

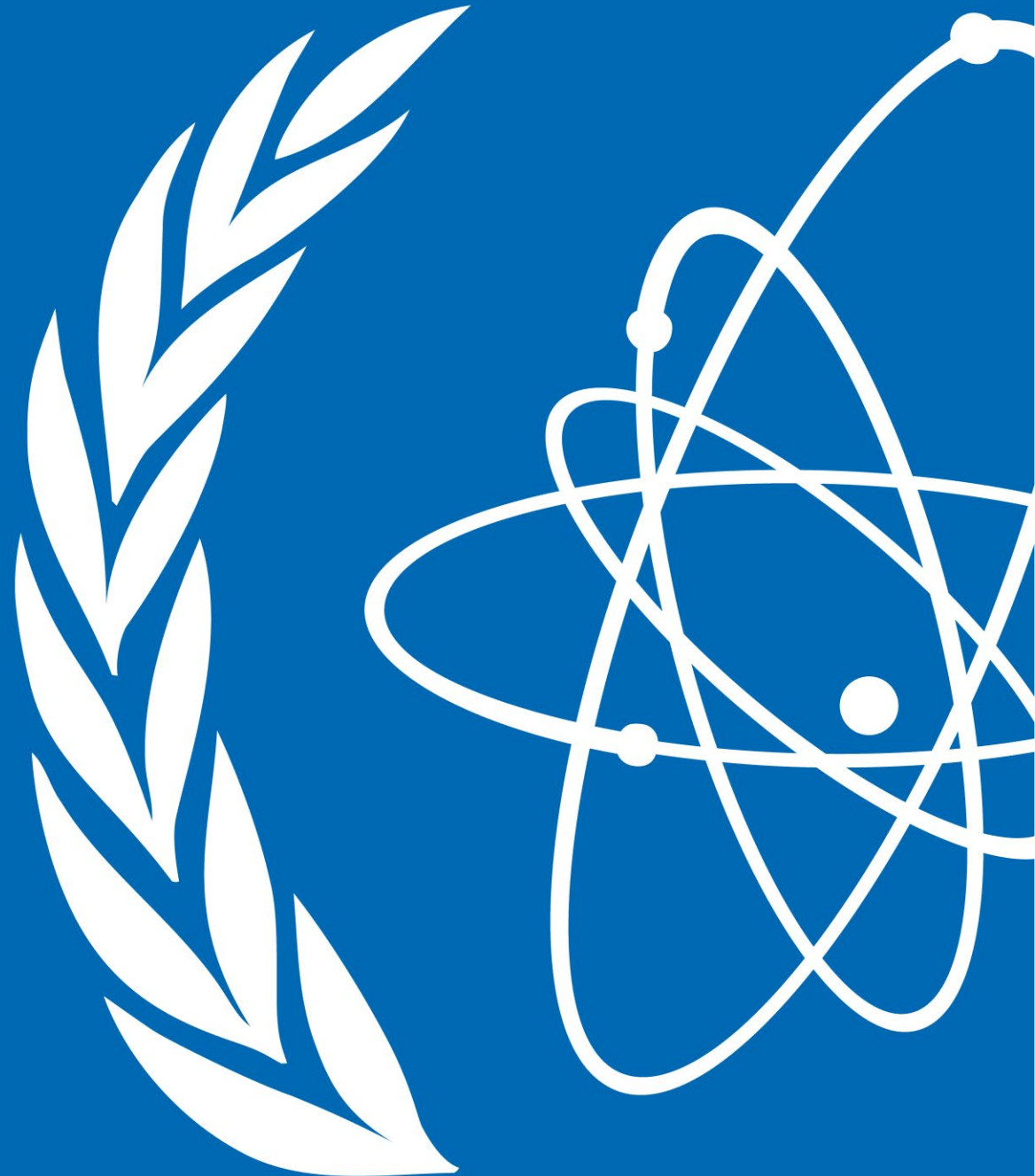
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New IAEA Safety Guide on Long Term Post-Remediation Management

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Glossary: IAEA and Remediation

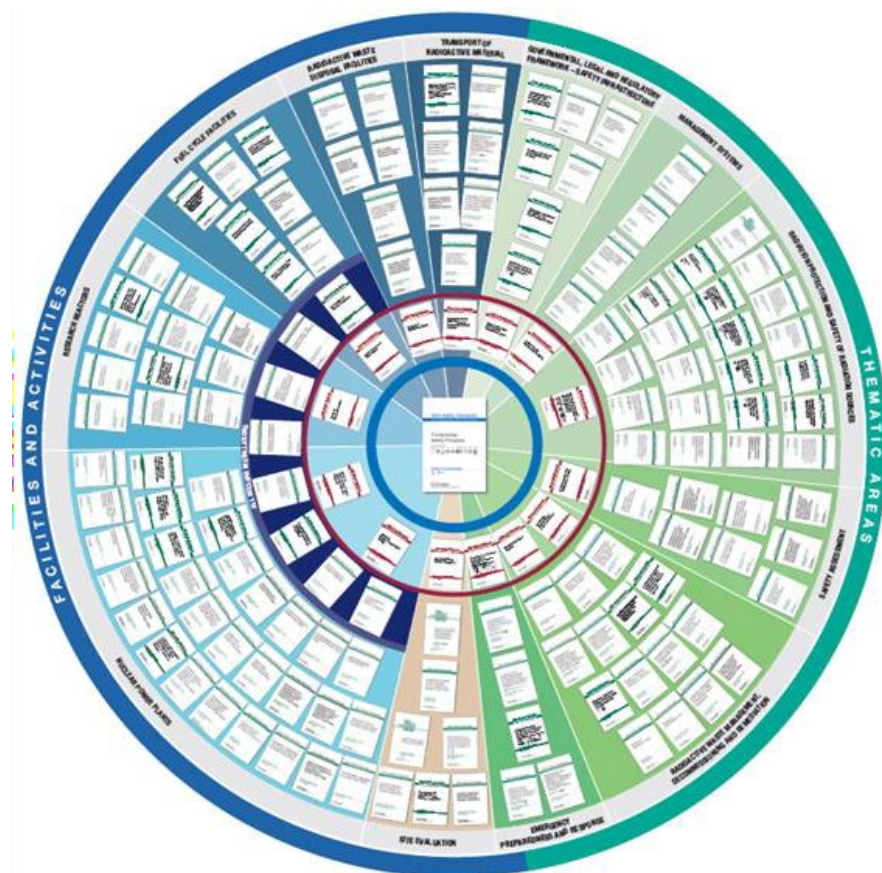
- Remediation

Any measures that may be carried out to **reduce the *radiation exposure*** due to existing *contamination* of land areas through actions applied to the *contamination* itself (the *source*) or to the *exposure pathways* to humans.

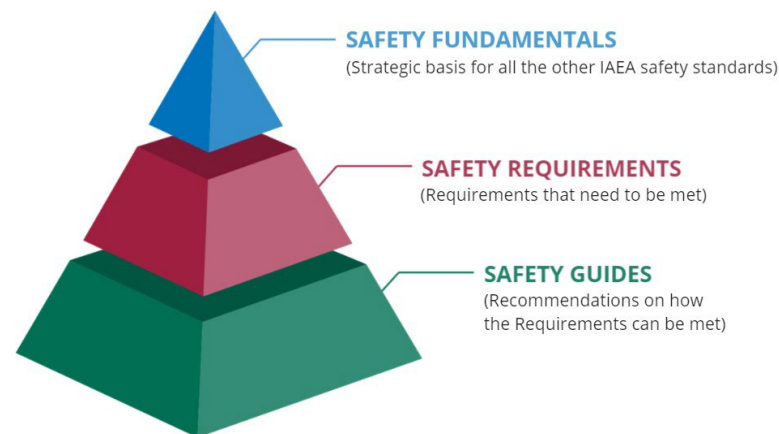
① Complete removal of the *contamination* is not implied.



IAEA Safety Standards: overview



Safety means the protection of the people and the environment against radiation risks, and the safety of facilities and activities that give rise to radiation risks.



International Consensus



The IAEA maintains safety standards for the protection of people and the environment from harmful effects of ionizing radiation. The Safety Standards Series contains three categories of publications: Fundamental Safety Principles, Safety Fundamentals, and Safety Codes. The safety standards are developed with the involvement and agreement of Member States and cover nuclear safety, radiation safety, transport safety, waste safety and emergency preparedness and response. While recognizing that regulating safety is a national responsibility, the IAEA encourages all Member States to apply the safety standards' principles, requirements and guidance in order to maintain and improve nuclear safety and radiation protection globally.

Travelers should be made aware that the <https://www.iaea.org/resources/safety-standards> website is not intended to be used as a legal reference and can be found in hard copy from pubs.iaea.org/BooksOrder.

An Online User Interface (PDS-UI), available at <https://pubs.iaea.org/pds-ui/>, allows users to navigate and search the content of the publications in the Safety Standards Series.

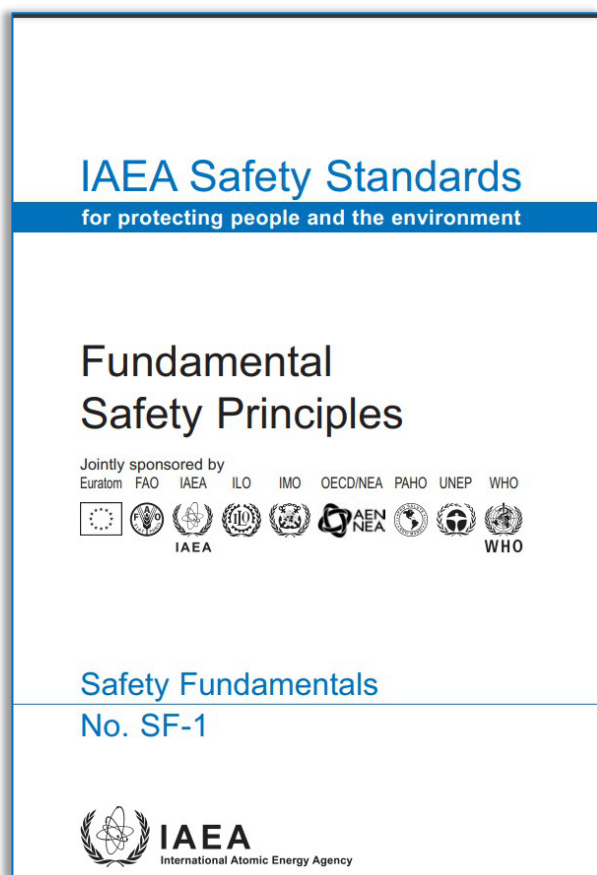


New IAEA Safety Guide on Long Term Post-Remediation Management



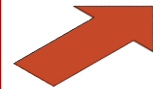
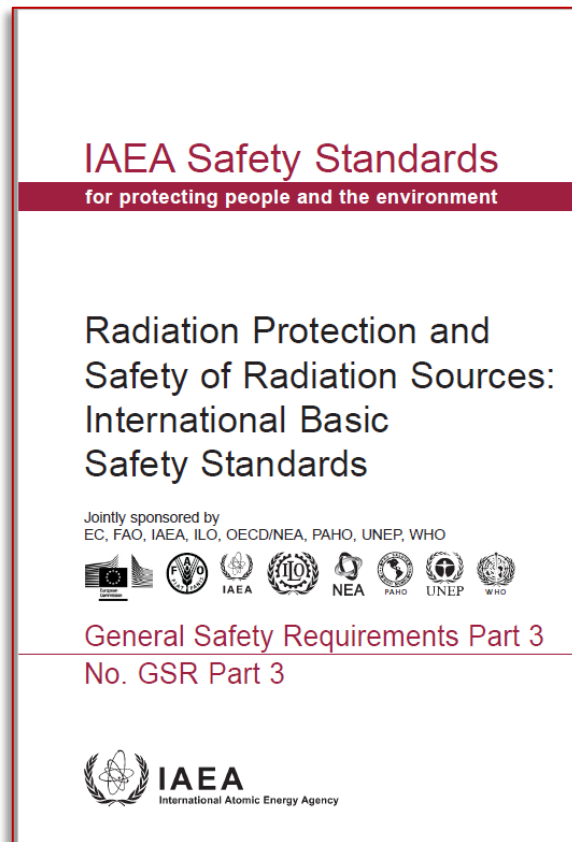
IAEA Safety Fundamentals – 10 Principles

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



- **Principle 1:** Responsibility for safety
- **Principle 2:** Role of government
- **Principle 3:** Leadership and management for safety
- **Principle 4:** Justification of facilities and activities
- **Principle 5:** Optimization of protection
- **Principle 6:** Limitation of risks to individuals
- **Principle 7:** Protection of present and future generations
- **Principle 8:** Prevention of accidents
- **Principle 9:** Emergency preparedness and response
- **Principle 10:** Protective actions to reduce existing or unregulated radiation risks

IAEA Radiation Protection and Safety of Radiation Sources- International Basic Safety Standards



Radiation Protection Principles:

- Justification
- Optimization
- Dose Limitation

Exposure Situations:

- Planned exposure situations
- Emergency exposure situations
- **Existing exposure situations**

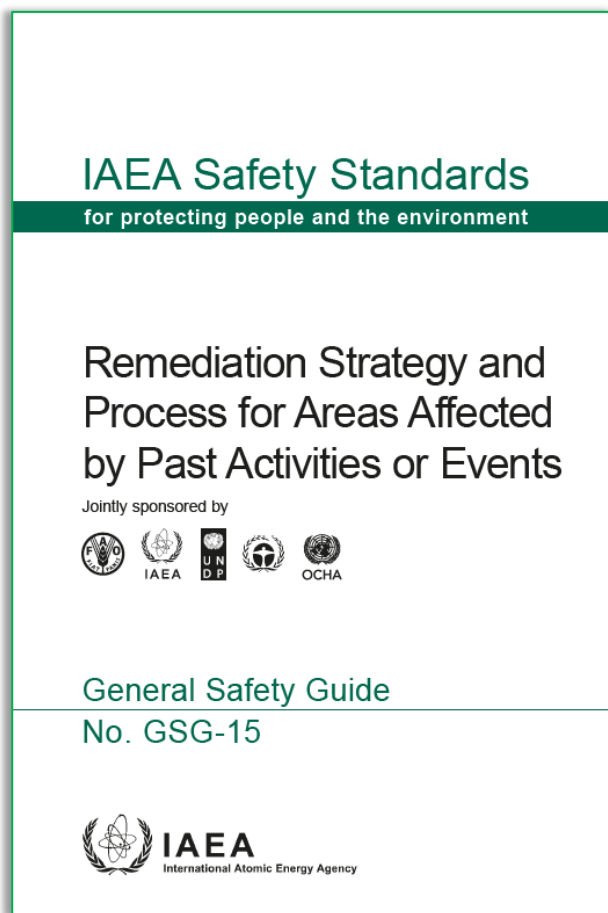
*“The requirements for **existing exposure situations** to exposure due to **contamination of areas** by residual radioactive material deriving from:*

- Past activities that were never subject to regulatory control or that were subject to regulatory control but not in accordance with the requirements of the IAEA Standards;*
- A nuclear or radiological emergency, after an emergency has been declared to be ended”*

Requirements:

- ☐ Identification and evaluation of exposures of concern
- ☐ Justification and optimization of protection and safety
- ☐ Necessary provisions for remediation
- ☐ Protection of the workers

IAEA Safety Guide on Remediation Strategy and Process for Areas Affected by Past Activities or Events (GSG-15)



▪ Justification of Remediation

This justification involves a determination of whether the benefits of remediation (e.g. to individuals and society) outweigh any possible detriments from the remediation (potential impacts on the environment, the reduction in long term impact)

▪ Optimization of Protection and Safety in Remediation

The process of optimization of protection and safety will be specific to the prevailing circumstances (e.g. environmental conditions, location of the area, surrounding population and land use, the availability of resources for remediation) and is a structured, iterative process that is applied to plan and implement remediation.

▪ Reference Levels

For an area affected by past activities or an event, the reference level is the starting point for **optimization** of protection and safety through remediation. The recommended range for existing exposure situations is **1–20 mSv/y**.

▪ End point criteria - end state criterion

The end point is typically the level of contamination beyond which further remediation is considered unnecessary. One or more end point criteria are generally established for each remedial action or group of related remedial actions to verify their completion.

▪ Graded Approach

The planning and implementation of remediation to determine the appropriate levels of analysis, documentation, actions and regulatory oversight such that the effort is commensurate with the risks associated with the affected site or area.






Remediation Strategy and Process

IAEA Safety Standards

for protecting people and the environment


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

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General Safety Guide

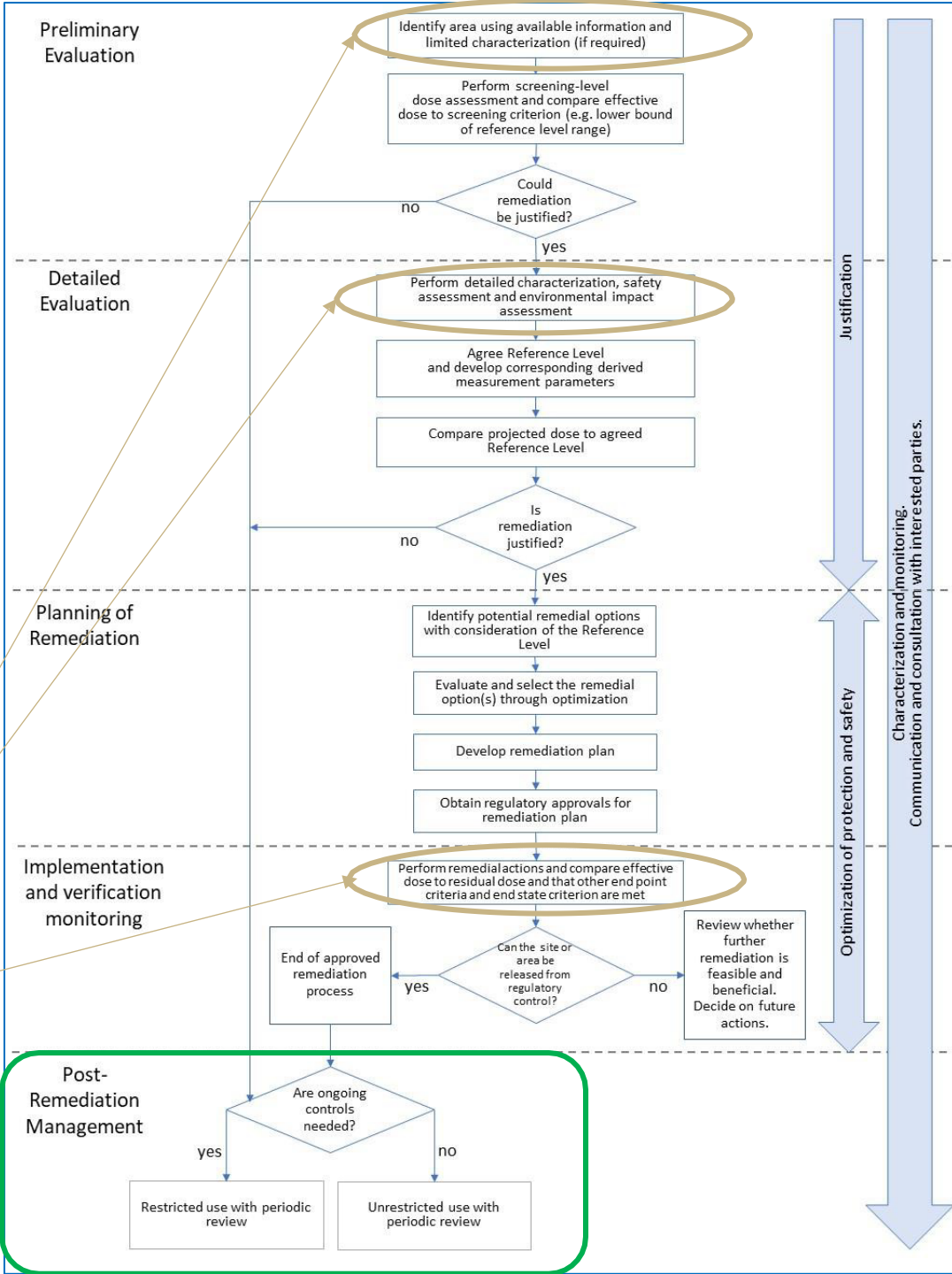
No. GSG-15



The Remediation Process can be described in terms of 5 phases:

- ☐ Preliminary evaluation
- ☐ Detailed evaluation
- ☐ Planning of remediation
- ☐ Implementation and verification monitoring
- ☐ Post-remediation management.

Characterization and Monitoring are key

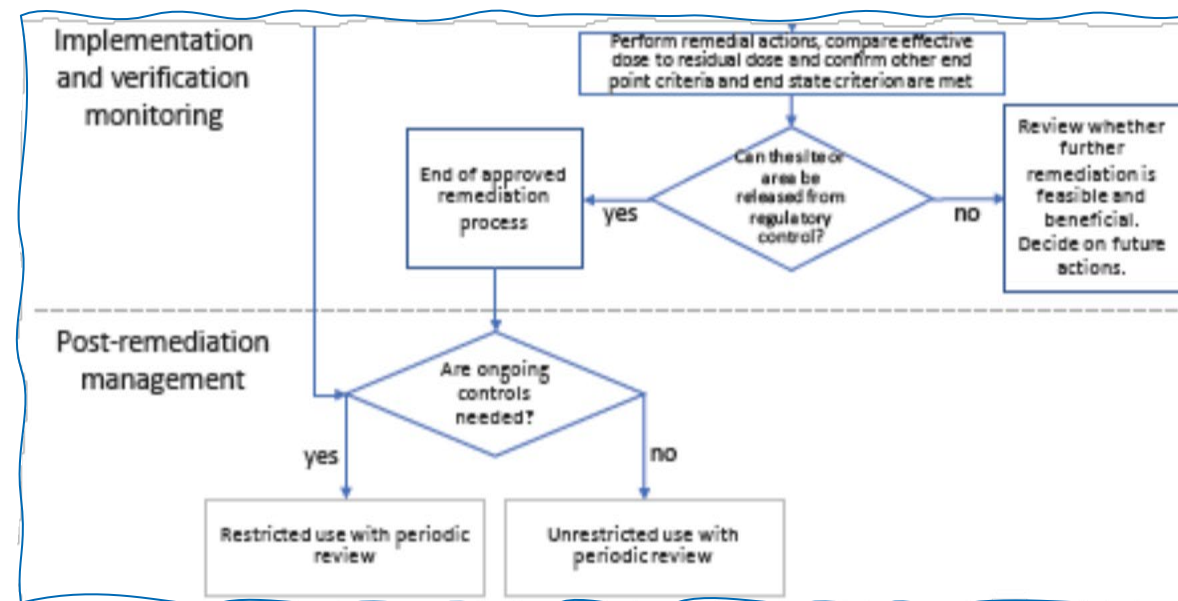


Key messages

- Planning post-remediation?

Start when planning remediation

- Assign roles and responsibilities and foster coordination among relevant parties
- Justify and optimize the post-remediation measures, while applying a graded approach
- Include long term challenges and risks from rare events
- Involve interested parties as early as possible
- Manage records and knowledge and preserve them for the long term
- Install sustainable funding mechanisms for current cost and financial assurance for unforeseen cost.



From Fig. 1 – GSG-15

Types of controls in post-remediation management (1/2)

Institutional Controls	Types	Examples	Responsible entity
Active measures (physical activities, such as the application of engineering controls tailored for the site.)	Monitoring	Radiological monitoring Programme Environmental monitoring programme	Approved by the regulatory body and implemented by the responsible parties
	Surveillance	Surveillance programme Geotechnical surveillance of engineered structures	Responsible parties
	Operation of facilities	Water treatment plant	Responsible parties
	Remedial work	Actions in the case of rare events	Responsible parties
	Maintenance of remediated areas	Preventive maintenance Corrective maintenance	Responsible parties Responsible parties
	Management of residuals materials	Residual solid waste Residual liquid waste Chemicals Radioactive waste in solid or liquid form Scrap (contaminated and non-contaminated) Oils and greases	Approved by the regulatory body or other competent authorities and implemented by the responsible parties
	Sites access control	Video surveillance, fencing, signage	Responsible party

Types of controls in post-remediation management (2/2)

Institutional Controls	Types	Examples	Responsible entity
Passive measures (controls designed to complement active controls, rarely the sole protective measure at a site)	Restrictions on land use: <ul style="list-style-type: none">- For residential use- For industrial use- For agriculture use- For recreational use	Encumbrances	Relevant authorities, including local one and regulatory body, where applicable
		Easements	
	Restriction on the trade of commodities	Deeds	
	Restrictions on food		
	Restriction on the use of groundwater		
	Communication and Information and education of the public	Public consultations, Support self-help measures, Citizen science (see section 6) Visitors centre (Annex II)	Local authority, regulatory body and responsible parties

Case studies of post remediation management

I. The Fernald Preserve Site - a former U.S. Department of Energy (DOE) uranium processing facility



Fernald Site in 1987 before operations ceased (left) and in 2010 (right), five years after remediation of the site was finished (from DOE LM, 2017, A Decade of Difference).

Controlled burn conducted on the Fernald Preserve



The Community Meeting Room, Resource Room, and outdoor Program Shelter were designed to be used by the public when they are not in use by Fernald Preserve staff. These facilities are available free of charge for noncommercial use by organized groups.

Seating capacity for the Community Meeting Room is 120 for theater seating with rows of chairs and 80 for conference seating with chairs and tables.

Seating capacity at standard tables in the outdoor Program Shelter is 58. The seating capacity in the Resource Room is 8 (at a conference table).

The application review process to reserve these facilities could take up to two weeks.

To make a room reservation or for more information, please email us at Fernald@lm.doe.gov.

U.S. DEPARTMENT OF ENERGY
Legacy Management

Visit Fernald Preserve
Fernald Preserve Hours:
Monday to Sunday, 7 a.m. to dusk.

Visitors Center Hours:
Wednesday to Saturday, 9 a.m. to 5 p.m.
Sunday, 12 p.m. to 5 p.m.
Closed public holidays

FERNALD PRESERVE
7400 Willey Road, Hamilton, Ohio 45013
(513) 648-3330
Fernald@lm.doe.gov • Energy.gov/lm

Back to SCHOOL

Fernald Preserve Visitors Center
PROGRAMS AND OUTREACH

“Back to School” programmes and outreach brochure for the Fernald Preserve in 2024.

Case studies of post remediation management

II. Post-Remediation management of the Wismut legacy site, Germany

Waste rock pile and shaft in 1992, 2 years after end of uranium production (Archive Wismut GmbH)



Remediated Waste Rock Pile of U-mine, Bad Schlema



Golfpark Westerzgebirge
<https://golf-bad-schlema.de>



** Pictures courtesy Wismut*

RemPlex Summit 2025

Conclusions

- ❑ Residual radioactive contamination in sites or areas affected by past activities or events might pose risks to people and the environment, even after completion of remediation activities.
- ❑ When contamination is not completely removed by remedial actions, it is necessary to manage the risks from residual contamination using controls to restrict the uses of the remediated areas and to maintain control over the source and exposure pathways in the long term.
- ❑ This control may be active (monitoring, surveillance, remedial work) or passive (land use control), in line with the definition of the term ‘institutional control’ in the IAEA Safety Glossary.
- ❑ The objective of the new IAEA Safety Guide is to provide recommendations on the regulatory framework, planning and implementation of long term post-remediation management and post-remediation control measures for remediated areas that still contain residual radioactive material.
- ❑ Internal review of the draft manuscript is completed, review by Safety Committees (WASSC, RASSC, ..) is ongoing, followed by Member States’ consultation. Publication is expected in 2028.



Thank you!

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