

R&D for geological disposal:

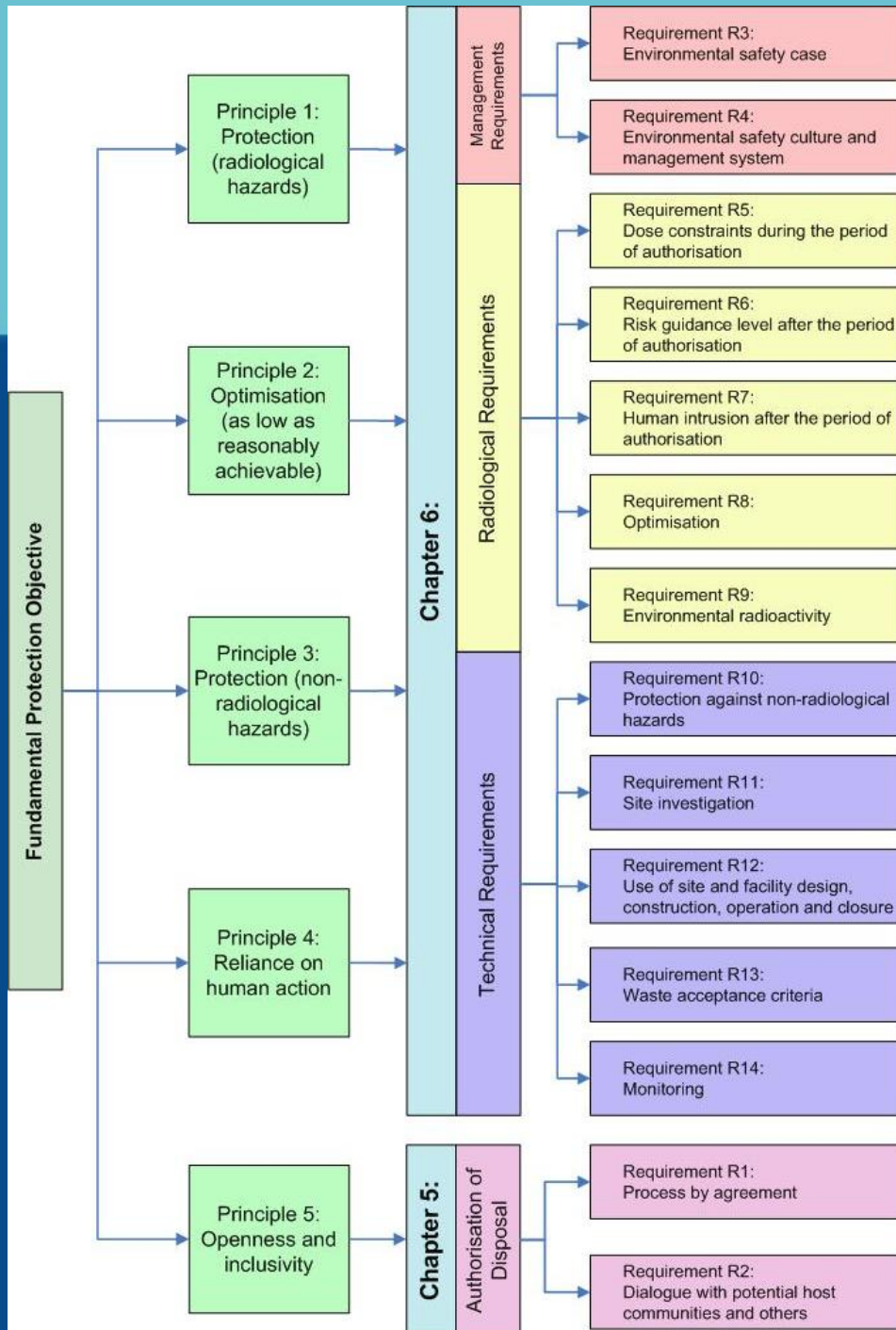
**The role & expectations of the
Environment Agency**

Overview

- Our role in R&D activities for a Geological Disposal Facility (GDF)
- Broad expectations for developer's R&D activities
- Our own research to inform regulatory activities

Our role

- We are the environmental regulator for radioactive waste disposals in England & Wales
- GDF will require an Authorisation for radioactive waste disposal
 - Other environmental permits (e.g. mining wastes, water abstraction)
 - Nuclear site licence from HSE
 - Must satisfy DfT requirements at the time of transport across public domain
 - Regulators working together, joint website



GRA

- We (& NIEA) recently issued revised Guidance on Requirements for Authorisation for developers of GDFs
- Sets out:
 - Fundamental protection objective
 - 5 principles to be followed
 - 14 requirements to meet if we are to authorise disposal to a specified GDF

ESC

- Requirement 3 is that developer must provide an Environmental Safety Case (ESC):
 - To show that members of public & environment adequately protected, both at time of disposal & in future
 - close link with operational safety case for HSE/NII
- We will expect the ESC and associated activities to be supported by R&D (and demonstration) as appropriate

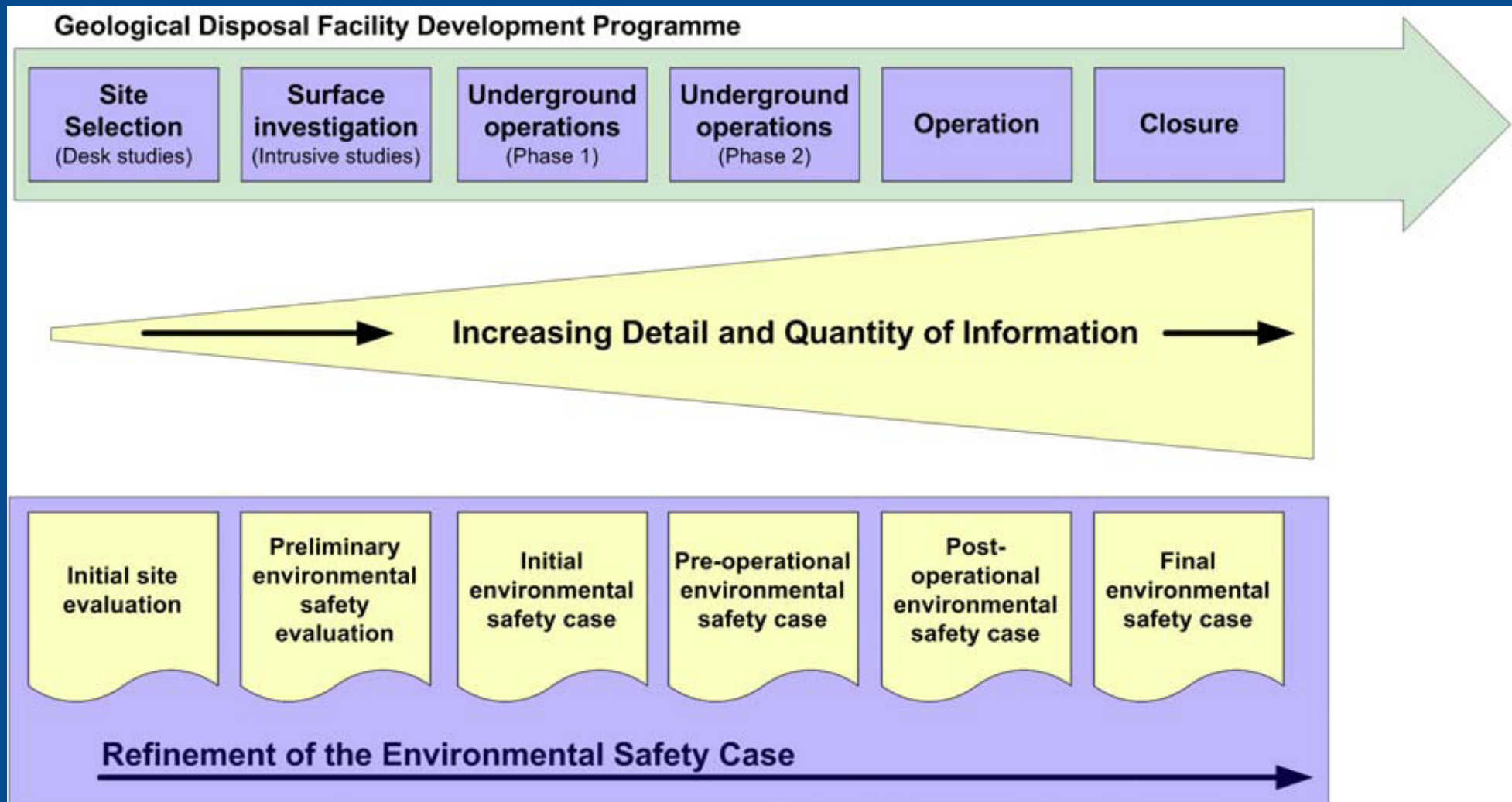
Staged authorisation

- We expect a staged authorisation process
 - Government has proposed legislative change to enable
 - Hold points beyond which regulatory approval is required to proceed
 - Updated ESC required at each hold point
 - We may specify R&D work required to be carried out by the developer before the next hold point
- (Otherwise – we will expect similar process by agreement)

Programme timescales

- Long timescale for GDF development
- Not expecting all answers at start
 - Right answers at right time
 - More qualitative views, on feasibility at start (?)
 - More quantitative as programme progresses
- Evolving programme of R&D, increasing knowledge

Information timeline



Examples of what we wish to see in the developer's ESC

- Quality science, robust, unbiased
- Good engineering practice - tried & tested?
 - leading edge & blue sky possible but need timely reduction of uncertainties and demonstration
- Identification & management of uncertainties (residual?)
- Passive safety principles
- Validation of models, theory
- Robust (multiple?) lines of argument, peer review, links to international work
- Demonstration of optimisation

(importance of non technical aspects in decision making)

Examples of potential R&D areas

- Co-location of ILW & HLW/spent fuel
- Conceptual repository designs (e.g. optimisation, layout)
- Novel wasteforms, alternatives (Pu, graphite?)
- Testing & demonstration of modelling predictions (e.g. barriers, groundwater, gas, sorption, URL?)
- Parameter changes with time
- Effects in real systems (e.g. heterogeneity, impure phases, kinetic effects)
- Effects of microbial activity (e.g. degradation, corrosion)

Our engagement with RWMD

- We have annual programme to scrutinise RWMD's GDF programme
 - Our annual report available
 - Includes their R&D work as appropriate (e.g. gas, package longevity, fissile limits)
- Our response to early draft RWMD R&D strategy for GDF is available on our website
- Need for clear definition of questions & uncertainties for R&D to tackle, and the decisions it will support

Our research

- Aimed at informing our regulatory position
 - Efficiently target and lever our (limited) resources
- Comprises:
 - Projects funded by us
 - International collaboration (e.g. EU, NEA, regulators)
 - National & international workshops & conferences
 - Our work in scrutinising RWMD programme & disposability on licensed nuclear sites

Examples of our research projects

Feasibility and implications of reworking ILW packages

Technical issues associated with deep repositories in different geological environments

Understanding controls on the performance of repositories for HLW and spent fuel

Approaches to assuring the disposability of radioactive waste packages

Assessing the characterisation of geological environments for repository implementation

Summary

- Responsibility for GDF R&D is primarily a matter for developer
- Our responsibility is primarily to ensure the suitability of the ESC the R&D supports
- (and our own capability)
- R&D and demonstration needs will ramp up