

# The IAEA Research Reactor Decommissioning Demonstration (R2D2) Project: Sharing U.S. Decommissioning Experience

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# NRC Regulations

- 10 CFR Part 20 Subpart E “License Termination Rule”
- 10 CFR Part 50.82 – specific section on decommissioning non-power reactors

# Topics

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- Overview of the IAEA Research Reactor Decommissioning Demonstration Project
- Sponsoring and Hosting of an International Meeting
- NRC R2D2 Project Experience
- State University of New York at Buffalo Workshop – “Project Management and Dismantling”
- Humboldt Bay Workshop – “Final Surveys and Release of Sites”
- Conclusions

# Overview of the R2D2 Project

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- Scope - focus on demonstrating the decommissioning of a research reactor. The scope includes all aspects of the decommissioning process, from establishing a legal and regulatory infrastructure to the final release of the facility from regulatory control.
- Purpose of the project – assist IAEA Member States in planning and implementing safe decommissioning of research reactors
  - Provide a platform for “hands-on” and practical training
  - Facilitate exchange of information, experience, education and training
  - Serve as a model for use in the decommissioning of research reactors
  - Demonstrate the interaction between the parties involved in decommissioning
- Achieve objectives through series of workshops involving lectures, national presentations, discussions, exercises, practical demonstrations/observations of activities
- Two phases: planning (2006-2012) and implementation (2012-2015) with a total of 14 workshops

# R2D2 Project Workshop Schedule

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- Legal / regulatory 06/06
- Basics of D+D 10/06
- Transition 11/07
- Characterization 12/07
- Decommissioning planning 09/08
- Cost estimates 03/09
- D+D Technology 07/09
- **Safety Assessment 10/10**
- Release of sites / buildings 10/10
- Review of D+D plan 07/11
- Prepare for D+D 05/12
- **Project Management / RR dismantling 12/12**
- Dismantling of higher active RR parts 06/15
- **Release / Final Survey 09/15**

R2D2: 10 years, 14 workshops,  
and 7 hosts in 6 countries

# Hosting and Sponsoring an International Meeting

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- Host and Sponsor for the Workshop
- Host Government Agreement with IAEA
- Office of International Program Coordination – State Department Coordination with VISAs
- IAEA Participant Invitations
- Travel, Hotel and Transportation Logistics
- Technical Agenda
- Meeting Presentations and Demonstrations
- Cultural Program

# Safety Assessment 2010

## RISO Research Center

### Roskilde, Denmark

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# R<sup>2</sup> D<sup>2</sup> Project Workshop Format

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- Welcomes
- Overview of the Project and Site
- Overview of Decommissioning Program Requirements/Regulations
- Expert Technical Topical Lectures
- Site Tour
- Demonstrations and Exercises
- Team Reporting of Demonstration/Exercises
- Cultural Event
- Workshop Critique



# SUNY At Buffalo Materials Research Center (BRMC)

IAEA R2D2P Workshop on “Project Management –  
Decommissioning Dismantling” December 3-7, 2012



# SUNY at Buffalo International Attendees



U.S. NRC

United States Nuclear Regulatory Commission

*Protecting People and the Environment*



11 International Participants; Argentina, Brazil, Canada, Egypt, Indonesia, Libya, Malaysia, Philippines, Romania, Serbia, Vietnam

**US NRC Research Reactor Decommissioning Legal & Regulatory Framework**

**US NRC Research Reactor Decommissioning Requirements**

**UB Perspective of Regulatory Requirements and Planning**

**UB-MRCR Decommissioning Plan and Project Status Overview**

**Decommissioning Management Contractor Perspective**

**IAEA Safety Standards for Decommissioning**

**Update on IAEA Activities Pertaining to Decommissioning**

**The Regulators View of Successful Research Reactor Decommissioning**

**Research Reactor Case Studies: WPI, U Mi, U Az, U IL, VA-Omaha**

**U. S. NRC Decommissioning Inspection Program and Research Reactor Inspection Decommissioning Experience**



# UB Dismantling Exercises



Hood  
Dismantling



Reactor Internals  
Removal



I & C Shop Inside  
Reactor Building

# Buffalo Workshop Cultural Event

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# Research Reactor Decommissioning Demonstration Project Workshop on “Release of Buildings and Sites / Final Survey” September 28 to October 2, 2015

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## **Sponsors**

International Atomic Energy Agency (IAEA)  
Decommissioning and Remediation Unit  
US Nuclear Regulatory Commission (NRC)  
Office of Nuclear Materials Safety and Safeguards,

## **Meeting Managers**

Vladan Lubjenov and Mika Shimba-Yamada,  
R2D2P Workshop Technical Secretaries  
Bruce A. Watson, CHP, Chief and John B. Hickman, Project Manager  
US NRC Reactor Decommissioning Branch

## **Host**

Loren Sharp, Director and Plant Manager  
Humboldt Bay Nuclear Decommissioning Project  
Pacific Gas & Electric Company (PGE)  
1000 King Salmon Avenue  
Eureka, California, USA 95503





# IAEA Workshop Scope and Purpose at Humboldt Bay

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- Final phases of decommissioning (completion of decommissioning and termination of the authorization for decommissioning):
  - ✓ Demonstration of compliance with the end state criteria – final survey
  - ✓ Release of the site from regulatory control
- Learn the rationale for establishing the criteria used for release of sites from regulatory control
- Discuss and demonstrate how a final radiological survey is performed and how the results of the survey are analyzed and presented to prove compliance with the end state criteria
- Discuss the regulatory process for release of sites and interactions between the different parties involved during that process



# Humboldt Bay Workshop Lectures

PGE Humboldt Bay Decommissioning Project Status	Loren Sharp, PGE Director and Plant Manager Humboldt Bay
R2D2 Project Overview, Workshop Agenda, Schedule and Expected Outcomes	Vladan Ljubenov and Mika Shimba-Yamada, IAEA
Workshop Assignments, Survey Assignment, and Reporting	Vladan Ljubenov and Mika Shimba-Yamada,, IAEA and Bruce Watson, US NRC
US NRC Research Reactor Decommissioning Regulations, Release Criteria and Guidance	Bruce Watson, CHP Chief, Reactor Decommissioning
US NRC Research Reactor vs Power Reactor Decommissioning Requirements	John Hickman, Project Manager US NRC
PGE License Termination Plan and Final Status Survey Plan Project Status Overview	Bill Barley, CHP, PGE LTP FSS Manager
U. S. NRC Decommissioning Inspection Program and Research Reactor Inspection Decommissioning Experience	Gerald Schlapper, CHP, Senior Inspector US NRC Region IV
Overview of NRC Decommissioning Radiological Surveys, Surfaces and Sub-surfaces, Release Criteria and Records	Bruce Watson, CHP, NRC
Multi-Agency Radiological Survey & Site Investigation Manual (MARSSIM) Overview (+ 6 Technical Lectures)	Timothy Vitkus, CHP, ORAU
Demonstration of MARSSIM and Visual Sample Plan Demonstration	Timothy Vitkus, CHP, ORAU

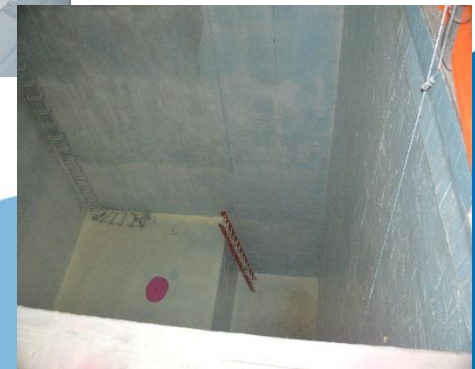
# Participants –Redwood College and Technical tour

18 Participants from 12 countries:  
Argentina, Brazil, China, Egypt,  
Indonesia, Iraq, Japan, Malaysia,  
Mexico, Philippines, Serbia, Vietnam





# Technical Tour





# Workshop Demonstration – Learning by Doing

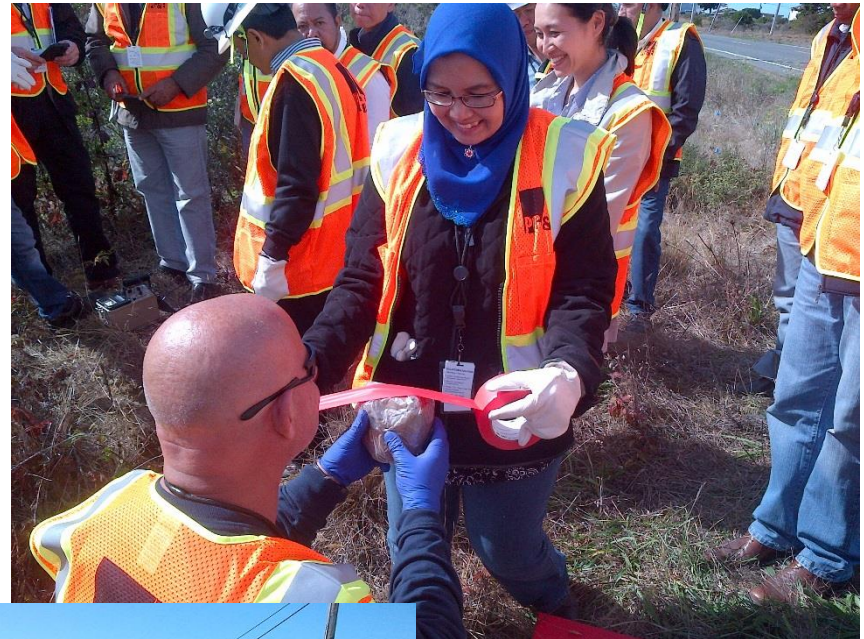


Pre-Operational  
Survey  
Instrument  
Checks





# Workshop Demonstration – Field Activities – Land Surveys



Land Surveys,  
Soil Sampling, and  
Chain-of-Custody





# Workshop Demonstration – Field Activities – Land Surveys

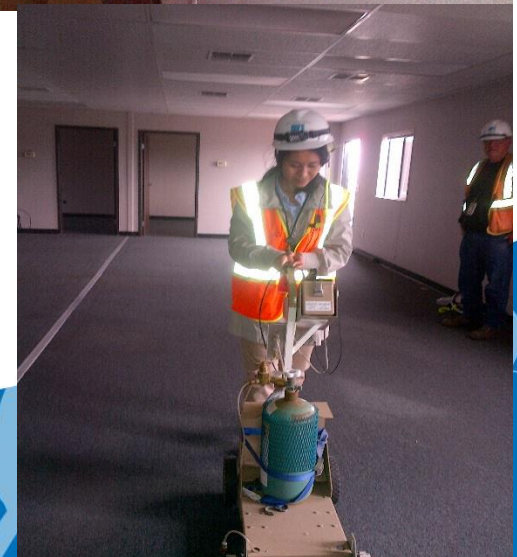




# Workshop Demonstration – Survey of Structure for Release



Direct Scan  
Surveys and  
Large Area  
Detector  
Surveys





# Humboldt Bay Cultural Event

## Giant Redwoods



## Ingomar Mansion Restaurant



# Conclusions

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## United States

- Supported 1 R2D2 Project Workshop
- Hosted 2 R2D2 Project Workshops in the United States
- Conveyed Relevant US Experience
- SUNY Buffalo Workshop - Research Reactor Decommissioning is performed safely
- Humboldt Bay Workshop - residual activity can be measured and Sites, structures and lands can be unconditionally released

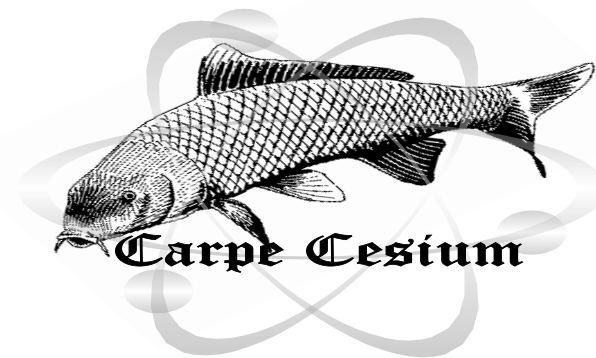
## IAEA

- R2D2 Project: 10 years, 14 workshops, 7 hosts in 6 countries
- IAEA implemented all the planned activities.
- This is not enough to conclude that the project was a success. The key success indicator is the progress made in the participating countries.
- Very positive impact of the R2D2 has been reported.
- Contribution of the other IAEA projects has been recognized.
- Proposal for a continuation of the project was made by Egypt.
- The need for continuation of training and exchange of experiences has been recognized.

# Questions ?



The Reactor Decommissioning  
Branch,  
*The Dead Reactor Society*





# Thank You for Attending

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## Reactor Decommissioning Branch



### **Carpe Cesium**

AKA,  
*The Dead Reactor Society*