Research and Training Reactors

Position Statement
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The American Nuclear Society (ANS) recognizes that the nation's research and training reactors (RTRs) are vital elements of the U.S. nuclear science and technology education, training, and research infrastructure. Therefore, the ANS endorses government, industry, and university programs that maintain and expand the fleet of research and training reactors at U.S. universities, national laboratories, and corporations.

RTRs SERVE THE NATION'S INTERESTS IN THREE MAIN AREAS: RESEARCH, EDUCATION, AND SERVICE.

Research

- Characterization of current and advanced materials using advanced neutron science
- Advancement in power reactor safety and the establishment of scientific bases for new reactor designs
- Development of high-technology applications in fields where neutron sources are needed, such as materials science, fluid dynamics, and biomedical science
- Exploration of basic science in diverse fields such as archaeology, biology, chemistry, medicine, and physics
- Advancement of neutron imaging techniques to investigate phenomena such as the behavior of hydrogen fuel cells in advanced automobiles

Education

- Preparation of the next generation of nuclear engineers, physicists, and energy professionals by providing undergraduate and graduate students with unique hands-on experiences, including observing the nuclear fission process and the interaction of radiation with matter, gaining an understanding of important nuclear systems, and becoming familiar with nuclear regulations and safety procedures
- Training students to operate, maintain, regulate, and improve reactors and other facilities associated with national defense and nuclear power activities by allowing students to learn to operate the controls, pumps, valves, and electronics associated with complex industrial systems
- Providing research opportunities for undergraduate and graduate students through hands-on experience with the production, safe handling, and use of radioactive materials in laboratories
- Education of future generations of radiochemists
- Enhancing public awareness and counteracting irrational fears of nuclear science and applications through tours and demonstrations
- Stimulating the interest of America's youth in science and nuclear science

Service (to the Community, the Nation, and the World)

- Medical and industrial radioactive isotope production
- Radiation effects characterization of power plant materials and electronics for space missions
- Characterization of performance of spent fuel shipping and storage casks, and radiation detectors
- Testing of new detection systems and advanced instrumentation for nuclear power facilities and nuclear security applications
- Nondestructive inspection of critical components for industry, defense, and space missions

RTRs HAVE EXEMPLARY SAFETY RECORDS BEFITTING THEIR RESEARCH AND EDUCATIONAL MISSION.

In general, RTRs generate significantly less heat and radiation than large power reactors. Many RTRs have simple, robust designs that make them ideal tools for student operators and researchers and ideal reactors for placement on university campuses. Their design and smaller size often simplifies their physical security requirements and safety case.

RTR DESIGNS ARE SCALABLE ACCORDING TO THEIR MISSIONS.

Low-Power Reactors (< 250 kW) are excellent for operator training and student education as well as radio-nuclear applications such as neutron activation analysis (NAA).

Mid-Power Reactors (250–2000 kW) are extremely flexible and can perform a wide range of research activities including neutron beam research, neutron scattering, and radiography, as well as training and NAA.

High-Power Reactors (> 2000 kW) are major research tools at national laboratories and select universities. These reactors perform vital research in materials behavior under irradiation, produce isotopes for research and medicine, and provide high-flux neutron beams for research.

Pulsing Reactors (TRIGAs and PULSTARS) operate in a pulsed mode, with short-term excursions up to 40,000 MW, to examine the effects of radiation bursts on materials.

STATEMENT OF SPECIAL CONSIDERATION

The ANS recognizes the specialized roles that RTRs fulfill in university, government, and industry programs as they collectively help to achieve and maintain U.S. technical leadership in nuclear research. RTRs provide an important and unique tool to meet the scientific challenges of today and the future. However, the future of the RTR community in the U.S. is at risk. The continuing decline in financial support within the U.S. government for basic RTR infrastructure, as well as the increased cost of

relicensing and security measures, may force universities and research institutes to terminate their RTR programs. Therefore, the ANS believes that special consideration should be given to:

- Continued national funding support to maintain and expand RTR fuel and infrastructure programs, without which RTR programs are at risk of declining;
- U.S. government funding and encouragement of collaborative efforts between government facilities and universities to enhance the utilization of existing RTRs; and
- Efforts to identify and address the future needs by working towards development and deployment of the next generation of nuclear research and training facilities.

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The American Nuclear Society, founded in 1954, is a not-for-profit scientific and educational society of over 11,500 scientists, engineers, and educators from universities, government and private laboratories, and industry.

Position Statements are the considered opinions and judgments of the Society in matters related to nuclear science and technology. They are intended to provide an objective basis for weighing the facts in reaching decisions on important national issues.