Department of Nuclear Energy
Division of Nuclear Fuel Cycle and Waste Technology

IAEA
International Atomic Energy Agency

Fact Sheet on Research Reactor Support

What are the issues?

Research reactors (RRs) have been used in a wide range of applications including nuclear power development, basic physics research, education and training, medical isotope production, geology, industry and other fields. However, many research reactors are fuelled with High Enriched Uranium (HEU), are underutilized and aging, and have significant quantities of spent fuel. HEU inventories (fresh and spent) pose security risks Unavailability of a high-density-reprocessable fuel hinders conversion and limits back-end options and represents a survival dilemma for many RRs. Improvement of interim spent fuel storage is required at some RRs. Many RRs are under-utilized and/or inadequately funded and need to find users for their services, or permanently shut down and eventually decommission. Reluctance to decommission affect both cost and safety (loss of experienced staff) and many shut down but not decommissioned RR with fresh and/or spent fuel at the sites invoke serious concern.

What are the benefits of research reactor support?

Research reactor support helps to ensure that research reactors can be operated efficiently with fuels and targets of lower proliferation and security concern and that operators have appropriate technology and options to manage RR fuel cycle issues, especially on long term interim storage of spent research reactor fuel. Availability of a high-density-reprocessable fuel would expand and improve back end options.

What services does Nuclear Fuel Cycle and Materials provide?

- assistance to Member States to convert research reactors from High Enriched Uranium fuel and targets (for medical isotope production) to qualified Low Enriched Uranium fuel and targets while maintaining reactor performance levels. The assistance includes provision of handbooks and training in the performance of core conversion studies, advice for the procurement of LEU fuel, and expert services for LEU fuel acceptance.
- technical and administrative support for countries considering repatriation of its spent research reactor fuel to the country of origin under the U.S. Spent Fuel Acceptance Program and the Russian Research Reactor Fuel Return program. This includes the provision of handbooks on technical and administrative preparations for shipping the fuel, as well as training courses.
- evaluation of the current status, progress and trends of research reactor spent fuel storage projects or national programmes in this field, present proven technologies and/or organizational/managerial practices that can serve as models to solve specific issues. We also provide assistance in specific areas such as: assessment of infrastructure required to plan and implement research reactor spent fuel storage (wet or dry), improvement of management practices, implementation of water quality programmes, implementation of corrosion surveillance programmes and assessment of costs associated with research reactors spent fuel storage.

What are recent NFC&MS activities in research reactor support?

- technical support, advice, and assistance to several countries that are converting research reactors from HEU to LEU fuel, including countries with Russian-designed research reactors.
- international initiatives to encourage the conversion of research reactors.
- promoting the analysis of the use of LEU in accelerator-driven sub-critical facilities.
- developing international guidelines for research reactor fuel qualification.
- transferring technology to enable countries to produce for local needs the medical radioisotope Mo-99 from LEU or neutron activation.

- developing guidelines for research reactor operators to analyze various fuel cycle options (e.g. uranium and fuel provision, core management, spent fuel management).
- assisting countries in analyzing the effects of long-term storage of aluminium-clad fuel in water, implementing water quality programmes, corrosion surveillance programmes and in general all aspects of RR spent fuel storage.

How to benefit from this activity?

- Member States interested in repatriating fresh or spent research reactor fuel, especially High Enriched Uranium and converting their reactor to Low Enriched Uranium fuel should contact the Technical Cooperation Department of the IAEA.
- Member States interested in knowing more about the Agency's programme on research reactor support should contact:

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