



Deliverable 13.2: Mapping of available course materials

Work Package 13

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Executive Summary

In March 2020, WP13 launched a ‘Survey on training initiatives’ in order to get a clear overview of the training needs as well as the existing training courses in the field of Radioactive Waste Management (RWM) within the EURAD community. The survey was sent to all EURAD Beneficiaries [1].

The 80 respondents have indicated a total of 363 training needs, of which 262 are indicated as ‘difficult to find’ in the field of RWM were identified. A lot of topics are covered by the existing courses, however, analysis of the training needs indicated that there are still a lot of gaps for many of the EURAD partners [1].

In this report, the results of the ‘Mapping of available course materials’ are summarized. These results will be linked to the “List of training needs from Research, Development and Demonstration and Strategic Studies” [1] and EURAD Roadmap. This way, the Roadmap can serve as an easily accessible tool to check which trainings need to be addressed, and what is the background to start with. In the end, the Roadmap, together with the list [1] and this report, provide an easily accessible overview of identified training gaps for end-users as well as a starting point to start looking for available training courses.

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Glossary

EURAD	European Joint Programme on Radioactive Waste Management
FP	Framework Programme
FTF	Face-to-Face
IAEA	International Atomic Energy Agency
RE	Research Entities
RWM	Radioactive Waste Management
TSO	Technical Support Organization
WAC	Waste Acceptance Criteria
WMO	Waste Management Organization
WP	Work Package
IRSN	Institute for Radiation Protection and Nuclear Safety
EN	English
RS	Russian
FR	French
JP	Japanese
CZ	Czech
GR	German
FN	Finnish
SP	Spanish

1. Introduction

The main goal of European Joint Programme on Radioactive Waste Management (EURAD) Work Package (WP) 13 is to establish the ‘School of Radioactive Waste Management (RWM)’. The School of RWM acts as the executive body for all training and mobility actions that are organized within EURAD. For training courses, a diverse portfolio of tailored basic and specialized courses will be established. This portfolio will contain a list of existing initiatives (e.g. International Atomic Energy Agency, IAEA, courses), but will also contain new training courses to bridge identified gaps. Its content will be linked to the EURAD Roadmap. In doing so, the School of RWM contributes to the strategic knowledge management objectives of EURAD, namely: (i) preservation of generated knowledge (in- and outside of EURAD), (ii) transfer of knowledge towards Member States and between generations and (iii) dissemination of knowledge (by organizing training courses based on identified training needs within RWM (Belmans N., Coeck M., [1]; EURAD- Grant Agreement number: 847593 [2])).

Training needs have already been identified, collected and analyzed; the results can be found in D13.1 [1]. This task continues in this report, whose objective is to perform a mapping of currently existing available course materials in the field of RWM. To do so, several sources have been searched including a thorough forensic analyses of EURATOM Framework Programmes (FP) and other current initiatives developed by IAEA and NEA. Courses found have been gathered, analyzed and summarized in this deliverable. The report has been structured in the following sections: the sources and criteria used for searching, mapping, analyzing of the training courses and some final remarks.

It is worth mentioning that over the last year (2020) due to the pandemic and confinement COVID-19 situation, the most Face-To-Face (FTF) courses have been cancelled/postponed. Many of them are being re-oriented towards the on-line (e.g. e-learning modules), online live (i.e. live webinars) or blended learning methodology. Having said that, the analysis and results gathered in this report have been done during the transition period so this effect cannot be truly observed, as it (mostly) covers the pre-COVID-19 and transition period.

2. Sources and criteria for the searching

The following sources have been analysed during the mapping: EURATOM projects, EURAD partners’ courses, international nuclear entities, and the open web. Special attention has been given to organizations providing training to regulators. However, a compromise about how far to extend the search had to be reached since the seven Framework Programmes (FP) and H2020 of EURATOM on their own account for around 228 different projects, most of them contain different kind of training, workshops, seminars etc. It was not possible to find training information in all cases. This section gathers all sources from which mapping data have been collected, in order to make them available if needed.

EURATOM Projects

In *Table 1* and *Table 2*, 59 projects from H2020 and FP7 related to RWM are listed, respectively. Some provided specific training courses while most had a final project’s workshop summarizing their research and results. Unfortunately, information of the specific subjects and/or course titles or content was not always available. All projects that provided topics of their courses or workshops were added to the mapping. All the other EURATOM FP that were not searched in detail (FP 1 to 6) are included in Appendix A for tracking reasons.

Table 1. EURATOM H2020 Projects related with RWM.

#	Acronym	Name	Permanent link
1	ANNETTE	Advanced Networking for Nuclear Education and Training and Transfer of Expertise	https://cordis.europa.eu/project/id/661910
2	Beacon	Bentonite mechanical evolution	https://cordis.europa.eu/project/rcn/210819_en.html
3	BRILLIANT	Baltic Region Initiative for Long Lasting InnovActive Nuclear Technologies	https://cordis.europa.eu/project/rcn/196918_en.html
4	Cebama	Cement-based materials, properties, evolution, barrier functions	https://cordis.europa.eu/project/rcn/196920_en.html
5	CHANCE	Characterization of conditioned nuclear waste for its safe disposal in Europe	https://cordis.europa.eu/project/rcn/210835_en.html
6	CORONA II	Enhancement of training capabilities in VVER technology through establishme...	https://cordis.europa.eu/project/rcn/196913_en.html
7	DISCO	Modern spent fuel dissolution and chemistry in failed container conditions	https://cordis.europa.eu/project/rcn/210837_en.html
8	ENENplus	Attract, Retain and Develop New Nuclear Talents Beyond Academic Curricula	https://cordis.europa.eu/project/rcn/211046_en.html
9	EURAD	European Joint Programme on Radioactive Waste Management	https://cordis.europa.eu/project/rcn/223662_en.html
10	GEMMA	GEneration iv Materials MAaturity	https://cordis.europa.eu/project/rcn/210833_en.html
11	GENIORS	GEN IV Integrated Oxide fuels recycling strategies	https://cordis.europa.eu/project/rcn/210831_en.html
12	HoNESt	History of Nuclear Energy and Society	https://cordis.europa.eu/project/rcn/196914_en.html
13	INSIDER	Improved Nuclear Site characterization for waste minimization in DD operation...	https://cordis.europa.eu/project/rcn/210843_en.html
14	JOPRAD	Towards a Joint Programming on Radioactive Waste Disposal	https://cordis.europa.eu/project/rcn/196893_en.html
15	MEET CINCH	A Modular European Education and Training Concept In Nuclear and RadioChem...	https://cordis.europa.eu/project/rcn/211030_en.html
16	MICADO	Measurement and Instrumentation for Cleaning And Decommissioning Operations	https://cordis.europa.eu/project/rcn/223666_en.html
17	MIND	Development of the safety case knowledge base about the influence of microbial p...	https://cordis.europa.eu/project/rcn/196908_en.html
18	Modern2020	Development and Demonstration of monitoring strategies and technologies fo...	https://cordis.europa.eu/project/rcn/196921_en.html
19	MYRTE	MYRRHA Research and Transmutation Endeavour	https://cordis.europa.eu/project/rcn/196919_en.html
20	NUCLEU 2020	Connecting EURATOM National Contact Points in a pro-active network under...	https://cordis.europa.eu/project/rcn/196907_en.html
21	SAMOFAR	A Paradigm Shift in Reactor Safety with the Molten Salt Fast Reactor	https://cordis.europa.eu/project/rcn/196909_en.html
22	SITEX II	Sustainable network for Independent Technical EXPertise of radioactive waste...	https://cordis.europa.eu/project/rcn/196925_en.html
23	THERAMIN	Thermal treatment for radioactive waste minimisation and hazard reduction	https://cordis.europa.eu/project/rcn/210838_en.html
24	TRANSAT	TRANSversal Actions for Tritium	https://cordis.europa.eu/project/rcn/210826_en.html
25	VINCO	Visegrad Initiative for Nuclear Cooperation	https://cordis.europa.eu/project/rcn/196922_en.html

Table 2. EURATOM FP 7 Projects related with RWM.

#	Acronym	Name	PERMANENT LINK
1	ACSEPT	Actinide recycling by separation and Transmutation	https://cordis.europa.eu/project/rcn/85734_en.html
2	ANDES	Accurate Nuclear Data for nuclear Energy Sustainability	https://cordis.europa.eu/project/rcn/95952_en.html
3	BELBAR	Bentonite Erosion: effects on the Long term performance of the engineered Barr...	https://cordis.europa.eu/project/rcn/101412_en.html
4	CARBOWASTE	Treatment and Disposal of Irradiated Graphite and Other Carbonaceous Waste	https://cordis.europa.eu/project/rcn/88385_en.html
5	CAST	Carbon-14 Source Term	https://cordis.europa.eu/project/rcn/110253_en.html
6	CATCLAY	Processes of Cation Migration in Clay rocks	https://cordis.europa.eu/project/rcn/94448_en.html
7	CDT	Central Design Team (CDT) for a Fast-spectrum Transmutation Experimental Facility	https://cordis.europa.eu/project/rcn/92883_en.html
8	CP-ESFR	Collaborative Project on European Sodium Fast Reactor	https://cordis.europa.eu/project/rcn/92070_en.html
9	CROCK	Crystalline rock retention processes	https://cordis.europa.eu/project/rcn/97424_en.html
10	DOPAS	Full Scale Demonstration of Plugs and Seals	https://cordis.europa.eu/project/rcn/106583_en.html
11	EBSSYN	A joint EC/NEA EBS project synthesis report	https://cordis.europa.eu/project/rcn/88921_en.html
12	ECNET	EU-CHINA Nuclear Education and Training Cooperation	https://cordis.europa.eu/project/rcn/97432_en.html
13	ERINDA	European Research Infrastructures for Nuclear Data Applications	https://cordis.europa.eu/project/rcn/97421_en.html
14	EU-NMR-AN	Towards a European Competence Centre for Nuclear Magnetic Resonance (NMR) o...	https://cordis.europa.eu/project/rcn/93850_en.html
15	EVOL	Evaluation and Viability of Liquid Fuel Fast Reactor System	https://cordis.europa.eu/project/rcn/97054_en.html
16	FAIRFUELS	Fabrication, Irradiation and Reprocessing of FUELS and targets for transm...	https://cordis.europa.eu/project/rcn/90990_en.html
17	FIRST	Nuclides - Fast / Instant Release of Safety Relevant Radionuclides from Spent Nuc...	https://cordis.europa.eu/project/rcn/100941_en.html
18	FORGE	Fate of Repository Gases	https://cordis.europa.eu/project/rcn/89382_en.html
19	GETMAT	Gen IV and Transmutation materials	https://cordis.europa.eu/project/rcn/85745_en.html
20	INSOTEC	(International) Socio-Technical Challenges for implementing geological disposal	https://cordis.europa.eu/project/rcn/97435_en.html
21	IPPA	Implementing Public Participation Approaches in Radioactive Waste Disposal	https://cordis.europa.eu/project/rcn/97430_en.html
22	LUCOEX	Large underground concept experiments	https://cordis.europa.eu/project/rcn/97392_en.html
23	MODERN	Monitoring Developments for safe Repository operation and staged closure	https://cordis.europa.eu/project/rcn/93569_en.html
24	PEBS	Long-term performance of Engineered Barrier Systems (EBS)	https://cordis.europa.eu/project/rcn/96796_en.html
25	PETRUS II	Towards European training market and professional qualification in Geolo...	https://cordis.europa.eu/project/rcn/93518_en.html
26	PETRUS III	Implementing sustainable E&T programmes in the field of Radioactive Wastes...	https://cordis.europa.eu/project/rcn/109649_en.html
27	RECOSY	Redox phenomena controlling systems	https://cordis.europa.eu/project/rcn/88406_en.html
28	REDUPP	Reducing Uncertainty in Performance Prediction	https://cordis.europa.eu/project/rcn/97434_en.html
29	SACSESS	Safety of actinide Separation processes	https://cordis.europa.eu/project/rcn/106488_en.html
30	SECIGD	Secretariat of the Implementing Geological Disposal Technology Platform	https://cordis.europa.eu/project/rcn/94433_en.html
31	SECIGD2	Secretariat of the Implementing Geological Disposal of Radioactive Waste - Te...	https://cordis.europa.eu/project/rcn/106449_en.html
32	SITEX	Sustainable network of Independent Technical expertise for radioactive waste di...	https://cordis.europa.eu/project/rcn/101495_en.html
33	SKIN	Slow processes in close-to-equilibrium conditions for radionuclides in water/sol...	https://cordis.europa.eu/project/rcn/97427_en.html
34	TALISMAN	Transnational Access to Large Infrastructure for a Safe Management of actinide	https://cordis.europa.eu/project/rcn/107657_en.html

EURAD survey on training initiatives

As reported by Belmans & Coeck M.(2020) [1] a ‘survey on training initiatives’ was launched and sent to the EURAD community in order to get a clear overview of the training needs, as well as the existing training courses in the field of RWM. 80 institutes/organizations responded to the survey, many of them participated in trainings taught as part of an international project. In addition to these 80 another 12 respondents, not included in the report, have been included in this mapping.

International nuclear entities

Table 3 collects international nuclear entities and/or platforms, which provide and/or collect existing trainings related to RWM. All of them have been explored and the trainings found have been included in the mapping.

Table 3. International nuclear entities providing/collecting trainings.

#	Acronym	Name	Permanent link
1	ENEN	European Nuclear Education Network	https://enen.eu/
2	IAEA (CLP4NET)	<ul style="list-style-type: none"> - Cyber Learning Platform for Network Education and Training - Underground Research Facilities Network for Geological Disposal - International Network of Laboratories for Nuclear Waste Characterization 	https://www.iaea.org/resources/databases/cyber-learning-platform-for-network-education-and-training-clp4net https://nucleus.iaea.org/sites/connect/URFpublic/Pages/default.aspx https://nucleus.iaea.org/sites/connect/LABONETpublic/Pages/default.aspx
3	CEIDEN	Technological platform of fission nuclear energy	https://ceiden.com/
4	ENSTII (IRSN)	European Nuclear Safety Training and Tutoring Institute	https://enstti.eu/wp/
5	NEA	Nuclear Energy Agency	https://www.oecd-nea.org/
6	IGD-TP	Implementing Geological Disposal of radioactive waste Technology Platform	https://igdtp.eu/
7	SITEX	Sustainable network for Independent Technical EXpertise on radioactive waste management	https://www.sitex.network/
8	NBP	Nuclear Business Platform	http://www.nuclearbusiness-platform.com/nuclear-industry/nuclear-waste-management-overview-opportunities/
9	EURADSCIENCE	EURADSCIENCE network. Network of research organisations for radioactive waste management science within Europe.	

It is worth to highlight CLP4NET platform from IAEA. This is a virtual training platform, available free of charge and provides training on most nuclear areas. Their training courses are usually divided into smaller modules, each of them taking around 4 hours to complete.

Finally, ENSTII activities are now being organized by IRSN (French Institute for Radiation Protection and Nuclear Safety).

3. Mapping of available course materials

More than 150 RWM courses have been collected, most of them are taught by organizations with research and technological activities, and mainly done as part of an international project. The following information has been gathered when available, and included in a database stored on EURAD’s platform

[\[https://service.projectplace.com/\]](https://service.projectplace.com/) and the EURAD School of Radioactive Waste Management [\[https://euradschool.eu/\]](https://euradschool.eu/)

- Course title
- Project name
- Organization
- Other participants
- Year
- Type of training: lectures, technical visits, hands-on, e-learning, self-study
- Mode of training: Online/ FTF
- Location/Platform
- Language
- Duration
- Cost
- Frequency
- Background/Required knowledge
- Target audience
- Certificate information¹
- Course objectives²
- Topics
- Learning outcomes
- Programme
- Weblink
- Comments

Training courses from year 2012 to 2021 are included. Most of them have a duration of around 1 week, but they can range from as short as 4 hours up to as long as 3 years. The most common language is English (EN) mainly because of the nature of this search, although some of them (from IAEA) were found to be given in several languages (Russian (RS), French (FR), Japanese (JP)), and less than 10% of them are taught in other languages (i.e. Czech (CZ), German (GR), Finnish (FN), French (FR) and Spanish (SP)). Most of courses are targeted to both, professionals and graduate students, and with similar background, BSc in Sciences/Engineering.

The found training courses have been tagged according to the seven EURAD themes:

1. Managing implementation and oversight of a RWM program
2. Radioactive waste (RW) characterization, processing and storage, and source term understanding for disposal
3. Engineered barrier system properties, function and long-term performance
4. Geoscience to understand rock properties, radionuclide transport, long-term geological evolution
5. Facility design and the practicalities of construction, operation and closure
6. Siting and licensing
7. Performance assessment, safety analysis and safety case development

This classification in seven themes is convenient in order to discretize the huge field of RWM activities and to align with the EURAD roadmap, although each theme refers to a broad subject itself. Most of the courses found cover some subjects of these themes not necessarily being specific of one them, and in most of the cases, they touch several themes.

Figure 1 shows the percentage of courses covering these items or parts of them. As observed, each theme or part of it, is taught by 37% of the courses; Siting and licensing (6) being the area with the least courses found. The areas where most courses are offered, close to 50% and above, are: RW characterization (2), Engineered barriers (3), and Geoscience (4).

¹ Information related with the certification:

- If it is or not a certified training activity.
- Number and type of credits (if it is the case),
- If a licence or accreditation can be obtained.
- Entity that grants the certification.

² Course objectives are referred to the overall goals of the training activity. They are different from the learning outcomes, which describe competencies or performance capacities to be acquired by the learner at the end of the training activity. [7].

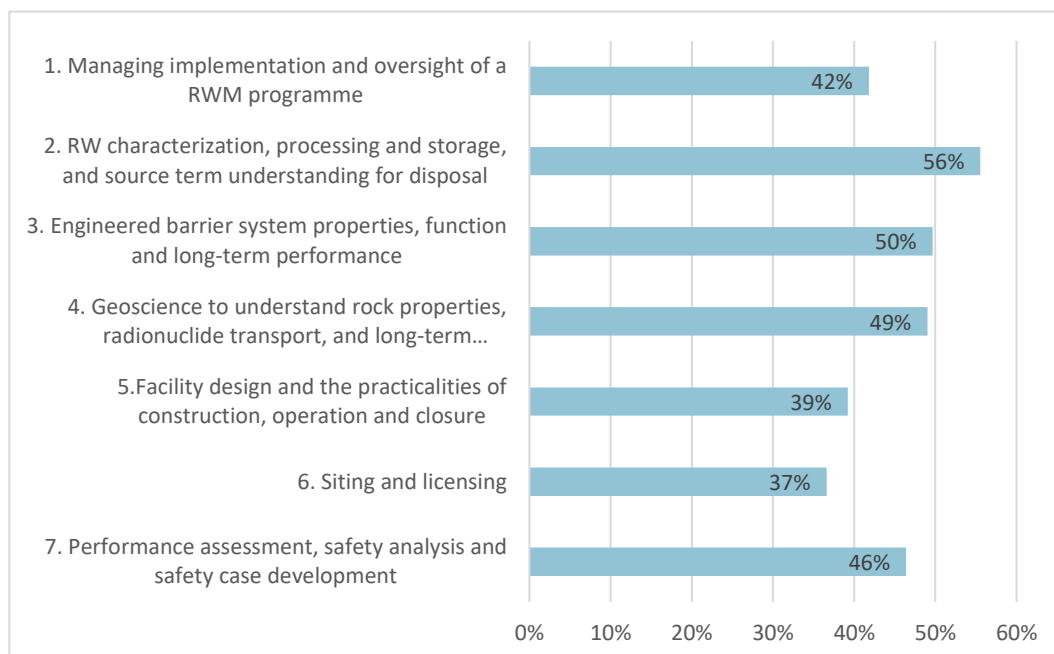


Figure 1. Classification of courses according to EURAD themes and the % of trainings comprising complete/parts of the themes.

This categorisation provided the criteria for the mapping. In addition, courses were classified as “general” when the training covered 4 to 7 EURAD themes or “specific” when they covered up to 3 themes. Around 1/3 of the courses fit into the general category providing an overview of RWM, having usually a duration of 1 week.

Appendix B collects the entire mapping database, split into 4 tables: General Face-to-Face, General Online, Specific Face-to-Face and Specific Online (Table 12, Table 13, Table 14, Table 15, respectively). These tables include the most relevant data, namely: title, project, organization, duration, language and the web-link in order provide the tracking.

4. Analysis

In order to establish a starting point related to the mapping of the available course materials, a first step was to perform a detailed search of all EURATOM RWM related projects. Many of them developed course materials that have been mapped.

Other main sources for the mapping have been EURAD partners’ courses and international nuclear entities. Finally, the open web was searched to complete the “big picture” of RWM course materials.

More than 150 courses related to RWM have been found. Nearly 62% of the courses have been taught as part of an international project with an average duration of one week.

Belmans & Coeck M. [1] reviewed the highest priorities of training needs, finding the following topics, which are shown in descending order of priority:

- 7.1 Safety Strategy
- 7.2.1 Safety case production
- 7.3.2 Treatment of uncertainty
- 3.1 Confirm waste form compositions, properties and behaviour under storage and disposal conditions, including impact on the disposal environment
- 7.3.1 Performance assessment and system models

- 3. Engineered Barrier Systems
- 2.2.2 Waste Acceptance Criteria
- 2.1.1 Waste Generation

With respect to the 7th theme “Performance assessment, safety analysis and safety case development”, there were four topics identified as “training difficult to find” (7.1, 7.2.1, 7.3.2 and 7.3.1). From the mapping (see Appendix B), 25 specific courses have been identified to provide training related to the 7th theme (Table 4) and only three of them cover the gap partially:

- “Safety Case Development” organized by the IAEA as a self-study online mode with a workload of 5 hours.
- “Nuclear safety case development” organized by the nuclear technology education consortium (UK), with a workload of 15 European Credit Transfer and Accumulation System (ECTS) points.
- “CRISTAL - Tools for Criticality Safety Calculation” organized by ENSTII (form now on organized by IRSN) with 1 week of duration.

At the time of making this report, no specific course on tackling uncertainties has been found, but EURAD is currently organizing a course covering this subject (expected summer of 2022).

This mapping confirms the need for the development of new training courses in “Performance assessment, safety analysis and safety case development” area.

Table 4. Specific courses related to EURAD Theme 7: “Performance assessment, safety analysis and safety case development”.

Course title	EURATOM PROJECT	Organisation	Other participants
Material and waste management in decommissioning	INSIDER (ELINDER)	CEA-INSTN	
Computer Control of Experiments	VINCO	CTU Prague, FNSPE	
Digital Safety Systems of Nuclear Reactors	VINCO	CTU Prague, FNSPE	
Practical course on reactor physics and operation	VINCO	CTU Prague, FNSPE	
Introducing safety culture and its application to the nuclear field	ANNETTE	ENEN	UNED, TECNATOM
Application of International Regulations in Qualification and Approval of Packages for the Transport of Radioactive Materials		ENSTTI, IRSN	
Application of Nuclear Safety Concepts in the Development of Regulations and Guidance		ENSTTI, IRSN	
CRISTAL - Tools for Criticality Safety Calculation		ENSTTI, IRSN	
Emergency Response to Transport Accidents involving Radioactive Materials at Sea and in Port Zones		ENSTTI, IRSN	
Implementing Nuclear Safeguards in practice		ENSTTI, IRSN	
Nuclear Criticality Safety		ENSTTI, IRSN	
Nuclear Materials Protection, Nuclear Safeguards and Interface with Nuclear Safety		ENSTTI, IRSN	
Technical Concepts, Techniques, Methods and Tools for the Assessment of Nuclear Safety and Radiation Protection		ENSTTI, IRSN	
Safety Case Development		IAEA	
Regulatory Issues and Standards	ENEN/PETRUS	ITC	
Thermal-hydraulics and chemistry in HLM reactors	MYRTE - MYRRHA Research and Transmutation Endeavour	MYRTE - MYRRHA Research and Transmutation Endeavour	
Mechanical measurements of irradiated materials	VINCO	National Centre for Nuclear Research (NCBJ)	JAEA
School of Nuclear Energy	VINCO	NCBJ	
Thermodynamic data collection and assessment		NEA	KIT-INE, LANL; A21, EMPA
Introduction to safety assessment in geological disposal of spent fuel - advanced sessions	ENEN/PETRUS II	POSIVA	
Operational control room staff, verification physicist, simulator training instructors	VINCO	VUJE a.s.	
Human-Technology-Organisation/Human Factors for Nuclear Safety including Virtual Reality Resources as part of Safety Culture	ANNETTE	UPPSALA UNIVERSITY	

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Nuclear Safety Case Development	ANNETTE	University of Manchester – NTEC Courses
Policy, Regulation and Licensing	ANNETTE	University of Manchester – NTEC Courses
Nuclear Energy and The Nuclear Fuel Cycle	ANNETTE	University of Central Lancashire Courses

Regarding the 3rd theme “Engineered barrier system properties, function and long-term performance”; two topics have been identified as “training difficult to find” (3.1 and 3) [1]. The mapping (Appendix B) identified 51 “general courses” including some overview of theme 3, and 25 “specific trainings” which also cover the subject to some extent (

Table 5). Many of them enclose “Engineered Barrier Systems” and “Wasteform” topics, specifically those organized under the PETRUS projects. More detailed information will be required to identify the real training needs of the EURAD researches to fulfil their demands as part of WP13 task 4, as is described in D13.5 [7].

Table 5. Specific courses related to EURAD Theme 3: “Engineered barrier system properties, function and long-term performance”.

Course title	EURATOM project	Organisation	Other participants
Petrology and Geochemistry of rocks relevant for final disposal	ENEN/PETRUS	Technische Universität Clausthal Institut für Endlagerforschung	
Physics and Chemistry of the Actinides		Institut des Sciences Chimiques de Rennes	Other (not specified yet)
Actinide Science & Applications		JRC	Other international organizations
Application of International Regulations in Qualification and Approval of Packages for the Transport of Radioactive Materials		ENSTTI, IRSN	
C-14 behaviour under repository conditions	CAST	KIT-INE	WAK-HDB
Clay minerals in soils and weathered rock	ENEN	European group	University of Helsinki
CRISTAL - Tools for Criticality Safety Calculation		ENSTTI, IRSN	
Disused Sealed Radioactive sources		IAEA	
DOT/NRC Radioactive Waste Packaging, Transportation and Disposal		EnergySolutions	
ENEN+ Summer School	ENEN+	ENEN+	Budapest University of Technology and Economics
Hands on training in nuclear chemistry	CINCH	CVUT	
The chemistry of f-elements		TU Dresden	Other institutions from: USA, Russia, France, Germany
Radioactive Waste Cementation		ICTP-IAEA	AEA, PNNL, CEA, Savannah River National, NEFW, Imperial College London, IGEM RAS, USDF, Kazan State University, VNIINM
Isotope Hydrology		IAEA	
Modern Spent Fuel Dissolution and Chemistry in Failed Container Conditions	DISCO	DISCO	
Nuclear Criticality Safety		ENSTTI, IRSN	
Nuclear fuel cycle	ANNETTE		The Belgian Nuclear Education Network
Geological storage in Precambrian bedrock"	ENEN/PETRUS	ÅSPÖ Hard Rock Laboratory, Sweden	
Migration of radioactive waste from deep geological waste repositories - Case Study	ENEN/PETRUS	BME	
Introduction to safety assessment in geological disposal of spent fuel	ENEN/PETRUS II	POSIVA	
Transport and Retention of Radionuclides in Argillaceous and Fractured Media	ENEN/PETRUS	ITC	
Release of radioactive materials and nuclear system component		AiNT	
Safety advisor in the transport of radioactive material		Ecoquímica Logística Integral	
State-of-the-art computer codes		NEA	
Virtual tritium school	TRANSAT	Aix-Marseille University, France	Jožef Stefan Institute, Slovenia CEA, France

Concerning to the 2nd theme “RW characterization, processing and storage, and source term understanding for disposal”, two topics were identified as “training difficult to find” (2.2.2 and 2.1.1) [1]. From the table of available trainings (Appendix B), 45 trainings marked as “general courses” and 40 marked as “specific training” (Table 6) provide some training related to theme 2. Many of them cover the characterization of RW but none of them addresses the “Waste Acceptance Criteria” specifically.

Table 6. Specific courses related to EURAD Theme 2: “RW characterization, processing and storage, and source term understanding for disposal”.

Course title	EURATOM project	Organization	Other participants
Physics and Chemistry of the Actinides		Institut des Sciences Chimiques de Rennes	Other (not specified yet)
Actinide Science & Applications		JRC	Other international organizations
Advanced courses on the nuclear fuel cycle	ANNETTE		The Belgian Nuclear Education Network
Bentonite training course	PEBS	BGR	
Characterisation of conditioned radioactive waste: status, challenges and new developments	CHANCE		SCK•CEN Academy
Characterization of radioactive waste		CIEMAT	
Geological disposal of radioactive waste	ANNETTE		Université de Lorraine & Universidad Politecnica de Madrid
CRISTAL - Tools for Criticality Safety Calculation		ENSTTI, IRSN	
Disused Sealed Radioactive sources		IAEA	
ENEN+ Summer School	ENEN+	ENEN+	Budapest University of Technology and Economics
Environmental Remediation and Site Release	INSIDER (ELINDER)	University of Birmingham	In collaboration with the IAEA
From nuclear data to a reliable estimate of spent fuel decay heat	ENEN	SCK•CEN	
Hands on training in nuclear chemistry	CINCH	CVUT	
The chemistry of f-elements		TU Dresden	Other institutions from: USA, Russia, France, Germany
Nuclear fuel cycle	ENEN	INSTN/CEA	
International school in nuclear engineering	ENEN	INSTN/CEA	
Introduction to Nuclear Reactor Physics	VINCO	CTU Prague, FNSPE	
Isotope Hydrology		IAEA	
Material and waste management in decommissioning	INSIDER (ELINDER)	CEA-INSTN	
Mechanical measurements of irradiated materials	VINCO	National Centre for Nuclear Research (NCBJ)	JAEA
Metrology for Radioactive Waste Characterisation and Clearance	INSIDER (ELINDER)	Joint Research Centre (JRC)	
Modern Spent Fuel Dissolution and Chemistry in Failed Container Conditions	EURAD-QUESTIONNAIRE	DISCO	
Monitoring in Geological Disposal of Radioactive Waste	Modern2020	Åspö Hard Rock Laboratory, Sweden.	
Nuclear Fuel Cycle	ANNETTE		University of Manchester – NTEC Courses
New Nuclear Sources	VINCO	CTU Prague, FNSPE	
Nuclear Criticality Safety		ENSTTI, IRSN	
Nuclear Energy and The Nuclear Fuel Cycle	ANNETTE		University of Central Lancashire Courses
Nuclear Fuel Characterization	MEET CINCH	CHALMERS	ASGARD project
Nuclear fuel cycle	ANNETTE		The Belgian Nuclear Education Network
Nuclear Fuel Cycle and Reprocessing	ENEN	CEA	
Nuclear Waste Management	ENEN	CEA	
Introduction to safety assessment in geological disposal of spent fuel - advanced sessions	ENEN/PETRUS II	POSIVA	
Numerical simulation in long-term safety analysis - probabilistic methods	ENEN/PETRUS	Technische Universität Clausthal Institut für Endlagerforschung	
Plug and Seal Training Workshop	DOPAS	CTU	POSIVA
Nuclear Fuel from ore to Waste	ENEN/GENTLE	DUT	
Release of radioactive materials and nuclear system component		AiNT	
Spent Fuel Storage		IAEA	
The ThUL School in Actinide Chemistry		HZDR (organized by different institutes every year)	Several research centers & universities
State-of-the-art computer codes		NEA	
Virtual tritium school	TRANSAT	Aix-Marseille University, France	Jožef Stefan Institute, Slovenia CEA, France

In general terms, the training needs that were identified previously [1] are confirmed during this mapping exercise, although several specific courses were found, they barely cover the gap itself, rather they provide an overview or introduce the subject to some extent. However, the courses that were mapped are a perfect starting point for developing new courses to fill the existing gaps.

5. Final Remarks

This report summarizes the mapping of available course materials up to June 2021. Several sources have been analysed as international entities or the open web; and a thorough forensic search through all EURATOM Framework programmes.

More than 150 courses all over Europe have been identified to be related to RWM. More than 61% have been given in the frame of a European project with a duration of around 1 week, around 80% are Face-To-Face courses and the remaining ones are online. It is worth to highlight the relevance of the online courses due to the current pandemic and confinement COVID-19 situation.

A cross comparison between this mapping and the training needs found within the frame of EURAD themes [1] confirm the lack of specific courses. However, they provide a perfect way to start developing new courses for filling the gaps identified.

6. References

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4. ENEN, European Nuclear Education Network, <https://enen.eu/>
5. NEA, Nuclear Energy Agency, <https://www.oecd-nea.org/>
6. IAEA, International Atomic Energy Agency, <https://www.iaea.org/>
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7. Acknowledgment

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Appendix A. EURATOM FP from 6 to 1

EURATOM FP 6 Projects:

Table 7. EURATOM FP 6 Projects

#	Acronym	Name	PERMANENT LINK
1	TIMODAZ	Thermal Impact on the Damaged Zone Around a Radioactive Waste Disposal in Cla...	https://cordis.europa.eu/project/rcn/80054_en.html
2	THERESA	Coupled thermal-hydrological-mechanical-chemical processes for application in...	https://cordis.europa.eu/project/rcn/85596_en.html
3	OBRA	European Observatory for Long-term Governance on Radioactive Waste Management	https://cordis.europa.eu/project/rcn/98367_en.html
4	CIP	New Governance approaches to radioactive waste management in Europe : Cowam in pr...	https://cordis.europa.eu/project/rcn/90946_en.html
5	ARGONA	Arenas for risk governance	https://cordis.europa.eu/project/rcn/90945_en.html
6	SAPIERR	Strategy Action Plan for Implementation of European Regional Repository - S...	https://cordis.europa.eu/project/rcn/107817_en.html
7	ACTINET	Network for Actinides Sciences (ACTINET-6)	https://cordis.europa.eu/project/rcn/107620_en.html
8	PUMA	Plutonium and Minor Actinides Management by Gas-Cooled Reactors	https://cordis.europa.eu/project/rcn/80057_en.html
9	VELLA	Virtual European Lead Laboratory	https://cordis.europa.eu/project/rcn/80059_en.html
10	EFNUDAT	European Facilities for Nuclear Data Measurements	https://cordis.europa.eu/project/rcn/80051_en.html
11	PAMINA	Performance assessment methodologies in application to guide the development o...	https://cordis.europa.eu/project/rcn/92084_en.html
12	MICADO	Model uncertainty for the mechanism of dissolution of spent fuel in a nuclear ...	https://cordis.europa.eu/project/rcn/80043_en.html
13	EUROTRANS	European research Programme for the transmutation of high level nuclear was...	https://cordis.europa.eu/project/rcn/85226_en.html
14	LWR	DEPUTY - Light Water Reactor fuels for Deep Burning of Pu in Thermal Systems	https://cordis.europa.eu/project/rcn/80048_en.html
15	CARD	Co-ordination of research, development and demonstrator (RD and D) priorities a...	https://cordis.europa.eu/project/rcn/80060_en.html
16	ESDRED	Engineering Studies and Demonstrations of Repository Designs (ESDRED)	https://cordis.europa.eu/project/rcn/74120_en.html
17	FUNMIG	FUNDAMENTAL PROCESSES OF RADIONUCLIDE MIGRATION	https://cordis.europa.eu/project/rcn/74124_en.html
18	EUROPART	EUROpean research program for the PARTitioning of minor actinides and some l...	https://cordis.europa.eu/project/rcn/74122_en.html
19	RED IMPACT	Impact of P and T and Waste Reduction Technologies on the Final Nuclear..	https://cordis.europa.eu/project/rcn/74119_en.html
20	NUDAME	Neutron data measurements at IRMM	https://cordis.europa.eu/project/rcn/89142_en.html
21	PATEROS	Partitioning and Transmutation European Roadmap for Sustainable nuclear energy	https://cordis.europa.eu/project/rcn/80047_en.html
22	ENFTP	Towards a European nuclear fission technology platform	https://cordis.europa.eu/project/rcn/75834_en.html
23	CANDIDE	Coordination action on nuclear data for industrial development in Europe	https://cordis.europa.eu/project/rcn/85595_en.html
24	NF	Understanding and Physical and Numerical Modelling of the Key Processes in the...	https://cordis.europa.eu/project/rcn/74118_en.html
25	CETRAD	Co-ordination Action on Education and Training in Radiation Protection and Rad...	https://cordis.europa.eu/project/rcn/74110_en.html
26	COWAM 2	Community Waste Management 2: Improving the Governance of Nuclear Waste Mana...	https://cordis.europa.eu/project/rcn/74123_en.html
27	GAIN	Gap analysis for long term inspection needs of nuclear plant	https://cordis.europa.eu/project/rcn/74105_en.html
28	SAPIERR	Support action: pilot initiative for European regional repositories	https://cordis.europa.eu/project/rcn/74103_en.html
29	CATT	Co-operation and Technology Transfer on long-term radioactive waste management f...	https://cordis.europa.eu/project/rcn/78635_en.html

EURATOM FP 5 Projects:

Table 8. EURATOM FP 5 Projects.

#	Acronym	Name	PERMANENT LINK
1	SFS	Spent fuel stability under repository conditions	https://cordis.europa.eu/project/rcn/58448_en.html
2	INTERLAB ANALYSIS	Interlaboratory radiochemical analysis comparison on a primary wast...	https://cordis.europa.eu/project/rcn/52865_en.html
3	FEBEX II	Full-scale engineered barriers experiment in crystalline host rock phase II	https://cordis.europa.eu/project/rcn/58656_en.html
4	CROP	Cluster repository project - a basis for evaluating and developing concepts of f...	https://cordis.europa.eu/project/rcn/54322_en.html
5	NET.EXCEL	Network of excellence in nuclear waste management and disposal	https://cordis.europa.eu/project/rcn/65039_en.html
6	GASNET	A thematic network on gas issues in safety assessment of deep repositories for...	https://cordis.europa.eu/project/rcn/58150_en.html
7	ITW	International topical workshop on "glass in its disposal environment"	https://cordis.europa.eu/project/rcn/91486_en.html
8	RESEAL II	A large scale in situ demonstration test for repository sealing in an argil...	https://cordis.europa.eu/project/rcn/52868_en.html
9	RISCOM II	Enhancing transparency and public participation in nuclear waste management	https://cordis.europa.eu/project/rcn/53141_en.html
10	CALIXPART	Selective extraction of minor actinides from high activity liquid waste by ...	https://cordis.europa.eu/project/rcn/52389_en.html
11	TRANCOM II	Migration case study: transport of radionuclides in a reducing clay sediment	https://cordis.europa.eu/project/rcn/52867_en.html
12	BENIPA	Bentonite barriers in integrated performance assessment	https://cordis.europa.eu/project/rcn/52851_en.html
13	OMNIBUS	Development of the tools and interpretation techniques for ultrasonic surveys...	https://cordis.europa.eu/project/rcn/58419_en.html
14	ACTAF	Aquatic chemistry and thermodynamics of actinides and fission products relevant...	https://cordis.europa.eu/project/rcn/52872_en.html
15	SAFETI	Seismic validation of 3-d thermo-mechanical models for the prediction of the r...	https://cordis.europa.eu/project/rcn/58445_en.html
16	BIOMOSA	Biosphere models for Safety Assessment of radioactive waste disposal based on...	https://cordis.europa.eu/project/rcn/59925_en.html
17	PYROREP	Pyrometallurgical processing research programme	https://cordis.europa.eu/project/rcn/52874_en.html
18	SOMOS	Safety and operational monitoring of nuclear waste repositories with fiber opti...	https://cordis.europa.eu/project/rcn/59927_en.html
19	MODEX-REP	Elaboration of hydromechanical coupled models by interpretation of the dist...	https://cordis.europa.eu/project/rcn/52458_en.html
20	N_TOF ADS	ADS nuclear data	https://cordis.europa.eu/project/rcn/52460_en.html
21	BENCHPAR	Benchmark tests and guidance on coupled processes for performance assessment...	https://cordis.europa.eu/project/rcn/58655_en.html
22	CONTAINER CORROSION	Long-term performance of candidate materials for HLW / spent fuel...	https://cordis.europa.eu/project/rcn/52916_en.html
23	PROTOTYPE REPOSITORY	Prototype repository - full scale testing of the KBS-3 concept f...	https://cordis.europa.eu/project/rcn/52873_en.html
24	BORIS	Building confidence in deep disposal : the borehole injection sites at tomsk-7 ...	https://cordis.europa.eu/project/rcn/52917_en.html
25	SPIN	Testing of safety and performance indicators	https://cordis.europa.eu/project/rcn/52875_en.html
26	TRAC-RODOS-HDM	Training Course on the Hydrological Dispersion Module of RODOS-HDM	https://cordis.europa.eu/project/rcn/65107_en.html
27	VE	Ventilation experiment in opalinus clay	https://cordis.europa.eu/project/rcn/59926_en.html
28	EB	Engineered barrier emplacement experiment in Opalinus clay	https://cordis.europa.eu/project/rcn/52386_en.html
29	BORIS	Bioavailability of radionuclides in soils: role of biological components and re...	https://cordis.europa.eu/project/rcn/52446_en.html
30	CORALUS_2	Integrated in situ corrosion test of alpha-active high-level waste glass - ...	https://cordis.europa.eu/project/rcn/52385_en.html
31	PADAMOT	Palaeohydrogeological data analysis and model testing	https://cordis.europa.eu/project/rcn/59928_en.html

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32	CLUSTER URL 2	Club of Underground Storage, Testing and Research Facilities for Radioactive Waste Disposal - CLUSTER URL 2	https://cordis.europa.eu/project/rcn/58145_en.html
33	MICROSTRUCTURAL WORK	Workshop on clay microstructure, Lund, 2002	https://cordis.europa.eu/project/rcn/65108_en.html
34	THEMATIC NETWORK ON MONITORING	Thematic network on the role of monitoring in a phased approach to disposal	https://cordis.europa.eu/project/rcn/58152_en.html
35	ACTINET	Establishment of a Network of Excellence for Actinide Science	https://cordis.europa.eu/project/rcn/65144_en.html
36	NANET	Establishment of a Network of Excellence for Actinide Science	https://cordis.europa.eu/project/rcn/67692_en.html
37	MICANET	Establishment of a Network of Excellence for Actinide Science	https://cordis.europa.eu/project/rcn/59918_en.html
38	GLAMOR	A critical evaluation of the dissolution mechanisms of high level nuclear waste glasses in conditions of relevance for geological disposal	https://cordis.europa.eu/project/rcn/58309_en.html
39	COMPAS	Comparison of alternative waste management strategies for long-lived radioactive wastes	https://cordis.europa.eu/project/rcn/58636_en.html
40	HUPA	Humic substances in performance assessment of nuclear waste disposal: actinide and iodine migration in the far-field	https://cordis.europa.eu/project/rcn/58446_en.html
41	HE	Heater experiment: rock and bentonite thermo-hydro-mechanical (THM) processes in the near field	https://cordis.europa.eu/project/rcn/58447_en.html
42	RETROCK	Treatment of geosphere retention phenomena in safety assessments	https://cordis.europa.eu/project/rcn/58527_en.html
43	BAMBUS II	Backfill and material behaviour in underground salt repositories, phase II	https://cordis.europa.eu/project/rcn/58654_en.html
44	ECOCLAY II	Effects of Cement on CLAY barrier performance - phase II	https://cordis.europa.eu/project/rcn/52388_en.html
45	IN CAN PROCESSES	Rates and mechanisms of radioactive release and retention inside a waste disposal canister	https://cordis.europa.eu/project/rcn/52870_en.html
46	EVANET-HYDRA	Evaluation and network of EC-decision support systems in the field of hydrological dispersion models and of aquatic radioecological research	https://cordis.europa.eu/project/rcn/58427_en.html
47	BIOCLIM	Modelling sequential biosphere systems under climate change for radioactive waste disposal	https://cordis.europa.eu/project/rcn/52457_en.html
48	ENEN	European Nuclear Engineering Network	https://cordis.europa.eu/project/rcn/60107_en.html
49	FRANCIS CLARET	Clay as a potential humic colloid source - implications for nuclear waste disposal	https://cordis.europa.eu/project/rcn/64043_en.html
50	HTR N1	High temperature reactor, nuclear, physics, waste and fuel cycle studies	https://cordis.europa.eu/project/rcn/58429_en.html

EURATOM FP 4 Projects:

Table 9. EURATOM FP 4 Projects.

#	Name	PERMANENT LINK
1	Understanding & improvement of ultra high performance cementitious materials resistance to long term water agression	https://cordis.europa.eu/project/rcn/38989_en.html
2	SUSRAD-Highly versatile but sustainable processes for the removal of radionuclides from radioactive waste	https://cordis.europa.eu/project/rcn/46371_en.html
3	Selective Separation of M(1+), M(2+) and M(3+) Radionuclides namely of Cs, Sr and Actinides from Nuclear Waste means of Chelating Hydrophobic Cluster Anions	https://cordis.europa.eu/project/rcn/47239_en.html

EURATOM FP 2 Projects:

Table 10. EURATOM FP 2 Projects.

#	Name	PERMANENT LINK
1	Study of a communication strategy aimed at achieving a possible better understanding of...	https://cordis.europa.eu/project/rcn/3108_en.html
2	Study concerning the evaluation of toxic elements present in nuclear wastes	https://cordis.europa.eu/project/rcn/3019_en.html
3	Treatment, Disposal, Re-Use of Building Demolition and Site Cleaning Wastes from Nuclea...	https://cordis.europa.eu/project/rcn/3010_en.html
4	Non-Destructive Examination of Nuclear Radioactive Waste Packages by Advanced Radiometr...	https://cordis.europa.eu/project/rcn/3088_en.html
5	EVEREST - EValuation of Elements Responsible for the dose Equivalent associated with th...	https://cordis.europa.eu/project/rcn/2988_en.html
6	Advanced processes for the treatment of low level liquid wastes at a pilot plant scale	https://cordis.europa.eu/project/rcn/3015_en.html
7	Wet oxidation of organic containing wastes	https://cordis.europa.eu/project/rcn/3018_en.html
8	Advanced management of radioactive wastes: comparative evaluation of processes for enh...	https://cordis.europa.eu/project/rcn/3021_en.html
9	Inventory and Characterization of Important Radionuclides for Safety of Storage and Dis...	https://cordis.europa.eu/project/rcn/3106_en.html
10	DEBORA - Development of Borehole Seals for High-Level Radioactive Waste	https://cordis.europa.eu/project/rcn/3020_en.html
11	Waste Management Studies for Large Volumes of Very Low-Level Waste	https://cordis.europa.eu/project/rcn/3110_en.html
12	Definition of reference level for exemption of wastes suitable for incineration	https://cordis.europa.eu/project/rcn/2997_en.html
13	BACCHUS - Demonstration of the In-situ Application of an Industrial Clay-Based Backfill...	https://cordis.europa.eu/project/rcn/4511_en.html
14	Use of methods and programmes developed in nuclear field for treatment and disposal of ...	https://cordis.europa.eu/project/rcn/4456_en.html
15	Tests for Process Control During Treatment of Low and Medium Radioactive Waste in Practise	https://cordis.europa.eu/project/rcn/3037_en.html
16	Performance Assessment of the Geological Disposal of Spent Fuel in a clay layer	https://cordis.europa.eu/project/rcn/3090_en.html
17	Aqueous Corrosion of Nuclear Glasses : Influence of Disposal Conditions	https://cordis.europa.eu/project/rcn/3091_en.html
18	Determination of Fissile Material by Neutron Transport Interrogation	https://cordis.europa.eu/project/rcn/27214_en.html
19	Corrosion of Selected Packaging Materials for Disposal of Heat-Generating Radioactive W...	https://cordis.europa.eu/project/rcn/3119_en.html
20	The evolution and implementation of a public information strategy on radioactive waste ...	https://cordis.europa.eu/project/rcn/3646_en.html
21	OKLO Natural Analogue for Transport Processes in a Geological Repository	https://cordis.europa.eu/project/rcn/3787_en.html
22	Organic matter and uraninite from the Oklo natural fission reactors - Natural analogous...	https://cordis.europa.eu/project/rcn/3089_en.html
23	The Corrosion of Nuclear Waste Glasses in a Clay Environment: Mechanisms and Modelling	https://cordis.europa.eu/project/rcn/3094_en.html
24	DECOVALEX - Development of coupled models and their validation against experiments in n...	https://cordis.europa.eu/project/rcn/4415_en.html

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25	Non-Nuclear Non-Destructive Testing Methods to Determine Free Water, Gas Pressure and M...	https://cordis.europa.eu/project/rcn/3120_en.html
26	Study of the Coupling Between "Fractured Medium" and "Porous Medium" Flow Models	https://cordis.europa.eu/project/rcn/3638_en.html
27	Some Aspects of Leaching Mechanisms of Ions Incorporated in Cement or Polymer	https://cordis.europa.eu/project/rcn/5609_en.html
28	Radionuclide Transport through the Geosphere into the Biosphere. Review Study of the Pr...	https://cordis.europa.eu/project/rcn/23964_en.html
29	Treatment of radioactive solvent waste by catalytic oxidation	https://cordis.europa.eu/project/rcn/4170_en.html
30	Effect of Insoluble Active Dissolution Fines on Fission Product Glasses	https://cordis.europa.eu/project/rcn/3093_en.html
31	The Performance of Cementitious Barriers in Repositories	https://cordis.europa.eu/project/rcn/3084_en.html
32	DECOVALEX - Development of coupled models and their validation against experiments in n...	https://cordis.europa.eu/project/rcn/4180_en.html
33	Study on Depleted Uranium (Tails) and on Uranium Residues from Reprocessing with Respec...	https://cordis.europa.eu/project/rcn/3103_en.html
34	In-situ research on compaction of and gas release in saliferous backfill (TSS experiment)	https://cordis.europa.eu/project/rcn/22612_en.html
35	Inventory and characterisation of important radionuclides in reactor and reprocessing w...	https://cordis.europa.eu/project/rcn/4455_en.html
36	The effect of Microbial Activity on the Near and Far Fields of a Deep Repository	https://cordis.europa.eu/project/rcn/27217_en.html
37	Effect of Humic Substances on the Migration of Radionuclides: Complexation of Actinides...	https://cordis.europa.eu/project/rcn/3640_en.html

EURATOM FP 1 Projects:

Table 11. EURATOM FP 1 Projects

#	Name	PERMANENT LINK
1	Decontamination of solid alpha wastes and recovery of the plutonium (prolix facility)	https://cordis.europa.eu/project/rcn/14036_en.html
2	Characterization of the Italian glasses and their interaction with clay	https://cordis.europa.eu/project/rcn/11720_en.html
3	Practice of treatment of radioactive wastes arising outside the nuclear fuel cycle in ...	https://cordis.europa.eu/project/rcn/11700_en.html
4	Determination of activity levels and recommendations for the exemption of radioactive ...	https://cordis.europa.eu/project/rcn/11699_en.html
5	The haw project : demonstration facility for high-level radioactive waste disposal in ...	https://cordis.europa.eu/project/rcn/14040_en.html
6	Comparison of waste management aspects of direct disposal of spent fuel and reprocessing.	https://cordis.europa.eu/project/rcn/13981_en.html
7	Investigations into the behaviour of highly compacted dry low level radioactive waste ...	https://cordis.europa.eu/project/rcn/13959_en.html
8	Assessment of management alternatives for reactor wastes	https://cordis.europa.eu/project/rcn/11741_en.html
9	Drawing-up of management routes for reactor waste based on industrial practices in fra...	https://cordis.europa.eu/project/rcn/11740_en.html
10	Derivation of weighting factors for cost and radiological impact for use in comparison...	https://cordis.europa.eu/project/rcn/13984_en.html
11	Embedded wastes and leachates analysis	https://cordis.europa.eu/project/rcn/13996_en.html
12	Exemption of radioactive wastes produced outside the nuclear fuel cycle in Spain	https://cordis.europa.eu/project/rcn/14299_en.html
13	Optimisation of waste management at source	https://cordis.europa.eu/project/rcn/11788_en.html
14	Destructive and non-destructive tests for radioactive waste packages	https://cordis.europa.eu/project/rcn/11705_en.html
15	Cost and radiological impact of reactor waste in below-grounds vaults.	https://cordis.europa.eu/project/rcn/13983_en.html
16	Review of non-destructive assaying methods for radioactive waste and study of an optim...	https://cordis.europa.eu/project/rcn/14298_en.html
17	Comparison of waste management aspects of direct disposal of spent fuel and reprocessing.	https://cordis.europa.eu/project/rcn/11738_en.html
18	Assessment of alternative ways of managing spent fuel cladding.	https://cordis.europa.eu/project/rcn/18194_en.html

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19	Evaluation of the management practices in Belgium for radioactive waste not linked to ...	https://cordis.europa.eu/project/rcn/11696_en.html
20	Utilisation of supported liquid membranes for the treatment of reprocessing concentrate.	https://cordis.europa.eu/project/rcn/14034_en.html
21	Conditioning of nuclear cladding waste by high temperature melting in cold crucible	https://cordis.europa.eu/project/rcn/14033_en.html
22	Limiting solubilities of radioelements in the interstitial waters of adjacent and back...	https://cordis.europa.eu/project/rcn/13955_en.html
23	The management of radioactive materials in non- nuclear sites in the UK	https://cordis.europa.eu/project/rcn/11701_en.html
24	The treatment of radioactive effluents of PWR - nuclear power plants by centrifugation.	https://cordis.europa.eu/project/rcn/11794_en.html
25	Hades - a pilot facility in the argillaceous layer beneath the nuclear site at MOL.	https://cordis.europa.eu/project/rcn/14039_en.html
26	Interaction of active glasses with several surrounding materials	https://cordis.europa.eu/project/rcn/13958_en.html
27	Experimental study of glass sampling devices	https://cordis.europa.eu/project/rcn/11718_en.html
28	Application of EC-test procedure: repository system simulation test.	https://cordis.europa.eu/project/rcn/13986_en.html
29	Study of the coupled thermo-hydro-mechanical effects on a HLW repository in a granite ...	https://cordis.europa.eu/project/rcn/13967_en.html
30	Corrosion of carbon steel overpacks for the geological disposal of radioactive waste.	https://cordis.europa.eu/project/rcn/11781_en.html
31	Application of EC-test procedure: repository system simulation test.	https://cordis.europa.eu/project/rcn/13989_en.html
32	Separation of actinides and long-lived fission products from HLW at the eurex plant mt...	https://cordis.europa.eu/project/rcn/14037_en.html
33	A thermo-mechanical behaviour of boom clay.	https://cordis.europa.eu/project/rcn/13969_en.html
34	Study of the migration of U, Th, and REE in a intragranitic uranium deposit	https://cordis.europa.eu/project/rcn/13968_en.html
35	In-situ study of radionuclide diffusion in clays by means of the autolab probe.	https://cordis.europa.eu/project/rcn/13972_en.html
36	FAR - field modelling of radionuclide migration	https://cordis.europa.eu/project/rcn/14008_en.html
37	Simulation of radionuclide exchange between aqueous and mineral-organic phases.	https://cordis.europa.eu/project/rcn/11715_en.html
38	Crushed salt behaviour under effect of a heat source in boreholes drilled in a salt mine.	https://cordis.europa.eu/project/rcn/14014_en.html
39	The detection and measurement of faults in clay.	https://cordis.europa.eu/project/rcn/14001_en.html
40	Optimization and characterization of cement products incorporating ashes from radwaste...	https://cordis.europa.eu/project/rcn/13961_en.html
41	Basic mechanisms of aqueous corrosion of waste glasses	https://cordis.europa.eu/project/rcn/11784_en.html
42	Sensitivity of waste glass leaching to parameters of the geological environment	https://cordis.europa.eu/project/rcn/11786_en.html
43	Textural and fluid phase analysis of rock salt subjected to the combined effects of pr...	https://cordis.europa.eu/project/rcn/13941_en.html
44	Emplacement feasibility of optimized air mortars	https://cordis.europa.eu/project/rcn/13963_en.html
45	EC repository systems simulation test-round robin test/granite system	https://cordis.europa.eu/project/rcn/13991_en.html
46	Natural analogues of radionuclide migration in granitic rocks through the study of pal...	https://cordis.europa.eu/project/rcn/14009_en.html
47	Summary and review of PAGIS- phase 2.	https://cordis.europa.eu/project/rcn/11748_en.html
48	Treatment separation and recovery transuranic elements from liquid wastes produced by ...	https://cordis.europa.eu/project/rcn/14035_en.html
49	Experimental analysis of radioactivity released by low-level and intermediate-level ra...	https://cordis.europa.eu/project/rcn/11725_en.html
50	Measurement of concentrations of matrix constituents and radionuclides released from n...	https://cordis.europa.eu/project/rcn/11747_en.html

Appendix B. Training Courses

Table 12. Face to Face General Courses.

Training Course	Link
Advanced Nuclear Waste Management; Project: EURAD's Survey; Org: IMT Atlantique; EN	https://www.imt-atlantique.fr/sites/default/files/document/MSc-IMTAtlantique-AdvancedNuclear.pdf
Basis for developing safe geological disposal (School of geological disposal); Project: EURAD's Survey; Org: SKB; 5 days; EN	https://www.skb.se/sgd2019/
Central European School - 9th International School on Nuclear Power in Poland; Project: VINCO; Org: National Centre for Nuclear Research (NCBJ); 4 days; EN	https://www.ncbj.gov.pl/en/aktualnosci/9th-international-school-nuclear-power ; https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bc9e695a&appld=PPGMS
Decommissioning of Nuclear Facilities; Project: ; Org: Czech Technical University in Prague; 3 years; CZ	https://www.fjfi.cvut.cz/en/education/bachelor-s-study/fields-of-bachelor-programme-new/decommissioning-of-nuclear-facilities-bc
Decommissioning of nuclear installations; Project: ENEN/ ELINDER; Org: SCK•CEN; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf_#page=5
Decommissioning of radioactive and nuclear facilities; Project: ; Org: CIEMAT; 30 h; ; SP	https://ceiden.com/formacion-descripcion/cursos-disponibles/?view=146
Decommissioning, Radioactive Waste and Environmental Management (N04); Project: ANNETTE; Org: ;EN	http://www.ntec.ac.uk/syllabi/N04_syllabus.html
Decommissioning, Radioactive Waste and Environmental Management (SC4110); Project: ANNETTE; Org: ; 5 days; EN	http://www.dimnp.unipi.it/walter-ambrosini/SC4110%20%20ANNETTE%20UCLan%20V15.05.html
Decontamination & dismantling techniques; Project: INSIDER (ELINDER); Org: KIT; 5 days; EN	http://insider-h2020.eu/trainingcourses/
EERRI Research Reactor Group Fellowship Programme; Project: VINCO; Org: Centre for Energy Research, Hungarian Academy of Sciences with Institute of Nuclear Techniques of Budapest University of Technology and Economics; 1 day; EN	https://nucleus.iaea.org/sites/connect/RRIHpublic/Pages/EERRI-Group-Fellowship.aspx
Engineered Barrier Systems - Bentonite properties and applications; Project: EURAD's Survey; Org: Grimsel; 5 days; EN	https://www.grimsel.com/gts-information/grimsel-training-centre-gtc
Final stage of the nuclear Lifecycle; Project: ANNETTE; Org: ; 1 day; ; EN	https://www.ifrt.kit.edu/vorlesungen/annette/KIT&JRC_Module2.html
From geophysical field data to geological models - theory and hands-on workshop; Project: EURAD's Survey; Org: Grimsel; 3 days; ; EN	http://www.grimsel.com/images/GTC_Files/GTC_Announcemet_From_Geo-physical_Field_Data_to_Geological_models_Hands_on_workshop.pdf
Fundamentals of geological disposal; Project: ENEN/PETRUS; Org: ITC; 10 days; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf_#page=89
Fundamentals of Geological Disposal; Project: EURAD's Survey; Org: Grimset Training Centre - Nuclear Training Solutions; 5 days; ; EN	http://www.nucleartrainingsolutions.com/nts-courses/gtc-nts-fundamentals-of-geological-disposal-2018
Geological Disposal at the Josef Experimental Repository; Project: ANNETTE; Org: CVUT; 3 days; ; EN	https://ceg.fsv.cvut.cz/en/copy_of_annette-courses-are-being-offered/view
Geological disposal of Radioactive Waste; Project: ANNETTE; Org: ; 93 h; ; FR	http://www.dimnp.unipi.it/walter-ambrosini/Geological%20Disposal%20Further.html

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Geological disposal of radioactive waste; Project: EURAD's Survey; Org: Université de Lorraine; 30 h; ; EN	http://www.dimnp.unipi.it/walter-ambrosini/Geological%20Disposal%20UL-UPM.html
Geomicrobiology in radioactive waste disposal; Project: MIND; Org: SCK•CEN; 4 days; ; EN	https://www.mind15.eu/public-meetings/
Introduction to the MARSSIM tool; Project: ; Org: TECNATOM S.A; 6 h; ; SP	https://ceiden.com/formacion-descripcion/cursos-disponibles/?view=57
JOPRAD – Towards a Joint Programming on Radioactive Waste; Project: SITEX-II; Org: JOPRAD; 2 days;EN	http://sitexproject.eu/index_2.html#workshops_201609
Management of Radioactive Waste; Project: EURAD's Survey; Org: Public Health England; ; ; EN	https://www.phe-protectionservices.org.uk/cms/article.php?article=340&course=32&details=true&site=RPTS
Management of the Decommissioning Process (N31); Project: ANNETTE; Org: ; ; ; EN	http://www.ntec.ac.uk/syllabi/N31_syllabus.html
Metrology for Waste Characterization and Clearance; Project: ; Org: JRC; 5 days; ; EN	https://ec.europa.eu/jrc/en/training-programme/metrology-waste-characterization-and-clearance-elinder-course-s7
Nuclear Decommissioning, Waste Management and environmental Site Remediation; Project: EURAD's Survey; Org: NINE (MMARS); ; ; EN	http://www.nineeng.com/courses/nuclear-decommissioning-waste-management-and-environmental-site-remediation
Nuclear Fuel: from Cradle to Grave; Project: ANNETTE; Org: ; 5 days; ; EN	https://www.ifrt.kit.edu/vorlesungen/annette/KIT&JRC_Module1.html
Nuclear Technology, Nuclear Waste Management and Radiation Protection (Summer School); Project: ANNETTE; Org: ENEN; 5 days; ; EN	https://www.annette.eu/summer-school/
Nuclear Waste Management; Project: ENEN; Org: CEA; 5 days; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=20
Nuclear Waste Management (International school in nuclear engineering); Project: EURAD's Survey; Org: CEA; 5 days ; ; EN	http://www-instn.cea.fr/en/education-and-training/continuing-education/short-courses/international-school-in-nuclear-engineering-nuclear-waste-management,1936959.html
Predisposal & Characterization of Radioactive Waste; Project: ; Org: IBC; 3 days; ; EN	https://www.projectcast.eu/cms-file/get/iFileId/2522
Processing, Storage and Disposal of Nuclear Wastes (N10); Project: ANNETTE; Org: ; ; ; EN	http://www.ntec.ac.uk/syllabi/N10_syllabus.html
Radiation Protection and Confinement Systems; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Radioactive Waste disposal; Project: ; Org: SCK•CEN; 8 days; ; EN	https://www.sckcen.be/en/node/842
Radioactive Waste Management; Project: ; Org: SCK•CEN; 8 days; ; EN	https://www.sckcen.be/en/node/843
Regulatory Control of Nuclear Sites: Inspection of Safety Systems, Structures and Components; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Regulatory Control of Radiation Protection in Mining and Minerals Processing Facilities and Activities; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Regulatory Control of Radiation Sources; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Regulatory Control of the Safety of Spent Fuel & Radioactive Waste Management; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf

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Regulatory Review and Assessment of the Safety Case for Disposal Facilities; Project: ; Org: ENSTTI, IRSN; 15 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Regulatory Review of Safety Cases for Geological Disposal of Radioactive Waste; Project: SITEX-II; Org: NEA, Integration Group for the Safety Case (IGSC); 2 days; ; EN	http://sitexproject.eu/index_2.html#workshops_201702
Regulatory review of the safety case for geological disposal; Project: SITEX-II; Org: ENSTII; 5 days; ; EN	http://sitexproject.eu/index_2.html#workshops
Storage of radioactive waste; Project: EURAD's Survey; Org: Mines Nancy Artem; ; ; EN	https://mines-nancy.univ-lorraine.fr/cours/petrus-storage-of-radioactive-waste-ces8aj/
The Legal and Regulatory Basis for Nuclear and Radiation Safety; Project: ; Org: ENSTTI, IRSN; 5 days; ; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Theramin technical training school; Project: THERAMIN; Org: CEA ; 3 days; ; EN	http://www.theramin-h2020.eu/downloads/THERAMIN%20Training%20school%20flyer.pdf
Radioactive Waste Management; Project: EURAD's Survey; Org: CIEMAT; 51 h; ; SP	http://www.dimnp.unipi.it/walter-ambrosini/UPM-1.html

Table 13. Online General Courses.

Training Course	Link
Borehole Disposal; Project: ; Org: IAEA; 3 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=358
Decommissioning Implementation; Project: ; Org: IAEA; 5 h; ; EN; JP	https://elearning.iaea.org/m2/enrol/index.php?id=518
Disposal of Radioactive Waste; Project: ; Org: IAEA; 5 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=357
Environmental Remediation; Project: ; Org: IAEA; 4 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=500
Fundamentals of RW disposal; Project: ; Org: IAEA; 5 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=357
Geological Disposal; Project: ; Org: IAEA; 5 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=356
Near Surface Disposal; Project: ; Org: IAEA; 5 h; ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=354
Predisposal RW Management; Project: ; Org: IAEA; 5 h; ; EN	https://elearning.iaea.org/m2/course/index.php?categoryid=60
Virtual first tritium school; Project: TRANSAT; Org: Jožef Stefan Institute; 2 days; EN	http://transat-h2020.eu/wp-content/uploads/2018/08/TRANSAT-1st-SUMMER-SCHOOL.pdf
Online Summer School on Nuclear decommissioning and Waste Management; Project: ELINDER; Org: Joint Research Centre (JRC); 5d; EN	https://ec.europa.eu/jrc/en/event/training-course/ndwm-summer-school

Table 14. Face to Face Specific Courses

Training Course	Link
Accelerators and ADS system; Project: MYRTE - MYRRHA Research and Transmutation Endeavour; Org: MYRTE - MYRRHA Research and Transmutation Endeavour; 2 days; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b48fb9d1&appId=PPGMS
Actinide Chemistry; Project: ; Org: HZDR (organized by different institutes every year); 5 days; EN	https://www.hzdr.de/db/Cms?pOid=44510&pNid=3488
Actinide Science & Applications (Summer School); Project: ; Org: JRC; 5 days; EN	https://ec.europa.eu/jrc/en/event/workshop/summer-school-2015
Application of International Regulations in Qualification and Approval of Packages for the Transport of Radioactive Materials; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Application of Nuclear Safety Concepts in the Development of Regulations and Guidance; Project: ; Org: ENSTTI, IRSN; 6 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Bentonite training; Project: PEBS; Org: BGR; 4 days; EN	https://www.pebs-eu.de/PEBS/EN/Events/events_inhalt_en.html?nn=1797144#link2
C-14 behavior under repository conditions; Project: CAST; Org: KIT-INE; 2 days; EN	https://iadtp.eu/wp-content/uploads/2017/10/CAST-2017-06-D7.13-TrainingCourse1-Notes.pdf
Carbon Capture and Storage: can anything be learned from 35 years' experience in geological disposal of radioactive wastes?; Project: ENEN/PETRUS; Org: ITC; 3 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=106
Cementos Alcalinos; Project: ; Org: IETCC; 3 days; SP	https://www.ietcc.csic.es/cursos-y-masters/curso-de-cementos-alcalinos-2020/
Characterization of conditioned radioactive waste: status, challenges and new developments; Project: CHANCE; Org: ; 1 day; EN	https://www.chance-h2020.eu/Document.ashx?dt=web&file=/Lists/Deliverables/Attachments/10/D6.4%20-%20CHANCE%20Topical%20day.pdf&guid=acd91207-a854-465d-bc08-da42364cab57
CHARACTERIZATION OF RADIOACTIVE WASTE; Project: ; Org: CIEMAT; 30h; SP	https://ceiden.com/formacion-descripcion/cursos-disponibles/?view=147
Clay minerals in soils and weathered rock; Project: ENEN; Org: European group; 10 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=85
Computer Control of Experiments; Project: VINCO; Org: CTU Prague, FNSPE; ; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Conditioning, disposal & final disposal of radioactive waste; Project: ; Org: AiNT; 4 days; GR	https://www.nuclear-training.de/seminar-details/modul-6-1210.html
Control systems of Nuclear Reactors; Project: VINCO; Org: CTU Prague, FNSPE; 9 months; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
CRISTAL - Tools for Criticality Safety Calculation; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Química del Cemento; Project: ; Org: IETCC; 8 days; SP	https://www.ietcc.csic.es/cursos-y-masters/curso-de-la-quimica-del-cemento-tomas-vazquez-2020/
Data Science Summer School; Project: ; Org: BGSE; 1-3 weeks; EN	https://www.barcelonagse.eu/study/summer-school/data-science
Digital Safety Systems of Nuclear Reactors; Project: VINCO; Org: CTU Prague, FNSPE; ; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Emergency Response to Transport Accidents involving Radioactive Materials at Sea and in Port Zones; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
ENEN+ Summer School; Project: ENEN+; Org: ENEN+; 5 days; EN	https://summerschool2020.enen.bme.hu/
Environmental Remediation and Site Release; Project: INSIDER (ELINDER)Org: University Birmingham;EN	http://insider-h2020.eu/trainingcourses/
FIRSTNuclides project; Project: FIRST-Nuclides; Org: KIT-INE; 2 days; EN	http://www.firstnuclides.eu/ZonaPublica/FIRST-Nuclides-training-course-announcement_v3.pdf

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From nuclear data to a reliable estimate of spent fuel decay heat; Project: ENEN; Org: SCK•CEN; 1 day; EN	https://www.sckcen.be/en/events-courses/topical-day-nuclear-data-reliable-estimate-spent-fuel-decay-heat-b0781b76-342f-e711-80c1-ecf4bbc6e827
Fundamentals of long-term safety analysis; Project: ENEN/PETRUS; Org: Technische Universität Clausthal Institut für Endlagerforschung; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=116
Geological disposal of Radioactive Waste; Project: ANNETTE; Org: ; 30h; EN	http://www.dimnp.unipi.it/walter-ambrosini/Geological%20Disposal%20UL-UPM.html
Geological storage in Precambrian bedrock; Project: ENEN/PETRUS; Org: Äspö Laboratory.Sweden; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=112
Hands on training in nuclear chemistry ; Project: CINCH; Org: CVUT; ; EN	https://www.cinch-project.eu/cinch2/data/CINCH_I/docs_I/CINCH_Hands_on_121116.pdf https://nanss.uu.se/education-training/mto-hf-safety-culture/
Human-Technology-Organisation/Human Factors for Nuclear Safety including Virtual Reality Resources as part of Safety Culture; Project: ANNETTE; Org: ; 2 months; EN	
Hydromechanical behaviour of bentonite: constitutive and numerical modelling; Project: Beacon; Org: BEACON; 15.5 h; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b85393c5&appId=PPGMS
Implementing Nuclear Safeguards in practice; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Introduction to Nuclear Reactor Physics; Project: VINCO; Org: CTU Prague, FNSPE; ; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Introduction to safety assessment in geological disposal of spent fuel; Project: ENEN/PETRUS II; Org: POSIVA; 4 days; FN	http://www.oldenen.eu/en/test/enen-database/enen-database-search/petrus-positiva-old-introduction-safety-assessment-geological-disposal-spent-fuel-advanced-sessions.course.76.html
Management of Radioactive Waste in Accordance with IAEA Safety Standards and International Best Practice; Project: ENEN/PETRUS; Org: Technische Universität Clausthal Institut für Endlagerforschung; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=109
Material and waste management in decommissioning; Project: INSIDER (ELINDER); Org: CEA-INSTN; ; EN	http://insider-h2020.eu/trainingcourses/
Mechanical measurements of irradiated materials ; Project: VINCO; Org: National Centre for Nuclear Research (NCBJ); 2 d; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bd507a32&appId=PPGMS
Metrology for Radioactive Waste Characterisation and Clearance; Project: INSIDER (ELINDER); Org: Joint Research Centre (JRC); 5 days; EN	http://insider-h2020.eu/trainingcourses/
Microbiology and disposal of radioactive waste; Project: ENEN/PETRUS; Org: MICANS; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=95
Migration of radioactive waste from deep geological waste repositories - Case Study; Project: ENEN/PETRUS; Org: BME; 6 hours; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=78
Modern Spent Fuel Dissolution and Chemistry in Failed Container Conditions; Project: EURAD-QUESTIONNAIRE; Org: DISCO; ; EN	https://www.disco-h2020.eu/Home/GeneralInformation
Monitoring in Geological Disposal of Radioactive Waste; Project: Modern2020; Org: Äspö Hard Rock Laboratory, Sweden.; 5 days; EN	http://www.modern2020.eu/training/learning-outcomes.html
New Nuclear Sources; Project: VINCO; Org: CTU Prague, FNSPE; ; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Nuclear Criticality Safety; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Nuclear Energy and The Nuclear Fuel Cycle; Project: ANNETTE; Org: ; 2 week; EN	http://www.dimnp.unipi.it/walter-ambrosini/SC4101%20%20ANNETTE%20UCLan%20V15.05.html
Nuclear Engineering; Project: ENEN; Org: INSTN/CEA; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=4
Nuclear Fuel cycle; Project: ENEN; Org: INSTN/CEA; 66 hours (10 days); EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf #page=1
Nuclear Fuel Cycle; Project: ANNETTE; Org: ; ; EN	http://www.ntec.ac.uk/syllabi/N02_syllabus.html
Nuclear fuel cycle; Project: ANNETTE; Org: ; 81h; EN	https://bnen.sckcen.be/en/Courses/Advanced_fuel_cycle
Nuclear fuel cycle; Project: ANNETTE; Org: ; 90 h; EN	https://bnen.sckcen.be/en/Courses/Nuclear_fuel_cycle

EURAD Deliverable 13.2 –Mapping of available course materials

Nuclear Fuel Cycle and Reprocessing; Project: ENEN; Org: CEA; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=22
Nuclear Fuel from ore to Waste; Project: ENEN/GENTLE; Org: DUT; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=19
Nuclear Materials Protection, Nuclear Safeguards and Interface with Nuclear Safety; Project: ; Org: ENSTTI, IRSN; 5 days; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Nuclear Safety Case Development; Project: ANNETTE; Org: ; ; EN	http://www.ntec.ac.uk/syllabi/N07_syllabus.html
Nuclear Waste Management; Project: ENEN; Org: CEA; 5 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=20
Numerical simulation in long-term safety analysis - probabilistic methods; Project: ENEN/PETRUS; Org: Technische Universität Clausthal Institut für Endlagerforschung; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=117
Operational control room staff, verification physicist, simulator training instructors; Project: VINCO; Org: VUJE a.s.; 900 h; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Petrology and Geochemistry of rocks relevant for final disposal; Project: ENEN/PETRUS; Org: Technische Universität Clausthal Institut für Endlagerforschung; 3 hours; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=115
Plug and Seal Training Workshop; Project: DOPAS; Org: CTU; 5 days; EN	https://posiva.fi/dopas/files/4375/DOPAS_Deliverable_D7_2_Plug_and_Seal_Training_Workshop_planning_and_implementation_report.pdf
Policy, Regulation and Licensing; Project: ANNETTE; Org: ; ; EN	http://www.ntec.ac.uk/syllabi/N09_syllabus.html
Radioactive material transport; Project: ; Org: CIEMAT; 30h; SP	https://ceiden.com/formacion-descripcion/cursos-disponibles/?view=154
Reactor physics and operation; Project: VINCO; Org: CTU Prague, FNSPE; ; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Regulatory Issues and Standards; Project: ENEN/PETRUS; Org: ITC; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=82
Release of radioactive materials and nuclear system component; Project: ; Org: AiNT; 2 days; GR	https://www.nuclear-training.de/seminar-details/modul-2-1205.html
Safety advisor in the transport of radioactive material; Project: ; Org: Ecoquímica Logística Integral; ; EN	https://ceiden.com/formacion-descripcion/cursos-disponibles/?view=210
Service and operational staff Courses ; Project: VINCO; Org: VUJE a.s.; 200 h; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Szkoła energetyki jądrowej / School of Nuclear Energy; Project: VINCO; Org: NCBJ; 5 d; PL, EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Technical and managing staff; Project: VINCO; Org: VUJE a.s.; 480 h; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b06d0d5f&appId=PPGMS
Technical Concepts, Techniques, Methods and Tools for the Assessment of Nuclear Safety and Radiation Protection; Project: ; Org: ENSTTI, IRSN; 3 weeks; EN	https://enstti.eu/wp/wp-content/uploads/2020/03/enstti_catalogue_2020.pdf
Technology and Management of the Decommissioning of Nuclear Facilities; Project: ANNETTE; Org: ; ; EN	http://www.fps.kit.edu/465.php
The chemistry of f-elements; Project: ; Org: TU Dresden; 5 days; EN	https://tu-dresden.de/mn/chemie/ac/ac3/die-professur/news/international-autumn-school-the-chemistry-of-f-elements-1
Thermal-hydraulics and chemistry in HLM reactors; Project: MYRTE - MYRRHA Research and Transmutation Endeavour; Org: MYRTE - MYRRHA Research and Transmutation Endeavour; 5 days; EN	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b3985c3f&appId=PPGMS
Transport and Retention of Radionuclides in Argillaceous and Fractured Media; Project: ENEN/PETRUS; Org: ITC; ; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=104
Understanding Thermo-Hydro-Mechanical processes for safety assessment: theory and numerical simulation; Project: ENEN/PETRUS; Org: CARDIFF; 6 days; EN	https://euradschool.eu/wp-content/uploads/2021/09/oldENEN-database-ET-info.pdf#page=69
International School of Nuclear Law (ISNL) Org: NEA/ University of Montpellier; 2 Weeks; EN	https://www.oecd-nea.org/icms/pl_23822/international-school-of-nuclear-law-isnl/
International Nuclear Law Essentials (INLE); NEA/ University of Montpellier; 5 days; EN	https://www.oecd-nea.org/icms/pl_15203/international-nuclear-law-essentials-inle

Table 15. Online Specific Courses.

Training Course	Link
Data Science Winter School; Project: ; Org: BGSE;20 h; EN	https://www.barcelonaqse.eu/study/professional-courses/data-science-winter-school
Desused Sealed Radioactive sources; Project: ; Org: IAEA;5h; SP, FR	https://elearning.iaea.org/m2/enrol/index.php?id=376
DOT/NRC Radioactive Waste Packaging, Transportation and Disposal; Project: ; Org: EnergySolutions;32 hours; EN	https://www.energysolutionstraining.com/core/files/energysolutionstraining/uploads/files/Course%20Catalog(3).pdf
How does corrosion influence the health of concrete?; Project: ; Org: IETCC;2 h; SP	https://www.ietcc.csic.es/noticias/como-influye-la-corrosion-en-la-salud-del-hormigon-how-does-corrosion-influence-the-health-of-concrete/
Introducing safety culture and its application to the nuclear field; Project: ANNETTE; Org: ENEN;25h; EN	http://blogs.uned.es/inooc/en/mooc_introducing_safety_culture/
Isotope Hydrology; Project: ; Org: IAEA;60h; EN	https://elearning.iaea.org/m2/enrol/index.php?id=759
Nuclear Fuel Characterization; Project: MEET CINCH; Org: CHALMERS;; EN	https://eshop.cinch-project.eu/Chemistry-of-the-nuclear-fuel-cycle-and-waste-management/products/Nuclear-Fuel-Characterization/13
Nuclear Knowledge Management orientation course; Project: ; Org: IAEA;1h; EN	https://elearning.iaea.org/m2/enrol/index.php?id=437
Nuclear Safety with respect to radioactive waste management facilities; Project: ; Org: TUV;2 days; EN	https://www.tuvsud.com/it-it/store/italia/nuclear-safety-with-respect-to-radioactive-waste-management-facilities-cms-Nuclear_Safety_Respect_Radioactive_Waste_Management_Facilities
Physics and Chemistry of the Actinides; Project: ; Org: Institut des Sciences Chimiques de Rennes;4 days; EN	https://ida2020.sciencesconf.org/
Planning for Environmental Remediation; Project: ; Org: IAEA;4h ; EN	https://elearning.iaea.org/m2/enrol/index.php?id=500
Policies, Strategies and Prerequisites for Radioactive Waste Management; Project: ; Org: IAEA;6h; EN, RS	https://elearning.iaea.org/m2/enrol/index.php?id=355
Radioactive Waste Cementation; Project: ; Org: ICTP-IAEA;14 days; EN	http://indico.ictp.it/event/9129/overview
REDUPP Lecture Series (x9); Project: REDUPP; Org: Several;4 days; EN	https://www.skb.se/redupp/training/
Safety Case Development; Project: ; Org: IAEA;5h; EN	https://elearning.iaea.org/m2/enrol/index.php?id=352
Spent Fuel Storage; Project: ; Org: IAEA;5h; EN, JP	https://elearning.iaea.org/m2/enrol/index.php?id=561
Thermochemical Database (TDB) Project course: Thermodynamic data collection and assessment; Project: ; Org: NEA;2 days; EN	https://www.oecd-nea.org/upload/docs/application/pdf/2020-09/outline_course_paris_2020.pdf
TRITIUM SCHOOL; Project: TRANSAT; Org: Aix-Marseille University;5 d; EN	http://transat-h2020.eu/transat-second-tritium-school/
Fundamentals of International Nuclear Law (FINL); Org: NEA; 9h; EN	https://www.oecd-nea.org/icms/pl_50604/fundamentals-of-international-nuclear-law-finl?id=pl_50604&preview=true
Training courses on state-of-the-art computer codes Org: NEA; Duration depending on the code; EN	https://www.oecd-nea.org/icms/pl_52270/training-courses-on-state-of-the-art-computer-codes

Appendix C. Link to complete overview of mapped training courses

The complete overview of mapped training courses can be consulted via the following link:

https://euradschool.eu/wp-content/uploads/2021/10/D13.2_MappingAvailableCourseMat.Final_2021_10_28.xlsx