



Current and future Belgian regulatory requirements on Clearance and Release from regulatory control of radioactive materials and sites

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Contents

Goal: Give an overview of current and future requirements on clearance & release

- 1. Clearance & exemption of materials**
2. Site release (after decommissioning)

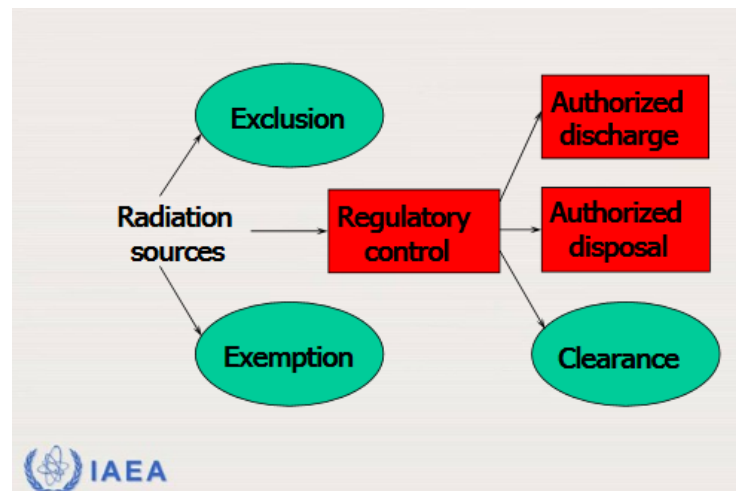
1. Clearance and Exemption Overview

- Reminder of definitions
- Current situation – exemption & clearance of materials
- Future situation – after transposition BSS 2013/59/Euratom

1. Clearance and Exemption

As a reminder: definitions BSS

- **Exemption levels:** *value established by a competent authority or in legislation and expressed in terms of activity concentration or total activity at or below which a radiation source is not subject to notification or authorisation;*
- **Clearance levels:** *values established by the competent authority or in national legislation, and expressed in terms of activity concentrations, at or below which materials arising from any practice subject to notification or authorisation may be released from the requirements of this Directive*



1. Clearance and Exemption

Current situation - Exemption

Exemption values defined in annex IA of GRR-2001

- Total activity (Bq)
- Activity concentration (kBq/kg) for moderate amounts
 - *Values taken from BSS 96/29/Euratom*



1. Clearance and Exemption

Current situation - Clearance

- Clearance values defined in annex IB of GRR-2001 (only for solid materials) in activity concentration (kBq/kg)
 - Values taken from RP 122
 - Calculated based on
 - Effective dose $\leq 10 \mu\text{Sv}/\text{year}$
 - Collective dose $\leq 1 \text{ man.Sv}/\text{year}$
 - Skin dose $\leq 50 \text{ mSv}/\text{year}$
- FANC Guidance (30/04/2010) on measurement procedures and techniques to comply with annex IB



1. Clearance and Exemption

Current situation - Clearance

- No surface activity clearance levels in regulatory framework
 - Clearance license (article 18 GRR-2001) can be requested at the FANC for clearance of solid materials with (higher) activity concentrations
 - > Clearance levels (annex IB)
 - < Exemption levels (annex IA)
- License application for clearance should prove that dose impact is $\leq 10 \mu\text{Sv}/\text{year}$
- Destination: landfill, incinerator, ...

1. Clearance and Exemption

Examples of recent clearance licenses

- SCK.CEN (2016)
 - Destination: INDAVER landfill
 - Quantity: max. 80 tons of soil
 - Activity levels: $^{137}\text{Cs} < 10 \text{ kBq/kg}$ (annex IA)
 - Origin: renovation of underground piping
- FBFC International (2018)
 - Destination: INDAVER landfill
 - Quantity: max. 12450 tons of soil
 - Activity levels: U isotopes $< 10 \text{ kBq/kg}$ (annex IA)
 - Origin: clean-up of site and nearby waterways

1. Clearance and Exemption

Future situation – BSS Transposition

Basic Safety Standards (2013/59/Euratom)
to be transposed in Belgian regulation

- Mass specific clearance levels taken from IAEA RS G-1.7 *Application of the Concepts of Exclusion, Exemption and Clearance* to be used both as default exemption values and as general clearance levels
 - Still based on 10 μ Sv/year dose constraint
- Specific clearance levels (f.e RP89 & RP113) are important tools for management of large volumes of materials arising from dismantling of nuclear facilities
- **Draft modification to GRR-2001 has undergone stakeholder consultation, publication end of 2018?**



1. Clearance and Exemption

Future situation – BSS Transposition

Draft Article 3.1, annex IA&IB: Exemption & Clearance

1) Total activity

- Exemption values from BSS annex VII table B column 3 → annex IA GRR-2001 → no changes in current values

2) Activity concentration

- Exemption values for moderate amounts of any type of material (≤ 1 ton)
 - BSS annex VII table B column 2 → annex IA GRR-2001 → no change in current values
- Exemption and clearance values for any amount of any type of material
 - BSS annex VII table A → annex IB GRR-2001 → Some changes to currently used values, for example C14, Cs137

3) Dose constraint

- Effective dose for member of public of exempted practice is $\leq 10 \mu\text{Sv}/\text{year}$

1. Clearance and Exemption

Future situation – BSS Transposition

| Radionuclide | GRR-2001 | | GRR-2018 After Transposition BSS 2013/59/Euratom | |
|---------------|------------------------------|--|--|--|
| | Annex IB | Annex IA | New Annex IB (BSS annex VII table A) | New Annex IA (BSS annex VII table B) |
| | Clearance values Bq/g | Exemption values for moderate amounts + Maximum accepted values for clearance license article 18 Bq/g | Clearance /Exemption values for any amount Bq/g | Exemption values for moderate amounts + Maximum accepted values for clearance license article 18 Bq/g |
| H-3 | 100 | 1000000 | 100 | 1000000 |
| C-14 | 10 | 10000 | 1 | 10000 |
| S-35 | 100 | 100000 | 100 | 100000 |
| Co-60 | 0,1 | 10 | 0,1 | 10 |
| Sr-90 | 1 | 100 | 1 | 100 |
| Tc-99 | 1 | 10000 | 1 | 10000 |
| Cs-137 | 1 | 10 | 0,1 | 10 |
| Eu-152 | 0,1 | 10 | 0,1 | 10 |
| Ir-192 | 0,1 | 10 | 1 | 10 |
| U-238 | 1 | 10 | 1 | 10 |
| Pu-239 | 0,1 | 1 | 0,1 | 1 |
| Am-241 | 0,1 | 1 | 0,1 | 1 |

1. Clearance and Exemption

Future situation – BSS Transposition

Draft Article 18 - Clearance license

- Extended to solid and liquid waste
- Clearance license needed when activity concentration > annex IB
 - No upper limit for activity concentration
 - Impactstudy needed to demonstrate compliance with dose constraint of 10 $\mu\text{Sv}/\text{year}$
 - No impact study needed for smaller quantities (< 1 ton) if activity concentration < annex IA : covered by BSS studies

1. Clearance and Exemption

Future situation – BSS Transposition

Draft Article 34.6 - Clearance of liquid radioactive waste

- When not applicable for release in sewers or surface waters (chemical composition)
- For smaller quantities (< 1 ton/year) : use generic clearance values of annex IB
- For larger quantities (> 1 ton/year) or for concentration levels > annex IB : via FANC clearance license article 18

1. Clearance and Exemption

Future situation – BSS Transposition

Draft Article 35.6 - FANC guide

- Specific clearance levels and associated requirements for specific materials or for materials originating from specific types of practices
- Will be drafted in line with “FANC/Bel V position papers” on clearance of buildings and materials:
 - RP 113 nuclide-specific values for surface contamination (reuse or demolition of buildings)
 - RP 89 nuclide-specific values for surface contamination (reuse of metals)
 - 0,4 Bq/cm² beta/gamma + 0,04 Bq/cm² alfa
- Stakeholder consultation to be started

Contents

Goal: Give an overview of current and future requirements on clearance & release

1. Clearance & exemption of materials
- 2. Site release (after decommissioning)**

2. Site release Overview

- Current situation : Belgium & Benchmarking other countries
- FANC/Bel V Position paper on Site Release (2016)
 - Scope : installations of class I and IIA
 - Dose constraints & Site release levels

2. Site release

Current regulatory framework Belgium

- Clearance levels for radioactive waste available in annex IB of GRR-2001
- Question:
 - Site materials = to be considered as radioactive waste with similar clearance levels ?

2. Site release

Current regulatory framework

IAEA

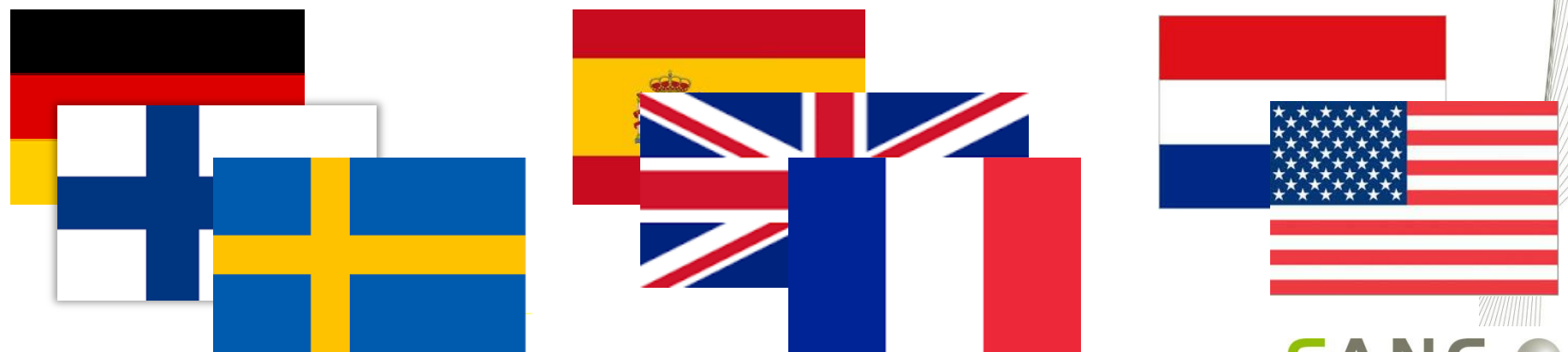


| | | | | | |
|------------------|-------------------------------|---|---|------------------------|---|
| license required | 1000 μ Sv 300 μ Sv | worst case scenario | 1 mSv | failure of restriction | Sites optimization by defining dose constraints WS-G-5.1 no optimization |
| | 100 μ Sv | some ten μ Sv de minimis concept EC-recommendations optimization 1 manSv | <u>Materials</u> graded approach | | |
| | 10 μ Sv | RS-G-1.7 no optimization | materials resulting from release of sites | | |
| | | movable | certainty of reuse | fixed | |

2. Site release

Current regulatory framework International

- Benchmarking with regulatory framework in other countries is not so easy:
 - FRA & SWE : case by case study
 - NLD, USA, ESP, ... : Dose constraints varying between 10 $\mu\text{Sv}/\text{year}$ and 250 $\mu\text{Sv}/\text{year}$



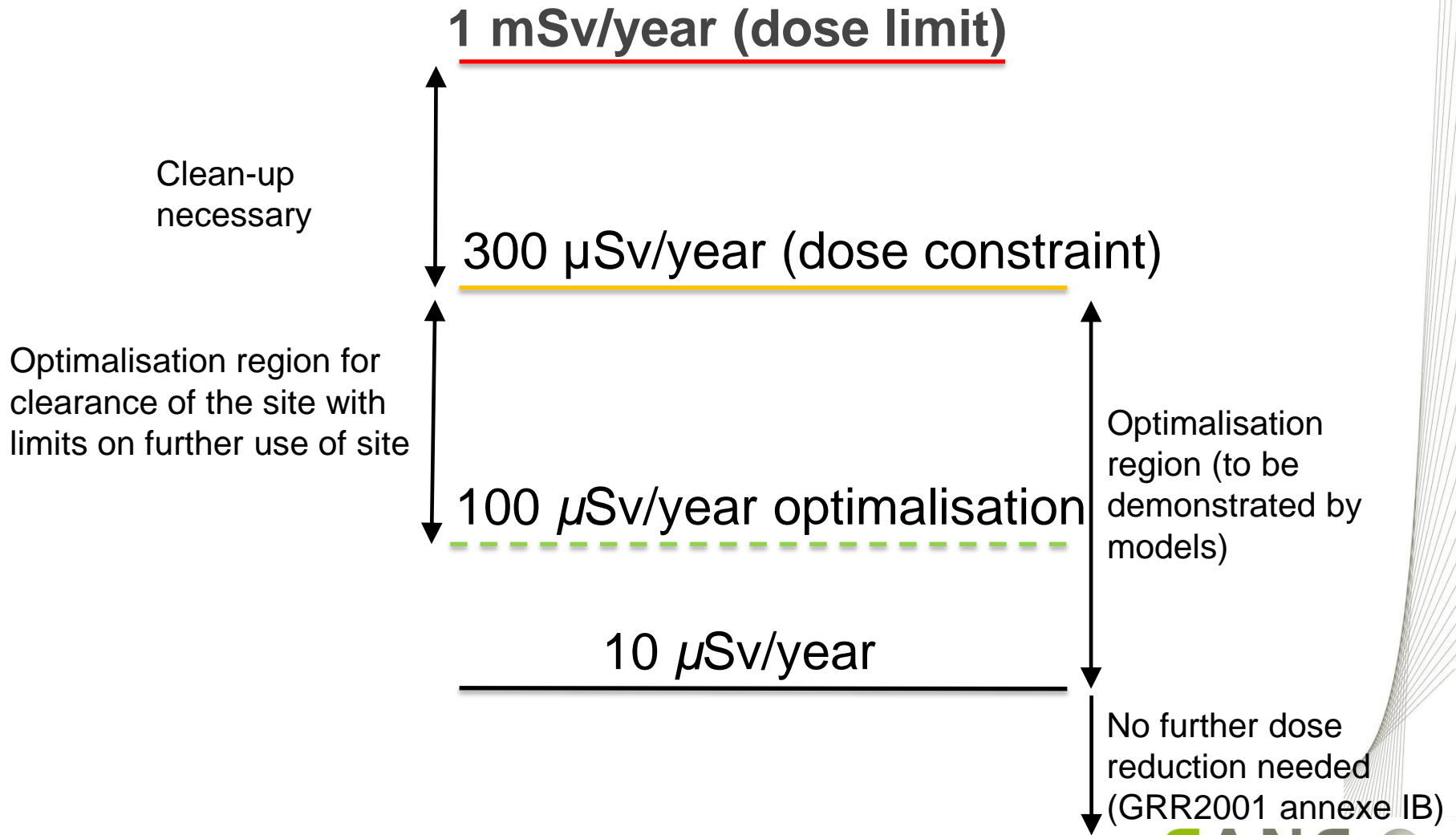
2. Site Release

FANC/Bel V Position paper on Site Release

- **Clearance levels:** 2 options possible:
 - 1) Licensee uses clearance levels of annex IB of GRR 2001 based on samples averaged on max. 1 ton (→ individual dose 10 μ Sv/year)
 - 2) Licensee will propose specific clearance levels for site materials based on exposure scenario's for radionuclides present on site. Clearance levels, scenario's and models to be approved by FANC
- !Natural occurring radioactive materials

2. Site release

FANC/Bel V Position paper on Site Release



2. Site release

Examples of site release

Clearance levels used: annex IB GRR-2001

▪ **Belgonucleaire**

- Former MOX production facility (ended 2006)
- Decommissioning well advanced : objective of unconditional release of site by 2018

▪ **FBFC International**

- Former U-fuel production and MOX assembly facility (ended 2010)
- Decommissioning well advanced : objective of unconditional release of site by 2019

▪ **Thetis reactor (University of Ghent)**

- Research reactor shut down in 2003
- Dismantling works completed in 2015
- Declassified in December 2015

2. Site release

Proposed proces

1. Licensee provides final dismantling report
 - Overview dismantling activities, results of radiologic end characterisation
2. Review by FANC & Bel V, based on
 - Inspections of clearance activities
 - Independent measurements
 - Review of final dismantling report
3. Decision by FANC
 - Greenfield: abolish dismantling licence
 - Brownfield: suggestion of limitations for further use building/site → competent regional authority
 - Submitted to stakeholder consultation

Conclusions

- Clearance of materials is well established process within Belgian regulatory framework
- Transposition of BSS in Belgium regulations on-going
- Challenges:
 - Increasing use of clearance licenses (decommissioning projects)?
 - Site release decisions in the near future
 - Strict regulatory supervision of licensee clearance practices required to ensure compliance

Questions?