

Elements of nuclear safety, radiological
protection and security series

Elements of security and non-proliferation

Jean Jalouneix

edp sciences

Cover image: mosaic of photographs related to the subjects dealt with in the different volumes of the Elements of nuclear safety, radiological protection and security series. The photographs illustrating the subjects covered in this first volume of the series are highlighted, outlined in yellow.

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Preface

As part of IRSN's Science and Technology Series, the aim of the "Elements of nuclear safety, radiological protection and security" (*Éléments de sûreté nucléaire, de radio-protection et de sécurité*) series is, like the 1996 publication entitled "Elements of nuclear safety" (*Éléments de sûreté nucléaire*), to provide all those whose work involves ionizing radiation, primarily in the nuclear industry, with information regarding the technological culture relative to prevention and management of the related risks. This new series is the result of the desire — and the necessity — not only to update the 1996 publication, but also to extend its scope to areas previously not covered or only touched upon.

In its collection of scientific works, IRSN promotes the most advanced knowledge acquired either within the Institute or as part of national or international collaboration, focusing particularly on the educational value of its presentation. With this in mind, the "road map" for this new series include clear explanations through recounting the history of developments in techniques, ideas, approaches, organizations and regulations, or through questions raised and lessons learned from accidents and operating feedback in general.

The series also aims to provide access for all those interested in these issues to technical knowledge and information that has been properly established and that can be checked in the subject areas referred to, thereby applying IRSN's three core values, Knowledge, Independence, and Accessibility, as defined in its Code of Ethics and Professional Conduct.

We hope that this "Elements of nuclear safety, radiological protection and security" series, coordinated by Jean Couturier, will contribute disseminating knowledge, especially as a new generation of nuclear scientists and technicians takes over from the old.

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This volume, on security (in the sense of protection against malicious acts) and non-proliferation (in the sense of the "safeguards" undertaken by States within the framework of international treaties), is, in terms of the schedule, the first in the series.

At a time when a significant share of the electricity used within the European Union is produced by nuclear power plants, and given the international context of a serious terrorist threat, controlling nuclear and radiological security, and preventing the proliferation of weapons of mass destruction are major issues for society.

Without disclosing any sensitive information, this work describes and explains the development and monitoring of the measures taken in France, Europe and internationally to protect nuclear material, the most hazardous radioactive sources and nuclear facilities themselves against malicious acts, whether these involve attempted sabotage or diversion. A publication covering in an overall picture the history, concepts, regulations, international agreements and the roles of the different players involved in these issues will undoubtedly prove invaluable.

IRSN's central position as provider of technical support to the French authorities in the areas of safety, security and radiological protection means that it has an integral view over all nuclear risks and can correlate expertise and knowledge in these different areas with a view to assessing security issues in relation to safety and radiological protection issues.

In the conclusions of the third nuclear security summit held in The Hague on March 25, 2014, the Heads of State reiterated that nuclear safety and security initiatives should be mutually supportive and work towards the common goal of protecting human health, society and the environment. As the public expert in these two fields, IRSN plays a central role in this initiative.

In particular, I would like to thank Jean Jalouneix, of IRSN's Defense, Security and Non-Proliferation Division, for writing this first work in the series.

Jacques Repussard
IRSN Director-General

The author

Jean Jalouneix, advisor on nuclear security to the Deputy Director General in charge of Defense-related missions, worked for around 14 years in the field of nuclear safety, notably on safety studies for the SUPER-PHENIX reactor, and was involved in defining the safety options for the EPR. He then worked for around 16 years in the field of nuclear security. He has been involved in drawing up the French regulations in this area, as well as international texts, including the revised version of the Convention on the Physical Protection of Nuclear Material and nuclear facilities, and has been a contributing author to fundamental texts in the IAEA's "Nuclear Security Series".

Foreword

This work on nuclear security and non-proliferation draws on the knowledge and expertise developed at the French Institute for Radiological Protection and Nuclear Safety (IRSN), which provides technical support in these fields to the French authorities. The Institute shall not, however, be held liable for its contents.

It is based on the collective work carried out in the areas of nuclear security and non-proliferation by all the staff at IRSN and, more specifically, the staff belonging to the IRSN's Nuclear Defense Expertise Division.

Jean Jalouneix, who works for IRSN, is the key author of this work and also acted as project coordinator. The following authors contributed to the work:

- Chapters 1 and 2, Jacques Aurelle and the staff of the Technical Support and Study Department, including Pierre Funk and David Ladsous in particular;
- Chapters 3 and 4, the staff of the International Inspections Escort Department, including Romuald Bon Nguyen in particular.

Georges Goué and Odile Lefèvre prepared the work for publication.

Jean Couturier, Michel Brière and Daniel Quéniart were active contributors in proofreading the entire work.