The VTR Mission

Nuclear Energy Innovation Capabilities Act, 2017 and the *Consolidated Appropriations Act, 2021* amended Section 955 of the *Energy Policy Act (EPACT), 2005* and directs the Secretary of Energy to provide for a versatile reactor-based fast neutron source by 2026.

Amendments. EPACT was modified to include the following regarding the Versatile Test Reactor:

Section (c) (1) (A) ...the Secretary (of Energy) shall provide for a versatile reactor-based fast neutron source...

Section (c) (3) Facility requirements

(A) Capabilities - The Secretary shall ensure that the user facility will provide, at a minimum, the following capabilities:

(i) Fast neutron spectrum irradiation capability.

(ii) Capacity for upgrades to accommodate new or expanded research needs.

(c) (3)(B) Considerations.--In carrying out the plan submitted under paragraph (2), the Secretary shall consider the following:

(i) Capabilities that support experimental high-temperature testing.

(ii) Providing a source of fast neutrons at a neutron flux, higher than that at which current research facilities operate, sufficient to enable research for an optimal base of prospective users.

(iii) Maximizing irradiation flexibility and irradiation volume to accommodate as many concurrent users as possible.

(iv) Capabilities for irradiation with neutrons of a lower energy spectrum.

(v) Multiple loops for fuels and materials testing in different coolants.

(vi) Additional pre-irradiation and post-irradiation examination capabilities.

(vii) Lifetime operating costs and lifecycle costs.

(c)(4) Deadline for establishment.--The Secretary shall, to the maximum extent practicable, complete construction of, and approve the start of operations for, the user facility by not later than December 31, 2026

Mission Capabilities and Requirements. DOE has identified the following to meet the mission need:

- Generate a high-peak fast-neutron flux to enable accelerated fuel and material testing
- Produce a high-neutron dose rate for materials testing
- Accomodate test sample lengths appropriate for fast-reactor fuel testing
- Provide a large test volume within the reactor's core region
- Enable innovative testing capabilities and flexibility in configuration and environment (ability to test materials in different reactor coolants)
- Provide the ability to test advanced sensors and instrumentation
- Have easy access to support facilities for experiment fabrication and post-irradiation examination
- Manage the reactor driver fuel (fuel needed to run the reactor)
- Enable access to the facility for testing as soon as possible.

Purpose and Need for the VTR. DOE describes the necessity of the VTR in Chapter 1, Section 1.3, of the Draft VTR EIS.