Geological Disposal of Radioactive Waste

Institute of Physics Nuclear Industry Group, in collaboration with Radioactive Waste Management Ltd (RWM)

13th July 2016, Birchwood, Warrington

Only approved presentations included

Radioactive Waste Management

IOP Institute of Physics
Nuclear Industry Group

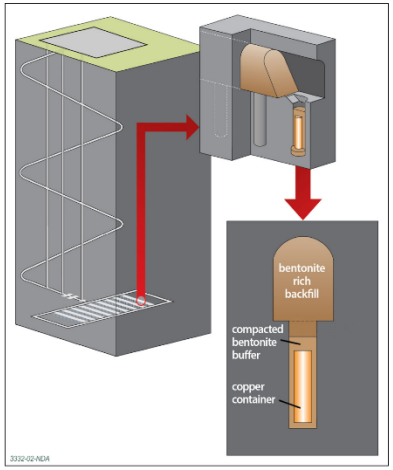
Geological Disposal of Radioactive Waste

Half-day seminar, Birchwood Centre Auditorium

Wednesday 13 July 2016 10:00 to 15:30

The UK has accumulated radioactive waste from a range of activities including nuclear power generation, medicine, research and defence-related nuclear programmes. Most of the waste can be disposed of safely in facilities on or near the surface, but a long-term solution is still needed for the most radioactive waste (higher activity waste), some of which will remain hazardous for hundreds of thousands of years.

Geological disposal is the internationally accepted way of managing higher activity waste. Geological disposal involves isolating the waste from the surface environment by placing it deep underground and containing the radioactivity so that it does not cause harm. This is achieved through the use of multiple engineered barriers which work together with the natural barrier provided by the geological environment.



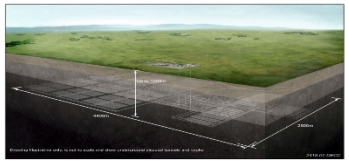
THE SEMINAR

The Institute of Physics Nuclear Industry Group, in collaboration with Radioactive Waste Management Ltd (RWM), has organised a seminar to learn about the most current issues associated with radioactive waste disposal from some of the industry's leading experts.

The session will be opened by Laurence Williams, an Emeritus Professor of Nuclear Safety and Regulation and Chair of the Committee of Radioactive Waste Management (CoRWM), who will share his experiences and make the case for geological disposal. We will also hear from industry experts currently working to deal with the UK's nuclear legacy and the pursuit of technological developments to find the most efficient method for disposing of the higher activity waste.

Representatives from RWM, the organisation charged with implementing geological disposal in the UK, will explain their role and share the latest developments and plans for the coming months.

This event is sponsored by
Radioactive Waste Management



Geological Disposal of Radioactive Waste

Wed 13th July 10:00 to 15:30

This is an open scientific meeting
It is free to attend, all are welcome, but registration is essential
Register here: www.iopconferences.org/iop/933/home

Time	Topic	Speaker
09:30	*Coffee & Registration*	
10:00	Why Geological Disposal? - Opening welcome	Laurence Williams, Emeritus professor at Imperial College, Chair of CoRWM
10:30	Decommissioning at Sellafield	Ed Matthews, Strategy & Technical Portfolio Manager, Sellafield Ltd
11:10	*Break & Refreshments*	
11:20	Management of Higher Activity Wastes on the Sellafield Site	Ciara Walsh, Integrated Waste Strategy Manager, Sellafield Ltd
12:00	Opportunities for Innovation in the Development of Solutions for Management of Radioactive Wastes at Sellafield	Neil Smart, Technology Development Manager, Sellafield Ltd
12:40	*Lunch*	
13:30	Bridging Waste Management Practices Today with Geological Disposal	Paul Skelton, Head of Sellafield Assessments, RWM
14:10	The Safety Case for Geological Disposal	Lucy Bailey, Acting Head of Disposal System Assessment, RWM
14:50	Geological Disposal: Next Steps - Closing remarks	Natalyn Ala, GDF Siting Director, RWM
15:30	*Close*	

There will be Q&A time with all speakers, after each talk

This event is organised by:
IOP Institute of Physics
Nuclear Industry Group

sponsored by:
Radioactive Waste Management

and supported by:
the nuclear institute
north west branch

THE VENUE

The Centre, Birchwood Park, Warrington WA3 6YN

Directions: www.thecentreatbirchwoodpark.co.uk/location.aspx

By rail: Birchwood rail station is closest, and is connected to The Centre with a walking route (20-25 min).

By car: An onsite carpark is available.

FURTHER INFORMATION

If you require further details, please contact the event organisers:

Dale McQueen dale.mcqueen@sellafieldsites.com
Lucy Bailey lucy.bailey@nda.gov.uk

Management of Higher Activity Wastes on the Sellafield Site

Dr Ciara Walsh, CPhys, MInstP

Integrated Waste Strategy Manager, Remediation, Sellafield Ltd.

Aim of presentation

- Gain insight into how Sellafield is managing Higher Activity Waste management
- Understand the ‘fit for purpose approaches’ being adopted to deliver site remediation
- Understand the opportunities being pursued for a diverse range of wastes

Sellafield has more than 60 years of history

1940s/50s

- Nuclear build begins
- Initially a military programme
- Later civil programme begins

1960s/70s

- Waste stored safely – pending treatment
- Storage capacity extended incrementally
- Coarse segregation of waste arising from process
- Magnox reprocessing starts

1980s

- Main expansion of site
- Major waste treatment focus
- Environmental impact substantially reduced

1990s

- Commercialisation of reprocessing, Thorp comes online
- Waste arising from processes treated in ‘real time’
- Product waste forms compatible with disposal concepts

2000s

- NDA formed
- Stop start progress in Decommissioning
- Calder Hall ceased generating power after 47 years in operation

2010s

- Decision taken to end Thorp reprocessing
- Vitrification of all overseas Highly Active Waste complete
- Decommissioning gathering pace
  - First sludge exports from FGMSP

The end of reprocessing..

- Oxide fuel reprocessing 2018
- Magnox fuel reprocessing 2020

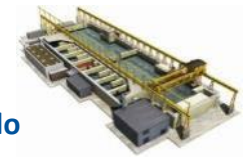
- What next?

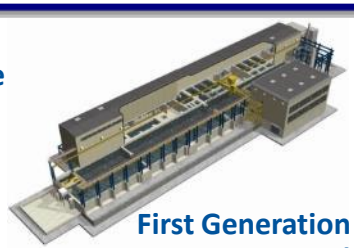
Post operations at the Sellafield site

Waste Retrieval

Magnox Swarf Storage Silo

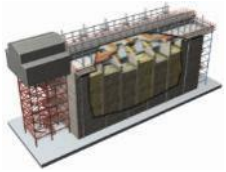
Pile Fuel Storage Pond





First Generation Magnox Storage Pond

Pile Fuel Cladding Silo

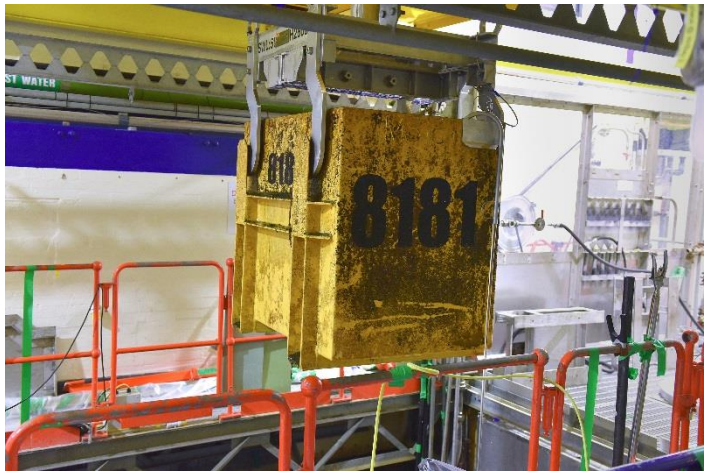


Remediation

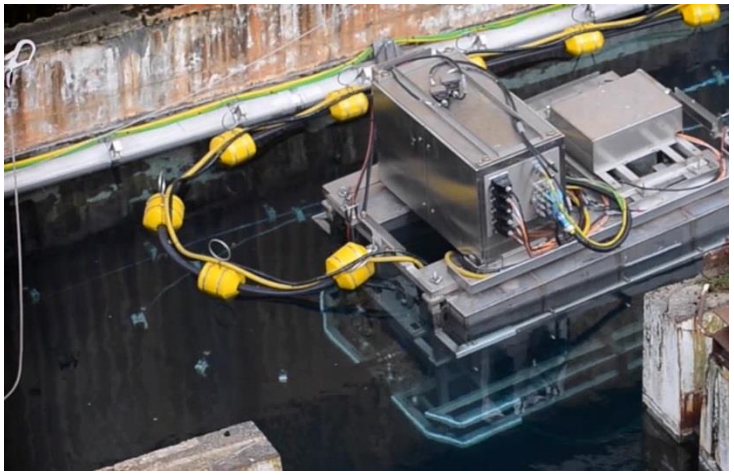
Waste Management

Recent successes

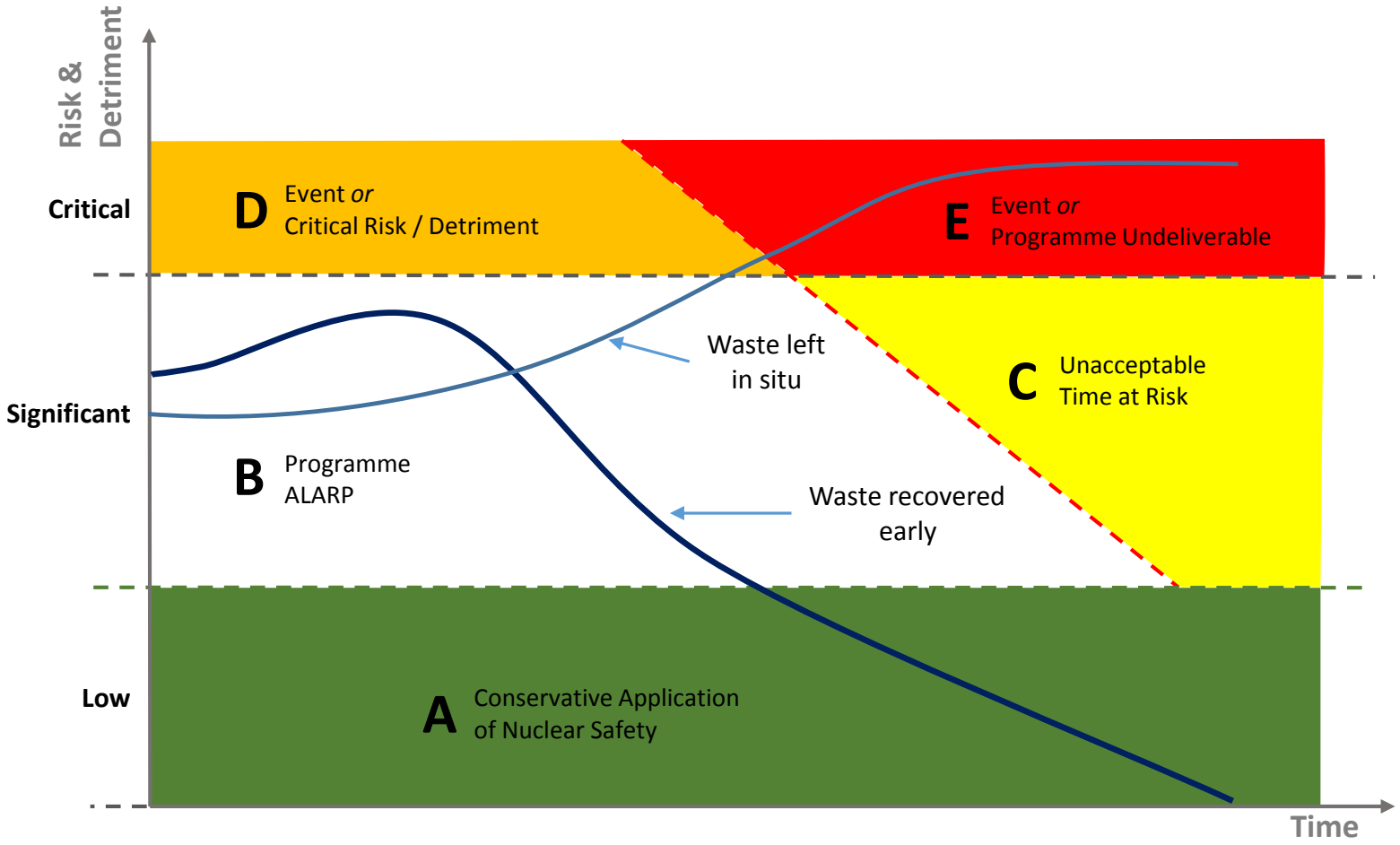
- Removal of canned fuel from Pile Fuel Storage Pond



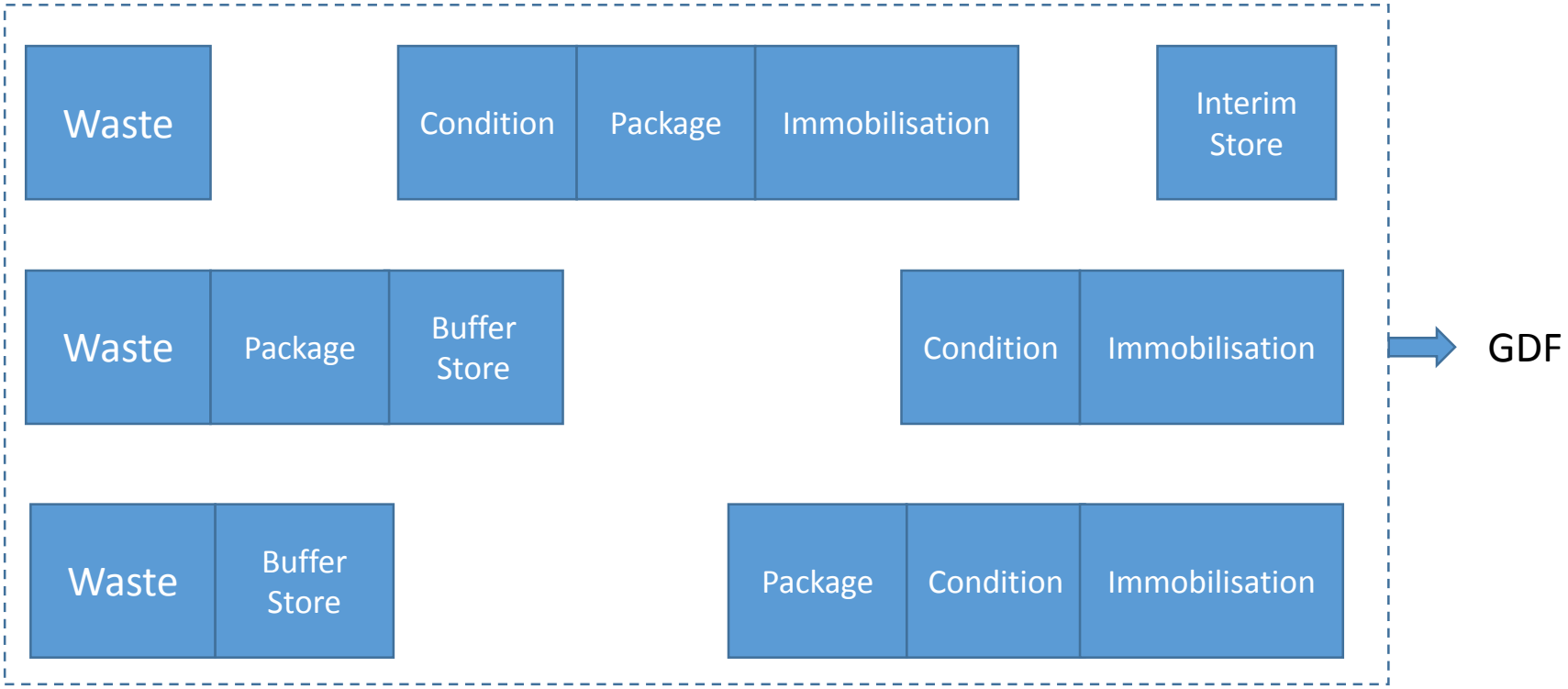
- Sludge retrieval from First Generation Magnox Storage Pond



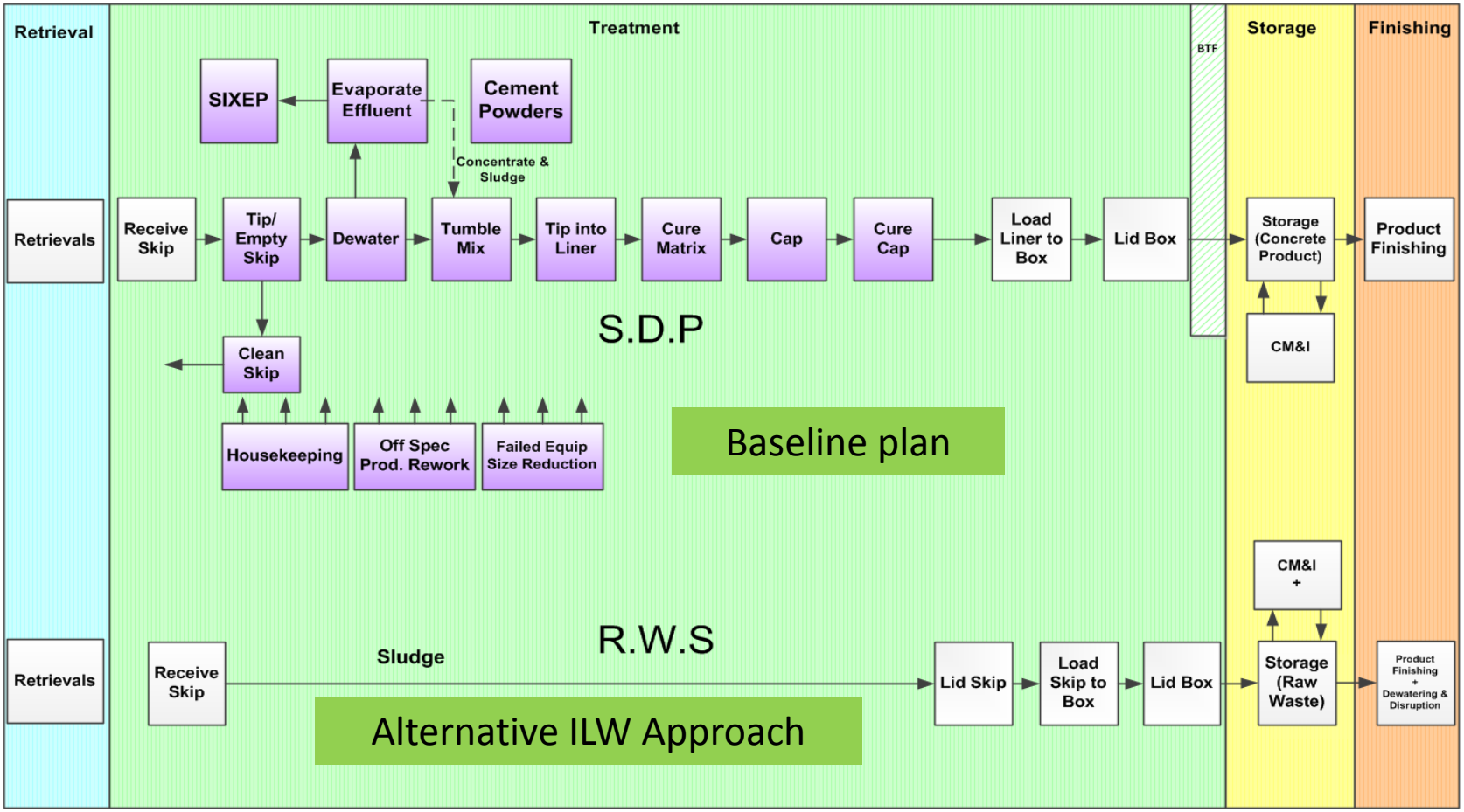
A risk framework



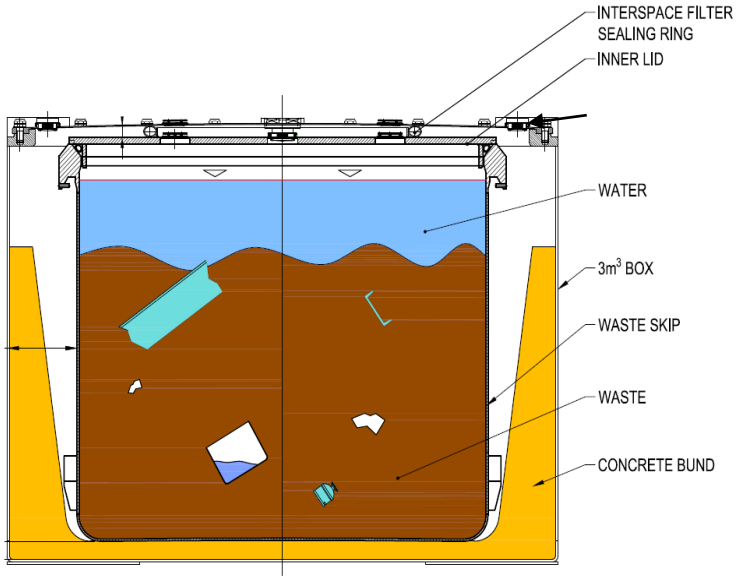
When/where to package/condition/immobilise



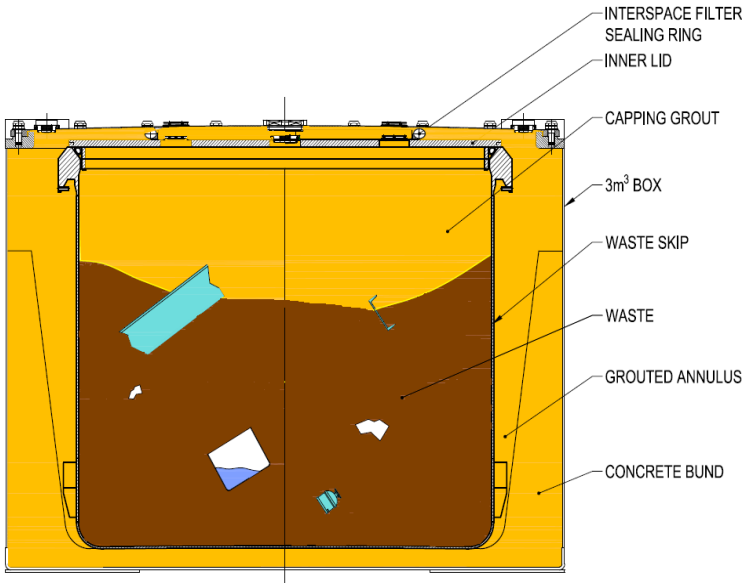
Major review of waste retrievals and management: alternative ILW approach



Waste skips containing sludge during raw waste storage and in condition for disposal

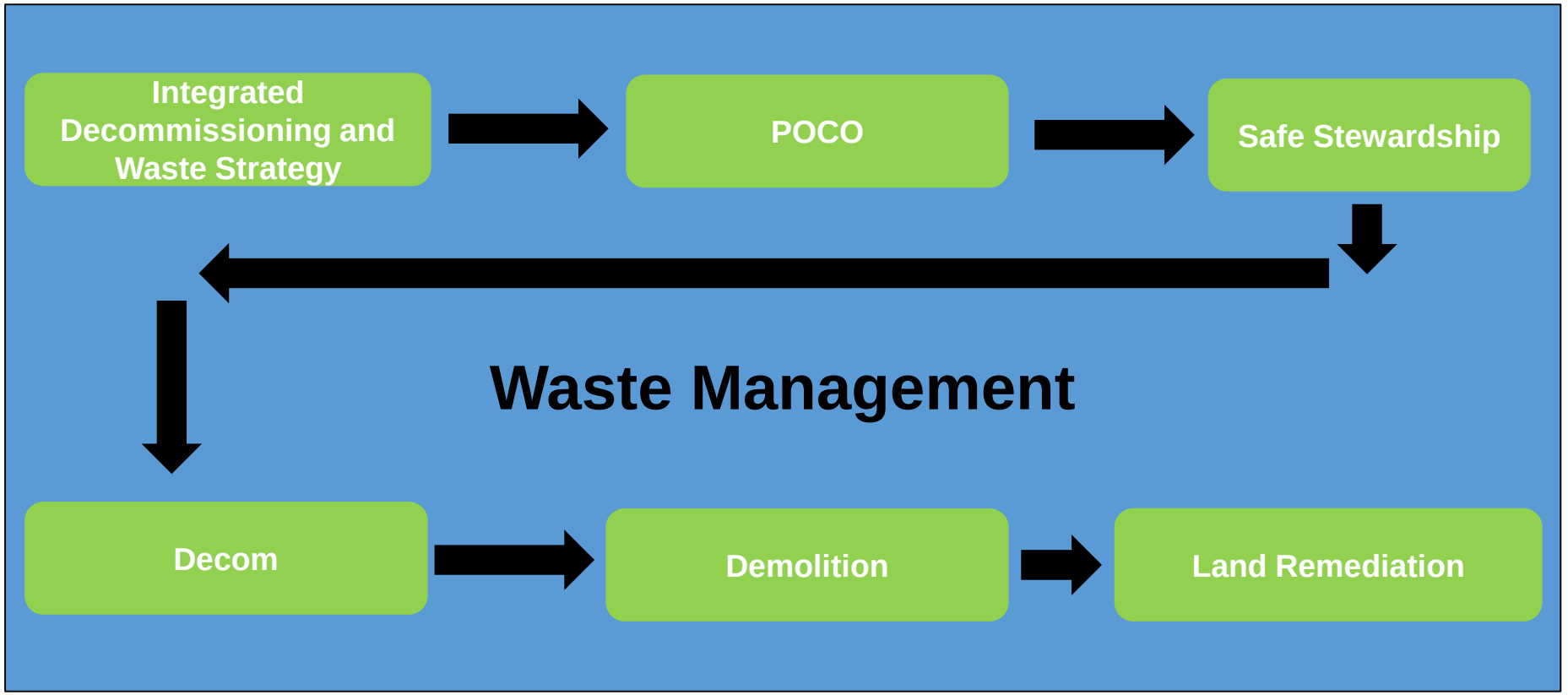


Container During
Raw Waste Storage



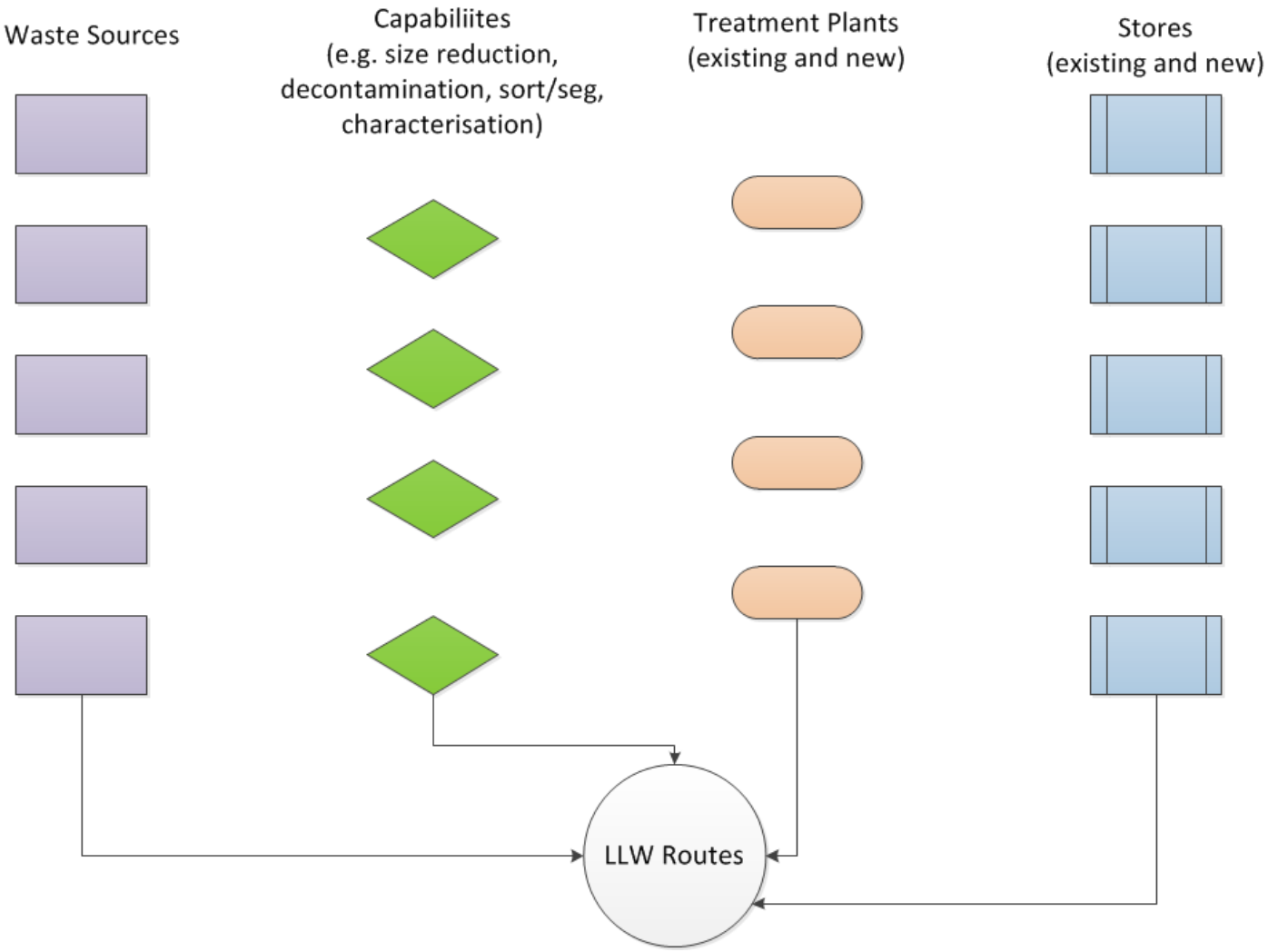
Product for Disposal

Broad-front decommissioning: end to end value stream



Re-use of existing facilities to enable decommissioning

Re-use of existing facilities to enable decommissioning



Opportunity: Reduction in ILW volumes

Diversion to LLWR

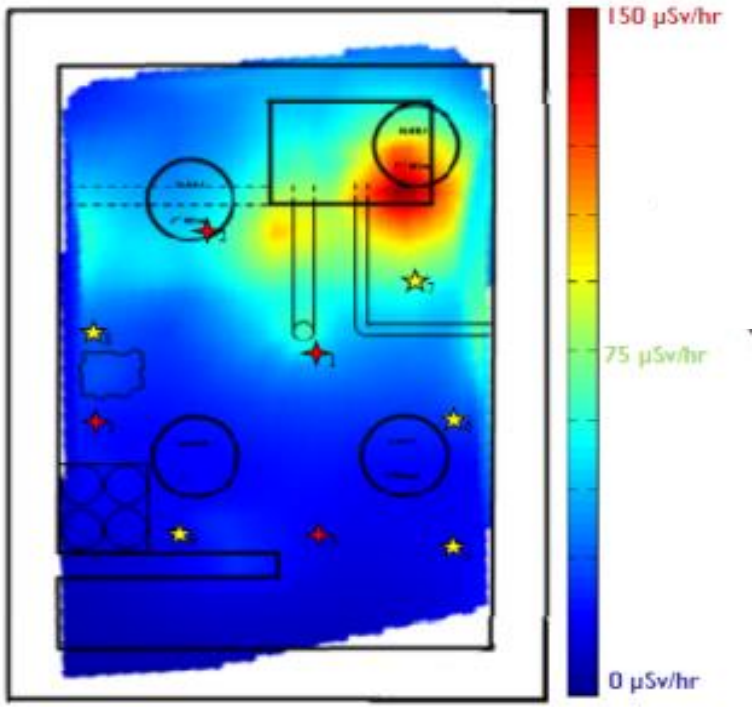
- Characterisation
- Decontamination
- Size reduction (remove hot spots)

Near surface disposal

- Higher limits than LLWR

Reduction in packaged volume

- Thermal treatment
- Compaction



N-Visage gamma image of the dose plane in a cell

Fit for purpose ILW containers

- Value engineering
- Learning from others

Disposal of whole gloveboxes?

More efficient use of existing assets

- Waste encapsulation plant
- Magnox encapsulation plant
- Stores

What next?

- Unrelenting focus on maintaining nuclear safety and security
- Driving fit for purpose solutions
  - Pile Fuel Cladding Silo
  - Removal of ventilation stacks
  - Completion of Magnox reprocessing
  - Start-up of new HA Evaporator

Radioactive Waste Management

Bridging Waste Management Practices Today with Geological Disposal

Paul Skelton MInstP – RWM Head of Sellafield Assessments

IoPNIG Seminar 13th July 2016

Radioactive Waste Management

Radioactive Waste Management Limited (RWM)

Vision

- A safer future by managing radioactive waste effectively, to protect people and the environment

Mission

- Deliver a geological disposal facility and provide radioactive waste management solutions

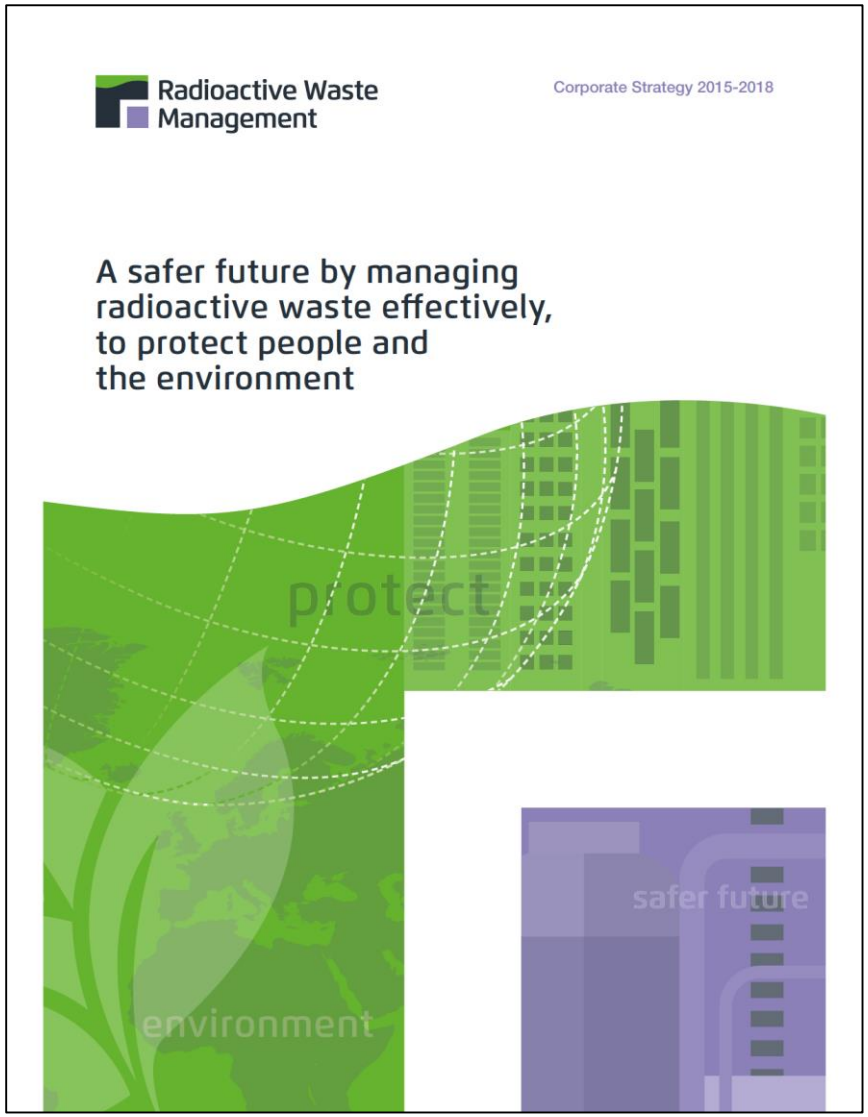
  - **Wholly- owned NDA subsidiary** (April 2014)

    - Current headcount around 120 staff
    - Plan for continued development into Site Licence Company

Radioactive Waste Management

RWM Corporate Strategy

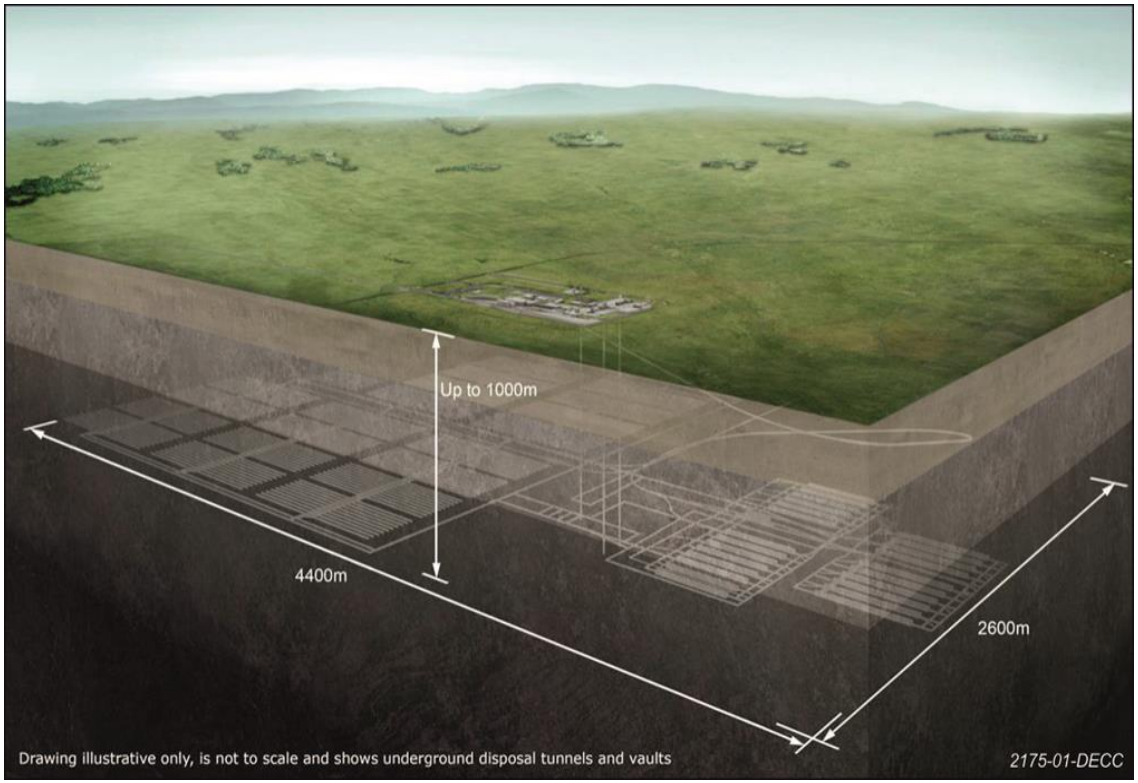
- sets out vision, mission and values
- identifies key strategic drivers
- describes RWM's strategy and governance arrangements



Radioactive Waste Management

What is required for a geological disposal facility?

- Design and Safety Case
- Waste packaged in a form compatible with GDF safety case
- Site
  - willing community
  - suitable geology



Radioactive Waste Management

Disposability Assessment – Bridging the gap

- The NDA / UK estate wide planning assumption is that a GDF will be available for receipt of wastes from 2040
- However Site Licensees have been creating waste packages for in excess of 20 years
- The move towards site closure and addressing High Hazard and Risk reduction requires waste owners to have confidence that the packages they propose to create now will be disposable

– How do we bridge this gap?

Purpose of Disposability Assessment

RWM: Disposability Assessment Aim and Principles

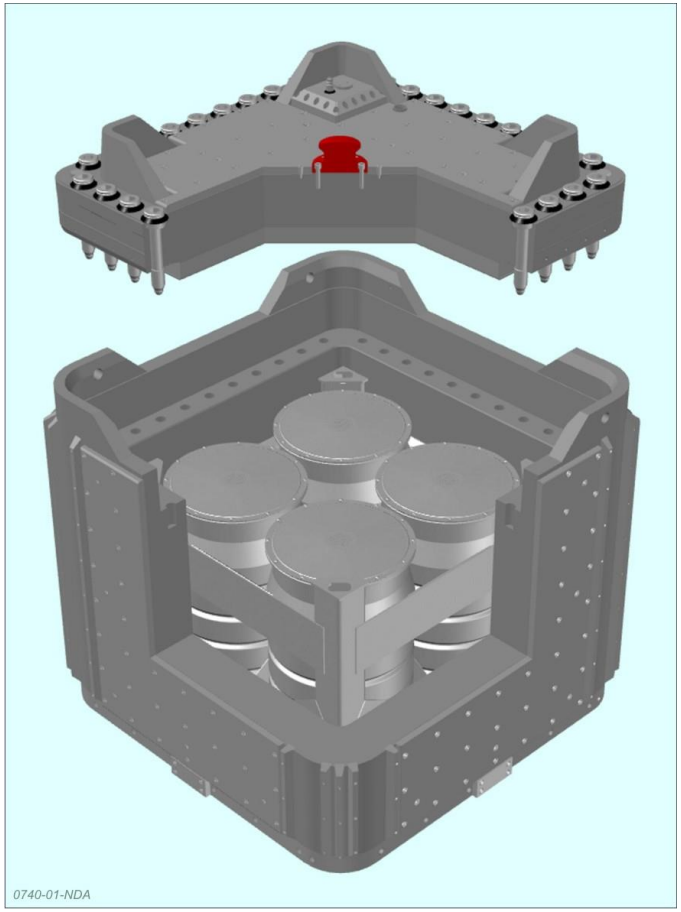
'The principal aim of the Disposability Assessment Process is to;

" minimise the risk that the conditioning and packaging of radioactive wastes results in packages incompatible with geological disposal, as far as this is possible in advance of the availability of Waste Acceptance Criteria for a geological disposal facility. As such, it is an enabler for early hazard reduction on UK nuclear sites."

- The disposability assessment is an input to the development of Radioactive Waste Management Cases which reflect the requirements of the full waste lifecycle

Transport Safety

- IAEA Transport Regulations
- Deterministic Assessment of Transport
- Precedent of over 40 years operating experience in the UK and overseas
- Informs development of transport plans



Radioactive Waste Management

Operational Safety

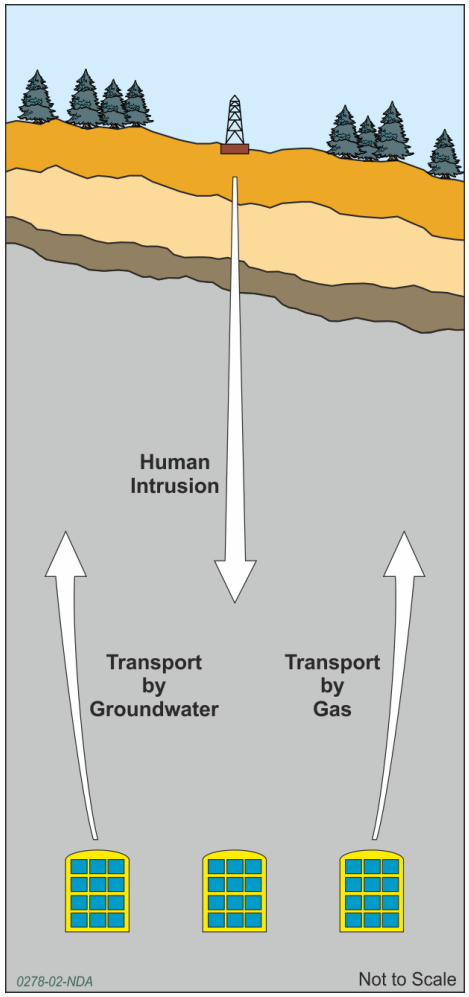
- Based on design concept for a GDF
  - Learning from available experience
  - Similarities with surface stores
- HAZOP Assessments
  - Fire
  - Impact
  - Etc
- Overseas learning
  - WIPP
  - Belgian experience

Radioactive Waste Management

Post-closure Safety

- Multi barrier concept
  - Waste form & package
  - Repository engineered barriers
  - Geological barrier (3 host rock types)

- 3 pathways assessed
  - Gas
  - Groundwater
  - Human intrusion



Radioactive Waste Management

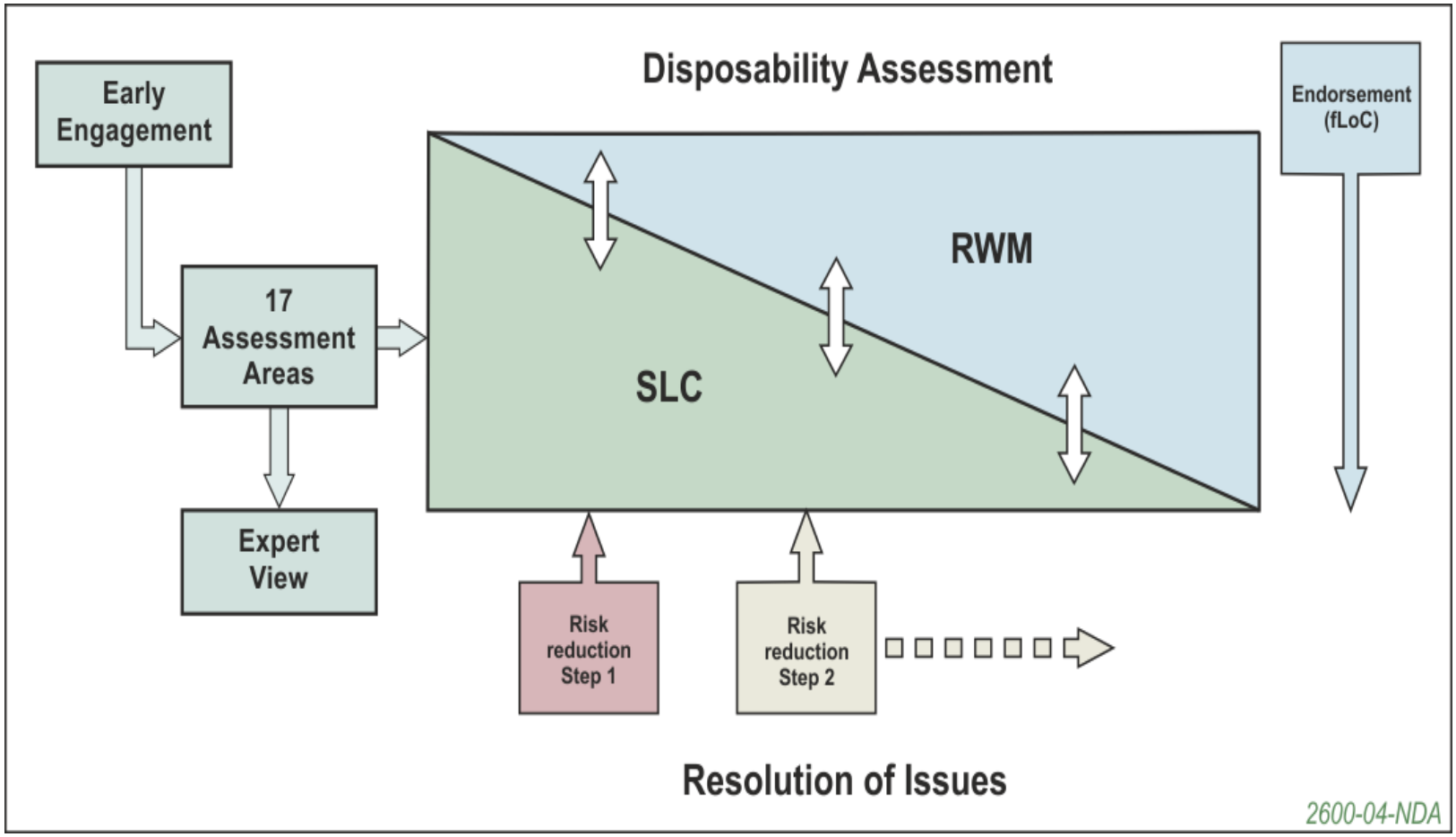
What does DA consider?

14 Areas of technical evaluation, in addition to the 3 safety areas

Nature and Quantity of Waste	Wasteform properties	Concept Compatibility	Safeguards
Container Design		Management System	
Impact Accident Performance	Container Integrity and Durability		Criticality
		Nuclear Security	
Non-radiological Environmental Protection	Fire Accident Performance		Policy
		Data Recording	

Radioactive Waste Management

DA Output - Phased Approach to Risk Management



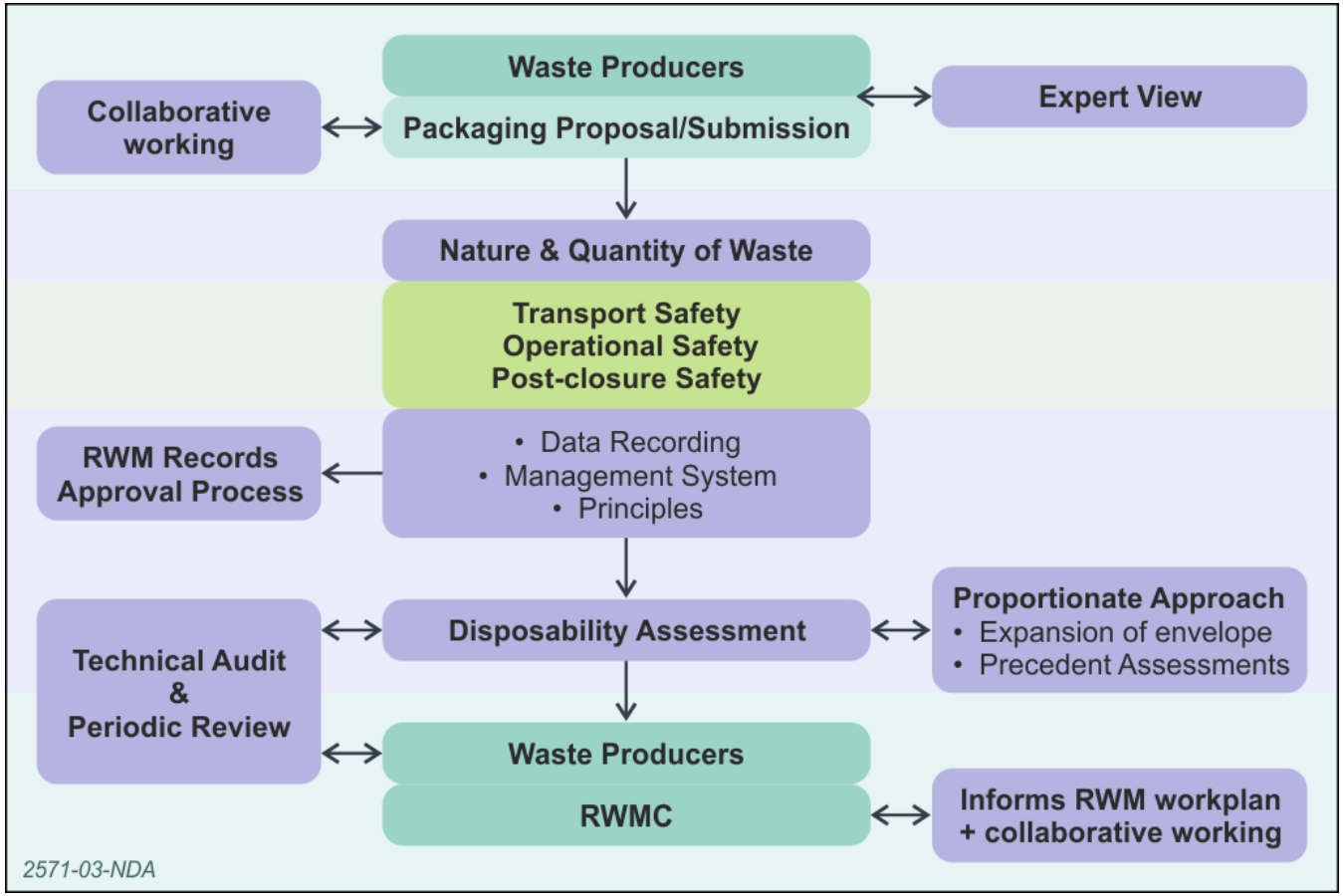
Radioactive Waste Management

Significance of a Disposability Assessment and the Letter of Compliance

- The wastes being packaged are compliant with the current specifications and requirements for a GDF
- The GDF design and safety case development is informed by the requirements of the waste
- It provides visibility of the disposability issues at the point of retrieval and packaging to inform future plans and decision making
- Provides NDA with a view on the risk of future re-work requirements
- Supports development of the licence holder's RWMC

Radioactive Waste Management

Disposability Assessment Process



Radioactive Waste Management

Summary and conclusion

• Disposability assessment is the progressive approach to bridge the gap between reducing hazard and risks today whilst ensuring visibility of the long term issues

• RWMs work informs the development of the radioactive waste management case (RWMC) for the lifecycle of the waste and make visible the balance of risk arguments affecting safety, environment and business risks

• RWMs role is as the future ‘duty holder’ for the GDF and this knowledge of the waste informs the development of the GDF design concept and safety case

Radioactive Waste
Management

The Safety Case for Geological Disposal

Institute of Physics Nuclear Industry Group Seminar
13th July 2016, Birchwood, Warrington

Lucy Bailey
Acting Head of Disposal System Assessment, RWM

Radioactive Waste Management

What is a safety case?

- “formal compilation of evidence, analyses and arguments that quantify and substantiate a claim that the repository will be safe”
- “compiled and presented at certain stages of a stepwise repository development programme with an aim to inform decision makers whether adequate information is available so that decisions to proceed to the next step can be made”

  - NEA Safety Case brochure, 2013

- “has to address site aspects and engineering aspects, providing logic and rationale for the design, and has to be supported by safety assessment. It also has to address the management system”
- “has to identify and acknowledge the unresolved uncertainties that exist at that stage and their safety significance, and approaches for management”

  - IAEA Safety Standards SSR-5, 2011

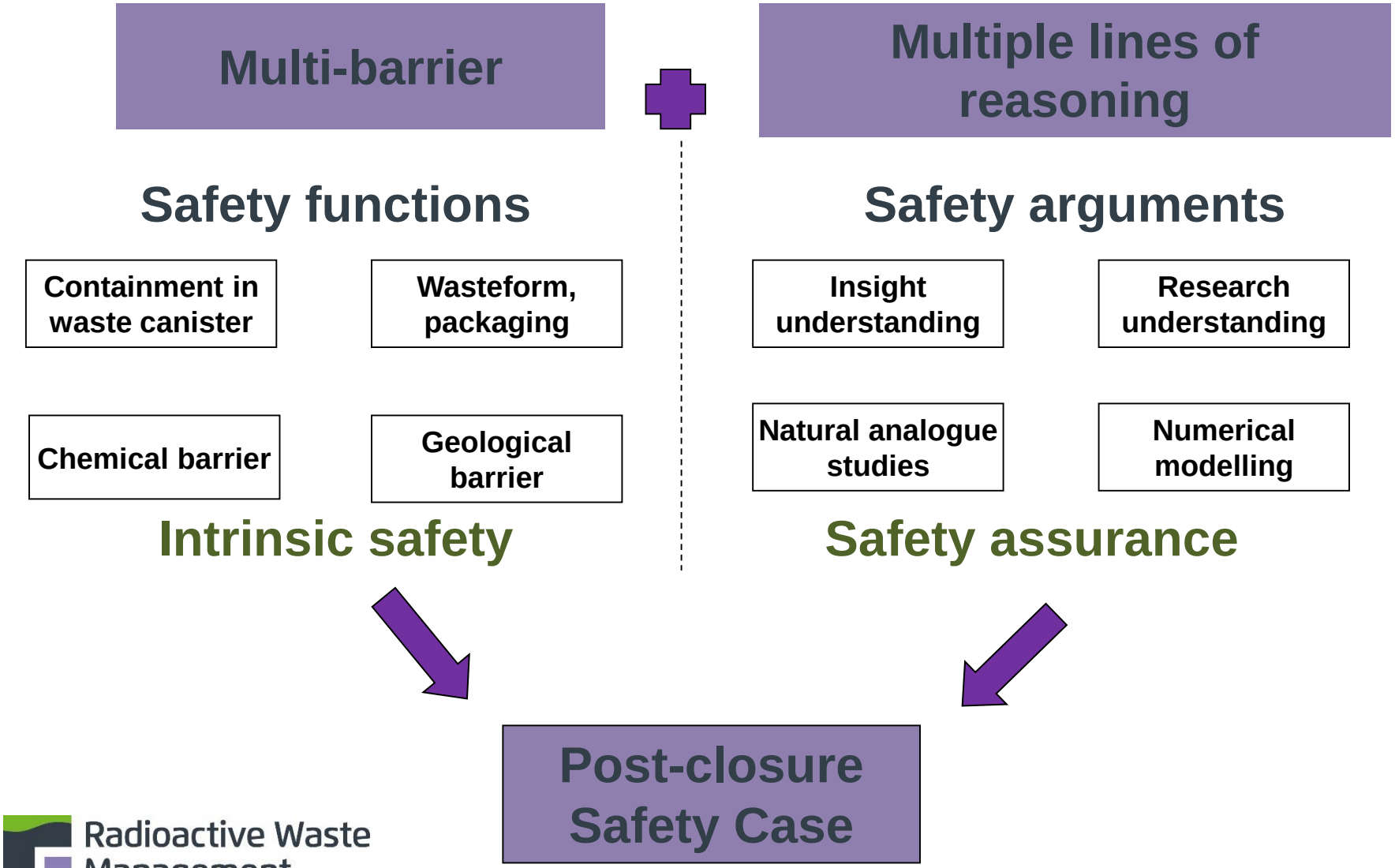
Radioactive Waste Management

Role of a safety case

- evidence that it is possible to safely dispose of the radioactive waste inventory
- evidence to support decision to move to next step of the disposal programme
- to inform and direct the ongoing science and technology programme
- to support any disposal facility siting process
- a vehicle for engagement with regulators and other stakeholders
- a basis for the provision of advice on the disposability of waste packages proposed by waste producers

Radioactive Waste Management

Multi-factor Safety Case



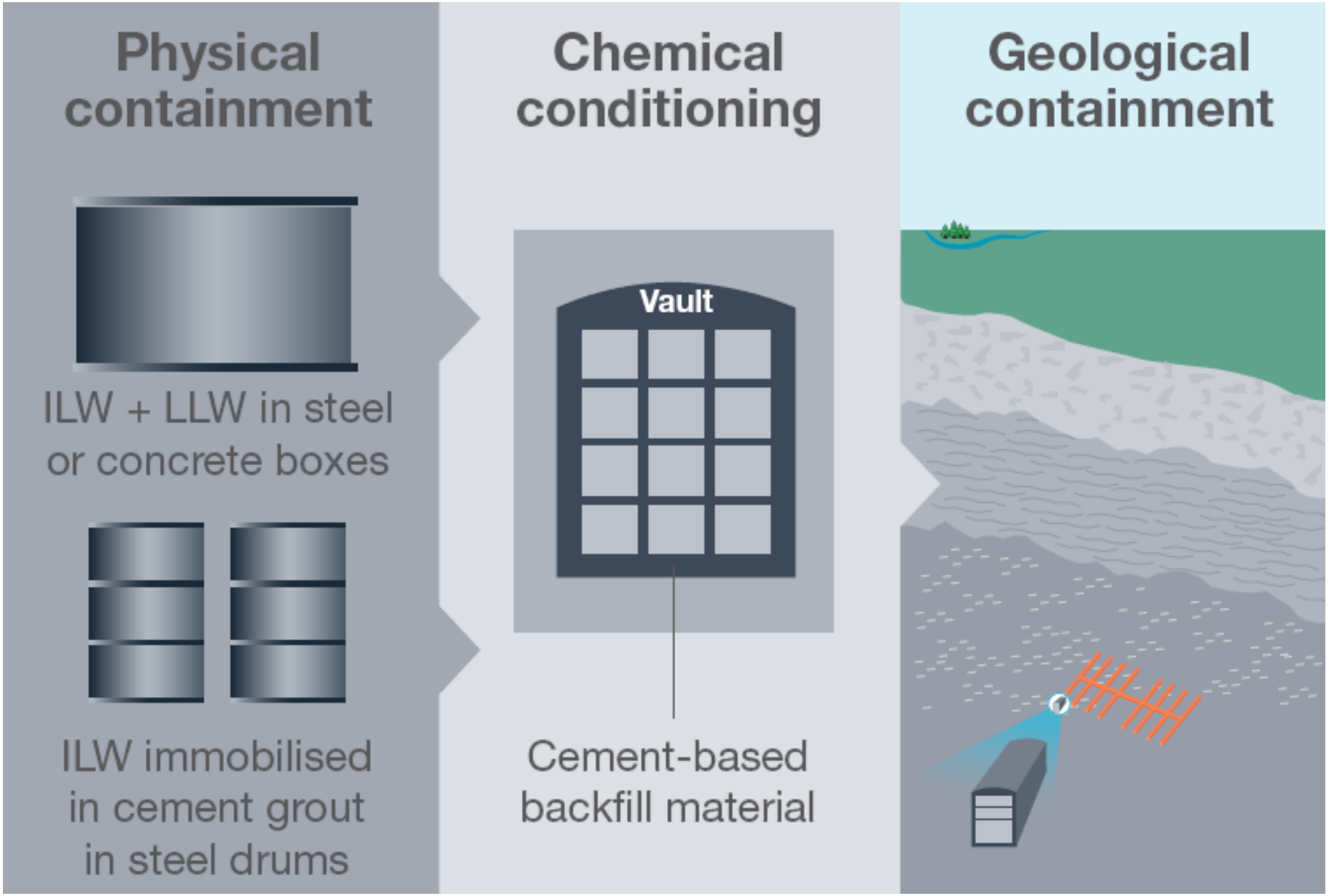
Radioactive Waste Management

Generic components and safety functions of a multi-barrier disposal concept

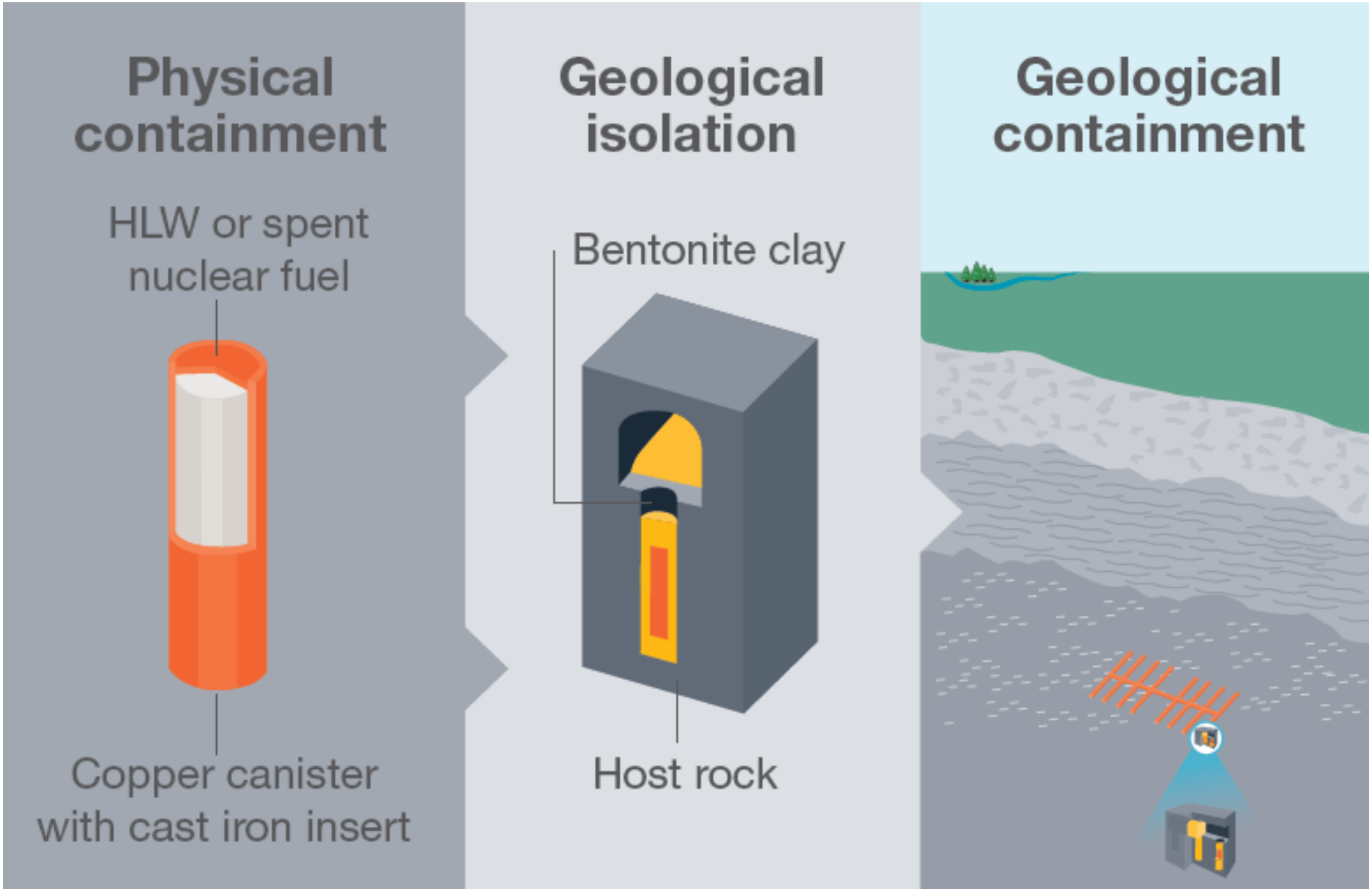
- **Wasteform**
  - stability (e.g. cement or resin for ILW, glass for HLW)
- **Waste container**
  - safe transport and handling
  - physical barrier post-closure
- **Local backfill / buffer**
  - protection of containers
  - chemical barrier
- **Mass backfill**
  - Stabilises structure & geometry of engineered barriers
- **Geosphere**
  - long-term isolation and stabilityretardation and retention of radionuclides
- **Seals**

Radioactive Waste Management

Illustrative multi-barrier disposal concept for ILW



Illustrative multi-barrier disposal concept for HLW



Multi-factor Safety Case

Multi-barrier

Multiple lines of reasoning

Safety functions

- Containment in waste canister
- Wasteform, packaging
- Chemical barrier
- Geological barrier

Intrinsic safety

Safety arguments

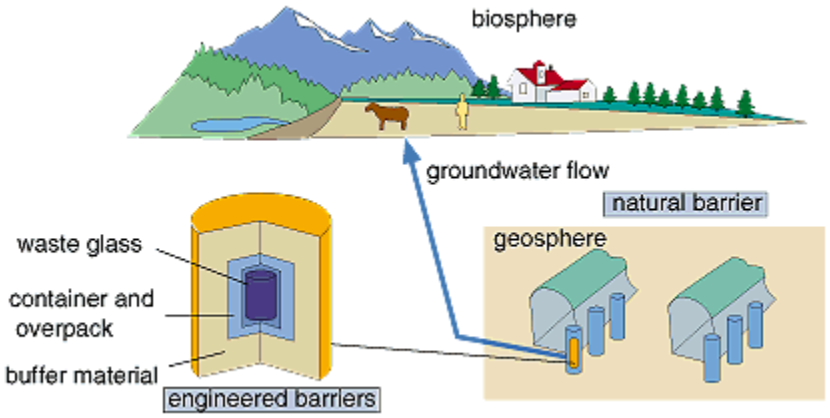
- Insight understanding

Safety assurance

Radioactive Waste Management

Radionuclide behaviour in the safety case

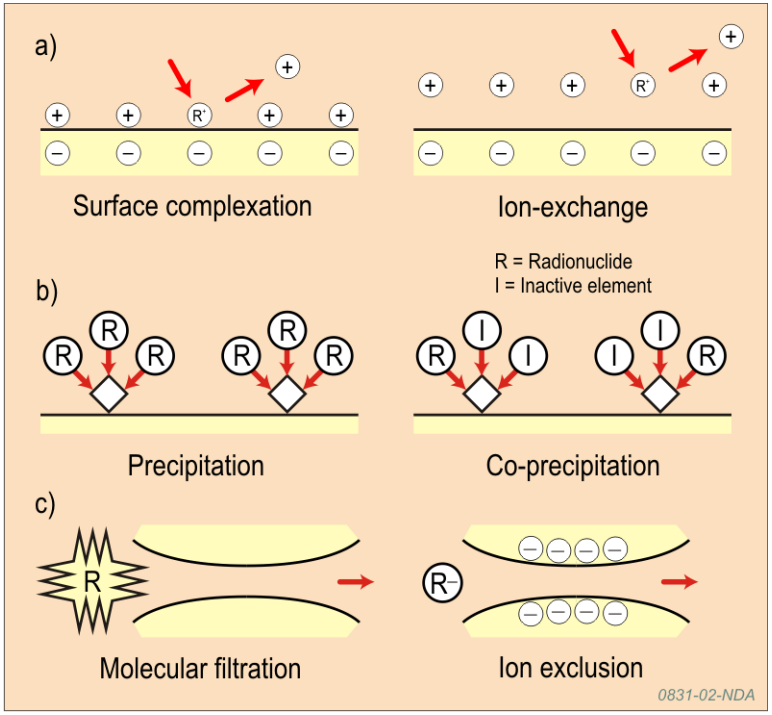
- Two high level objectives of a GDF:
  - Isolate waste from biosphere
  - Contain radionuclides and other toxic substances associated with waste
- Understanding radionuclide inventory and radionuclide behaviour enables consideration of the containment afforded by the multiple barrier system
- Two main pathways for radionuclides to leave GDF:
  - Via groundwater pathway
  - Via gas pathway



Radioactive Waste Management

Groundwater pathway (I)

- When contacted by water, wasteforms dissolve slowly, slowing release of radionuclides
- Solubility limitation, sorption and precipitation retard or immobilise radionuclides
- Many radionuclides get retained within engineered and natural barriers
- Important to quantify these processes so they can be modelled within safety case



Radionuclide retardation and immobilisation processes

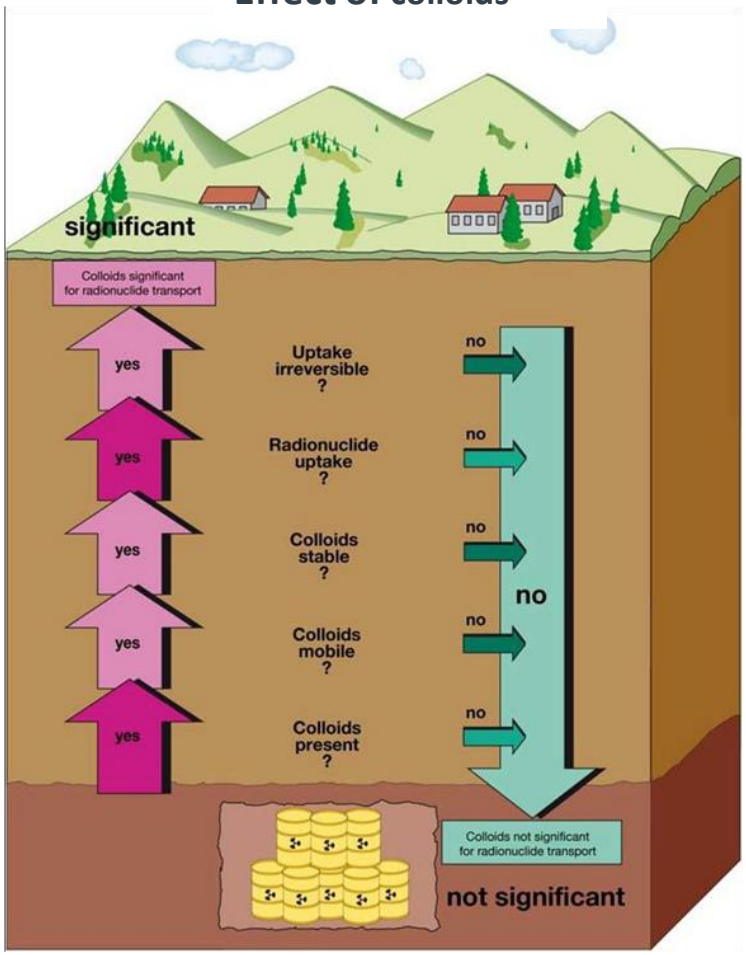
Radioactive Waste Management

44

Groundwater pathway (II)

- There are many factors which may affect solubility and sorption processes for example:
  - Colloids
  - Complexants
  - Microbes
- Need to understand these factors in order to assess them in safety case

Effect of colloids



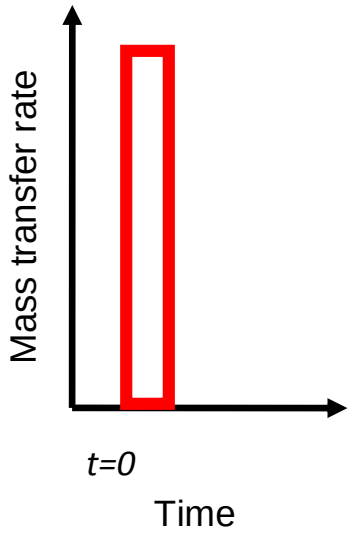
Radioactive Waste Management

Insight modelling

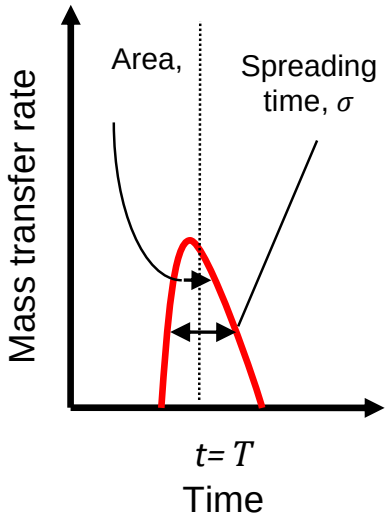
- Mathematical models of a disposal facility are usually developed in complex numerical codes (e.g. Tough2, Connectflow, GoldSim)
- Many physical processes are represented
- Simplified ‘insight’ models can be useful to gain an understanding of the system and therefore what matters most to the safety case
  - –analytic solutions
  - –bounding cases
- Potentially useful to steer research programme
- Apply physical understanding to barrier performance

Radioactive Waste Management

Role of barrier in attenuating radionuclide transport



Component of barrier system



Component of barrier system introduces:

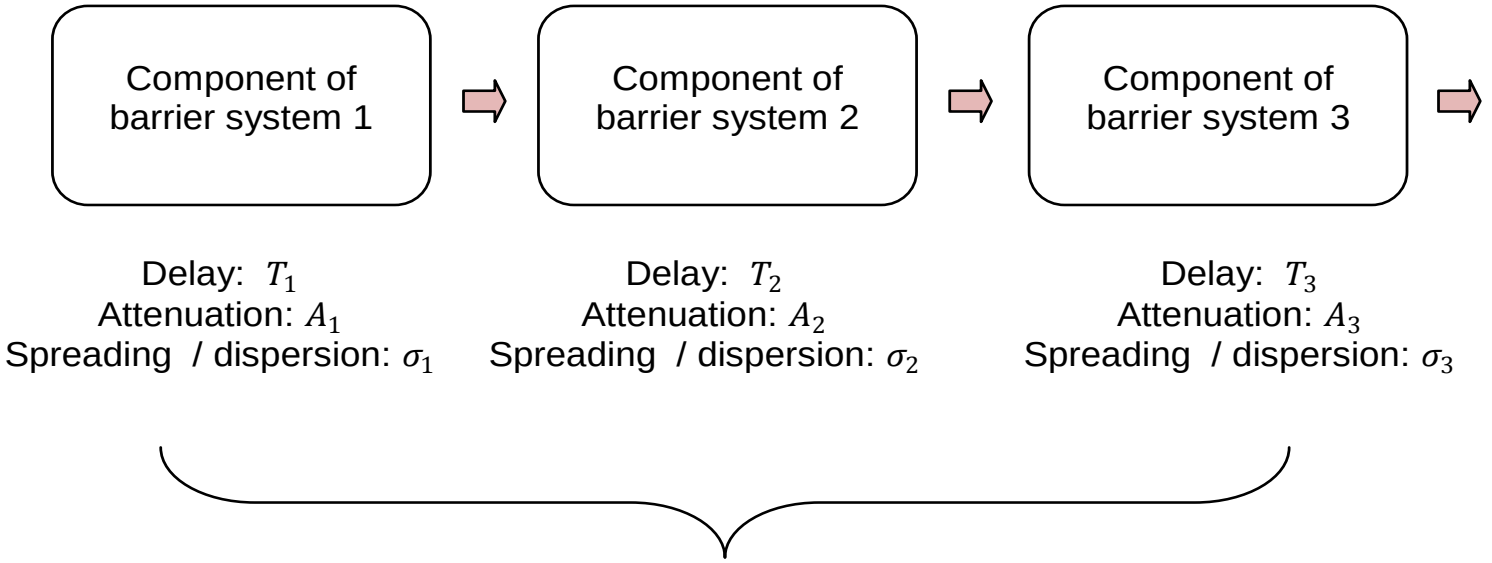
A delay: T

An attenuation: A

A spreading or dispersion: σ

Radioactive Waste Management

Multi-barrier attenuation



Total system

Delay: $T_T = T_1 + T_2 + T_3$

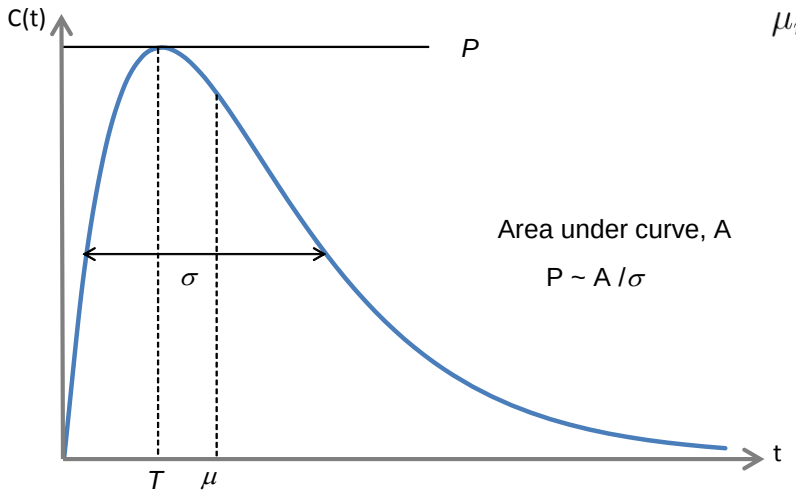
Attenuation: $A_T = A_1 \cdot A_2 \cdot A_3$

Spreading / dispersion: $\sigma_T = \sqrt{(\sigma_1^2 + \sigma_2^2 + \sigma_3^2)}$

Radioactive Waste Management

Advection-dominated geological environment

- For an approximately bell-shaped discharge curve C(t), key disposal system performance parameters may be related to the moments of C(t)
- If the governing equations are linear, these moments may be calculated more readily in Laplace space



$$\mu_n(a) \equiv \int (t-a)^n C(t)dt$$

Radioactive Waste Management

Advection-dominated geological environment

- Begin with the 1D advection-dispersion equation, including advection, longitudinal dispersion, linear reversible sorption and radionuclide decay (but not ingrowth and solubility limitation), a simple leaching source term and equilibrium biosphere

$$R_n \frac{\partial c_n}{\partial t} = D_n \frac{\partial^2 c_n}{\partial x^2} - v \frac{\partial c_n}{\partial x} - \lambda_n R_n c_n$$

- Application of the insight approximation allows an analytic expression for *peak risk* to be produced which depends on a number of key parameters:
  - initial inventory
  - radionuclide travel time relative to decay ($\lambda_n R_n T$)
  - volumetric rate of groundwater 'flushing' through disposal vault relative to decay ($qA/\lambda_n V$) – source-term spreading
  - longitudinal dispersion relative to path length (a_L/L) – geosphere spreading
  - biosphere factors

Radioactive Waste Management

Peak risk from the groundwater pathway

$$R_{peak} \propto \frac{I\,N\,G\;\;0.06B}{\sqrt{\sigma_s^2 + \sigma_g^2}}$$

R_{peak} = peak risk

I = inventory

N = fraction released from repository

G = fraction released from geosphere

B = biosphere factor

σ_s = source term spreading time

σ_g = geosphere spreading time

0.06 = dose to risk factor

Radioactive Waste Management

Multi-factor Safety Case

Multi-barrier

Multiple lines of reasoning

Safety functions

- Containment in waste canister
- Wasteform, packaging
- Chemical barrier
- Geological barrier

Safety arguments

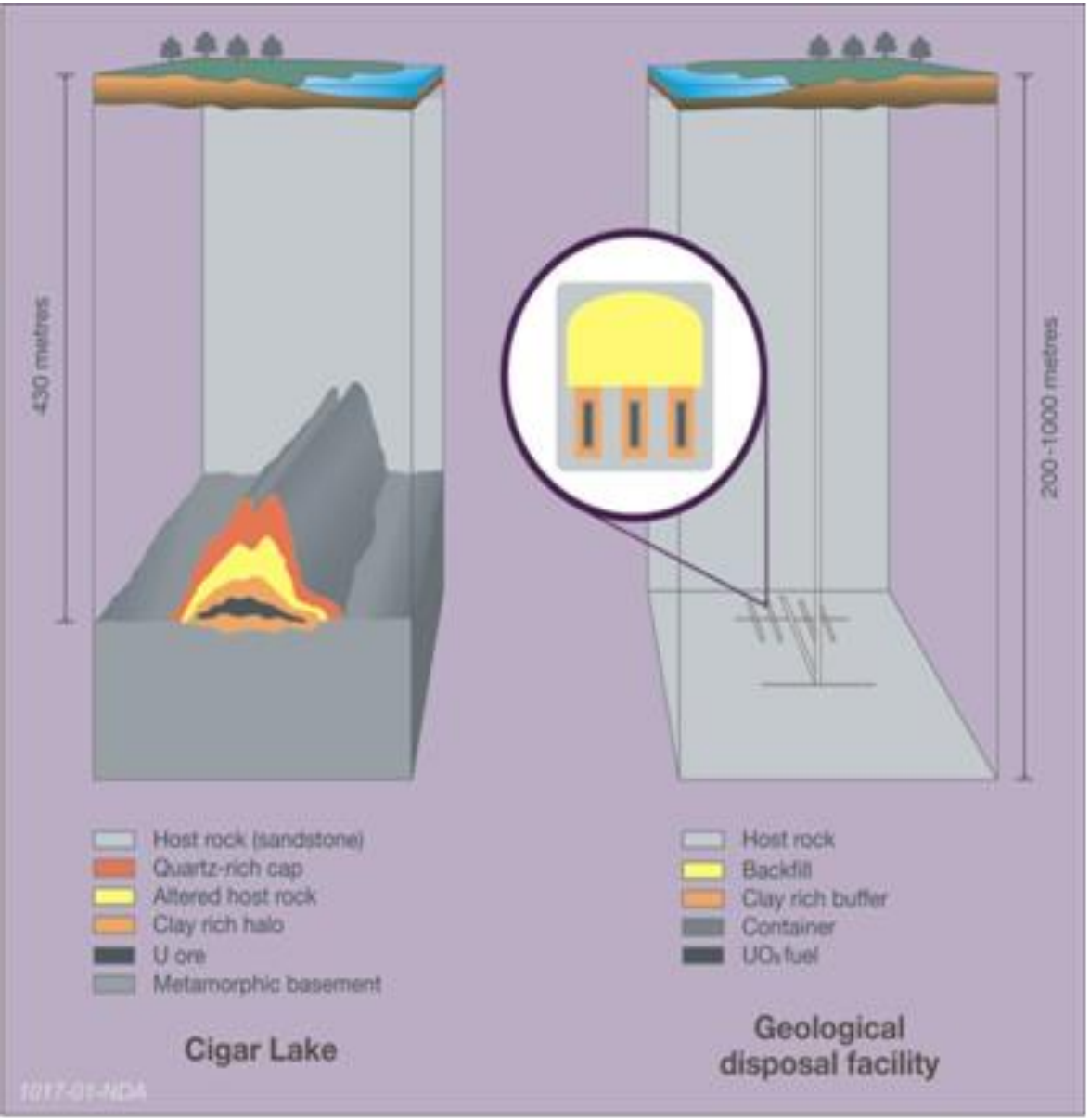
- Insight understanding
- Research understanding
- Natural analogue studies

Intrinsic safety

Safety assurance

Radioactive Waste Management

Cigar Lake, Canada – a geological analogue



- Uranium ore body formed 1,300 million years ago
- 430 metres depth
- Clay rocks surrounding ore have prevented release of uranium radionuclides to the surface
- Provides an analogue for a spent fuel disposal facility

Multi-factor Safety Case

Multi-barrier

Multiple lines of reasoning

Safety functions

- Containment in waste canister
- Wasteform, packaging
- Chemical barrier
- Geological barrier

Intrinsic safety

Safety arguments

- Insight understanding
- Research understanding
- Natural analogue studies
- Numerical modelling

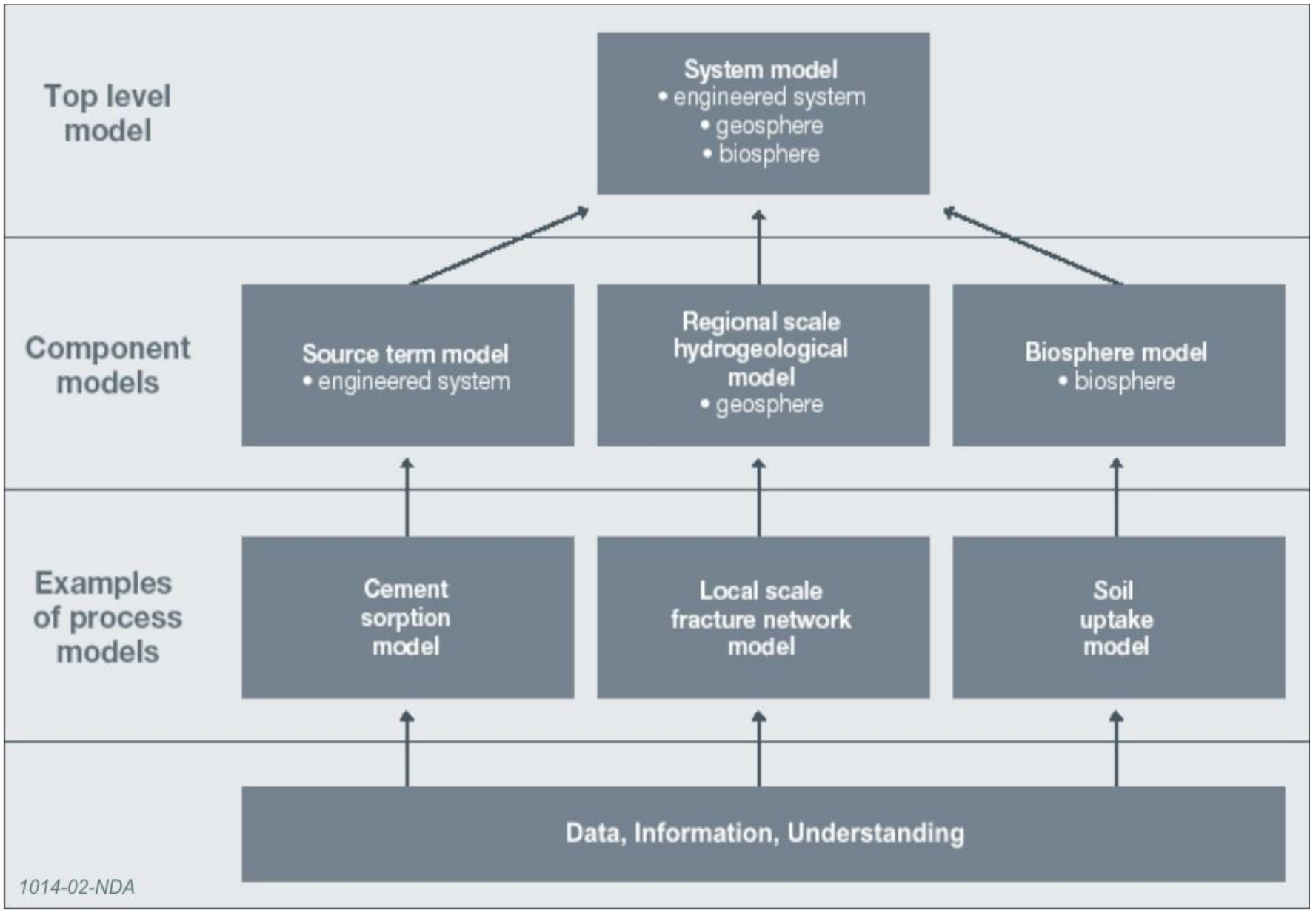
Safety assurance

Radioactive Waste Management

Assessment Approach

- Conceptual understanding of system performance
- Present understanding of normal evolution (**Base Scenario**) with reference to Knowledge Base (research)
- Identify **Variant Scenarios** based on unlikely but potentially disruptive features, events and processes (FEPs)
- Develop and parameterise descriptions of system components
- Develop and apply probabilistic Total System Models to assessment of scenarios

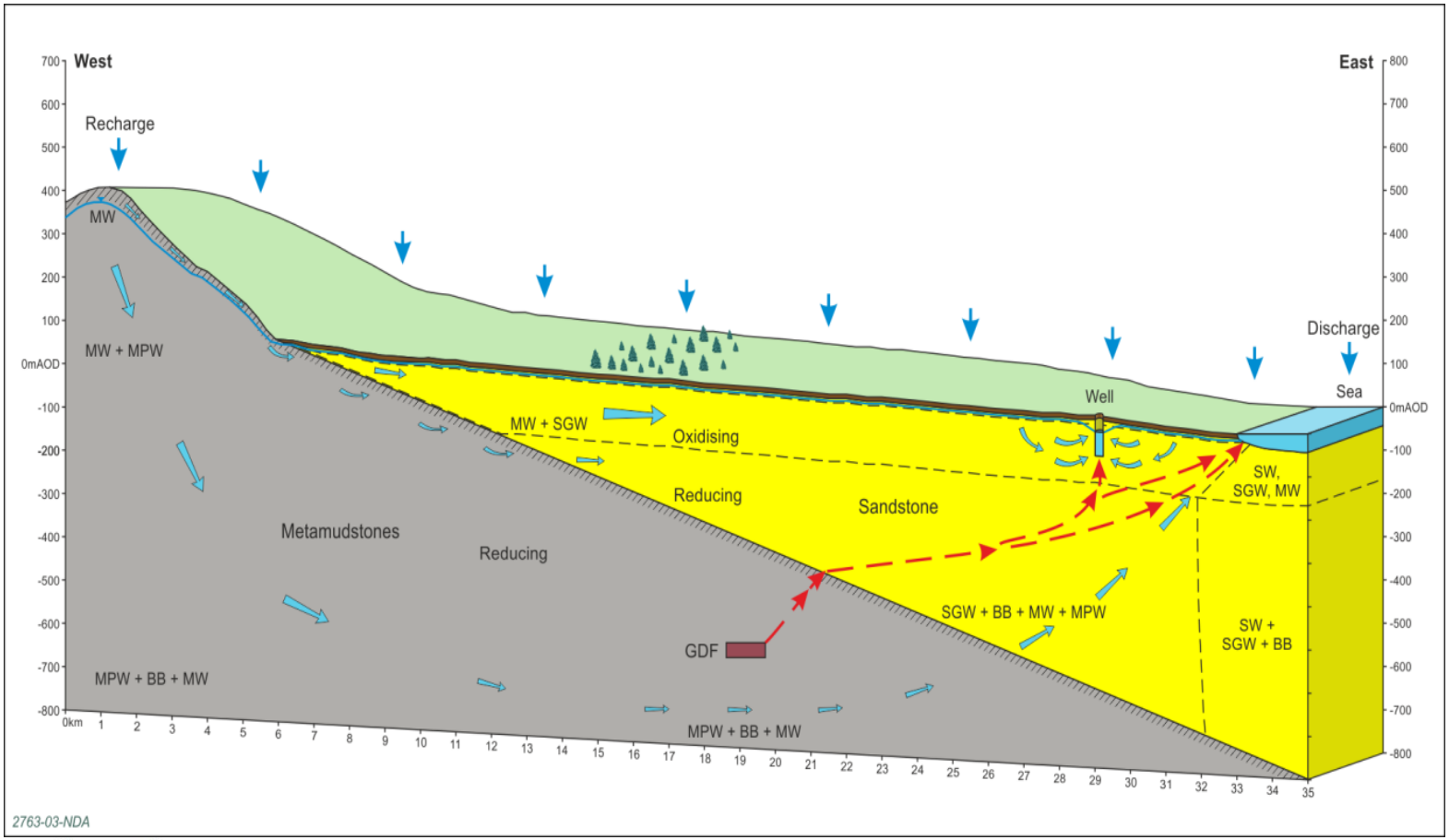
General approach to modelling



Generic UK example

- The demonstration of environmental safety of geological disposal is currently based on illustrations of plausible geological environments and engineered barrier systems for HHGW and LHGW disposal while a GDF site is sought.
- The safety concept is based on the disposal facility's barrier system providing a range of environmental safety functions that ensure long-term waste isolation and containment.
- Total system modelling supports a demonstration of how these long-term safety requirements will be met.

Generic UK example: Illustrative geological environment in higher strength rock



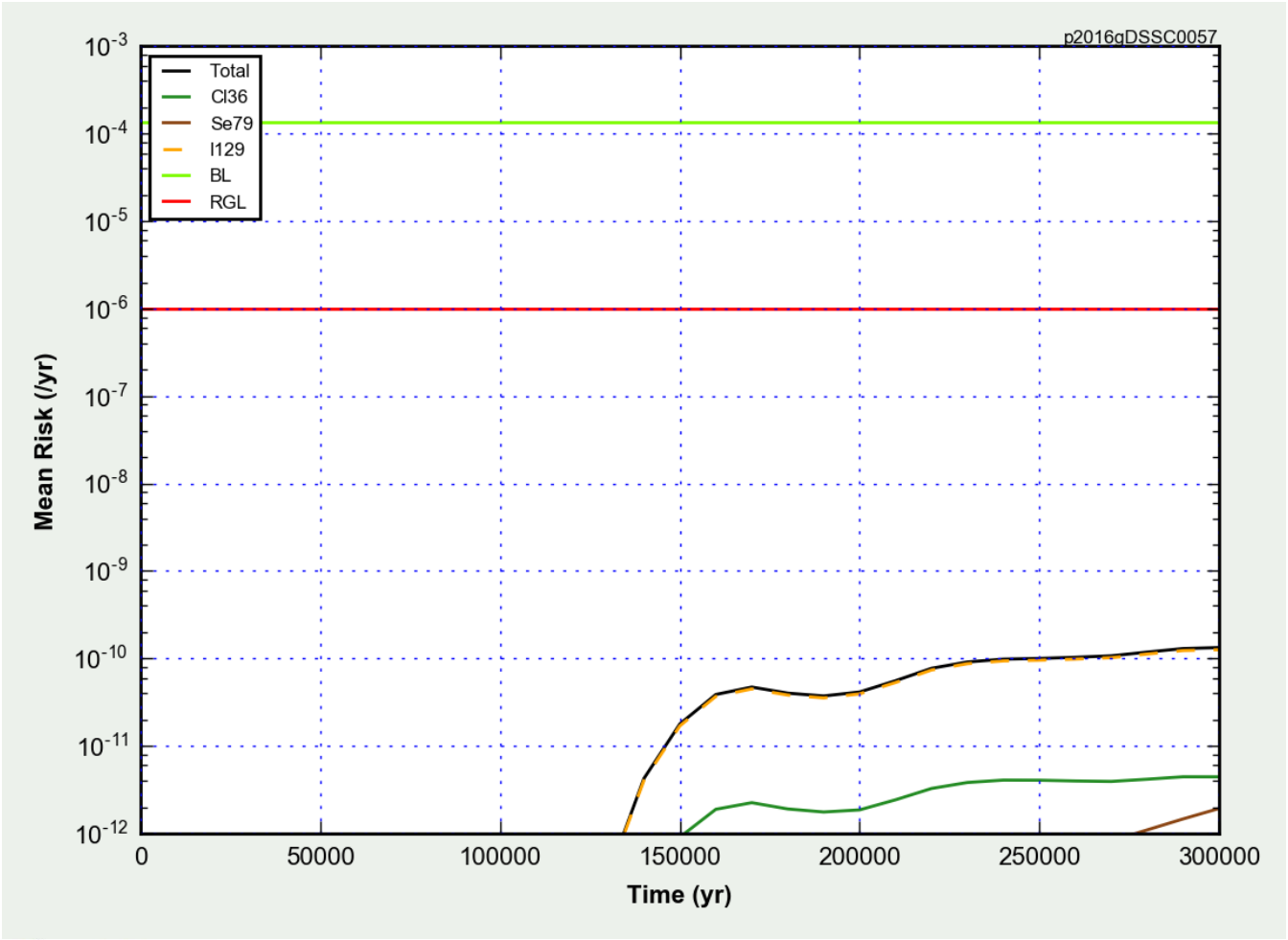
Radioactive Waste Management

Generic UK example: GoldSim TSM for HSR

- Key TSM processes
  - Advection and dispersion along illustrative pathway through fractures in the host rock and porous matrix of the sandstone cover rocks (with sensitivity to rock matrix diffusion in HSR evaluated)
  - Radioactive decay and ingrowth
  - Solubility limitation and sorption
  - Radiological exposure via marine and well pathways
- Parameter value distributions defined in RWM's Data Report
- 2,000 probabilistic realisations
- Timescales
  - 300,000 years
  - For longer periods, uncertainties associated with, for example, major climate change, such as glacial periods, may become significant
- Performance measures
  - Radionuclide activity fluxes across barriers
  - Mean radiological risk compared to background level and risk guidance level

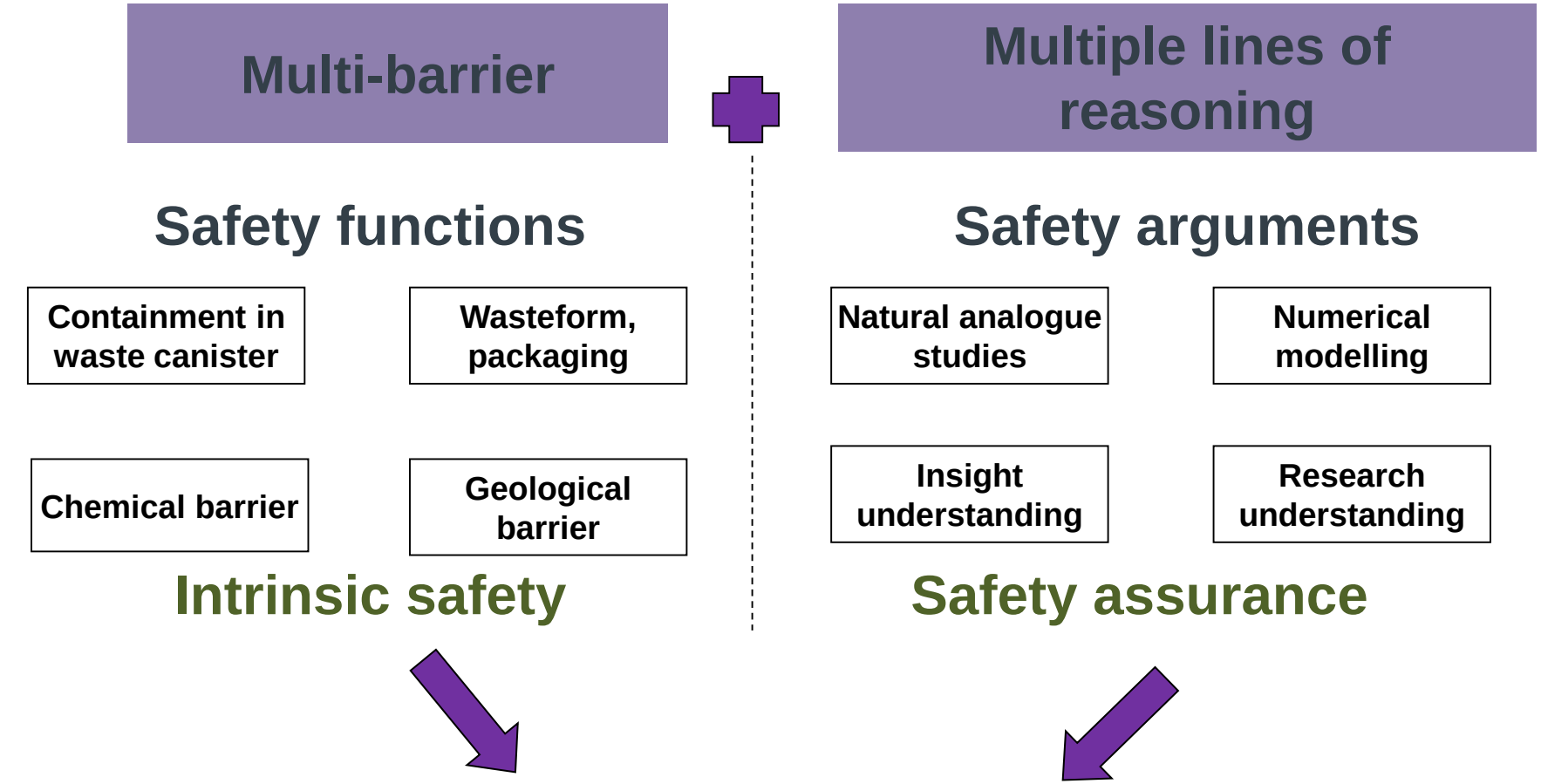
Radioactive Waste Management

Generic UK example: mean radiological risk



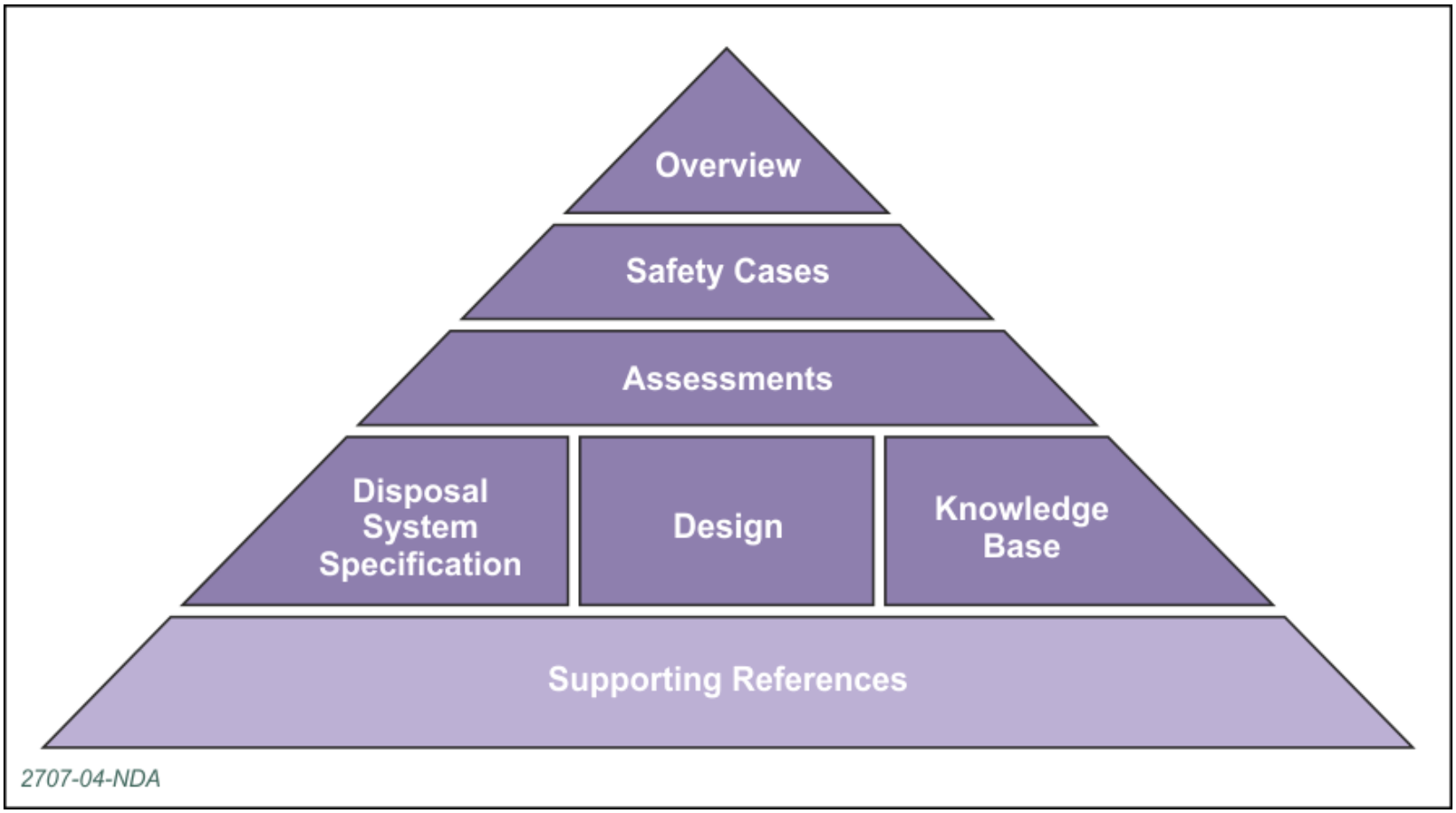
Radioactive Waste Management

Multi-factor Safety Case

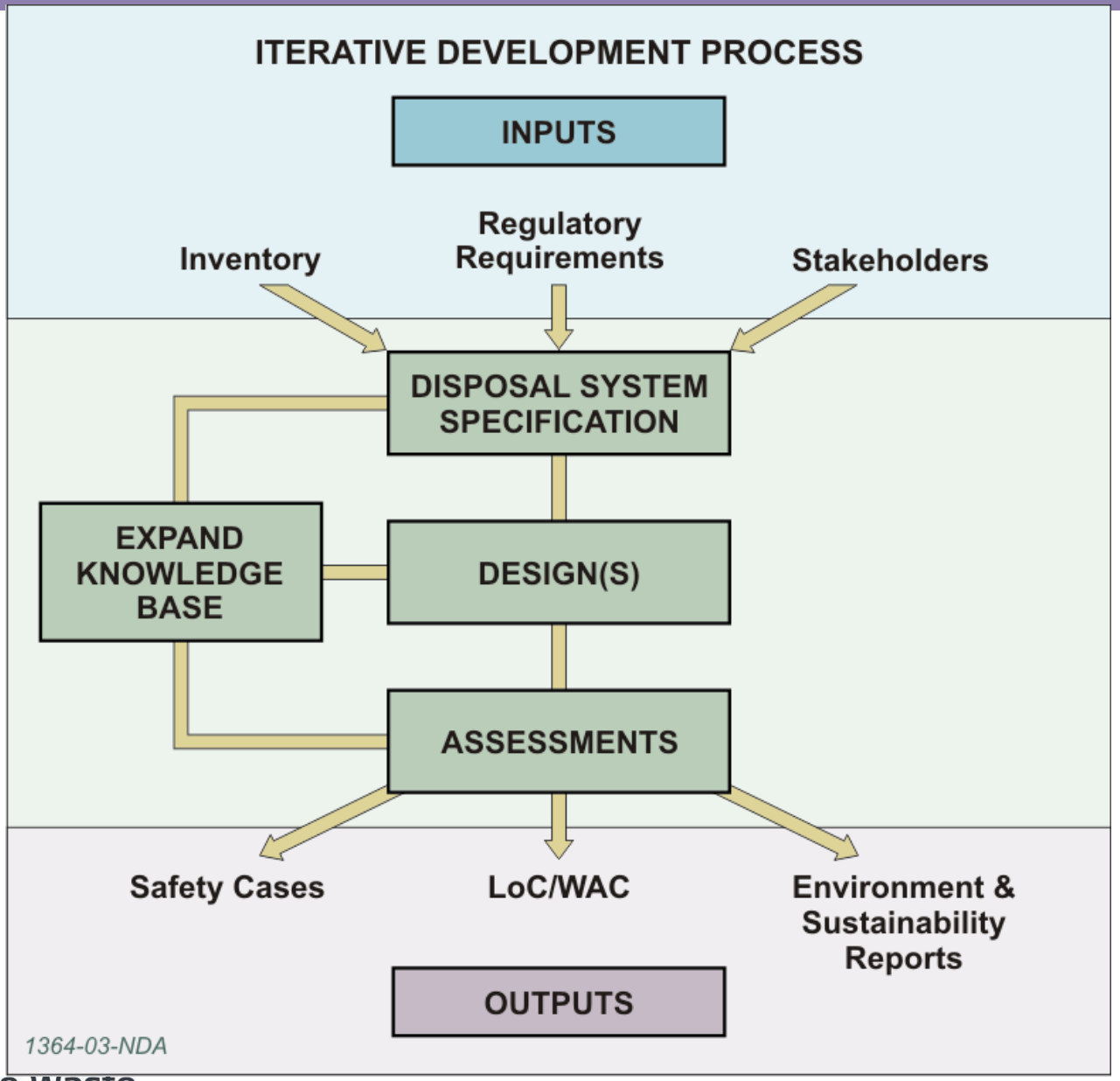


Radioactive Waste Management

Safety case structure (based on UK Generic DSSC 2016)



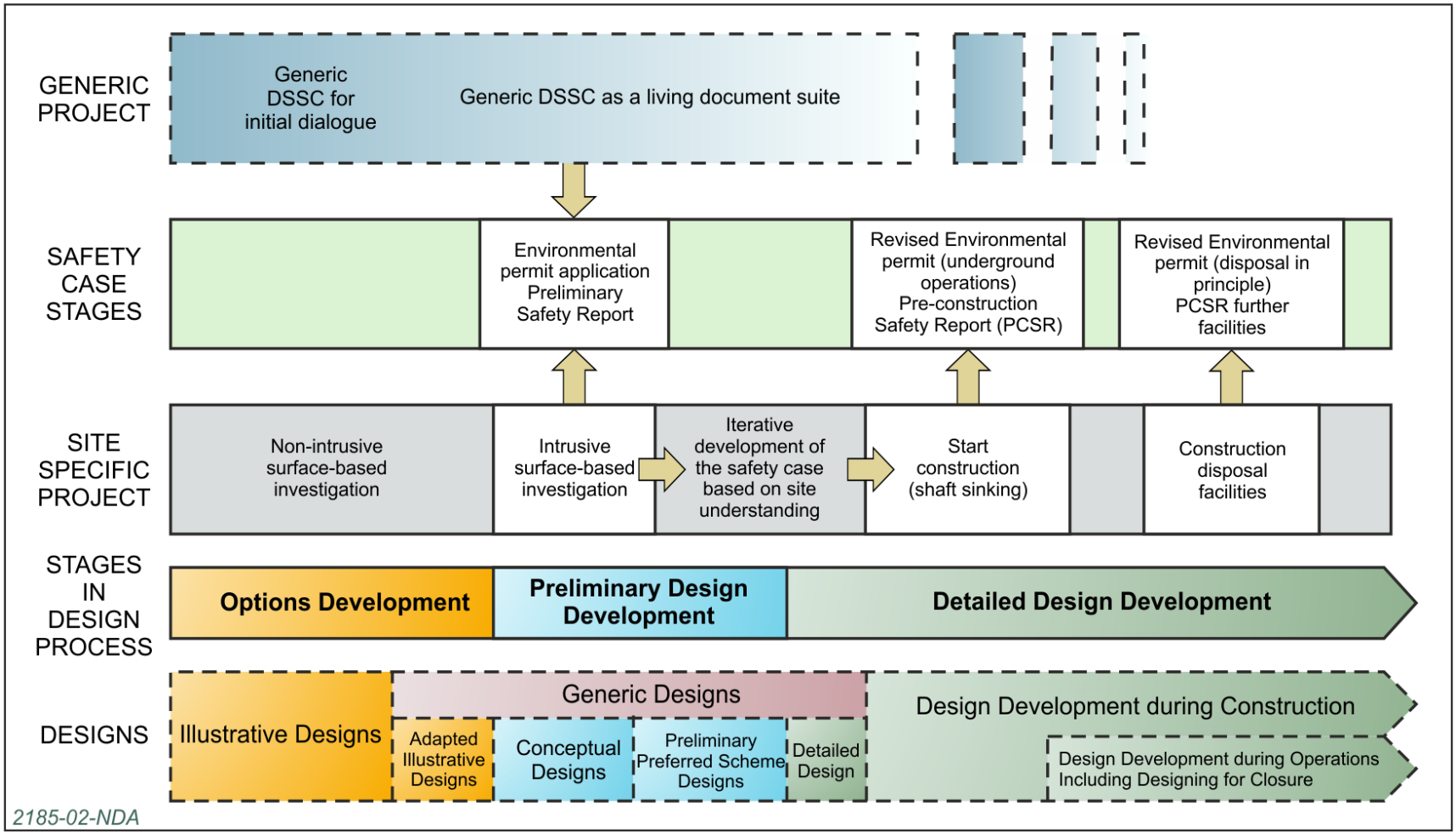
Radioactive Waste Management



Radioactive Waste Management

OFFICIAL

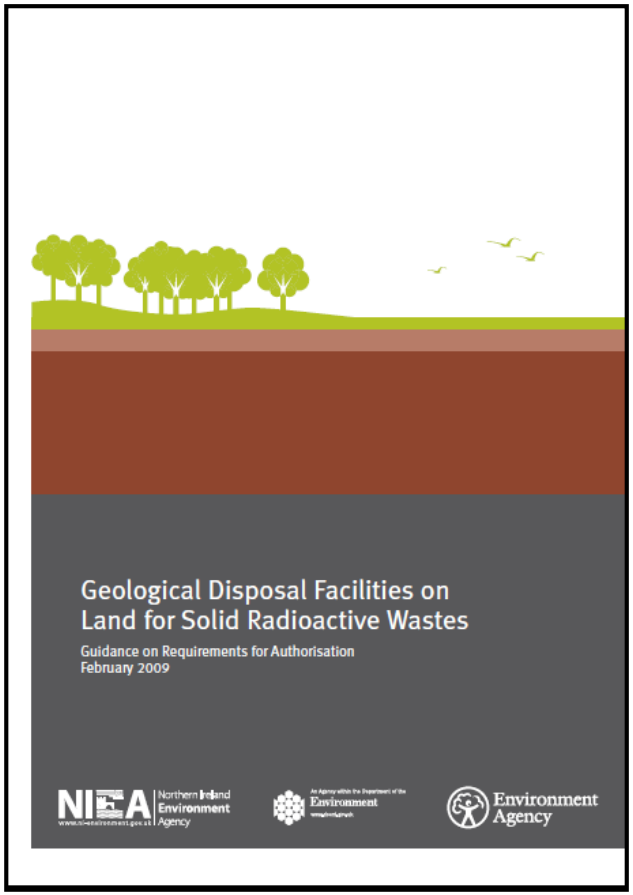
Safety Case Development (UK example)



Radioactive Waste Management

Safety case regulation

- Regulatory guidance sets out principles for a safety case and requirements that must be met
- In UK regulations, for example, there are requirements for:
  - Not relying on a single safety function
  - Multiple lines of reasoning
  - Demonstration consistency with a 10^{-6} annual individual risk guidance level
  - Demonstrating optimisation
  - Appropriate safety culture and management systems
  - Appropriate treatment of uncertainties
    - "We expect that quantifiable uncertainties will be considered within a numerical risk assessment. Unquantifiable uncertainties will also need to be taken into account in developing the case"



Radioactive Waste Management

International safety case collaboration

- OECD-NEA
  - **Integration Group for the Safety Case (IGSC)** builds and documents the technical and scientific basis for developing and reviewing safety cases
  - Strength of the IGSC derives from the diversity of affiliation, sensitivities and expertise of its members
- IAEA
  - Sets international safety standards, requirements and guides
- EC
  - Funds collaborative research across a wide range of topics related to geological disposal, including safety case methodology (e.g. EC PAMINA project)

Radioactive Waste Management

Summary

- Intrinsic long-term safety is provided through systems of multiple barriers (designed to reflect the waste type and the geological environment) that isolate and contain the wastes
- Insight understanding (application of basics physics) highlights the most important components of the barrier systems in terms of the environmental safety functions they provide in different geological environments
- Hierarchy of models enables assessment of barrier performance
- A safety case is a collection of all the arguments that build confidence in the safety of a geological disposal facility:
  - Including the facility design, intrinsic safety provided by multiple barriers, understanding of safety functions, evaluation of performance, supported by underpinning research and management of uncertainties
- Safety cases are regulated and there is much international collaboration to build confidence in safety case approaches and delivery

Thank you!
Any questions?

lucy.bailey@nda.gov.uk

Radioactive Waste Management

Radioactive Waste Management

IOP | Institute of Physics
Nuclear Industry Group

Geological Disposal: Next Steps

Natalyn Ala
GDF Siting Director

13 July 2016

Radioactive Waste Management

the nuclear institute
north west branch

Why do we need a GDF?

Radioactive waste is currently held in 30 secure surface stores across the UK, but this is not sustainable over the long term. We have all benefitted from the technology and it is now time to find a permanent solution.

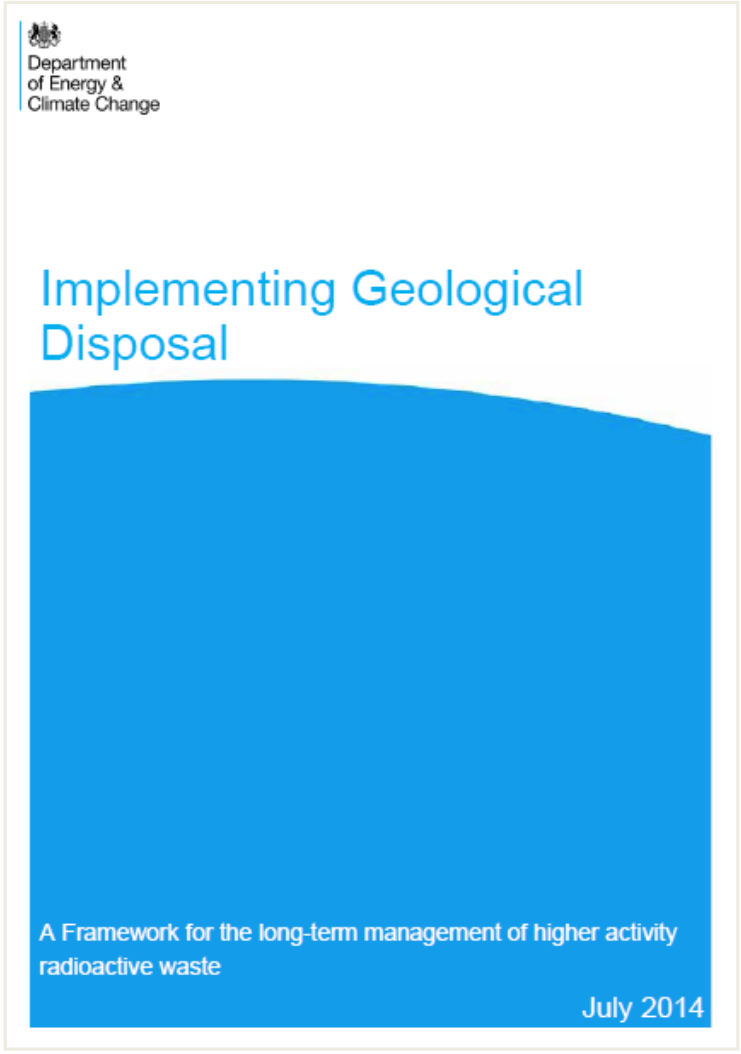
Geological disposal provides a safe, highly engineered facility designed to contain and isolate the waste.

We must remove the burden from future generations and act now to provide a better future for this and future generations.

Radioactive Waste Management

Policy framework

- Published July 2014
- Sets out the UK Government's framework for managing higher activity radioactive waste
- Updates and replaces 2008 MRWS White Paper
- Sets out a clear plan and timescales to address some remaining concerns and help communities participate
- Sets out **Initial Actions**
- Designates RWM as the developer responsible for implementing geological disposal



Radioactive Waste Management

Radioactive Waste Management

Initial Actions

- Based on willingness of local communities to participate
- Recognises importance of providing upfront information (geology, socio-economic impacts and community representation/ investment)

Initial Actions

- Amendments to national land-use planning arrangements for GDF and boreholes (DECC)
- Providing greater clarity on how DECC/RWM intend to work with communities (DECC)
- A national geological screening exercise (RWM)

Initial Actions: Update

National Geological Screening

- Published screening Guidance after public consultation
- Guidance endorsed by Independent Review Panel
- British Geological Survey (BGS) now collating data for community use

Land Use Planning

- GDF designated a Nationally Significant Infrastructure Project
- DECC expect to consult on draft National Policy Statement (NPS) before end 2016

Working With Communities

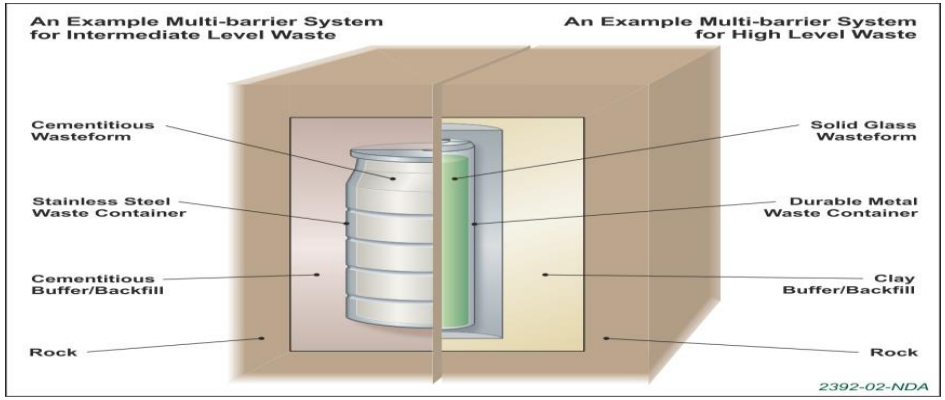
- DECC drafting policy and anticipating public consultation before end 2016

Radioactive Waste Management

What is a geological disposal facility?

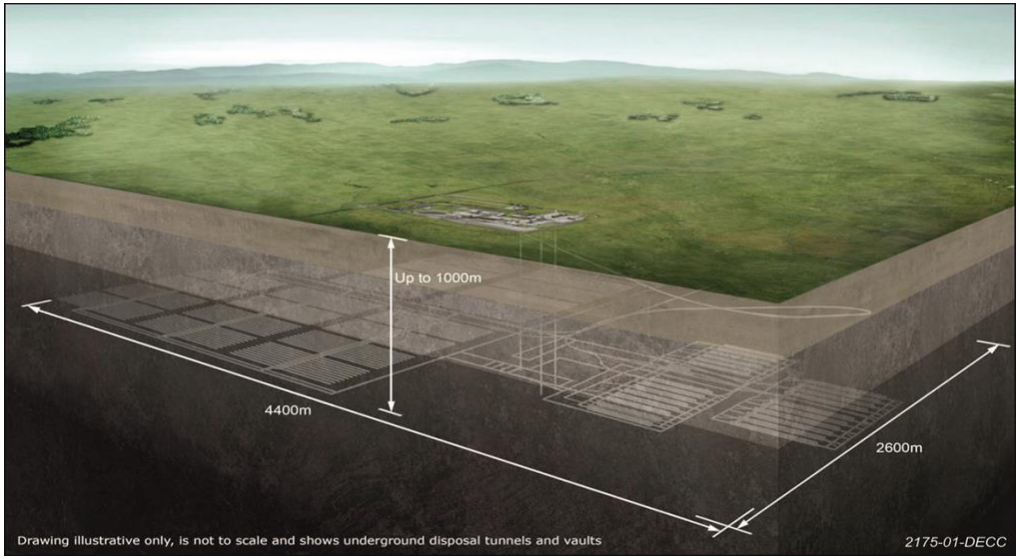
Containment

- Contain waste in multi-barrier package
- Place package in engineered underground facility



Isolation

- 200-1000m underground to protect from future glaciations
- As packages decay, surrounding rock provides long-term protective barrier



Radioactive Waste Management

National geological screening

Provide authoritative information that can be used in discussions with communities and may help RWM focus its engagement activities.

Screening will:

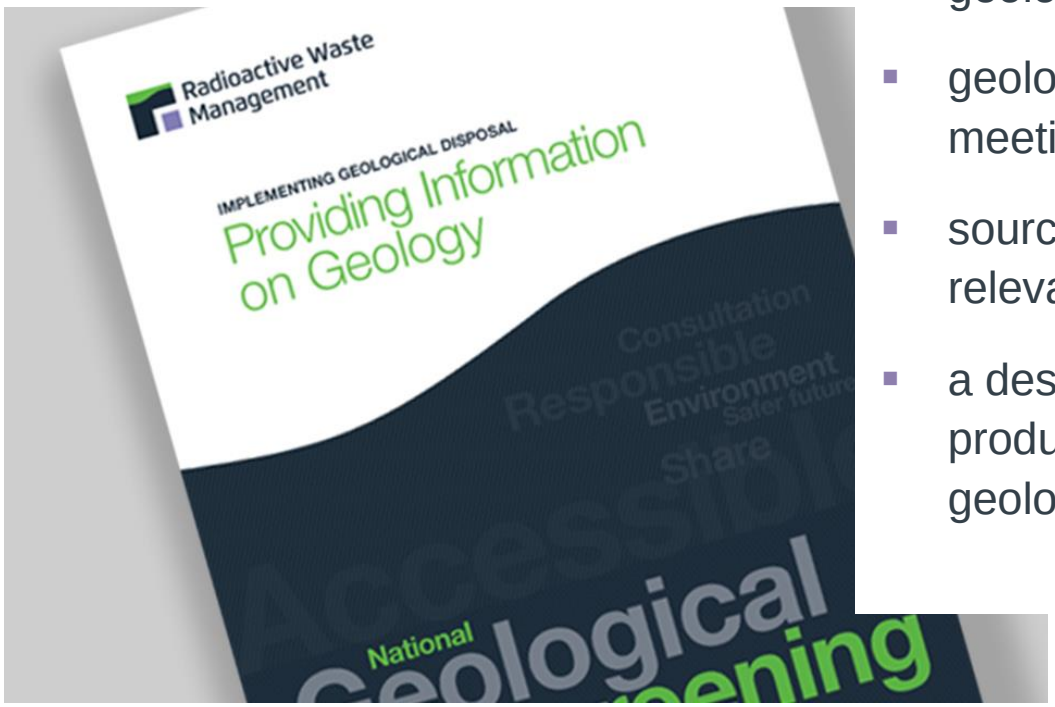
- focus on long-term environmental safety of a GDF
- draw on the requirements in the existing Disposal System Safety Case
- consider existing geological information only

Screening will not:

- definitively rule all areas as either ‘suitable’ or ‘unsuitable’
- target individual sites
- select sites
- replace statutory processes

Radioactive Waste Management

National geological screening



The Guidance comprises:

- the safety requirements to which the geological environment contributes
- geological attributes that are relevant to meeting these safety requirements
- sources of existing geological information relevant to understanding these attributes
- a description of the outputs that will be produced based on this existing geological information

Radioactive Waste Management

National geological screening

Topics and Attributes

The NGS Guidance identifies a number of long-term safety requirements and the geological attributes that are relevant to meeting them. These attributes fall into five geological topics:

- Rock Type
- Rock Structure
- Groundwater
- Natural Processes
- Resources

Rock Types

- Lower strength sedimentary rocks
- Higher strength rocks
- Evaporites

Potentially suitable host rock types:

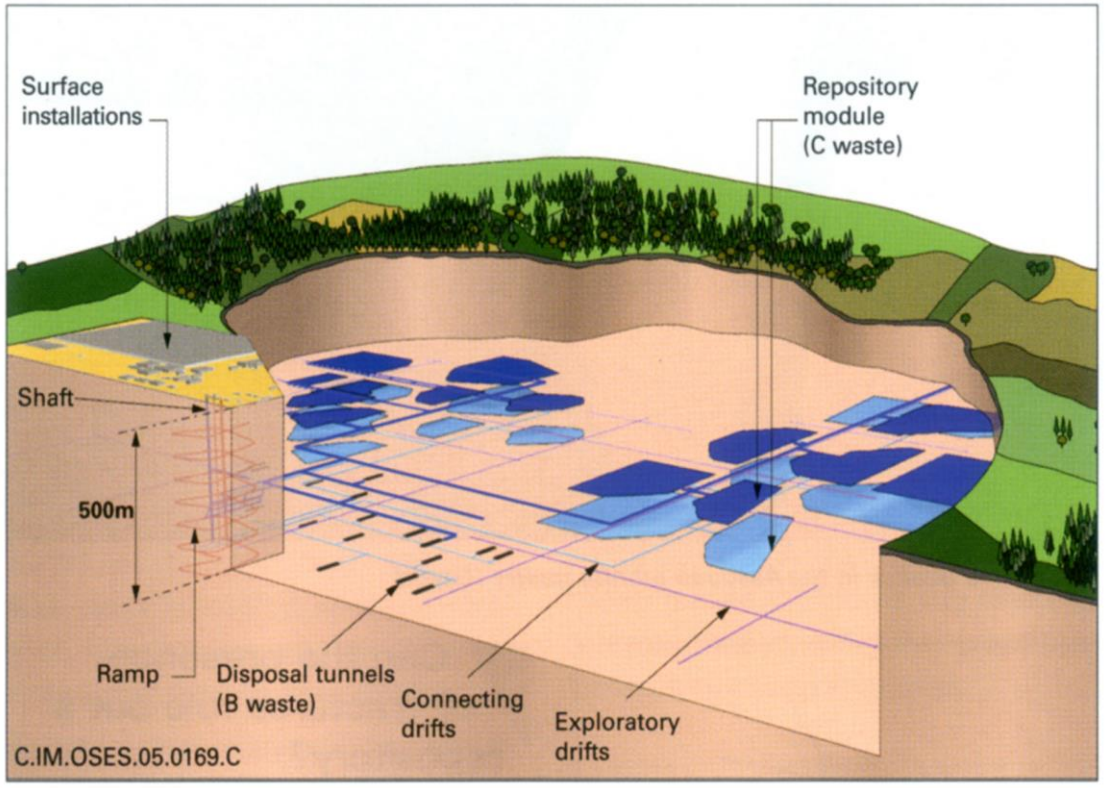
Lower Strength Sedimentary Rocks (e.g. clays, mudstones)

Jurassic mudstone
c.450 m:
Bure, France

Radioactive Waste Management

Potentially suitable rock types:

Higher Strength Rocks (e.g. granite, slate)

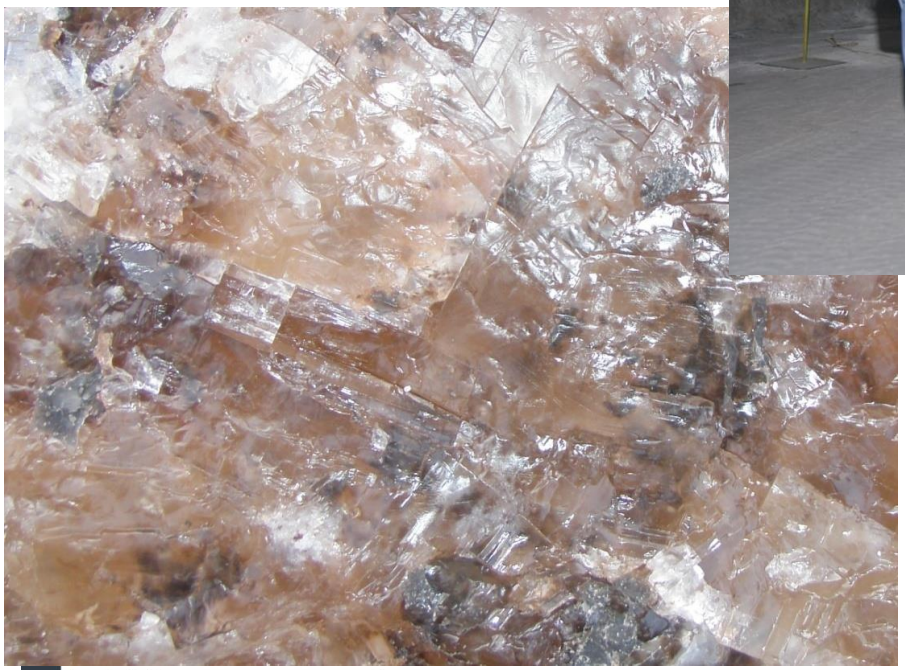


Äspö granite, Sweden

Radioactive Waste Management

Potentially suitable rock types:

Evaporite



WIPP Site:
Rock salt
USA

Rock salt (halite):
Germany

Initial Actions: Update

National Geological Screening

- Published screening Guidance after public consultation
- Guidance endorsed by Independent Review Panel
- British Geological Survey (BGS) now collating data for community use

Land Use Planning

- GDF designated a Nationally Significant Infrastructure Project
- DECC expect to consult on draft National Policy Statement (NPS) before end 2016

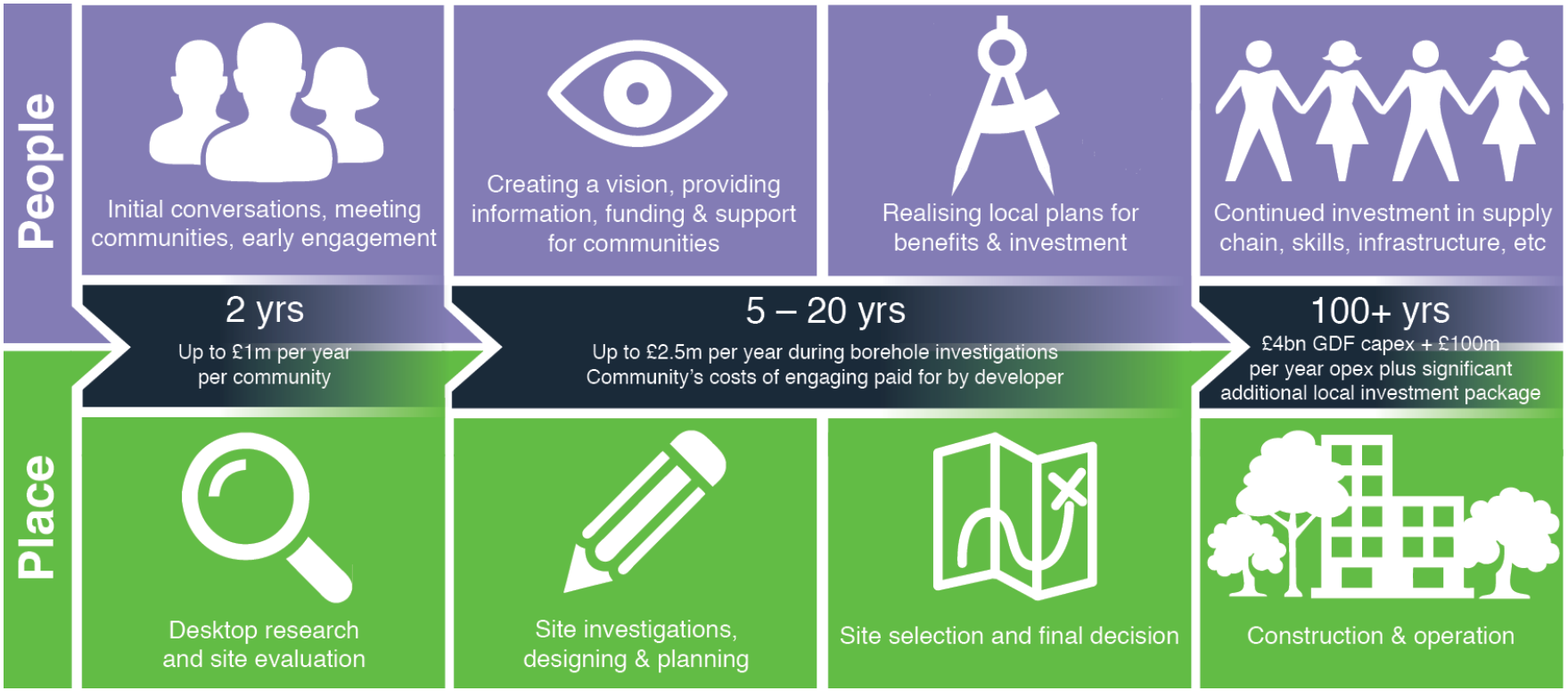
Working With Communities

- DECC drafting policy and anticipating public consultation before end 2016

Radioactive Waste Management

Geological Disposal

Working in partnership with communities



Radioactive Waste Management

Why is it important?

- Environmentally sound: removes waste from surface and places deep underground – “ice age proof”
- Economic sense: unburdens future generations from costs and risks of maintaining surface storage facilities
- Infrastructure investment: provides a potentially transformative investment opportunity for host community, creating focal point for additional jobs, growth and long-term local/regional economic stability
- New nuclear: requirement to have a programme for permanent disposal
- Investment stability: able to more accurately forecast future costs of decommissioning and waste disposal for investors in new nuclear

Socio-economic and political challenges

- GDF policy based on a consent-based approach with willing community having right of withdrawal at any time during the siting process
- Attract and retain community buy-in and support over a very long time period, and eventually secure a host community
- Certainty of funding and delivery during siting and the 150-year life of the GDF, insulated from political/ electoral cycle
- Appropriate delivery framework to partner with a community which commands ‘legitimacy’ over long time period
- Sustainable community and integrity of ownership of GDF for 150+ years

Key next steps prior to launch

- Complete Initial Actions
- Create compelling socio-economic proposition for prospective host communities
- Build RWM's capability and capacity to deliver GDF as a major infrastructure project
- Develop open, transparent, consultative approach to build trust with all stakeholders, especially local communities
- Develop a business case supporting the long-term investment that attracts and secures a host community

Radioactive Waste Management

Creating opportunities

Radioactive Waste Management

Keeping in touch

- Please feel free to ask any questions either now or on a one to one basis
- Alternatively you can contact GDFenquiries@nda.gov.uk
- You can visit our website at: www.gov.uk/rwm
- For regular updates please subscribe to our e-bulletin news alerts at: https://public.govdelivery.com/accounts/UKRWM/subscriber/new

Radioactive Waste Management