



A Perspective on Radwaste Repositories

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SOGIN Seminar 7 September 2021



Established in 1957

172 Member States



~ 2,560 multidisciplinary professional and support staff from more than 100 countries

ATOMS FOR PEACE AND DEVELOPMENT

- Ensuring information sharing and capacity building through:
 - International conferences and workshops
 - Publication of technical documents and reports
 - Coordination of international research activities (CRPs)
 - Peer reviews and Expert missions
 - Specific databases
 - E-Tools





Contract Con





One FACT: Waste streams ARE managed and solutions EXIST

International Conference on Radioactive Waste Management Solutions for a Sustainable Future

> .1–5 November 2021 IAEA.Headquarters, Vienna, Austri

International Conference on Radioactive Waste Management: Solutions for a Sustainable Future

1-5 November 2021, Vienna, Austria

https://www.iaea.org/events/international-conference-onradioactive-waste-management-2021







International Conventions & Standards



Joint Convention on the Safety of Spent Fuel Management & on the Safety of Radioactive Waste Management

> Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

IAEA International Law Series No. 1



Code of Conduct on the Safety & Security of Radioactive Sources

> CODE OF CONDUCT ON THE SAFETY AND SECURITY OF RADIOACTIVE SOURCES

放射源安全和保安行为准则

CODE DE CONDUITE SUR LA SÛRETÉ ET LA SÉCURITÉ DES SOURCES RADIOACTIVES

КОДЕКС ПОВЕДЕНИЯ ПО ОБЕСПЕЧЕНИЮ БЕЗОПАСНОСТИ И СОХРАННОСТИ РАДИОАКТИВНЫХ ИСТОЧНИКОВ

CÓDIGO DE CONDUCTA SOBRE SEGURIDAD TECNOLÓGICA Y FÍSICA DE LAS FUENTES RADIACTIVAS

مدونة قواعد السلوك بشأن أمان المصادر المشعة وأمتها

Euratom Waste Directive



	DIREC	TIVI	ES
	COUNCIL DIRECTIV	E 2011	70/URATOM
	of 19 h	dy 201	
	establishing a Community framework for the re radioacti	sponsib ive was	le and safe management of spent fuel and te
THE Have Unce	COUNCE OF THE EUROPEAN UNION, ng regard to the Treaty onablishing the European Atomic gr Community, and in particular Articles 31 and 32 rol.		buratom Treaty, on health and safety, form a coherent whole conferring upon the Contransistica provers of some considerable scope in order to protect the population and the environment against the risks of nuclear contamination (%).
Hencing paped in the proposed from the European Grounisation down up of the charactery the system of a proper presen- appointed by the Scientific and Technical Committee from amount with the spectra in the Mathematic Science. Having regard to the opinism of the European Economic and Social Committee (7).		89	Council Docision 87/400/lar atom of 14 December 1987 on Community arrangements for the early exchange of information in the event of a radiodiscil emergency () information to be used by the Marsher Kanes in order to protect the generation physics in early of a radiodogical error generation. Construction the state is more than the protect the generation physics in the generation of the state of the state of the state of the state error generation of the state of the state of the error generation of the state of the state of the state of the state of the state of the state of the error generation of the state o
Havi	ing regard to the opinion of the European Parliament (%,		steps to be taken in the event of a radiological emergency (*) insposed obligations on the Member States to inform the general public in the event of a
Whe	teas:		radiological emergency.
(1)	Article 2(b) of the Treaty establishing the European Atomic Energy Community (Eurobom Treaty) provides for the establishment of uniform safety standards to protect the health of workers and of the general public.	(7)	Council Directive 2003/122/furation (7) provides for the control of high-activity scaled radioactive sources and orphan sources, including disources, ha according with the Joint Convention on the Safety of Separa Fad Management and on the Safety of Radioactive Wate
(2)	Article 10 of the Eazeton Treaty provides for the enab- ishment of basic standards for the protection of the health of workers and the general public against the dangers arising from ionising radiations.		Management (the Joint Convertions) and the Inter- national Automic Energy Agency (IAEA) Code of Conduct on the Safety and Security of Radioactive Sources, and ourrent industrial practices, densed seded sources can be reased, recycled or disposed of. In many cases, this needs a neuron of the isource or return of the
(3)	Article 37 of the Euratom Treaty requires Member States to provide the Commission with general data relating to any plan for the dispersal of radioactive waste.		equipment, including the source, to a supplier or a manufacturer, for requalification or proceeding.
(4)	Council Directive 94/29/Earstom (*) stabilishes basic safety standards for the protection of the health of workers and the general public against the dangers ariting from ionizing radiation. That Directive has been supplemented by more specific legislation.	(8)	Discritive 2006/121/EC of the European Parliament and of the Council of 115 Match 2006 on the management of wavae. From extractive tolerations (9) convers the management of water from extractive isolatories which may be radiasticity, but evaluating unch appears as are specific, to radiasticity, which are matters deal with under the Foreaem Terror?
(9)	As recognised by the Court of Justice of the European Union in its case-law, the provisions of Chapter 3 of the	(9.6	187/87 (1988 ECR p.5013) and C-29/99 (2002 ECR p. 5-11223)
000	printer of 4 May 2011 (nor yer published in the Official Journal), printers of 23 June 2011 (nor yer published in the Official Journal), § 1. 159, 29.6,1996, p. 1.	CECE	9. 171, 301,21997, p. 76. 9. 1577, 712,999, p. 11. 9. 1345, 712,999, p. 13. 9. 146, 11,12,2003, p. 15.

IAEA Safety Standards for Disposal



IAEA Safety Standards	IAEA Safety Standards for protecting people and the environment
Fundamental Safety Principles	Disposal of Radioactive Waste
Safety Fundamentals No. SF-1	Specific Safety Requirements

IAEA Safety Standards for protecting people and the engineered	IAEA Safety Standards for protecting people and the environment	IAEA Safety Standards	IAEA Safety Standards	IAEA Safety Standards	IAEA Safety Standards	DS 477
Near Surface Disposal Facilities for Radioactive Waste	Geological Disposal Facilities for Radioactive Waste	Monitoring and Surveillance of Radioactive Waste Disposal Facilities	The Safety Case and Safety Assessment for the Disposal of Radioactive Waste	Classification of Radioactive Waste	Borehole Disposal Facilities for Radioactive Waste	The Management System for the Disposal of Radioactive Waste
Specific Safety Guide No: SSG-29	Specific Safety Guide No. SSG-14	Specific Safety Guide No. SSG-31	Specific Safety Guide No. SSG-23	General Safety Guide No. GSG-1	Safety Guide No. SSG-1	Safety Guide No. GS-G-3.4 Revision

Publications - Nuclear Energy Series



Principles

	NE-BP
Basic Principles	Nuclear Energy Basic Principles
Dbjectives	
Guides	
Technical Reports	

Objectives



Guides



Technical Reports





Reflect and build upon international experiences and good practices

Surface Disposal of LLW and VLLW in operation worldwide



Dukovany, Czech

There are a large number of repositories for low-level waste in operation worldwide

Near surface disposal

- Near surface disposal is defined as disposal in a facility constructed on the ground surface or up to a few tens of metres below ground level
- Safety is met by a combination of:
 - Features of the <u>disposal facility</u>
 - Features of the <u>site</u>
 - Limitations placed on the radiological inventory
 - Measures for surveillance and control



At *Centre de l'Aube* in France, site geology, facility design and waste limits are in place to meet safety requirements.



Designs for near surface disposal of LLW and VLLW





Near surface engineered facilities

There are a large number of repositories for low-level waste in operation worldwide

Near surface disposal, long-term performance

 Passive and engineered barriers



 Integration with natural landscape and post closure considerations



Proposed liner design for near surface disposal facility in Canada (Rowe et al., Canadian Geotechnical (2019)

The final cover layer at El Cabril will integrate into the surrounding environment. Site surveillance phase will last 300 years (Courtesy of Enresa)



HLW Disposal High in the International Agenda (6) DG of the IAEA visited Onkalo / Finland in December 2020



One of the most-viewed IAEA LinkedIn posts of 2020 – Over 30,000 views (plus lively discussion) – Launched at the quietest time of the year . . .

https://www.linkedin.com/posts/iaea _come-450-meters-undergroundas-we-visit-onkalo-activity-6746428501844348928-8LBN



HLW/SNF Disposal – Decades of RD&D Global historical overview of all RD&D in URFs



Implementing Geological Disposal: getting to licensing



Developing Geological Disposal: in motion

 China underground laboratory: construction starting



- In Russia plans are moving forward for construction of a URF for HLW
- Switzerland is moving into the final stage of their 3 steps siting program
- Canada has narrowed their list of candidate sites down to two
- Germany, Japan and the United Kingdom have all successfully relaunched scientifically/technically sound repository siting programmes with strong public engagement commitments

Multinational Approaches and National Programmes



- Joint Convention
 - Reference is a national repository, but no door is closed on a multi national repository as long as safety, security and an ethical approach are ensured
 - Cooperation and agreement between willing countries can be considered
- IAEA publications provide the clear message that:
 - Participation in collaborative repository project does **not** remove the requirement for a national policy
 - Regardless of the national or multi-national approach a national policy and strategy/national programme for RWM is needed
- Engaging with other countries can bring efficiencies to respective national programs, even if it does not lead to a Multi National Repository
 - Pool competencies to the first phases of a roadmap for a geological repository project
 - Save time and money



Thank you! And Stay Connected !

Professional Networks – link

eLearning – <u>link</u>

