



# IAEA Safety Standards GSR Part 5 and SSR 5

Training Course on the IAEA Safety  
Standards Overview

Shinagawa Campus, Tokai University,  
Tokyo, Japan  
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**L. Ozge UNVER**

Radioactive waste safety specialist

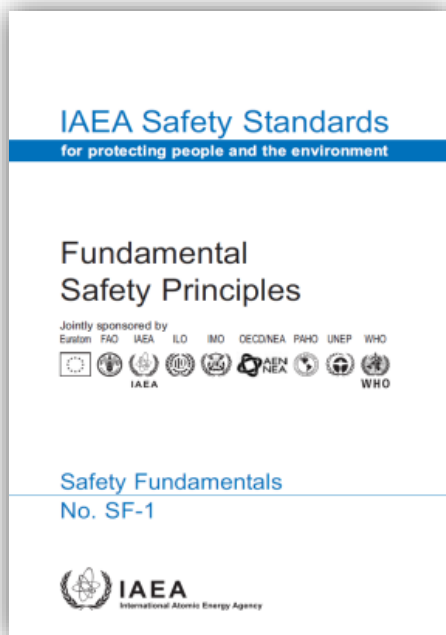
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**Waste and Environmental Safety Section  
Department of Nuclear Safety and Security**

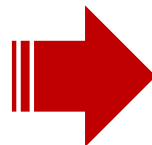
# Safety Fundamentals SF-1

## Policy document of the IAEA Safety Standards Series:

States the basic objectives, concepts and principles involved in ensuring protection and safety



## Fundamental Safety Objective



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

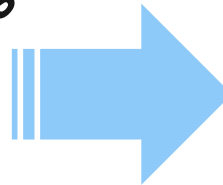
- (a) To control the radiation exposure of people and the release of radioactive material to the environment;
- (b) To restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation;
- (c) To mitigate the consequences of such events if they were to occur.

# Safety Fundamentals SF-1

*“Radioactive waste must be managed in such a way as to avoid imposing an undue burden on future generations; that is, the generations that produce the waste have to seek and apply safe, practicable and environmentally acceptable solutions for its long term management. The generation of radioactive waste must be kept to the minimum practicable level by means of appropriate design measures and procedures, such as the recycling and reuse of material.”*

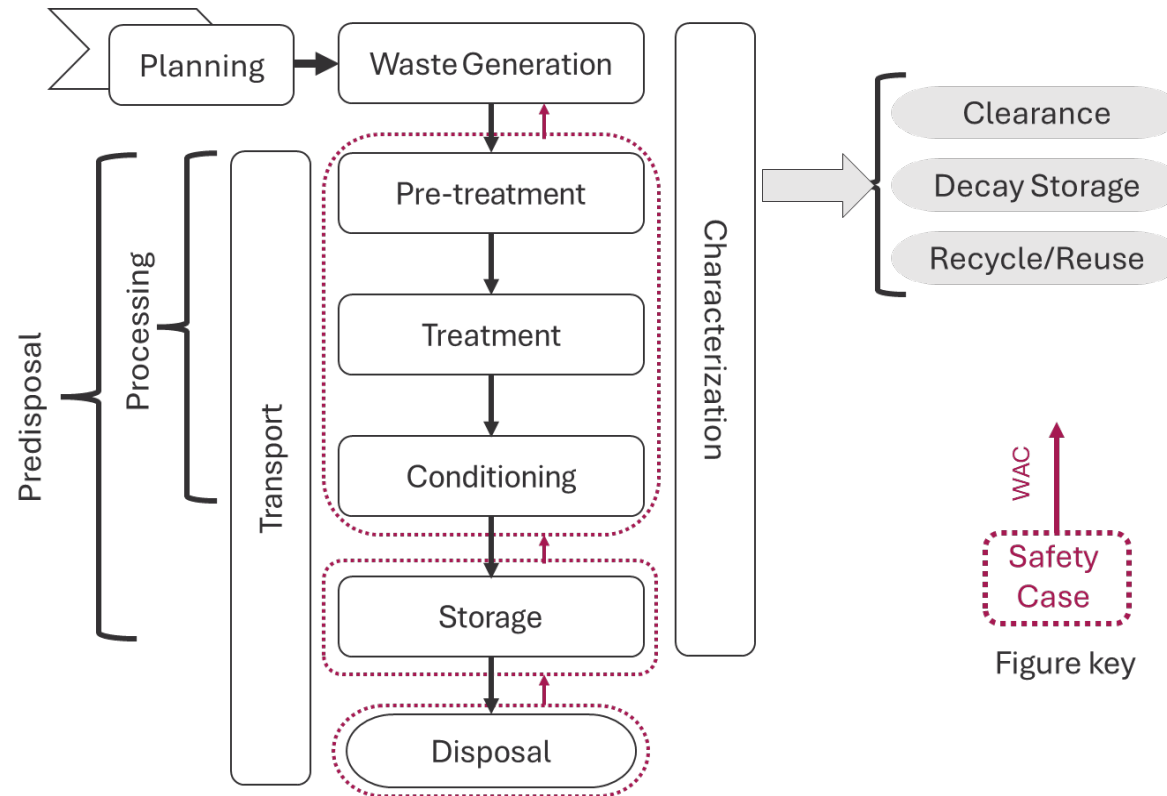


10 safety principles



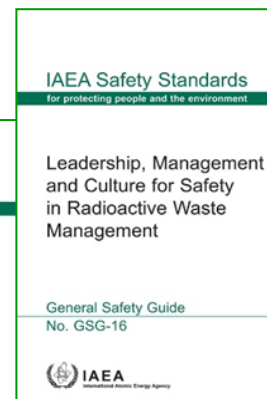
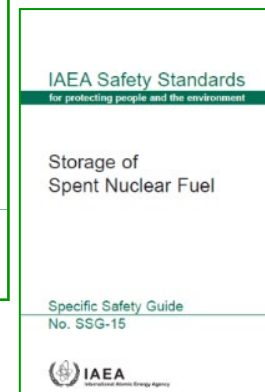
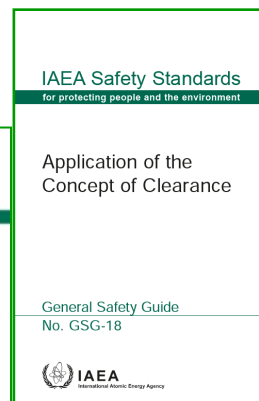
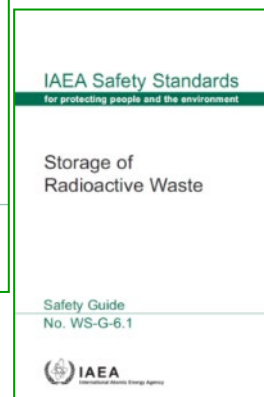
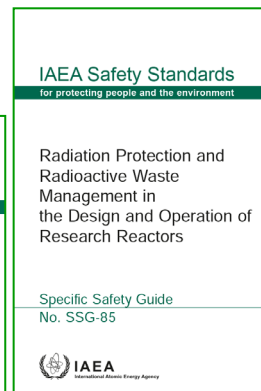
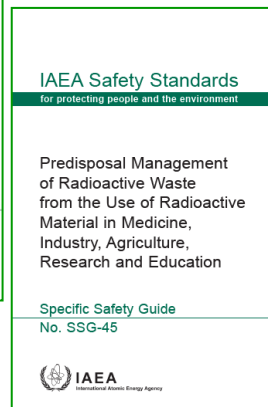
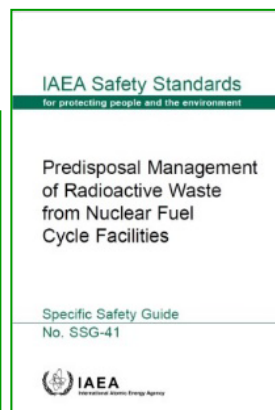
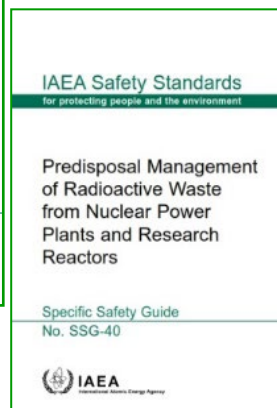
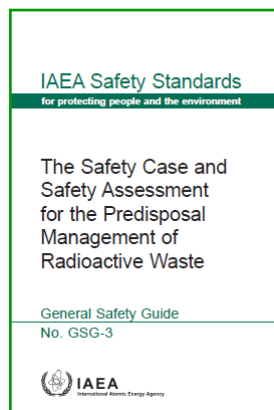
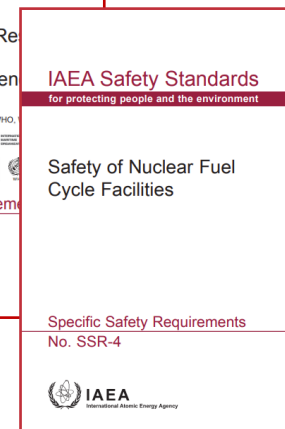
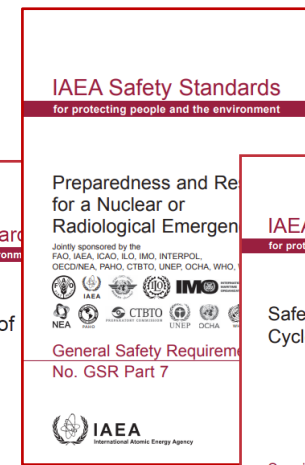
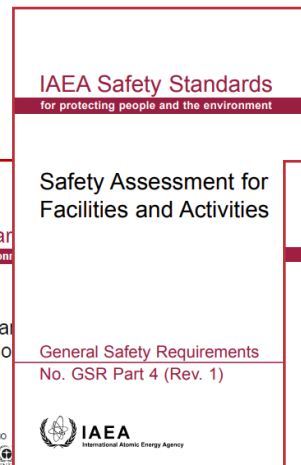
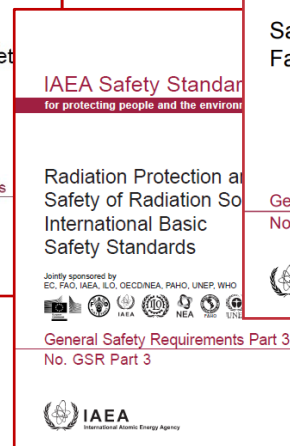
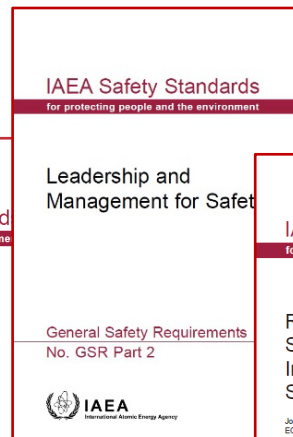
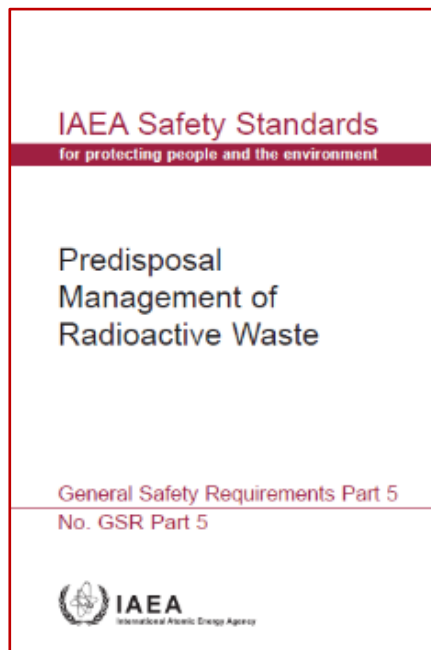
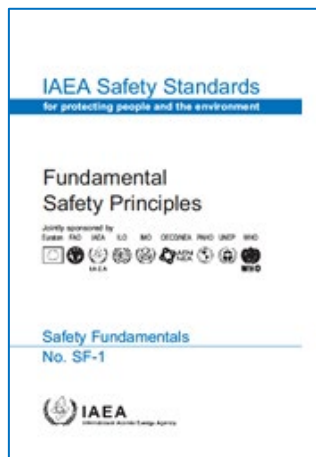
1. Responsibility for safety
2. Role of government
3. Leadership and management for safety
4. Justification of facilities and activities
5. Optimisation of protection
6. Limitation of risks to individuals
7. Protection of present and future generations.  
*People and the environment, present and future, must be protected against radiation risks*
8. Prevention of accidents
9. Emergency preparedness and response
10. Protective actions to reduce existing or unregulated radiation risks

# Basic Steps in RWM

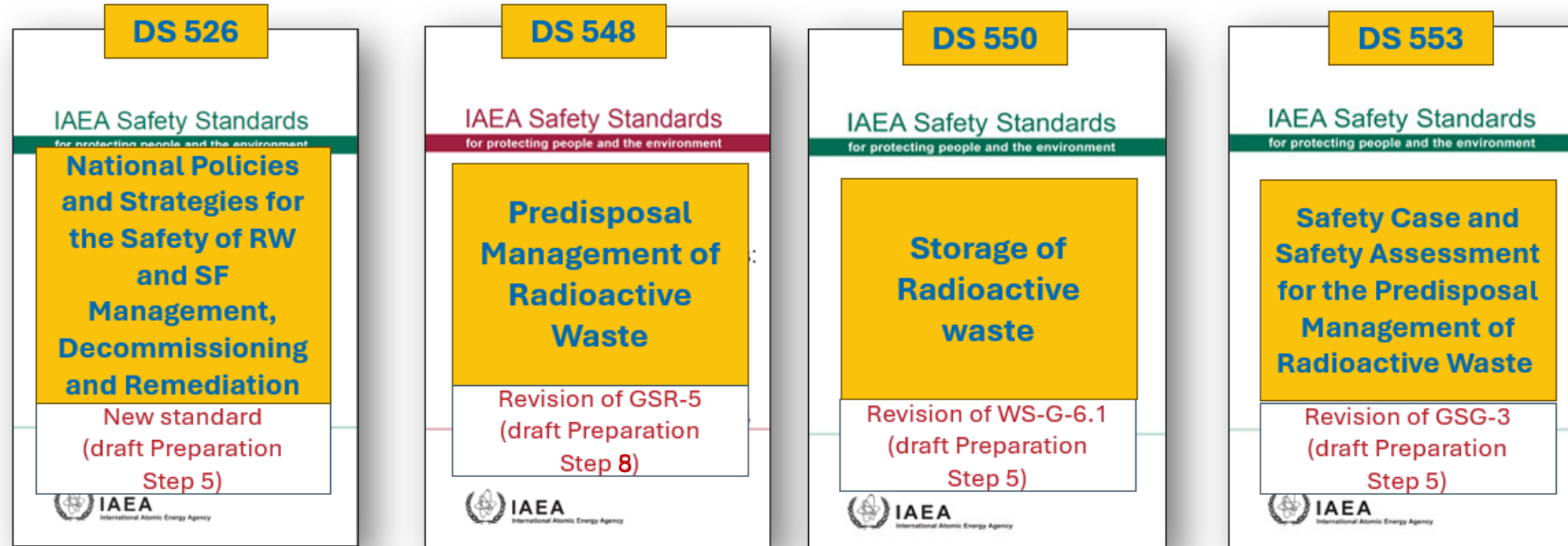


All radioactive waste must be managed safely from generation through to disposal. The end-state for all radioactive waste is disposal, with no intent to retrieve.

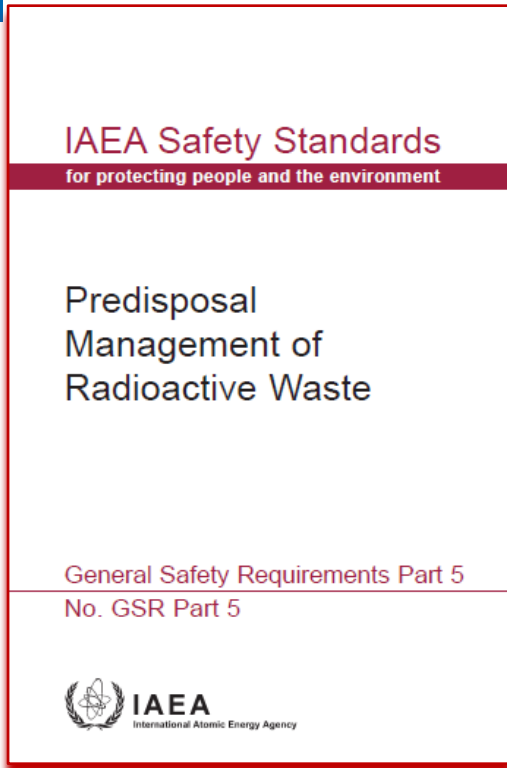
# Key Publications on Predisposal



# Safety Standards in Revision



# GSR Part 5: Predisposal Management of RW



## OBJECTIVES

- To establish the requirements that must be satisfied in the predisposal management of RAW
- To set out the objectives, criteria and requirements that apply to all stages of predisposal management facilities

## SCOPE

- Predisposal management of all types of RAW
- Predisposal management from generation to processing, storage, transport.

# GSR Part 5: Predisposal Management of RW

## 1. Introduction

## 2. Protection of Human Health & Environment

## 3. Responsibilities

## 4. Steps in the Predisposal Management of RW

## 5. Development and Operation of RWM Facilities & Activities

1. Legal and regulatory framework

2. National Policy & Strategy

3. Regulatory Responsibilities

4. Operator Responsibilities

5. Safety/Security

6. Interdependences

7. Management systems

8. Waste minimization

9. Characterization and classification

10. Waste processing

11. Waste storage

12. Waste acceptance for processing, storage and/or disposal

13. Preparation of the SC and supporting SA

14. Scope of the SC and supporting SA

15. Documentation of the SC and supporting SA

16. Periodic safety review

17. Facilities location and design

18. Facility construction and commissioning

19. Facilities operation, maintenance, emergency preparedness

20. Decommissioning

21. Nuclear safeguards

22. Existing facilities

IAEA Safety Standards

for protecting people and the environment

Predisposal  
Management of  
Radioactive Waste

General Safety Requirements Part 5

No. GSR Part 5



# GSR Part 5

## Requirement 1: Legal and regulatory framework

- The government shall provide for an appropriate national legal and regulatory framework within which RWM activities can be planned and safely carried out.
- Clear and unequivocal allocation of responsibilities, the securing of financial and other resources,
- The provision of independent regulatory functions.
- Protection shall also be provided beyond national borders as appropriate and necessary for neighboring States that may be affected.

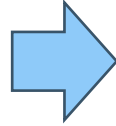
## Requirement 2: National policy and strategy on RWM

To assure the effective management and control of radioactive waste, the government shall ensure that a national policy and a strategy for RWM are established. The policy and strategy shall;

- be appropriate for the nature and the amount of the radioactive waste in the State,
- indicate the regulatory control required
- consider relevant societal factors
- be compatible with the SF-1 and with international instruments, conventions and codes that have been ratified by the State
- form the basis for decision making with respect to the RWM.

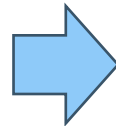
# GSR Part 5 Responsibilities

## Requirement 3: Regulatory body



- establish the requirements
- review and assess the safety case and the impact assessment
- provide for the issuing, amending, suspension or revoking of licences, subject to any necessary conditions
- carry out activities to verify that the operator meets these conditions
- take enforcement actions.

## Requirement 4: Operator



- be responsible for the safety of predisposal radioactive waste management facilities or activities.
- carry out safety assessments and develop a safety case,
- ensure that the necessary activities for siting, design, construction, commissioning, operation, shutdown and decommissioning are carried out in compliance with legal and regulatory requirements.

# GSR Part 5

## **Requirement 5: Requirements in respect of security measures**



Measures shall be implemented to ensure an integrated approach to safety and security in the PRWM.

## **Requirement 6: Interdependences**



Interdependences among all steps in the PRWM, as well as the impact of the anticipated disposal option, shall be appropriately taken into account:

- Compatibility
- Optimization

# GSR Part 5

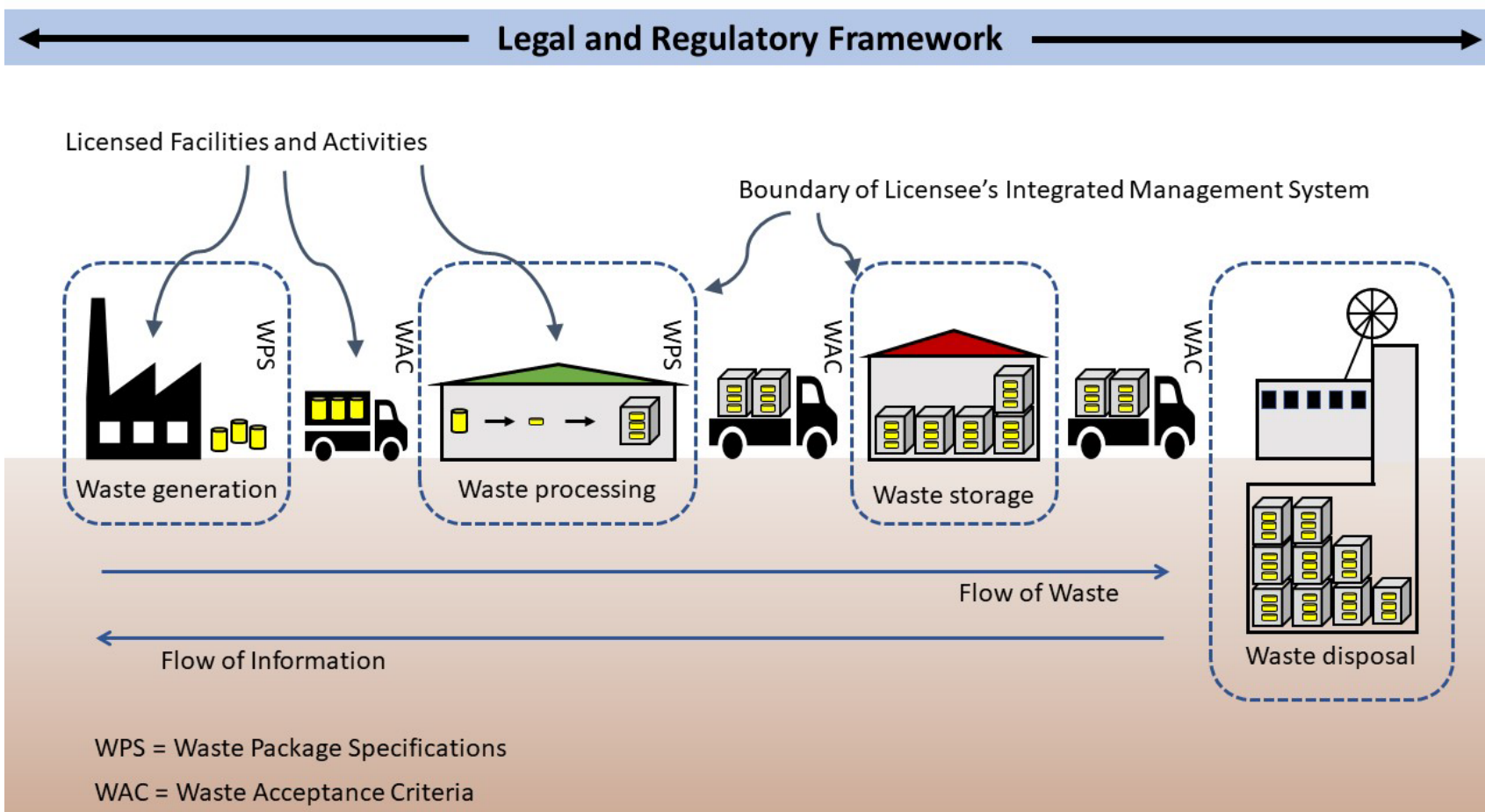
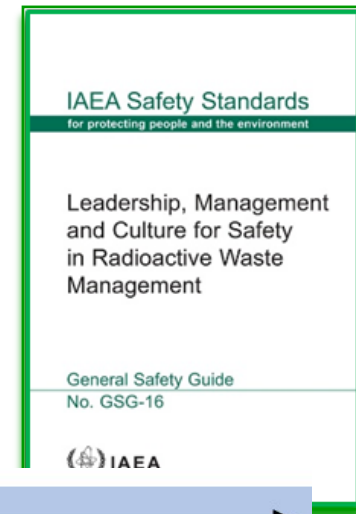
## Requirement 7: Management systems



- Applies to the siting, design, construction, operation, maintenance, shutdown and decommissioning of such facilities and to all aspects of processing, handling and storage of waste
- Features important to safe operation to be reflected in management system



Management systems shall be applied for all steps and elements of the predisposal management of radioactive waste.



# GSR Part 5 RWM Approaches

## Dilute and Disperse

Discharge the waste in a manner that reduces environmental concentrations to acceptable levels

Conducted under authorized discharge limit



## Concentrate and Contain

Reduce waste volume and condition and/or containerize waste to limit dispersion in the environment

The preferred option for disposal



## Delay and Decay

Hold the waste in storage until sufficient decay has occurred for desired management approach

Perfectly acceptable for short-lived waste



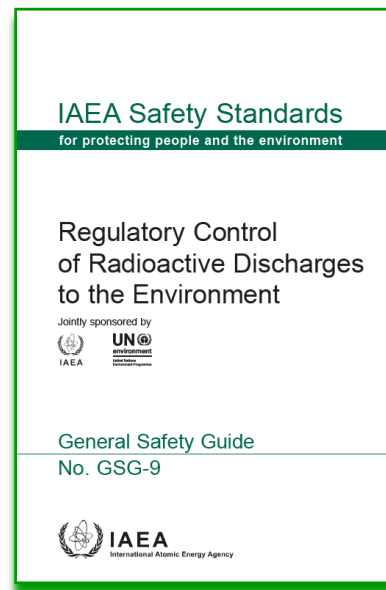
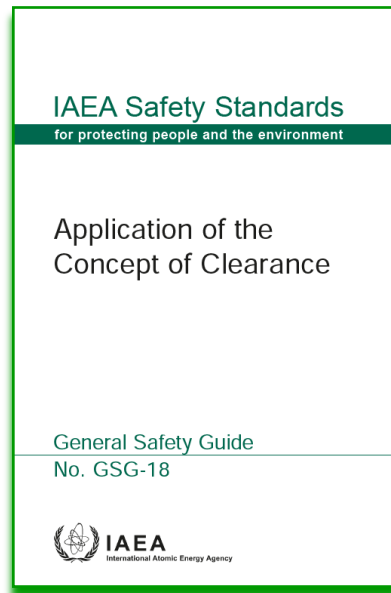
# GSR Part 5

## Requirement 8: Radioactive waste generation and control



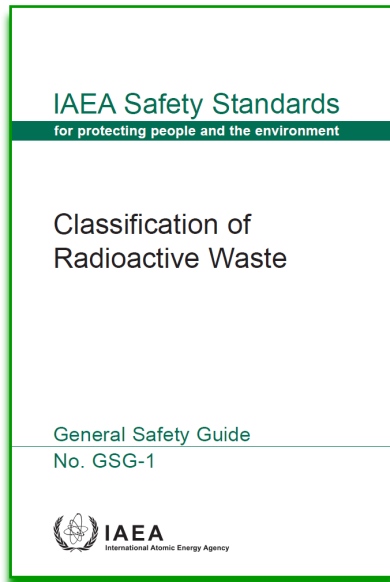
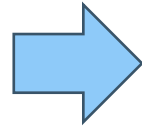
All radioactive waste shall be identified and controlled.  
Radioactive waste arisings shall be kept to the minimum practicable.

- Measures to control the generation considered in design and operation
- The authorized discharge of effluent and clearance of materials considered
- Reuse and recycling



# GSR Part 5

## Requirement 9: Characterization and classification of RW



At various steps in the PRWM, the RW shall be characterized and classified in accordance with requirements established or approved by the regulatory body.

- Characterized in terms of its physical, mechanical, chemical, radiological and biological properties
- The characterization serves to provide information relevant to process control and assurance that the waste or waste package will meet the acceptance criteria for processing, storage, transport and disposal
- RW may be classified for different reasons, and different classification schemes may be used in the successive steps in waste management. The most common classification is that made from the perspective of its future disposal

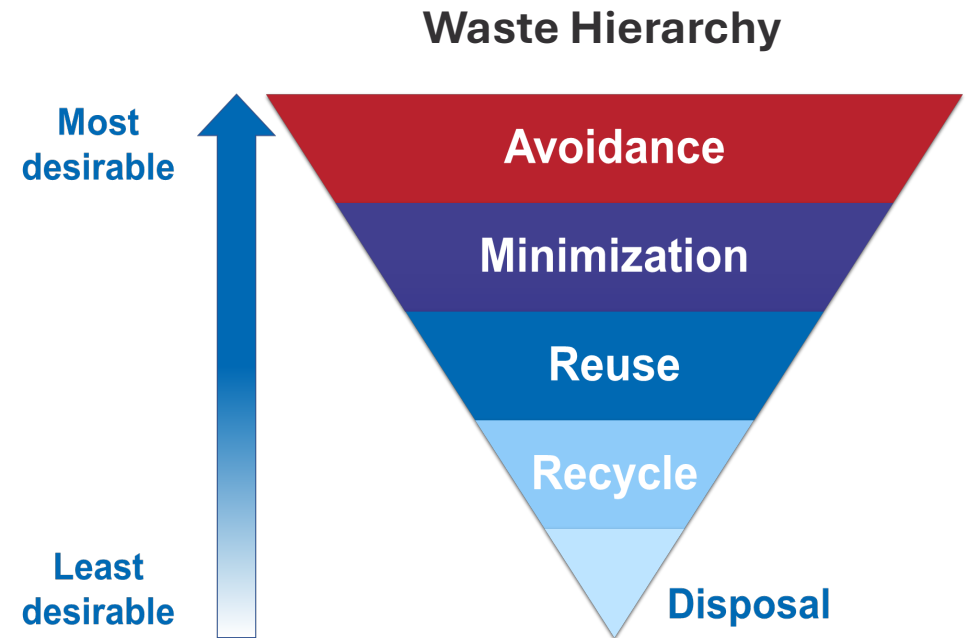
# GSR Part 5

## Requirement 10: Processing of radioactive waste

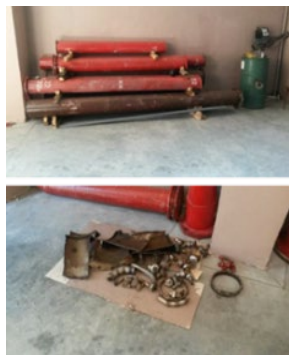
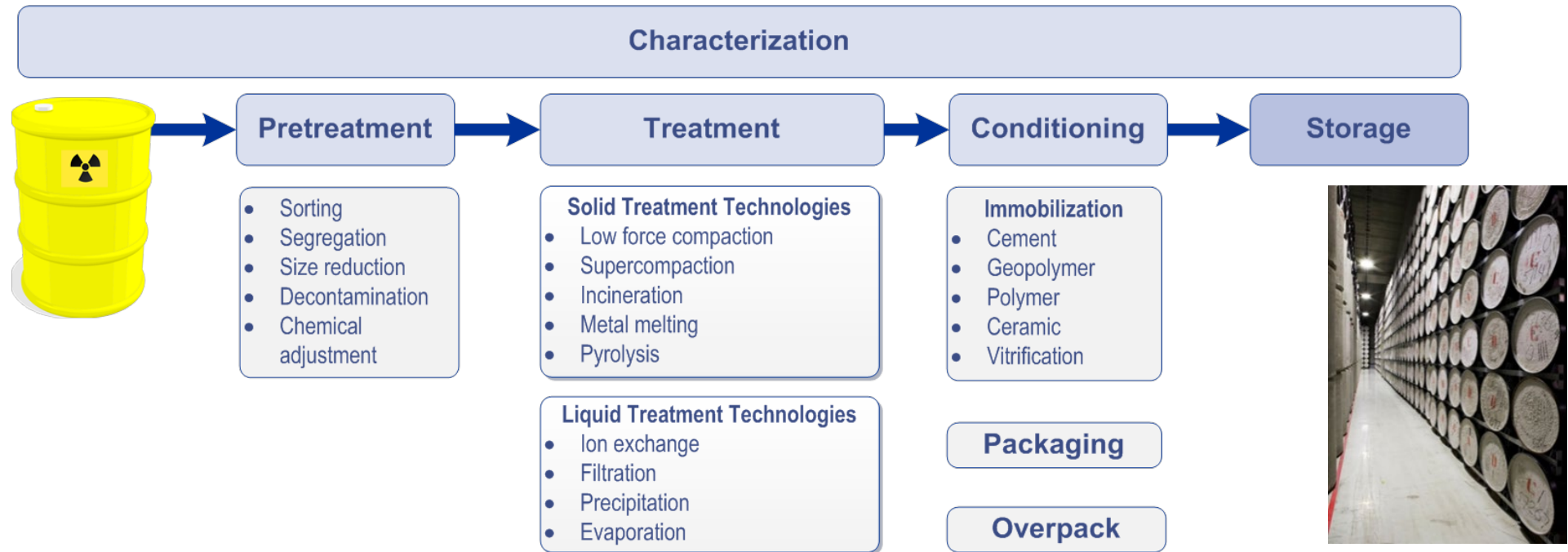


- Radioactive material for which no further use is foreseen and with characteristics that make it unsuitable for authorized discharge, authorized use or clearance from regulatory control shall be processed as radioactive waste.

- The processing of radioactive waste shall be based on appropriate consideration of the characteristics of the waste and of the demands imposed by the different steps in its management (pretreatment, treatment, conditioning, transport, storage and disposal).
- Waste packages shall be designed and produced so that the radioactive material is appropriately contained during both normal operation and in accident conditions that could occur in the handling, storage, transport and disposal of waste.



# Radioactive Waste Predisposal Schemes



# GSR Part 5

## Requirement 11: Storage of radioactive waste



- Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management.
- Due account shall be taken of the expected period of storage, and, to the extent possible, passive safety features shall be applied.
- For long term storage in particular, measures shall be taken to prevent the degradation of the waste containment.

*-Temporary placement in a facility with appropriate isolation and monitoring (By definition an interim measure, can last for several decades)*

*-Between and within the basic steps of management*

*-Intention in storing waste is that it be retrieved.*

- Storage for decay  
(prior to discharge or disposal)
- Storage of unconditioned radioactive waste  
(prior to conditioning)
- Storage of conditioned radioactive waste  
(prior to disposal)



IAEA Safety Standards  
for protecting people and the environment

Storage of  
Radioactive Waste

Safety Guide  
No. WS-G-6.1



# GSR Part 5

## Requirement 12: Radioactive waste acceptance criteria

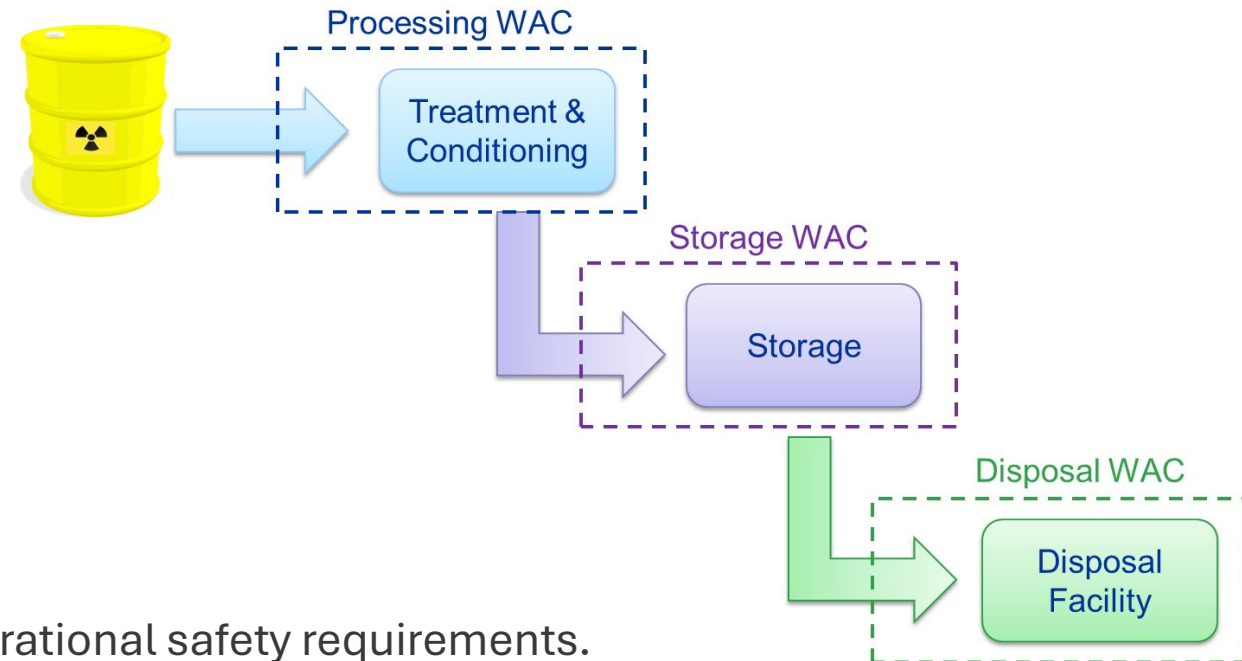


Waste packages and unpackaged waste that are accepted for processing, storage and/or disposal shall conform to criteria that are consistent with the safety case.



- WAC → the radiological, mechanical, physical, chemical and biological characteristics of waste packages and unpackaged waste that are to be processed, stored or disposed of.
- Non-conformances: The operators' procedures by taking remedial actions or by returning the waste.

Predisposal WAC address operational safety requirements.



# GSR Part 5 Safety Case and Safety Assessment

## Requirement 13: Preparation



- The operator shall prepare a SC and supporting SA.
- In the case of a step by step development, or in the event of the modification of the facility or activity, the SC and its supporting SA shall be reviewed and updated as necessary.

## Requirement 14: Scope



- The SC for a PRWM facility shall include a description of how all the safety aspects of the site, the design, operation, shutdown and decommissioning of the facility, and the managerial controls satisfy the regulatory requirements.
- The SC and its supporting SA shall demonstrate the level of protection provided and shall provide assurance to the regulatory body that safety requirements will be met.

## Requirement 15: Documentation



- The SC and its supporting SA shall be documented at a level of detail and to a quality sufficient to demonstrate safety, to support the decision at each stage and to allow for the independent review and approval of the SC and SA.
- The documentation shall be clearly written and shall include arguments justifying the approaches taken in the SC on the basis of information that is traceable.

## Requirement 16: Periodic safety reviews



- The operator shall carry out PSR and shall implement any safety upgrades required by the regulatory body following this review.
- The results of PSR shall be reflected in the updated version of the SC for the facility.

# GSR Part 5 Life Stages of the PRWM Facilities

## Requirement 17: Location and design



- PRWM facilities shall be located and designed so as to ensure safety for the expected operating lifetime under both normal and possible accident conditions, and for their decommissioning.

## Requirement 18: Construction and commissioning



- PRWM facilities shall be constructed in accordance with the design as described in the safety case and approved by the regulatory body.
- Commissioning shall be carried out to verify that the equipment, structures, systems and components, and the facility as a whole perform as planned.

## Requirement 19: Operation



PRWM facilities shall be operated in accordance with national regulations and with the conditions imposed by the regulatory body.

- Documented procedures.
- Maintenance of the facility to ensure its safe performance.
- Emergency preparedness and response plans, subject to the approval of the regulatory body.

## Requirement 20: Shutdown and decommissioning



- An initial plan for the shutdown and decommissioning in the design stage and periodical update throughout the operational period.
- Conduct of decommissioning in accordance with final decommissioning plan, as approved by the regulatory body.
- Assurance that sufficient funds will be available to carry out shutdown and decommissioning.

# GSR Part 5

## Requirement 21: Nuclear Safeguards



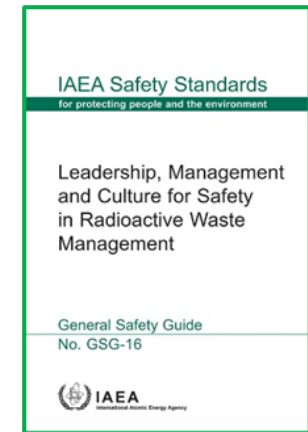
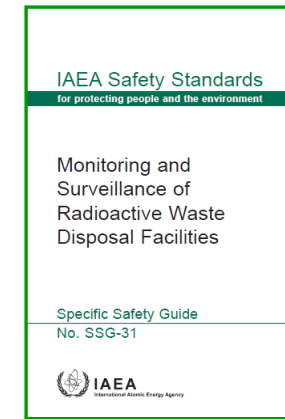
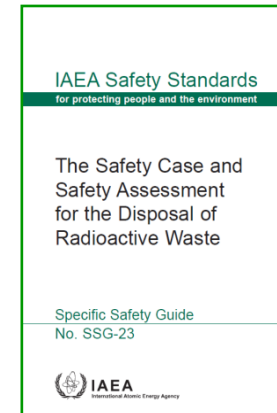
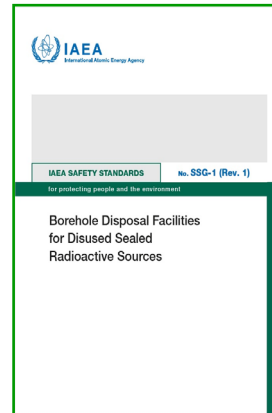
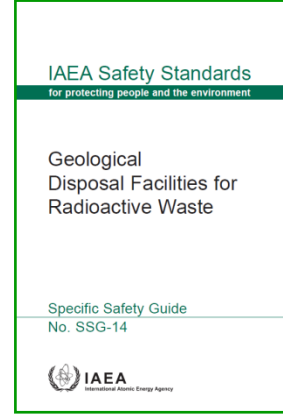
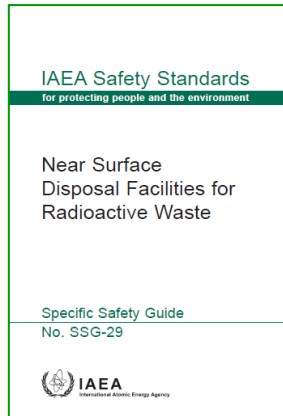
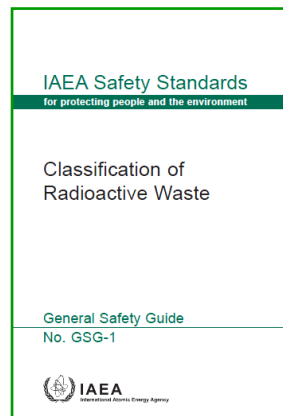
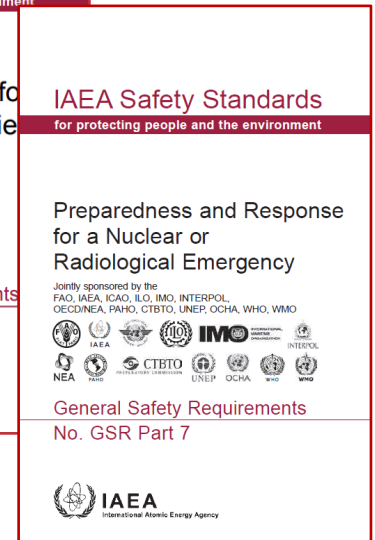
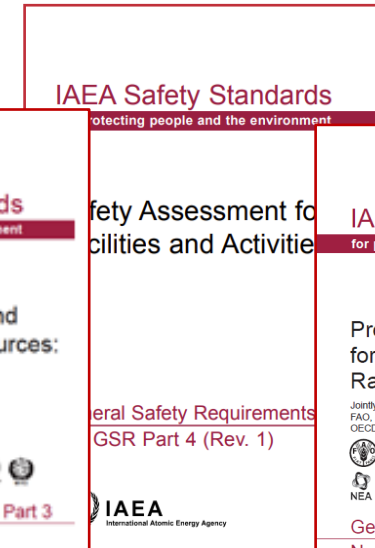
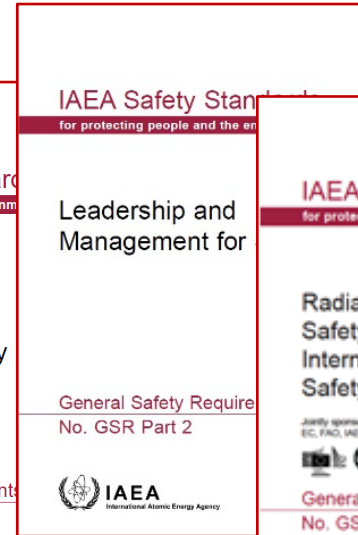
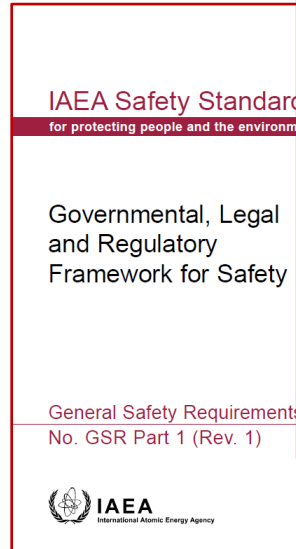
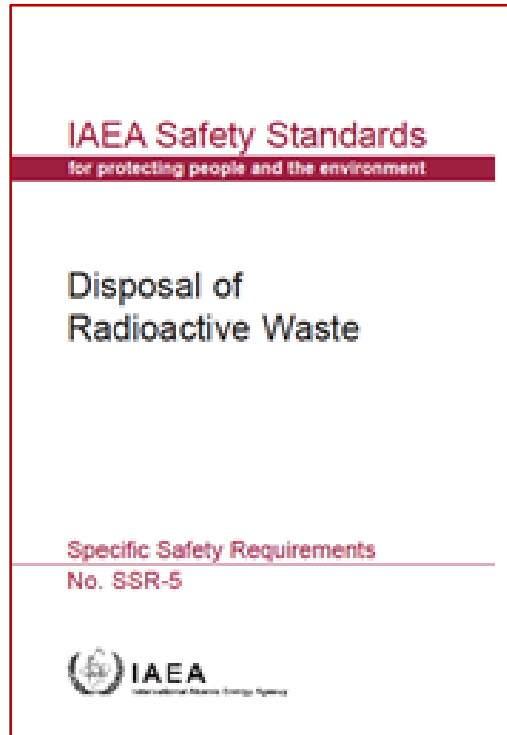
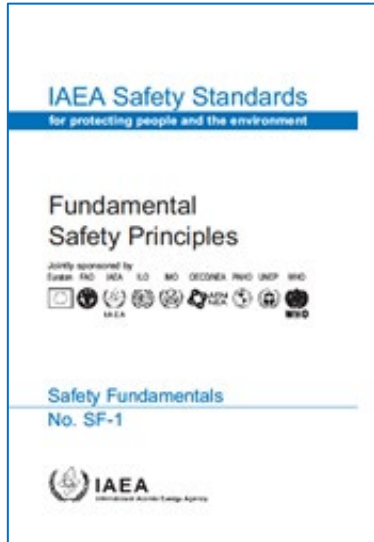
- For facilities subject to agreements on nuclear material accounting, in the design and operation of predisposal radioactive waste management facilities the system of accounting for and control of nuclear material shall be implemented in such a way so as not to compromise the safety of the facility.

## Requirement 22: Existing facilities



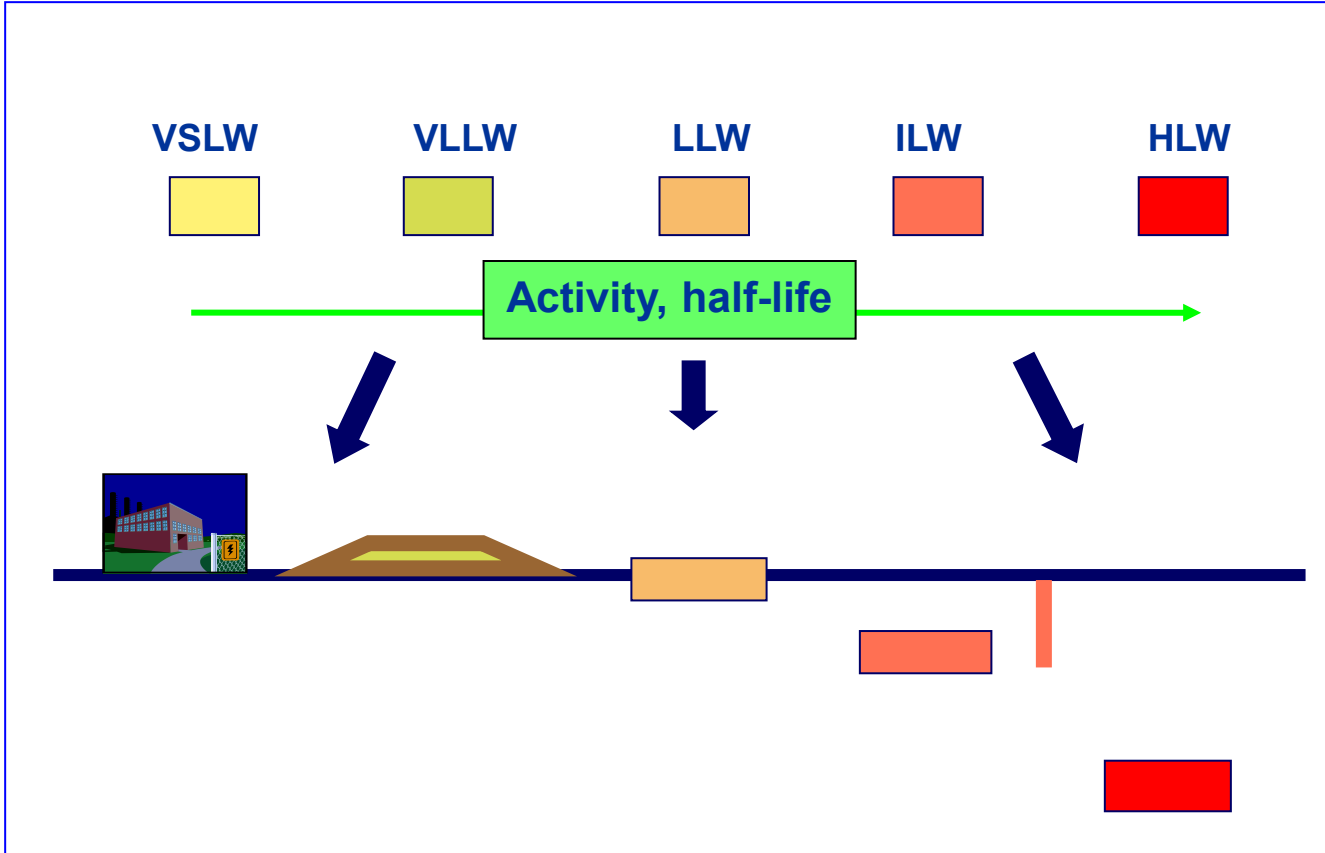
- The safety at existing facilities shall be reviewed to verify compliance with requirements.
- Safety related upgrades shall be made by the operator in line with national policies and as required by the regulatory body.
- In such a case, a review initiated by the regulatory body has to be used to identify those facilities that are not in compliance with all the requirements and that need additional modifications or operational restrictions, or that need to be shut down.

# Safety Standards: Disposal



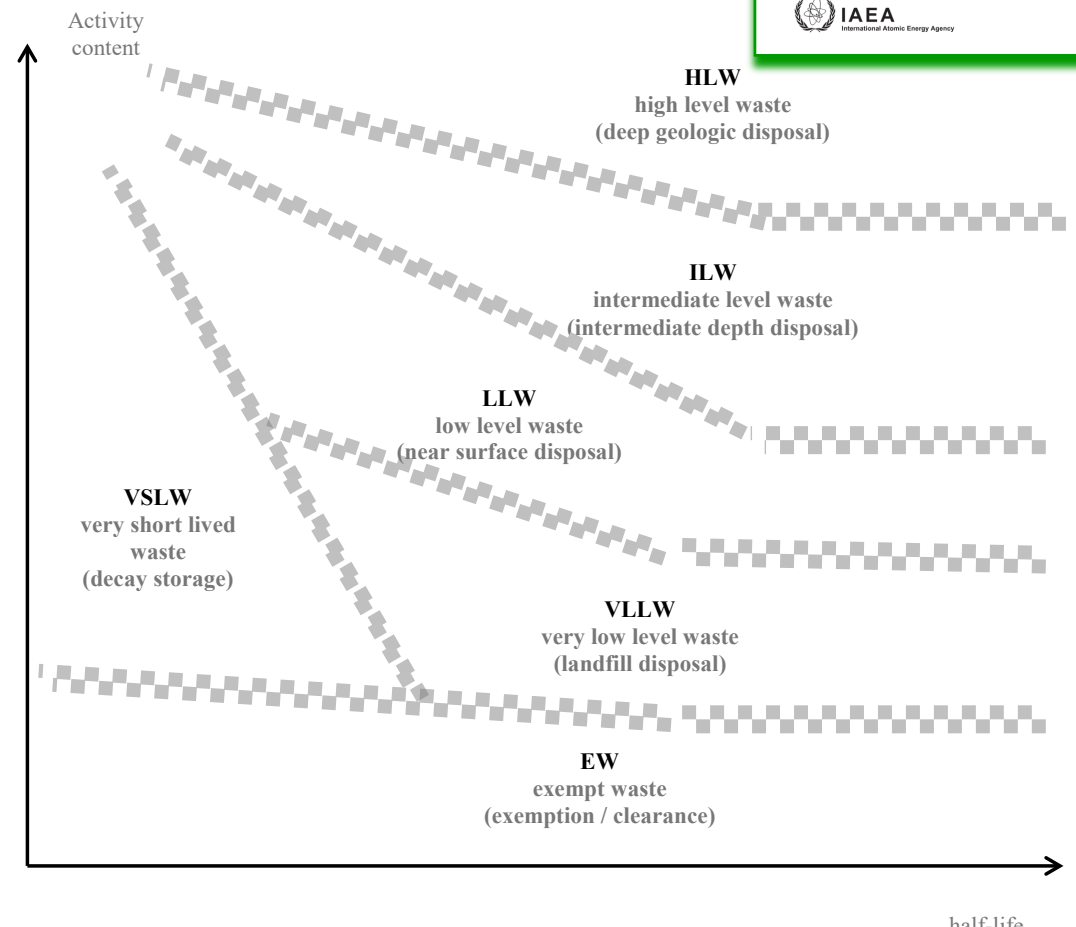
# Disposal Options and RAW classes

## Classification of radioactive waste



## Disposal solutions with increasingly robust Isolation and Containment

Notwithstanding the generic linkages between classes and disposal options, the suitability of waste for disposal in a particular disposal facility is required to be demonstrated by the safety case and supporting safety assessment for that facility



IAEA Safety Standards  
for protecting people and the environment

Classification of  
Radioactive Waste

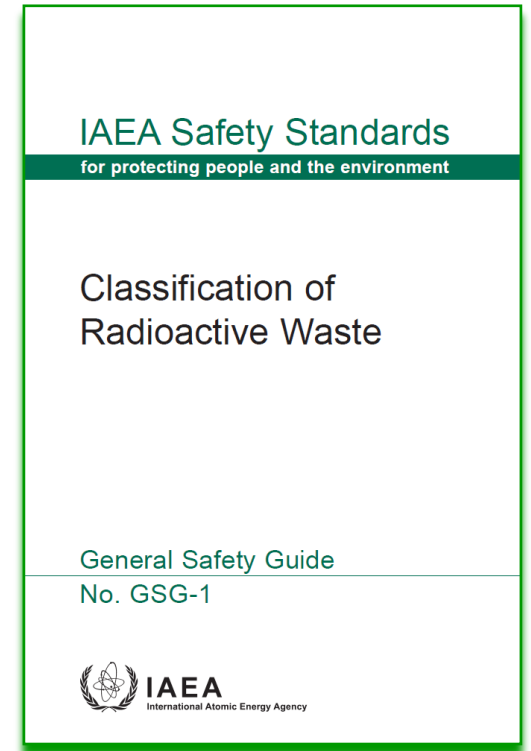
General Safety Guide  
No. GSG-1



# Classification of Radioactive Waste

## GSG-1

- **EW:** Meets the criteria for clearance, exemption or exclusion from regulatory control for radiation protection purposes.
- **VSLW:** Can be stored for decay over a limited period of up to a few years and subsequently cleared from regulatory control or discharged according to arrangements approved by the regulatory body.
- **VLLW:** Does not meet the criteria of EW, but that does not need a high level of containment and isolation and, therefore, *is suitable for disposal in surface landfill type facilities with limited regulatory control.*

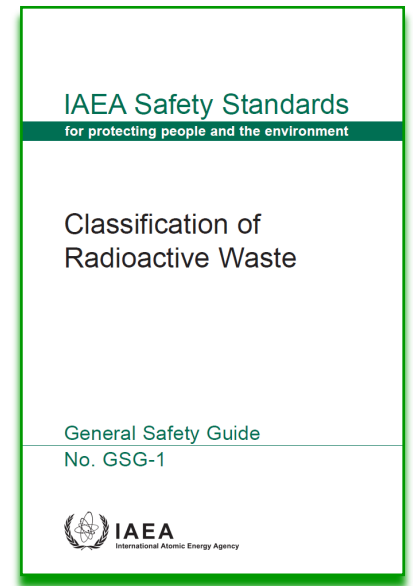


# Classification of Radioactive Waste

## GSG-1

- **LLW:** Above the clearance level, limited amounts of long lived Rn. Requires robust isolation and containment for periods up to a few hundred years. *Suitable for disposal in engineered near surface facilities typically from the surface to 30 m depth*
- **ILW:** content in long lived Rn → greater degree of containment and isolation than that provided by near surface disposal facilities. *Disposal at greater depth than that of NS disposal facilities i.e. order of tens of m to a few hundred m (intermediate depth disposal)*
- **HLW:** high levels of activity concentrations, heat generation by radioactive decay or waste with large amounts of long lived Rn. *Disposal in deep, stable geological formations of several hundred meters depth or more below the surface*

*The suitability of waste for disposal in a particular disposal facility is required to be demonstrated by the safety case and supporting safety assessment for that facility – fitting with WAC.*



# Disposal Options for Radioactive Waste

A number of design options for disposal facilities have been developed, and various types of disposal facility have been constructed in many States and are in operation.

These design options have different degrees of **containment and isolation** capability appropriate to the radioactive waste that they will receive.

The specific aims of disposal are:

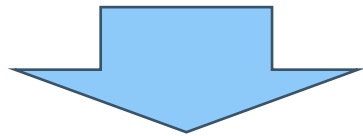
- a. To **contain** the waste;
- b. To **isolate** the waste from the accessible biosphere and to reduce substantially the likelihood of, and all possible consequences of, inadvertent human intrusion into the waste.
- c. To **inhibit, reduce and delay** the migration of radionuclides at any time from the waste to the accessible biosphere;
- d. To ensure that the amounts of radionuclides reaching the accessible biosphere due to any migration from the disposal facility are such that **possible radiological consequences are acceptably low** at all times.

*(SSR-5, Para 1.10)*

# Graded Approach to Disposal

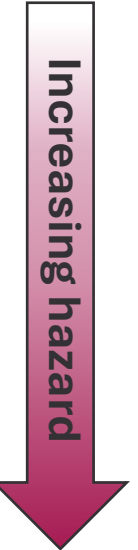
In accordance with the application of a graded approach, the ability of a disposal system to provide containment and isolation of the waste is required to be commensurate with the hazard potential of the waste.

- Hazard potential of the waste (LLW vs. HLW or NSD vs. GDF)
- Complexity of the site (dry vs. humid)
- The stage in the lifetime of a facility (siting vs. operation)

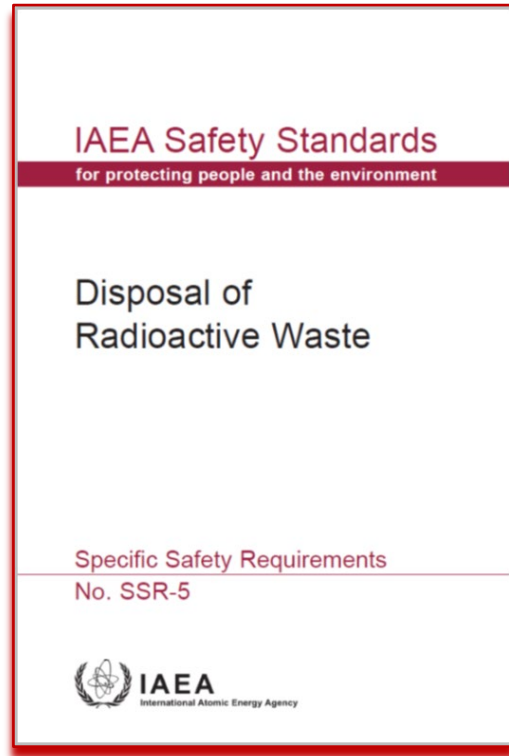


- Complexity of the facility design
- Detail and complexity of the safety case and safety assessment
- Detail and complexity of the regulatory review, and inspections

- **Above surface engineered landfill**
- **Near surface disposal – trenches, vaults or caverns, tunnels, silo**
- **Engineered facilities at intermediate depth – 10s to 100s of metres**
- **Geological disposal > few hundred metres**



# SSR-5: Disposal



## Requirements and criteria for disposal of all types of radioactive waste

Covers:

- Operational and post-closure phases

## Does not address:

- Broader issues of site selection
- Transport of waste to the site
- Non-radiological environmental impacts

Stakeholder involvement important, but also beyond the scope of the standard

A total of **26 requirements...**

# SSR-5: Disposal Requirements

1. Government responsibility
2. Regulator's responsibility
3. Operator's responsibility
4. Safety in development and operation
5. Passive means for safety
6. Understanding and confidence in safety
7. Multiple safety functions
8. Containment
9. Isolation
10. Surveillance and control
11. Stepwise development
12. Preparation, approval and use of the SC and SA
13. Scope of the SC and SA
14. Documentation of the SC and SA
15. Site characterization
16. Design
17. Construction
18. Operation
19. Closure
20. Waste acceptance
21. Monitoring
22. Post-closure & institutional control
23. Accountancy and control
24. Nuclear security measures
25. Management systems
26. Existing disposal facilities

# SSR- 5

## Radiation Protection Design Criteria for Post-Closure Safety for Public

| Dose Parameter      | Situation                                                  | Criteria                                                                                       | Actions                                                                                                                                                                                                  |
|---------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Annual dose         | all planned exposure situations                            | <an effective dose of 1 mSv in a year (dose limit)                                             | -                                                                                                                                                                                                        |
| Annual dose or risk | possible natural processes affecting the disposal facility | <dose constraint of 0.3 mSv in a year or a risk constraint of the order of $10^{-5}$ per year. | -                                                                                                                                                                                                        |
| Annual dose         | inadvertent human intrusion after closure                  | <1 mSv to those living around the site                                                         | efforts to reduce the probability of intrusion or to limit its consequences are not warranted.                                                                                                           |
|                     |                                                            | >20 mSv to those living around the site                                                        | alternative options for waste disposal are to be considered, i.e. disposal of the waste below the surface, or separation of the radionuclide content giving rise to the higher dose                      |
|                     |                                                            | in the range 1–20 mSv                                                                          | then reasonable efforts are warranted at the stage of development of the facility to reduce the probability of intrusion or to limit its consequences by means of optimization of the facility's design. |
| Organ dose          | inadvertent human intrusion after closure                  | >relevant thresholds for deterministic effects                                                 | Similar considerations apply                                                                                                                                                                             |

# SSR- 5 Design Concepts for Safety

## Requirement 5: Passive means for the safety

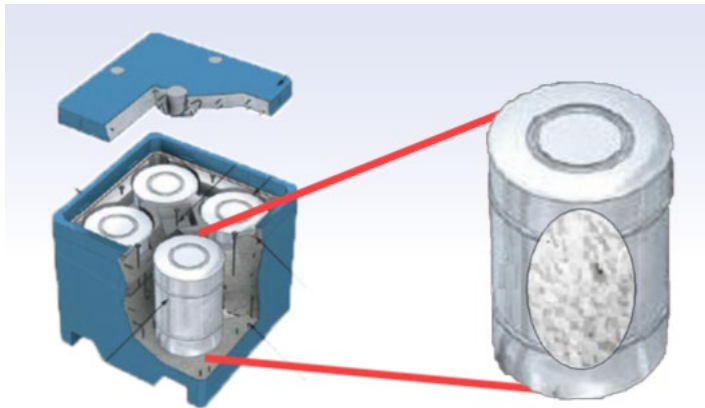


- Safety is ensured by passive means to the fullest extent possible and the need for actions to be taken after closure of the facility is minimized  
→ site, design, construct, operation and closure.

## Requirement 7: Multiple safety functions



- The host environment shall be selected and the engineered components of the facility designed and the facility operated so as to ensure that safety is provided by means of multiple safety functions.
- That is, containment and isolation of the waste shall be provided by means of a number of physical components of the disposal system whose performance is achieved by diverse physical and chemical processes together with the various operational controls.
- The capability of the individual components and controls together with that of the overall disposal system to perform as assumed in the safety case shall be demonstrated.
- The overall performance of the disposal system shall not be unduly dependent on a single safety function.



# SSR- 5 Design Concepts for Safety

## Requirement 8: Containment



The engineered components, including the waste form and packaging, shall be designed, and the host environment shall be selected, so as to provide containment of the waste during the period when radioactive decay has not yet significantly reduced the hazard posed by the waste and in the case of heat generating waste when the waste produces heat energy in amounts that could adversely affect the performance of the disposal system.

**Containment** means  
prevention or reduction of  
radionuclide migration



## Requirement 9: Isolation



The disposal facility shall be sited, designed and operated to provide features that are aimed at isolation of the radioactive waste from the biosphere and from humans. The features shall aim to provide isolation for several hundreds of years for short lived waste and at least several thousand years for intermediate and high-level waste. In doing so, consideration shall be given to both the natural evolution of the disposal system and disturbing events.

**GDF:** Disposal at hundred meters of depth, avoidance of sites where there are natural resources

**NSD:** Institutional controls

# SSR- 5 Design Concepts for Safety

## Requirement 10: Surveillance and control of passive safety features



An appropriate level of surveillance and control shall be applied in order to protect and preserve the passive safety barriers to the extent that this is needed in order to fulfil the functions that they are assigned in the post closure safety case.

Throughout its lifetime, a disposal facility is monitored for different purposes, as follows:

- To establish a baseline.
- To monitor the behaviour of, and changes to, the disposal system barriers:
  - Changes to waste packages;
  - Near field chemical and physical changes induced by the construction of the disposal facility and by interactions between introduced materials, groundwater and host rock;
  - Chemical and physical changes to the surrounding geosphere and in the atmosphere;
  - Changes to associated buffer and sealant materials.
- To monitor radionuclide transport and the release of radionuclides to the biosphere.
- To establish a database of information on the surrounding environment.

IAEA Safety Standards  
for protecting people and the environment

Monitoring and  
Surveillance of  
Radioactive Waste  
Disposal Facilities

Specific Safety Guide  
No. SSG-31



# SSR-5 Life Stages of Disposal Facilities

## **Requirement 11: Step by step development and evaluation**



Disposal facilities shall be developed, operated and closed in a series of steps, each supported, as necessary, by iterative evaluations of the site, of the options for design, construction, operation and management, and of the performance and safety of the disposal system.

## **Requirement 15: Site characterization**



Site shall be characterized at a level of detail sufficient to support both a general understanding of the characteristics of the site, including its present condition, its probable natural evolution, possible natural events and also human plans and actions that may affect the facility or its vicinity over the period of interest with regard to safety, and a specific understanding of the impact on safety of features, events and processes associated with the site and the facility.

## **Requirement 16: Design**



The disposal facility and its engineered barriers shall be designed to contain the waste with its associated hazard, to be physically and chemically compatible with the host geological and/or surface environment, and to provide post-closure safety features that complement those afforded by the host environment.

The facility and its engineered components shall also be designed to provide for safety during the operational period.

# SSR- 5 Life Stages of Disposal Facilities

## Requirement 17: Construction



A disposal facility shall be constructed in accordance with the design as described in the approved safety case and supporting safety assessment. It shall be constructed in such a way as to preserve the post-closure safety functions of the host environment that have been shown to be important by the safety case. The construction activities shall be carried out to ensure safety during the operational period.

## Requirement 18: Operation



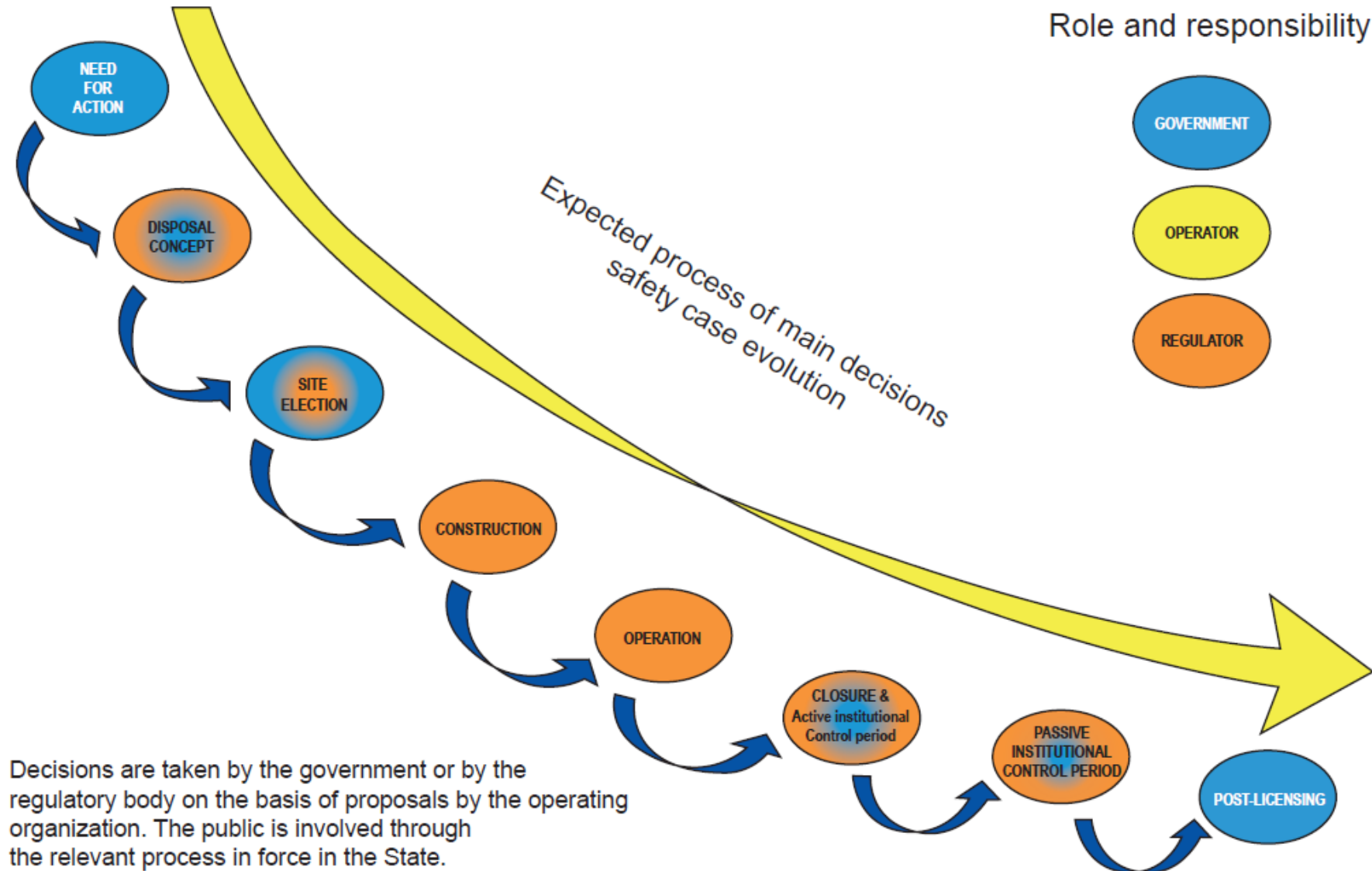
A disposal facility shall be operated in accordance with the conditions of the licence and the relevant regulatory requirements to maintain safety during the operational period, and post-closure period.

## Requirement 19: Closure

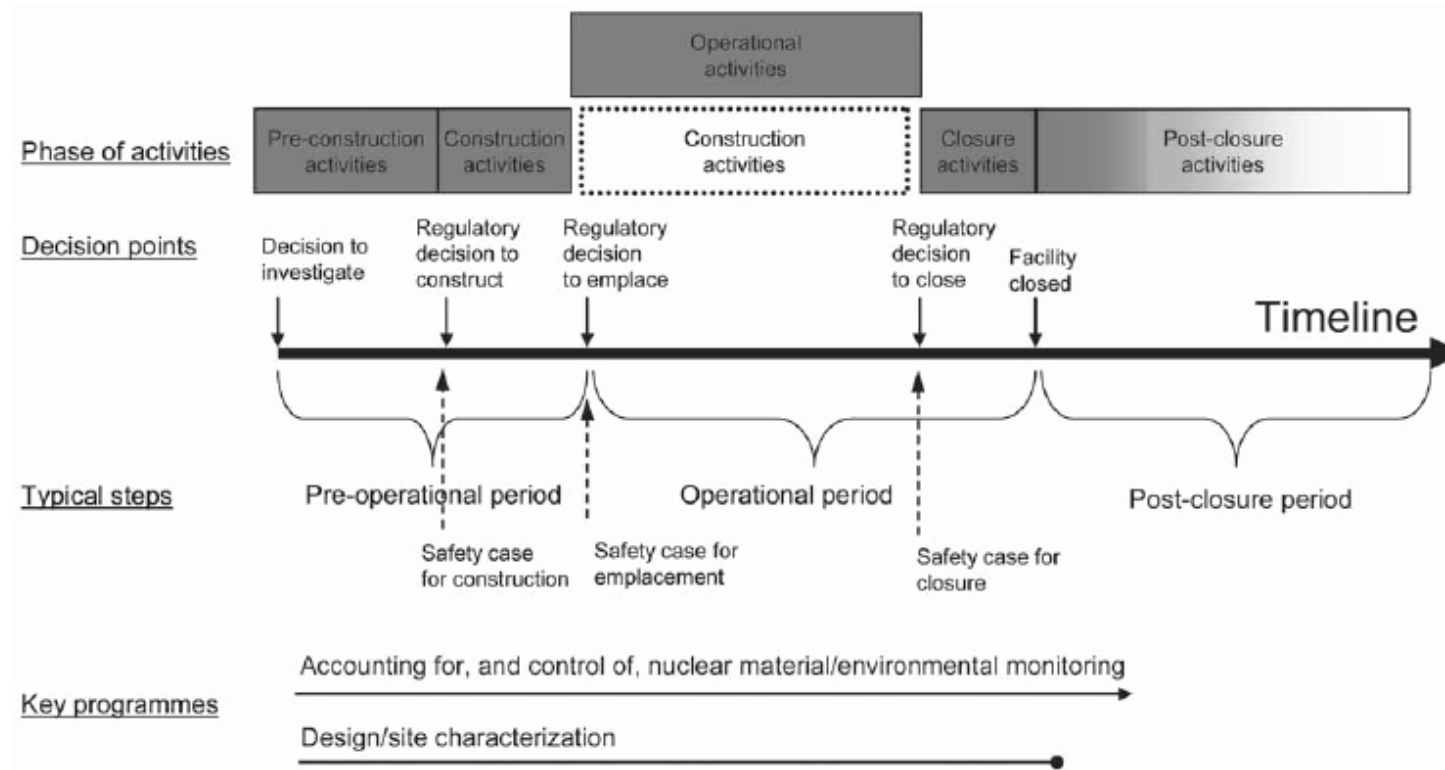


A disposal facility shall be closed in such a way that provides for the safety functions shown by the safety case to be important for the post-closure period. Plans for closure, including the transition from active management of the facility, shall be well defined and practicable, so that closure can be carried out safely at an appropriate time.

# Typical Steps in the Process of Developing a NSDF



# Timeline to Illustrate the Development of a Geological Disposal Facility



IAEA Safety Standards

for protecting people and the environment

Geological  
Disposal Facilities for  
Radioactive Waste

Specific Safety Guide

No. SSG-14



IAEA  
International Atomic Energy Agency

# SSR- 5 Assurance of Safety

## Requirement 20: Waste acceptance



Waste packages and unpackaged waste accepted for emplacement in a disposal facility shall conform to criteria fully consistent with and derived from the safety case for the operational and post-closure safety of the disposal facility.

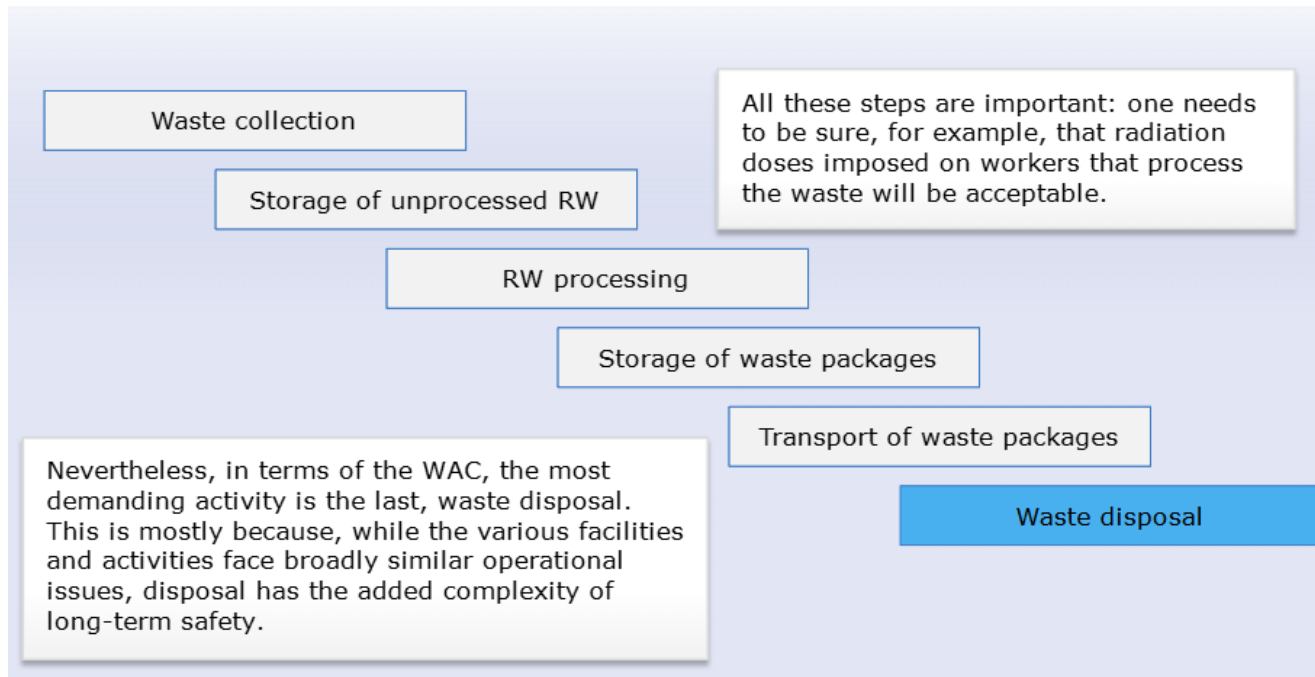
1. Radiological

2. Non-radiological

3. Administrative

Operational  
safety

Post closure  
safety



For packages, radiological WAC consist of limits on:

- Specific activity in a package and/or total activity in a package. Because waste packages (WP) usually come in standard sizes, these two parameters are normally strongly connected.
- Contact dose rate.
- Loose contamination.

For the repository as a whole, there will be a limit on the total activity allowed there.

# SSR-5 Assurance of Safety

## **Requirement 21: Monitoring programmes**



- A programme of monitoring shall be carried out prior to and during the construction and operation of a disposal facility, and after closure, if this is part of the safety case.
- This programme shall be designed to collect and update the information needed to confirm the conditions necessary for the safety of workers and members of the public and the protection of the environment during the operation of the facility and to confirm the absence of any conditions that could reduce the post-closure safety of the facility.

## **Requirement 22: Post-closure and institutional controls**



- An appropriate level of surveillance and control shall be applied in order to protect and preserve the passive safety barriers to the extent that this is needed in order to fulfil the functions that they are assigned in the post closure safety case.
- Plans shall be prepared to address such surveillance and control and the arrangements for maintaining the availability of information on the disposal facility.
- These plans shall form part of the safety case on which authorization to close the facility is granted.

# Safety Case

The safety case is the collection of scientific, technical, administrative and managerial arguments and evidence in support of the safety of a waste management facility or activity, covering

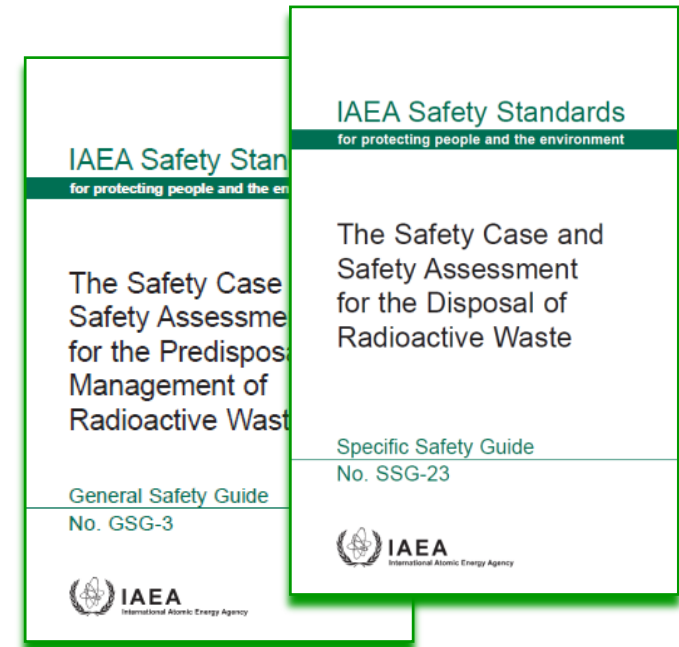
- the suitability of the site,
- design,
- construction,
- operation,
- decommissioning,
- closure and after closure.

*The safety case has to include considerations for reducing hazards posed to workers, members of the public and the environment during normal operation and in possible accident conditions.*

*The safety case should be commensurate with the potential hazard.*

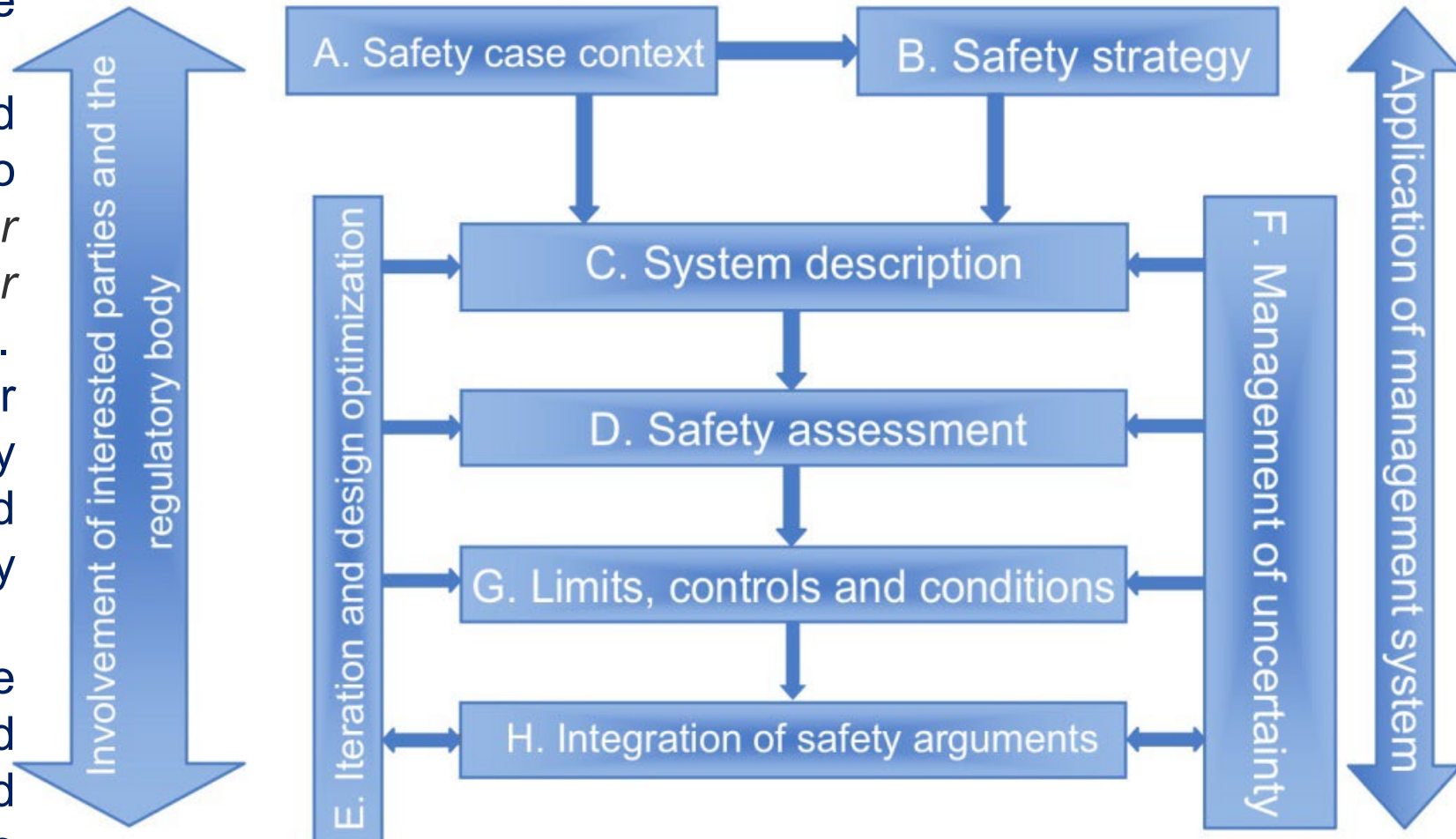
*The safety case and supporting safety assessment provide the basis for demonstration of safety and for licensing.*

*They will evolve with the development of the facility or activity, and will assist and guide decisions on siting, location, design and operations.*



# Safety Case

The “**safety case**” should be developed from the conceptualization of the facility and should be maintained throughout its lifetime, up to decommissioning (*for predisposal*) or closure (*for disposal*) and licence termination. Management systems for ensuring the quality of all safety related work should be applied throughout and the regulatory process applied. Arrangements to facilitate the involvement of all interested parties in the development and use of the safety case should be in place.



# Safety Assessment

The term '**safety assessment**' is used in GSG-3 and SSG-23 to refer to all assessments performed as part of the safety case.

- Safety assessment, an integral and important part of the safety case, is driven by a systematic assessment of radiation hazards.
- And involves quantification of radiation dose and radiation risks that for comparison with dose and risk criteria, and provides an understanding of the behaviour of the facility or activity under normal conditions and anticipated operational occurrences and accidents.
- This encompasses all aspects that are relevant for the safety of all stages of facility lifetime.
- The safety assessment also addresses qualitative aspects, non-radiological issues, and organizational and managerial aspects.

# Summary

- Safety requirements apply to all steps of waste management up to disposal
- Safety requirements apply to all types of radioactive waste and facilities where radioactive waste is generated, processed, stored, or disposed of.
- It is important to consider interdependencies and compatibility between all steps of radioactive waste management.
- Safety should be demonstrated in a safety case that is reviewed and approved by the regulatory body for all predisposal and disposal facilities in a periodical manner.
- Existing facilities should be reviewed for compliance with modern safety requirements.
- Development of safety requirements for disposal and predisposal of radioactive waste should be supported by development of corresponding safety guides.
- Countries should identify and develop disposal routes and facilities for their radioactive waste – don't delay.



*"The most valuable lesson learned from the past 60 years of peaceful uses of nuclear technology is recognition of the need to prioritize waste management planning before waste is generated."*



**THANK  
YOU**

