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NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE

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Working Party on Decommissioning and Dismantling (WPDD)

A MAP OF INTERNATIONAL ACTIVITIES ON DECOMMISSIONING AND DISMANTLING OCTOBER 2006

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INTRODUCTION

Background

This document has been prepared by the WPDD in order to fulfil its role of an information centre within the NEA on international activities being performed in the field of decommissioning and dismantling. The intention is to update the document yearly and to share it widely also outside the NEA.

Organisation of this document

Besides this Introduction, the next chapter provides an overview of decommissioning activities within the Nuclear Energy Agency (NEA), the European Community (EC), the International Atomic Energy Agency (IAEA) and the World Nuclear Association (WNA). The following chapter categorises more specifically the ongoing activities under 5 headings pertaining to: Policy Aspects, Strategy Aspects; Implementation Aspects; Stakeholder Information and Involvement Aspects; and Transitional Phase Aspects.

The document includes further four Appendices:

- A glossary of acronyms.
- A list of publications of the NEA in the field of D&D.
- A list of publications of the EC in the field of D&D.
- A list of publications of the IAEA in the field of D&D

OVERVIEW

OECD Nuclear Energy Agency (NEA)

Within the NEA, decommissioning is discussed within several Standing Technical Committees. The NEA programme of work in the area of decommissioning includes the following:

- **RWMC**
  - Working Party on Decommissioning and Dismantling (WPDD) [http://www.nea.fr/html/rwm/wpdd.html]

    The Radioactive Waste Management Committee (RWMC) created its Working Party on Decommissioning and Dismantling (WPDD) in 2001 to address the policy and regulatory aspects of decommissioning.

    The (2002) publication *The Decommissioning and Dismantling of Nuclear Facilities: Status, Approaches, Challenges*, reviews the situation in decommissioning, and identifies key issues.

    The WPDD has also created a web-based, publicly accessible information platform of national decommissioning policies, practices and projects.[1] This information is updated yearly.

    Information on national decommissioning programmes can also be found in a NEA RWMC-RF[2] web-based information platform of national fact sheets. Here information on national frameworks on decommissioning can be found including the national policies, primary legislation and general regulation, regulations concerning specific activities and guidance on implementation. The platform also gives the current status on national strategies and current issues as well as information on which installations are in the decommissioning phase. Research and development plans regarding decommissioning are also listed in the RWMC-RF information platform as well as information on the question on funding of the decommissioning work.

    A status report "*Achieving the Goals of the Decommissioning Safety Case*" was issued in April 2005[3]. During 2006 three status reports have been issued "*Selecting Strategies for the Decommissioning of Nuclear Facilities*"[4], "*Releasing the Sites of Nuclear Installations*"[5] and "*Decommissioning Funding. Ethics, Implementation, Uncertainties*"[6] . These reports

1. The address is: http://www.nea.fr/html/rwm/wpdd/welcome.html.

2 The address to the RWMC-RF fact sheet information platform is : http://www.nea.fr/html/rwm/rf/welcome.html

3 ISBN 92-64-01068-8

4 ISBN 92-64-02305-4

5 ISBN 92-64-02307-0

6 The OLIS number is NEA/RWM/WPDD(2006)3/REV1

are freely available at the NEA webpage [http://www.nea.fr/html/rwm/wpdd.html] (when printed as brochures also available in French versions). A task group is currently working on a status report on the "*Release of Materials and Buildings"*.

A workshop was held in Tarragona in September 2003 regarding the *Strategy Selection for Decommissioning*. Another workshop was held in Rome in 2004 with the title *"Safe, Efficient, and Cost-effective Decommissioning*". In 2004 WPDD also published a leaflet "*Decommissioning of Nuclear Power Facilities. It can and has been done*" that shows worldwide examples of successful projects, see Appendix B.

The WPDD is the only Working Party totally committed to decommissioning within the NEA.

- Stakeholder Involvement in Radioactive Waste Management Decision Making

  The Forum on Stakeholder Confidence (FSC) [http://www.nea.fr/html/rwm/fsc.html] was initiated by RWMC in 2000 and is charged with investigating and distilling the lessons that can be learnt from national and international experience regarding decision-making processes and avenues for stakeholder involvement in radioactive waste management. It is important to identify similarities and differences, understand the key concerns of the various stakeholders, and develop means to interact effectively. Some of the lessons learned are directly applicable to decommissioning and in November 2005 WPDD and FSC held a joint Topical session on stakeholder involvement in decommissioning projects[7]. A brochure on lessons learnt from presentations made to and within WPDD on stakeholder involvement is in preparation and is intended to be available early 2007.

  Some recent NEA reports on stakeholder involvement and decision making that may be applicable to decommissioning are the following. They can all be downloaded from the web-page http://www.nea.fr/html/rwm/fsc.html:

  - *The Regulator's Evolving Role and Image in Radioactive Waste Management*, NEA 2003, ISBN ISBN 92-64-02142-6
  - *Public Information,Consultation and Involvement in Radioactive Waste Management. An International Overview of Approaches and Experiences*, NEA 2003, ISBN 92-64-02128-0
  - *Stakeholder Involvement Techniques*, NEA 2004, NEA/RWM/FSC(2004)7
  - *Stepwise Approach to Decision Making for Long-term Radioactive Waste Management* , NEA 2004, ISBN 92-64-02077-2
  - *Learning and Adapting to Societal Requirements for Radioactive Waste Management*, NEA 2004, ISBN 92-64-02080-2

- The Co-operative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installation Decommissioning Projects (CPD) has, since its creation in 1985, worked to share industrial, project-level experience among decommissioning projects. The expertise of these decommissioning projects is used by the WPDD, and other NEA groups working in the area of decommissioning, notably the NDC Expert Group, as the technical basis for discussions. In 2004 the CPD entered into a new agreement

[7] The proceedings can be downloaded from the web-page http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-5.pdf

involving 22 organisations in 12 countries/economies. Currently the CPD is working with a total of 42 decommissioning projects.

- **CNRA**
  - The Committee on Nuclear Regulatory Activities (CNRA) has developed a policy-level understanding of regulatory issues in decommissioning. In April 2003 the CRNA published a document titled "*The Regulatory Challenges of Decommissioning Nuclear Reactors"*, NEA#04375, ISBN: 92-64-02120-5, available on the Web at: [http://www.nea.fr/html/nsd/reports/nea4375-decommissioning.pdf].

- **CNSI**
  - In 2001 the CSNI Special Expert group on Human and organizational factors organized a workshop on management of change. In June 2004 the group published in a paper on "*Managing and Regulating Organisational Change in Nuclear Installations*", CSNI Technical Opinion Papers - No. 5, NEA#05348, ISBN: 92-64-02069-1, available on the Web at: [http://www.nea.fr/html/nsd/reports/2004/nea5348-change.pdf] The Special Expert Group also co-organised the session on "*Management of Transition and Change Throughout Decommissioning*" during the Workshop on "*Safe, Efficient, and Cost-effective Decommissioning*" held in Rome September 2004.

- **CRPPH**

The Committee on Radiation Protection and Public Health (CRPPH) has, for some time, been contributing to the development of new radiation protection norms, as provided in the recommendations of the International Commission on Radiological Protection (ICRP). Part of this work involves the philosophy and practical approach to the release of sites, facilities and materials from radiological regulatory control. Although the CRPPH has no reports specifically focused on sites and materials release, the Committee's work on the evolving system of radiological protection, independently and with the ICRP and on stakeholder involvement in decision making are directly related to such releases. Several recent reports address these topics and can be downloaded from the NEA webpage [http://www.nea.fr/html/pub/ret.cgi?div=RP].

- **The Evolution of the System of Radiological Protection**
  - *A Critical Review of the System of Radiation Protection: First Reflections of the OECD Nuclear Energy Agency's Committee on Radiation Protection and Public Health,* OECD/NEA, 2000
  - *The Way Forward in Radiological Protection, An Expert Group Report*, OECD/NEA, 2002
  - *Radiological Protection of the Environment: The Path Forward to a New Policy? –* Workshop Proceedings Taormina, Sicily, Italy, 12 – 14 February 2002, OECD/NEA, 2003
  - *Radiological Protection of the Environment*: Summary Report of the Issues, OECD/NEA, 2003
  - *A New Approach to Authorisation in the Field of Radiological Protection: The Road Test Report*, prepared by R.V. Osborne and F.J. Turvey, OECD/NEA, 2003
  - *Future Policy for Radiological Protection*: Workshop Proceedings, Lanzarote, Spain 2 – 4 April 2003, OECD/NEA 2003
  - *Possible Implications of Draft ICRP Recommendations*, OECD/NEA, 2003
  - *Proceedings of the Asian Regional Conference on the Evolution of the System of Radiological Protection*, Tokyo, 24 – 25 October 2002, OECD/NEA 2003

- *Future Policy for Radiological Protection: A Stakeholder Dialogue on the Implications of the ICRP Proposals*, Summary Report, Lanzarote, Spain, OECD/NEA 2004
- *Optimisation in Operational Radiological Protection*: A Report by the Working Group on Operational Radiological Protection of the Information System on Occupational Exposure, OECD/NEA 2005
- *Evolution of the System of Radiological Protection*, Second Asian Regional Conference, Tokyo, Japan, 28 – 29 July 2004, OECD/NEA 2005
- *The Process of Regulatory Authorisation: A report by the CRPPH Expert Group on the Regulatory Application of Authorisation*, OECD/NEA 2006

- **Stakeholder Involvement in Radiation Protection Decision Making**
  - *The Societal Aspects of Decision Making in Complex Radiological Situations,* Proceedings of an International Workshop, Villigen, Switzerland, 13-15 January 1998, OECD/NEA,1998.
  - *Better Integration of Radiation Protection in Modern Society:* Workshop Proceedings, Villigen Switzerland, 23-25 January 2001, OECD/NEA, 2001.
  - *Policy Issues in Radiological Protection Decision Making:* Summary of the 2nd Villigen (Switzerland) Workshop, January 2001, OECD/NEA 2001.

- **NDC**

  The Nuclear Development Committee (NDC) has a large programme dealing with various aspects of the sustainability of nuclear power. This committee has traditionally looked at the financial implications of decommissioning nuclear reactors, which is the subject of their latest report, *Decommissioning Nuclear Power Plants, Policies, Strategies and Costs*[8], released in summer 2003. Cost estimates for a large number of nuclear power plants, including a broad range of reactor types, sizes and sites are analysed with an emphasis on understanding the main reasons for their variability. The report gives insights into decommissioning policies, strategies and costs in the 26 countries that participated in the study.

Co-ordination of decommissioning work within the NEA is taken up yearly by the Chairs of the NEA Standing Technical Committees.

European Commission (EC)

It is anticipated that approximately one third of the 148 nuclear power reactors operating within the European Union (EU) will be in decommissioning by 2025. For the past two decades the European Commission has been very active in the various aspects of decommissioning and this period has seen a shift in emphasis from research towards policy issues. A recent initiative at EU legislation in this field has not yet received the required qualified majority of EU member States. The Commission is nevertheless committed to report annually to the European Parliament on a number of decommissioning issues and is in the process of adopting a recommendation on decommissioning finance.

The European Commission, through its direct involvement in billion-€ support to decommissioning and dismantling of Soviet-design reactors, is also rapidly gaining greater practical insight into factors affecting strategy and project selection, decommissioning waste and regulatory aspects of decommissioning

[8] ISBN 92-64-10431-3

The Commission is active in taking initiatives of legal scope in the nuclear field addressing the back end of the nuclear fuel cycle in particular. In January 2003, the Commission submitted proposals in areas that impinge on the provision of financial resources for decommissioning and the management of radioactive waste. The EC has proposed to the Council of the European Union the adoption of a Directive "*Setting out basic obligations and general principles on the safety of nuclear installations*"[9]. It addresses the need for funding of end-of-life liabilities and includes an Annex setting out the minimum acceptable criteria for Decommissioning funds.

The national decommissioning funds became subject to discussions in the context of the Directive on the common rules for the internal market in electricity. While the most important driving factor for the Commission is the assurance of the safety of the European citizen it was agreed that the Commission would issue an annual report on this topic the first of which was provided in 2004[10]. The cornerstones to be investigated in the annual report are the adequacy of these resources; their availability; their use for the purpose for which they have been established; and the transparency in their management. For the second report covering the period 2005-6, the Commission has embarked on an ambitious programme of consultation backed up by technical studies.

The consultation process takes place on two levels the first involving technical experts (the NEA and IAEA are members of this group) and, secondly with bi-annual meetings with national representatives. A detailed questionnaire will be used in order to provide for a more detailed report which will cover all commercial nuclear installations. The study "*Analysis of the factors influencing the selection of strategies for decommissioning of nuclear installations*" is aimed at identifying all the factors and variables that need to be taken into account in the process of selection of a decommissioning strategy, providing ultimately a guideline of general application for the selection of the strategy of decommissioning. A second study, the "*Inventory of best practices in the decommissioning of nuclear installations*" will create an information bank gathering the real and most updated experience from ongoing and completed decommissioning projects, identifying the best practices, the critical path and the milestones of the projects.

The Commission intends to present in 2006 a recommendation on the use of financial resources earmarked for the decommissioning, aimed at ensuring that each Member State has at its disposal an adequate decommissioning fund which is available when needed, which is managed in a transparent way and finally which is used for the purpose for which it has been established. The research-related activities are carried out within the Framework Programme for the European Union's research, technological development and demonstration. The Projects currently under execution represent the continuation of a long-standing effort in this area, started in the early eighties. Today, these Projects serve two main purposes: enhanced networking across Europe, and structured access for the experts and the public to the important common documentary resources built through decades of practical works.

A recent example of the former is the "*Thematic Network on Decommissioning*" – started in 2001– involving some fifty organisations and that covers all aspects specific to decommissioning, from technological to legal or strategic issues. A recent example of the latter is the *Project "EC decommissioning information Network*"[11], which integrates previously created databases on

[9] http://europa.eu.int/comm/energy/nuclear/safety/new_package_en.htm

[10] http://europa.eu.int/servlet/portail/RenderServlet?search=DocNumber&lg=en&nb_docs=25&domain=Preparatory&in_force=NO&type_doc=COMfinal&an_doc=2004&nu_doc=719

[11] The European Thematic Network on Decommissioning of Nuclear Installations [http://www.ec-tnd.net/]

decommissioning costs and tools in a single platform accessible via Internet. Other Projects of this kind are: the "*Compendium on the state of the art in Decommissioning*" and the "*Standardised Decommissioning Cost Estimating of VVER- 440 NPPs*".

International Atomic Energy Agency (IAEA)

The IAEA has a long-standing comprehensive programme of work on decommissioning and has published a number of **safety standards** and technical reports on various aspects of decommissioning of facilities using radioactive material (http://www-pub.iaea.org/MTCD/publications/series1.asp). A list of Agency safety standards and technical reports that have been published since 1990, are provided in Appendix D. The new Safety Requirements on Decommissioning of Facilities Using Radioactive Material (WS-R-5) is expected to be approved by the Board of Governors in September 2006. On this basis the existing Safety Guides WS-G-2.1, WS-G-2.2 and WS-G-2.4 are also envisaged to be revised. A new Safety Guide on Release of Sites from regulatory Control upon Termination of Practices (WS-G-5.1) has been approved in June 2006, and a new Safety Guide on Safety Assessment for Decommissioning of Facilities Using Radioactive Material is planned to be reviewed by WASSC, RASSC and NUSSC this year for submission for Member States comments. The draft safety standards are available in the http://www-ns.iaea.org/standards/documents/dsnumber-list.asp web site.

The Technical Group on Decommissioning (TEGDE) provides technical guidance on the Agency's programmatic activities in the area of decommissioning; provides guidance in the development of harmonized policies and strategies for decommissioning; provides a focal point for the discussion and resolution of technical issues and prepares status reports on relevant issues; and is a forum for the exchange of information on lessons learned and on the progress of national and international programmes in this field. The Secretariat for TEGDE is provided jointly by the Agency's Department of Nuclear Energy and the Department of Nuclear Safety and Security. A NEA officer is member of TEGDE to enhance coordination between IAEA and NEA in the decommissioning field. The participants completed two position papers highlighting collective opinions of decommissioning strategies and funding issues. These were published by the IAEA as TECDOC- 1476 and TECDOC-1478 available at the http://www-pub.iaea.org/MTCD/publications/series1.asp web site.

In June of 2004, The Agency's Board of Governors approved an **Action Plan on Decommissioning of Nuclear Facilities (**http://www-ns.iaea.org/downloads/rw/action-plans/decomm-action-plan.pdf**)**. The purpose of the Action Plan is to sharpen the focus of the Agency's programme concerning decommissioning. The major actions are:

- Assess the magnitude of the worldwide decommissioning task.
- Strengthen the Safety Standards on decommissioning.
- Share experiences when applying safety assessments to decommissioning activities.
- Assist developing countries with research reactor decommissioning.
- Establish safe conditions for the entombment option.
- Review options for the management of radioactive waste from decommissioning activities.
- Promote information exchange on decommissioning experience.
- Summarize experience on funding mechanisms for ensuring that decommissioning can be performed safely.
- Facilitate the exchange of experience on the re-use of decommissioned sites.

- Collect experiences related to the preserving of information in the case of deferred dismantling.
- Summarize experiences on the involvement of stakeholders in decision making and social issues related to the shutdown and decommissioning of nuclear facilities.

The Action Plan is planned to be reviewed and revised in 2007 with respect to the outcomes of the forthcoming I*nternational Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities*, to be held from 11 to 15 December 2006 in Athens, Greece.

There are a number of new activities that have been initiated by the Agency in 2006. The first is the **Research Reactor Decommissioning Demonstration Project (R^2D^2P)** in the Philippines. The project's focus is decommissioning of a research reactor in Philippines with the early stages of decommissioning and includes all aspects of the process, from establishing a regulatory infrastructure for the regulatory body to the final release of the facility from regulatory control. The objective of this project is to facilitate the exchange of information and experience, provide education and training on associated activities, and serve as a model for other similar projects in other countries. The concept is to assist the regulatory body and operator throughout the entire decommissioning process. It begins with upgrading the regulatory infrastructure and is envisaged to continue until the final release of the site. The project aims to act as a platform for hands-on training for technicians from other countries; to provide model safety documents that can be used as examples; to provide lessons learned from a research reactor decommissioning project; and to result in a decommissioned facility. The project commences at the first technical meeting on Legal and Regulatory Aspects of Decommissioning that took place from 26 to 30 June 2006 in Manila, Philippines. A second Technical Meeting on Decommissioning Planning is planned to be held from 16 to 20 October 2006 in the Philippines.

The second phase of the international project on Evaluation and Demonstration of Safety of Decommissioning of Nuclear Facilities (DeSa project) is underway (http://www-ns.iaea.org/tech-areas/waste-safety/desa/start.asp). The objective of the project is to develop a harmonized approach for evaluating the safety of decommissioning activities, applying the graded approach and for reviewing safety assessment. The project has been working on defining the content of typical safety assessments for all types of nuclear facilities and develops a regulatory approach for the regulatory bodies for evaluating safety assessment reports. Model safety assessment have been currently prepared as part of the second phase for three facilities – a nuclear power plant, a research reactor and a nuclear laboratory, that can be used as a template for operators. The third joint working group meeting of the project is organised from 13 to 17 November 2007 in Vienna, and the project is envisaged to be finalised in 2007. The third initiative is the **I*nternational Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities*** that will be held from 11 to 15 December 2006 in Athens, Greece. The event is organised by the IAEA in cooperation with the NEA, EC and WNA and hosted by the Greek Atomic Energy Commission. It will provide the good practices and lessons learned from less successful decommissioning activities that have been found during decommissioning projects. It will be divided into sessions concerning regulation, planning, implementation, waste disposal, waste management, technology concerns and social impacts. Details about the conference are available on the http://www-pub.iaea.org/MTCD/Meetings/ Announcements.asp?ConfID=143 web site.

In February 2006 the IAEA has initiated a new project on providing **technical assistance to Iraq**. The objective of the project is to assist the Government of Iraq with the evaluation and decommissioning of the existing facilities that have used radioactive material in the past and were damaged by the Gulf wars. Developing a hazard assessment for each facility and site, and incorporating this assessment into

a prioritization system based on hazards and risks will be the backbone of the project (http://www.iaea.org/NewsCenter/Multimedia/PhotoEssays/Iraq/movie.html). The second and third meetings of this project are scheduled to take place from 13 to 17 November 2006, and from 20 to 24 November 2006 in Vienna.
The second meeting of the contracting parties of the **Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management** (Joint Convention) took place from 15 to 24 May 2006 in Vienna. It was attended by forty Contracting Parties and NEA as an observer. The main outcomes and conclusions from the meeting are summarised in the President's report that is available on the http://www-ns.iaea.org/conventions/waste-jointconvention.htm web site. At present there are 41 contracting parties to the convention and the third meeting is planned to be held from 11 to 22 May 2009.
The Agency is also providing **technical assistance to Member States** in the planning for decommissioning of NPPs and research reactors. This assistance is organised at a regional and country specific basis. Two main regional projects have been underway to assist countries from Central and Easter Europe to adequately plan decommissioning of research reactors (RER/9/058 TC project) and NPPs (RER/3/003 TC project). The technical assistance comprises of workshops (e.g. legal and regulatory aspects, project management, characterisation survey) and expert missions for review and advise on specific parts of decommissioning plans for specific facilities (e.g. characterisation, cost estimation). In addition specific advice has been provided to MSs (e.g. China, Lithuania, Romania, Ukraine, Georgia) through national projects (http://www-tc.iaea.org/tcweb/default.asp).

World Nuclear Association (WNA)
The WNA is the international private-sector organization supporting the people, technology, and enterprises that comprise the global nuclear energy industry. WNA members include the full range of enterprises involved in producing nuclear power, from uranium miners to equipment suppliers to generators of electricity.

The WNA has formed a Decommissioning Group, to highlight how decommissioning worldwide is being achieved safely and economically within the nuclear industry. The main tasks of the group are to:

- introduce the key issues relating to decommissioning within the nuclear industry.
- highlight successful decommissioning projects across the whole nuclear fuel cycle and worldwide.
- provide an authoritative information source on decommissioning activities.

A web-site is available [http://www.world-nuclear.org/wgs/decom/intro.htm] which provides a broad introduction to decommissioning within the nuclear industry, highlights the key aspects of a decommissioning strategy, and illustrates how decommissioning is being carried out today and the various approaches adopted to ensure that facilities are decommissioned safely and economically.

WNA has during 2006 issued a Position Statement on "Safe Decommissioning of Civil Nuclear Industry Sites" [http://www.world-nuclear.org/position/decommissioning.htm] which presents the nuclear industry's perspective and policy on the important subject of decommissioning of civil nuclear industry sites. The document contains a number of "Essential Messages" covering a wide range of issues i.e. environmental and sustainability principles, decommissioning strategy selection, transition planning, management of materials and waste, public confidence and appreciation and cost estimations. The Position Statement also includes a discussion of safe decommissioning practice.The

WNA has also created a web-based database [http://www.world-nuclear.org/wgs/decom/database/database.htm] on decommissioning within the civil nuclear industry. The database provides a comprehensive listing of commercial and prototype / research reactors already and currently being decommissioned worldwide. The database is currently being developed to incorporate all nuclear facilities within the nuclear fuel cycle.

DETAILED MAP

1. Policy Aspects

Decommissioning *Policy* is taken to include all aspects of a government's approach to decommissioning issues. For example, any requirements regarding the ultimate use of decommissioned sites, waste management policy, public and worker health and safety policies, environmental safety policies, policies for the clearance of materials, regional development aspects, etc.

1.1 What are the current and planned decommissioning policies in the individual countries?

- In September 2002 the NEA\WPDD released a web-based information platform of D&D national fact sheets that is openly accessible at [http://www.nea.fr/html/rwm/wpdd/welcome.html]. Annual updates are performed.
- Information on decommissioning policies can also be found on the RWMC-RF web-based information platform (see http://www.nea.fr/html/rwm/rf/welcome.html)
- Also in September 2002, the NEA\WPDD issued a booklet entitled "The Decommissioning and Dismantling of Nuclear Facilities: Status, Approaches, Challenges". The booklet is freely accessible on the web and can be downloaded from [http://www.nea.fr/html/rwm/reports/2002/3714-decommissioning.pdf].
- The NEA\NDC has released a report titled "Decommissioning Nuclear Power Plants: Policies, Strategies and Costs" ISBN**:** 92-64-10431-3. The publication can be purchased in E-book (PDF -format) at the NEA website.
- The Annual Reports of the EC to the European Parliament on the use of financial resources earmarked for the decommissioning summarises the national approaches in the EU Member States. For further information, please consult the EC Decommissioning Website http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
- The planned EC Recommendation on the use of financial resources earmarked for the decommissioning.
- In 2004 the IAEA has published a "Status of the Decommissioning of Nuclear Facilities around the World", see under "Other Documents" in Appendix D.

1.2 What are the main elements of a national policy?

- The NEA WPDD and NDC publications mentioned in Section 1.1 are useful to this effect. Additionally, The NEA\RWMC has held a topical session (March 2003) on "Liabilities identification and management at a national level". The proceedings was issued in October 2003 and is publicly available at the NEA website with document number [NEA/RWM(2003)14][12].
- Three EC studies, one on "Analysis of the factors influencing the selection of strategies for decommissioning of nuclear installations", another on "analysis of environmental, economic and social issues linked to the decommissioning of nuclear installations", and

[12] See webpage: http://www.nea.fr/html/rwm/docs/2003/rwm2003-14.pdf

another on decommissioning funding methodologies are expected to be available in late 2006. All are expected to be useful reading for policy-makers and will be made available at http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm as they become available.

- The EC-sponsored Thematic Network on Decommissioning (TND) has created a Working Group on Strategies, Policies and Funding in Decommissioning. For more information, please consult: http://ec-cnd.net/ .

- The IAEA has a document in preparation dealing inter alia with the dispositioning of lower level decommissioning waste and materials. It illustrates several industrial options to safely and cost-effectively manage materials and waste resulting from decommissioning.

- The IAEA TEGDE has prepared a report on this issue which was published in 2005 (TECDOC-1478 Selection of Decommissioning Strategies: Issues and Factors) focusing on national policies and strategies as dictated by national constraints and providing examples.
- An IAEA Safety Report" Decommissioning Strategies for Facilities Using Radioactive Material" is in final stage of approval. It also discusses specific safety issues related to the three main decommissioning strategies – immediate dismantling, deferred dismantling and entombment.

1.3 What are the ethical principles that have impact on decommissioning?

- OECD; The Implementation of the Polluter Pays Principle. Recommendations by the Council on 14 November, 1974

- OECD; Recommendation of the Council concerning the Application of the Polluter-Pays Principle to Accidental Pollution. 7 July 1989 . C(89)88/Final.

- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (IAEA 1997)

- Rio Declaration 1992 on Environment and Development (Principle 16).

- The Principles of Radioactive Waste Management, IAEA Safety Series No. 111-F, 1995

- Council Directive 97/11/EC of 3March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

- Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment.

- Commission's Guidance on the implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.

- Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.

- Nuclear safety and the environment. Environmental Impact Assessment for the Decommissioning of Nuclear Installations. Report under EC Contract B4-3040/99/MAR/C2 by Cassiopee, University of Wales and ECA Global. EUR 2005, June 2001, Revised February 2002.

- Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC.

- Communication from the Commission to the European Parliament and the Council. Report on the use of financial resources earmarked for the decommissioning of nuclear power plants. COM/2004/0719 final.

- OECD\NEA Status Report, 2006, "Decommissioning Funding. Ethics, Implementation, Uncertainties" NEA/RWM/WPDD(2006)3/REV1.

1.4 How is licensing structured?

- The NEA\WPDD information platform of national fact sheets contains relevant information (see section 1.1). Information can also be found in the RWMC information platform on the Regulatory Control of Radioactive Waste in 18 NEA member countries: http://www.nea.fr/html/rwm/rf/welcome.html. Additional information can be found in the CRNA document *The Regulatory Challenges of Decommissioning Nuclear Reactors* , NEA#04375, ISBN: 92-64-02120-5, available on the Web at: [http://www.nea.fr/html/nsd/reports/nea4375-decommissioning.pdf]. The issue was also discussed in Session 7 of the workshop "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004, see proceedings on CD-Rom published in 2005.

1.4.1 What kind of regulation is needed for decommissioning?

- IAEA has issued Safety Requirements and Safety Guides dealing with decommissioning:
  - WS-R-2 Predisposal Management of Radioactive Waste, including Decommissioning (under revision)
  - WS-R-5, Decommissioning of Facilities Using Radioactive Material (draft);
  - WS-G-2.1, Decommissioning of Nuclear Power Plants and Research Reactors;
  - WS-G-2.2, Decommissioning of Medical, Industrial and Research Facilities;
  - WS-G-2.4, Decommissioning of Nuclear Fuel Cycle facilities;
  - RS-G-1.7, Application of the Concepts of Exclusion, Exemption and Clearance;
  - WS-R-3, "Remediation of Areas Contaminated by Past Activities and Accidents";
  - WS-G-5.1 "Release of Sites from Regulatory Control on Termination of Practices" (in print).
- NEA\CNRA has issued (February 2000) a report on Regulatory Practices for Decommissioning of Nuclear Facilities with Special Regard to Regulatory Inspection

Practices. The report can be downloaded from the web: [http://www.nea.fr/html/nsd/docs/1999/cnra-r99-4.pdf].

- NEA\CNRA has issued in April 2003 a report entitled: "The regulatory Challenges of Decommissioning Nuclear Reactors". The report can be downloaded from the web at: [http://www.nea.fr/html/nsd/reports/nea4375-decommissioning.pdf] (in PDF format).This publication is also available in French as: *Les autorités de sûreté face au démantèlement des réacteurs nucléaires*.
- The IAEA has published a Technical Document "Planning, managing and organizing the decommissioning of nuclear facilities: lessons learned", (IAEA-TECDOC-1394 [2004]) and two Technical Reports "Decommissioning of Small Medical, Industrial and Research Facilities (TRS 414) and "Transition from Operation to Decommissioning of Nuclear Installations (TRS 420).
- IAEA has published Safety Reports on "Safe enclosure of nuclear facilities during delayed dismantling (SRS 26)", and "Safety considerations in the transition from operations to decommissioning of nuclear facilities (SRS 36).
- The IAEA also published the Safety Report No. 45 "Standard Format and Content for Safety Related Decommissioning Documents"
- The WPDD Topical session "Emerging issues and trends in regulatory practices during the decommissioning and dismantling of nuclear power plants" held in Paris, October 24, 2006. Proceedings will be published at the WPDD web-pages in spring 2007.

1.5 Will all national D&D sites be returned for unrestricted (or restricted) use?

- The NEA\WPDD and RWMC-RF references in Section 1.1 contain relevant information.
- The NEA\WPDD has held a topical Session on Building & Site Release and Reuse at its meeting in June 2002. The proceedings [NEA/RWM/WPDD(2002)8] are available and downloadable from the WPDD web page.
- The CRPPH Expert Group on the Regulatory Application of Authorisation (EGRA) has identified authorised release as a key area. In summer 2005 a report will released with the title "The Process of Regulatory Authorisation".
- In March 2003 the NEA\RWMC Regulators' Forum held a topical session on regulatory criteria for removal of regulatory controls. In September 2004 the Regulators' Forum issued the report "Removal of Regulatory Controls for Materials and Sites. National Regulatory Positions" with number NEA/RWM/RF(2004)6. The report can be downloaded from the webpage [http://www.nea.fr/html/rwm/regulator-forum.html].
- The NEA publication "Releasing the Sites of Nuclear Installations" ISBN 92-64-02307-0 which was printed in 2006.
- IAEA Technical Report TRS-444 (2006) Redevelopment of Nuclear Facilities after Decommissioning provides numerous examples of reuse/redevelopment of nuclear facilities after decommissioning.
- The IAEA has developed guidance on release of sites from regulatory control (for restricted or unrestricted use (Safety Guide WS-G-5.1). The Agency is also working on a draft Safety Report on Monitoring for Compliance with Remediation Criteria (DD744), which could also be applied to the release of sites at the end of decommissioning.

1.6 On which basic regulatory principles and/or approaches ought clearance and recycling of material to be handled?

- See the NEA\RWMC Regulators' Forum document [NEA/RWM/RF(2004)6] as mentioned above.
- A NEA\CRPPH expert group on the Regulatory Application of Authorisation (EGRA) is looking at principles for authorized releases (see above).
- The NEA publication "Releasing the Sites of Nuclear Installations" ISBN 92-64-02307-0 which was printed in 2006 gives some views on the concepts for clearance and release.
- The IAEA is considering a change to the Basic Safety Standards that would integrate the scope of regulatory control to define what materials should be under regulatory control. It will include the concepts of exemption and clearance, as well as deal with contaminated commodities. Recently a Safety Guide (RS-G-1.7) "Application of the Concepts of Exclusion, Exemption and Clearance" was issued.
- The US National Academy of Sciences /Board on Energy and Environmental Systems has issued the report: "The disposition dilemma: controlling the release of solid materials from USNRC-licensed facilities" (2002), see http://fermat.nap.edu/books/0309084172/html
- A Topical session on materials management has been organized at the WPDD meeting in Dec. 2001 [downloadable at: http://www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-7.pdf]
- The TND has set up a Working Group on Recycle and Reuse of Materials.
- The EU, in Council Directive 96/29/EURATOM, states

  1. The requirement for 'prior authorisation of "disposal, recycling or reuse of radioactive substances or materials containing radioactive substances arising from any practice subject to the requirement of reporting or authorisation"

  2. The disposal, recycling or reuse of such materials may be released from the requirements of the Directive provided they comply with clearance levels established by national competent authorities, following the basic criteria set out in Annex 1 of the Directive and taking into account technical guidance provided by the Community.
- The IAEA has published a Safety Guide on application of the concepts of exclusion, exemption and clearance (RS-G-.1.7) which provides reference levels of activity concentrations for release of bulk material from regulatory control. A complementary Safety Report N. 44 is providing details on the scenarios and calculation assumption used for the derivation of the levels, recommended in RS-G-1.7.
- An international symposium on clearance of material was held in Germany in March 2006, organised by TUV-Nord (Germany) in cooperation with EC, NEA and IAEA.

1.7 What are the funding arrangements?

1.7.1 How are financial guarantees built-in in the D&D policy and its implementation?

1. These questions are touched upon in the proceedings from the WPDD Topical Session on Funding held in Paris November 9, 2004. The proceedings can be downloaded from the NEA webpage http://www.nea.fr/html/rwm/wpdd.html.

2. The NEA Status Report "*Decommissioning Funding. Ethics, Implementation, Uncertainties*" NEA/RWM/WPDD(2006)3/REV1 deals with this issue.

1.7.2 What are funding schemes including decommissioning liabilities?

- The NEA\RWMC has held a topical session (March 2003) on "Liabilities identification and management at a national level". The proceedings was issued in October 2003 and is publicly available at the NEA website with document number NEA/RWM(2003)14 .The NEA\WPDD information platform of national fact sheets (See Section 1.1) has relevant information.
- The NEA Status Report "*Decommissioning Funding. Ethics, Implementation, Uncertainties*" NEA/RWM/WPDD(2006)3/REV1 is here helpful.
- The NEA\NDC report (2003) has relevant information, see Section 1.1.
- The EC issued the first of its annual reports on EU financial resources earmarked for decommissioning in 2004. The second report covering the period 2005-6 will address all commercial nuclear installations and in considerably greater detail. The 2004 report is expected to be published in the end of 2006, and will be accessible on: http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm .
- The EC plans to publish a recommendation on the use of financial resources earmarked for decommissioning, aimed at ensuring that each Member State has at its disposal an adequate decommissioning fund which is available when needed, which is managed in a transparent way and finally which is used for the purpose for which it has been established. This should encouraging further sharing of best practice in decommissioning funding schemes, and be available by the end of 2006. Once adopted, the final version will be available for download on: http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm .
- In this context, the EC has also established an expert group covering issues relating to Decommissioning Funding.
    - Since 2004 the EC has rapidly expanded its work on the Decommissioning Support programmes, which aim to assist acceding Member States in their efforts to close and decommission specified reactor units. Work on these programmes has included support with overall decommissioning planning, capacity-building in regulatory and other associated agencies, project-based support to address technical challenges and social impacts, as well as support to security of supply issues related to closure. These programmes are expected to continue for the medium-term, and are generating considerable best practice in implementation.
    - Summary briefings and documents relating to the Decommissioning support programmes are available on the Commission's DG TREN website: http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm; The main management route for Community assistance to the decommissioning efforts in EU

member States is via the International Decommissioning Support Funds, managed by the EBRD in London, to which the EU is the major (but not the sole) contributor. Link: http://www.ebrd.com/country/sector/nuclear/overview/index.htm

- The IAEA TEGDE has prepared a report on this issue which was published in 2005 (TECDOC-1476 Financial Aspects of Decommissioning), see Appendix D.

1.8 How should D&D be regulated to ensure the necessary safety and environmental protection?

- Relevant information can be found in the NEA\CNRA report "*The* Regulatory *Challenges of Decommissioning Nuclear Reactors"* , NEA#04375, ISBN: 92-64-02120-5, available on the Web at: [http://www.nea.fr/html/nsd/reports/nea4375-decommissioning.pdf]. The issue was also discussed in Session 7 of the NEA workshop "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004.
- The WPDD has organized and documented a Topical session on the Safety Case of Decommissioning in December 2001 [NEA/RWM/WPDD(2002)2]. It is downloadable at: [http://www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-2.pdf]. A status report titled "Achieving the Goals of the Decommissioning Safety Case" was issued in April 2005 with the number [NEA/RWM/WPDD(2005)3] and is available at the NEA webpage [http://www.nea.fr/html/rwm/wpdd.html].
- The IAEA has developed a new Safety requirements WS-R-5 that provide recommendations on the authorisation and regulation of decommissioning. The supporting safety Guides WS-G-2.1, WS-G.2.2 and WS-G.2.4 also provided more specific details.

2. Strategy Aspects

Decommissioning *Strategy* is taken to include all aspects that decommissioning projects propose to national competent authorities in the context of application for permission to decommission. For example, the time scale for safe-store, proposed site disposition and use after decommissioning, technical aspects of decommissioning activities, etc.

2.1 When is it suitable to carry out D&D? Which decommissioning option should be used - deferred, immediate or safe enclosure?

- An International Seminar on Decommissioning Strategy Selection was organised by the NEA\WPDD in Tarragona, Spain in September 2003. The Proceedings are available at the NEA bookshop.
- A NEA Status Report "Selecting Strategies for the Decommissioning of Nuclear Facilities" ISBN 92-64-02305-4, was issued in 2006 and deals with these issues.
- IAEA Technical Report TRS-444 (2006) Redevelopment of Nuclear Facilities after Decommissioning focuses inter alia on site redevelopment as an element affecting the decommissioning strategy.
- Draft Safety Report on Decommissioning Strategies for facilities Using Radioactive Material Discusses the factors affecting safety of decommissioning when immediate dismantling, deferred dismantling or entombment is selected.
- TECDOC 1478 Selection of Decommissioning Strategies: Issues and Factors also provide recommendation in this field.

2.1.1 For how many years is safe storage suitable?

- The IAEA has published a Technical Document "On-site disposal of nuclear facilities as a decommission strategy", [IAEA-TECDOC-1124(2000)]. The document mainly deals with the "Entombment" strategy.
- The TND has organised a Working Group on Strategies, Policies and Funding
- An IAEA Safety Report on "Safe enclosure of nuclear facilities during delayed dismantling", has been published (SRS 26, 2002).
- The report "The Roles of Storage in the Management of Long-lived Radioactive Waste. Practices and Potentialities in OECD Countries" (the RoST report) RWMC, ISBN 92-64-02315-1.

2.2 How dependent is the D&D strategy on the existence of waste management policies and facilities?

- An International Seminar on Decommissioning Strategy Selection was organised by the NEA\WPDD in Tarragona, Spain in September 2003. The Proceedings are available at the NEA bookshop.

- The 2006 NEA Status Report "Selecting Strategies for the Decommissioning of Nuclear Facilities" ISBN 92-64-02305-4, touch upon this issue.
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2.2.1 How is the D&D strategy harmonised with the long-term waste management strategy?

- The IAEA has published a Technical Document "On-site disposal of nuclear facilities as a decommission strategy", [IAEA-TECDOC-1124(2000)]. It deals mainly with the entombment strategy.
- The 2006 NEA Status Report "Selecting Strategies for the Decommissioning of Nuclear Facilities" ISBN 92-64-02305-4, touch upon this issue in Section 3.1.5 on page 19-20.
- The NEA\NDC report (2003) has relevant information, see Section 1.1.
- The IAEA published TRS-441 Management of Problematic Waste and Material Generated During the Decommissioning of Nuclear Facilities in 2005.
- The IAEA draft Safety Guide DS376 addresses the relationship and dependence on waste management.
- The IAEA international projects on Evaluation and Demonstration of Safety during Decommissioning (DeSa) and Safety Driven Waste Management Solutions (SADRWMS) project also held a joint meeting in October 2005 to discuss the relationship and dependence of decommissioning and waste management.

2.2.2 What waste disposal arrangements (repositories, etc) and precautions are necessary?

- CPD projects reports are very country and site specific but could serve as information basis.
- The NEA\WPDD and RWMC-RF information platforms, see Section 1.1, have relevant information.
- The NEA\NDC report (2003), see Section 1.1, surveys the drivers behind national strategies, including the availability of waste disposal facilities.
- The IAEA has a document in preparation dealing inter alia with the dispositioning of lower level decommissioning waste and materials. It illustrates several industrial options to safely and cost-effectively manage materials and waste resulting from decommissioning. It presents several release modes including radioactive or conventional disposal, recycling, entombment etc.
- A TECDOC is at advanced stage of preparation at the IAEA illustrating the results of a Coordinated Research Project on disposal of low and intermediate level decommissioning waste.
- The IAEA has developed Safety Requirements for Near Surface Disposal (WS-R-1), supported by the Safety Guide on Safety Assessment for Near Surface Disposal (WS-G.1.1). In addition a new Safety Requirements WS-R-4 on Geological Disposal was published in 2006 and a complementary Safety Guide is in preparation.
- An IAEA International Project on the Application of the Safety Assessment methodology (ASAM) was completed in 2006. The report of this project also addresses consideration of heterogeneity of waste disposed in near surface facilities.

2.3 At what cost - also radiological - should dismantling be carried out?

- In 1999 the NEA jointly with IAEA and EC published a document titled "A Proposed Standardised List of Items for Costing Purposes in the Decommissioning of Nuclear Installations, *Interim Technical Document". The NEA Co-operative Project on Decommissioning was instrumental in preparing this document. The document are freely available at the webpage* http://www.nea.fr/html/rwm/reports/1999/costlist.pdf
- The 2006 NEA Status Report "*Decommissioning Funding. Ethics, Implementation, Uncertainties*" NEA/RWM/WPDD(2006)3/REV1 discusses this question in it's Section 4.4.
- The IAEA has published "*Review of selected cost drivers for decision on continued operation of older nuclear reactors*" (IAEA-TECDOC-1084, 1999) .
- The "Standardised Decommissioning Cost Estimating of WWER-440 Nuclear Power Plant Project"/EC is developing a Standardised Decommissioning Cost Estimate of WWER-440 reactors, based on the previously developed Proposed Standardised List of Items for Costing Purposes.
- The TND has organised a Working Group on Decommissioning Costs.

2.4 How does one arrive at generic[13] estimates of dismantling costs as function of D&D strategy in order to determine decommissioning funding costs?

- The NEA\NDC Report (2003), see Section 1.1, addresses this question.

13 This question is also linked to question 3.5.

3. Implementation Aspects

3.1 What will be the contents of an EIA for D&D?

- A study has been published in June 2001 by the EC Environment Directorate titled "Environment Impact Assessment for the decommissioning of Nuclear Installations - Final Report" [Contract B4-3040/99/136035/MAR/C2]
- "Consolidated NMSS Decommissioning Guidance" (Sept. 2002) issued by NRC [NUREG-1757, vol-1] in which some chapters (15-17) are dealing with EIA
- Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. It specifically includes the decommissioning of nuclear installations.
- The topical session at the WPDD meeting in December 2001 has examined the safety cases decommissioning within an EIA context, see Section 1.8

3.2 How is a safety case set up and managed?

3.2.1 What are the elements of a D&D safety case?

- Relevant information can be found in the report titled "Achieving the Goals of the Decommissioning Safety Case**"** in April 2005 with the number [NEA/RWM/WPDD(2005)3]. This report is freely available at the NEA webpage [http://www.nea.fr/html/rwm/wpdd.html].
- The IAEA has developed safety standards (WS-R-5) and safety guides, supported by Safety Report 45, see Appendix D, that describes the safety related documents required for authorisation, regulation and completion of decommissioning activities,

3.2.2 How wide is the range of assumptions needed for accident analysis?

- The proceedings of the WPDD Topical Session on Safety Case provides relevant information, see Section 1.8.
- The TND has organised a Working Group on Institutional, Legal, Regulatory Aspects, Licensing and Decommissioning Plan

3.2.3 What is the experience and lessons learned that can be fed back to the process of regulating decommissioning activities including criteria for judging safety cases?

- The proceedings of the Topical session at the NEA WPDD meeting in December 2001 have covered the safety case and the management of change, see Section 1.8.
- A new Safety Report on Safety Documentation is being prepared at the IAEA. It will describe the format and content of safety related documents needed for decommissioning planning and implementation. It will address the decommissioning plan, cost estimate, environmental impact statement, safety assessment, etc.

- The Task Group on the Safety Case (TGSC) of the NEA\WPDD issued a status report titled "Achieving the Goals of the Decommissioning Safety Case**"** in April 2005 with the number NEA/RWM/WPDD(2005)3. This report is freely available at the NEA webpage [http://www.nea.fr/html/rwm/wpdd.html].
- The issue was also discussed in Session 7 of the NEA workshop "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004, see proceedings on CD-Rom published in 2005.
- The IAEA Safety standards (WS-R-5, WS-G-2.1, WS_G-2.2. and WS-G-2.4., as well as the draft DS376) address the need for feedback of lessons learned form decommissioning and periodic review of the decommissioning plans.
- The IAEA DeSa project has a Regulatory Review Working Group that is developing recommendations on review of safety assessment for decommissioning. The project has also established a group that is developing recommendations on the application of the graded approach in accordance with the type and complexity of the facility under decommissioning.
- The WPDD Topical session "Emerging issues and trends in regulatory practices during the decommissioning and dismantling of nuclear power plants" held in Paris, October 24, 2006. Proceedings will be published at the WPDD web-pages spring 2007.

3.3 What type of organisation or implementing framework is best to carry out the D&D programme?

- IAEA has published: TRS-399, Management and Organisation for the Decommissioning of Large Nuclear Facilities, 2000. A follow up document is TECDOC-1394 (2004) Planning, Organizational and Management Aspects of Decommissioning: Lessons Learned.
- The TND has organised a Working Group on Project Management and Planning of Decommissioning
- An IAEA Technical Report on "Record Keeping for the Decommissioning of Nuclear Facilities: Guidelines and Experience" (TRS 411) has been issued in 2002. A follow up document of long term aspects of record keeping in deferred decommissioning projects is under preparation and expected to be published in 2008.

3.4 What are R&D needs?

3.4.1 Decontamination and dismantling techniques

- The CPD has published a guidance document on decontamination techniques used in decommissioning activities, 1999.
- The question was touched upon at the NEA workshop "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004 see reference in Appendix B.
- IAEA has published: TRS-395, "State-of-the-Art Technology for Decontamination and Dismantling of Nuclear Facilities", 1999.
- IAEA-TECDOC-1022, "New methods and techniques for decontamination in maintenance or decommissioning operations: Results of a CRP", 1998.
- The IAEA recently published the following Technical Reports "The Dismantling of Contaminated Stacks" (TRS-440); The Decommissioning of Research Reactors: State-of-

the-art, Trends and Open Issues" (TRS-446); and "The Decommissioning of Underground Structures, Systems and Components" (TRS-439). Another report on decommissioning of research reactors and other small nuclear facilities by making use of constraint resources is under preparation and expected to be published in 2008.

- US National Academy of Sciences/National Research Council, "Research opportunities for deactivating and decommissioning DOE Facilities", Washington, DC, 2001.
- The "Innovative Remote Dismantling Techniques (IRDIT) Project"/EC is working on:
  - Extension of existing know-how on remote dismantling techniques.
  - Collection and evaluation of specific data on remote dismantling of the RPV and reactor components at a WWER and a western PWR reactor.
  - Comparison of different techniques applied to typical reactor types (PWR and WWER).
- An IAEA Technical Report on "Decommissioning of small medical, industrial and research facilities" (TRS 414) has been issued, 2003.

3.4.2 What is R&D for very hot reactor internals?

- Dismantling of reactor internals is an activity needed in dismantling/replacement projects, e.g. Ringhals, BR-3, and Greifswald. The experience is that it is not clear that substantial R&D is needed.

3.4.3 What is R&D for dismantling concrete and its reuse?

- The European Commission DG-Research has published some reports on these topics; these are available for purchase. A full list together with contact details is available at : http://www.eu-decom.be/about/initabout.htm.

3.4.4. What is R&D for decontamination of metals?

- Relevant information can be found in the report "Decontamination Techniques Used in Decommissioning Activities" This report was prepared by the CPD Task Group on Decontamination in 1999. The report is freely available on the webpage [http://www.nea.fr/html/rwm/reports/1999/decontec.pdf].
- The European Commission DG-Research has published some reports on these topics; these are available for purchase. A full list together with contact details is available at: http://www.eu-decom.be/about/initabout.htm.

3.4.5. What is R&D for dealing with "exotic" and toxic materials (like Na, NaK, Be, Graphite,...)

- The IAEA Technical Report on the "Management of Problematic Waste and Material Generated During the Decommissioning of Nuclear Facilities" TRS- 441, has been published in 2005.

3.5 How can costing of individual[14] industrial projects be estimated?

- The NEA\IAEA\EC have published a joint guidance document on cost breakdown structures for analysing and recording costs, see Appendix B.
- The European Commission DGENV/DGTREN launched a project on "Development of Methodologies for cost calculations and financial planning of decommissioning operations". The final report is available, see Appendix C.

3.6 What clearance procedures should be implemented for materials?

- NEA is currently (2006) working on a Status Report on the *Release of Materials and Buildings.* The report is scheduled to be published in 2007.
- The IAEA has issued a Safety Guide entitled "Application of the Concepts of Exclusion, Exemption and Clearance" (RS-G-1.7) which provides international guidance on this issue.
- A draft Safety Report on Monitoring for Compliance with Exclusion, Exemption and Clearance Values has been developed by the IAEA, see Appendix D.
- NUREG 1640, see web page http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1640/
- The EU has issued a series of recommendations to provide the guidance foreseen in Article 5 of Council Directive96/29/EURATOM:
  - RP 113 Recommended Radiological Protection Criteria for the clearance of buildings and building rubble arising from the dismantling of nuclear installations (2000).
  - RP 122 Practical use of the concepts of clearance and exemption: Part I: Guidance on general clearance levels for practices (2000).
  - RP 89 Recommended Radiological Protection Criteria for the Recycling of Metal from the Dismantling of Nuclear Installations (1998).

  In the context of the revision of Directive 96/29/EURATOM the European Commission's Article 31 Group of Experts is reviewing the current EU guidance and that contained in the IAEA guide RS-G-1.7, with a view to recommending the values that might be incorporated in the revised Directive.

3.7 What clearance procedures should be implemented for sites?

- The NEA and IAEA have completed a joint study on the environmental remediation of uranium mining and milling facilities and issued a report in the end of 2001.
- The IAEA has published a Safety Requirements "Remediation of areas contaminated by past activities and accidents". A Safety Guide on "Implementation of the Remediation Process for Past Activities and Accidents" (DS-172) has been developed and been sent to Member States for comment. A Safety report on monitoring for compliance with cleanup criteria is also being prepared.
- ANS N13.12 on Release of sites.

14. This question is also linked to question 2.4.

- The TND has organised a Working Group on Site Characterisation, Remediation and Reuse.
- The NEA\WPDD created a Task Group reviewing the release of sites, buildings, and materials. A survey of national practices in releasing sites has being carried out. A status report has been published in 2006 "*Releasing the Sites of Nuclear Installations*" ISBN 92-64-02307-0.
- A draft IAEA Safety Report on Monitoring for Compliance with Remediation Criteria has been developed that focuses on monitoring of sites (land) for the purposes of potential release from regulatory control, see Appendix D.

3.8 How to perform the release measurement for very large volumes of materials and complex geometry?

- Relevant information can be found in the NEA report "Nuclear Decommissioning. Recycling and Reuse of Scrap Metals". This report was prepared by a CPD Task Group in 1999. The report is freely available on the webpage [http://www.nea.fr/html/rwm/reports/1996/recycling.pdf].
- The IAEA has published a technical Report "Radiological characterisation of shutdown nuclear reactors for decommissioning purposes," TRS No.389 (1998).

3.9 What waste treatment technologies have been found to work and what have not?

3.9.1 How are special waste items to be dealt with, e.g. large items and reactor internals?

- Some information can be found in the Proceedings of the WPDD Topical Session on Materials Management. [http://www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-7.pdf]. See also: Topical Session on Buildings & Sites Release and Reuse, Karlsruhe, Germany, 17-18 June 2002 [NEA/RWM/WPDD(2002)8].
- A TECDOC is at advanced stage of preparation at the IAEA illustrating the results of a Coordinated Research Project on disposal of low and intermediate level decommissioning waste. It includes cases of special waste items.

3.9.2 Which are good practices for volume reduction?

- Identified as an issue by NEA Standing Technical Committees Chairs.
- The IAEA has published a Technical Report on the "Minimization of Radioactive Wastes from Decontamination and Decommissioning of Nuclear Facilities", TRS No. 401 (2001).

4. Stakeholder Information and Involvement Aspects

4.1 Informing stakeholders on the safety and manageability of the D&D process

- The NEA\WPDD report (2002), see Section 1.1, reviews also stakeholder issues; See also the proceedings of the Tarragona Seminar, see Section 2.1.
- The NEA FSC reports as mentioned in the Overview chapter are useful.
- WPDD and FSC held in 2005 a joint Topical session. on stakeholder involvement in decommissioning projects[15].
- A brochure on lessons learnt from presentations made to and within WPDD on stakeholder involvement is in preparation [NEA\RWM\WPDD(2006)8\PROV]
- The TND has organised a Working Group on Public Perception, Public Relations Aspects of Decommissioning

4.2 How is the general public to be involved in the EIA process?

- Some information can be found in the proceedings of the WPDD Topical Session on Safety Case [NEA/RWM/WPDD(2002)2] and the Status report "*Achieving the Goals of the Decommissioning Safety Case*" which was published in April 2005 [NEA/RWM/WPDD(2005)3]. This report is freely available at the NEA webpage [http://www.nea.fr/html/rwm/wpdd.html].
- See the NEA FSC reports as mentioned in the Overview chapter
- See the WPDD\FSC joint Topical session and the Brochure as mentioned above.
- The TND has organised a Working Group on the Environmental and Socioeconomic Aspects of Decommissioning.
- The IAEA has a related document in preparation on socio-economic implications of decommissioning. It is expected to be published in 2008.

4.3 Who are the stakeholders?

- See the NEA FSC reports as mentioned in the Overview chapter
- See the WPDD\FSC joint Topical session and the Brochure as mentioned above.
- The NEA\WPDD report of 2002, see Section 1.1, has relevant information. See also the proceedings of the Tarragona Seminar in Section 2.1.
- The IAEA has a document in preparation focussing on stakeholders' identification. It is expected to be published in 2008.

[15] The proceedings can be downloaded from the web-page http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-5.pdf

- The IAEA, together with NEA, EC and WNA are organising an international conference on lessons learned form decommissioning and the safe termination of nuclear practices in December 2006, where social aspects and stakeholders involvement will be discussed.

5. Transitional Phase Aspects

5.1 What are the special aspects of the transition phase from facility operation to decommissioning?

- The CSNI Special Expert group on Human and organizational factors has organized a workshop on management of change in 2001 and published in June 2004 a paper on "Managing and Regulating Organisational Change in Nuclear Installations", CSNI Technical Opinion Papers - No. 5, NEA#05348, ISBN: 92-64-02069-1, available on the Web at: [http://www.nea.fr/html/nsd/reports/2004/nea5348-change.pdf]. The Special Expert Group also co-organised the session on "Management of Transition and Change Throughout Decommissioning" during the Workshop on "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004, see proceedings on CD-Rom.
- SEGHOF discussed the theme during its meeting following the NEA Rome workshop "Safe, Efficient, and Cost-effective Decommissioning" held in Rome September 2004 and its member countries are asked to come up with practical proposals on how to continue. The SEGHOF has expressed its readiness for joint activities in the field.
- IAEA has published a Technical report on "Transition from Operation to Decommissioning of Nuclear Installations" (TRS 420), as well as a Safety report, "Safety Considerations in the Transition from Operations to Decommissioning" (SRS 36)".
- The IAEA Safety requirements (WS-R-2, WS-R-5) and Safety Guides (WS-G-2.1, WS-G-2.2, and WS-G-2.4) also provide recommendations on safety considerations during the transition phase from operation to decommissioning.

Appendix A

GLOSSARY OF ACRONYMS

CNRA:	Committee on Nuclear Regulatory Activities of the OECD/Nuclear Energy Agency.
CPD:	Co-operative Programme on Decommissioning reporting to the RWMC of the OECD/Nuclear Energy Agency.
CRPPH:	Committee on Radiation Protection and Public Health of the OECD/Nuclear Energy Agency.
CSNI:	Committee on Safety of Nuclear Installations of the OECD/Nuclear Energy Agency.
D&D:	Decommissioning and Dismantling.
DGENV:	Directorate General of Environment of the European Commission.
DGTREN:	Directorate General of Energy and Transport of the European Commission.
EC:	European Commission.
EGRA:	NEA\CRPPH Expert Group on the Regulatory Application of Authorisation.
EIA:	Environmental Impact Assessment.
EURATOM:	The European Atomic Energy Community, is an international organization composed of the members of the European Union established on 25 March 1957.
IAEA:	International Atomic Energy Agency.
ISBN:	International Standard Book Numbering system.
NEA:	Nuclear Energy Agency (OECD).
NDC:	Nuclear Development Committee of the OECD/Nuclear Energy Agency.
NMSS:	US Nuclear Regulatory Commission Office of Nuclear Material Safety and Safeguards.
NPP:	Nuclear Power Plant.
NRC:	Nuclear Regulatory Commission (U.S.).
PWR:	Pressurized Water Reactor.
RPV:	Reactor Pressure Vessel.
RWMC:	Radioactive Waste Management Committee of the OECD/Nuclear Energy Agency.

TEGDE: Technical Group on Decommissioning of the IAEA.

TGDC: Task Group on Decommissioning Costs under the Co-operative Programme on Decommissioning (CPD).

TGSC Task Group on the Safety Case under the WPDD.

TND: Thematic Network on Decommissioning sponsored by the European Commission Research Directorate-General.

USNRC: see NRC.

WGIP: Working Group on Inspection Practices under the CNRA of the OECD/Nuclear Energy Agency.

WPDD: Working Party on Decommissioning and Dismantling under the RWMC of the OECD/Nuclear Energy Agency.

WWER: Water Cooled Water Moderated Nuclear Power Reactor.

Appendix B

List of NEA Documents on Decommissioning and Decontamination of Nuclear Facilities

-2003

Document Type	**Titles**	**NEA References**
Report ***Free*** ***OECD/NEA/CPD, IAEA, EC***	A Proposed Standardised List of Items for Costing Purposes in the Decommissioning of Nuclear Installations	http://www.nea.fr/html/rwm/reports/1999/costlist.pdf
Report ***Free*** ***OECD/NEA/CPD***	Decontamination Techniques Used in Decommissioning Activities	http://www.nea.fr/html/rwm/reports/1999/decontec.pdf
Report ***Free*** ***OECD/NEA/CPD***	Recycling and Reuse of Scrap Metals: A Report by a Task Group of the NEA Co-operative Programme on Decommissioning	http://www.nea.fr/html/rwm/reports/1996/recycling.pdf
Report ***Free*** ***OECD/NEA/CPD***	The NEA Co-operative Programme on Decommissioning: The First Ten Years 1985-95	http://www.nea.fr/html/rwm/reports/1996/decommissioning.pdf
Report ***Free***	The Decommissioning and Dismantling of Nuclear Facilities: Status, Approaches, Challenges. Available also in French.	ISBN 92-64-18488-0 www.nea.fr/html/rwm/reports/2002/3714-decommissioning.pdf
Report ***For Sale*** ***(NDC)***	Decommissioning Nuclear Power Plants. Policies, Strategies and Costs	ISBN 92-64-10431-3 www.oecdbookshop.org/oecd/display.asp?TAG=X2PAO8XX5X197X286EVH6Q&CID=&LANG=EN&SF1=DI&ST1=5LMQCR2K1S6L
Report ***Free*** ***(CNRA)***	The Regulatory Challenges of Decommissioning Nuclear Reactors. Also available in French.	ISBN 92-64-02120-5 www.nea.fr/html/nsd/reports/nea4375-decommissioning.pdf
Brochure ***Free***	Decommissioning of Nuclear Power Facilities, It can and has been done (Illustrated eight-page brochure, 2004). Available also in Italian and French	www.nea.fr/html/rwm/reports/2004/nea5728-decom.pdf
Proceedings ***Free***	Topical Session on the Decommissioning and Dismantling Safety Case, Paris, 5 December 2001	NEA/RWM/WPDD(2002)2 www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-2.pdf

Proceedings ***Free***	Topical Session on Materials Management, Paris, 6 December 2001	NEA/RWM/WPDD(2002)7 www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-7.pdf
Proceedings ***Free***	Topical Session on Buildings & Sites Release and Reuse, Karlsruhe, Germany, 7-10 June 2002	NEA/RWM/WPDD(2002)8 www.nea.fr/html/rwm/docs/2002/rwm-wpdd2002-8.pdf
Proceedings ***For Sale***	Strategy Selection for the Decommissioning of Nuclear Facilities. Seminar Proceedings, Tarragona, Spain, 1-4 September 2003	ISBN 92-64-01671-6 www.oecdbookshop.org/oecd/display.asp?sf1=identifiers&st1=662004091P1
Proceedings ***Free***	Topical Session on "Liabilities Identification and Long-term Management at the National Level", Paris France, March 2003	NEA/RWM/(2003)14 www.nea.fr/html/rwm/docs/2003/rwm2003-14.pdf

2004-2006

Proceedings ***Free***	Safe, Efficient, and Cost-Effective Decommissioning. Proceedings from a workshop, Rome, Italy, 6-10 September 2004	Set of 5 CD-Roms *Contact NEA Secretariat*
Report ***Free***	Safe, Efficient, and Cost-Effective Decommissioning. Conclusions and final Stocktaking. Workshop September 6-10, 2004, Rome, Italy	NEA/RWM/WPDD(2005)6 http://www.nea.fr/html/rwm/docs/2005/rwm-wpdd2005-6.pdf
Report ***Free***	Achieving the Goals of the Decommissioning Safety Case. Also available in French.	ISBN 92-64-01068-8 www.nea.fr/html/rwm/docs/2005/rwm-wpdd2005-3.pdf
Report ***Free***	Topical Session on Funding Issues in Connection with Decommissioning of Nuclear Power Plants, Paris, France 9	NEA/RWM/WPDD(2005)4/PROV http://www.nea.fr/html/rwm/docs/2005/rwm-wpdd2005-4.pdf
Report ***Free***	Selecting Strategies for the Decommissioning of Nuclear Facilities. A status report. Paris, February 8, 2006. [	ISBN 92-64-02305-4 http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-1.pdf
Report ***Free***	Decommissioning Funding. Ethics, Implementation, Uncertainties.	NEA/RWM/WPDD(2006)3/REV1 (in preparation)
Report ***Free***	Releasing the Sites of Nuclear Installations. A status report.	ISBN 92-64-02307-0 http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-4.pdf
Report ***Free***	Proceedings of the Topical Session on Stakeholder involvement in Decommissioning Projects - WPDD-6 Meeting - November 14, 2005	NEA/RWM/WPDD(2006)5 http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-5.pdf

Appendix C

List of EC Documents on Decommissioning and Decontamination of Nuclear Facilities

A great deal of additional documentation is readily accessible via: http://www.eu-decom.be/introduction/initintroduction.htm

NB: all the documents listed below are in the process of being published via the link below

Document type	Title	Link
Commission decision	Special programme to support the decommissioning of nuclear power plants and consequential measures in the energy sector for Lithuania in 2004	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Commission decision	Special programme to support the decommissioning of nuclear power plants and consequential measures in the energy sector for Lithuania in 2005	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Commission decision	Special programme to support the decommissioning of nuclear power plants and consequential measures in the energy sector for Lithuania in 2006	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Commission decision	Special programme to support the decommissioning of nuclear power plants and consequential measures in the energy sector for Slovakia in 2004	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Commission decision	Special programme to support the decommissioning of nuclear power plants and consequential measures in the energy sector for Slovakia in 2005	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Background briefing	Information Note: decommissioning Support to Lithuania	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Background briefing	Information Note: decommissioning Support to the Slovak Republic	http://ec.europa.eu/energy/nuclear/decommissioning/index_en.htm
Commission Communication	Communication from the Commission to the European Parliament and the Council; COM(2004)719; Brussels, 26.10.2004;	http://europa.eu.int/servlet/portail/RenderServlet?search=DocNumber&lg=en&nb_docs=25&domain=Preparatory&in_force=NO&type_doc=COMfinal&an_doc=2004&nu_doc=719
Legislative proposal	Proposal (COM(2003)32) and Amended Proposal (COM(2004)526) for a Council Directive (Euratom) setting out basic obligations and general principles on the safety of nuclear installations	http://europa.eu.int/comm/energy/nuclear/safety/new_package_en.htm

Appendix D

List of IAEA Documents Published Since 1985 on Decommissioning and Decontamination of Nuclear Facilities

Safety Series (SS)		
1.	Safety Requirements on Predisposal Management of Radioactive Waste, Including Decommissioning	SS No. WS-R 2 (2000)
2	Safety Requirements on Decommissioning of Facilities Using Radioactive Material (draft)	SS WS-R-5
3.	Safety Guide on Decommissioning of Nuclear Power Plants and Research Reactors	SS No. WS-G-2.1 (1999)
4.	Safety Guide on Decommissioning of Medical, Industrial and Research Facilities	SS No. WS-G-2.2 (1999)
5.	Safety Guide on Decommissioning of Nuclear Fuel Cycle Facilities	SS No WS-G-2.4 (2001)
6.	Safety Guide on Application of the Concepts of Exclusion, Exemption and Clearance	SS No. RS-G-1.7 (2004)
7.	Safety Guide on Release of Sites from Regulatory Control upon Termination of Practices (in print)	WS-G-5.1 (2006)
8.	Safety Guide on Safety Assessment of Decommissioning of Facilities Using Radioactive Material	DS 376

Safety Report Series (SR)		
1	Safe Enclosure of Nuclear Facilities During Deferred Dismantling	Safety Reports Series No.26 (2002)
2.	Managing the Early Termination of Operation of Nuclear Power Plants	Safety Reports Series No. 31 (2003)
3	Safety Considerations in the Transition from Operation to Decommissioning of Nuclear Facilities	Safety Reports Series No. 36 (2004)
4.	Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance	Safety Reports Series No. 44 (2005)
5.	Standard Format and Content for Safety Related Decommissioning Documents	Safety Reports Series No. 45 (2005)
6.	Safety Assessment for Decommissioning of Nuclear Facilities (draft)	DD 741
7.	Monitoring for Compliance with Exclusion, Exemption and Clearance Values (draft)	DD740
8.	Decommissioning Strategies for Facilities Using Radioactive Material (in print)	DD820
9.	Safety Aspects of Management of Radioactive Waste (draft)	DD862

Technical Reports Series (TRS)		
1.	Decontamination of Nuclear Facilities to Permit Operation, Inspection, Maintenance, Modification or Plant Decommissioning	TRS No. 249 (1985)
2.	Methodology and Technology of Decommissioning Nuclear Facilities	TRS No. 267 (1986)
3.	Methods for Reducing Occupational Exposure During the Decommissioning of Nuclear Facilities	TRS No. 278 (1987)
4.	Decontamination and Demolition of Concrete and Metal Structures During the Decom. of Nuclear Installations	TRS No. 286 (1987)
5.	Factors Relevant to the Recycling or Reuse of Components Arising from the Decommissioning and Refurbishment of Nuclear Facilities	TRS No. 293 (1988)
6.	Monitoring Programmes for Unrestricted Release Related to Decommissioning of Nuclear Facilities	TRS No. 334 (1992)
7.	Cleanup and Decommissioning of a Nuclear Reactor After a Severe Accident	TRS No. 346 (1992)
8.	Application of Remotely Operated Handling Equipment in the Decommissioning of Nuclear Facilities	TRS No. 348 (1993)
9.	Planning and Management for the Decommissioning of Research Reactors and Other Small Nuclear Facilities	TRS No. 351 (1993)
10.	Decontamination of Water Cooled Reactors	TRS No. 365 (1994)
11.	Decommissioning Techniques for Research Reactors	TRS No. 373 (1994)
12.	Safe Enclosure of Shutdown Nuclear Installations	TRS No. 375 (1995)
13.	Design and Construction of Nuclear Power Plants to Facilitate Decommissioning	TRS No. 382 (1997)
14.	Decommissioning of Nuclear Facilities Other than Reactors	TRS No. 386 (1998)
15.	Radiological Characterisation of Shutdown Nuclear Reactors for Decommissioning Purposes	TRS No. 389 (1998)
16.	State-of-the-art Technology for Decontamination and Dismantling of Nuclear Facilities	TRS No.395 (1999)
17.	Organization and Management for the Decommissioning of Large Nuclear Facilities	TRS No. 399 (2000)
18.	Minimisation of Radioactive Waste from Decontamination and Decommissioning of Nuclear Facilities	TRS No. 401 (2001)
19.	Record keeping for the Decommissioning of Nuclear Facilities: Guidelines and Experience	TRS No. 411 (2002)
20.	Decommissioning of Small Medical, Industrial and Research Facilities	TRS No. 414 (2003)
21.	The Transition from Operation to Decommissioning of Nuclear Installations	TRS No. 420 (2004)
22.	The Power Reactor Information System (PRIS) and its Extension to Non-Electrical Applications, Decommissioning and Delayed Projects Information	TRS No. 428 (2005)
23.	Dismantling of Contaminated Stacks at Nuclear Facilities	TRS No. 440 (2005)
24.	Management of Problematic Waste and Material Generated During the Decommissioning of Nuclear Facilities	TRS No. 441 (2006)
25.	The Decommissioning of Underground Structures, Systems and Components	TRS No. 439 (2006)
26.	Redevelopment of Nuclear Facilities after Decommissioning	TRS No. 444 (2006)
27.	The Decommissioning of Research Reactors;Evolution, State-of-the-art, Open Issues	TRS No.446 (2006)

Technical Documents (TECDOC)		
1.	Decontamination and Decommissioning of Nuclear Facilities: Final Report of Three Research Meetings (1984-87)	IAEA-TECDOC 511 (1989)
2.	Decontamination of Transport Casks and of Spent Fuel Storage Facilities	IAEA-TECDOC-556 (1990)
3.	Factors Relevant to the Sealing of Nuclear Facilities	IAEA-TECDOC-603 (1991)
4.	Considerations in the Safety Assessment of Sealed Nuclear Facilities	IAEA-TECDOC-606 (1991)
5.	National Policies and Regulations for Decommissioning Nuclear Facilities	IAEA-TECDOC-714 (1993)
6.	Decontamination and Decommissioning of Nuclear Facilities - Results of a CRP, ,Phase II: 1989-1993	IAEA-TECDOC-716 (1993)
7.	New Methods and Techniques for Decontamination in Maintenance or Decommissioning Operations - Results of a Co-ordination Research Programme, 1994-1998	IAEA-TECDOC-1022 (1998)
8.	Technologies for Gas Cooled Reactor Decommissioning, Fuel Storage and Waste Disposal, Proceedings of a Technical Committee Meeting held in Juelich, Germany, 8-10 September 1997	IAEA-TECDOC-1043 (1998)
9.	On-site Disposal as a Decommissioning Strategy	IAEA-TECDOC-1124 (1999)
10.	The Decommissioning of WWER-Type Nuclear Power Plants	IAEA-TECDOC-1133 (2000)
11.	Nuclear Graphite Waste Management -Technical Committee Meeting , Manchester, United Kingdom, 18-20 Oct 1999	CD-ROM (2001)
12.	Decommissioning Techniques for Research Reactors- Final report of a Co-ordinated Research Project 1997-2001	IAEA-TECDOC-1273 (2002)
13.	Safe and Effective Nuclear Power Plant Life Cycle Management Towards Decommissioning	IAEA-TECDOC-1305 (2002)
14.	Decom Costs of WWER-440 Nuclear Power Plants. Interim Report: Data Collection and Preliminary Evaluations	IAEA-TECDOC-1322 (2002)
15.	Planning, Organizational and Management Aspects of Decommissioning: Lessons Learned	IAEA-TECDOC-1394 (2004)
16.	Operational and Decommissioning Experience with Fast Reactors	IAEA-TECDOC-1405 (2004)
17.	Financial Aspects of Decommissioning	IAEA-TECDOC- 1476 (2005)
18.	Selection of Decommissioning Strategies: Issues and Factors	IAEA-TECDOC-1478 (2005)

Other		
1.	Nuclear Data Requirements for Fission Reactor Decommissioning	INDC (NDS)-269 (1993)
2.	International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning	INDC (NDS)-355 (1996)
3.	A Proposed Standardised List of Items for Costing Purposes in the Decommissioning of Nuclear Installations	OECD/NEA, Paris 1999
4.	Safe Decommissioning for Nuclear Activities, Proc. of an Int. Conf. Berlin, 14-18 Oct. 2002	IAEA, Vienna, 2003
5.	Joint NEA/IAEA/EC Workshop on the Regulatory Aspects of Decommissioning, 19-21 May, 1999, Rome	ANPA, Rome, 2000
6.	Status of the Decommissioning of Nuclear Facilities Around the World	IAEA, Vienna. 2004