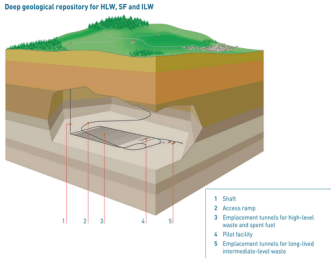
Symposium on International Safeguards: Linking Strategy, Implementation and People



Geological Repository Safeguards: Options for the Future

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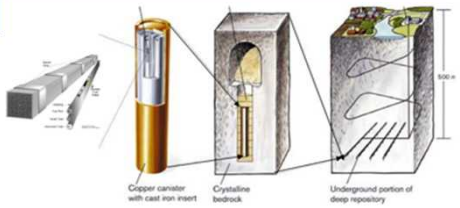

Geological repositories present new challenges and opportunities for the future of international nuclear safeguards.

Opportunities:

- Improve SBD
- Harmonize 3S
- C/S: A primary, long-term safeguards approach?

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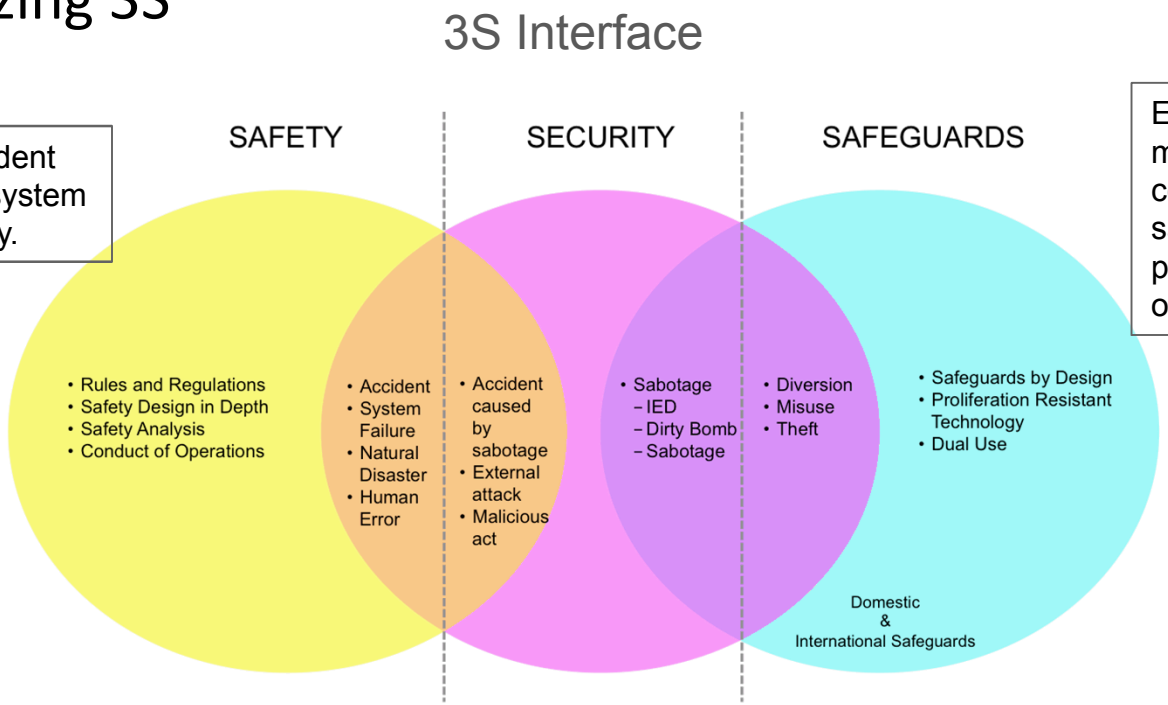
Opportunities for Repository Safeguards

- Safeguards by Design (SBD)
  - Opportunity to demonstrate long-term commitment to sustainability of international nuclear safeguards at a repository
- Harmonizing 3S

Example 1: Security incident could serve as warning system for safeguards and safety.



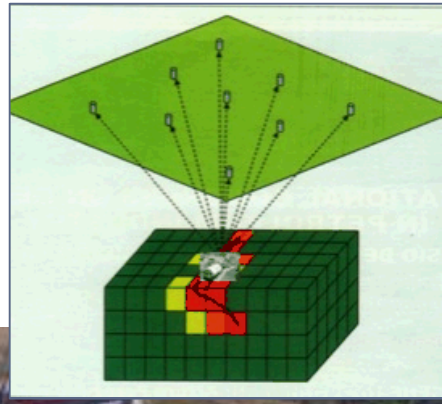
Example 2: SBD monitoring systems could inform safety/security procedures in event of diversion.

- C/S: A primary safeguards approach?

Opportunities for Containment and Surveillance

- C/S as primary safeguards approach…
  - After final accountancy verification, emplacement, and closure, limited access below ground
  - Safeguards must rely exclusively on maintaining CoK
  - Remote monitoring and C/S will be heavily relied upon in long-term
    - Surveillance
    - Seismic/acoustic monitoring
    - Canister I.D., seals
    - Remote sensing and data transmission

Must consider concerns, challenges, and questions

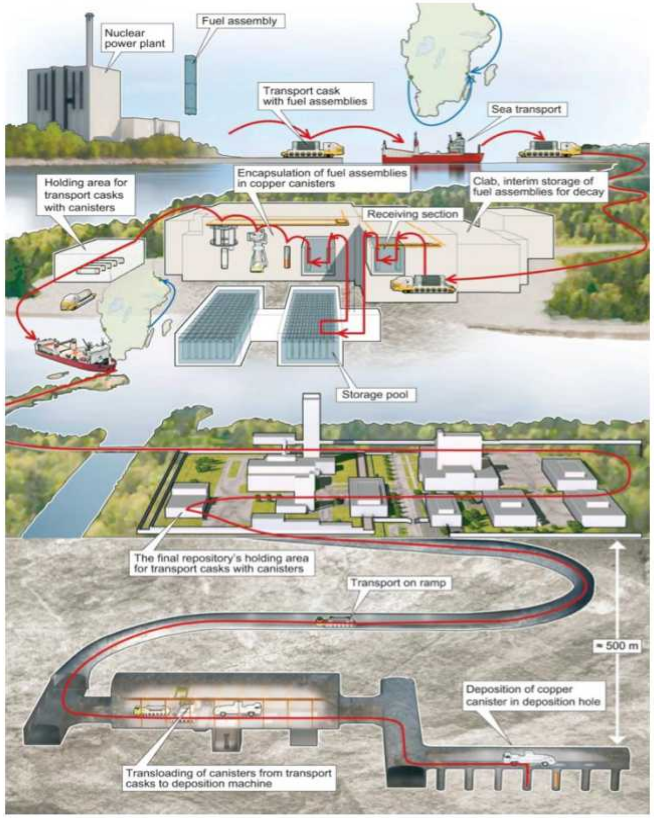


Seismic monitoring: option for above ground monitoring and detection of undeclared underground activity. Will need authentication and encryption.

What are we worried about?

- **Before emplacement:**
  - Spent fuel accountancy before encapsulation
  - Canister I.D.
  - Tracking during transport
  - Maintaining CoK
  - Non-diversion during emplacement

- **After emplacement and closure:**
  - Ensuring no undeclared access, i.e., tunnel boring, razing
  - Monitoring FOREVER!



Source: SKB

Need to think about challenges

Challenges

- Unlike any other nuclear facility, a repository is FOREVER.
- Maintaining CoK after final verification
- Safeguards after closure
- DIV of repository during all relevant phases
- Rapidly changing technology
  - Ex: Roads and cars 100 years ago

Ford Model T on muddy road, circ. 1915.
Sufficient for today's highways?

- Must think about safeguards of today *and* tomorrow
  - Architecture of safeguards regime must be robust to adapt
- Challenges raise important questions…

Questions Remain…

- Once final accountancy measurement is complete and canister is buried, what is relevance of accountancy information?
- How do we adapt to rapid pace of technology development?
- How does retrievability impact safeguards?
- Will IAEA have capacity to monitor indefinitely?
- How do we manage information in the very long-term?
- What are “safeguards” between CSA/AP and “termination of safeguards”?

Thank you!

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