

IAEA Safety Standards

for protecting people and the environment

Release of Sites from Regulatory Control on Termination of Practices

Safety Guide

No. WS-G-5.1



IAEA

International Atomic Energy Agency

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The publications by means of which the IAEA establishes standards are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety, and also general safety (i.e. all these areas of safety). The publication categories in the series are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

Safety standards are coded according to their coverage: nuclear safety (NS), radiation safety (RS), transport safety (TS), waste safety (WS) and general safety (GS).

Information on the IAEA's safety standards programme is available at the IAEA Internet site

<http://www-ns.iaea.org/standards/>

The site provides the texts in English of published and draft safety standards. The texts of safety standards issued in Arabic, Chinese, French, Russian and Spanish, the IAEA Safety Glossary and a status report for safety standards under development are also available. For further information, please contact the IAEA at P.O. Box 100, A-1400 Vienna, Austria.

All users of IAEA safety standards are invited to inform the IAEA of experience in their use (e.g. as a basis for national regulations, for safety reviews and for training courses) for the purpose of ensuring that they continue to meet users' needs. Information may be provided via the IAEA Internet site or by post, as above, or by email to Official.Mail@iaea.org.

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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world".

IAEA SAFETY STANDARDS SERIES No. WS-G-5.1

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SAFETY GUIDE

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2006

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Printed by the IAEA in Austria
November 2006
STI/PUB/1244

IAEA Library Cataloguing in Publication Data

Release of sites from regulatory control on termination of practices :
safety guide. — Vienna : International Atomic Energy Agency, 2006.
p. ; 24 cm. (IAEA safety standards series, ISSN 1020-525X ;
no. WS-G-5.1)
STI/PUB/1244
ISBN 92-0-101606-9
Includes bibliographical references.

1. Nuclear facilities — Decommissioning. 2. Radioactive waste disposal. I. International Atomic Energy Agency. II. Series: Safety Standards Series ; WS-G-5.1.

IAEAL

06-00439

FOREWORD

by Mohamed ElBaradei
Director General

The IAEA's Statute authorizes the Agency to establish safety standards to protect health and minimize danger to life and property — standards which the IAEA must use in its own operations, and which a State can apply by means of its regulatory provisions for nuclear and radiation safety. A comprehensive body of safety standards under regular review, together with the IAEA's assistance in their application, has become a key element in a global safety regime.

In the mid-1990s, a major overhaul of the IAEA's safety standards programme was initiated, with a revised oversight committee structure and a systematic approach to updating the entire corpus of standards. The new standards that have resulted are of a high calibre and reflect best practices in Member States. With the assistance of the Commission on Safety Standards, the IAEA is working to promote the global acceptance and use of its safety standards.

Safety standards are only effective, however, if they are properly applied in practice. The IAEA's safety services — which range in scope from engineering safety, operational safety, and radiation, transport and waste safety to regulatory matters and safety culture in organizations — assist Member States in applying the standards and appraise their effectiveness. These safety services enable valuable insights to be shared and I continue to urge all Member States to make use of them.

Regulating nuclear and radiation safety is a national responsibility, and many Member States have decided to adopt the IAEA's safety standards for use in their national regulations. For the Contracting Parties to the various international safety conventions, IAEA standards provide a consistent, reliable means of ensuring the effective fulfilment of obligations under the conventions. The standards are also applied by designers, manufacturers and operators around the world to enhance nuclear and radiation safety in power generation, medicine, industry, agriculture, research and education.

The IAEA takes seriously the enduring challenge for users and regulators everywhere: that of ensuring a high level of safety in the use of nuclear materials and radiation sources around the world. Their continuing utilization for the benefit of humankind must be managed in a safe manner, and the IAEA safety standards are designed to facilitate the achievement of that goal.

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CONTENTS

1.	INTRODUCTION	1
	Background (1.1–1.2)	1
	Objective (1.3)	2
	Scope (1.4–1.8)	2
	Structure (1.9)	3
2.	RADIATION PROTECTION ASPECTS	3
	General (2.1–2.2)	3
	Justification (2.3)	4
	Dose limitation (2.4)	4
	Optimization of protection (2.5–2.15)	4
3.	REGULATORY AND LEGAL FRAMEWORK	8
	Government (3.1–3.6)	8
	Regulatory body (3.7–3.10)	10
	Operator (3.11–3.12)	11
4.	DEVELOPMENT OF CLEANUP ACTIVITIES FOR THE RELEASE OF A SITE	12
	Introduction (4.1–4.6)	12
	Site characterization (4.7–4.9)	14
	Release criteria (4.10–4.16)	15
	Definition of end points (4.17–4.19)	17
	Development of the cleanup plan (4.20–4.30)	18
5.	IMPLEMENTATION OF THE CLEANUP ACTIVITIES FOR SITE RELEASE	21
	Cleanup activities (5.1–5.2)	21
	Monitoring (5.3–5.8)	21
	Management of radioactive waste (5.9)	22
	Clearance of material during cleanup (5.10–5.11)	23
	Ensuring compliance with release criteria (5.12–5.20)	23

Decision to release the site (5.21–5.22) 25

Management systems (5.23–5.27) 25

6. INTRODUCTION OF A NEW PRACTICE 27

APPENDIX: EXAMPLE OF THE CONTENTS

OF A CLEANUP PLAN..... 29

REFERENCES 31

CONTRIBUTORS TO DRAFTING AND REVIEW 33

BODIES FOR THE ENDORSEMENT OF IAEA SAFETY

STANDARDS 35

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1. INTRODUCTION

BACKGROUND

1.1. An increasing number of facilities¹ have come or are coming to the end of their useful lifetimes and are at present being, or are going to be, decommissioned with the intention of removing the sites² from regulatory control. In many cases decommissioning activities include the decontamination of land, ponds and buildings and other structures such as underground pipes and tanks at a site that have become contaminated as a result of an authorized practice³ [1]. The release of a site from regulatory control may be contingent on measures taken to clean up⁴ the site as part of the decommissioning activities at the end of an authorized practice conducted at a facility or part of a facility. The extent of the cleanup is a function of the size, complexity and hazard potential of the site and the potential future uses envisaged for it.

1.2. The IAEA has developed a number of safety standards on safety during decommissioning [2–5], management of the associated radioactive waste (including its transport) [2, 6–12], radiation protection [1], legal and governmental infrastructure [13] and the removal of radioactive material from regulatory control [14]. This Safety Guide supports the Safety Requirements publication on decommissioning [2] and supplements the guidance in this area with recommendations on meeting the requirements for the release of sites from regulatory control on the termination of practices.

¹ The term ‘facility’ as used in this Safety Guide means a facility with its associated land, buildings and equipment in which radioactive material is used, processed, handled or stored on such a scale that consideration of safety is required.

² The term ‘site’ as used in this Safety Guide means land together with any buildings or other structures being considered for release from regulatory control.

³ The term ‘practice’ means any human activity that introduces additional sources of exposure or exposure pathways or extends exposure to additional people or modifies the network of exposure pathways from existing sources, so as to increase the exposure or the likelihood of exposure of people or the number of people exposed.

⁴ The term ‘cleanup’ as used in this Safety Guide means any measures that may be carried out to reduce the radiation exposure from existing contamination through actions applied to the contamination itself (the source) or to the exposure pathways to humans.

OBJECTIVE

1.3. The objective of this Safety Guide is to provide guidance to the regulatory body and operators on the release of sites or parts of sites from regulatory control after a practice has been terminated. Such release from regulatory control may require the cleanup of contaminated sites, and this publication provides guidance in this area also.

SCOPE

1.4. This Safety Guide applies to sites that have become contaminated as a result of activities relating to the conduct of a practice and that are being considered for release from regulatory control as part of an overall decommissioning process [2]. All activities covered in this Safety Guide are considered part of a practice and meet the requirements [1] for such a practice.

1.5. This Safety Guide applies to all types of facility, including nuclear power and research reactors, fuel cycle facilities, manufacturing plants, medical facilities, research and university laboratories, and other research facilities that require a graded approach to regulation [2]. It does not apply to tailings from processing or to radioactive waste disposal sites. However, it does apply to auxiliary facilities at such sites. This publication focuses on radiation protection aspects, the required legal and regulatory framework, the development and implementation of cleanup activities, the unrestricted and restricted use of sites, and the introduction of a new practice on a released site.

1.6. In the context of this Safety Guide, ‘release of sites from regulatory control’ refers only to the release of sites from the requirements for radiation protection of the appropriate regulatory body, which does not preclude that other regulations may still apply at the sites.

1.7. This Safety Guide does not apply to the remediation of large sites contaminated as a result of past activities that were not conducted under the requirements of the Basic Safety Standards (BSS) [1], or as a result of accidents; that is, it does not apply to remediation in intervention situations⁵.

⁵ The term ‘intervention’ means any action intended to reduce or avert exposure or the likelihood of exposure to sources that are not part of a controlled practice or that are out of control as a consequence of an accident.

Intervention might be needed at sites that have been contaminated as a result of unauthorized activities, such as inadequate activities for radioactive waste management and disposal, accidental radioactive discharges to the environment, nuclear accidents, nuclear weapon tests and past activities that were not adequately controlled. Intervention situations are the subject of other safety standards [1, 15–17].

1.8. Such sites may pose significant non-radiological hazards to workers, the public and the environment that should be addressed during decommissioning activities. The protection of human health and the environment against such non-radiological hazards is outside the scope of this Safety Guide. However, in the context of decommissioning, these hazards are required to be given due consideration during the planning and implementation process, in the safety assessments and environmental assessments, and in the estimation of costs and the provision of finance for the decommissioning project (Ref. [2], para. 2.2).

STRUCTURE

1.9. Section 2 of this Safety Guide describes the key radiation protection principles and criteria that should be applied to the cleanup and release of sites. The legal and regulatory framework, together with the corresponding responsibilities of the government, the regulatory body and operators, are discussed in Section 3. Section 4 provides guidance on the development of cleanup activities for the release of a site, while guidance on implementation of these activities, together with considerations for restricted use, is presented in Section 5. Section 6 discusses the introduction of a new practice on a released site. The Appendix provides a list of subjects that should be included in a cleanup plan.

2. RADIATION PROTECTION ASPECTS

GENERAL

2.1. The release of sites from regulatory control is the final stage in the decommissioning process and is also the final stage of the practice [2]. Therefore, the radiation protection requirements of the BSS [1] are required to be enforced during all decommissioning activities (Ref. [2], paras 2.4–2.6), and the principles of justification, dose limitation and optimization of protection [1]

are therefore applicable to the entire decommissioning practice. Their application to the release of sites from regulatory control is the subject of this section. The dose criteria discussed in this section apply to prospective effective doses to members of the public above the pre-practice background levels that would be received after the site has been released. These doses are the summed effective doses arising from the site (considered as one source), including land and buildings and other structures. The uncertainties associated with knowledge of the site and its potential uses after its release should be taken into account in the estimation of prospective doses.

2.2. The requirements of the BSS are required to be enforced during all decommissioning activities (Ref. [2], paras 2.4–2.6), including during cleanup and site release, in order to protect workers, members of the public and the environment during the cleanup and after release of the site.

JUSTIFICATION

2.3. Decommissioning and the release of sites from regulatory control should not be regarded as separate practices requiring justification in their own right. The consequences of both decommissioning and the subsequent release of a site from regulatory control should be considered within the initial justified decision on the adoption of the practice as a whole [1, 2]. The principle of justification requires that the net benefit of the practice be positive.

DOSE LIMITATION

2.4. “The normal exposure of individuals shall be restricted so that neither the total effective dose nor the total equivalent dose to relevant organs or tissues, caused by the possible combination of exposures from authorized practices, exceeds any relevant dose limit” (Ref. [1], para. 2.23). The dose limit of 1 mSv in a year for members of the public represents an upper bound on the sum of effective doses from all possible combinations of exposures arising from practices [1].

OPTIMIZATION OF PROTECTION

2.5. Optimization of protection should include evaluation of the exposure of workers during cleanup activities (i.e. including material characterization and

radioactive waste management) and evaluation of long term exposure of the public arising from the residual site contamination after site release. This evaluation will need to ensure that the protection of workers and the public is optimized below the dose constraints defined by the regulatory body.

2.6. Cleanup and release from regulatory control of a site is one of the sources of exposure for which a dose constraint should be applied as for an authorized practice [1]. This dose constraint should take into account multiple pathways of exposure and should not exceed 300 μSv in a year above background [17].

2.7. Before commissioning a new facility, therefore, the operator should ensure that a baseline survey of the site, including obtaining information on radiological conditions, is performed to define the levels of background radiation at the facility site. These levels will be further used at the end of the practice as a basis for comparison with the levels used to release the site. For existing facilities for which no such baseline survey was carried out in the past to determine these background levels, data from analogous, undisturbed areas with similar characteristics should be used for this purpose. These analogous areas should be areas that have similar physical, chemical, radiological and biological characteristics to those of the site considered for release, but they should not have been contaminated with radioactive material as a result of activities at the site. Such areas are not limited to natural areas undisturbed by human activities.

2.8. The applicable dose constraint for the public after the release of a site should be expected to be no higher than that applied for the operational phase of the practice. However, the two phases do not necessarily share a common set of circumstances (in particular, they do not necessarily have the same critical groups) on the basis of which to prescribe equality between the dose constraints applied before the termination of a practice and those applied afterwards.

2.9. In accordance with the BSS [1] and the recommendations of the International Commission on Radiological Protection (ICRP) [17], dose constraints should be applied prospectively to exposure from radioactive residues expected to remain in human habitats after the termination of a practice. The site dose release criteria should thus be based on an optimization of protection under this constraint, with account taken of the fact that optimization below the order of 10 μSv in a year might not be warranted on radiological protection grounds.