



Basic training module 3: Occupational radiation protection

1. Background of the ENETRAP training modules

The ENETRAP project series (FP7 grant agreement n° 605159) developed a European radiation protection training scheme (ERPTS) for RPEs, consisting of three common basis modules, several optional modules and some add-on modules. This basic training module (N°3: Occupational radiation protection) is the third of the three basic mandatory modules. It consists of a number of training courses which are linked to specific competences and activities that a Radiation Protection Expert (RPE) requires in compliance with Council Directive 2013/59/Euratom (BSS).

2. Training module objective

The course participant will gain the knowledge, skills and attitudes to provide expert radiation protection advice to employers, staff and members of the public that will allow him or her to seek the status of Radiation Protection Expert (RPE) from an authorised body.

3. Module overview

The Module on Occupational radiation protection consists of six courses:

Course 3.1	Transport
17	Implement the regulatory measures for transport of radioactive material (Class 7)
17.1	Apply RP for transport
Course 3.2	Design issues
18	Design a facility based on the source term
18.1	Design an installation with sealed sources
18.2	Design an installation with unsealed sources
Course 3.3	Accidents and emergency issues
19	Study the accidental / incidental situations
19.1	Use the feedback of accidental / incidental situations
Course 3.4	Safety culture
20	Being involved in the interface safety - Radiation
20.1	Consider applications from authority
20.2	Analyse safety report in terms of radiation protection
Course 3.5	Waste management
21	Take account of radiation protection issues for waste generated by the installation
21.1	Manage waste for an operation
21.2	Manage waste generated during decommissioning
Course 3.6	ALARA culture
21a	Implement the ALARA principle
21.a.1	Apply the 3 ALARA principles
21.a.2	Apply the ALARA procedure



4. Marking and assessment criteria

Each of the 6 courses requires self-studying previous to the course.

There will be a one hour written examination on the last day of the face to face module that will consist of a multiple choice examination to assess knowledge (K) (70% pass-mark) showing a detailed understanding of the subject.

The candidate must pass all three components (K, S, A) to pass each course. The candidate must also pass all courses to pass the Module.

Evaluation Procedure		
Evaluation Question	Judgement Criteria	Indicators and Descriptors
To what extent has the course module participant achieved the required RPE KSAs?	The participant's level of achievement of the course module KSAs will be judged by their grade (marks) from the written examinations.	An overall grade (mark) of: <50% indicate a need for further development. 50 – 70% the course module participant has average knowledge and some experience, however, they should upgrade their KSAs to increase their level of qualification. >70% the course module participant has sufficient knowledge and experience.

5. Pre-requisites

The applicant will be expected to have achieved an education to level 6 of the European Qualification Framework (EQF) (e.g. Bachelor degree level either specifically in radiation protection, or in a physical/engineering/mathematical discipline or equivalent through life long learning).

The applicant will be expected to have completed the generic ENETRAP III modules 1 and 2 as pre-requisites for third Module (see below for alternative pre-requisites):

Basic training module 1: Basics

- 1.1 Radioactivity and Nuclear Physics
- 1.2 Interaction of radiations with matter
- 1.3 Dosimetry: quantities and units
- 1.4 Biological effects of radiations
- 1.5 Physical principles of detection

Basic training module 2: Foundation

- 2.1 Application of ionising radiation
- 2.2 Radiation protection
- 2.3 Radiation protection internal dosimetry
- 2.4 Protection against external exposure
- 2.5 Dose monitoring
- 2.6 Regulatory context
- 2.7 Natural sources of ionising radiation
- 2.8 Public and environmental radiation protection
- 2.9 Ethical considerations



Accreditation of Prior Certificated Learning (APCL), which covers learning that has been assessed and certificated by an education or training system, will be considered where appropriate, e.g. the applicant has been awarded a Bachelor or Master's degree whose contents demonstrates the above components had been covered and examined. Alternatively, applicants who can demonstrate equivalent achievement through Life Long Learning (LLL) will also be considered. APCL or LLL applications should be made to the Module co-ordinator before starting the module.

6. Learning outcomes and indicators from EQF per training course

Legend:

Competence	17	Implement the regulatory measures for transport of radioactive material (Class 7)
Training course	3.1	Transport
Activity	17.1	Apply RP for transport
Learning outcome in terms of knowledge (K), skills (S) or attitude (A)	LO K 17.1.1	List the variables to be monitored (Dose rate, Bq/cm ² ...)

17	Implement the regulatory measures for transport of radioactive material (Class 7)	
Course 3.1	Transport	
17.1	Apply RP for transport	
Knowledge		
LO K 17.1.1	List the variables to be monitored (Dose rate, Bq/cm ² ...)	
LO K 17.1.2	Apply the labelling of the truck and the package	
LO K 17.1.3	Identify the transport documents (declaration of shipment, ...)	
Skills		
LO S 17.1.1	Measure the dose equivalent (contact and 1m)	
LO S 17.1.2	Measure the level of contamination of the package	
LO S 17.1.3	Define the transport index	
Attitude		
LO A 17.1.1	Exchange with the transport counsellor (Class 7) of the organisation	

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	1
Proposed Duration	3 hours theoretical sessions 3 hours tutorials/PW/OJT



18	Design a facility based on the source term
Course 3.2	Design issues
18.1	Design an installation with sealed sources
Knowledge	
LO K 18.1.1	List the rules for shielding
LO K 18.1.2	List the control procedures
Skills	
LO S 18.1.1	Apply the rules of shielding
LO S 18.1.2	Apply control procedures
Attitude	
LO A 18.1.1	Take into account the human factor (incident, accident, malicious ...)
18.2	Design an installation with unsealed sources
Knowledge	
LO K 18.2.1	List the control procedures (not contamination)
LO K 18.2.2	List the rules of containment (ventilation, gloves box ...)
Skills	
LO S 18.2.1	Implement control procedures (not contamination)
LO S 18.2.2	Apply the rules of containment (ventilation, gloves box ...)

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	0.5
Proposed Duration	3 hours theoretical sessions

19	Study the accidental / incidental situations
Course 3.3	Accidents and emergency issues
19.1	Use the feedback of accidental / incidental situations
Knowledge	
LO K 19.1.1	Identify the process of reporting to authorities
LO K 19.1.2	Evaluate the release
Skills	
LO S 19.1.1	Evaluate the predictive dosimetry in accidental / incidental situations
LO S 19.1.2	Provide and maintain the register of sources based on the perimeter of EPR
Attitude	
LO A 19.1.1	Be available to teams (provide information, source term ...)

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or



	innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	0.5
Proposed Duration	3 hours theoretical sessions

20	Being involved in the interface safety - radiation
Course 3.4	Safety culture
20.1	Consider applications from authority
Knowledge	
LO K 20.1.1	Explain the transfer of dose between populations
LO K 20.1.2	Characterise the safety analysis vs RP analysis
Skills	
LO S 20.1.1	Quantify dose following a request from authority
20.2	Analyse safety report in terms of radiation protection
Skills	
LO S 20.2.1	Prepare complementary RP report

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	0.5
Proposed Duration	4 hours theoretical sessions

21	Take account of radiation protection issues for waste generated by the installation
Course 3.5	Waste management
21.1	Manage waste for an operation
Knowledge	
LO K 21.1.1	Identify the clearance levels (Europe and national)
Skills	
LO S 21.1.1	Conduct a waste zoning
LO S 21.1.2	Check the adequacy of RP zoning and waste zoning
21.2	Manage waste generated during decommissioning
Knowledge	
LO S 21.2.1	Define the principles of decommissioning
LO S 21.2.2	Define the different strategies for decommissioning
LO S 21.2.3	Define the different technics and their implementation

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between



	different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	1
Proposed Duration	8 hours theoretical sessions

21a	Implement the ALARA principle
Course 3.6	ALARA culture
21.a.1	Apply the 3 ALARA principles
Knowledge	
LO K 21.a.1.1	Define the 3 ALARA principles (Justification, optimisation and limitation)
LO K 21.a.1.2	Implement ALARA principles using the new ICRP recommendations
Skills	
LO S 21.a.1.1	Calculate the dosimetric impact of RP options
LO S 21.a.1.2	Calculate the economic impact of RP actions
Attitude	
LO S 21.a.1.1	Adopt the ALARA attitude based on the ALARA culture
LO S 21.a.1.2	Promote the ALARA culture
21.a.2	Apply the ALARA procedure
Knowledge	
LO K 21.a.2.1	List the 5 steps (analysis, RP options, Quantification, selection of ALARA option, sensibility analysis)
LO K 21.a.2.2	Define the alpha value
Skills	
LO S 21.a.2.1	Identify the ALARA option (balance)

Indicators from EQF	
Knowledge	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields
Skill	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
EQF Level	5-6
ECVET Credit Points	1
Proposed Duration	3 hours theoretical sessions 3 hours tutorials/PW/OJT