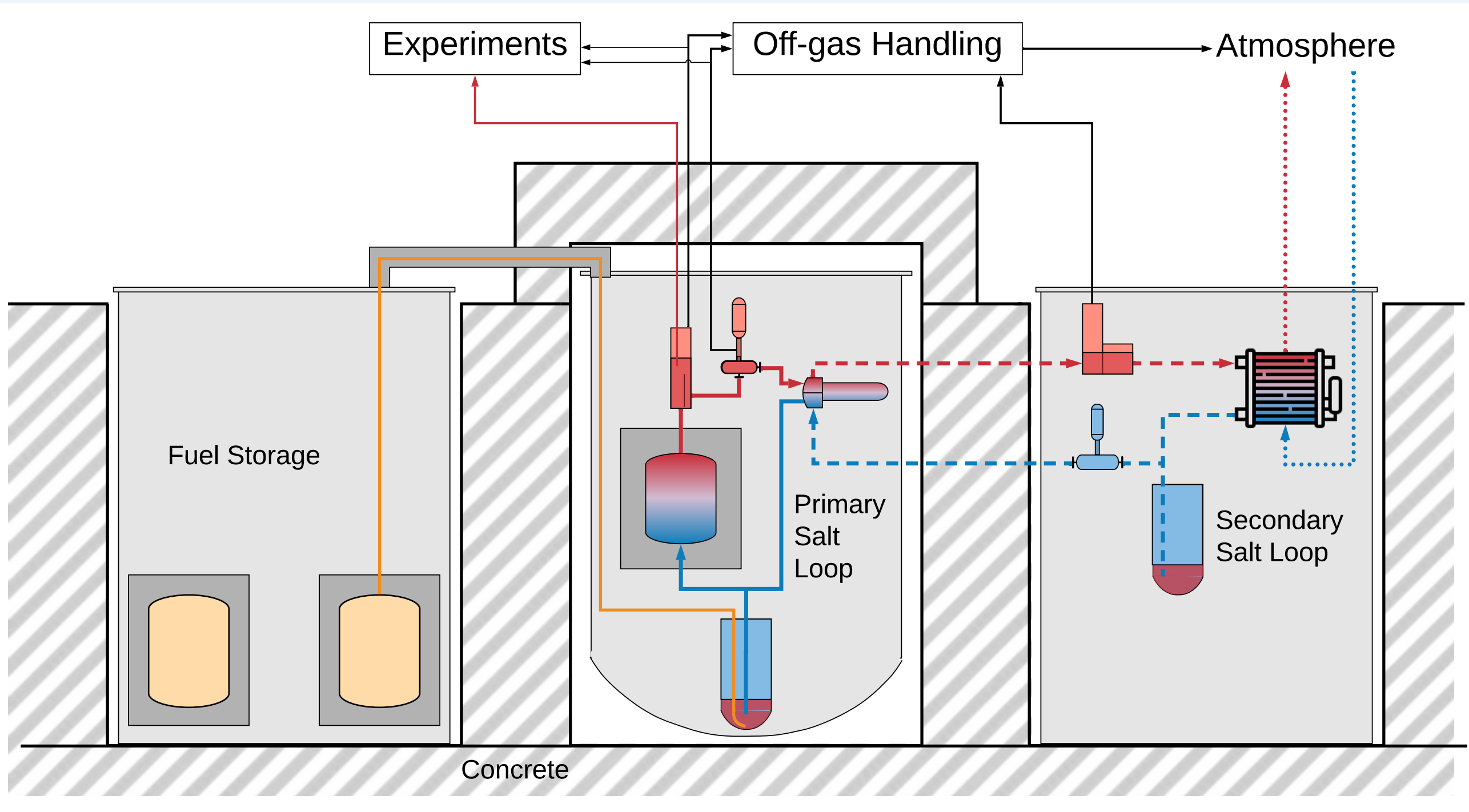
Molten Salt Research Reactor is Simplified MSRE



Nuclear Energy eXperimental Testing

The Molten Salt Reactor Experiment operated at ORNL from 1965-1969 on U-235 and U-233.





MSRE

shared concepts

- UF_4 LiF-BeF₂ fuel
- Loop design
- Graphite moderator
- Drain tank
- Trench-based radiation protection
- 5-years of full-power operation

MSRR

simplified concepts

- 19.75% instead of 33% ²³⁵U
- 1 MWth instead of 8-10 MWth
- SS-316 instead of Hastelloy-N
- No freeze valve
- Utilizing 50 years of technology advancement

University Research Reactors

NEXT

NuclearNews

April 2022

University Programs

Four universities team up to design molten salt research reactor

Fri, Aug 21, 2020, 12:11PM | Nuclear News

Abilene Christian University (ACU) is leading a consortium called NEXTRA—the Nuclear Energy Experimental Testing Research Alliance—with the Georgia Institute of Technology, Texas A&M University, and the University of Illinois at Urbana-Champaign.

U of Illinois plans to integrate research microreactor

Wed, Aug 19, 2022, 10:00AM

The University of Illinois at Urbana-Champaign is planning to integrate a research microreactor into its existing research infrastructure. The reactor will be used for a variety of research applications, including the production of isotopes and the study of nuclear reactions.

Abilene Christian's NEXT Lab applies for MSRR construction permit

Thu, Aug 18, 2022, 3:04PM

ANS Nuclear Cafe

The Nuclear Energy eXperimental Testing (NEXT) Laboratory at Abilene Christian University in Texas submitted a construction permit application to the Nuclear Regulatory Commission for its...
The NEXT Lab is a state-of-the-art research facility that will be used for a variety of research applications, including the production of isotopes and the study of nuclear reactions.

University may host the second USNC microreactor in Canada

Tue, May 24, 2022, 10:30AM | Nuclear News

McMaster University, Ultra Safe Nuclear Corporation (USNC), and Global First Power (GFP) have embarked on a new partnership to study the feasibility of deploying a USNC Micro Modular Reactor...





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
- Design Completed: 2021
- Begin Construction: 2022
- Completed: 2023















The Natura Resources sponsored Research Alliance is leading the way in MSR development and deployment.

1. ACU will finish building the SERC in July to house the MSRR.
2. ACU has submitted the construction permit to the NRC.
3. The NRC accepted our CP and agreed to an 18-month review.

NEXTRA

Nuclear Energy eXperimental Testing Research Alliance

Natura
Resources
SUSTAINABLE ENERGY





THANK YOU

acunextlab.org

