Using natural analogues to build stakeholder confidence in geological disposal

Presentation to 13th NAWG Meeting
Cyprus May 2011

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Nuclear Decommissioning Authority

Catalogue of natural analogue data

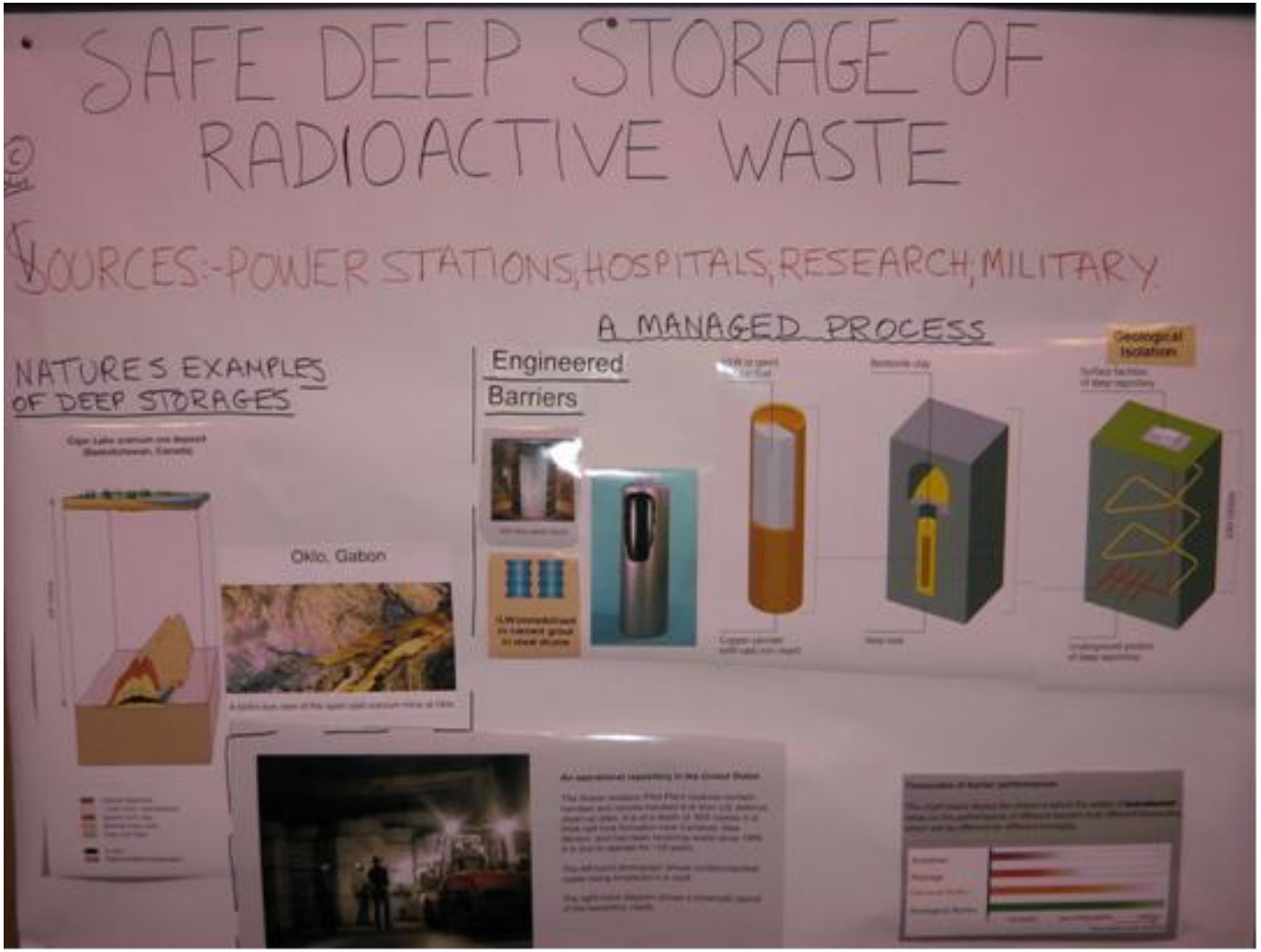
- **Aim**
  - Set of ‘flyers’ summarising key points for general audience
- **Scope**
  - All aspects of disposal relevant to UK situation
    - HLW, ILW, range of geologies and concepts
    - ‘Classical’ analogue projects
    - Natural system data
- **Exclusions**
    - ‘Field experiments
    - URL studies

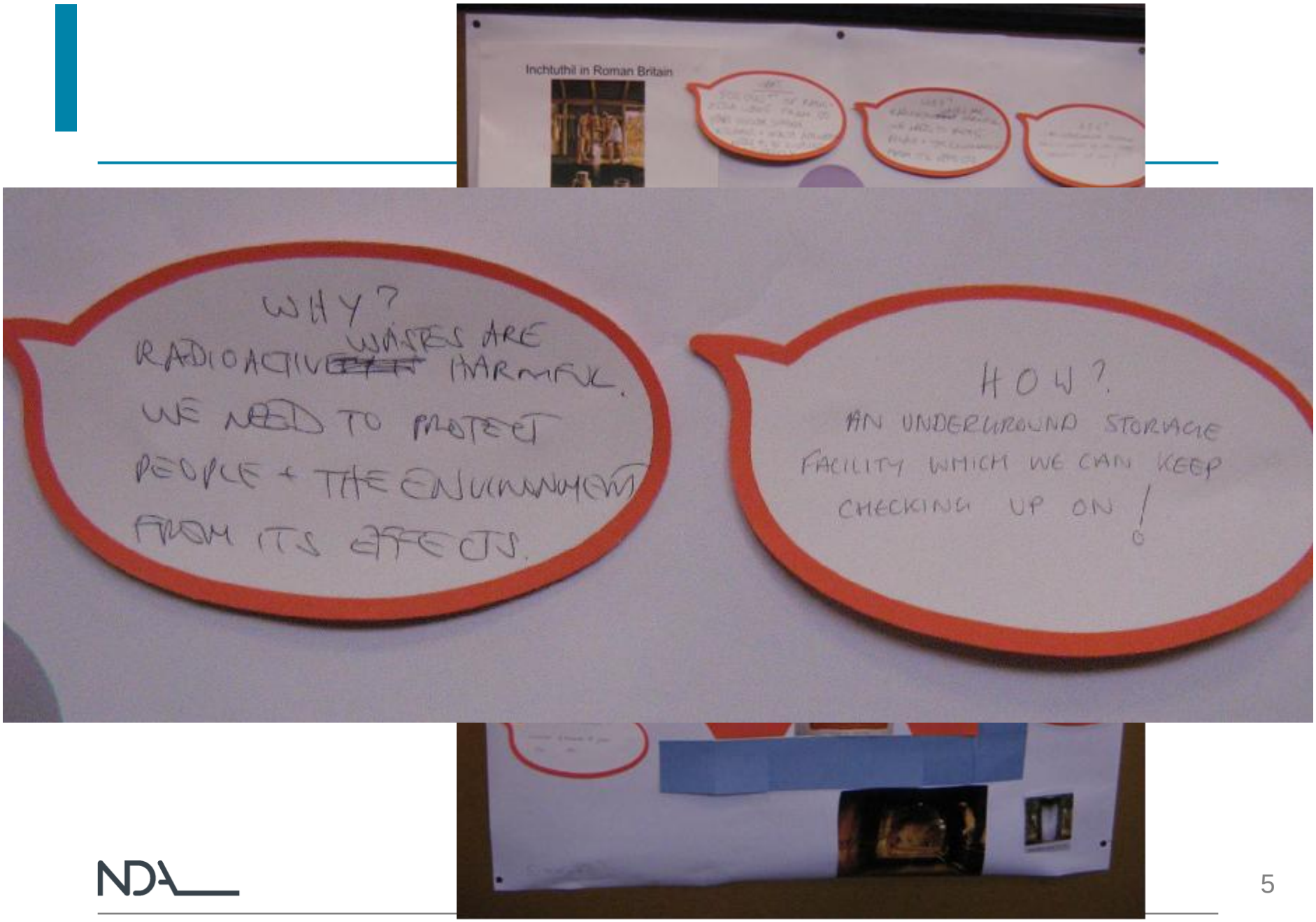
PAMINA stakeholder workshop

Research into the effectiveness of different methods for communicating the safety case to stakeholders

- **When?**
  - 17th October 2007, in Manchester, UK
- **Who?**
  - 14 stakeholder participants
  - Led by NDA and facilitated and reported on by Galson Sciences Ltd
- **Highly interactive - presentations, posters, video**

The Results ….


SAFE DEEP STORAGE OF
RADIOACTIVE WASTE
SOURCES:-POWER STATIONS, HOSPITALS, RESEARCH, MILITARY
A MANAGED PROCESS
NATURES EXAMPLES
OF DEEP STORAGES
Oklo, Gabon
Engineered
Barriers
Geological
Isolation


Inchtuthil in Roman Britain
WHY?
RADIOACTIVE WASTES ARE HARMFUL.
WE NEED TO PROTECT
PEOPLE + THE ENVIRONMENT
FROM ITS EFFECTS.
HOW?
AN UNDERGROUND STORAGE
FACILITY WHICH WE CAN KEEP
CHECKING UP ON!

Stakeholder views on natural analogues

- **Seen as a useful component in presenting a safety case, but not by themselves**
- **More helpful to explain issues, than provide reassurance**
  - "…you need to explain why you have confidence in a bunch of rusty nails and an old Roman wall."
- **Both workshop groups chose to use natural analogue examples in their poster designs**
  - Cigar Lake and Oklo as examples of natural 'storage' of radioactivity
  - Roman helmet as an example to highlight corrosion issues

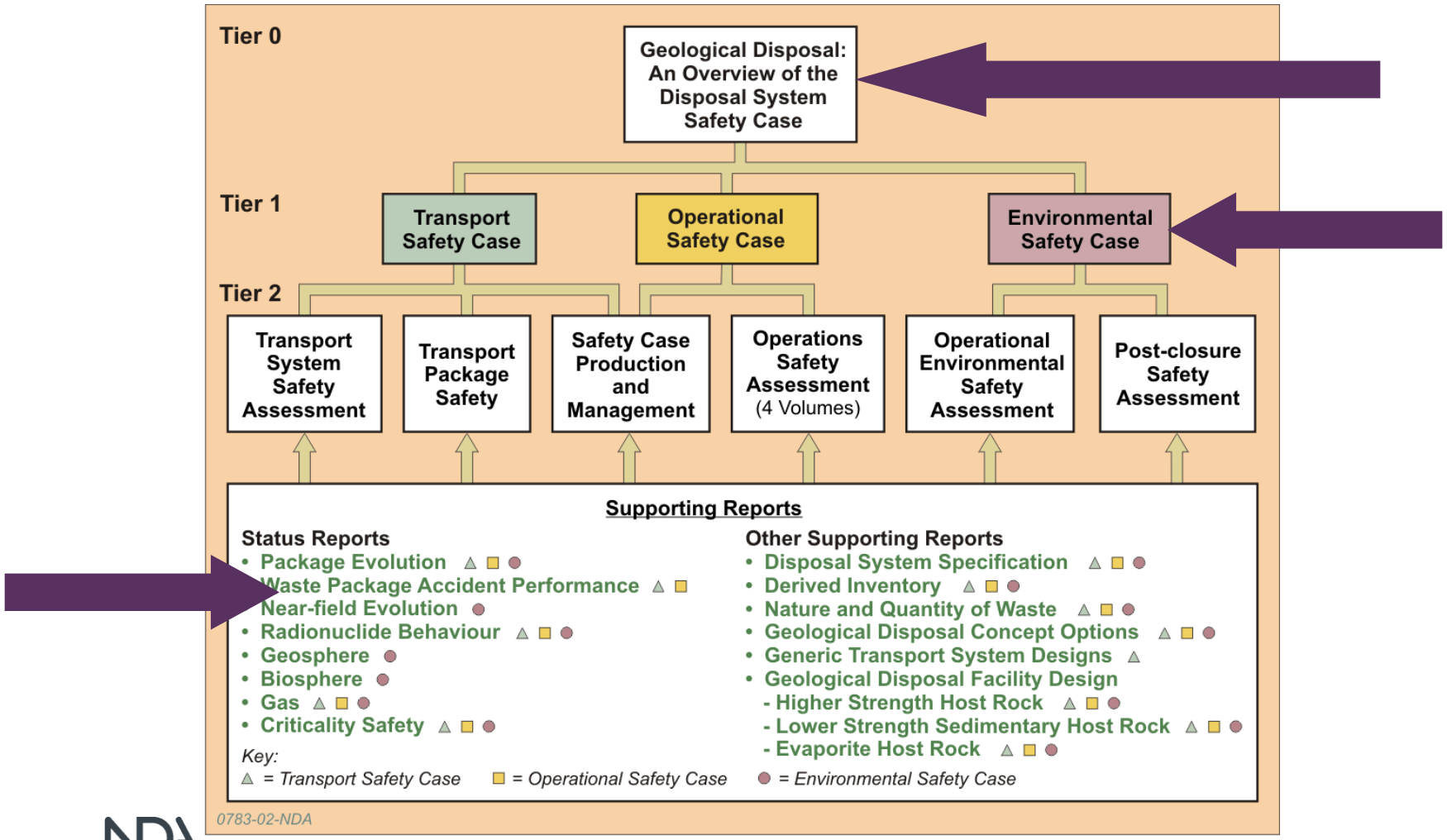
Generic DSSC

- **Suite of documents published in 2011 which address:**
  - packaging of waste
  - transport of waste to the facility
  - construction and operation of the facility
  - long-term environmental safety after facility has been closed
- **Prepared to**
  - provide confidence that higher activity wastes can be safely disposed of in a GDF
  - provide a basis for disposability assessments of waste being packaged now
  - provide a basis for desk-based studies
  - provide a basis of scrutiny of our work stakeholder comments and input,
  - identify research and site characterisation needs

Use of natural analogues

- **Demonstrating/ Communicating long-term safety**
  - ‘Alternative’ lines of reasoning
- **Providing understanding of long-term and/or large scale processes**
  - Cement/rock interaction
- **Model testing/validation no longer considered as important**
  - Boundary conditions often poorly -constrained

Generic DSSC suite of documents



Communicating long-term safety

Lessons learned on natural analogues

- **Used to:**
  - Explain concepts
  - Make comparisons with familiar and/or natural systems
  - Provide alternative, non-numerical line of reasoning
  - Provide evidence of behaviour over very long timescales, that cannot be achieved in the laboratory
- **Potential dangers of analogues:**
  - Conditions may not replicate those found in a repository
  - May be negative as well as positive analogues
  - Analogues may be taken too far