

ROUTES SUBTASK 4.2 - WORKSHOP

“Managing new criteria and more restrictive limits imposed by the safety report of the planned surface repository in Belgium”

14/15th of June 2021



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 847593.



OUTLINE

1. Background

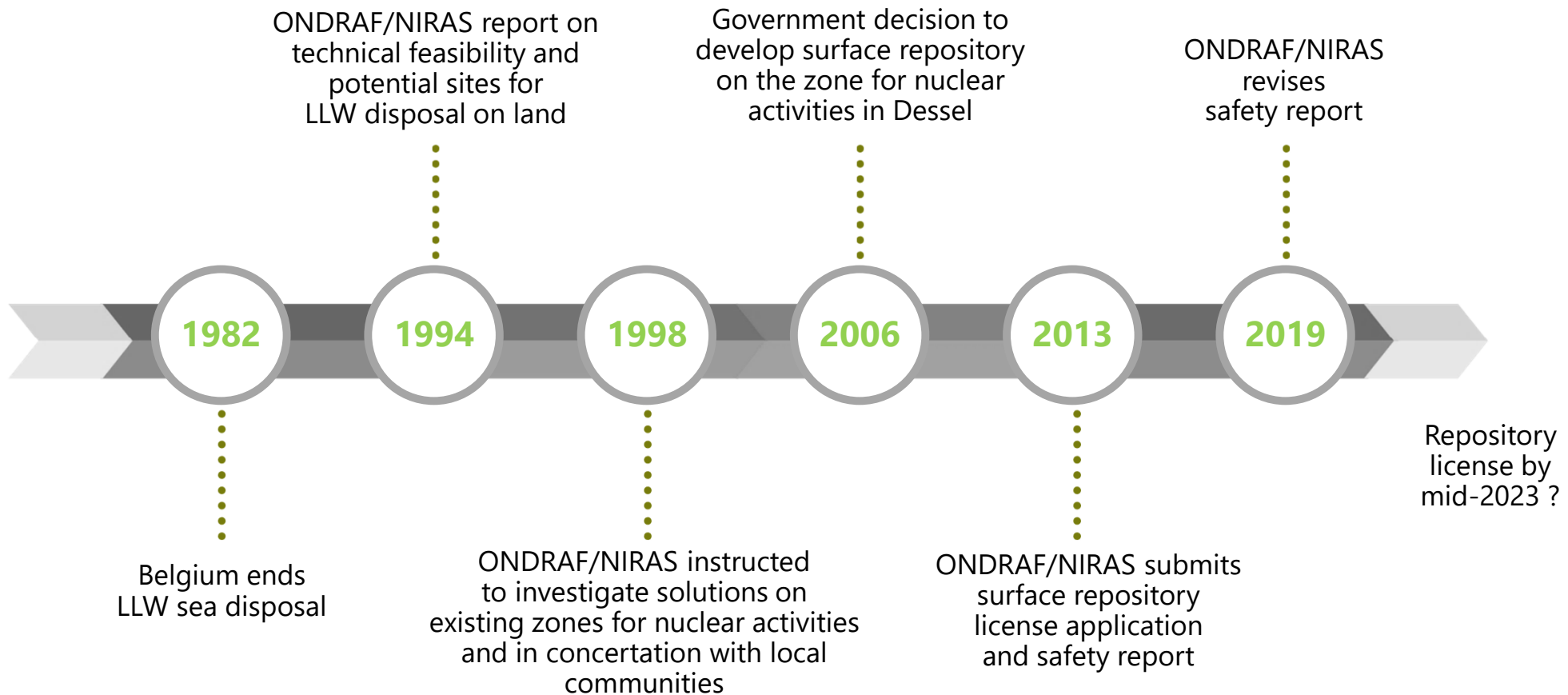
- Time line of the surface repository in Dessel
- Surface disposal basic technical concept

2. Hard to meet 'critical' criteria

3. Proposed solution

- Guidance on sorting of raw/treated waste
- Modifications to the safety report
- Modification of the acceptance system

1.1 - TIME LINE OF THE SURFACE REPOSITORY IN DESSEL (BELGIUM)



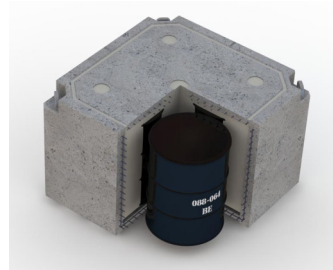
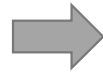
1.2 – SURFACE DISPOSAL BASIC TECHNICAL CONCEPT



Conditioned waste
(in storage)



Insertion in concrete
container ('caisson')



Cementation
→ monolith



Disposal



Long-term management

2 – HARD TO MEET ‘CRITICAL’ CRITERIA

- Safety report of surface repository introduced several new acceptance criteria upstream of the waste cycle
- Waste producers find it difficult to meet four specific ‘critical’ criteria:
 1. Cemented waste must be insensitive to alkali-silica reaction (**ASR**) or delayed ettringite formation (**DEF**)
 - Purpose: avoid expansion of the waste form inside the monoliths
 - Difficulty: requires testing (time consuming) or detailed information on used construction materials (often not archived)
 2. Per drum, the content of **mineral chloride ions** (Cl^-) in the waste form may not exceed 0.4 % of the cement mass
 - Purpose: (1) limit corrosion of carbon steel reinforcement bars in the concrete barriers, (2) limit complexation of nuclides
 - Difficulty: very low limit value, whereas the presence of mineral chlorides is generally not known precisely
 3. Per drum, the content of **sulphates** (SO_4^{-2}) in the waste form may not exceed 1.2 % of the mass of the waste form (the only exception is BaSO_4)
 - Purpose: limit sulphate attack on concrete barriers
 - Difficulty: very low limit value, whereas the presence of sulphates is generally not known precisely
 4. Per drum, the content of **cellulose materials** may not exceed a certain limit value (100 g in case of a 400-litre drum)
 - Purpose: limit complexation of nuclides by ISA (degradation product of cellulose)
 - Difficulty: very low limit value, whereas the presence of cellulose materials is generally not known precisely



3 – PROPOSED SOLUTION

1. Future modifications of the safety report

- Currently, RD&D is ongoing to support future relaxation of 'critical' criteria
 - ❖ e.g., cellulose limit per 400-litre drum: from 100 g → 250 g → several kg
- Modifications will be submitted one-by-one
- Envisaged time period: 2023 (shortly after granting of license) ... several years

2. ONDRAF/NIRAS provides new guidance to waste producers on sorting of raw waste

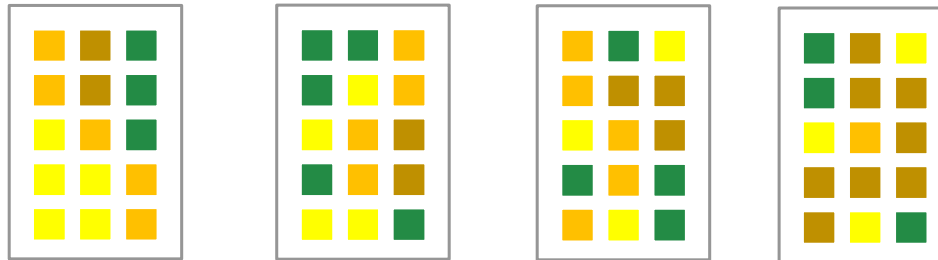
- Objective: creation of '**mono-problematic**' **waste fluxes** and (hopefully) also 'problem-free' waste
- Advantage: simplify the future demonstration of compliance to WAC

3. Modification of the acceptance system

- Basic concept of the acceptance system (basic building blocks)
- Real life situation before and after modification of the acceptance system

3.2 - ILLUSTRATION OF THE CREATION OF MONO-PROBLEMATIC WASTE FLUXES

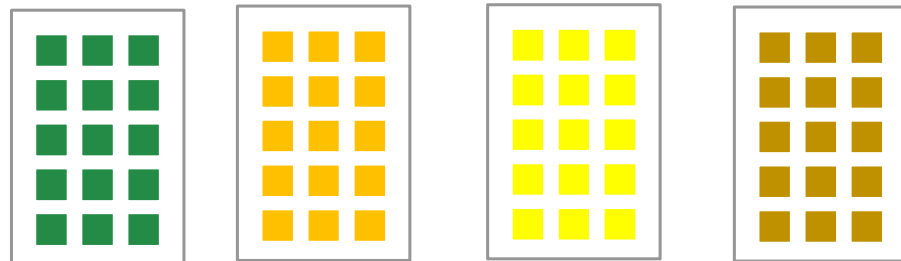
waste packages sorted until now:



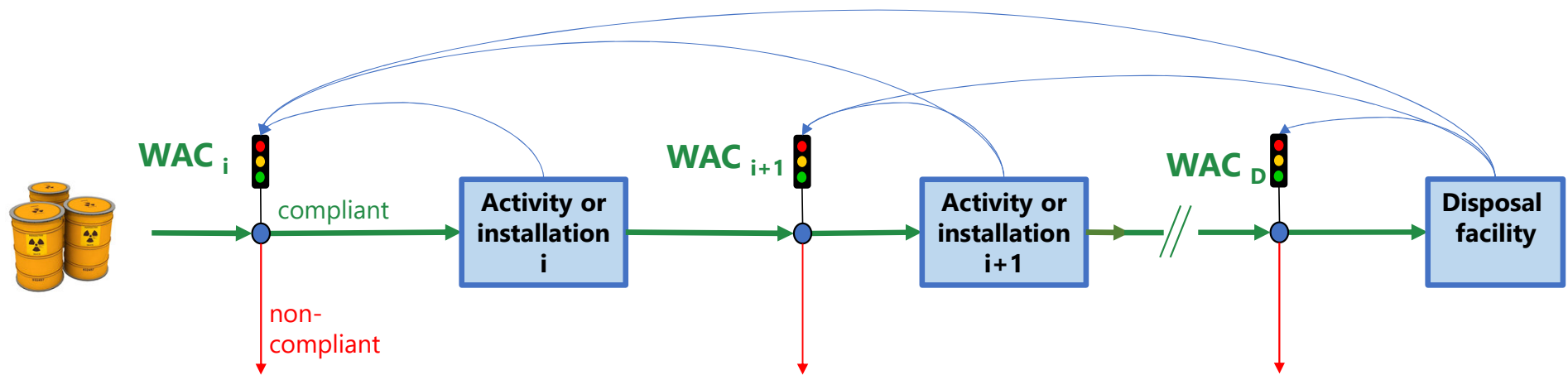
■ = problem-free waste fraction
■ ■ ■ = problematic waste fraction with respect to certain critical criteria



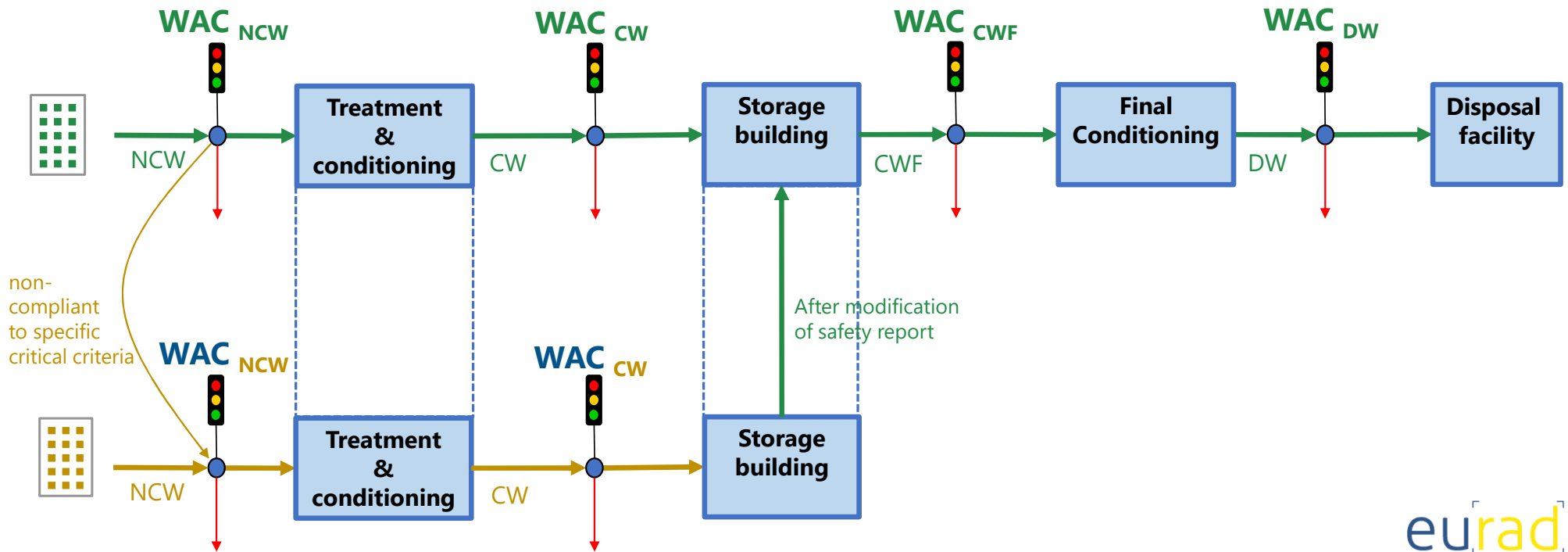
waste packages sorted according to new guidance:



3.3.1 – BASIC BUILDING BLOCKS OF THE WASTE ACCEPTANCE SYSTEM



3.3.2 – REAL LIFE WASTE ACCEPTANCE SYSTEM + MODIFICATION





ROUTES TASK 4 - WASTE ACCEPTANCE CRITERIA

Thank You for your attention!