

adjustment is made every five years. Originally, the Price-Anderson Act was administered by the US Atomic Energy Commission (USAEC) for both commercial and US Government nuclear activities. When the USAEC was abolished in 1974, Price-Anderson responsibility was allocated between two separate agencies: the US Nuclear Regulatory Commission (USNRC) administers Price-Anderson coverage for its licensees, while the US Department of Energy (USDOE) administers coverage for its contractors. USDOE contractors are indem-

nified by the US Government in the same amount as for nuclear power plants.

The new Energy Policy Act of 2005 includes the Price-Anderson Amendments Act of 2005 (Sections 601 to 610). The 2005 Amendments extend the Price-Anderson authority of the USNRC another 20 years to 31 December 2025. This essentially applies to new nuclear power plants, since coverage for all existing NPPs was established under the original Act. The main change for existing and future NPPs is that the annual maximum retrospective assessment per

reactor per nuclear incident has been increased from USD 10 million to USD 15 million (with inflation indexing every five years). The 2005 Amendments also provide that modular power reactors of 100 MW or more (e.g. pebble bed units) will be treated as one unit for the assessments. The current total amount of coverage and liability limit for NPPs (USD 10.7 billion) remains the same. The Amendments also extend to 31 December 2025 the separate authority of the USDOE to indemnify its contractors for nuclear hazards. ■

---

## New publications



### Economic and technical aspects of the nuclear fuel cycle

#### Actinide and Fission Product Partitioning and Transmutation

Eighth Information Exchange Meeting  
Las Vegas, Nevada, United States  
9-11 November 2004

ISBN 92-64-01071-8

Free: paper or web.

In response to the interest expressed by its member countries, the OECD Nuclear Energy Agency (NEA) has regularly organised biennial information exchange meetings on actinide and fission product partitioning and transmutation (P&T) since 1990, in

order to provide experts with a forum to present and discuss the latest developments in the field. This book and its enclosed CD-ROM contain the proceedings of the 8<sup>th</sup> Information Exchange Meeting held in Las Vegas, Nevada, USA on 9-11 November 2004. The meeting covered the broad spectrum of developments in the field, including the potential impact of P&T on radioactive waste management, new partitioning technologies, fuels for transmutation devices, as well as critical and accelerator-driven transmuting devices. More than 80 papers were presented during the meeting and have been reproduced in the proceedings.

---

# Nuclear safety and regulation

## Review of the Role, Activities and Working Methods of the CNRA

### Committee on Nuclear Regulatory Activities (CNRA)

ISBN 92-64-01062-9

Free: paper or web.

This report, prepared by an independent review group, characterises the current role, priorities and working methods of the NEA Committee on Nuclear Regulatory Activities (CNRA), identifies and analyses issues of concern, and suggests ways to further increase the efficiency and effectiveness as well as the visibility of the committee. It also reviews the role and interactions between the CNRA and the other NEA standing technical committees and international organisations, and suggests ways to improve co-ordination and co-operation. In formulating its report, the review group examined various CNRA documents (e.g. summary records, reports) interviewed past and present CNRA members, standing technical committee chairs and others, and gathered additional input through a questionnaire. Conclusions and recommendations have been derived concerning the mid-term and long-term role and orientation of the committee and, in particular, the balance between technical- and policy-related activities.

## The Safety of the Nuclear Fuel Cycle

ISBN 92-64-01421-7 Price: € 70, US\$ 88, £ 48, ¥ 9600.

The procurement and preparation of fuel for nuclear power reactors, followed by its recovery, processing and management subsequent to reactor discharge, are frequently referred to as the “front end” and

“back end” of the nuclear fuel cycle. The facilities associated with these activities have an extensive and well-documented safety record accumulated over the past 50 years by technical experts and safety authorities. This information has enabled an in-depth analysis of the complete fuel cycle. Preceded by two previous editions in 1981 and 1993, this new edition of the Safety of the Nuclear Fuel Cycle represents the most up-to-date analysis of the safety aspects of the nuclear fuel cycle. It will be of considerable interest to nuclear safety experts, but also to those wishing to acquire extensive information about the fuel cycle more generally.

## Review of the Role, Activities and Working Methods of the CSNI

### Committee on the Safety of Nuclear Installations (CSNI)

ISBN 92-64-01072-6

Free: paper or web.

This report, prepared by a senior-level assessment group, describes the current role, priorities and working methods of the NEA Committee on the Safety of Nuclear Installations (CSNI), identifies and analyses issues of concern, and suggests ways to further increase the efficiency and effectiveness of the committee. It also reviews CSNI interactions with the NEA Committee on Nuclear Regulatory Activities (CNRA), the other NEA standing technical committees and international organisations, and suggests ways to improve co-ordination and co-operation. In closing, conclusions are drawn and recommendations made concerning the future operation and role of the committee.

# Radiological protection

## Evolution of the System of Radiological Protection

### Second Asian Regional Conference, Tokyo, Japan, 28-29 July 2004

ISBN 92-64-01362-8 Price: € 40, US\$ 50, £ 27, ¥ 5 500.

One of the main challenges facing radiological protection experts is how to integrate radiological pro-

tection within modern concepts of and approaches to risk governance. It is within this context that the International Commission on Radiological Protection (ICRP) decided to develop new general recommendations to replace its *Publication 60* recommendations of 1990. In the process of developing these new recommendations, the views of the ICRP have evolved significantly, largely due to stakeholder involvement that has been actively solicited by the ICRP. In this regard, it was upheld

during the First Asian Regional Conference organised by the NEA in October 2002 that the implementation of the new system must allow for regional, societal and cultural differences. In order to ensure appropriate consideration of these differences, the NEA organised the Second Asian Regional Conference on the Evolution of the System of Radiological Protection. Held in Tokyo on 28-29 July 2004, the conference included presentations by the ICRP Chair as well as by radiological experts from Australia, China, Japan and Korea. Within their specific cultural and socio-political milieu, Asia-Pacific and western ways of thought on how to improve the current system of radiological protection were presented and discussed. These ways of thinking, along with a summary of the conference results, are described in these proceedings.

## Occupational Exposure Management at Nuclear Power Plants

Fourth ISOE European Symposium, Lyon, France 24-26 March 2004

ISBN 92-64-01036-X Price: € 50, US\$ 65, £ 34, ¥ 6700.

The Information System on Occupational Exposure (ISOE) has become a unique, worldwide programme on the protection of workers at nuclear power plants. It includes a vast network for exchanging experience in the area of occupational exposure management as well as the world's largest database on occupational exposure from nuclear power plants. Each year, an ISOE international symposium offers a forum for radiation protection professionals from the nuclear industry, operating organisations and

regulatory authorities to exchange information on practical experience with occupational radiation exposure issues in nuclear power plants. These proceedings summarise the presentations made at the Fourth ISOE European Symposium on Occupational Exposure Management at Nuclear Power Plants, held in March 2004 in Lyon, France.

## Occupational Exposures at Nuclear Power Plants – 2003

Thirteenth Annual Report on the ISOE Programme, 2003

ISBN 92-64-01065-3

Free: paper or web.

The Information System on Occupational Exposure (ISOE) was created by the OECD Nuclear Energy Agency in 1992 to promote and co-ordinate international co-operative undertakings in the area of worker protection at nuclear power plants. The ISOE Programme provides experts in occupational radiation protection with a forum for communication and exchange of experience. The ISOE databases enable the analysis of occupational exposure data from the 465 commercial nuclear power plants participating in the Programme (representing some 90% of the world's total operating commercial reactors). The Thirteenth Annual Report of the ISOE Programme summarises achievements made during 2003 and compares annual occupational exposure data. Principal developments in ISOE participating countries are also described.

# Radioactive waste management

## Achieving the Goals of the Decommissioning Safety Case

A Status Report

ISBN 92-64-01068-8

Free: paper or web.

The key issue in the decommissioning of nuclear facilities is the progressive removal of hazards, by stepwise decontamination and dismantling activities that have to be carried out safely and within the boundaries of an approved safety case. The decommissioning safety case is a collection of arguments and evidence to demonstrate the safety of a decommissioning project. The safety case involved analysing the hazards and the separate

stages required for hazard reduction. This status report, drawn from the activities of the OECD/NEA Working Party on Decommissioning and Dismantling (WPDD), will be helpful to individuals and organisations involved in the preparation of a decommissioning safety case.

## Clay Club Catalogue of Characteristics of Argillaceous Rocks

ISBN 92-64-01067-X

Free: paper or web.

The OECD/NEA Working Group on the Characterisation, the Understanding and the Performance of Argillaceous Rocks as Repository Host Formations,

namely the "Clay Club", examines the various argillaceous rocks that are being considered for the deep geological disposal of radioactive waste, i.e. from plastic, soft, poorly indurated clays to brittle, hard mudstones or shales. The Clay Club considered it necessary and timely to provide a catalogue to gather in a structured way the key geoscientific characteristics of the various argillaceous formations that are – or were – studied in NEA member countries with regard to radioactive waste disposal. The present catalogue represents the outcomes of this Clay Club initiative.

## Engineered Barrier Systems (EBS) in the Context of the Entire Safety Case

Process Issues – Workshop Proceedings, Las Vegas, United States, 14-17 September 2004

ISBN 92-64-01313-X Price: € 40, US\$ 50, £ 27, ¥ 5 500.

The Integration Group for the Safety Case (IGSC) of the Nuclear Energy Agency (NEA) is co-sponsoring a project with the European Commission to develop a greater understanding of how to achieve the necessary integration for successful design, construction, testing, modelling and performance assessment of engineered barrier systems (EBS). These proceedings include the main findings and presented papers from the second workshop of the EC-NEA EBS project, which covered *inter alia* research and development work on pre- and post-closure processes; thermal management; thermal, hydraulic, mechanical and chemical process models; and repository design. The workshop was hosted by the US Department of Energy in Las Vegas, USA, on 14-17 September 2004.

## International Peer Reviews for Radioactive Waste Management

General Information and Guidelines

*Bilingual*

ISBN 92-64-01077-7

*Free: paper or web.*

International peer reviews as a working method is closely associated with OECD practice, where it is facilitated by the homogeneous membership and the high degree of trust shared by the member countries. International peer reviews of national radioactive waste management programmes, or of specific aspects of them, have been increasingly carried out over the past ten years. This document lays down the guidelines that the requesting country, the Secretariat and the international review team ought to have in mind when an international peer review is requested, organised or carried out.

## NEA Sorption Project Phase II

Interpretation and Prediction of Radionuclide Sorption onto Substrates Relevant for Radioactive Waste Disposal Using Thermodynamic Sorption Models

ISBN 92-64-01206-0 Price: € 70, US\$ 88, £ 48, ¥ 9 600.

The modelling of the key process of radionuclide sorption is of great importance in assessing the performance or safety of deep and near-surface repositories for radioactive waste. The first phase of the NEA Sorption Project ran from 1997 to 1998, and highlighted the diversity in the details of the thermodynamic descriptions of sorption processes. Phase II of the NEA Sorption Project was initiated as a major international contribution towards demonstrating the consistency and applicability of different thermodynamic sorption models to support the selection of a sorption parameter, namely Kd values for safety assessments. It was implemented in the form of a comparative modelling exercise based on selected datasets for radionuclide sorption by both simple and complex materials. This report presents the results of Phase II of the Sorption Project, conducted as a co-operative project under the auspices of the Integration Group for the Safety Case (IGSC) of the OECD/NEA Radioactive Waste Management Committee (RWMC).

## Radioactive Waste Management Programmes in OECD/NEA Member Countries

ISBN 92-64-01210-9 Price: € 45, US\$ 56, £ 31, ¥ 6 200.

These fact sheets present the radioactive waste management programmes of 20 OECD/NEA member countries. They include information about the sources, types and quantities of waste as well as how and by whom they are managed. References for further information are also provided for each country.

## The Regulatory Function and Radioactive Waste Management

International Overview

ISBN 92-64-01075-0

*Free: paper or web.*

This overview presents an easily accessible synopsis of the regulatory control of radioactive waste management in 15 NEA member countries. It covers the management of radioactive waste from all types of nuclear installations, such as nuclear power plants, research reactors and nuclear fuel cycle facilities. It also addresses medical, research and industrial sources as well as defence-related sources where relevant. The overview should be of interest to a wide audience of both specialists and non-specialists.

---

# Nuclear Law

## Nuclear Law Bulletin Nos. 75 and 76

ISSN 0304-341X Price: € 90, US\$ 103, £ 58, ¥ 12 200.

Considered to be the standard reference work for both professionals and academics in the field of nuclear law, the *Nuclear Law Bulletin* is a unique international publication providing its subscribers with up-to-date information on all major developments falling within the domain of nuclear law. Published twice a year in both English and French, it covers legislative developments in almost 60 countries around the world as well as reporting on relevant jurisprudence and administrative decisions,

international agreements and regulatory activities of international organisations.

## + Supplement to Nuclear Law Bulletin

### No. 75 – Unofficial Consolidated Texts of the Paris and Brussels Supplementary Conventions as Amended

ISBN 92-64-01214-1 Price: € 24, US\$ 29, £ 16, ¥ 3 200.

### No. 76 – Estonia 2004 Radiation Act

ISBN 92-64-03674-1 Price: € 24, US\$ 29, £ 16, ¥ 3 300.

# Nuclear Science and the Data Bank

## Benchmark on Deterministic Transport Calculations Without Spatial Homogenisation

### MOX Fuel Assembly 3-D Extension Case

ISBN 92-64-01069-6

Free: paper or web.

An important issue regarding deterministic transport methods for whole core calculations is that homogenised techniques can introduce errors into results. In addition, with modern computational abilities, direct whole core heterogeneous calculations are becoming increasingly feasible. Following a previous benchmark in this series in 2003, this 3-D extension case was designed to simulate three core configurations with different levels of axial heterogeneity utilising control rods. A majority of the participants obtained solutions that were more than acceptable for typical nuclear reactor calculations, showing that modern deterministic transport codes and methods can calculate the flux distribution reasonably well without relying upon special homogenisation techniques. The report will be of particular interest to reactor physicists and transport code developers.

modelling techniques for new nuclear technologies and concepts as well as for current applications. Recently developed “best-estimate” computer code systems for modelling 3-D coupled neutronics/thermal-hydraulics transients in nuclear cores and for coupling core phenomena and system dynamics (PWR, BWR, VVER) need to be compared against each other and validated against results from experiments. International benchmark studies have been set up for this purpose. The present report is the second in a series of four and summarises the results of the first benchmark exercise, which identifies the key parameters and important issues concerning the thermal-hydraulic system modelling of the transient, with specified core average axial power distribution and fission power time transient history. The transient addressed is a turbine trip in a boiling water reactor, involving pressurisation events in which the coupling between core phenomena and system dynamics plays an important role. In addition, the data made available from experiments carried out at the Peach Bottom 2 reactor (a GE-designed BWR/4) make the present benchmark particularly valuable.

## Boiling Water Reactor Turbine Trip (TT) Benchmark - Volume II

### Summary Results of Exercise 1

ISBN 92-64-01064-5

Free: paper or web.

In the field of coupled neutronics/thermal-hydraulics computation there is a need to enhance scientific knowledge in order to develop advanced

## Evaluation of Proposed Integral Critical Experiments with Low-moderated MOX Fuel

ISBN 92-64-01049-1

Free: paper or web.

Although the fabrication of mixed-oxide (MOX) fuel is well-established with appropriate safety margins, it would still be beneficial to optimise the process by further investigating and possibly reducing

these margins. It is also important to demonstrate that all operations involving plutonium and MOX fuels adhere to strict safety standards, and that these standards are based upon the most reliable tools and data. An NEA workshop, organised in April 2004, confirmed that even though existing unpublished experiments could partially address the need for more accurate experimental data, the need for additional experiments remained. An ad hoc expert group was therefore established to define a framework and method for the selection and performance of new experimental programme(s) of interest. The present publication describes the selection criteria and methodology that were used to compare experimental proposals and makes recommendations on which experimental programme(s) should be pursued.

## International Evaluation Co-operation – Vol. 19

### Neutron Activation Cross-section Measurements from Threshold to 20 MeV for the Validation of Nuclear Models and their Parameters

ISBN 92-64-01070-X

Free: paper or web.

A Working Party on International Evaluation Co-operation was established under the sponsorship of the OECD/NEA Nuclear Science Committee (NSC) to promote the exchange of information on nuclear data evaluations, validation and related topics. Its aim is also to provide a framework for co-operative activities among the members of the major nuclear data evaluation projects. This includes the possible exchange of scientists in order to encourage co-operation. The working party compiles requirements for experimental data resulting from these activities and determines common criteria for evaluated nuclear data files with a view to assessing and improving the quality and completeness of evaluated data.

## International Evaluation Co-operation – Vol. 21

### Assessment of Neutron Cross-section Evaluations for the Bulk of Fission Products

ISBN 92-64-01063-7

Free: paper or web.

Subgroup 21 of the NEA Nuclear Science Committee Working Party on International Evaluation Co-operation was charged with the task of assessing neutron cross-section evaluations for fission products. The undertaking of the task group was considerable: the review and assessment of neutron-induced cross-sections in all major evaluated nuclear data libraries. As a result, the subgroup provided recommen-

dations for the best evaluations for 218 fission products, as set out in this report.

## Fuels and Materials for Transmutation

### A Status Report

ISBN 92-64-01066-1

Free: paper or web.

The safe and efficient management of spent fuel from the operation of commercial nuclear power plants is an important issue. Worldwide, more than 250 000 tons of spent fuel from reactors currently operating will require disposal. These numbers account for only high-level radioactive waste generated by present-day power reactors. Nearly all issues related to risks to future generations arising from the long-term disposal of such spent nuclear fuel is attributable to only about 1% of its content. This 1% is made up primarily of plutonium, neptunium, americium and curium (called transuranic elements) and the long-lived isotopes of iodine and technetium. When transuranics are removed from discharged fuel destined for disposal, the toxic nature of the spent fuel drops below that of natural uranium ore (that which was originally mined for the nuclear fuel) within a period of several hundred to a thousand years. This significantly reduces the burden on geological repositories and the problem of addressing the remaining long-term residues can thus be done in controlled environments having timescales of centuries rather than millennia stretching beyond 10 000 years. Transmutation is one of the means being explored to address the disposal of transuranic elements. To achieve this, advanced reactor systems, appropriate fuels, separation techniques and associated fuel cycle strategies are required. This report describes the current status of fuel and material technologies for transmutation and suggests technical R&D issues that need to be resolved. It will be of particular interest to nuclear fuel and material scientists involved in the field of partitioning and transmutation (P&T), and in advanced fuel cycles in general.

## Pellet-clad Interaction in Water Reactor Fuels

### Seminar Proceedings, Aix-en-Provence France, 9-11 March 2004

ISBN 92-64-01157-9

Price: € 110, US\$ 138, £ 74, ¥ 14 700.

This report communicates the results of an international seminar which reviewed recent progress in the field of pellet-clad interaction in light water reactor fuels. It also draws a comprehensive picture of current understanding of relevant phenomena and their impact on the nuclear fuel rod, under the widest possible conditions. State-of-the-art knowledge is presented for both uranium-oxide and mixed-oxide fuels.

## Utilisation and Reliability of High Power Proton Accelerators

Workshop Proceedings, Daejeon, Republic of Korea, 16-19 May 2004

ISBN 92-64-01380-6 Price: € 120, US\$ 150, £ 82, ¥ 16 400.

Accelerator-driven systems (ADS) are being considered for their potential use in the transmutation of radioactive waste. The performance of such hybrid nuclear systems depends to a large extent on the specification and reliability of high power accelerators, as well as the integration of the accelerator with spallation targets and sub-critical systems. At present, much R&D work is still required in order to

demonstrate the desired capability of the system as a whole. Accelerator scientists and reactor physicists from around the world gathered at an NEA workshop to discuss issues of common interest and to present the most recent achievements in their research. Discussions focused on accelerator reliability; target, window and coolant technology; sub-critical system design and ADS simulations; safety and control of ADS; and ADS experiments and test facilities. These proceedings contain the technical papers presented at the workshop as well as summaries of the working group discussions held. They will be of particular interest to scientists working on ADS development as well as on radioactive waste management issues in general.

### Where to buy NEA publications

#### *North America:*

#### **Extenza-Turpin North America**

56 Industrial Park Drive, Pembroke, MA 02359, USA  
Tel.: +1 (781) 829 8973 – Fax: +1 (781) 829 9052  
Toll free: +1 (800) 456 6323; E-mail: [ocdna@extenza-turpin.com](mailto:ocdna@extenza-turpin.com)

#### *Rest of the world:*

#### **Extenza-Turpin Distribution Services Limited**

Stratton Business Park, Pegasus Drive,  
Biggleswade, Bedfordshire, SG18 8TQ, UK  
Tel.: +44 (0) 1767 604800; Fax: +44 (0) 1767 601640  
E-mail: [ocedrow@extenza-turpin.com](mailto:ocedrow@extenza-turpin.com); Website: [www.extenza-turpin.com](http://www.extenza-turpin.com)

#### **Online ordering: [www.oecd.org/bookshop](http://www.oecd.org/bookshop)**

Browse OECD titles online at [www.oecd.org/bookshop](http://www.oecd.org/bookshop). Purchase the paperback and download the PDF e-book. Save 20% by buying just the PDF file. Consult our list of worldwide distributors.

#### **Secure payment with credit card.**

### Where to order free NEA publications

#### **OECD/NEA Publications Service**

12, boulevard des Îles, F-92130 Issy-les-Moulineaux, France  
Tel.: +33 (0) 1 45 24 10 15 – Fax: +33 (0) 1 45 24 11 10  
E-mail: [neapub@nea.fr](mailto:neapub@nea.fr) – Internet: [www.nea.fr](http://www.nea.fr)

#### **Online reports: [www.nea.fr](http://www.nea.fr)**

OECD PUBLICATIONS, 2 rue André-Pascal, 75775 PARIS CEDEX 16  
PRINTED IN FRANCE – (68 2005 02 1 P) – ISSN 1016-5398