



IAEA's SUBPROGRAMME ON RESEARCH REACTORS

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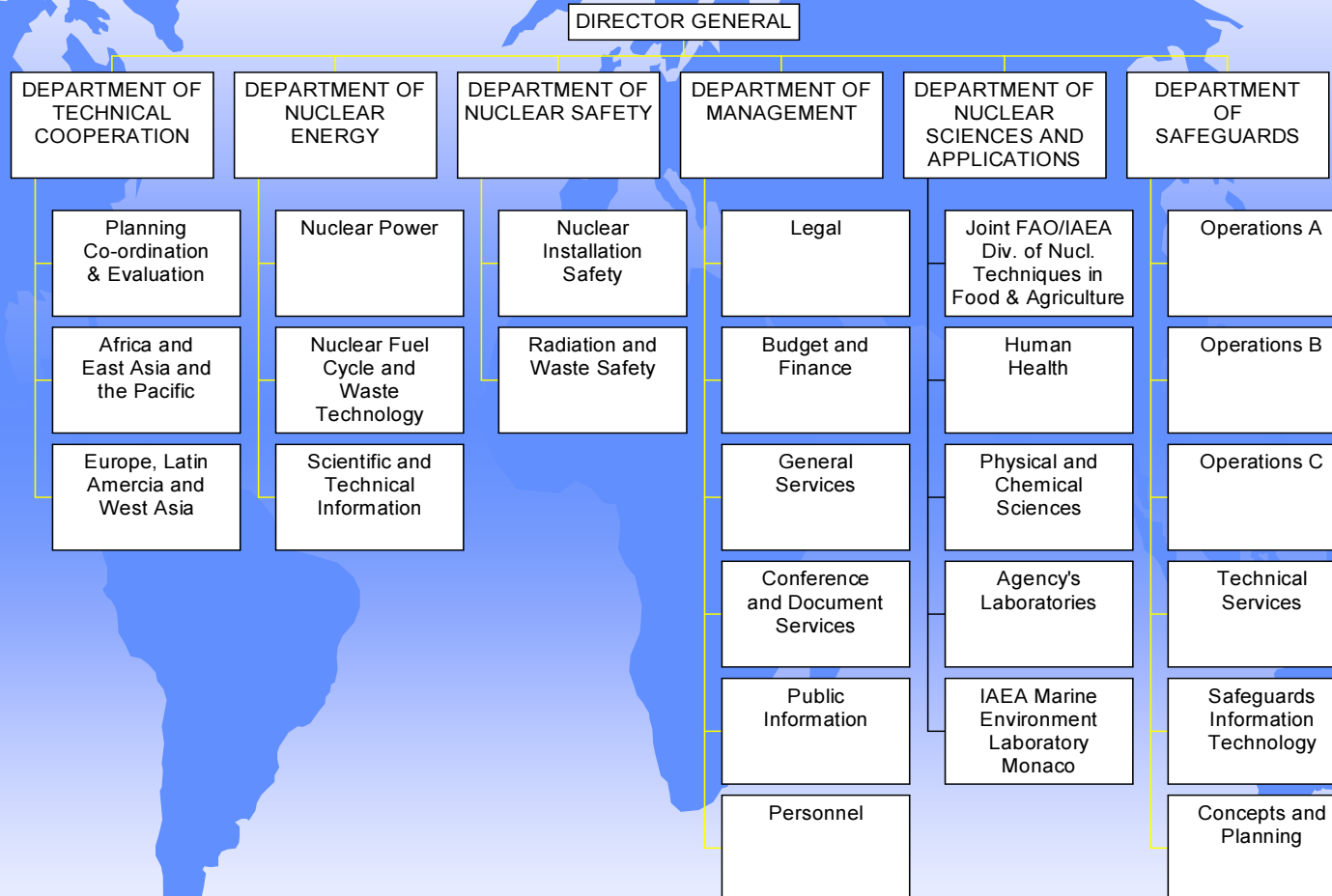


Outline

- Introduction: Organization Setting
- Programmatic Structure
- Strategic Directions
- Projects under Subprogramme on RRs
- Recent Publications
- Publications in the pipeline
- Conclusions



IAEA Organizational Chart





Programmatic Structure

→ Programme D. Nuclear Science

→ Subprogramme D.2: Research Reactors

- ☞ Project D.2.0.1: Enhancement of utilization and applications of RRs
- ☞ Project D.2.0.2: Supporting RR Modernization and Innovation
- ☞ Project D.2.0.3: Addressing RR Fuel Cycle Issues
- ☞ Project D.2.0.4: Transfer of Know-how on Decommissioning of RRs and Irradiated Core Materials
- ☞ Project D.2.0.5: RR Operation, Maintenance, Availability and Reliability



Strategic Directions

- ◆ Focus on:
 - Strategic planning
 - Increase use (i.e. isotope production, materials modification)
 - Refurbishment and replacement of ageing equipment
 - Fuel cycle issues (i.e. spent fuel management, HD fuel qualification)
 - Planning decommissioning



Strategic Directions (Cont'd)

◆ Focus on:

- Regional and interregional thematic collaborations, networking and centres of excellence
- Support of the HEU minimization efforts
- RR support needed for evolutionary and innovative nuclear power reactors and fuel cycles (increased interest in nuclear power)
- International collaboration to assess projected needs for research reactors



Subprogramme D.2 - Research Reactors

Objective 1

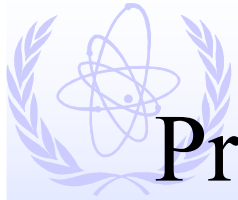
- Increase capabilities of interested MS to safely and reliably carry out:
 - ☞ Scientific research and technology development at RRs; and
 - ☞ Conduct ageing management, decommissioning, refurbishment and modernization.



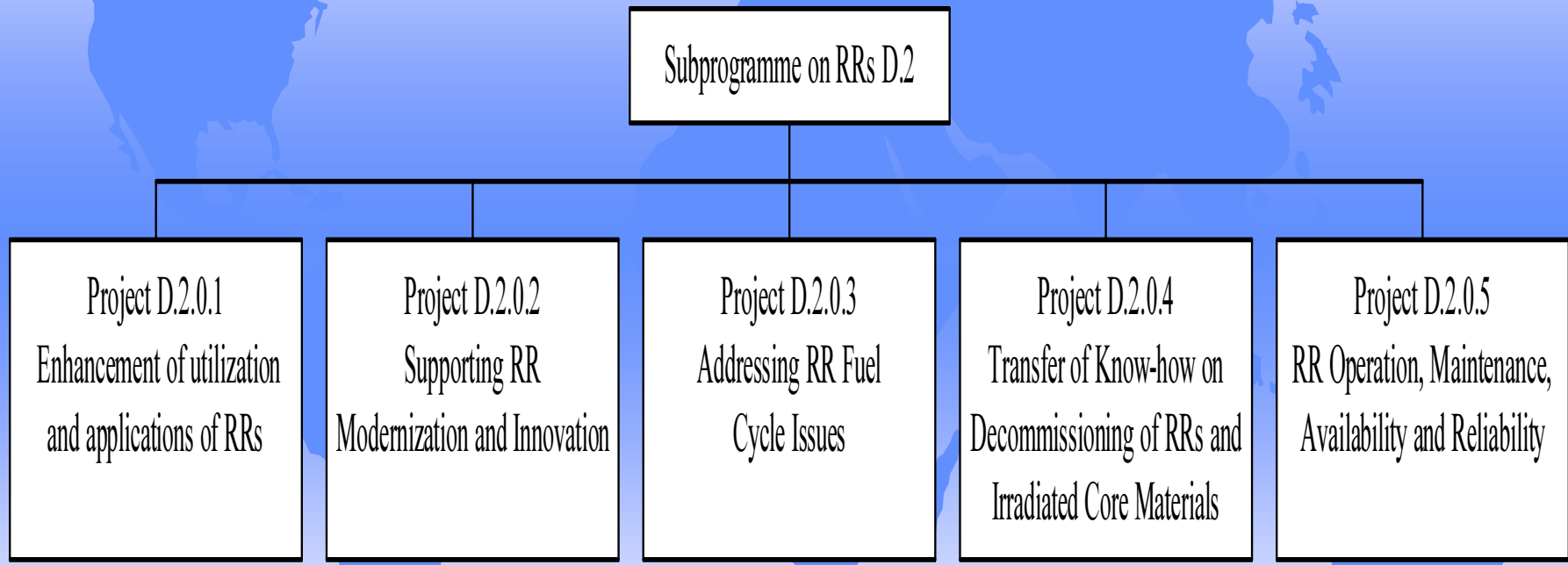
Subprogramme D.2 - Research Reactors

Objective 2

- Enhance potential of interested MS to:
 - ☞ Plan new facilities when needed;
 - ☞ Cope with RR fuel cycle issues; and
 - ☞ Reduce proliferation risks by:
 - Conversion from HEU to LEU of RRs cores;
 - Conversion of targets for RI production; and
 - Returning fuel to the country of origin.



Projects Under the Subprogramme on RRs





Project D.2.0.1: Enhancement of Utilization and Applications of RRs

Objectives

- To enhance RR utilization in Member States for many practical applications:
 - ☞ Isotope production;
 - ☞ Neutron radiography;
 - ☞ Neutron beam research;
 - ☞ Material characterization and testing; and
 - ☞ increase cooperation between different RR centres.



Project D.2.0.1: Enhancement of Utilization and Applications of RRs

Activities

- Strategic planning and regional networking for sustainability;
- RR Database (RRDB);
- RR application for materials development / testing;
- Support for the IAEA-TC projects involving utilization and applications of RRs;
- Data acquisition and analysis for neutron beam line experiments; and
- Other specific application of RRs.



Project D.2.0.2: Supporting RR Modernization and Innovation

Objectives

- To increase the competence of interested MS to plan and implement :
 - ☞ Refurbishment of RRs;
 - ☞ Modernization of RRs;
 - ☞ Construction of new RRs or major RR systems; and
 - ☞ Improvement of RRs performance.



Project D.2.0.2: Supporting RR Modernization and Innovation

Activities

- Develop RR coalitions, networks and centres of excellence;
- Provide advice and assistance as requested to RR planning, modernization or refurbishment;
- Support activities on RR innovative technologies;
- Support initiatives on innovative RRs; and
- Assist in planning new facilities.



Project D.2.0.3: Addressing RR Fuel Cycle Issues

Objectives

- Strengthen capability of interested MS to deal with all fuel cycle issues:
 - ☞ Fuel development;
 - ☞ Fuel fabrication;
 - ☞ Fuel qualification; and
 - ☞ Spent fuel management
- To promote:
 - ☞ Conversion from HEU to LEU;
 - ☞ Return spent and fresh fuel to the country of origin; and
 - ☞ Regional solutions to the back end of the fuel cycle.



Project D.2.0.3: Addressing Research Reactor Fuel Cycle Issues

Activities

- Database on spent fuel from RRs;
- Assistance to RRs with degraded spent fuel;
- Support conversion of RRs and return of spent and fresh fuel to the country of origin;
- Support development of high density U-Mo fuels;
- Promote good practices for the management of RR spent fuel;



Project D.2.0.3: Addressing Research Reactor Fuel Cycle Issues

Activities

- Studies on economic aspects of the RR nuclear fuel cycle;
- Support use of LEU in accelerator driven subcritical assemblies;
- Coordinate an International Technical Working Group on RRs;
- Support small-scale, indigenous production of Mo-99 using LEU or neutron activation; and
- Evaluation of RR support needed for the innovative nuclear power reactors and fuel cycles.



Project D.2.0.4: Facilitating Transfer of Know-how on Decommissioning of RRs and Irradiated Core Materials

Objectives

- To increase the capability in interested Member States with RRs to plan and implement decommissioning; and
- To improve understanding of the ageing of irradiated materials and advanced materials for reactor core applications.



Project D.2.0.4: Facilitating Transfer of Know-how on Decommissioning of RRs and Irradiated Core Materials

Activities

- Studies on decommissioning of RRs and other small nuclear facilities under constrained resources;
- Improve understanding of ageing irradiated core materials;
- Studies on cost estimates for decommissioning of RRs; and
- Postirradiation inspection of RR fuel.



Project D.2.0.5: Research Reactor Operation, Maintenance, Availability and Reliability

Objectives

- Increase the competence of interested MS to:
 - ☞ develop operations and/or maintenance plans;
 - ☞ Implement these plans; and consequently
 - ☞ optimize facility availability and reliability.



Project D.2.0.5: Research Reactor Operation, Maintenance, Availability and Reliability

Activities:

- Disseminate information on good practices on RR availability and reliability;
- Support projects involving operation, maintenance, availability and reliability improvements.



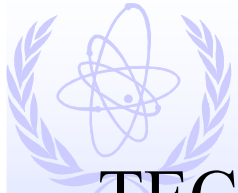
Recent Publications

- Utilization Related Design Features of Research Reactors: A Compendium, Technical Reports Series No. 455, 2007
- Spent Fuel Management Options for Research Reactors in Latin America, IAEA TECDOC Series No. 1508, 2006
- Understanding and Managing Ageing of Material in Spent Fuel Storage Facilities, Technical Reports Series No. 443, 2006
- Research Reactor Utilization, Safety, Decommissioning, Fuel and Waste Management, Proceedings of an International Conference held in Santiago, Chile, 10-14 November 2003, Proceedings Series, 2005
- Corrosion of Research Reactor Aluminium Clad Spent Fuel in Water, Technical Reports Series No. 418, 2003₂₁



Publications in the pipeline

- Optimization of RR Availability and Reliability – Final DCT and NE Senior Management approval complete. Sent to IAEA Publications Committee on 11-January
- Utility of Aqueous Homogeneous Reactors for the production of ^{99}Mo and other Short Lived Isotopes – DPP Approved, all comments from contributors have been addressed. Final document formatting is in-progress.
- Research Reactor Support needed for Innovative Nuclear Power Reactors and Fuel Cycles – DPP Approved
- RR Modernization and Refurbishment – DPP Submitted, comments from a review consultancy are being addressed by report contributors.



Publications in the pipeline

- TECDOC: "Return of research reactor spent fuel to the country of origin: requirements for technical and administrative preparations and national experiences". Proceedings of a technical meeting held in Vienna, August 28 to 31, 2006 (In Publication Committee)
- Guidelines: "Recommended practices for water quality management in research reactors & related facilities" (In preparation)
- Corrosion of Research Reactor Aluminium Clad Spent Fuel in Water - Report of CRP Phase II (advanced draft)
- Good Practices on Research Reactor Fuel Qualification (final draft and DPP submitted)
- Economic Aspects of the Research Reactor Fuel Cycle (draft needs improvement and additional chapter)



Conclusions

- SP focuses on the different facets of RRs for their effective utilization and management;
- SP addresses non-proliferation concerns: support to GTRI;
- SP supports the establishment of coalitions, regional and interregional thematic collaborations, networking and centres of excellence;
- SP addresses RR support for evolutionary and innovative nuclear power reactors and fuel cycles;



Conclusions

- SP promotes international collaboration to assess projected needs over the long term for RRs on a global and regional basis;
- New project on RR operation, maintenance, availability and reliability has been initiated in 2007; and
- New TWGRR information for knowledge sharing and advice and guidance for implementation of the IAEA's programmatic activities



THANK YOU FOR YOUR ATTENTION!

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