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**NUCLEAR
MEASUREMENTS,
TECHNIQUES
AND
INSTRUMENTATION
INDUSTRIAL
APPLICATIONS
PLASMA PHYSICS
AND
NUCLEAR FUSION**

1986-1996

*international
atomic energy
agency
publications*

**NUCLEAR
MEASUREMENTS,
TECHNIQUES AND
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**INDUSTRIAL
APPLICATIONS**

**PLASMA PHYSICS
AND
NUCLEAR FUSION**

1986–1996

**DIVISION OF PUBLICATIONS
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This catalogue lists all sales publications of the International Atomic Energy Agency dealing with Nuclear Measurements, Techniques and Instrumentation, Industrial Applications, Plasma Physics and Nuclear Fusion, and issued during the period of 1986–1996. Most publications are in English. Proceedings of conferences, symposia and panels of experts may contain some papers in languages other than English (French, Russian or Spanish), but all of these papers have abstracts in English.

It should be noted that prices of books are quoted in Austrian Schillings. The prices do not include local taxes and are subject to change without notice.

All books in this catalogue are 16 × 24 cm, paper-bound, unless otherwise stated.

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NUCLEAR MEASUREMENTS, TECHNIQUES AND INSTRUMENTATION

MEASUREMENT OF RADIONUCLIDES IN FOOD AND THE ENVIRONMENT: A Guidebook Technical Reports Series No. 295

This guidebook describes the facilities, equipment and analytical methods required to determine the concentrations of various radionuclides in environmental materials and foodstuffs.

Contents: 1. Introduction; 2. Pathways and samples of interest; 3. Radionuclides of interest; 4. Requirements for laboratories, equipment and personnel; 5. Collection and preparation of samples; 6. Analytical methods; 7. Analytical quality control; *References:* Sections 1–7; *Bibliography:* Sections 1–7; *Annex I:* Method for determining gamma emitters; *Annex II:* Methods for radiochemical analysis of tritium; *Annex IV:* Methods for radiochemical analysis of plutonium, americium and curium; *Annex V:* Units, prefixes and symbols; *Annex VI:* Nuclear accident scenarios; *Annex VII:* Radionuclide data; *Annex VIII:* Grass sample collection; *Annex IX:* Gamma spectrometric systems; *Annex X:* Potential suppliers of calibration sources and reference materials.

STI/DOC/10/295 (169 pp., 15 figures; 1989)
ISBN 92-0-125189-0
Price: 480 Austrian Schillings

Physics

ATOMIC AND PLASMA-MATERIAL INTERACTION DATA FOR FUSION (Supplement to the journal Nuclear Fusion)

The purpose of this series of annually published journals is to publish original contributions and review articles containing high quality data on the atomic and plasma-material interaction processes of interest to thermonuclear fusion research. The scientific scope of the journals includes the topics of elementary atomic collision processes in fusion plasmas, involving photons, electrons, ions, atoms and molecules, the collision processes of plasma particles with surfaces of fusion relevant materials, and thermophysical material response

phenomena related to the plasma–material interactions. The review articles provide comprehensive critical analyses and sets of recommended data for a broader class of interaction processes or thermophysical response phenomena. The series represents a medium for direct exchange of expert assessed or generated atomic and plasma–material interaction data information between the atomic/material physics and fusion research communities.

**ATOMIC AND PLASMA–MATERIAL INTERACTION
DATA FOR FUSION, Volume 1
(Supplement to the journal Nuclear Fusion)**

This first volume is devoted to the plasma–material interaction processes and contains critical data assessments and data collections for all major particle–surface collision processes related to the partial recycling, impurity generation and material erosion in tokamak fusion devices. Apart from processes induced by particle impact, plasma–material interaction effects related to off-normal plasma events (e.g. disruptions, runaway electron bombardment) are also covered in this volume. A summary of the status of data information on these effects is also provided.

STI/PUB/23/APID/1 (138 pp., 87 figures, 21 × 30 cm; 1991)
Price: 300 Austrian Schillings

**ATOMIC AND PLASMA–MATERIAL INTERACTION
DATA FOR FUSION, Volume 2
(Supplement to the journal Nuclear Fusion)**

Volume 2 of Atomic and Plasma–Material Interaction Data for Fusion is devoted to the atomic and molecular processes taking place in the edge region of magnetically confined fusion plasmas. The comprehensive review articles included in this volume discuss exhaustively the current status of the spectroscopic and collision data for fusion plasma edge constituents. The collision processes considered include: electron scattering on plasma edge neutrals, electron impact excitation and ionization of atomic and molecular ions, particle impact induced dissociative and energy transfer reactions involving molecular hydrogen isotopes, heavy particle collision processes and ion–molecule reactions. Radiative losses and electron cooling rates for carbon and oxygen plasma impurities are also provided.

STI/PUB/23/APID/2 (134 pp., 60 figures, 21 × 30 cm; 1992)
Price: 300 Austrian Schillings

**ATOMIC AND PLASMA–MATERIAL INTERACTION
DATA FOR FUSION, Volume 3
(Supplement to the journal Nuclear Fusion)**

Volume 3 of Atomic and Plasma–Material Interaction Data for Fusion is devoted to atomic collision processes of helium atoms and of beryllium and boron atoms and ions in fusion plasmas. Most of the articles included in this volume are extended versions of the contributions presented at the IAEA experts meetings on Atomic Data for Helium Beam Fusion Alpha Particle Diagnostics and on the Atomic Database for Beryllium and Boron, held in Vienna, June 1991, or have resulted from the cross-section data analyses and evaluations performed by the working groups of these meetings. The volume contains reviews of the most important classes of collision processes of plasma particles with helium atoms and beryllium and boron ions, and comprehensive sets of recommended cross-section data for these processes.

STI/PUB/23/APID/3 (127 pp., 26 figures, 21 × 30 cm; 1992)
Price: 300 Austrian Schillings

**ATOMIC AND PLASMA–MATERIAL INTERACTION
DATA FOR FUSION, Volume 4
(Supplement to the journal Nuclear Fusion)**

Volume 4 of Atomic and Plasma–Material Interaction Data for Fusion contains the result of a critical data evaluation of the cross-sections of ground state and excited hydrogen atoms colliding with the basic fusion plasma constituents, the electrons and protons, and with the multiply charged ions of major plasma impurities. The primary purpose of the present volume is to provide a complete set of the collisional data required for the modelling of neutral hydrogen beam penetration in a thermonuclear fusion plasma.

STI/PUB/23/APID/4 (180 pp., 77 figures, 21 × 30 cm; 1993)
Price: 350 Austrian Schillings

**ATOMIC AND PLASMA–MATERIAL INTERACTION
DATA FOR FUSION, Volume 5
(Supplement to the journal Nuclear Fusion)**

Volume 5 of Atomic and Plasma–Material Interaction Data for Fusion is devoted to a critical review of the physical and thermo-mechanical properties of presently considered candidate plasma-facing and structural materials for next-generation thermonuclear fusion reactors. This volume should provide fusion reactor designers with a source of critically assessed

material properties data, including information on the material response to high heat and particle fluxes and on the thermohydrodynamic coupling with coolants. Emphasis is given to the presentation of the most recent results for plasma-facing reactor materials.

STI/PUB/23/APID/5 (268 pp., 197 figures, 21 × 30 cm; 1994)
Price: 350 Austrian Schillings

**ATOMIC AND PLASMA-MATERIAL
INTERACTION DATA FOR FUSION, Volume 6
(Supplement to the journal Nuclear Fusion)**

***NEW**

Volume 6 of Atomic and Plasma-Material Interaction Data for Fusion includes critical reviews and results of original experimental and theoretical studies on inelastic collision processes among the basic and dominant impurity constituents of fusion plasmas. The following processes are considered: electron impact excitation of excited helium atoms, electron impact excitation and ionization of plasma impurity ions and atoms, electron-impurity-ion recombination and excitation, ionization and electron capture in collisions of plasma protons and impurity ions with the main fusion plasma neutron components H, He and H₂ (the latter being always present in the plasma edge or introduced into the plasma by neutral beam injection for heating, fuelling or diagnostic purposes).

STI/PUB/23/APID/6 (264 pp., 132 figures, 21 × 30 cm; 1995)
Price: 350 Austrian Schillings

Dosimetry (Techniques)

**ABSORBED DOSE DETERMINATION IN PHOTON
AND ELECTRON BEAMS — An International
Code of Practice
Technical Reports Series No. 277**

This report was prepared by P. Andreo, J.R. Cunningham, K. Hohlfeld and H. Svensson on the basis of a draft developed at an Advisory Group meeting, Vienna, 18–22 March 1985. It represents a step towards a Universal Code advising users in Secondary Standard Dosimetry Laboratories (SSDLs) and radiation therapy centres throughout the world on how to obtain the absorbed dose from a measurement of exposure of another appropriate quantity.

Contents: Introduction; Radiation quantities and units; Equipment; Radiation quality specification and determination; Measurement chain; Formalism; Determination of absorbed dose to water; Details on correction factors; The uncertainty in absorbed dose determination at the reference point; Appendix A: Evaluation of uncertainties; Appendix B: Introduction to worksheets and flow diagrams; References.

STI/DOC/10/277 (98 pp., 16 figures and 4 diagrams; 1987)

E ISBN 92-0-315090-0

S ISBN 92-0-315090-0

Price: 310 Austrian Schillings

**BIOLOGICAL DOSIMETRY: CHROMOSOMAL
ABERRATION ANALYSIS FOR DOSE ASSESSMENT**
Technical Reports Series No. 260

This report covers the principles of cytogenetics and chromosome morphology and provides a full description of the procedures and techniques for the correct application of chromosome aberration analysis. The appendix contains an example of a well established protocol for performing chromosome aberration analysis.

Contents: Introduction; Radiation dosimetry; Basic principles of radiation biology; Human lymphocytes; Structure of the chromosome in relation to interactions with radiation; Classification of chromosomal aberrations; Analytical methods; Data handling; Dose estimation; Special problems and some examples of dose assessments; Appendix: Protocol for producing and processing cultures.

STI/DOC/10/260 (69 pp., 30 figures; 1986)

ISBN 92-0-125086-X

Price: 260 Austrian Schillings

**GUIDELINES ON CALIBRATION OF
NEUTRON MEASURING DEVICES**
Technical Reports Series No. 285

The majority of the existing Secondary Standard Dosimetry Laboratories (SSDLs) were established primarily to work with X rays and gamma rays. Neutron sources are, however, increasingly being applied in industrial processes, research, nuclear power development and radiation biology and medicine. This publication deals primarily with methods of applying radioactive neutron sources for calibration of instrumentation, and gives an indication of the space, manpower and facilities needed to fulfil the minimum requirements of a calibration laboratory for neutron

work. Its intention is to serve as a guide for centres about to start on neutron dosimetry standardization and calibration.

Contents: 1. Introduction; 2. Concepts of dosimetry and calibration; 3. Types of calibration and test measurement; 4. Sources, equipment and facilities; 5. Procedures and methods; 6. Calibration of beam dosimeters; 7. Reports and records; Appendix I: Basic quantities and units; Appendix II: Glossary; Appendix III: Neutron sources; Appendix IV: Fluence to dose equivalent conversion functions; Appendix V: List of symbols; References.

STI/DOC/10/285 (76 pp., 8 figures; 1988)

ISBN 92-0-115088-1

Price: 250 Austrian Schillings

HIGH DOSE DOSIMETRY FOR RADIATION PROCESSING Proceedings Series

Proceedings of a symposium, the second in its field, Vienna, 5-9 November 1990. Reliable dosimetry is a key parameter for quality assurance of radiation processing and irradiated products. The standardization of dosimetry provides a basis for the regulatory approval of irradiated products and for international clearance for free trade. Papers presented at the meeting discussed the development of new techniques, the improvement of reference and routine dosimetry systems and the quality control and assurance of dosimetry, giving an authoritative account of the status of high dose dosimetry throughout the world in 1990.

Contents: General aspects; Development of dosimetry techniques; Reference dosimetry and review of dosimetry techniques; Quality control and assurance of dosimetry.

STI/PUB/846 (513 pp., 217 figures; 1991)

ISBN 92-0-010291-3

Price: 1380 Austrian Schillings

MEASUREMENT ASSURANCE IN DOSIMETRY Proceedings Series

Proceedings of a symposium, Vienna, 24-27 May 1993. Accurate dosimetry is of great importance for applications of radiation in medicine. The symposium covered all the various steps required in the calibration chain to determine the absorbed dose in radiotherapy. Different calibration procedures at primary and secondary standard laboratories were discussed, and

reports were presented on dose intercomparisons based on different national and international protocols. Analyses of accuracy of various interaction coefficients were also presented. The final session dealt with the special problems of diagnostic X ray dosimetry.

Contents: Status of primary standards for absorbed dose, exposure and kerma; Intercomparison, dissemination and transfer; Calibrations and quality assurance programmes; Dose, volume and quality specifications; Interaction coefficients and correction factors; Application of different protocols for absorbed dose determination; Plane parallel chambers; Beam quality dependence; Direct calibration in absorbed dose to water; Diagnostic X ray dosimetry.

STI/PUB/930 (691 pp., 167 figures, 1994)

ISBN 92-0-100194-0

Price: 1900 Austrian Schillings

Nuclear Analytical Techniques

APPLICATIONS OF ISOTOPES AND RADIATION IN CONSERVATION OF THE ENVIRONMENT

Proceedings Series

Proceedings of a symposium, Karlsruhe, 9-13 March 1992. The objective was to review present knowledge of the applications of radiation, radioisotopes and nuclear methods of analysis in the monitoring and control of environmental pollution and in reducing emissions of environmentally toxic substances. Isotopes and radiation have many characteristics which enable them to make unique contributions to the better understanding of environmental processes, as well as to directly protect the environment from the impact of toxic substances. These kinds of application form the focus of this volume.

Contents: Overviews of some main areas of application of nuclear techniques; Flue gas purification; Radiation processing of liquid and solid wastes; Industrial applications; Radiotracer studies; Major analytical techniques and new approaches in environmental monitoring and research; Nuclear analytical techniques and their applications: 1. Atmospheric studies; 2. Studies of solid wastes, sediments and soils; 3. Hydrochemical and miscellaneous studies; Panel: Current problems and future

trends in the use of isotopes and radiation for conservation of the environment.

STI/PUB/904 (699 pp., 221 figures; 1992)

ISBN 92-0-000492-X

Price: 1900 Austrian Schillings

GUIDEBOOK ON RADIOISOTOPE TRACERS IN INDUSTRY **Technical Reports Series No. 316**

The idea of using tracers (chemical tracers, dyes, etc.) in the investigation of complex physical phenomena has always attracted the attention of scientists and engineers. When radioactive isotopes became available it was immediately recognized that they offered an almost ideal solution to tracer selection. Extensive experience has been gathered all over the world in the application of radioactive tracers in industry. This guide is devoted to reviewing the present status of the tracer method as such and to its applications to those branches of industry which have derived large benefits from the use of this technology.

Contents: Chapter 1. Introduction; Chapter 2. The concept of tracers; Chapter 3. General tracer technology; Chapter 4. Tracer methodology; Chapter 5. General applications; Chapter 6. Case studies; Chapter 7. Current trends in development and applications; Annexes I-VI.

STI/DOC/10/316 (374 pp., 116 figures; 1990)

ISBN 92-0-165090-6

Price: 1060 Austrian Schillings

NUCLEAR TECHNIQUES IN THE EXPLORATION AND EXPLOITATION OF ENERGY AND MINERAL RESOURCES **Proceedings Series**

Proceedings of a symposium, Vienna, 5-8 June 1990. Over the past decades, many nuclear techniques have been developed and used on an industrial scale for the exploration and exploitation of energy and mineral resources, resulting in very great technical and economic benefits. The major nuclear techniques which are currently employed on a large scale include nucleonics control and on-stream analysis, nuclear well logging and tracer investigations. The advantages of nuclear techniques include rapidity, relative simplicity and, in some cases, the possibility of use in hostile environments where no other methods can be used. Furthermore, nuclear measurements and nucleonics control can be made by non-contact processes. The purpose of the symposium was to review the latest concepts and develop-

ments and to foster an exchange of information leading to technology transfer from developed to developing countries.

Contents: Nucleonics control systems and on-stream analysers in the coal industry; On-line nuclear and nuclear related analytical techniques in the mineral industry; Nucleonics control systems and on-stream mineral analysers; Nuclear borehole logging applications; Nuclear borehole logging instrumentation, data processing and interpretation; Tracer techniques and radiometric methods in the mineral industry; Off-line nuclear activation analysis in the mineral industry; Summary of the panel discussion: Nuclear and nuclear related techniques in the mineral industry — trends and future perspectives.

STI/PUB/841 (627 pp., 207 figures; 1991)

ISBN 92-0-060091-3

Price: 1660 Austrian Schillings

Research Reactors and Particle Accelerators (Applications)

APPLICATIONS OF ISOTOPES AND RADIATION IN CONSERVATION OF THE ENVIRONMENT

(See under Nuclear Analytical Techniques, p. 11)

CODE ON THE SAFETY OF NUCLEAR RESEARCH REACTORS: DESIGN Safety Series No. 35-S1

This publication presents international consensus principles useful in the design of a research reactor. It is complemented by Safety Series No. 35-S2, Code on the Safety of Nuclear Research Reactors: Operation. Both publications provide basic principles and requirements for the safety of research reactors and critical assemblies, including the essential safety requirements for siting, quality assurance and regulatory control. These codes supersede the 1984 edition of Safety Series No. 35, Safe Operation of Research Reactors and Critical Assemblies.

Contents: Definitions; 1. Introduction; 2. Safety objectives; 3. Regulatory supervision; 4. Siting requirements; 5. General design requirements; 6. Specific design requirements; Appendix:

Selected postulated initiating events; Annex: Selected safety functions.

STI/PUB/927 (44 pp., 1992)
E ISBN 92-0-104292-2
F ISBN 92-0-200193-2
R ISBN 92-0-400592-0
S ISBN 92-0-300292-8
Price: 220 Austrian Schillings

**CODE ON THE SAFETY OF NUCLEAR
RESEARCH REACTORS: OPERATION**
Safety Series No. 35-S2

This publication presents international consensus principles useful in the operation of a research reactor. It is complemented by Safety Series No. 35-S1, Code on the Safety of Nuclear Research Reactors: Design. Both publications provide basic principles and requirements for the safety of research reactors and critical assemblies, including the essential safety requirements for siting, quality assurance and regulatory control. These codes supersede the 1984 edition of Safety Series No. 35, Safe Operation of Research Reactors and Critical Assemblies.

Contents: Definitions; 1. Introduction; 2. Safety objectives; 3. Regulatory supervision; 4. Responsibilities for safe operation; 5. Safety analysis for operation; 6. Operational limits and conditions; 7. Operating procedures; 8. Commissioning; 9. Maintenance, period testing and inspection; 10. Core management and fuel handling; 11. Records and reports; 12. Reactor utilization; 13. Modifications; 14. Radioactive wastes; 15. Radiation protection; 16. Emergency planning; 17. Security; 18. Quality assurance; 19. Decommissioning; Annex: Examples of operational aspects of research reactors that require particular attention in a quality assurance programme.

STI/PUB/928 (44 pp.; 1992)
E ISBN 92-0-104392-9
F ISBN 92-0-200293-2
R ISBN 92-0-400692-7
S ISBN 92-0-300392-4
Price: 220 Austrian Schillings

**DIRECTORY OF NUCLEAR
RESEARCH REACTORS 1994**

***NEW**

This Directory provides administrative, technical and utilization information on nuclear research reactors, operational or shut

down, available in the IAEA Research Reactor Data Base (RRDB) as of the end of December 1994. General information on reactors which are planned or under construction is also included. All information was collected by the Agency through questionnaires.

Contents: Part I: Operating reactors; Part II: Shut down reactors; Part III: Unverified information; Part IV: Reactors under construction; Part V: Planned reactors; Part VI: Statistical summary; Part VII: Abbreviations; Part VIII: Sample questionnaire.

STI/PUB/983 (896 pp., 3 figures, 21 × 30 cm; 1995)
ISBN 92-0-105494-7
Price: 2520 Austrian Schillings

MULTIPURPOSE RESEARCH REACTORS

Proceedings Series

Proceedings of a symposium held in Grenoble, 19–23 October 1987. Research reactors are interdisciplinary tools that can be used in a variety of fields. They also play an important role in the support of national and international nuclear programmes. Purpose research reactors with high fluxes, such as materials testing and neutron beam reactors, have a wide application. Their efficient utilization requires technology groups specialized in the design and fabrication of irradiation devices, as well as dosimetry and hot cell groups to permit insertion and extraction of radioactive material and post-irradiation examinations.

Contents: Neutron beam research and applications of neutron scattering; Reactor engineering; Irradiation testing of fuel and material for fission and fusion reactors; Research reactor utilization programmes; Neutron capture therapy; Neutron activation analysis; Applications of small reactors in research and training.

STI/PUB/762 (629 pp., 179 figures, 1988)
ISBN 92-0-050688-7
Price: 1560 Austrian Schillings

NUCLEAR RESEARCH REACTORS IN THE WORLD — December 1996 Edition

Reference Data Series No. 3

***NEW**

This is the tenth edition of Reference Data Series No. 3. This booklet contains general information, as of the end of

August 1996, on research reactors in operation, under construction, planned, and shut down. The information is collected by the Agency through questionnaires sent to Member States through the designated national correspondents.

IAEA-RDS-3/10 (127 pp., 11 figures, 9.5 x 17.5 cm; 1996)

ISBN 92-0-104696-0

Price: 200 Austrian Schillings

RADIOLOGICAL SAFETY ASPECTS OF THE OPERATION OF ELECTRON LINEAR ACCELERATORS

Technical Reports Series No. 188

Electron linear accelerators are being used throughout the world in increasing numbers in a variety of important applications. Foremost among these is their role in the treatment of cancer. Commercial uses include non-destructive testing by radiography, food preservation, product sterilization and radiation processing of materials such as plastics and adhesives. Scientific applications include investigations in radiation biology, radiation chemistry, nuclear and elementary particle physics and radiation research. This manual provides authoritative guidance in radiation protection for this important category of radiation sources.

Contents: Introduction; Uses and characteristics of electron linear accelerators; Radiation at electron linear accelerator installations; Radiation shielding; Typical installations; Radiation monitoring and interpretation of measurements; Requirements for an effective safety programme; General bibliography; Appendices.

STI/DOC/10/188 (327 pp., 75 figures, 1979)

ISBN 92-0-125179-3

Price: 680 Austrian Schillings

RADIOLOGICAL SAFETY ASPECTS OF THE OPERATION OF PROTON ACCELERATORS

Technical Reports Series No. 283

This report serves as a guide for the planning and implementation of radiation protection programmes for all types of positive ion accelerators. The basic types of accelerators are briefly described, followed by a detailed description of several installations covering the energy range from 10 MeV to 500 GeV. Special emphasis is given to the production of ionizing radiation

and its transmission through shielding, computer techniques for shield design, radiation measurement and interpretation and the radiological impact of accelerators on the environment. Extensive references are given so that the book can serve as a source to the published literature.

Contents: Introduction; Characteristics of positive ion accelerators; Radiation environment of positive ion accelerators; Radiation measurements at accelerators; Radiation shielding; Accelerator radiation safety programme; Radiological environmental impact of accelerators; Sources of information and bibliography on accelerator radiation protection.

STI/DOC/10/283 (473 pp., 134 figures; 1988)

ISBN 92-0-125188-2

Price: 1210 Austrian Schillings

**SAFETY ASSESSMENT OF RESEARCH
REACTORS AND PREPARATION OF THE
SAFETY ANALYSIS REPORT**
Safety Series No. 35-G1

This Safety Guide, a companion document to Safety Series Nos 35-S1 and 35-S2, is part of a set of publications in the IAEA Safety Series dealing with all the important areas of research reactor safety which includes Safety Standards, Safety Guides and Safety Practices. This guide presents guidelines, approved by international consensus, for the preparation, review and assessment of the safety documentation (Safety Series No. 35-S1) and for the preparation of the Safety Analysis Report (SAR) (Safety Series No. 35-S2). In addition, it is most applicable during the design and construction stage of research reactors, as well as during relicensing or reassessment of already existing reactors.

Contents: 1. Introduction; 2. Requirements for safety assessment in the licensing process for a research reactor; 3. Preparation of the safety analysis report; 4. Performance of the review and assessment; Appendix: Contents of a Safety Analysis Report; Annex I: Safety analysis approach and methods; Annex II: Examples of input parameters and initial conditions; Annex III: Examples of items to be considered in the reactor description; Annex IV: Typical sources of radioactive material or radiation fields in a research reactor.

STI/PUB/960 (103 pp.; 1994)

ISBN 92-0-104594-8

Price: 400 Austrian Schillings

SAFETY IN THE UTILIZATION AND MODIFICATION OF RESEARCH REACTORS

Safety Series No. 35-G2

This Safety Guide, part of a set of publications in the IAEA Safety Series dealing with all the important areas of research reactor safety which includes Safety Standards, Safety Guides and Safety Practices, develops the general concepts presented in Safety Series Nos 35-S1 and No. 35-S2 and should be read in conjunction with them. This guide presents guidelines, approved by international consensus, for the safe utilization and modification of research reactors to ensure that these projects are implemented without undue risks to personnel, the public, the environment or the reactor. While the guide is most applicable to existing reactors, it is also recommended for use by organizations planning to put a new reactor into operation.

Contents: 1. Introduction; 2. Organization and responsibilities; 3. Safety assessment, categorization and approval routes; 4. General and specific safety requirements for design; 5. Pre-implementation phase of a utilization or modification project; 6. Implementation phase of a utilization or modification project; 7. Post-implementation phase of a utilization or modification project; 8. Operational safety requirements for experiments; 9. Safety considerations in the handling, dismantling, post-irradiation examination and disposal of experimental devices; 10. Safety aspects of out-of-reactor installations; 11. Quality assurance of experiments and modifications; Annex I: Categorization criteria; Annex II: Justification of a project.

STI/PUB/961 (47 pp., 1 figure; 1994)

ISBN 92-0-104694-4

Price: 240 Austrian Schillings

Nuclear Data

CIAMDA 87 — An Index to the Literature of Atomic and Molecular Collision Data Relevant to Fusion Research

The CIAMDA Series attempts to provide a worldwide bibliographical index of the research publications on collisions between electrons, photons, hydrogen isotopes and helium, as well as collisions between these species and other ions, atoms and (a few) molecules of importance in magnetic-confinement fusion research. The first issue, CIAMDA 80, covered the period from the early 1950s to the middle of 1979. This update extends the index from the cut-off date of CIAMDA 80 to August 1986.

Contents: Introduction; Section I: Major data references; Section II: Data index for collisions between two partners; Section III: Bibliography for the data index; Section IV: References not included in the data index; Section V: Author index. Appendix A: REF codes; Appendix B: Table IV. List of elements.

STI/PUB/752 (315 pp., 21 × 29.7 cm; 1987)

ISBN 92-0-039087-0

Price: 430 Austrian Schillings

CINDA-A (1935-1987)

An index to literature and computer files on microscopic neutron data. It is a worldwide bibliography of the literature on microscopic neutron nuclear data resulting from experiments, theory and evaluations, and an index to internationally available computer libraries of neutron data. It is thus of interest to every scientist involved in pure or applied neutron physics, such as experimental neutron physics, compilation and evaluation of neutron nuclear data, reactor physics, nuclear fusion, neutron dosimetry, radiation protection and shielding, irradiation in medicine and biology, radioisotope production and neutron activation techniques. The present CINDA file contains more than 230 000 entries. It also includes index lines for experimental and evaluated numerical data files available from data centres. The entries are sorted by element, isotope and data category. The list of data categories comprises microscopic cross-sections, angular distributions and energy spectra from all neutron-induced reactions of the energy range from 0 to 50 MeV and above, as well as resonance parameters, resonance integrals, level density parameters, yields of fission neutrons and fission fragments, gamma ray spectra, and also a few related nuclear reactions such as spontaneous fission, photo-fission and production of photo-neutrons. CINDA-A, the archival issue in 5 volumes, contains entries from the literature published between 1935 and 1987. CINDA-A is supplemented by CINDA 90 which covers the literature published from 1988 to spring 1990.

Contents: Vol. 1: Introduction; CINDA listing for collective entries 'Many' and 'Fprod'; Molecules and mixtures; Annex; Vol. 2: CINDA listing for 1 Hydrogen to 30 Zinc; Vol. 3: CINDA listing for 31 Gallium to 54 Xenon; Vol. 4: CINDA listing for 55 Caesium to 83 Bismuth; Vol. 5: CINDA listing for 84 Polonium to 105 Hahnium.

CINDA-A (Rev. 1) (Vol. 1: 191 pp., Vol. 2: 923 pp., Vol. 3: 685 pp., Vol. 4: 667 pp., Vol. 5: 675 pp.; 16.5 × 24 cm; 1990)

1: ISBN 92-0-039190-7

2: ISBN 92-0-039290-3

- 3: ISBN 92-0-039390-X
4: ISBN 92-0-039490-6
5: ISBN 92-0-039590-2

Price: Vol. 1: 240 Austrian Schillings
Vol. 2: 1200 Austrian Schillings
Vol. 3: 900 Austrian Schillings
Vol. 4: 900 Austrian Schillings
Vol. 5: 900 Austrian Schillings

**CINDA 96 — SUPPLEMENT TO CINDA 95
(1988–1996)**

***NEW**

CINDA 96 is the supplement to CINDA 95, an index to the literature on neutron nuclear data published after 1987. The complete CINDA file as of 1 June 1996 is contained in the archival issue CINDA-A (5 volumes, 1990) plus CINDA 95 and the current issue, CINDA 96.

CINDA 96 (158 pp., 16.5 x 24 cm; 1996)
ISBN 92-0-104196-9
Price: 280 Austrian Schillings

**COMPENDIUM OF NEUTRON SPECTRA AND
DETECTOR RESPONSES FOR RADIATION
PROTECTION PURPOSES
Technical Reports Series No. 318**

A wide variety of radiation dosimeters and survey instruments are used to monitor exposure to neutrons. To establish an adequate neutron monitoring programme and to evaluate dosimetry results properly, it is important to know both the energy distribution of the neutrons encountered and the energy dependent response of the measuring devices. It is also important for calibration to use such neutron fields whose spectra are appropriate for the particular application. This compendium includes a collection of neutron spectra encountered in various occupational environments and the spectra of calibration neutron sources. It also gives the response functions of various neutron dosimeters and survey instruments. Finally, it includes the calculated energy responses for each of the detectors and spectra given.

Contents: Chapter 1. Introduction; Chapter 2. Dosimetric quantities; Chapter 3. Dosimeters and survey instrument response functions; Chapter 4. Calibration neutron spectra; Chapter 5. Operational spectra; Chapter 6. Monoenergetic neutrons incident on elliptical phantom.

The neutron fluence to dose conversion factor, detector responses and spectra tabulated are available on diskette from: Division of Publications, International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria.

STI/DOC/10/318 (274 pp., 61 figures; 1990)

ISBN 92-0-125290-0

Price: 720 Austrian Schillings

**HANDBOOK ON NUCLEAR DATA FOR BOREHOLE
LOGGING AND MINERAL ANALYSIS**
Technical Reports Series No. 357

This handbook is a compendium of nuclear data to be used for neutron borehole logging and neutron activation analysis of mineral samples, meeting the major requirements of the nuclear geophysics community for microscopic cross-section and decay data.

Contents: Chapter 1. Introduction; Chapter 2. Table of nuclides; Chapter 3. Prompt gamma rays from thermal neutron capture — Extracted from the database; Chapter 4. Nuclear decay gamma rays with intensities higher than 5% — An extract from the ENSDF radioactivity database; Chapter 5. Spectra of neutron sources; Chapter 6. Neutron induced reaction cross-section data for nuclides required for borehole logging and mineral analysis; Chapter 7. Neutron source averaged cross sections.

STI/DOC/10/357 (231 pp. + 1 diskette containing approx. 100 pp., 78 figures; 1993)

ISBN 92-0-102393-6

Price: 1000 Austrian Schillings

**NUCLEAR AND ATOMIC DATA FOR RADIOTHERAPY
AND RELATED RADIOBIOLOGY**
Panel Proceedings Series

Proceedings of an Advisory Group meeting, Rijswijk, Netherlands, 16-20 September 1985, in co-operation with the Radiobiological Institute TNO. The meeting had the following specific objectives: to make an inventory of available knowledge on nuclear and atomic data sets relevant to radiotherapy and related radiobiology; to identify and specify further needs for nuclear and atomic data and their accuracies; to stimulate new experimental and theoretical work to fill the identified gaps in nuclear reaction, decay and atomic data; to formulate specific *technical recommendations for future work.*

Contents: Introduction; Applications and beam production; Neutron interactions; Pion interactions; Charged particle interactions; Charged particle track structure; Working groups: 1. Beam production and field description; 2. Dosimetry; 3. Interpretation and optimization of biological effects.

STI/PUB/741 (454 pp., 141 figures; 1987)

ISBN 92-0-131087-0

Price: 1140 Austrian Schillings

**RECOMMENDED DATA ON ATOMIC COLLISION
PROCESSES INVOLVING IRON AND ITS IONS
Nuclear Fusion — Special Supplement 1987**

This publication contains recommendations given by a group of experts who attended an Advisory Group meeting in Vienna, 18–20 September 1985. The purpose of the meeting was to review the available atomic collision data relevant to fusion plasma modelling, with emphasis on processes involving iron and its ions. The fourteen experts from five Member States reviewed the status of data in the relevant areas of atomic physics and made specific recommendations regarding the use of these data.

Contents: R.A. Phaneuf, R.K. Janev, H.T. Hunter: Charge exchange processes involving iron ions; M.S. Pindzola, D.C. Griffin, C. Bottcher, S.M. Younger, H.T. Hunter: Electron impact ionization data for the iron isonuclear sequence; A.E. Kingston, M.A. Lennon: Electron excitation rates for iron ions.

STI/PUB/23/SPS/1987 (131 pp., 44 figures, 21 × 29.7 cm; 1987)

ISBN 92-0-139087-4

Price: 280 Austrian Schillings

INDUSTRIAL APPLICATIONS

Radiation Processing

**APPLICATIONS OF ISOTOPES AND RADIATION
IN CONSERVATION OF THE ENVIRONMENT
Proceedings Series**

Proceedings of a symposium, Karlsruhe, 9–13 March 1992. The objective was to review present knowledge of the applications of

radiation, radioisotopes and nuclear methods of analysis in the monitoring and control of environmental pollution and in reducing emissions of environmentally toxic substances. Isotopes and radiation have many characteristics which uniquely contribute to the better understanding of environmental processes, as well as directly protect the environment from the impact of toxic substances. These kinds of applications form the focus of this volume.

Contents: Overviews of some main areas of application of nuclear techniques; Flue gas purification; Radiation processing of liquid and solid wastes; Industrial applications; Radiotracer studies; Major analytical techniques and new approaches in environmental monitoring and research; Nuclear analytical techniques and their applications: 1. Atmospheric studies; 2. Studies of solid wastes, sediments and soils; 3. Hydrochemical and miscellaneous studies; Panel: Current problems and future trends in the use of isotopes and radiation for conservation of the environment.

STI/PUB/904 (699 pp., 221 figures; 1992)

ISBN 92-0-000492-X

Price: 1900 Austrian Schillings

HIGH DOSE DOSIMETRY FOR RADIATION PROCESSING Proceedings Series

Proceedings of a symposium, the second in its field, Vienna, 5-9 November 1990. Reliable dosimetry is a key parameter for quality assurance of radiation processing and irradiated products. The standardization of dosimetry provides a basis for the regulatory approval of irradiated products and for international clearance for free trade. Papers presented at the meeting discussed the development of new techniques, the improvement of reference and routine dosimetry, systems and the quality control and assurance of dosimetry, presenting an authoritative account of the status of high dose dosimetry throughout the world in 1990.

Contents: General aspects; Development of dosimetry techniques; Reference dosimetry and review of dosimetry techniques; Quality control and assurance of dosimetry.

STI/PUB/846 (513 pp., 217 figures; 1991)

ISBN 92-0-010291-3

Price: 1380 Austrian Schillings

Radiometry

GAMMA, X-RAY AND NEUTRON TECHNIQUES FOR THE COAL INDUSTRY Panel Proceedings Series

Proceedings of an Advisory Group meeting in 1984 to review the latest developments and to make recommendations on the most promising areas and priorities for future research and development. Potential applications include on-line process measurement of coal ash, moisture, calorific value, sulphur and elemental analyses. Improved borehole logging instruments make possible the in situ determination of ash content and coal seam delineation for resource assessment and for mine development planning.

STI/PUB/707 (216 pp., 94 figures; 1986)
ISBN 92-0-161086-6
Price: 530 Austrian Schillings

Tracers

GAMMA, X-RAY AND NEUTRON TECHNIQUES FOR THE COAL INDUSTRY Panel Proceedings Series

(See under Radiometry above)

GUIDEBOOK ON RADIOISOTOPE TRACERS IN INDUSTRY Technical Reports Series No. 316

The idea of using tracers (chemical tracers, dyes, etc.) in the investigation of complex physical phenomena has always attracted the attention of scientists and engineers. When radioactive isotopes became available it was immediately recognized that they offered an almost ideal solution to tracer selection. Extensive experience has been gathered all over the world in the application of radioactive tracers in industry. This guide is devoted to reviewing the present status of the tracer method as such and to its applications to those branches of

industry which have derived large benefits from the use of this technology.

Contents: Chapter 1. Introduction; Chapter 2. The concept of tracers; Chapter 3. General tracer technology; Chapter 4. Tracer methodology; Chapter 5. General applications; Chapter 6. Case studies; Chapter 7. Current trends in development and applications; Annexes I–VI.

STI/DOC/10/316 (374 pp., 116 figures; 1990)

ISBN 92–0–165090–6

Price: 1060 Austrian Schillings

NUCLEAR TECHNIQUES IN THE EXPLORATION AND EXPLOITATION OF ENERGY AND MINERAL RESOURCES

Proceedings Series

Proceedings of a symposium, Vienna, 5–8 June 1990. Over the past decades, many nuclear techniques have been developed and used on an industrial scale for the exploration and exploitation of energy and mineral resources, resulting in very great technical and economic benefits. The major nuclear techniques which are currently employed on a large scale include nucleonics control and on-stream analysis, nuclear well logging and tracer investigations. The advantages of nuclear techniques include rapidity, relative simplicity and, in some cases, the possibility of use in hostile environments where no other methods can be used. Furthermore, nuclear measurements and nucleonics control can be made by non-contact processes. The purpose of the symposium was to review the latest concepts and developments and to foster an exchange of information leading to technology transfer from developed to developing countries.

Contents: Nucleonics control systems and on-stream analysers in the coal industry; On-line nuclear and nuclear related analytical techniques in the mineral industry; Nucleonics control systems and on-stream mineral analysers; Nuclear borehole logging applications; Nuclear borehole logging instrumentation, data processing and interpretation; Tracer techniques and radiometric methods in the mineral industry; Off-line nuclear activation analysis in the mineral industry; Summary of the panel discussion: Nuclear and nuclear related techniques in the mineral industry — trends and future perspectives.

STI/PUB/841 (627 pp., 207 figures; 1991)

ISBN 92–0–060091–3

Price: 1660 Austrian Schillings

PLASMA PHYSICS AND NUCLEAR FUSION

ATOMIC AND PLASMA-MATERIAL INTERACTION DATA FOR FUSION *(Supplement to the journal Nuclear Fusion)*

The purpose of this series of annually published journals is to make available original contributions and review articles containing high quality data on the atomic and plasma-material interaction processes of interest to thermonuclear fusion research. The scientific scope of the journals includes the topics of elementary atomic collision processes in fusion plasmas, involving photons, electrons, ions, atoms and molecules, the collision processes of plasma particles with surfaces of fusion relevant materials, and thermophysical material response phenomena related to the plasma-material interactions. The review articles provide comprehensive critical analyses and sets of recommended data for a broader class of interaction processes or thermophysical response phenomena. The series represents a medium for direct exchange of expert assessed or generated atomic and plasma-material interaction data information between the atomic/material physics and fusion research communities.

ATOMIC AND PLASMA-MATERIAL INTERACTION DATA FOR FUSION, Volume 1 *(Supplement to the journal Nuclear Fusion)*

This first volume is devoted to the plasma-material interaction processes and contains critical data assessments and data collections for all major particle-surface collision processes related to the partial recycling, impurity generation and material erosion in tokamak fusion devices. Apart from processes induced by particle impact, plasma-material interaction effects related to off-normal plasma events (e.g. disruptions, runaway electron bombardment) are also covered in this volume. A summary of the status of data information on these effects is also provided.

STI/PUB/23/APID/1 (138 pp., 87 figures, 21 x 30 cm; 1991)
Price: 300 Austrian Schillings

ATOMIC AND PLASMA-MATERIAL INTERACTION DATA FOR FUSION, Volume 2 *(Supplement to the journal Nuclear Fusion)*

Volume 2 of Atomic and Plasma-Material Interaction Data for Fusion is devoted to the atomic and molecular processes

taking place in the edge region of magnetically confined fusion plasmas. The comprehensive review articles included in this volume discuss exhaustively the current status of the spectroscopic and collision data for fusion plasma edge constituents. The collision processes considered include: electron scattering on plasma edge neutrals, electron impact excitation and ionization of atomic and molecular ions, particle impact induced dissociative and energy transfer reactions involving molecular hydrogen isotopes, heavy particle collision processes and ion-molecule reactions. Radiative losses and electron cooling rates for carbon and oxygen plasma impurities are also provided.

STI/PUB/23/APID/2 (134 pp., 60 figures, 21 × 30 cm; 1992)
Price: 300 Austrian Schillings

**ATOMIC AND PLASMA-MATERIAL INTERACTION
DATA FOR FUSION, Volume 3
(Supplement to the journal Nuclear Fusion)**

Volume 3 of Atomic and Plasma-Material Interaction Data for Fusion is devoted to atomic collision processes of helium atoms and of beryllium and boron atoms and ions in fusion plasmas. Most of the articles included in this volume are extended versions of the contributions presented at the IAEA experts meetings on Atomic Data for Helium Beam Fusion Alpha Particle Diagnostics and on the Atomic Database for Beryllium and Boron, held in Vienna, June 1991, or have resulted from the cross-section data analyses and evaluations performed by the working groups of these meetings. The volume contains reviews of the most important classes of collision processes of plasma particles with helium atoms and beryllium and boron ions, and comprehensive sets of recommended cross-section data for these processes.

STI/PUB/23/APID/3 (127 pp., 26 figures, 21 × 30 cm; 1992)
Price: 300 Austrian Schillings

**ATOMIC AND PLASMA-MATERIAL INTERACTION
DATA FOR FUSION, Volume 4
(Supplement to the journal Nuclear Fusion)**

Volume 4 of Atomic and Plasma-Material Interaction Data for Fusion contains the result of a critical data evaluation of the cross-sections of ground state and excited hydrogen atoms colliding with the basic fusion plasma constituents, the electrons and protons, and with the multiply charged ions of major plasma

impurities. The primary purpose of the present volume is to provide a complete set of the collisional data required for the modelling of neutral hydrogen beam penetration in a thermonuclear fusion plasma.

STI/PUB/23/APID/4 (180 pp., 77 figures, 21 × 30 cm; 1993)
Price: 350 Austrian Schillings

**ATOMIC AND PLASMA-MATERIAL INTERACTION
DATA FOR FUSION, Volume 5**
(Supplement to the journal Nuclear Fusion)

Volume 5 of Atomic and Plasma-Material Interaction Data for Fusion is devoted to a critical review of the physical and thermo-mechanical properties of presently considered candidate plasma-facing and structural materials for next-generation thermonuclear fusion reactors. This volume should provide fusion reactor designers with a source of critically assessed material properties data, including information on the material response to high heat and particle fluxes and on the thermohydrodynamic coupling with coolants. Emphasis is given to the presentation of the most recent results for plasma-facing reactor materials.

STI/PUB/23/APID/5 (268 pp., 197 figures, 21 × 30 cm; 1994)
Price: 350 Austrian Schillings

**ATOMIC AND PLASMA-MATERIAL
INTERACTION DATA FOR FUSION, Volume 6**
(Supplement to the journal Nuclear Fusion)

***NEW**

Volume 6 of Atomic and Plasma-Material Interaction Data for Fusion includes critical reviews and results of original experimental and theoretical studies on inelastic collision processes among the basic and dominant impurity constituents of fusion plasmas. The following processes are considered: electron impact excitation of excited helium atoms, electron impact excitation and ionization of plasma impurity ions and atoms, electron-impurity-ion recombination and excitation, ionization and electron capture in collisions of plasma protons and impurity ions with the main fusion plasma neutron components H, He and H₂ (the latter being always present in the plasma edge or introduced into the plasma by neutral beam injection for heating, fuelling or diagnostic purposes).

STI/PUB/23/APID/6 (264 pp., 132 figures, 21 × 30 cm; 1995)
Price: 350 Austrian Schillings

This publication describes the current scientific, engineering and technological developments in the field of inertial confinement fusion (ICF). It provides an introduction to ICF as well as an overview of the various technologies needed for inertial fusion power plant development. It was compiled by an international group of experts under the auspices of an IAEA Advisory Group on Inertial Fusion Energy and is intended for a large audience, e.g. policy makers, scientists, engineers or technologists in other fields, and students.

Contents: 1. Introduction: Inertial fusion energy fundamentals; 2. Inertial confinement target physics; 3. IFE power plant design principles; 4. Special design issues; 5. Inertial fusion energy development strategy; 6. Safety and environmental impact; 7. Economics and other figures of merit; 8. Other uses of inertial fusion; 9. International activities; Authors.

STI/PUB/944 (457 pp., 146 figures; 1995)

ISBN 92-0-100794-9

Price: 1320 Austrian Schillings

FUSION REACTOR DESIGN AND TECHNOLOGY 1986 Panel Proceedings Series

Proceedings of a Technical Committee meeting and workshop, Yalta, 26 May to 6 June 1986. The purpose of the meeting was: (a) to review and assess the current status and recent progress made in fusion reactor experiments, design and technology; (b) to identify the areas in which work needs to be done in order to progress towards the goal of commercial fusion power reactors; and (c) to identify the critical issues in fusion reactor design and technology that will be important during the next five years.

Contents: (Vol. 1) Fusion programmes; Tokamaks; Non-tokamak reactors and open systems; Inertial confinement concepts; Fission-fusion hybrids; (Vol. 2) Plasma engineering; Nuclear and energy technologies; Materials developments; System studies and safety aspects.

STI/PUB/754 (Vol. 1: 600 pp., 232 figures; Vol. 2: 523 pp., 149 figures; 1987)

1: ISBN 92-0-131187-7

2: ISBN 92-0-131287-3

Price: Vol. 1: 720 Austrian Schillings

Vol. 2: 660 Austrian Schillings

NUCLEAR FUSION

A journal issued twelve times a year which includes original articles, letters, review papers and comments in the field of controlled nuclear fusion. At present, papers covering the following areas are published: plasma effects; processes and phenomena directly related to fusion research; production, heating and confinement of plasmas of interest to fusion research; application of experimental and diagnostic techniques to high temperature plasmas; fusion reactor concepts and closely related technology. Special issues and supplements are published at irregular intervals and are not included in the subscription.

STI/PUB/23 (approx. 1800 pp./year, figures)

ISSN 0029-5515

Price: Annual subscription (1997): 9500 Austrian Schillings

A special rate of ATS 1000 for 12 issues is available to individuals whose institution subscribes to Nuclear Fusion, provided that their mailing address is the same as that of the institution. Price per single issue: 900 Austrian Schillings

NUCLEAR FUSION — Thirty Years Cumulative Index Volumes 1-30 (1960-1990)

This cumulative index should serve as a tool to rapidly retrieve Nuclear Fusion articles that deal with specific topics in fusion research and covers the first 31 years (1960-1990) of the journal. The chronological index lists titles and authors of all published Nuclear Fusion articles in order of publication. The subject index groups the articles under broad categories (such as Heating, or Confinement and Transport) which are subdivided into more specific categories (ICH, Transport phenomena, etc.). A further subdivision distinguishes between type of experiment (tokamak, mirror, etc.) and character of the article (experimental, theoretical, etc.). The author index is a complete list of all authors in alphabetical order, with reference to volume and page number.

Contents: Foreword; Introduction; I. Chronological index; II. Subject index; III. Author index.

STI/PUB/23/CUMI/1992 (137 pp., 21 x 30 cm, 1992)

ISBN 92-0-100692-6

Price: 250 Austrian Schillings

**RECOMMENDED DATA ON ATOMIC COLLISION
PROCESSES INVOLVING IRON AND ITS IONS**
Nuclear Fusion — Special Supplement 1987

This publication contains recommendations given by a group of experts who attended an Advisory Group meeting held in Vienna, 18–20 September 1985. The purpose of the meeting was to review the available atomic collision data relevant to fusion plasma modelling, with emphasis on processes involving iron and its ions. The fourteen experts from five Member States reviewed the status of data in the relevant areas of atomic physics and made specific recommendations regarding the use of these data in plasma modelling calculations.

Contents: R.A. Phaneuf, R.K. Janev, H.T. Hunter: Charge exchange processes involving iron ions; M.S. Pindzola, D.C. Griffin, C. Botcher, S.M. Younger, H.T. Hunter: Electron impact ionization data for the iron isonuclear sequence; A.E. Kingston, M.A. Lennon: Electron excitation rates for iron ions.

STI/PUB/23/SPS/1987 (131 pp., 44 figures, 21 × 30 cm; 1987)
ISBN 92-0-139087-4
Price: 280 Austrian Schillings

**WORLD SURVEY OF ACTIVITIES IN CONTROLLED
FUSION RESEARCH — 1994 Edition**
Nuclear Fusion — Special Supplement 1994

This is the seventh edition of the World Survey of Activities in Controlled Fusion Research. The first part of the Survey presents the updated addresses, telecom information and scientific staff of over 300 institutes and organizations worldwide active in fusion research. Information on the scientific programmes is presented in the form of short descriptions of the main activities, complemented by references to the detailed tables in the 1991 Edition where additional information can be found. The second part of the Survey is the Personnel Index, listing around 7000 fusion scientists. The format is that of a loose-leaf system, which allows last minute corrections and facilitates updating between publication of the regular issues.

Contents: List of institutes, alphabetized by country and city; Laboratories, scientific staff and summaries of activities;

Personnel Index; Table headings World Survey 1991
(Parts B–D).

STI/PUB/023/SPS/1994 (434 pp., 21 x 30 cm; 1994)
ISBN 92–0–103594–2
Price: 1280 Austrian Schillings

**PLASMA PHYSICS AND CONTROLLED
NUCLEAR FUSION RESEARCH 1986**
Proceedings Series

Proceedings of the Eleventh International Conference, Kyoto,
13–20 November 1986.

Contents: (Vol. 1) Artsimovich memorial lecture and tokamak
experiments; Plasma heating and current drive. (Vol. 2) Magnetic
confinement theory; Open confinement; Alternative and support-
ing systems. (Vol. 3) Inertial confinement; INTOR; Technology
and reactor concepts; Fundamental processes and new trends;
Summaries.

STI/PUB/723 (Vol. 1: 669 pp., 335 figures; Vol. 2: 747 pp., 385 fig-
ures; Vol. 3: 629 pp., 321 figures; 1987)

- 1: ISBN 92–0–130087–5
- 2: ISBN 92–0–130187–1
- 3: ISBN 92–0–130287–8

Price: Vol. 1: 1680 Austrian Schillings
Vol. 2: 1820 Austrian Schillings
Vol. 3: 1540 Austrian Schillings

**PLASMA PHYSICS AND CONTROLLED
NUCLEAR FUSION RESEARCH 1988**
Proceedings Series

Proceedings of the Twelfth International Conference, Nice,
12–19 October 1988.

Contents: (Vol. 1) Artsimovich memorial lecture and tokamak
experiments; Plasma heating and current drive. (Vol. 2) Magnetic
confinement systems; Non-tokamak confinement systems.
(Vol. 3) Inertial confinement fusion; Next step concepts
(INTOR/ITER); Technology and reactor concepts, including
safety and environmental aspects; Fundamental processes and
new trends; Summary session.

STI/PUB/787 (Vol. 1: 775 pp., 433 figures; Vol. 2: 763 pp., 308 figures; Vol. 3: 720 pp., 250 figures; 1989)

- 1: ISBN 92-0-130089-1
- 2: ISBN 92-0-130189-8
- 3: ISBN 92-0-130289-4

Price: Vol. 1: 1920 Austrian Schillings
Vol. 2: 1880 Austrian Schillings
Vol. 3: 1760 Austrian Schillings

**PLASMA PHYSICS AND CONTROLLED
NUCLEAR FUSION RESEARCH 1990
Proceedings Series**

The proceedings of the Thirteenth International conference, Washington, DC, 29 September to 3 October 1990. The Conference was characterized by reports of steady technical progress in research on both magnetic and inertial confinement fusion, leading towards the long term goal of producing commercial energy from controlled fusion power generators. Also, major results were reported from the completion of the Conceptual Design Activities of the International Thermonuclear Experimental Reactor (ITER) project, which has been conducted since 1988 under the auspices of the IAEA. At the technical sessions more than 200 papers were presented. Contributions were made on: tokamak experiments; inertial confinement; non-tokamak confinement systems; magnetic confinement theory and modelling; plasma heating and current drive; ITER; technology and reactor concepts; and the economic, safety and environmental aspects of fusion.

Contents: (Vol. 1) Artsimovich memorial lecture and tokamak experiments; Plasma heating and current drive. (Vol. 2) Magnetic confinement theory and modelling; Non-tokamak confinement systems; (Vol. 3) Inertial confinement fusion; International thermonuclear experimental reactor (ITER); Technology and reactor concepts; Economic, safety and environmental aspects of fusion; Summaries.

STI/PUB/844 (Vol. 1: 865 pp., 420 figures; Vol. 2: 808 pp., 330 figures; Vol. 3: 814 pp., 194 figures; 1991)

- 1: ISBN 92-0-130091-3
- 2: ISBN 92-0-130191-X
- 3: ISBN 92-0-130291-6

Price: Vol. 1: 2300 Austrian Schillings
Vol. 2: 2100 Austrian Schillings
Vol. 3: 2100 Austrian Schillings

**PLASMA PHYSICS AND CONTROLLED
NUCLEAR FUSION RESEARCH 1992**
Proceedings Series

Proceedings of the Fourteenth International Conference, Würzburg, 30 September to 7 October 1992. The conference was characterized by reports of recent results from all the major fusion facilities around the world, including the milestone experiment at JET in which tritium was introduced for the first time into a tokamak fuel mixture. The proceedings include all the technical papers, the pertinent discussions and five conference summaries.

Contents: (Vol. 1) Artsimovich memorial lecture and tokamak experiments (Session A). (Vol. 2) Magnetic confinement theory and modelling (Session D); Non-tokamak confinement systems (Session C). (Vol. 3) Inertial confinement fusion; ITER and next step devices; Technology and reactor concepts. (Vol. 4) Conference summaries.

STI/PUB/906 (Vol. 1: 791 pp., 386 figures; Vol. 2: 689 pp., 258 figures; Vol. 3: 461 pp., 169 figures; Vol. 4: 77 pp., 27 figures; 1993)

- 1: ISBN 92-0-101093-1
- 2: ISBN 92-0-101193-8
- 3: ISBN 92-0-101293-4
- 4: ISBN 92-0-101393-0

Price: Vol. 1: 2200 Austrian Schillings
Vol. 2: 1900 Austrian Schillings
Vol. 3: 1560 Austrian Schillings
Vol. 4: 240 Austrian Schillings

**PLASMA PHYSICS AND CONTROLLED
NUCLEAR FUSION RESEARCH 1994**
Proceedings Series

***NEW**

Proceedings of the Fifteenth International Conference held in Seville, 26 September to 1 October 1994. The conference was characterized by valuable scientific results on virtually all aspects of controlled fusion and fusion technology, laying a solid foundation for continued progress. The proceedings include all the technical papers, the pertinent discussions, and five conference summaries which are published as a separate volume.

Contents: (Vol. 1) Artsimovich memorial lecture and toroidal confinement systems (Sessions A1 to A6). Toroidal confinement systems overview (Session A1); Core plasma physics (Session A2); Heating and current drive (Session A3); Divertor and edge physics (Session A4); Concept optimization (Session A5);

Helical system physics (Session A6); (Vol. 2) Combined poster session A2/A4 (Core plasma physics, and divertor and edge physics); Combined poster session A3/A5 (Heating and current drive, and concept optimization); Combined poster session A6/C (Helical system physics, and pinches and open systems); Pinches and open systems (Session C); ITER (Session E); New devices, reactors and technology (Session F). (Vol. 3) Inertial confinement fusion; Magnetic confinement theory; (Vol. 4) Conference summaries.

STI/PUB/948 (Vol. 1: 809 pp., 448 figures; Vol. 2: 809 pp., 363 figures; Vol. 3: 731 pp., 285 figures; Vol. 4: 65 pp., 9 figures; 1995)

1: ISBN 92-0-102295-6

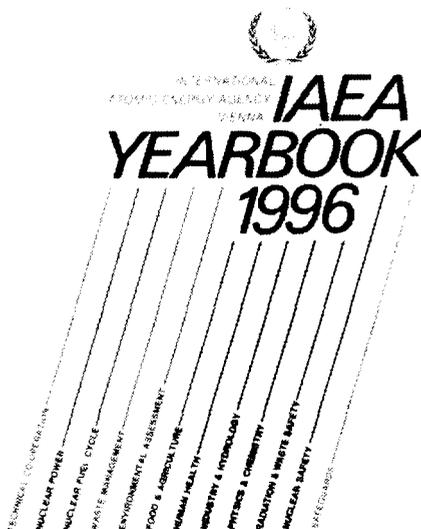
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Vol. 3: 2080 Austrian Schillings
Vol. 4: 280 Austrian Schillings

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IAEA YEARBOOK 1996

The eighth edition of the IAEA Yearbook concentrates on developments in nuclear science and technology. The first article provides an account of the IAEA's involvement in international efforts over the past ten years to compile and disseminate scientifically assessed information on the causes and consequences of the 1986 Chernobyl nuclear power plant accident. Part A focuses on the IAEA's efforts to improve the quality of technical co-operation projects, with emphasis on better planning to maximize the impact of these programmes. Part B provides details on how nuclear techniques can be used to improve human health and welfare, on new developments in food irradiation, and on the role of isotope tools in the fight against malnutrition. A report on the latest status and trends in the area of nuclear power, the nuclear fuel cycle and radioactive waste management is presented in Part C. The Nuclear Safety Review, Part D, concentrates on selected areas of special interest, covering nuclear safety, radiation safety and radioactive waste safety. Part E, dealing with IAEA safeguards activities, provides a report on the status of safeguards implementation in 1995, as well as articles on the IAEA's new 'Clean Laboratory' at Seibersdorf, on combating the illicit trafficking of nuclear material and other radioactive sources, and on new trends in safeguards inspector training.

Contents: Nuclear Energy and Safety; Part A — Transfer of Nuclear Technology; Part B — Applications of Nuclear Techniques and Research; Part C — Nuclear Power, Nuclear Fuel Cycle and Waste Management; Part D — Nuclear Safety Review; Part E — IAEA Safeguards; Part F — The IAEA.

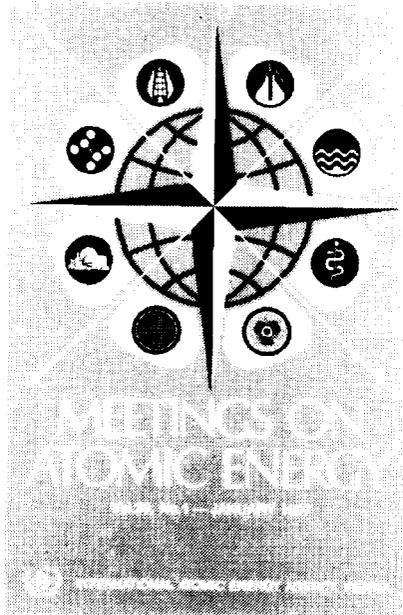
Parts C and D are also available separately.

STI/PUB/1017 (304 pp., 72 figures; 1996)
ISBN 92-0-102096-1

Part C: STI/PUB/1018 (118 pp., 28 figures; 1996)
ISBN 92-0-102196-8

Part D: STI/PUB/1019 (64 pp., 18 figures; 1996)
ISBN 92-0-103496-2

Price: 500 Austrian Schillings
Part C: 200 Austrian Schillings
Part D: 140 Austrian Schillings



MEETINGS ON ATOMIC ENERGY

Each quarterly issue presents listings of future conferences and training courses on subjects directly or indirectly related to nuclear energy and its peaceful uses. Information is given — subject to availability — on the scope, abstract deadlines, sponsors and contact addresses of each conference/training course. This is an indispensable reference and aid for institutes, universities, libraries and individual scientists in the scheduling and planning of activities.

Contents: Chronological listings of conferences and exhibitions with both *Keyword* and *Location indices*; *International* and national training courses; Detailed information on IAEA meetings.

GEN/PUB/2 (approx. 200 pp./issue)

ISSN 0047-6641

Price: Annual subscription (1997),

Vol. 29: 740 Austrian Schillings

Price per single issue (1997): 210 Austrian Schillings

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