



**International Atomic Energy Agency**

**The History and Evolution of the IAEA  
Technical Assistance Programme on  
Decommissioning and the International  
Decommissioning Network as Its Highest  
Point**

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# OUTLINE

- **The Basis of the Technical Assistance (Co-Operation) Programme of the IAEA**
- **Examples of Technical Co-operation Projects**
- **From Technical Co-operation to Regular Programme**
- **The International Decommissioning Network**



# Management of Technical Co-operation (TC\*) projects

- Funding, administration, overall supervision with the TC Dept. of the IAEA
- Technical strategy and management with technical units from NE, NS Dept. of the IAEA
- **\* Technical Co-operation is the terminology commonly used at the IAEA rather than Technical Assistance**

# Typical TC mechanisms

- **Expert missions (EM)**
- **Equipment and other capital expenditure items**
- **Fellowships/site visits**
- **Technical advice to provide guidance in specialized areas**
- **Radiation monitoring, software, computer codes**
- **Recipient country staff visit other countries for training or info gathering**



# Typical TC mechanisms ( cont'd)

- **Workshops/training courses**
- **Review of policy, operating or regulatory documents**
- **Specific topics in decommissioning and radioactive waste management**
- **Peer review and recommendations by international experts (incl. homework and EMs)**

## Typical TC mechanisms (cont'd)

- **National consultants**
- **To review project progress, exchange views between countries with similar projects etc.**



# Typical activities

- **Expert assistance in drafting or review of decommissioning plans ( Operator)**
- **Expert assistance in drafting or review of legislation/regulations ( Regulator)**
- **Specialist advice on topical issues e.g. management of beryllium wastes**
- **Procurement of neutron activation codes incl. training or radiological characterization instruments**
- **National workshops e.g. record keeping for decommissioning or organizational structures**



## Typical activities (cont'd)

- **Fellowships on waste management state-of-the-art**
- **Scientific visits on EIA methodologies**



# Target audience

- Reactor Operators
- Regulators
- Policy- and Decision-makers (Government officials, etc.)
- Technical Support Organizations (contractors etc.)
- Waste Management Companies



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# **LATVIA (1995-2008)**

**Detailed Decommissioning Plan for IRT Research Reactor  
and Infrastructure Development : the TC project on  
decommissioning that lasted longest  
( current focus on individual technologies)**

# Salaspils, Latvia : detail of the waste cementation plant procured by the IAEA



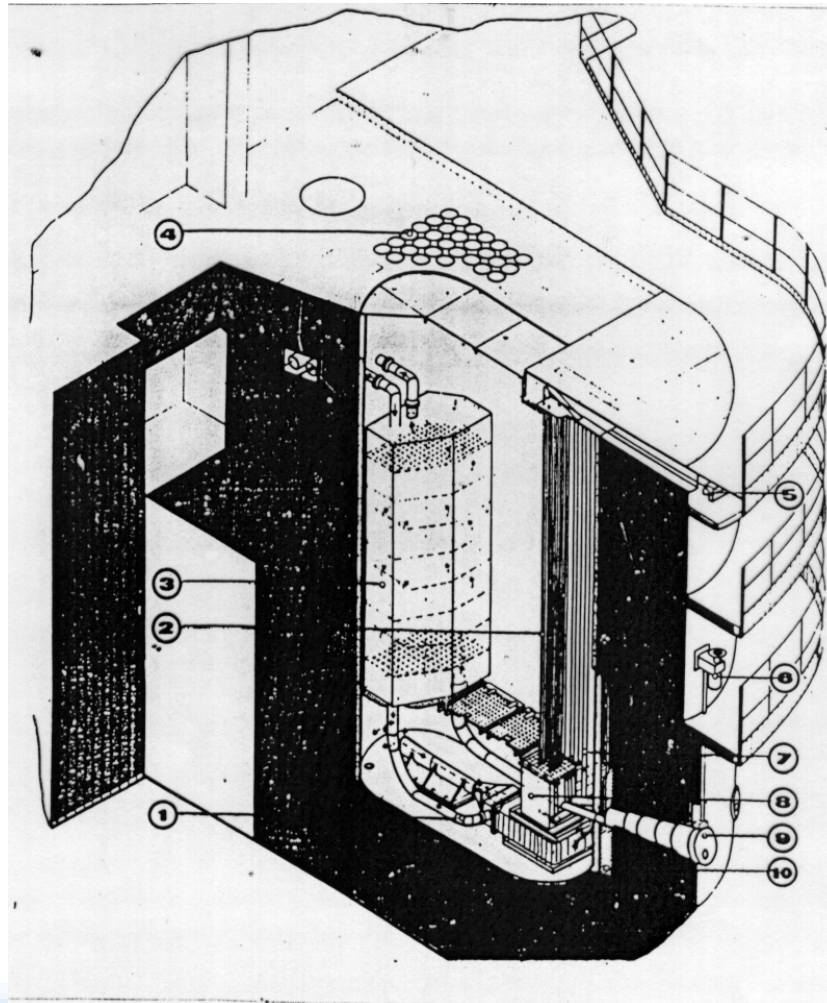


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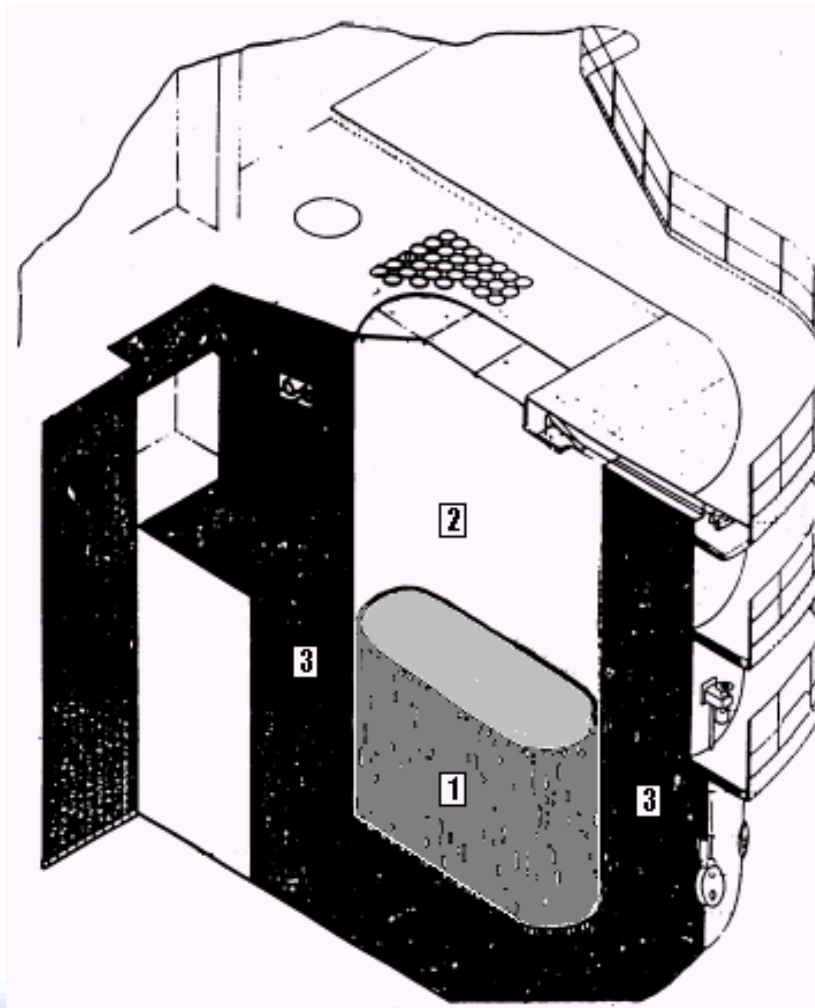
**GEORGIA ( 1997-1999;  
2005-2008; follow-up)**

**Decommissioning of IRT Reactor incl. Implementation  
(Partial Entombment Aug 2002). Continued 2005-8 to  
complete decom of aux systems; in 2009 starting  
dismantling of outdoor piping**

# Georgia's reactor before .....



# .....and after entombment





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# **POLAND ( 1995-1999)**

**Detailed Decommissioning Plan and  
Implementation for WWR Research Reactor  
( Partial Dismantling)**

## Regional project (2004 , ongoing)

- **Decommissioning of research reactors in Eastern Europe**
- **Advice on specified topics ( e.g. Hungary, drafting preliminary decommissioning plans)**
- **Regional Workshops (Istanbul, May 2005, on establishing decommissioning strategies for operational research reactors)**
- **Experts/ lecturers from various countries**

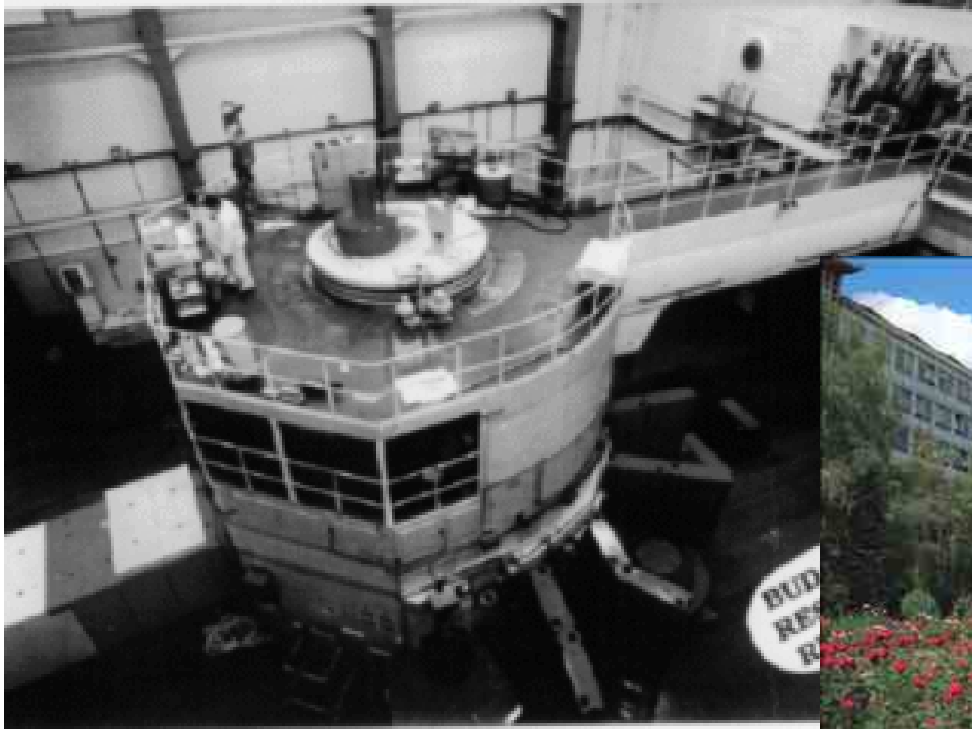




# Research reactors in Hungary

## Budapest Research Reactor, KFKI Atomic Energy Research Institute

- VVR-M10 1959 (1986)
- 10 MW
- 3720 h (2003)



## Training Reactor, Budapest University of Techniques and Economics,

-Pool type (designed by  
Hungarian experts) 1971

- 0.1 MW
  - 310 h (2003)
- ADVICE GIVEN BY IAEA ON  
PRELIMINARY  
DECOMMISSIONING PLAN**



# Training Courses / Workshops either Regional or Interregional \*

- 1997 Bucharest, Romania on decommissioning of RRs ( Regional, Europe)
- 1998, 2000 ANL, USA on decommissioning of RRs ( Interregional)
- 2000 Ljubljana, Slovenia on basics of decommissioning ( Regional, Europe)
- 2002 Buenos Aires, Argentina on decommissioning of RRs (Regional, Latin America)
- 2003 Taejeon, Korea, on decommissioning of RRs (Regional, East Asia)
- 2003 Karlsruhe, Germany on decommissioning of NPPs (Regional, Europe)
- 2004 Vandellos, Spain on issues in decommissioning of NPPs (Regional, Europe)
- 2005 Istanbul, Turkey on decommissioning of RRs (Regional, Europe)
- 2006 Almaty, Kazakhstan on decommissioning of RRs (Regional, Europe)
- 2006 Pretoria, South Africa on decommissioning of RRs (Regional, Africa)
- 2007 Tashkent, Uzbekistan on decommissioning of RRs (Regional, Europe)

\* It does not include progress review or planning events. After 2007, see IDN-related slides

## Training Courses ( cont'd)

- **Audience : 25 ( for regional TCs) or 30 (for interregional TCs) plus local participants**
- **Lecturers: 2 staff members , 2-3 international experts plus local lecturers**



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**FEEDBACK from  
TECHNICAL COOPERATION PROJECTS  
to the REGULAR PROGRAMME**

**(publications, conferences, Coordinated Research Projects (CRP),  
working groups: all forms of “indirect” technical assistance)**

# CRP on Decommissioning Techniques for Research Reactors ( completed in 2002)



**Belarus IRT  
reactor (partly  
dismantled)**

# IAEA Participation in Paldiski International Expert Review Group (PIERG, up to 2000)

Same photo with  
gamma-camera



## TC feed back

- **The TC projects constitute a valuable source of information for the Waste Technology Section on :**

- **Agency Member States' needs**
- **Recurrent RWM issues**

**which are addressed in the Agency regular programme activities (examples follow)**



## TC feed back

- **Decommissioning**
  - **TC projects on planning and implementation of decommissioning at research reactors (Latvia, Romania, Serbia, etc.)**

**TRS-463 Decommissioning of Research Reactors by Making Optimal Use of Available Resources (2008)**





## TC feed back

- **Decommissioning**
  - **TC project on implementation of entombment strategy (Georgia)**

**TECDOC-1124 On-site disposal as a decommissioning strategy (1999)**

## TC feed back

- **Decommissioning**
  - **TC project on remote operation and robotics at Bohunice A-1 site (Slovakia)**

**TRS-439 Decommissioning of underground structures, systems and components (2006)**



## TC feed back

- **Decommissioning**
  - **TC projects on planning for decommissioning at Ignalina NPP-1 site (Lithuania)**

**TRS-420 Transition from Operation to  
Decommissioning of Nuclear Installations**





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# **IAEA's vs. Member State's role**

**The need for the recipient country to take full responsibility to achieve the objectives of the project**

# Typical issues in D&D projects ( no particular order)

- **Obsolescence of equipment and lack of maintenance**
- **Lack of decommissioning/waste management technologies and other infrastructure**
- **Uncertain identification of roles and responsibilities e.g. operator vs. regulator**
- **Perception of low priority and poor motivation**
- **Need for a cultural/organizational change (e.g. job conversion for a team of researchers)**

## Typical issues in D&D projects (cont'd)

- **Lack of qualified staff ( the best people may leave early)**
- **Lack of specific regs e.g. licensing process or clearance criteria**
- **Social aspects (“working yourself out of a job”)**
- **No timely allocation of funds**
- **Nuclear facilities put into”limbo”**
- **Poor involvement of stakeholders, e.g. over-centralization, lack of consensus, unfocused assistance**



# For the IAEA D&D Programme

## NETWORKING IS THE KEY....



## Why develop a Network approach?

- **Create a forum for SYSTEMATICALLY**
  - *sharing information and lessons learned*
  - *transferring knowledge*
  - *comparing approaches valued by all MS*
- **Coordinate support to organizations or Member States with less advanced programmes from Member States with more experience;**
- **Complement existing Agency activities with more *demonstration projects* giving practical *hands-on and user-oriented* experience**





## Why develop a Network approach? (cont'd)

- Improve efficiency / effectiveness in planning and delivering training – to whom & when needed
- Obtain direct feedback, advice and guidance on the IAEA's programmes in radioactive waste management, decommissioning, environmental remediation
- Provide a means to build and sustain relationships through the sharing of information and knowledge

# Why develop a Network approach? (cont'd)

- **From sporadic TC projects to systematic networking: the International Decommissioning Network**

# *International Decommissioning Network (IDN)*

**A “Network of Networks”**

**to promote the sharing of  
practical  
decommissioning  
experience**

- **Established in 2007 by  
Waste Safety, Waste  
Technology & TC**

- **One of four networks in  
Waste and Decommissioning**



## **NETWORKS – “Centres of Excellence”**

**Organizations that possess a record of excellence, a breadth of decommissioning knowledge, facilities suitable for demonstration or training and a willingness to share their experience through the NETWORK, may be identified as “Members” and acknowledged as “Centres of Excellence” in co-operating with the IAEA**

## **Centres of Excellence in Co-operation with the IAEA can be expected to:**

- **Possess a high level of decommissioning knowledge and a commitment to excellence.**
- **Participate consistently in IDN activities including Technical and Advisory (Steering Group) Meetings**
- **Host training courses, fellowships or scientific visits by Participants;**
- **Provide suitably qualified and experienced individuals for Expert Missions to support Participants;**
- **Provide qualified peers to support the IAEA's efforts on peer reviews;**



## **Participants Priorities – IDN TM Oct 2007**

### **Demonstrations/training “Top 5” Requested**

- 1. Demonstrations on use of characterization techniques and equipment**
- 2. Decontamination and cutting techniques and tools**
- 3. Management and clearance of decommissioning wastes**
- 4. Sponsor onsite, interactive training on “Basic Practices in Decommissioning”**
- 5. Cost-estimation for small facilities using simplified methodology**



## **“IDN” - Workshops in 2008**

- **Size Reduction of Components for Decommissioning**  
(Hosted by CEN/SCK Mol, Belgium, Oct 8-10)
  - ✓ **Decontamination**
  - ✓ **Dismantlement (cutting) of large components**
- **Decommissioning Materials Management and Clearance**  
(Hosted by ENRESA, Spain, Oct 13-17)
  - ✓ **Segregation, sampling, characterization**
  - ✓ **Processing, recycle and reuse**
  - ✓ **Dispositioning**



## **Workshops SCK-CEN Mol and ENRESA: Very effective “Hands on” format**

- **Presentation by an “engaged” professional**
- **Video of active work**
- **Field visit to observe operations**
- **Personal interaction with simulators, tools in inactive environment**
- **Recap and “round table” with experts and participants to discuss the experience**





# The Workshop sights and sounds

**BR3 at SCK-CEN Mol**  
The characterization, decontamination and dismantlement of the reactor addressed the challenge of alpha-contamination on the inside of the stack shown here.



# “IDN” - Achievements in 2008 Communications and Experimental Media

A regular “IDN Update” which serves as a newsletter for the IDN and helped us to organize a simple but effective teleconference around a video illustrating CEA decommissioning.



# Peer Review and Appraisal Services

- **Decommissioning**
  - **UK in June 2008**
    - ✓ Request from Magnox Electric
    - ✓ Review and evaluation of Bradwell decommissioning
    - ✓ Explicit Terms of Reference
    - ✓ International team of senior experts
      - Belgium, Canada, France, Germany, Spain, USA,
  - **Technical Meeting (“lessons learned”)**
    - ✓ In Vienna on 3-4 November 2008



# RER – 3005 Extension: A “Network” Vehicle

The RER 3005 Project on decommissioning planning is being continued into the 2009-2011 period with increased budget to enable participation and events to be organized beyond the traditional “European” Project borders.

Project Design Budget: RER2006024  
 Events with Non-RER Participants -  
 Base and Additional Budget Requirements

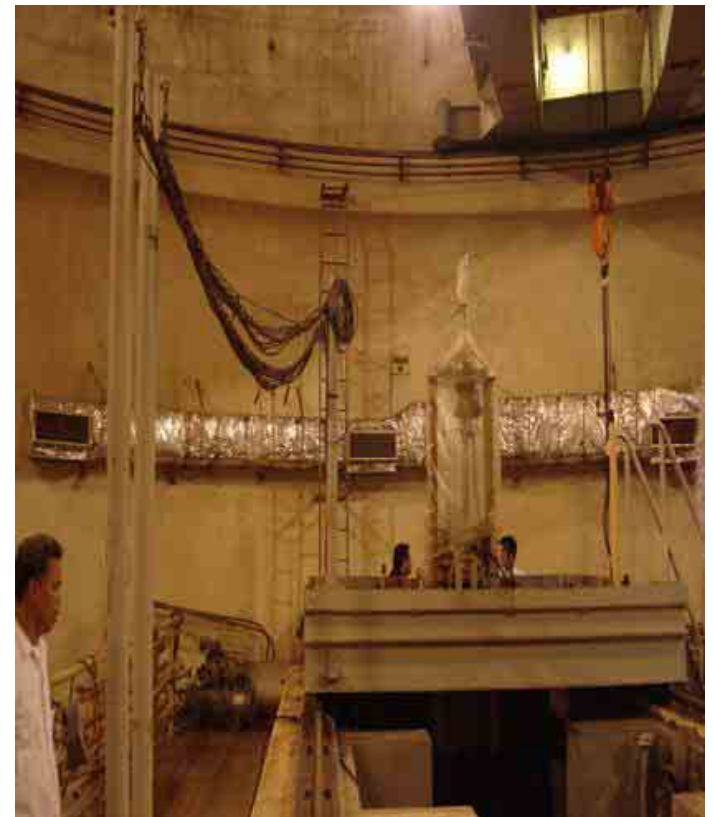
Year	Input	Budget30/5*	Total ++ Funding Req
2009	IDN Workshop & demonstration of concrete cutting for a RR bioshield. Note: potential hos...Australia	\$55 000.00	\$75 000.00
2009	IDN workshop on simplified costing for decommissioning of RRs and other small facilities...(VUJE)	\$40 000.00	\$60 000.00
2009	Workshop & demonstration of the application of gamma-camera technology, mapping software...(CIEN)	\$45 000.00	\$60 000.00
2009	Scientific Visits and Fellowships	\$20 000.00	\$30 000.00
	<b>Sub-Total for 2009</b>	<b>\$160 000.00</b>	<b>\$225 000.00</b>
2010	IDN "basic" training course covering all of the fundamentals of decommissioning at a hig...	\$40 000.00	\$60 000.00
2010	Workshop on safety assessment...	\$40 000.00	\$60 000.00
2010	IDN workshop on remote technology for NPP decommissioning...	\$40 000.00	\$60 000.00
2010	Workshop on materials management and clearance criteria (in Europe)...	\$40 000.00	\$60 000.00
2010	IDN Workshop & demonstration of advanced cutting technologies. Note: potential host orga...	\$45 000.00	\$75 000.00
2010	Scientific Visits and Fellowships	\$20 000.00	\$30 000.00
	<b>Sub-Total for 2010</b>	<b>\$225 000.00</b>	<b>\$345 000.00</b>
2011	A "basic" training course covering all of the fundamentals of decommissioning at a high...	\$45 000.00	\$60 000.00
2011	Group SV to RRs and other small nuclear facilities under active decommissioning in Europ...	\$18 240.00	\$30 000.00
2011	IDN Workshop & demonstration of advanced cutting technologies. Note: potential host orga... (Japan, held if ~ 50k additional is available)	\$0.00	\$75 000.00
2011	IDN Workshop & demonstration of the application of gamma-camera technology, mapping soft...	\$40 000.00	\$60 000.00
2011	Scientific Visits and Fellowships	\$20 000.00	\$30 000.00
	<b>Sub-Total for 2011</b>	<b>\$123 240.00</b>	<b>\$255 000.00</b>
	<b>Total Workshop Component of Budget</b>	<b>\$508 240.00</b>	<b>\$825 000.00</b>
	<b>For Assumed Total Project Budget*</b>	<b>961, 820</b>	<b>\$ 1 270 000.00</b>

Notes:  
 \* Budget 30/05 corresponds to workshop part of TC budget 951k\$ for TCEU Proj. Design Sheet 30/5  
 For Events inside Europe assume 2/3 participants are from Europe,  
 For Events outside Europe assume 1/3 participants from Europe  
 ++ Revised 30/05 to reflect: Workshop in Europe = Typical cost = \$60,000 (1 TO, no paid lect.);  
 Workshop outside Europe Typical cost = \$75, 000 (2 TO, one paid lecturer)



# Research Reactor Decommissioning Demonstration Project (R2D2P)

- Hands-on experience approach
- Mutual learning club (13 MSs participating)
- 3 Workshop in Philippines and 1 in Australia
- Philippines RR Decommissioning plan expected in 2008
- Australia and China to join the project by offering their RRs as demonstration sites
- An active component of IDN



**6 years projects (Started in 2006)**

# Workshops under Discussion for 2009 (I)

- **IDN Workshop & demonstration of concrete cutting for a RR bioshield, ANSTO, Australia Q2**
- **Workshops already planned in the frame of R2D2P:**
  - **costing estimates for decommissioning of RRs. R2D2P workshop in Manila Q2 2009**
  - **technology for decommissioning, under discussion for FZK, Germany, likely Q3 2009**
- **Synergies between RER 3005 and R2D2P will be identified and acted on.**



## **Workshops under Discussion for 2009 (II)**

- **“Basic” training course covering all of the fundamentals of decommissioning at a level suitable for project managers and planners, ANL, Chicago USA Q2**
- **“Experts” workshop on simplified costing for research reactors and other small facilities, Slovakia or Vienna Q4, 2009**
- **Workshop on Management Approaches and Systems for Decommissioning, Spain, Q4, 2009**



## Workshop under discussion for 2010-2011

- A "basic" training course covering all of the fundamentals of decommissioning for Project Managers and Planners – INSTN, Marcoule, France...
- Workshop & demonstration of advanced cutting technologies. Potential host organization Japan?
- Decommissioning of small facilities - VUJE, Slovakia
- Workshop and Demonstration of the application of Gamma-Camera Technology and mapping software





# Contact Us

- **IAEA Decommissioning web page**  
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**THANKS !!!!**