



International Atomic Energy Agency

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

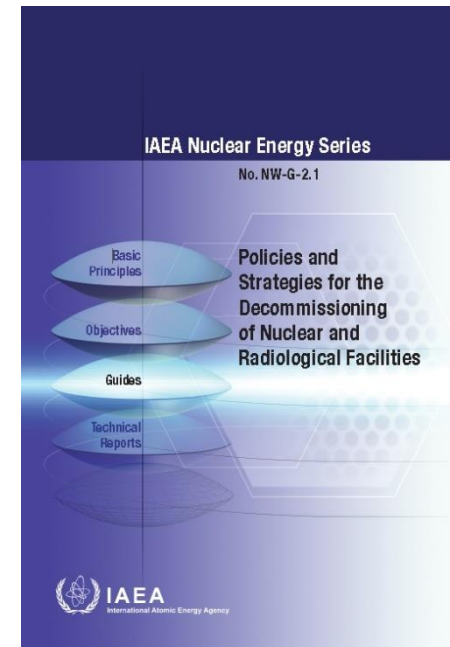
- ✓ Two IAEA sections deal, inter alia, with decommissioning and waste management issues – **Waste Technology Section (WTS)** and **Waste and Environmental Safety Section (WES)**;
- ✓ WTS is one of the sections within Nuclear Fuel Cycle & Waste Technology Division, **Nuclear Energy Department**;
- ✓ WES is part of Radiation, Transport & Waste Division, **Nuclear Safety & Security Department**.

Technical Publications

- ✓ 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:

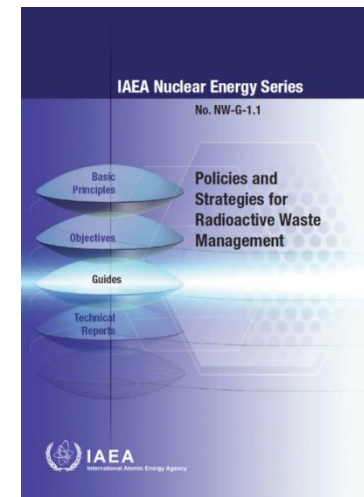
Technical Publications: 2012 – 2014

- ✓ Policies and Strategies for the Decommissioning of Nuclear and Radiological Facilities, IAEA NE Series report No. NW-G-2.1, 2012;
- ✓ International Structure for Decommissioning Costing (ISDC) of Nuclear Installations. Prepared in cooperation with NEA OECD and EC, published by NEA OECD in Paris, 2012;
- ✓ Planning, Management and Organizational Aspects of the Decommissioning of Nuclear Facilities, IAEA-TECDOC-1702, 2013;
- ✓ Cost Estimation for Research Reactor Decommissioning, IAEA NE Series report No. NW-T-2.4, 2013/2014.



Technical Publications: 2012 – 2014

- ✓ Management of NORM Residues, IAEA-TECDOC-1712, 2013;
- ✓ Options for Management of Spent Fuel and Radioactive Waste for Countries Developing New Nuclear Power Programmes, NE Series report No. NW-T-1.24, 2013;
- ✓ Report from CRP “Behaviour of Cementitious Materials in Long Term Storage and Disposal of Radioactive Waste”, IAEA-TECDOC-1701, 2013.



Revised IAEA Safety Requirements for Decommissioning

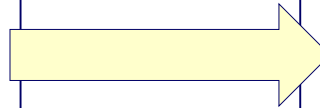

2006

2014

IAEA Safety Standards
for protecting people and the environment

Decommissioning of
Facilities Using
Radioactive Material

Safety Requirements
No. WS-R-5




Draft Safety Requirements:
Decommissioning of Facilities

Revision of IAEA Safety Standards Series No. WS-R-5

GENERAL SAFETY REQUIREMENTS No. GSR Part 6
DS450

Revision of IAEA Safety Standards Series No. WS-R-5



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.

International Decommissioning Network (cont.)

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.

Waste Characterization Network (cont.)

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** - **C**onnecting the **N**etwork of **N**etworks for **E**nhanced **C**ommunications and **T**raining 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.

CONNECT

To learn more about CONNECT and view tutorial videos, click [here](#).

Networks



Geological Disposal
Underground Research
Facilities for Geological
Disposal

[Learn More / Join URF](#)



Networking Nuclear
Education
Networking Nuclear
Education

[Learn More / Join NNE](#)



International Low Level
Waste Disposal Network
Near Surface Disposal of
Low Level Radioactive Waste

[Learn More / Join DISPONET](#)



International
Decommissioning Network
Decommissioning of Nuclear
Facilities

[Learn More / Join IDN](#)



Management System
Network of Excellence
Management System
Network

[Learn More / Join MSN](#)



Coordination Group for
Uranium Legacy Sites
Coordination Group for
Uranium Legacy Sites

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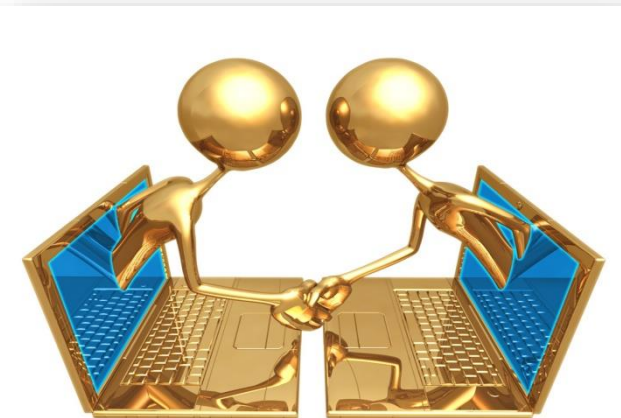
Nuclear Knowledge
Management
Nuclear Knowledge
Management

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Network on
Environmental
Management and
Remediation
ENVIRONET - Environmental
Remediation and NORM Management
Network

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On-going Regional TC Projects

- ✓ RER9120 (2012-2015) “Supporting Decommissioning Implementation for Facilities Using Radioactive Material”;
- ✓ INT9175 (2012-2015) “Promoting Safe and Efficient Clean-up of Radioactively Contaminated Facilities and Sites”.



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Technical Cooperation



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);
- ✓ Russia: International Peer Review on the application of international safety standards to the liquid RWM practices in the Russian Federation (2013).

International Decommissioning Peer Review of Roadmap towards Fukushima Daiichi Decommissioning

- ✓ “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:

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

✓ Second Mission:

- 25 November – 4 December 2013;
- 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;
- 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;
- Final report published on : http://www.iaea.org/newscenter/focus/fukushima/final_report120214.pdf.



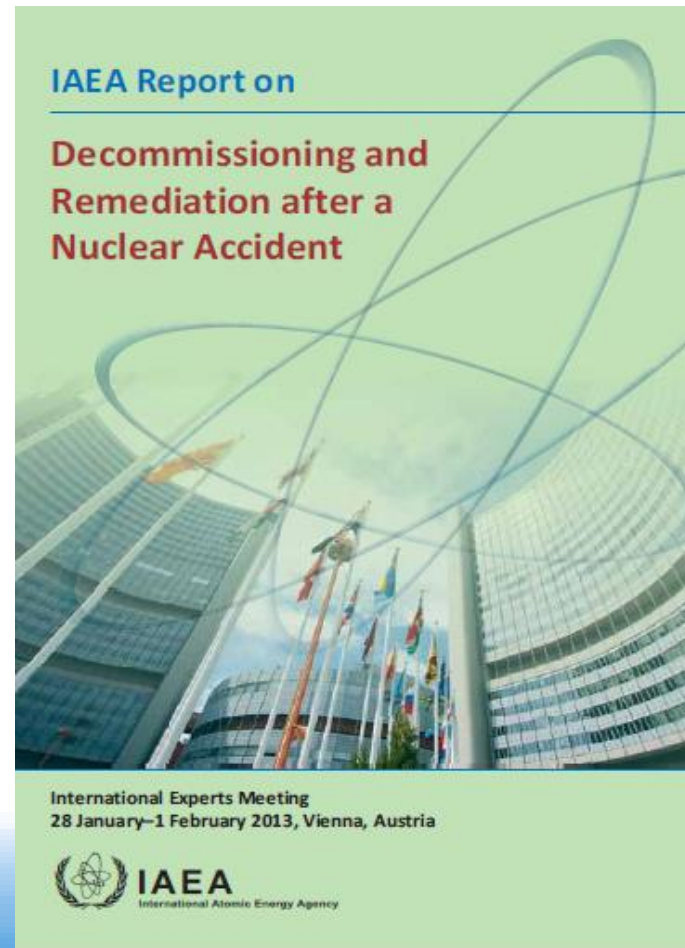
ARTEMIS

- ✓ 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);



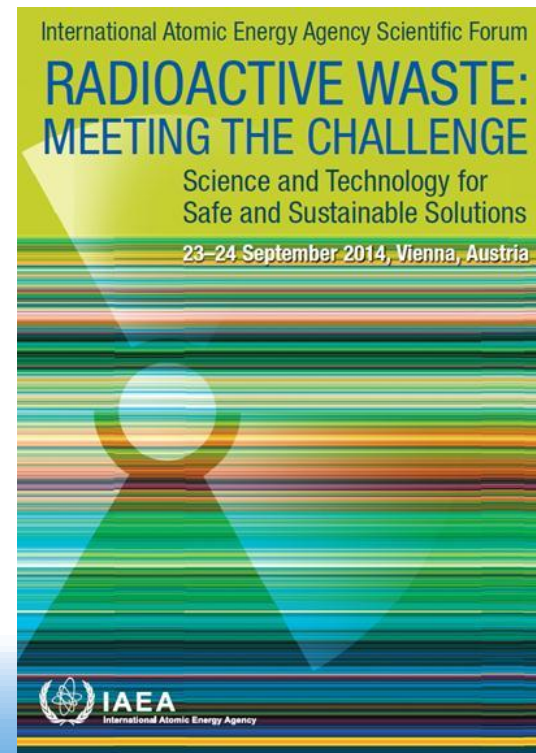
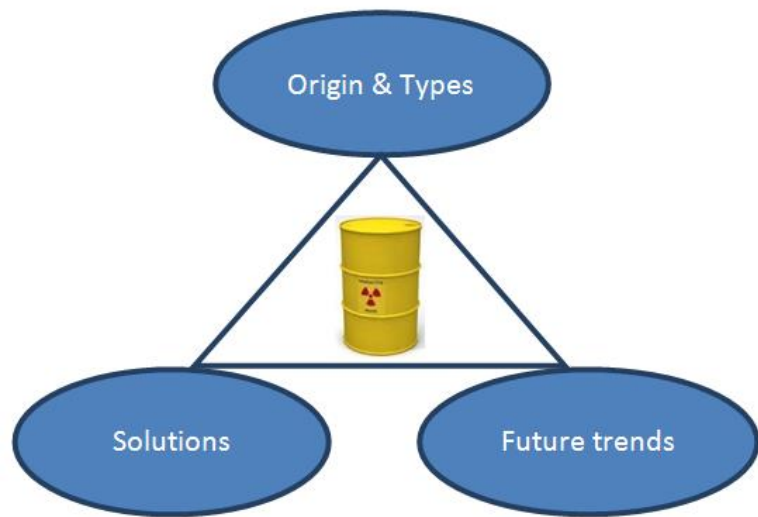
Other Activities

- ✓ 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;
- ✓ IAEA, OECD-NEA and EC Joint Working Group on Status and Trends in Radioactive Waste Management and Spent Fuel Management;
- ✓ 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.

Scientific Forum - Major topics



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

IAEA Safety Standards
for protecting people and the environment

Radiation Protection and
Safety of Radiation Sources:
International Basic
Safety Standards
INTERIM EDITION

General Safety Requirements Part 3
No. GSR Part 3 (Interim)




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

IAEA
SAFETY
STANDARDS
SERIES

Application of the
Concepts of Exclusion,
Exemption and
Clearance

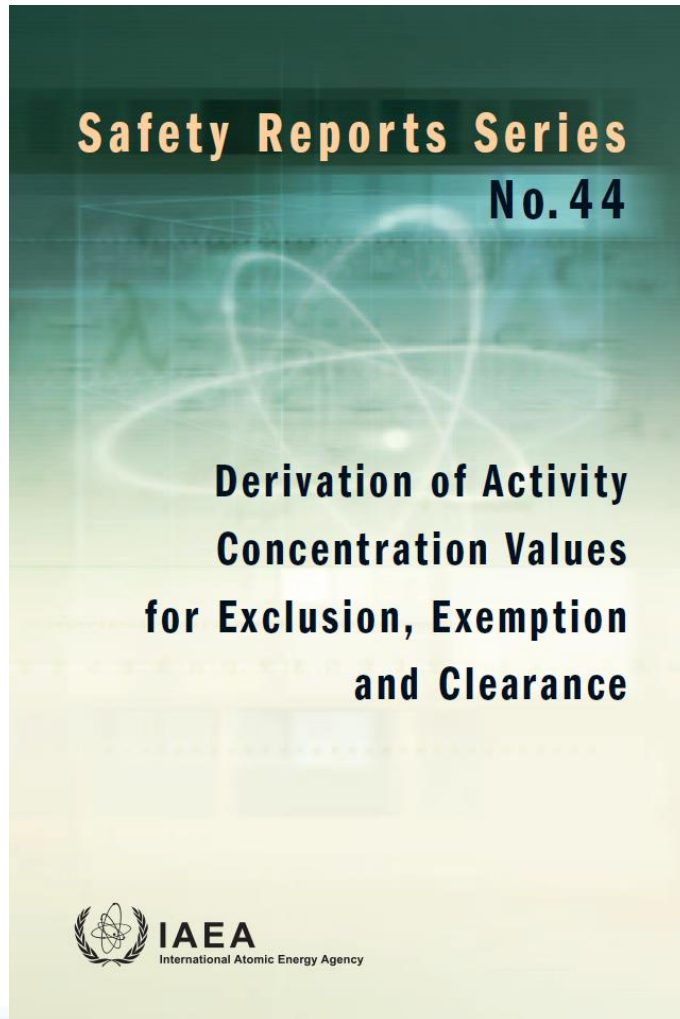
SAFETY GUIDE

No. RS-G-1.7

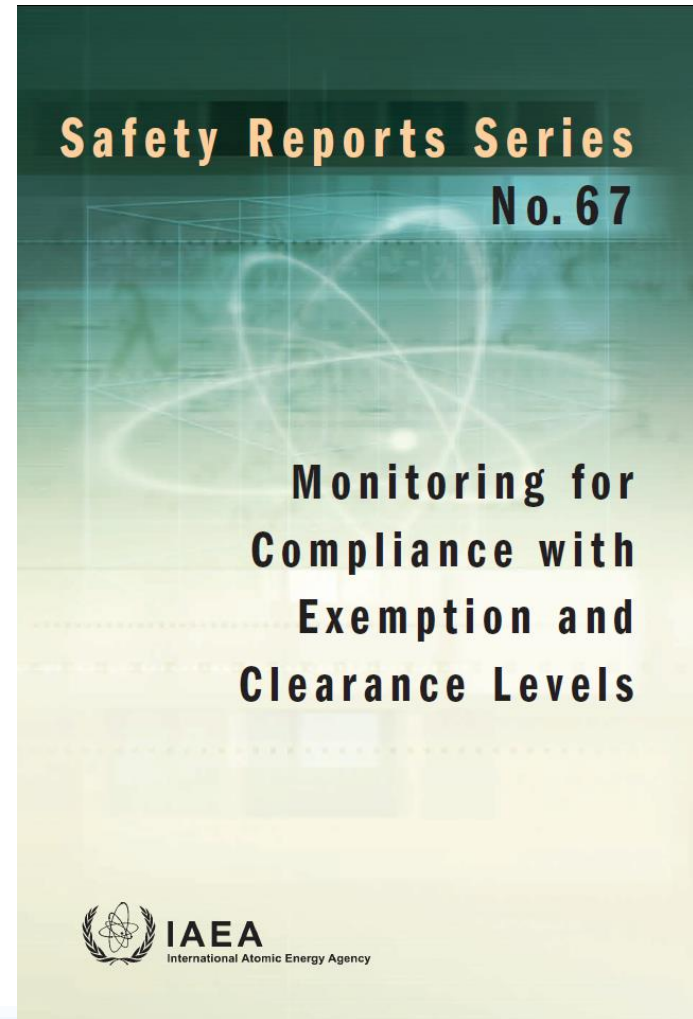


Supporting publications

2005



2012



“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

Control and Management of Radioactive Material Inadvertently Incorporated into Scrap Metal

Proceedings
of an International Conference
Tarragona, Spain
23–27 February 2009



- 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.

IAEA Safety Standards

for protecting people and the environment

Control of Orphan
Sources and Other
Radioactive Material
in the Metal Recycling
and Production Industries

Specific Safety Guide

No. SSG-17



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

http://www-pub.iaea.org/MTCD/Publications/PDF/IAEA_CODEOC_METRECYC_web.pdf

Control of Transboundary Movement of Radioactive Material Inadvertently Incorporated into Scrap Metal and Semi-finished Products of the Metal Recycling Industries

Results of the Meetings Conducted to
Develop a Draft Code of Conduct

- Draft – full consensus not yet achieved;
- Further actions unclear at the moment.



Thank you for your attention