IAEA
International Atomic Energy Agency
Atoms for Peace and Development

The IAEA Coordinated Research Project on borehole disposal

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Security of Disused Radioactive Sources
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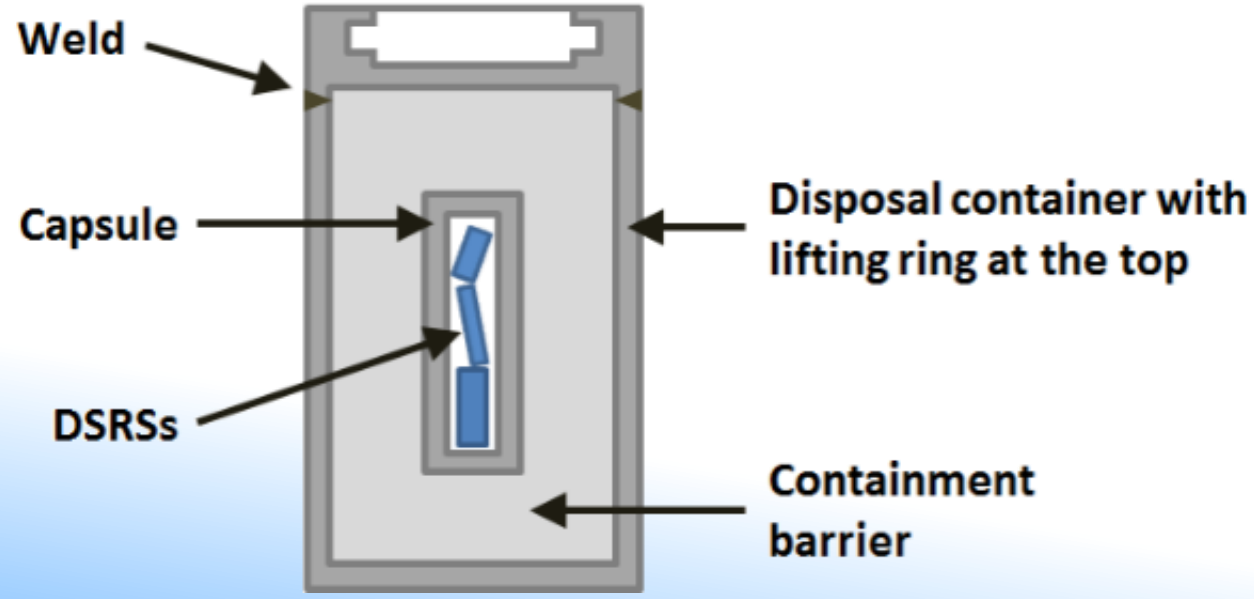
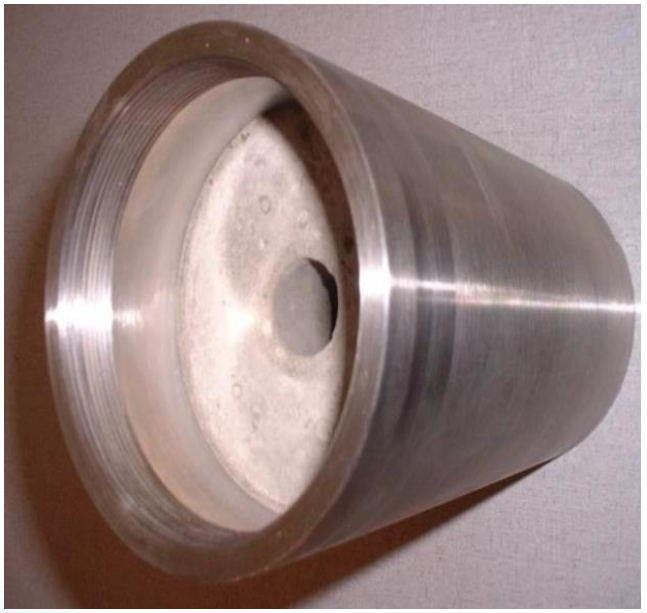
DSRS borehole disposal projects

Reference design

- DSRSs are placed in waste packages
  - capsule — 316L stainless steel
  - containment barrier — cement grout
  - container — 316L stainless steel

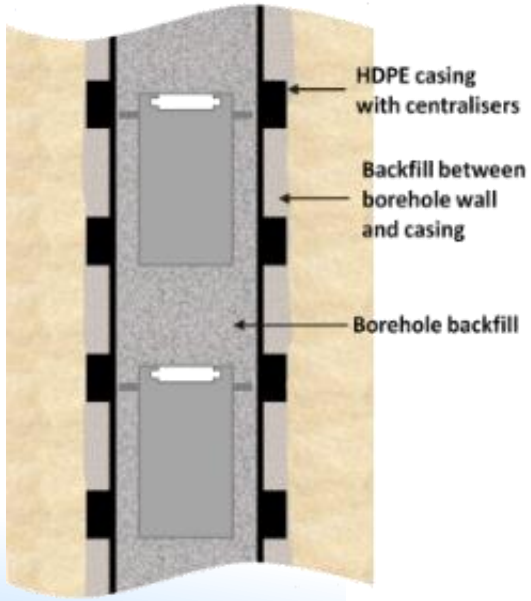


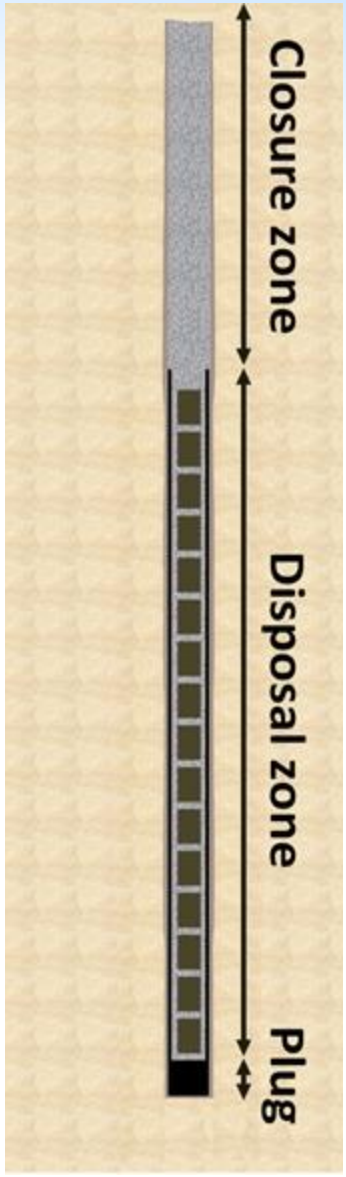


DSRS borehole disposal projects

Reference design

- waste packages are lowered into a disposal borehole which has an HDPE casing and which is backfilled and closed
  - closure zone
  - disposal zone
  - cemented bottom plug





DSRS borehole disposal projects

Malaysian Nuclear Agency

- 12.928 sources (among which 10.241 Am-241 sources mainly from smoke detectors) contained in 60 capsules with a total activity of ca. 32 Ci or ca. 1 TBq

- disposal site at Malaysian Nuclear Agency (32 km south of Kuala Lumpur)
- the license for this borehole disposal project was obtained in July 2019 and disposal is planned for 2020

DSRS borehole disposal projects

Ghana Atomic Energy Commission

- 256 sources contained in 13 capsules with a total activity of less than 900 Ci or 33 TBq
- disposal site at the Ghana Atomic Energy Commission (near Accra)
- GAEC is currently preparing a license application

Support provided by IAEA

Training and capacity building covering

- safety assessment and application of safety assessment software
- implementors - how to develop a safety case for DSRS borehole disposal
- how to draft regulations for borehole disposal
- regulators - on safety case evaluation

Support provided through IAEA

Equipment and tools

- Mobile Tool Kit, including transfer casks, for conditioning and disposal of category 3-5 sources
- integration of the NECSA Mobile Hot Cell in the concept for conditioning and disposal of category 1-2 sources

CRP on borehole disposal

These pilot projects have crystallised wide interest in the borehole disposal concept for DSRS and small quantities of low- and intermediate-level radioactive waste.

6 countries commencing the path to implementation of DSRS borehole disposal in the coming years	14 further countries that have expressed an interest in the concept	At least 16 further countries for which DSRS borehole disposal may be a disposal route of their DSRS
Australia	Azerbaijan	Albania
Bulgaria	Bosnia and Herzegovina	Cambodia
Canada	Brazil	Egypt
Indonesia	China	Ethiopia
Iran	Croatia	Iraq
South Africa	Cuba	Jordan
	Israel	Lebanon
	Lithuania	Libya
	Montenegro	Macedonia
	Pakistan	Mongolia
	Romania	Myanmar
	Russian Federation	Nepal
	Tanzania	Philippines
	Turkey	Serbia
		Sri Lanka
		Tunisia

CRP on borehole disposal

- To support future borehole disposal projects, it is proposed to develop a standardised framework for the borehole disposal of DSRS and small quantities of low- and intermediate-level waste other than DSRS.
- The goal of such **a standardised framework is to develop a consistent, comprehensive and robust package of scientific and technical data, along with guidance, information, tools and training across all of the borehole disposal programme** that can be licensed and implemented for a wide range of DSRS inventories and geologies.
- This will reduce the need for each Member State to develop all materials from first principles and make the borehole disposal option more readily licensable and implementable.

CRP on borehole disposal

CRP on borehole disposal

1. Preparing for a borehole disposal project
2. The design and engineering behind the disposal concept
3. Scientific and technical basis of the disposal concept
4. Site selection and characterisation
5. A safety case for the disposal concept
6. A security plan for the disposal concept
7. Regulating the disposal project

In addition, training material about all those components will be developed. The development of those training packages will be managed by the Agency.

CRP on borehole disposal

- Coordinated Research Projects (CRPs) have been designed to stimulate and coordinate the undertaking of research in selected nuclear fields by scientists in IAEA Member States. They are targeted to make a clear contribution towards greater understanding or resolution of a specific issue or problem.

- Participating organisations are:
  - ANSTO & CSIRO, Australia
  - CNEN, Brazil
  - IPEN, Brazil
  - BNRA, Bulgaria
  - SERAW, Bulgaria
  - AECL, Canada
  - CNL, Canada
  - CNSC/CCSN, Canada
  - CIRP, China
  - ANDRA, France
  - BGE, Germany
  - BAPATEN, Indonesia
  - BATAN, Indonesia
  - Norwegian Nuclear Decommissioning, Norway
  - NRWDI, South Africa
  - SANDIA NL, USA

Planned activities

- February 2020

  IAEA Consultancy Meeting cementitious components of the borehole disposal concept

- May 2020

  Research Coordination Meeting Year 1 and workshop on “The feasibility and operational aspects of borehole disposal”

- May 2021

  Research Coordination Meeting Year 2 and workshop on “Safety concept and assessment of borehole disposal”

- May 2022

  Research Coordination Meeting Year 3 and workshop on “Siting a borehole disposal facility”

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Thank you