

11th Plenary the Global Nuclear Safety and Security Network

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Remediation of Legacy Sites and Management of Naturally Occurring Radioactive Material (NORM) Residues

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Global needs for Remediation of Legacy Sites

Legacy sites?

- **Existing contamination** on sites affected by residual radioactive material from :
 - **past activities** never subject to regulatory control or that were subject to regulatory control but not in accordance with the requirements of the IAEA Safety Standards,
 - **events/accidents**, after end of emergency phase.
- For which a **decision on control** needs to be taken

Remediation?

Measures to reduce the radiation exposure from **existing contamination** of land areas through actions applied to:

- the contamination itself (the source) or
- the exposure pathways to humans.

Example:

Uranium mining tailings in Central Asia



Photograph : Degmay site in Tajikistan, 2024

Global needs for Remediation of Legacy Sites



Legal and regulatory framework for remediation:

- To assign responsibilities
- To make provisions for financing remediation
- To guarantee long-term effectiveness of remedial actions



Capacity building:

- Remediation as a process
 - Identification and characterisation of a site
 - Selection of the 'best remedial option' and end state
 - Monitoring
- Long-term post-remediation management
 - Responsibilities
 - Financing
 - Monitoring and Control



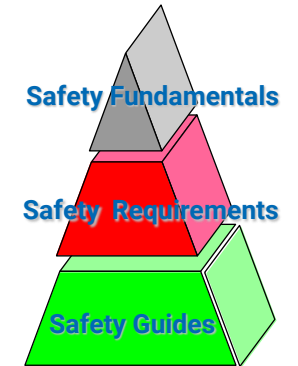
Support to Member States for Remediation of Legacy Sites



Legal and regulatory framework for remediation:

The system of IAEA Safety Standards for remediation

"The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation."



IAEA Safety Standards
for protecting people and the environment

**Fundamental
Safety Principles**

Jointly sponsored by
Euratom, FAO, IAEA, ILO, IMO, OECD/NEA, PAHO, UNEP, WHO

Safety Fundamentals
No. SF-1

IAEA
International Atomic Energy Agency

IAEA Safety Standards
for protecting people and the environment

**Radiation Protection and
Safety of Radiation Sources:
International Basic
Safety Standards**

Jointly sponsored by
EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO

General Safety Requirements Part 3
No. GSR Part 3

IAEA
International Atomic Energy Agency

IAEA Safety Standards
for protecting people and the environment

**Remediation Strategy and
Process for Areas Affected
by Past Activities or Events**

Jointly sponsored by
IAEA, UN, WHO, OCHA

General Safety Guide
No. GSG-15

IAEA
International Atomic Energy Agency

**New Safety
Guide (DS538):**
Long Term Post-
Remediation
Management of
Areas Affected by
Past Activities or
Events

Status DS538:
*Review by Safety
Committees (WASSC,
RASSC, ...) in
November 2025 (step 7)*

Support to Member States for Remediation of Legacy Sites



Capacity building: Training

e Learning course of GSG-15 at a glance

Objective

To learn:

- Background for the development of the GSG-15
- Basic structure of national framework for remediation
- The principles of radiation protection for remediation
- Process of remediation

Target learners

For example:

- Governments
- National authorities
- Operating organization
- Academic societies
- Other parties involved with remediation



Structure

Basically:

- In line with the structure of GSG-15
- 6 modules

Schedule

As a rough estimation:

- 1 year
(Analysis – Design – Production – Choice of developer – Implementation - Evaluation)
- HBA in Q3 and Q4

Support to Member States for Remediation of Legacy Sites



Capacity building: Networks for information and knowledge exchange

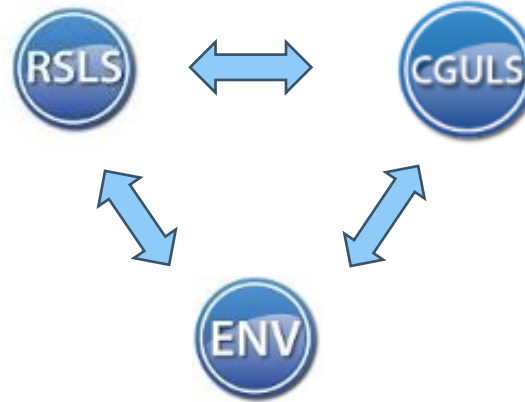


since 2010
RSLs

INTERNATIONAL WORKING FORUM ON REGULATORY SUPERVISION OF LEGACY SITES

- Brings attention to legacy sites;
- Shares information about such sites among participating Member States;
- Promotes efficient and effective regulatory supervision;
- Promotes the application of the IAEA safety standards and good practice.

<https://nucleus.iaea.org/sites/connect/rslspublic/SitePages/Home.aspx>



CGULS Coordination group for Uranium Legacy Sites



Since 2012



Since 2024



<https://nucleus.iaea.org/sites/cguls/English/SitePages/Home.aspx>

ENVIRONET Network of Environmental Remediation and NORM management



<https://nucleus.iaea.org/sites/connect-members/environet/SitePages/Home.aspx>

Support to Member States for Remediation of Legacy Sites



Capacity building: Expert missions, TC support

❑ CGULS Missions in Tajikistan, Uzbekistan, Kyrgyzstan (T, U, K) in 2024:

- Improvement of Water Analysis Methods in participating laboratories of CGULS, *26 Feb. - 7 March, T-U-K;*
- Review of operator's capacity assessment for remediation and long-term management, *6 - 10 May, Tajikistan;*
- Development of National State Program on Remediation and post-remediation management, *23 Sept. – 4 Oct., T-U-K.*

❑ TC Project RAF9070 : Regional Training Course on Radiation Exposure from Remediation, *Feb. 2025, Egypt.*

- Hosted by Egyptian Atomic Energy Authority (EAEA)
- Over 30 participants from about 30 African Member States

Support to Member States for Remediation of Legacy Sites

Upcoming events and projects:

- ❑ **CGULS Annual Meeting** : 6-10 October 2025, Tashkent, Uzbekistan
- ❑ **CGULS Africa Technical meeting** : 17-21 November 2025, Centurion, South-Africa
- ❑ **RSLs Annual technical meeting** : 9-13 March 2026, IAEA, Vienna

❑ **UMREG2025** –Project proposal: **STREAMS**

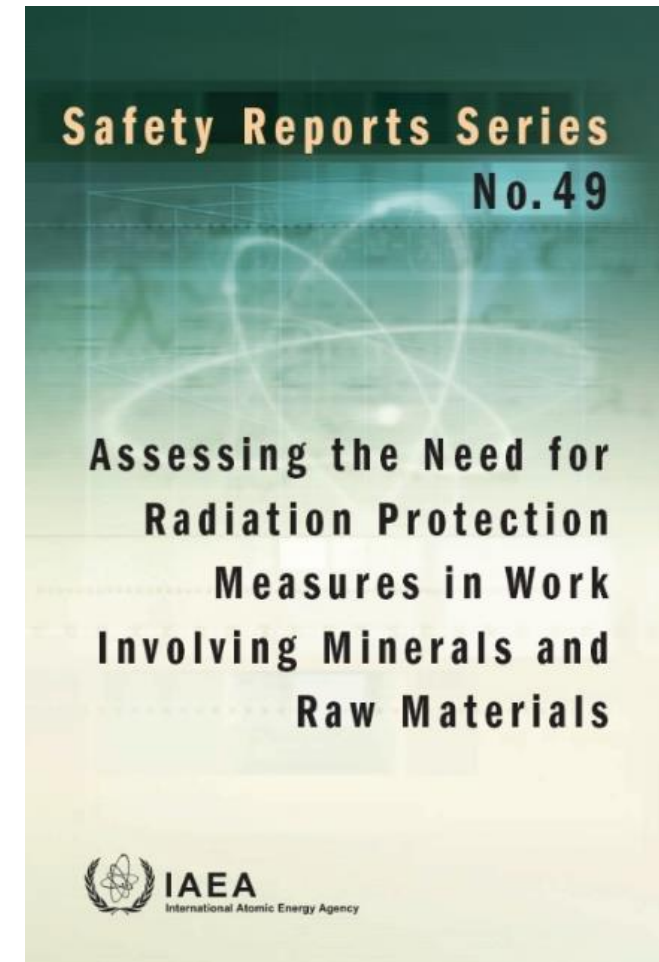
Sustainable Mining and Resilient Environmental Remediation in Line with Circular Economy Principles and Social Integration Encompassing Artisanal Mining



Activities of Radiation safety concern of NORM residues

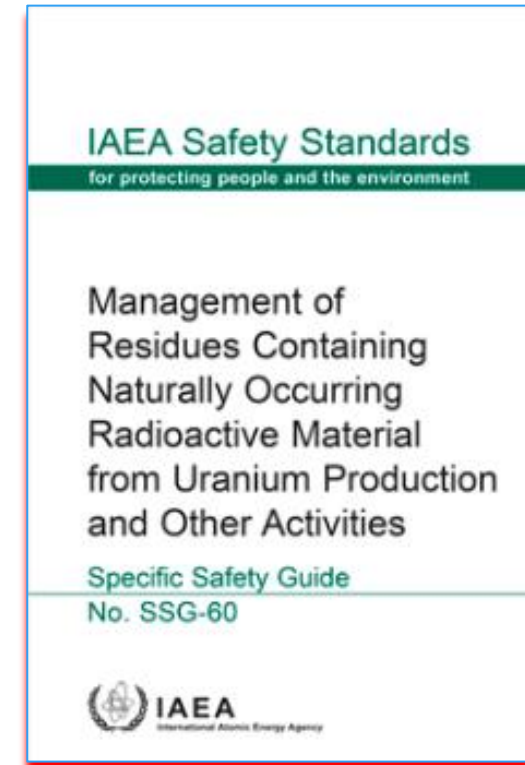
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1. Uranium mining and processing
 2. Rare earths extraction
 3. Thorium extraction & use
 4. Niobium extraction
 5. Non-U mining – incl. radon
 6. Oil and gas
 7. TiO_2
 8. Phosphates
 9. Zircon & zirconia
 10. Metals production (Sn, Cu, Al, Fe, Zn, Pb)
 11. Burning of coal etc.
 12. Water treatment – incl. radon

- new activities (such as geothermal energy)
- reuse and recycling, disposal



IAEA Safety Standards SSG-60 Management of Residues Containing Naturally Occurring Radioactive Material from Uranium Production and Other Activities

1. Introduction
2. Overview of NORM activities and NORM residues
3. Governmental, legal and regulatory framework for safety
4. Protection of people and the environment
5. System for regulatory control
6. Strategies for NORM residue management
7. The safety case and safety assessment for NORM residues management
8. Safety consideration for long term Management of NORM Residues
- Appendix I. Special considerations of residues from uranium production
- Appendix II. Residue management plan for uranium production
- Appendix III. Closure plan for tailings management facility
- References
- Annex I. Examples of residues to be assessed for possible regulatory control
- Annex II. Sampling and determining radionuclide activity concentrations
- Annex III. Example of application of the graded approach in the management of NORM residues
- Annex IV. Reuse and Recycling of NORM Residues
- Annex V. Bibliography

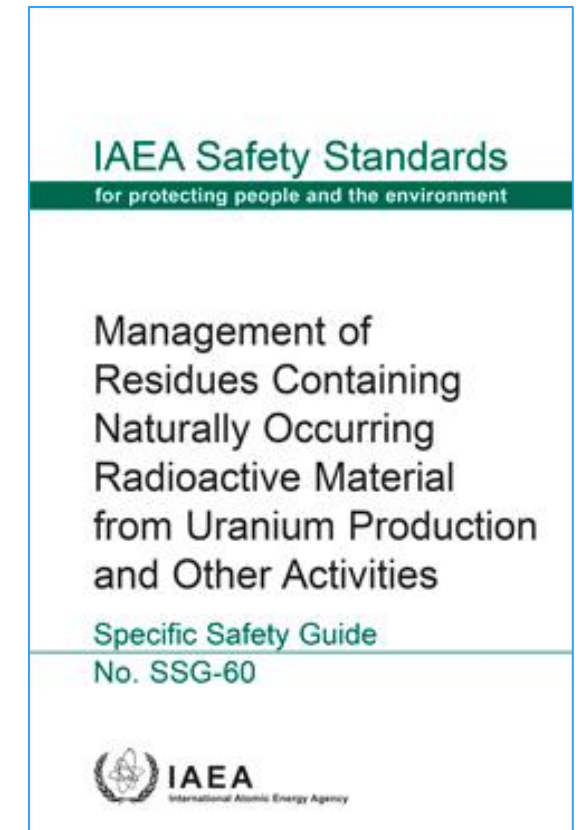


SSG-60 – Solutions for management of NORM residues

Understand NORM residues	Regulation in a graded approach	Reuse/recycle	Long term management (Disposal)
• Survey • Identification • Characterization • Safety assessment • Categorization with connection to subsequent management options	• Exemption • Notification • Registration • License • Clearance	• Internal (one operator) • Cross sectors (various operators) • Cross borders	• Municipal landfill • Hazardous waste landfill • RW near surface disposal • RW sub-surface disposal (injection of contaminated liquid is one of the example)

Regulatory Forum for Safety of Uranium Production and Management of Naturally Occurring Radioactive Materials (REGSUN)

- <https://gnssn.iaea.org/main/REGSUN/SitePages/Home.aspx>
- To help **build capacity** in all MSs undertaking or considering uranium production or the management of NORM residues.
- To promote good regulation and safe and environmentally responsible practices, through the **application of IAEA Safety Standards**.
- To promote and increase the exchange of information and expertise among its participants, including regular updates on best practice approaches, targeted assistance in review and provision of expertise, and identification of gaps in guidance and support.
- To support the utilization of IAEA tools and training materials.
- To provide strategic input for future IAEA work in areas related to safety of uranium production and NORM residues management.



REGSUN webpage – log in

<https://gnssn.iaea.org/main/REGSUN/SitePages/Home.aspx>

(or “google” “IAEA REGSUN” ...)

Members Area

⇒ Through nucleus account



- Annual Meeting:
 - REGSUN 2018, 2019, 2020, 2021, 2022
 - REGSUN 2023, 24-28 July 2023
 - REGSUN 2024, 3-7 June 2024
 - REGSUN 2025, 19-23 May 2025
 - **REGSUN 2026, Q2 2026**
- Technical Meeting:
 - Safety Assessment for the Long Term Management of Radioactive Residues from UP, 2018
 - Decommissioning of UPF and other Facilities Containing NORM, 2019
 - Decommissioning Planning for UPF, 13-17 December 2021
 - TM on protection of groundwater in ISR for uranium production, 5- 9 December 2022
 - **Training Course on Safety of Uranium Production using In Situ Recovery Method, 2026**

Status: Task Working Group for NORM Regulation

Tasks	Work Done	Further actions
Task 1. Develop a one-week training workshop for developing and implementing a regulatory regime for NORM residues consistent with the graded approach.	<u>ME-RAS9096-2404115: Workshop on Establishing Radiation Safety Framework for the Management of Naturally Occurring Radioactive Material</u>	Consolidate the training program Conduct regional and national training
Task 2. Prepare guidance and case studies on the application of specific exemption and specific clearance to NORM residues.	Topical discussion Collect and share existing practices	Explore opportunity to develop a topical project
Task 3. Support development of regulations for NORM residues	<u>Expert missions conducted</u>	Continue to support development of regulations
Task 4. Support application of NORM registry		Review and discuss way forward

Status: Development of Learning Centre of Management of NORM Residues

Tasks	Work Done	Further actions
Consolidate the Basic Modules on SSG-60 (English version)	Consolidated and used at various events.	• Convert to e-learning • Sector specific information • Safety assessment • Disposal/reuse and recycle • Improve the <u>REGSUN Member – LearningNORM</u>
Develop <u>REGSUN Member - FAQs</u> (iaea.org)	<u>REGSUN - FAQs</u>	Update to be more illustrative and interactive
Develop competence for regulating and managing NORM residues	Discussed at REGSUN2024	Form a document

Status: Development of Learning Centre for Safety of Uranium Production

Tasks	Work Done	Further actions
<u>Safety and Regulation for Uranium Production</u>	Taks 1. Safety demands and regulatory challenges of uranium production to meet demand of tripling nuclear energy by 2050 (To be decided) Task 2. Prepare for an advisory service on Inspection of tailings facilities Task 3. Decommissioning of Uranium Production Facilities (focus on safety assessment and regulatory review)	
Safety of Uranium Exploration	Needs of the development to be reviewed	
Safety of Uranium Production by In Situ Recovery	Drafted	Prepare for training course Support IAEA expert mission
Safety Assessment of uranium production activities		May just focus on regulatory review

Proposed events responding GNSSN Survey

- Workshop on establishing radiation safety framework for the management of NORM
 - To discuss and share experiences on the establishment of safety framework for managing residues/wastes containing Naturally Occurring Radioactive Material (NORM).
 - Proposed host country: EuCAS Member State; Proposed dates: Q2/2026
- Workshop on safety and regulation of NORM residues from oil/gas industries
 - To share information on regulations and on regulatory practices related to radiation safety and to management of waste containing NORM from oil/gas industries
 - Proposed host country: Norway, The Netherlands; Proposed dates: Q2/2026

Thank you!

