

# BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



## **Safety Series No. 6 IAEA Safety Standards** (1973 Revised Edition)

<i>Publisher</i>	International Atomic Energy Agency, c/o UNIPUB, New York (1979)
<i>Pages</i>	171
<i>Price</i>	\$21.25
<i>Reviewer</i>	Gerald Schlapper

This publication examines, in considerable detail, regulations published by the International Atomic Energy Agency (IAEA) for transport of radioactive and fissile material by multimodes. The regulations are intended to provide basic guidance for international transport, and readers are cautioned to consult local government regulations for any additional specific requirements. The regulations are presented in seven well-organized sections followed by an appendix in a quick-reference format.

Section I provides an introduction to the publication. The purpose and scope of these regulations are clearly defined as are the limitations that result from additional requirements established by local government agencies. For example, parts of the regulations specify that a certain action is required. However, because of differing international agreements and/or local laws or customs, responsibility for completing this action is not assigned to any party in the transport system (i.e., licensee, consignee, consignor). A comprehensive list of definitions is provided.

Section II details packaging and package design requirements. The format for the presentation is well organized. General requirements are first specified, and then additional requirements are outlined for packages containing various levels of radioactivity. Requirements for testing to demonstrate compliance are not specified in this section, but the testing requirements located in a later section are clearly referenced.

Sections III and IV deal with activity limits set for various packages. Section III discusses items exempt from the requirements and also proposes transport arrangements for low specific activity and low-level solid radioactive material. Section IV presents activity limits for Type A and Type B packages. Techniques for determination of limits on special form material ( $A_1$ ) and normal form material ( $A_2$ ) are outlined. There are typographical errors in some of the tabulated values. However, these errors are corrected on an errata sheet.

Section V provides an outline of controls for transport and storage while in transit. This section addresses labeling,

marking, segregation, and other items of a more administrative nature. The section does not attempt to address controls that relate to the physical protection of the material while in transit, as these requirements are not a part of this safety standard.

Section VI outlines the general and specific requirements for shipment of fissile material in Fissile Class I, II, and III packages. General provisions for nuclear criticality safety are stated. Numerous tables are provided that detail permissible masses of uranium and plutonium for various consignments. A limited number of examples are provided of package designs requiring multilateral or unilateral approval. Expansion of the number of examples provided is suggested but, as noted in the publication, these examples should be submitted by member states.

Section VII is important as it deals with the test and inspection procedures used to show compliance with the applicable regulations. Assumptions to be employed regarding conditions of normal and accident transport such as ambient temperature, duration of thermal test, water depth for immersion, etc. are clearly specified. This section also presents the IAEA definition of an unyielding surface as "... a flat, horizontal surface of such a character that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen." As in previous sections, the requirements are profiled from those applicable in general to those additional requirements that must be satisfied for certain shipments.

The final section of the main body of regulations deals with administrative requirements including items to be discussed in application to a competent authority for package approval. Specifications for competent authority certificates of approval to include identification marks are discussed. Quality control requirements in the fabrication and maintenance of packaging are only briefly addressed. Because of the increasing emphasis on quality control, expansion of this portion of the regulations is suggested.

Perhaps the most useful and, thus, most important part of this IAEA publication is the appendix. The appendix contains 12 schedules that list, in an abbreviated, quick-reference format, the requirements for 12 categories of shipments. These schedules provide a summary of the main provisions and reference, by paragraph number, the relevant detailed provisions. Summary tables are also provided. The appendix serves as a good starting point for anyone initiating a search for requirements to insure safe transport of radioactive and/or fissile material. It is also intended to serve as a guide to those national authorities wishing to adapt the schedule format to their specific requirements.

This publication will serve as a valuable reference for international regulatory requirements for the transport of radioactive materials. Review of these regulations will show general agreement with local government requirements. The user is cautioned that local considerations may dictate additional specific requirements that must be implemented. The standard is well organized and the enumerated paragraphs allow for clear cross-referencing. Only a very limited number of typographical errors were noted. An errata sheet was inserted but not bound into the publication. Immediate insertion of the corrections into the main text is suggested as this corrigendum is easily misplaced. In summary, this safety standard will serve as a practical reference for a wide audience that includes individuals from the practicing licensed engineer level through managers and even to representatives for various state and national governmental bodies.

*After receiving his MS in nuclear engineering from the University of Missouri at Columbia in 1970, Gerald Schlapper joined the operations staff of the University of Missouri Research Reactor Facility. While on the staff, he supervised shipments of Type A and Type B quantities of radioisotopes, which included design and certification of shipping containers. On assumption of the position of reactor physicist in 1975, he acquired responsibility for spent-fuel shipments, which included safety analysis reports for spent-fuel casks. Dr. Schlapper received his PhD in nuclear engineering in 1977 and remained on the staff of the Research Reactor Facility until January 1981, when he assumed his current position as a faculty member of the Nuclear Engineering Department at Texas A&M University. During his career he has served as a consultant to various agencies including the U.S. Army, Argonne National Laboratory, and the U.S. Nuclear Regulatory Commission.*

### **Advances in Radiation Protection and Dosimetry in Medicine**

<i>Editors</i>	Ralph H. Thomas and Victor Perez-Mendez
<i>Publisher</i>	Plenum Publishing Corporation, New York (1980)
<i>Pages</i>	658
<i>Price</i>	\$69.50
<i>Reviewer</i>	Gerald Schlapper

This volume consists of the *Proceedings of the Symposium on Advances in Radiation Protection and Dosimetry in Medicine* held in Erice, Italy, from September 16 to 25, 1979. This book is essentially a compilation of presentations by internationally recognized scientists from western Europe and North America of advances in radiation protection and dosimetry during the decade preceding this meeting. New modalities of radiation therapy are discussed along with advances in the protection of radiotherapy patients and the medical staff. The volume includes discussions of computed tomography diagnostic techniques,

conventional (photon) treatment planning, and use of "new" particulate radiation forms in therapy.

The format of this publication follows that of a typical symposium or short course. This course, the third in a distinguished series, opens with remarks by Alessandro Rindi, director of the International School of Radiation Damage and Protection, Frascati, Italy. The remarks provide a historical presentation of the previous two courses in health physics and a very brief discussion of the topics to be covered. The introductory remarks are followed by the keynote address titled, "The New Particles and Their Application in Medicine," by Stanley Curtis of Lawrence Berkeley Laboratory. This paper reviews the applications of the "new" particles in clinical medicine to include depth-dose curves, treatment plans, methods of tumor localization, and other aspects of medical application primarily in the areas of radiotherapy and diagnostic radiology. This keynote address provides an excellent introduction to the papers that follow and, in addition, provides the novice reader with sufficient background so that he may grasp the main points of the succeeding presentations. The second lecture by Ralph Thomas provides additional fundamental information at a more detailed level. Thomas discusses the underlying assumptions of radiation protection and provides the reader with an excellent list of references for basic research and applied science efforts in the field of radiation protection. The introductory material is followed by articles by scientists internationally recognized in their fields of interest.

Sources of information on the adverse effects of ionizing radiation (fundamental radiobiology, animal experimentation, and epidemiological studies) are discussed by Silini, Paretzke, Rossi, Larsson, Broese, and Curtis. The limitations inherent in the data from these sources and the extrapolation of this data to humans are discussed. Areas of disagreement are also noted. Several presentations deal with dose effect relationships and estimation of radiation risk in man. Use of quality factors to predict biological response to radiation absorption is discussed along with varied opinions on the value to be employed for these calculations. These presentations by Paretzke, Rossi, and Silini provide for interesting reading as differing opinions are presented in an informed, scientific manner.

In addition to the discussions in the area of radiation protection, this volume also addresses sources of high linear energy transfer radiations (Schimmerling),<sup>3</sup> their application in clinical medicine (Curtis, Chen), detection and dosimetry systems for photons and "new" radiations (Perez-Mendez, Thomas, Larsson, Broese, Schimmerling). The final article by Thomas addresses a comprehensive radiation monitoring program to include environmental monitoring that is suggested for accelerator installations and completes the cycle of presentations that range from theoretical aspects of microdosimetry to macroscopic operational considerations.

This book is an extremely valuable review of recent advances in radiation protection in dosimetry. While, as the title indicates, the emphasis leans toward medical applications, this review provides material of interest to all professional health physicists. The inclusion of the emphasis on medical aspects in the title of the volume is, perhaps, misleading. The book contains a detailed index, which, when coupled with the papers and references supplied by

<sup>3</sup>Names of some of the lecturers in the areas discussed are enclosed in parentheses.