Overview of the IAEA supported decommissioning and waste management activities

Vladimir Michal
NE Department, Acting Head of Waste Technology Section and Decommissioning and Environmental Remediation Team Leader

Vladan Ljubenov
NS Department, Waste and Environmental Safety Section, Decommissioning specialist
Content

✓ Introduction;
✓ Preparation of thematically focused technical publications;
✓ Safety related publications and events;
✓ WTS Networks;
✓ Implementation of regional and national technical cooperation projects;
✓ Peer review services;
✓ Other activities;
✓ Aspects of importance to this Symposium.
Introduction

✓ Two IAEA sections deal, inter alia, with decommissioning and waste management issues – Waste Technology Section (WTS) and Waste and Environmental Safety Section (WES);

✓ WTS is one of the sections within Nuclear Fuel Cycle & Waste Technology Division, Nuclear Energy Department;

✓ WES is part of Radiation, Transport & Waste Division, Nuclear Safety & Security Department.
More than sixty publications (NE Series reports, Technical Series reports, Safety standards, Safety reports, TECDOCs etc.) were published by the IAEA from 80-s in the field of decommissioning;

Some of them are in common between decommissioning and waste management, some of them were prepared in cooperation with other organizations, e.g. NEA OECD;

The most recent technical publications are as follows:


✓ Management of NORM Residues, IAEA-TECDOC-1712, 2013;


Revised IAEA Safety Requirements for Decommissioning

• General Safety Requirements GSR Part 6 “Decommissioning of Facilities”;
• Endorsed by the Board of Governors in March 2014;
• To supersede WS-R-5 (2006);
• Brings the requirements in line with the new BSS (2011);
• Entombment not considered acceptable strategy for “normal” decommissioning, still last option under “exceptional circumstances”;
• Addresses “phased approach” to planning, licensing and conduct;
• Addresses in more details end-state with restrictions.
Ongoing Activities and Draft Publications on Safety of Decommissioning

- Revision of the two facility specific Safety Guides:
  - Decommissioning of Nuclear Installations,
  - Decommissioning of Medical, Industrial and Research Facilities.
- Safety Report on Use of Safety Assessment Results in Planning and Implementation of Decommissioning (FaSa);
- Management of Project Risks in Decommissioning (DRiMa);
- Entombment – Regulatory and Safety Aspects;
- Methodologies for Source Term Assessment for Decommissioning (activation calculations);
- Experiences and Lessons Learned Worldwide in Clean-up and Decommissioning of Nuclear Facilities in the Aftermath of Accidents (joint WTS/WES).
International Decommissioning Network

The IDN is a joint initiative of the IAEA's Departments of Technical Co-operation, Nuclear Energy, Nuclear Safety & Security to act as a “Network of Networks” to increase visibility and leverage learning from national and regional decommissioning projects & existing networks.

Objectives:

• To provide increased opportunities for practical decommissioning hands on and user-oriented experience,
• To facilitate sharing of knowledge and experience,
• To raise awareness of need and encourage decision-makers to move forward with decommissioning project implementation,
• To attract additional resources to the field and accelerate the pace of decommissioning activities worldwide.
Examples of IDN activities in 2014:

- Workshop on Safety Assessment of Sites for Decommissioning and Remediation, ANL, USA, April;
- Scientific Visit on Concrete Cutting Technologies, Dounreay, UK;
- Training Course on Protection of Workers and Radiation Control and Monitoring, France;
- Workshop on Environmental Impact Assessment of Sites for Decommissioning and Remediation, Italy;
- Workshop on Technology Selection for Decommissioning and Environmental Remediation, Karlsruhe, Germany;
- Workshop on Decommissioning of Soviet-type Research Reactors, Bucharest, Romania
- IDN Annual Forum for Regulators and Operators in the Field of Decommissioning, IAEA, November;
- IDN projects – CIDER, DACCORD, DRiMa.
Waste Characterization Network

Objectives:

• Coordinate support to organizations or MSs with less advanced programmes on characterization of L&IL waste;

• Organize training and demonstration activities providing hands-on experience and disseminating proven analytical procedures;

• Facilitate sharing and exchange of knowledge and experience amongst organizations with characterization facilities.
Examples of LABONET activities in 2012-2014:

- Workshop on Radioactive Waste Characterization – Practices & Trends, SCK.CEN, Belgium, November 2012;
- Training Course on Non-Destructive Assay of Radioactive Waste, Trebic, CR, August 2013;
- LABONET Annual Meeting, IAEA, December 2013;
- Workshop on characterization techniques and Annual Meeting are scheduled for 2014.
Near-surface Disposal Network DISPONET

Objectives:

• To coordinate support to organizations or MSs with less advanced programmes for disposal of low level waste, by making available the relevant skills, knowledge, managerial approaches and expertise from MSs with operating disposal facilities;

• To facilitate information and experience sharing amongst organizations with advanced designs and disposal facilities in operation;

• To organize training and demonstration activities with a regional or thematic focus providing hands-on, user-oriented experience and advising on proven technologies;

• To create a forum to receive expert advice and technical guidance for the Agency programme on low level waste disposal; and

• To encourage knowledge transfer regarding good practices in low level waste disposal.
Network for Underground Research Laboratories for Geological Disposal of HLW

- Geological disposal is the preferred option for the HLW/SNF and LL-ILW;
- The technologies are available now;
- Different countries are at various stages of development (long development timescales);
- URF contribute a move from theory to practice and demonstrate viability;
- Provision of Training in Geological Disposal – URF Network training courses;
- Enhancing Communications between Practitioners in Geological Disposal – through CONNECT;
- Supporting Demonstrations of Technology and Methodologies – Ad Hoc support.
CONNECT

✓ CONNECT - Connecting the Network of Networks for Enhanced Communications and Training in Radioactive Waste Management, Decommissioning and Environmental Remediation;

✓ CONNECT is a concept and a tool to facilitate interactions between individuals and organizations involved in all aspects of radioactive waste management;

✓ CONNECT objectives are to disseminate experience effectively, to find solutions to common problems more efficiently, to enhance operational safety by encouraging adoption of best international practices, to improve Member States access to high-quality training material and to engage more professionals in each Network than is currently possible.
To learn more about CONNECT and view tutorial videos, click here.

**Networks**

- **URF**
  - Geological Disposal
  - Underground Research Facilities for Geological Disposal
  - Learn More / Join URF

- **NNE**
  - Networking Nuclear Education
  - Learn More / Join NNE

- **DISP**
  - International Low Level Waste Disposal Network
  - Near Surface Disposal of Low Level Radioactive Waste
  - Learn More / Join DISPONET

- **IDN**
  - International Decommissioning Network
  - Decommissioning of Nuclear Facilities
  - Learn More / Join IDN

- **MSN**
  - Management System Network of Excellence
  - Management System Network
  - Learn More / Join MSN

- **CGULS**
  - Coordination Group for Uranium Legacy Sites
  - Learn More / Join CGULS

- **NKM**
  - Nuclear Knowledge Management
  - Nuclear Knowledge Management
  - Learn More / Join NKM

- **ENV**
  - Network on Environmental Management and Remediation
  - ENVIRONET - Environmental Remediation and NORM Management Network
  - Learn More / Join ENVIRONET
On-going Regional TC Projects


✓ INT9175 (2012-2015) “Promoting Safe and Efficient Clean-up of Radioactively Contaminated Facilities and Sites”.
National Technical Cooperation Projects

✓ New national TC projects (2014-2015) focused on decommissioning and/or waste management initiated in Bosna, Brazil, Cambodia, China, Georgia, Indonesia, Malaysia, Moldova, Philippines etc. and continues in Ukraine, Romania, Serbia, Slovakia …. 

✓ Management of DSRS is also one of the covered issues:
  ✓ Support of field activities – conditioning and removal of higher-activity sources and aggregations,
  ✓ currently underway in 8 countries (Middle East, Africa, Central and South America),
  ✓ in some cases MHC is used.
Decommissioning Peer Review services

- RWM Activities of COVRA, Netherlands (2009);
- EC-IAEA-Ukraine Joint Project on Nuclear Safety Evaluation of Ukrainian NPPs – Task 3 on Waste and Decommissioning (2009);
- International Peer Review of UK Magnox Decommissioning Programme (2008-2011) – final report handed over to Magnox representatives at the IAEA in February 2012;
- Korea: Geological disposal programme with emphasis on suitability for pyro processed waste (2012);
- UK, NDA: Peer Review of Interim Storage of Higher Activity Waste Packages-Industry Guidance (2012);
“Mid-and-Long-Term Roadmap” was adopted by the Government of Japan and TEPCO Council on Mid-to-Long Term Response for Decommissioning in December 2011, revised in July 2012 and again in June 2013.

The Roadmap includes description of the main steps and activities to be implemented for the decommissioning of the TEPCO’s Fukushima Daiichi NPP.

GoJ asked the IAEA to organize International Peer Review of the Mid-and-Long-Term Roadmap including review of relevant individual topics. Review was implemented in a two steps = two missions in 2013.
International Decommissioning Peer Review of Roadmap towards Fukushima Daiichi Decommissioning

✓ The first Mission:
  o 15-22 April 2013;
  o Team: 9 IAEA staff (NE, NS, MTPI), 4 external experts (Canada, France, RF, USA), Team leader: Juan Carlos Lentijo, DIR-NEFW;
  o Final report submitted to GoJ on 22 May 2013 and published on: [http://www.iaea.org/newscenter/news/2013/fukushimareport.html](http://www.iaea.org/newscenter/news/2013/fukushimareport.html);
  o The report highlights 9 Acknowledgments to date and offers Advice on 17 points where the current practices could be improved.

✓ Second Mission:
  o 25 November – 4 December 2013;
  o Team: 11 IAEA staff (NE, NS, NA, MTPI), 5 external experts (OECD/NEA, Canada, France, Hungary, UK) + 3 experts involved in preparation of the IAEA Report on 1F accident (IAEA staff, USA); Team leader: JC Lentijo;
  o Summary report with 19 Acknowledgments and 19 Advisory Points was presented to METI and the IAEA press conference was organized last day of the mission;
The Review Service for managing radioactive waste and spent fuel, control of discharges, decommissioning and remediation is a cross-cutting coordinated activity of NE and NS Departments.

Objective: to provide independent expert opinion and advice on:
- radioactive waste and spent fuel management,
- assessment of radiological impacts to people and the environment,
- management of residues arising from uranium production,
- decommissioning and
- remediation issues.

Based upon the IAEA safety standards and technical guidance, as well as international good practice.
Other Activities

- WTS and WES are involved in several activities of the IAEA Action Plan on Nuclear Safety in the field of decommissioning and waste management after severe radiological or nuclear accident;

- IEM4 on Decommissioning and Remediation after an Accident, January 2013;

- Development of relevant IAEA reports (ongoing);
Other Activities

- CRP on Treatment of Irradiated Graphite to Meet Waste Acceptance Criteria for Disposal (2011-2013);
- CRP on Processing Technologies for High Level Waste, Formulation of Matrices and Characterization of Waste Forms (2013-2015);
- Support of nuclear Newcomers;
- Development of E-learning material for CONNECT platform;
- PRIS Decommissioning module recently with 149 power reactor units.
GC 2014 Scientific Forum

- Focused on management of radioactive waste and availability of solutions,
- Two days event, DG opening statements, presentations from top level managers, panel discussion, highlight of the Agency support to MSs, side exhibitions.
Aspects of importance to this Symposium

- Clearance of material / waste
- Scrap metal / metal recycling
Clearance of Material and Waste from Decommissioning

GSR Part 3 Interim (BSS):

• The regulatory body shall approve which sources, including materials and objects, within notified or authorized practices may be cleared from further regulatory control, using as the basis for such approval the criteria for clearance specified in Schedule I or any clearance levels specified by the regulatory body on the basis of such criteria.

• TABLE I-2. Levels for exemption of bulk amounts of solid material without further consideration and for clearance of solid material without further consideration: activity concentrations of radionuclides of artificial origin.

• TABLE I-3: Levels for clearance of material: activity concentrations of radionuclides of natural origin.
2011

General philosophy and table in RS-G-1.7 (2004) incorporated into the BSS. RS-G-1.7 remains.
Supporting publications

2005

Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance

2012

Monitoring for Compliance with Exemption and Clearance Levels
“Spanish Protocol”

• Melting of a Cs-137 source in 1998 resulted in an airborne release, production of 270 t of contaminated dust and ~$26M in clean-up costs;

• Voluntary agreement between national authorities, relevant private companies, and trade unions;

• Establishes a national system for addressing radioactive material discovered in scrap metal;

• Addresses radiological surveillance, radiation monitoring report for imports, and actions to be taken when radioactive material is discovered including handling of radioactive waste.
International Conference: Control and Management of Radioactive Material Inadvertently Incorporated into Scrap Metal

- 23–27 February 2009;
- Organized by the Spanish Nuclear Safety Council (CSN) in cooperation with IAEA;
- In general, a lack of harmonized approach to transboundary issues;
- “…binding international agreement between governments to unify the approach to transborder issues concerning metal scrap containing radioactive material …”
Orphan Sources and Other Radioactive Material in the Scrap Metal and Recycling Industries

2012

• SSG-17, Orphan Sources and Other Radioactive Material in the Scrap Metal and Recycling Industries;

• Recommendations on meeting Safety Requirements in relation to the presence of radioactive material in scrap metal;

• Responsibilities and actions concerning the discovery of radioactive material and regaining control over it;

• Scope is primarily domestic.
Draft Metal Recycling Code of Conduct

• Based on the “Spanish protocol”, SSG-17, Code of Conduct for Safety of Radioactive Sources;
• Scope: radioactive material in transboundary movements of consignments;
• Objective: protect people and the environment; harmonize the approach of States;
• Aim is to bring radioactive material that is discovered under control promptly and handle it safely;
• Addresses:
  • Roles of the State, regulatory body, industry and the IAEA,
  • Radiological criteria: clearance values for unsealed material and exempt values for sources,
  • Radiation monitoring of consignments and provision of a radiation monitoring report,
  • Actions following discovery of radioactive material,
  • Framework for return of consignments,
  • Training of individuals.
Draft Metal Recycling Code of Conduct


- Draft – full consensus not yet achieved;
- Further actions unclear at the moment.
Thank you for your attention