

Document Preparation Profile (DPP)

1. IDENTIFICATION

Document Category:	Safety Guide
Working ID:	<u>DS459</u>
Proposed Title:	Management of Radioactive Residues from Mining, Mineral Processing, and other NORM related Activities
Proposed Action:	Revise and Expand “Management of Radioactive Waste from the Mining and Milling of Ores”, 2002, Safety Guide, IAEA No. WS-G-1.2
Review Committees:	WASSC (Leading); RASSC
Technical Officers:	<u>Z. Fan, NSRW</u>

2. BACKGROUND/RATIONALE

The current version of the Safety Guide “Management of Radioactive Waste from the Mining and Milling of Ores”, (WS-G-1.2) was published in 2002. The Safety Guide provided guidance on the safe management of radioactive waste that resulted from the mining and milling of ores, primarily uranium and thorium ores

Since WS-G-1.2 was published, a growing number of Member States have been concerned about the safety of radioactive residues arising from other mining and milling activities in relation to naturally occurring radioactive material (NORM). Meanwhile, energy demand has stimulated a growing interest in the expansion of uranium mining and milling. Additional experience and interest has arisen in the management of radioactive residues (which includes waste) at new mines and in countries or states developing mineral resources. New international recommendations have also been developed related to potential radiological effects on the environment. In addition, the International Basic Safety Standards and other Safety Requirement documents relevant to this field have been revised. WASSC has recognized these changes and needs and recommended (in June 2011) that the Secretariat to expand the scope of WS-G-1.2 beyond mining and milling of ores, to include activities involving radioactive residues from any process associated with NORM.

The residues generated in mining and milling activities differ from those generated at, for example, nuclear power plants or medical facilities. An important difference affecting their management is the very large volumes of many of these residues. This has important consequences to the possible siting and engineering options that are available. In addition, radon and many of the very long half-lived radionuclides presented in these residues implies that long term concerns should be fully addressed in term of the protection of future generations against radiation risk.

A Feedback Analysis Report (FAR) concluded that WS-G-1.2 should be revised and expanded. Particularly, the Safety Guide WS-G-1.2 should be revised and expanded as per the

“Summary of Issues to be addressed” identified in part 1 of the ANNEX to this DPP. In addition, the FAR included a first draft of a “Revised Table of Contents” for the new Safety Guide, which is included as in part 2 of the ANNEX to this DPP.

3. OBJECTIVE

The objective of this safety guide is to provide recommendations and guidance to regulatory bodies, operating organizations, technical support organizations, and other interested parties on safe management of radioactive residues arising from the mining, milling and processing of ores (primarily uranium and thorium), and from other activities generating NORM residues. The guidance will address new facilities; however, this guide may also be relevant to the review and upgrading of existing facilities where reasonably practicable. The guide is to address residues arising during all phases of a facility lifetime.

4. JUSTIFICATION

This safety guide is intended to update and expand the WS-G-1.2 so as to include the management of radioactive residues from the mining and milling of ores, and NORM residues that require management. It will help ensure a clear, safe, systematic and comprehensive management of all radioactive residues. The new guide will take into consideration and reference other work and IAEA documents underway on facility safety, management systems, termination of activities, decommissioning, safety assessment, and radioactive waste management.

5. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

The proposed Safety Guide will be developed as part of the IAEA Safety Standards Series. Due account will be given to existing safety standards, for example those General Safety Requirements for governmental, legal and regulatory frameworks, radiation protection, waste management and disposal of radioactive waste, and decommissioning and termination of activities. As applicable, it will be necessary to coordinate with the development and revision of other relevant IAEA Safety Standards, such as DS 357 (Monitoring and Surveillance of Radioactive Waste Disposal Facilities).

The new Safety Guide will be based on the Safety Fundamentals and the relevant Safety Requirements that are found principally in the following safety standards:

- Fundamental Safety Principles (SF-1)
- Governmental, Legal and Regulatory Framework for Safety (GSR Part1)
- Radiation Protection and Safety of Radiation Sources, International Basic Safety Standards 2011 Edition (GSR Part 3)
- Safety Assessment for Facilities and Activities (GSR Part 4).
- Predisposal Management of Radioactive Waste (GSR Part 5)
- Disposal of Radioactive Waste (SSR-5).

Supersedes: This safety guide is a revision and expansion of the IAEA Safety Guide: “Management of Radioactive Waste from the Mining and Milling of Ores”, IAEA Safety Standards Series No. WS-G-1.2 (2002), and will supersede it.

6. OVERVIEW

This Safety Guide addresses the management of radioactive residues that arise from mining, mineral processing, and other industries that generate NORM residues. A NORM residue is material that remains from a process and comprises or is contaminated by NORM. In accordance with the IAEA Safety Glossary, a NORM residue may or may not be waste.

The Safety Guide will provide life cycle guidance on the site selection and evaluation and design of tailings management facilities, and on their construction, operation and closure, decommissioning and termination, including organizational and regulatory requirements (GSR Part 1). The guide will as necessary include some guidance on the development of a safety case and safety assessment for facilities and activities involving NORM residues, as required by GSR Part 4 and GSR Part 5.

The guidance is intended to be applicable to the mining and milling of ores for the extraction of uranium or thorium, and to other industries including mining and processing of other ores, the oil and gas industry and the phosphate industry. Further information on sources of NORM residues can be found in *Assessing the Need for Radiation Protection Measures in Work Involving Minerals and Raw Materials* (IAEA Safety Report 49, 2007). Regulatory bodies should determine the extent to which this guidance should be applied to particular industries in accordance with graded approach.

In general this guide applies to bulk amount of residues and not discrete sources, such as radium sources for which management is covered in other IAEA documents. The bulk amount may be judged and decided based on the MS’s regulations. This guide is also intended to cover management of contaminated equipment as well as the radioactive residues generated by the process.

This Safety Guide is principally directed towards the management of residues generated by new facilities. It may not be practical to apply all of these recommendations to existing facilities. In such cases, the regulatory body should decide the extent to which these recommendations apply. This guidance should apply to residues arising from decommissioning and remediation activities.

Certain non-radiological characteristics of the residues may pose significant hazards and risks. Detailed consideration of the requirements to protect people and the environment against the non-radiological hazards and risks is outside the scope of this Safety Guide. However, the management of non-radiological hazards is an input, along with radiological hazards, to be considered in the comprehensive optimization of protection.

7. PRODUCTION SCHEDULE: Provisional schedule for preparation of the document, outlining realistic expected dates for:

STEPS	Projected Dates
STEP 1: Preparing a DPP	Q3 2011
STEP 2: Approval of DPP by the Coordination Committee	Q4 2011
STEP 3: Approval of DPP by the Safety Standards Committees or the relevant group where appropriate	Q4 2011
STEP 4: Approval of DPP by the CSS	Q2 2012
STEP 5: Preparing the draft	Q1 2013
STEP 6: Approval of draft by the Coordination Committee	Q2 2013
STEP 7: Approval by the Safety Standards Committees for submission to Member States for comments or the relevant group where appropriate	Q4 2013
STEP 8: Soliciting comments by Member States	Q2 2014
STEP 9: Addressing comments by Member States	Q4 2014
STEP 10: Approval of the revised draft by the Coordination Committee Review in NS-SSCS	Q1 2015
STEP 11: Approval by the Safety Standards Committees for submission to the CSS or the relevant group where appropriate	Q2 2015
STEP 12: Endorsement by the CSS	Q4 2015
STEP 13: Establishment by the Publications Committee and/or Board of Governors (for SF and SR only)	NA
STEP 14: Target publication date	Q2 2016

8. RESOURCES

Staff: 52 staff weeks

Consultants: 20 consultant weeks

ANNEX

1. Summary of Issues to be Addressed

This is a summary of issues to be addressed in the revised and updated Safety Guide:

- a) WS-G-1.2 contains good guidance that remains current and relevant, particularly to uranium mining and milling facilities.
- b) WS-G-1.2 does not address predisposal management of Radioactive Waste (GSR Part 5). For example, pre-treatment, treatment, storage, transport, and conditioning.
- c) The document must be clear on the inclusion of “in situ recovery”, as this has become a major resource recovery and process for uranium.
- d) GSR Part 5 and SSR-5 do not specifically address residue, rather they refer to radioactive wastes. Some explanatory text will be needed to clarify the notion of residues.
- e) The guide should address or recognize possible differences among some Member States in their regulation of NORM, which may or may not include uranium and thorium mine and milling residues.
- f) Risk based approach to be applied to management of residues.
- g) General updates to document to reflect current IAEA terminology, definitions, references etc.
- h) Protection of the environment, which has evolved since 2002, e.g., ICRP 103 and 108.
- i) NORM residues can include other contaminated objects, like pipes, scaling, sludge, etc.
- j) The guidance should address the regulation and management of mixed residues (i.e., those that contain radiological and non-radiological contaminants).
- k) Residues may contain other components which may be retrieved, and segregation of residue, reuse and recycle, and disposal should be addressed.
- l) As appropriate, the transport and import/export of radioactive residues could be addressed.
- m) Describe graded approach to managing different residues, based on the wide range of activity levels in NORM residues.
- n) Make connection to remediation or decommissioning, and how these activities can generate a waste or a residue.
- o) As a result of broadening the scope to include NORM or other types of NORM, the new Guide will need to address the modifications to the section on “Options for Waste Management”.

2. Revised Table of Contents

This revised Table of Contents is a proposed draft that subsequent working groups will likely want to revise. It is based on WS-G-1.2, but was expanded to reflect the scope of the new Safety Guide. New sections, subsections and appendices could be added or revised in future drafting sessions.

1. INTRODUCTION

- Background
- Objective
- Scope
- Structure

2. PROTECTION OF PEOPLE AND THE ENVIRONMENT

- General (The concept of radiological protection in the long-term management of residues.)
- Radiological protection of people
- Radiological protection of the environment
- Non-radiological considerations

3. ADMINISTRATIVE, LEGAL AND REGULATORY FRAMEWORK

- National policy and strategy
- Responsibilities

4. STRATEGY FOR RESIDUE MANAGEMENT

- General
- Identification and categorization
- Characterization and Segregation
- Reuse and Recycle of Residues
- Storage and retrieval of residues
- Options for waste management (If certain streams of residues are considered to be radioactive waste, long term management will be challenged with very long half-lived alpha-emitter, extremely large of volume and instability of waste form)
- Remediation of Residue Facilities

5. SAFETY CONSIDERATIONS IN Long-term Management of Residues

- Site selection
- Design and Construction
- Operation
- Decommissioning and Closure
- Removal of regulatory control
- Institutional control

6. SAFETY ASSESSMENT and SAFETY CASE

- General, scope, purpose, responsibility
- Graded approach to Safety Assessment, interaction between safety assessment and the engineering design and operation management, long-term safety management options and optimization

7. MANAGEMENT SYSTEMS

8. MONITORING AND SURVEILLANCE

9. FINANCIAL ASSURANCE

REFERENCES