Nuclear Energy Series

IAEA
International Atomic Energy Agency
Atoms for Peace and Development

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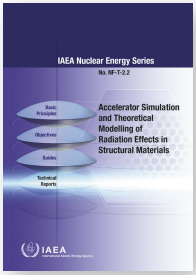
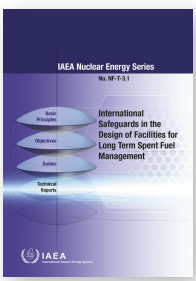


Accelerator Simulation and Theoretical Modelling of Radiation Effects in Structural Materials

IAEA Nuclear Energy Series No. NF-T-2.2

This publication summarizes the findings and conclusions of the IAEA coordinated research project (CRP) on accelerator simulation and theoretical modelling of radiation effects, aimed at supporting Member States in the development of advanced radiation resistant structural materials for implementation in innovative nuclear systems. This aim can be achieved through enhancement of both experimental neutron-emulation capabilities of ion accelerators and improvement of the predictive efficiency of theoretical models and computer codes. This dual approach is challenging but necessary, because outputs of accelerator simulation experiments need adequate theoretical interpretation, and theoretical models and codes need high dose experimental data for their verification. Both ion irradiation investigations and computer modelling have been the specific subjects of the CRP, and the results of these studies are presented in this publication which also includes state of the art reviews of four major aspects of the project: challenges and trends of structural materials development for present and future reactor designs, accelerator methodologies for material testing, multiscale modelling tools, and advanced examination techniques.

(105 pp., 64 figs; 2018) • ISBN 978-92-0-107415-7 • STI/PUB/1732 • €39.00



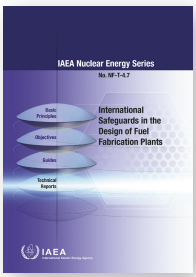
International Safeguards in the Design of Facilities for Long Term Spent Fuel Management

IAEA Nuclear Energy Series No. NF-T-3.1

This publication is the fifth in the IAEA Nuclear Energy Series to provide

guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of facilities for long term spent fuel management; however, vendors, national authorities and financial backers can also benefit from the information provided. The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

(70 pp., 25 figs; 2018) • ISBN 978-92-0-100717-9 • STI/PUB/1767 • €36.00

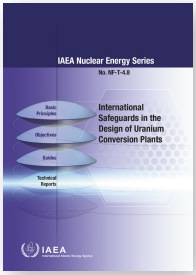


International Safeguards in the Design of Fuel Fabrication Plants

IAEA Nuclear Energy Series No. NF-T-4.7

This publication is the third in a series from the IAEA that provides guidance on the early consideration of safeguards requirements in the design and construction of nuclear facilities. It is principally intended for designers and operators of nuclear fuel fabrication facilities; however, vendors, state authorities and investors may also benefit from the information provided. This guidance is introductory rather than comprehensive; more detailed information on IAEA safeguards implementation can be found in the Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols (IAEA Services Series No. 21, May 2016) and other publications in that series. This publication expands upon the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction (IAEA Nuclear Energy Series No. NP-T-2.8, April 2013).

(52 pp., 23 figs; 2017) • ISBN 978-92-0-103315-4 • STI/PUB/1699 • €30.00



International Safeguards in the Design of Uranium Conversion Plants

IAEA Nuclear Energy Series No. NF-T-4.8

This publication is the fourth in the IAEA Nuclear Energy Series to provide guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of conversion plants; however, vendors, national authorities and financial backers can also benefit from the information provided. The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

(36 pp., 11 figs; 2017) • ISBN 978-92-0-100517-5 • STI/PUB/1766 • €30.00

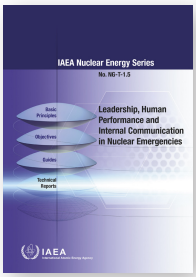
Enhancing Benefits of Nuclear Energy Technology Innovation through Cooperation Among Countries

IAEA Nuclear Energy Series No. NF-T-4.9

This publication provides a summary of the INPRO collaborative project on synergistic nuclear energy regional group interactions evaluated for sustainability. Benefits of nuclear technology innovation can be amplified through co-operation among countries in the nuclear fuel cycle. Nuclear energy sustainability can be enhanced, not only for technology holders but also for a variety of technology users, including those who do not pursue innovations in their home countries. If one partner in a synergistic collaboration is achieving enhanced sustainability, then the other partner(s) may achieve similar enhancement through collaboration without the requisite large national investments in technology, R&D and related infrastructure development. Within the publication, 28 case studies have been conducted by Member States to identify and evaluate mutually beneficial patterns of co-operation in the

nuclear fuel cycle and the driving forces and impediments involved in such co-operation.

(Forthcoming) • ISBN 978-92-0-101118-3 • STI/PUB/1807 • €66.00

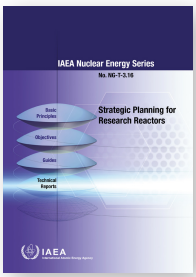


Leadership, Human Performance and Internal Communication in Nuclear Emergencies

IAEA Nuclear Energy Series No. NG-T-1.5

This publication focuses on the challenges and their possible solutions in the areas of leadership, human performance and internal communication in a severe nuclear emergency. It presents a brief overview of some of the key concepts, especially how they relate to an organization's ability to successfully manage an emergency event. The target audience for this publication are those officials and senior managers dealing with emergency response in the operating organization, government, local authorities and the regulatory body. Those who have an influence on the style of leadership and personnel development and training that is applied in their organizations and who are involved in emergency preparedness and response will also benefit from this publication.

(36 pp., 2 figs; 2018) • ISBN 978-92-0-103317-8 • STI/PUB/1789 • €30.00



Strategic Planning for Research Reactors

IAEA Nuclear Energy Series No. NG-T-3.16

This publication is a revision of IAEA-TECDOC-1212 which primarily focused on enhancing the utilization of existing research reactors. This updated version also provides guidance on how to develop and implement a strategic plan for a new research reactor project and will be of particular interest for organizations which are

preparing a feasibility study to establish such a new facility. This publication will enable managers to determine more accurately the actual and potential capabilities of an existing reactor, or the intended purpose and type of a new facility. At the same time, management will be able to match these capabilities to stakeholders/users' needs and establish the strategy of meeting such needs. In addition, several annexes are presented, including some examples as clarification to the main text and ready-to-use templates as assistance to the team drafting a strategic plan.

(61 pp., 7 figs; 2017) • ISBN 978-92-0-101317-0 • STI/PUB/1771 • €38.00

Strategic Environmental Assessment (SEA) for Nuclear Power Programmes: Guidelines

IAEA Nuclear Energy Series No. NG-T-3.17

This publication provides practical guidance for performing strategic environmental assessments (SEAs) for nuclear power programmes. It incorporates the latest knowledge and draws on best practices in conducting SEAs. Based on inputs from SEA experts from across the world, it lays down an effective SEA process that contributes to: strengthening decision making for nuclear power programmes; achieving environmentally sound and sustainable development; and improving good governance and building public trust and confidence in decision-making. Importantly, SEA for nuclear power programmes can ensure effective communication with the public and other stakeholders. Consequently, significant emphasis is placed on stakeholder engagement and public participation. Further, appropriate tools for assessment and quality review are presented for all stages of the SEA process.

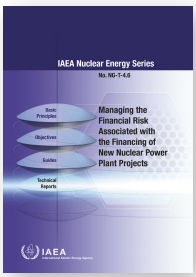
(Forthcoming) • ISBN 978-92-0-104418-1 • STI/PUB/1815 • €36.00

Preparation of a Feasibility Study for a New Research Reactor Project

IAEA Nuclear Energy Series No. NG-T-3.18

This publication describes the various elements to be included in a comprehensive, robust and logically structured feasibility study report for a new research reactor project. It provides guidance for the main supporting organization or team of a new research reactor to enable them to undertake an authoritative and comprehensive feasibility study that could be submitted to decision makers for their review in order to support proposals and endorse an action plan for construction of such a facility. It includes considerations of justification for a new research reactor, associated key nuclear infrastructure issues, cost-benefit analysis and risk management that would have to be addressed prior to authorizations for the establishment of a new research reactor. Addressing these issues will help Member States to develop a comprehensive understanding of all the roles, obligations and commitments involved in establishing and operating a research reactor and ensure that these are met during all phases of the project life cycle. The publication also includes a generic template for preparing a feasibility study report and provides some examples and lessons learned from individual Member States in preparing such studies.

(Forthcoming) • ISBN 978-92-0-104518-8 • STI/PUB/1816 • €30.00



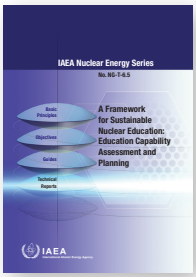
Managing the Financial Risk Associated with the Financing of New Nuclear Power Plant Projects

IAEA Nuclear Energy Series No. NG-T-4.6

Mitigation of the financial risks attendant on a nuclear power plant new build project is a key to ensuring project viability. This publication emphasizes how various risks — including those typically considered to be ‘engineering risks’

— will give rise to such financial risks. It then introduces the linkage between efficient financial risk allocation/mitigation and the cost of capital, and sets out a range of mechanisms which can be used to manage and allocate risks efficiently, thereby minimizing the cost of capital and enhancing project economics. At a practical level the publication provides an insight into the concerns, modes of thinking, and language which a nuclear new-build proponent may expect to encounter within the financing community as they seek to develop their project.

(93 pp., 33 figs; 2017) • ISBN 978-92-0-100317-1 • STI/PUB/1765 • €32.00

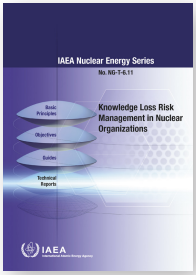


A Framework for Sustainable Nuclear Education: Education Capability Assessment and Planning

IAEA Nuclear Energy Series No. NG-T-6.5

This publication provides a framework for maximizing the potential of a country's higher education system to contribute to the promotion and development of nuclear science and technology. Progress towards this objective can be achieved within the framework of the education capability assessment and planning (ECAP) methodology. By utilizing the process and guidance provided through this methodology, countries can benefit from a more systematic and integrated strategic approach to developing, enhancing and continuously improving their national nuclear education system by strengthening the interaction and coordination between government, educators and industry. The approach aims to support the achievement of sustainable nuclear science and technology education to meet a country's national development priorities.

(Forthcoming) • ISBN 978-92-0-101318-7 • STI/PUB/1809 • €35.00

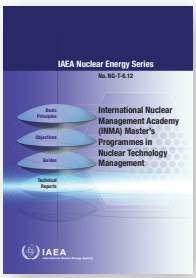


Knowledge Loss Risk Management in Nuclear Organizations

IAEA Nuclear Energy Series No. NG-T-6.11

This publication provides a methodology to enable knowledge loss risk management to ensure safe, reliable and efficient operation of nuclear facilities. It focuses on aspects of knowledge loss risks associated with employee attrition and provides guidance to mitigate them. The described methodology has proved itself in nuclear power plants and can be adopted by any other nuclear related organization. The publication also provides examples of best practices (case studies) of effective knowledge loss risk management gathered from the nuclear power plants and nuclear related organizations as outlined in annexes I-V.

(77 pp., 31 figs; 2017) • ISBN 978-92-0-101816-8 • STI/PUB/1734 • €30.00



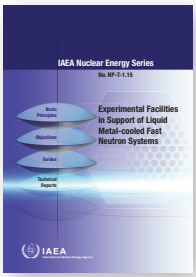
International Nuclear Management Academy (INMA) Master's Programmes in Nuclear Technology Management

IAEA Nuclear Energy Series No. NG-T-6.12

The International Nuclear Management Academy (INMA) is an IAEA facilitated collaboration framework in which universities and other educational institutions provide master's degree programmes that focus on management competencies for the nuclear sector. The current publication presents an overview of these master's degree programmes, addresses the needs, interests and benefits of establishing formal educational programmes at master's level focusing on management aspects for the nuclear sector. It describes common requirements for the INMA-NTM programmes as well as recommendations for implementation, and considers cooperation/collaboration

of universities at national and international level. The attached CD provides supplementary information, such as detailed examples of requirements for different programme themes, course level forms and descriptions, terms of references and a cover letter template. The target audience are current managers and young professionals with a potential of becoming future managers.

**(Forthcoming) • ISBN 978-92-0-107217-7 •
STI/PUB/1795 • €38.00**

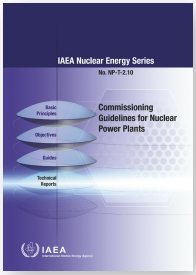


Experimental Facilities in Support of Liquid Metal–cooled Fast Neutron Systems

IAEA Nuclear Energy Series No. NP-T-1.15

This publication presents both an overview and detailed information on more than 150 experimental facilities being used for developing and deploying innovative liquid metal-cooled (sodium, lead and lead-bismuth) fast neutron systems, both critical and subcritical. Facilities, both under construction and those in operation are considered. It is expected that by providing the end users with detailed information on existing and future experimental facilities able to support innovative liquid metal cooled fast neutron systems, the publication will facilitate cooperation between organizations and knowledge transfer. An overview of the existing and future experimental facilities is presented in the body text of this publication. The profiles of all facilities in the form of individual papers are available on the attached CD-ROM and in the related on-line database maintained by the IAEA Catalogue of Facilities in Support of Liquid Metal–cooled Fast Neutron Systems (LMFNS Catalogue).

**(Forthcoming) • ISBN 978-92-0-101018-6 •
STI/PUB/1806 • €30.00**



Commissioning Guidelines for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-2.10

Commissioning is one of the key steps towards putting into service a new nuclear facility, or a new system, structure or component within an existing facility. Commissioning activities need to be planned early in the design and procurement process, with careful consideration of eventual acceptance criteria and test methods. This publication describes commissioning in its basic form, the commissioning process specific to nuclear power plants (NPPs), the relevant management system requirements, typical organizational models and critical human resources issues. It also provides details on experience and lessons learned in Member States. The publication will be of use to all stakeholders involved in the commissioning of NPPs, including owner operators, contractors, engineers, regulatory bodies and vendors.

(133 pp.; 31 figs; 2018) • ISBN 978-92-0-102816-7 • STI/PUB/1742 • €48.00

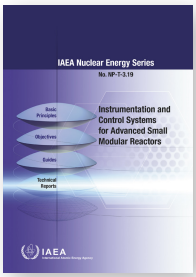
Approaches for Overall Instrumentation and Control Architectures of Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-2.11

This publication concerns approaches for establishing the overall instrumentation and control (I&C) architecture of a nuclear power plant. It describes the characteristics and content of general I&C architectures, presents architectural principles and addresses the limitation of the potential effects of postulated common cause failures. It introduces an architectural development process and discusses technical considerations for the design. The publication emphasizes safety aspects, addresses the defence in depth concept, but also includes consideration of plant availability, operability and security. It recognizes the potential for adverse effects of I&C failures on plant availability and operability that may arise from increased architectural complexity, and also describes

the optimization of I&C functionality and features that are required to be implemented.

(Forthcoming) • ISBN 978-92-0-102718-4 • STI/PUB 1821 • €30.00



Instrumentation and Control Systems for Advanced Small Modular Reactors

IAEA Nuclear Energy Series No. NP-T-3.19

This publication emphasizes the key cross cutting technological issues associated with instrumentation and control systems and human system interfaces that arise from the specific behaviour and operational characteristics of advanced small modular reactors (SMRs). It is intended to assist Member States in understanding current knowledge, practices, design and architecture, implementation, operating and maintenance related aspects with I&C systems in SMRs, as well as for discussing the challenges and issues that need to be resolved in this field in the first phases of design and implementation by Member States active in SMR development.

(95 pp., 27 figs; 2017) • ISBN 978-92-0-101217-3 • STI/PUB/1770 • €39.00

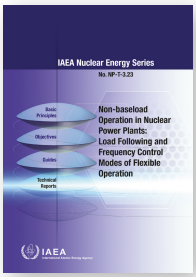
Buried and Underground Piping and Tank Ageing Management for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.20

This publication is one in a series of reports on the assessment and management of ageing of the major nuclear power plant (NPP) components. It deals with buried and underground piping and tank systems that are included as part of an NPP and addresses potential ageing mechanisms, age related degradation, and ageing management as well as condition assessments for the material and components of such systems. The intended

target audience for this publication are NPP owners, operators, designers, engineers and specialists.

(Forthcoming) • ISBN 978-92-0-102116-8 • STI/PUB/1735 • €60.00

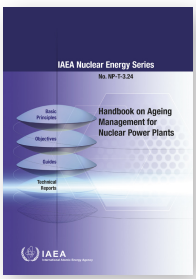


Non-baseload Operation in Nuclear Power Plants: Load Following and Frequency Control Modes of Flexible Operation

IAEA Nuclear Energy Series No. NP-T-3.23

This publication aims to address all relevant aspects of flexible (non-baseload) operation of nuclear power plants (NPPs) specifically focusing on changing electrical output to match the electrical demand and to control the frequency of the electrical system. It provides collective guidance based on current knowledge and operational experience, for the decision making, preparation and implementation of flexible operation for Member States who are considering future flexible operations of their NPPs.

(173 pp.; 62 figs; 2018) • ISBN 978-92-0-110816-6 • STI/PUB/1756 • €40.00



Handbook on Ageing Management for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.24

This handbook on ageing management for nuclear power plants (NPPs) has been developed in compliance with relevant IAEA safety standards and draws on lessons learned from ageing management practices worldwide. It provides an overview of the topic and guidance on proactive ageing management within NPPs. The publication also collates information on ageing mechanisms, effects on structures, systems and components, the regulatory framework as well as some details on innovative techniques and

research and development in the area. The information is presented concisely with clear flow charts and with structured reference to the underlying principles. The handbook will support NPP staff, maintenance managers, vendors, personnel at research organizations and regulators in their work related to the ageing of structures, systems and components.

(152 pp., 66 figs; 2017) • ISBN 978-92-0-102416-9 • STI/PUB/1738 • €48.00

Economic Assessment of the Long Term Operation of Nuclear Power Plants: Approaches and Experience

IAEA Nuclear Energy Series No. NP-T-3.25

This publication describes the various approaches to the techno–economic assessment of a project for the long term operation of a nuclear power plant in its specific market environment. It examines the process of defining the technical scope required to prolong the operating licences of nuclear power plants and highlights the need for further studies on technical cost drivers and economic assessments in order to better define the cost boundaries of long term operation. Information is also provided on the new IAEA software LTOFIN, which was developed to assist in performing long term operation economic assessments within the process described in the publication.

(Forthcoming) • ISBN 978-92-0-104218-7 • STI/PUB/1813 • €47.00

Managing Counterfeit and Fraudulent Items in the Nuclear Industry

IAEA Nuclear Energy Series No. NP-T-3.26

Counterfeit and fraudulent items (CFIs) are of increasing concern in the nuclear industry and generally throughout the industrial and commercial supply chains. Experience has shown that a lack of control of the processes involved in the sourcing, receipt, use and/or disposal of items can lead to the introduction of counterfeit or fraudulent items into a nuclear facility. This publication is designed to assist Member State organizations to prevent, detect

and address CFIs on an ongoing basis. It provides users with recognized good practices for the introduction of a programme to effectively manage CFIs in the nuclear industry.

(Forthcoming) • ISBN 978-92-0-102318-6 • STI/PUB/1817 • €39.00

Dependability Assessment of Software for Safety Instrumentation and Control Systems at Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.27

This publication defines a framework that represents the state of the art in assessment methodologies for safety and instrumentation and control software used at nuclear power plants. It describes an approach for developing and communicating assessments based on claims, argument and evidence. The assessment of software dependability, which encompasses properties such as safety, reliability, availability, maintainability and security, is an essential and challenging aspect of the safety justification. Guiding principles for a dependability assessment are established to provide the basis for defining an assessment strategy and implementing the assessment process. Sources of evidence for the assessment are provided and lessons learned from past digital instrumentation and control system implementation in areas such as software development, operational usage, regulatory review and platform certification are also described.

(Forthcoming) • ISBN 978-92-0-101218-0 • STI/PUB/1808 • €38.00

Technical Support to Nuclear Power Plants and Nuclear Power Progammes

IAEA Nuclear Energy Series No. NP-T-3.28

This publication addresses relevant aspects of requesting and obtaining effective technical support (TS) and its adequate utilization in decision making on nuclear power programmes, projects and plants. It describes the TS functions and associated organizational activities and skills in providing technical and scientific input to the

decisions on plant safety and performance throughout the plant's lifecycle and serves as a guidance for establishing and sustaining TS capability and capacity in Member States both embarking on nuclear power programmes and operating nuclear power plants. The publication also presents observations, lessons learned and conclusions drawn from good practices for defining and maintaining roles, responsibilities and interfacing requirements of technical support organizations (TSOs), nuclear power project/plant entities and other stakeholders. As such, it provides a set of descriptive and practiced processes that integrate technical and scientific information for safety, performance and economical aspects in support of sound and timely decisions on the safe, reliable and efficient operation of nuclear power plants.

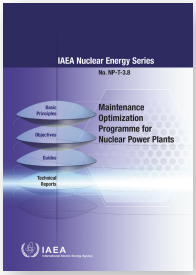
(Forthcoming) • ISBN 978-92-0-103018-4 • STI/PUB/1824 • €42.00

Industrial Safety Guidelines for Nuclear Facilities

IAEA Nuclear Energy Series No. NP-T-3.3

These IAEA guidelines on industrial safety for nuclear facilities are co-sponsored by the International Labour Organization. Specific review of industrial safety practices at nuclear plants have been part of the IAEA OSART (Operational Safety Review Team) missions for decades, and supplementary guidance for such reviews has been available since 1990. This publication presents the latest good practices that nuclear organizations have put into place to implement high quality industrial safety programmes.

(Forthcoming) • ISBN 978-92-0-101617-1 • STI/PUB/1774 • €60.00

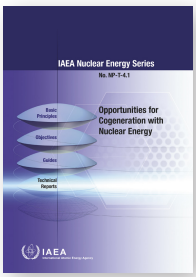


Maintenance Optimization Programme for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.8

This publication deals with the latest nuclear power plant maintenance optimization programmes and provides key requirements and strategies for successful implementation. It documents shared proven maintenance optimization methods and techniques from Member States, including more detailed examples in the annexes of this publication.

(48 pp.; 8 figs; 2018) • ISBN 978-92-0-110916-3 • STI/PUB/1757 • €39.00

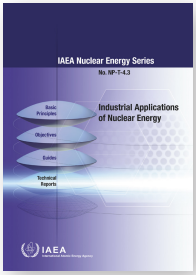


Opportunities for Cogeneration with Nuclear Energy

IAEA Nuclear Energy Series No. NP-T-4.1

This publication presents a comprehensive overview of various aspects relating to the application of cogeneration with nuclear energy, which may offer advantages such as increased efficiency, better cost effectiveness, and reduced environmental impact. The publication provides details on experiences, best practices and expectations for the foreseeable future of cogeneration with nuclear power technology and serves as a guide that supports newcomer countries. It includes information on systems and applications in various sectors, feasibility aspects, technical and economic details, and case studies.

(91 pp., 32 figs; 2017) • ISBN 978-92-0-103616-2 • STI/PUB/1749 • €58.00



Industrial Applications of Nuclear Energy

IAEA Nuclear Energy Series No. NP-T-4.3

This publication provides a detailed overview of the potential use of nuclear energy for industrial systems and/or processes which have a strong demand for process heat/steam and power, and on the mapping of nuclear power reactors proposed for various industrial applications. It describes the technical concepts for combined nuclear–industrial complexes that are being pursued in various Member States, and presents the concepts that were developed in the past to be applied in connection with some major industries. It also provides an analysis of the energy demand in various industries and outlines the potential that nuclear energy may have in major industrial applications such as process steam for oil recovery and refineries, hydrogen generation, and steel and aluminium production. The audience for this publication includes academia, industry, and government agencies.

(80 pp., 32 figs; 2017) • ISBN 978-92-0-101417-7 • STI/PUB/1772 • €59.00

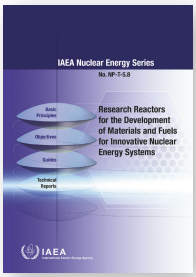
Digital Instrumentation and Control Systems for New Facilities and Modernization of Existing Research Reactors

IAEA Nuclear Energy Series No. NP-T-5.7

This publication draws on the results of a technical meeting which addressed key areas of modernization projects for instrumentation and control (I&C) systems in research reactors. The meeting provided a forum for international experts to exchange information on the technical and managerial aspects of I&C systems and modernisation projects specifically related to I&C and to discuss all technical areas relevant to the complex process of research reactor I&C system modernization and the use of digital I&C in new research reactor projects. The publication includes a summary of all papers and

provides detailed guidance to research reactor operators intending to upgrade existing facilities from analogue to digital or older digital to newer digital technology, and to governments or agencies seeking to construct a new research facility with the latest digital I&C systems.

(Forthcoming) • ISBN 978-92-0-103015-3 • STI/PUB/1696 • €58.00



Research Reactors for the Development of Materials and Fuels for Innovative Nuclear Energy Systems

IAEA Nuclear Energy Series No. NP-T-5.8

This publication presents an overview of research reactor capabilities and capacities in the development of fuels and materials for innovative nuclear reactors, such as GenIV reactors. The compendium provides comprehensive information on the potential for materials and fuel testing research of 30 research reactors, both operational and in development. This information includes their power levels, mode of operation, current status, availability and historical overview of their utilization. A summary of these capabilities and capacities is presented in the overview tables of section 6. Papers providing a technical description of the research reactors, including their specific features for utilization are collected as profiles on a CD-ROM and represent an integral part of this publication. The publication is intended to foster wider access to information on existing research reactors with capacity for advanced material testing research and thus ensure their increased utilization in this particular domain. It is expected that it can also serve as a supporting tool for the establishment of regional and international networking through research reactor coalitions and IAEA designated international centres based on research reactors.

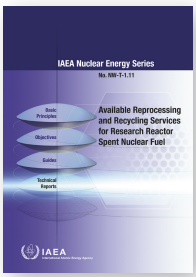
(27 pp., 2 figs; 2017) • ISBN 978-92-0-100816-9 • STI/PUB/1728 • €32.00

Waste from Innovative Types of Reactors and Fuel Cycles

IAEA Nuclear Energy Series No. NW-T-1.7

For reactors currently operating, the types of wastes expected to be generated under normal operating regime are known and, aside from a few problematic wastes (such as graphite, tritium and radiocarbon) most of these wastes have clearly defined cradle-to-grave (end-to-end) pathways. However, for advanced and innovative reactors and their fuel cycles, some waste types may either have new or different properties or might be problematic for processing with the currently available technologies. One of the primary challenges for advanced and innovative reactors and their nuclear fuel cycles is that solutions must be identified for all eventually problematic wastes prior to initiating construction of these facilities. This publication sets the stage for considering the waste generation of advanced fuel fabrication, reactor operation and decommissioning, reprocessing of spent fuel and waste pathways early in the development of new reactors and their associated fuel cycles. It describes waste flows in broad chemical and physical terms and identifies possible processing, recycling and disposition pathways. The publication is intended to support the nuclear industry in taking an early and integrated approach to waste management.

(Forthcoming) • ISBN 978-92-0-102818-1 • STI/PUB/1822 • €41.00



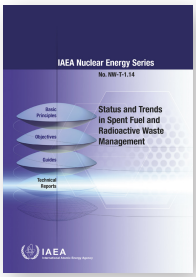
Available Reprocessing and Recycling Services for Research Reactor Spent Nuclear Fuel

IAEA Nuclear Energy Series No. NW-T-1.11

The high enriched uranium (HEU) take back programmes will soon have achieved their goals. When there are no longer HEU inventories at research reactors and no commerce in HEU for research reactors, the primary driver for the take back programmes will cease. However,

research reactors will continue to operate in order to meet their various mission objectives. As a result, inventories of low enriched uranium spent nuclear fuel will continue to be created during the research reactors' lifetime and, therefore, there is a need to develop national final disposition routes. This publication is designed to address the issues of available reprocessing and recycling services for research reactor spent fuel and discusses the various back end management aspects of the research reactor fuel cycle.

(85 pp., 37 figs; 2017) • ISBN 978-92-0-103216-4 • STI/PUB/1746 • €38.00



Status and Trends in Spent Fuel and Radioactive Waste Management

IAEA Nuclear Energy Series No. NW-T-1.14

Based on the outcome of a collaborative project undertaken by the IAEA, OECD-NEA and the European Commission, this publication provides a global overview of the status of radioactive waste and spent fuel management concerning inventories, programmes, current practices, technologies and trends. It includes an analysis of national arrangements and programmes for radioactive waste and spent fuel management, an overview of current waste and spent fuel inventories and estimates of future amounts. International and national trends in these areas are also addressed.

(57 pp., 25 figs; 2018) • ISBN 978-92-0-108417-0 • STI/PUB/1799 • €39.00

Options for Management of Spent Fuel and Radioactive Waste for Countries Developing New Nuclear Power Programmes

IAEA Nuclear Energy Series No. NW-T-1.24 (Rev. 1)

Many countries are considering the construction of their first nuclear power plant or the expansion of a small nuclear power programme, and some have limited experience in

managing radioactive waste and spent nuclear fuel. The present revised publication provides a concise summary of key issues related to the development of a sound radioactive waste and spent nuclear fuel management system. It is intended to brief countries with small or newly established nuclear power programmes about the challenges of, and to describe current and potential alternatives for, managing reactor waste and spent fuel arising during operation and decommissioning of nuclear power plants.

(Forthcoming) • ISBN 978-92-0-103118-1• STI/PUB/1825 • €32.00

Decommissioning after a Nuclear Accident: Approaches, Techniques, Practices and Implementation Considerations

IAEA Nuclear Energy Series No. NW-T-2.10

This publication describes differences in post-accident situations compared with normal decommissioning (i.e. decommissioning after a planned final shutdown) and identifies significant decision factors as applicable. It focuses on the on-site decommissioning aspects of a technical nature, which need to be addressed after a nuclear accident. Non-technical issues, such as policy and strategy, project planning, organization and management are also covered. The collection of experience on approaches, techniques, practices and implementation considerations is based on practical examples and lessons learned from past events, including the Fukushima Daiichi accident. Although the publication addresses decommissioning of nuclear power reactors after an accident, many aspects and considerations are also relevant for non-power nuclear facilities as well as legacy nuclear facilities.

(Forthcoming) • ISBN 978-92-0-104018-3 • STI/PUB/1811 • €39.00

Lessons Learned from Deferred Dismantling of Nuclear Facilities

IAEA Nuclear Energy Series No. NW-T-2.11

The publication discusses the issues that must be dealt with when preparing the facility for safe enclosure, or safely maintaining it for a long time. It provides details of lessons learned from deferred decommissioning of nuclear facilities following planned shutdown. These lessons have been learned from a variety of facilities, with a variety of hazards, configurations and decommissioning programmes. While some of the considerations addressed may apply to facilities involved in an operating incident or accident, they are not specifically addressed by this publication as the individual nature of their hazards and decommissioning challenges precludes their use as exemplars. The publication addresses the preparation for, and the steady state part of the safe enclosure phase; it should be understood that in a later part of that phase the on- and off-site requirements and arrangements will change as plans and infrastructure are prepared for the next phase, which is the final dismantling, remediation and site release.

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