

*High-Temperature Teaching & Test Reactor  
(HT<sup>3</sup>R)*

**Research Facility Requirements**

**Presentation to NRC**

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# UTPB Energy, Security & Environment Research Institute

- Train Scientist & Engineers to Develop and Improve Gen IV VHTR Technologies
  - High-Temperature Gas Reactors
  - High-Temperature Processes (H<sub>2</sub>, Syn-Fuels, Water Desalinization, Refractories, etc)
  - Brayton Cycle Electricity Generation
- Support NGNP at INL
- Train Operators and Technical Staff to work at Future Gas Reactor Facilities

# HT<sup>3</sup>R is The Keystone (It's Multifaceted!)

## Supports Many Research Disciplines

- Radiation Research Laboratory
- High-Temperature Materials and Process Development Laboratory
- High-Temperature Energy Transfer Laboratory.

# Radiation Research Laboratory Design Objectives

- Hot Cell & Remote Handling Capabilities
- One or Two Line-of Sight Beam Ports. One will have an On-Line Mass Spectrometer with Moving Tape Collection System

# Radiation Research Laboratory Design Objectives

- Two Automatic Sample Irradiation tubes (“Rabbits”). One to Hot Cell, One to Remote Counting Station.
- Positions in Reactor Core to Test Fuel

# High-Temperature Materials & Process Development Laboratory Design Objectives

- Develop New Refractory Materials that can be machined and molded into “usable” shapes and sizes.
- Develop economic processes to:
  - Generate non-petroleum sources of hydrocarbons to be used in transportation
  - Generate Hydrogen from Water
  - Generate desalinated potable water from brines like sea water.

# High-Temperature Energy Conversion Laboratory Design Objectives

- R&D on Advanced Brayton Cycles
- R&D on Advanced Gas Turbine Components: bearings, seals, recuperators, etc.

# Wanted From the NRC

- Input on Licensing Process for Estimation of Cost & Schedule for PCD (2006)
- Review of Licensing Plan Developed During Conceptual Design (2007)
- HT<sup>3</sup>R Licensing Complete by 2012