



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

The IAEA Coordinated Research Project on borehole disposal

Philippe Van Marcke

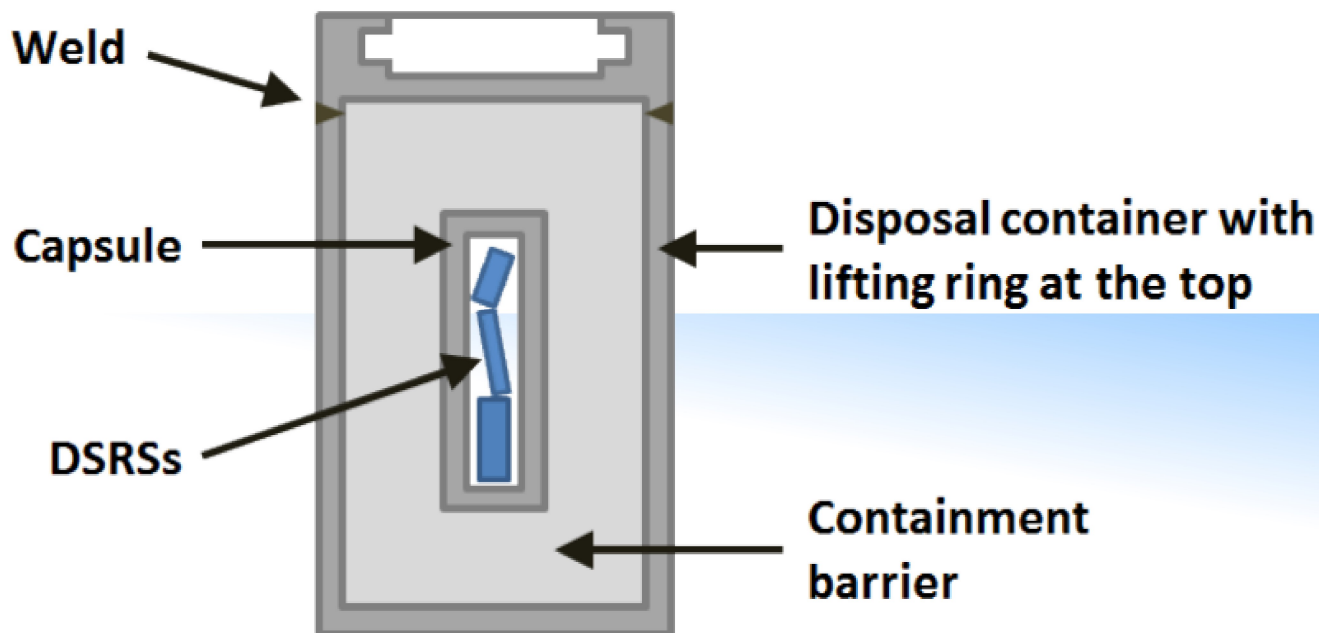
ERDO meeting

Vienna, 25 September 2019

DSRS borehole disposal projects

Reference design

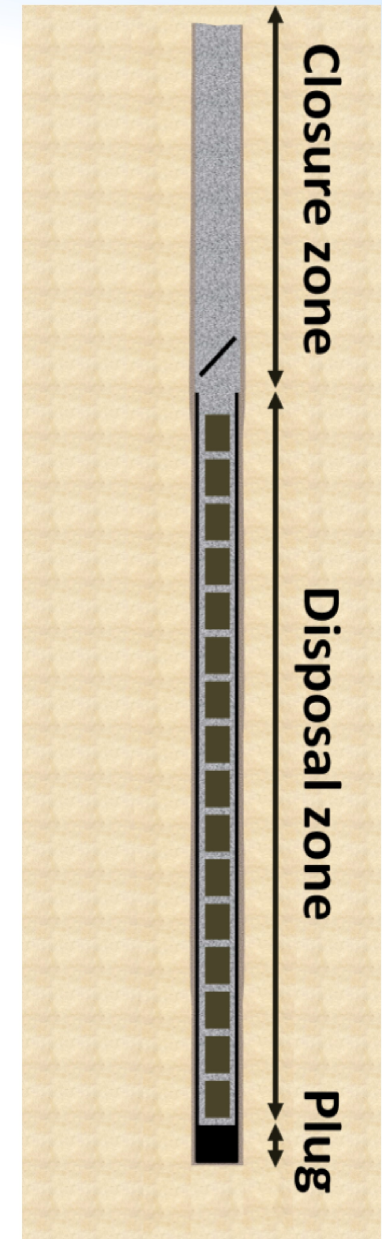
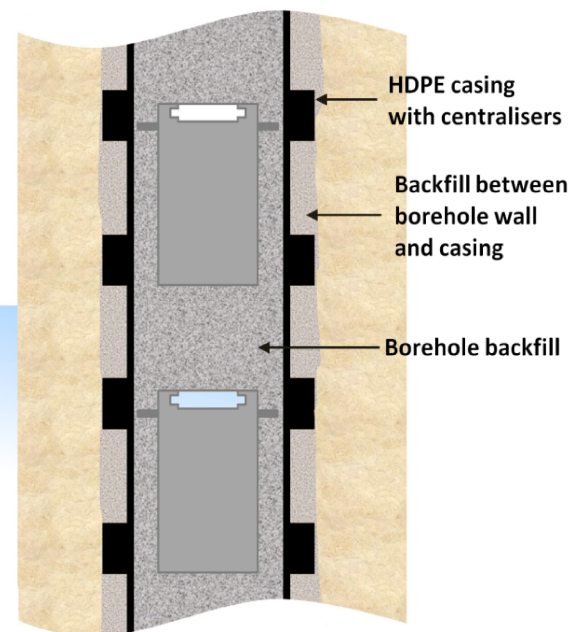
- DSRSs are placed in waste packages
 - capsule 3 mm thick 316L stainless steel
 - containment barrier cement grout
 - container 6 mm thick 316L stainless steel



DSRS borehole disposal projects

Reference design

- waste packages are lowered into a disposal borehole (26 cm diameter) which has an HDPE casing and which is backfilled and closed
 - closure zone (minimum 30 m deep)
 - 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



IAEA support



Training and capacity building

- management systems for borehole disposal implementation
- drafting regulations for borehole disposal
- training in safety assessment and application of safety assessment software
- guidelines to implementers on how to develop a safety case for DSRS borehole disposal
- guidelines to regulators on safety case evaluation

IAEA support



IAEA equipment and tools

- Mobile Tool Kit, including transfer casks, for conditioning and disposal of category 3-5 sources
- integration of the 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

Australia
Bulgaria
Canada
Indonesia
Iran
South Africa

14 further countries that have expressed an interest in the concept

Azerbaijan
Bosnia and Herzegovina
Brazil
China
Croatia
Cuba
Israel
Lithuania
Montenegro
Pakistan
Romania
Russian Federation
Tanzania
Turkey

At least 16 further countries for which DSRS borehole disposal may be a disposal route of their DSRS

Albania
Cambodia
Egypt
Ethiopia
Iraq
Jordan
Lebanon
Libya
Macedonia
Mongolia
Myanmar
Nepal
Philippines
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 more 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 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.

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