



TRIGA RC-1 RESEARCH NUCLEAR REACTOR

A NEUTRON SOURCE SERVING SCIENCE AND SOCIETY

The **TRIGA RC-1**, research nuclear reactor, located at the ENEA Casaccia Research Center, was built in the 1960s and has been operating since 1969 at a power of **1 MW**. TRIGA RC-1 is a pool-type thermal nuclear reactor, with the core inserted in a cylindrical graphite reflector and immersed in demineralized water.

Water performs three key functions: neutron moderator, coolant, and biological shielding.

The low-enriched fuel (19,9% ^{235}U) consists of cylindrical elements made of a ternary Zr-H-U alloy. The presence of zirconium hydride gives the reactor a strong prompt negative temperature coefficient, ensuring intrinsic safety.

The thermal power generated is removed by natural water circulation, maintained at constant temperature through heat exchangers and cooling towers.

Technical data

- Maximum power: 1 MW
- Maximum neutron flux: $2,7 \times 10^{13} \text{ n/cm}^2\cdot\text{s}$
- Cooling: [convezione naturale dell'acqua](#)
- Core: annular structure immersed in water

Fuel and configuration

- Uranium-ZrH alloy 19.9% enrichment
- 7 concentric rings of fuel elements
- Moderator and coolant: [water](#)

High safety standards

- Core immersed in water (~6 m shielding)
- Concrete shielding structure

EXPERIMENTAL FACILITIES

TRIGA RC-1 is equipped with a wide range of irradiation channels and devices.

Main facilities include

- Central thimble (high flux)
- 40-position rotary rack (Lazy Susan)
- Pneumatic "Rabbit" system
- 6 horizontal neutron beam channels
- Thermal column and thermalizing column

ISO 9001 certification

APPLICATIONS AND RESEARCH ACTIVITIES

The TRIGA RC-1 provides an intense neutron source used in various fields:



Nuclear Medicine

- Feasibility studies for radioisotope production
- Development of new radiopharmaceuticals for diagnostics and therapy



Industry

- Radioisotopes and tracers for industrial processes
- Dosimetry: radiation dose studies and measurements
- Radiation damage: testing the resistance of electronic components to harsh environments (e.g. space missions)



Scientific Research

- Neutron Activation Analysis (NAA): trace and ultra-trace element identification in samples from research, industry, medicine, cultural heritage, and forensics
- Detector calibration: testing and validation of neutron instrumentation

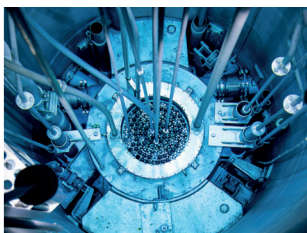
EDUCATION AND FUTURE

TRIGA RC-1 is a national reference for: university training, nuclear plant operator training, and advanced skills development.

Activities include practical reactor experience, experiment design, and neutron measurements.

A strategic infrastructure

TRIGA RC-1 represents a unique infrastructure in Italy: the availability of neutron beams with different spectra and energies makes it a hub for basic research, industrial applications, medicine, and cultural heritage protection, as well as a training ground for new generations of scientists and engineers.



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