



PETRUS-III PROJECT

(Contract Number: FP7 - 605265)

Deliverable: D.1.13

Professional and trainee profiles

Nature of the deliverable		
R	Report	X
P	Prototype	
D	Demonstrator	
O	Other	

Author(s): Abdesselam Abdelouas

Reporting period: 1

Date of issue of this report: 24/07/2015

Start date of project: 01/09/2013

Duration: 36 Months

Project co-funded by the European Commission under the Euratom Research and Training Programme on Nuclear Energy within the Seventh Framework Programme		
Dissemination Level		
PU	Public	*
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the partners of the PETRUS III project	
CO	Confidential, only for partners of the PETRUS III project	

DISTRIBUTION LIST

URL: <http://...>

Name	Number of copies	Comments
	electronic copy via website and / or email	

[PETRUS-III]

Deliverable DI.1 Version n° 1

Dissemination level:

Date of issue of this report: **24/09/14**



Scope	WP1.3	Version:	V1
Type/No.	Report	Total pages	12
Title:	Professional and trainee profiles	Chapters:	
Filename:	PETRUSIII_WP1_D1.13	Suppl. pages:	
Internet		Phase	

ABSTRACT:

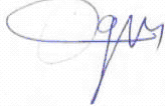
The professional and trainee profiles constitute a fundamental step toward the implementation of the ECVET system (European Credit system for Vocational Education and Training) for the geological disposal of radioactive waste. Many documents and input from waste management agencies officers were used to design as better as possible the profile of a safety engineer specialized in assessment and safety analysis for Construction License of a Selected Site.

RESPONSIBLE: Abdesselam Abdelouas

INTERNAL REFERENCES:

[PETRUS-III]

Signatures

	Name	Signature	Date
Prepared by	Abdesselam Abdelouas		24/07/15
Revised by			
Approved by:			25/07/2015

Document history

Identifier	Date	Short description

Abbreviations

KSC	Knowledge Skills Competencies
LO	Learning Outcomes

1. Methodological approach to design the profile of a safety engineer in the field of geological disposal of radioactive waste

a. EQF and ECVET

We based our approach on the ECVET system, which is connected to other European initiatives called EQF (European Qualifications Framework), EQAVET (European quality assurance in vocational education and training) and Europass.

ECVET system uses components such as Learning outcomes, units and points, Memorandum of Understanding, learning agreements...

The European Qualifications Framework is based on the description of Knowledge, Skills and Competencies (KSC). It is important to indicate that the EQF deals with qualification and not with academic diploma. The qualifications are based on Learning Outcomes (LO). Eight levels describe the EQF which are defined by a set of descriptors indicating learning outcomes relevant to qualifications at that level in any systems of qualifications.

EQF Level	Knowledge	Skills	Competence
	In the context of EQF, knowledge is described as <i>theoretical and/or factual</i> .	In the context of EQF, skills are described as <i>cognitive</i> (involving the use of logical, intuitive and creative thinking), and <i>practical</i> (involving manual dexterity and the use of methods, materials, tools and instruments)	In the context of EQF, competence is described in terms of <i>responsibility and autonomy</i> .

EQF Level	Knowledge	Skills	Competence
	In the context of EQF, knowledge is described as theoretical and/or factual .	In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking), and practical (involving manual dexterity and the use of methods, materials, tools and instruments)	In the context of EQF, competence is described in terms of responsibility and autonomy .
Level 1	Basic general	Basic skills required to	Work or study under

	knowledge	carry out simple tasks	direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5^[1]	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6^[2]	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
Level 7^[3]	Highly specialised	Specialised problem-	Manage and transform

	<p>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</p> <p>Critical awareness of knowledge issues in a field and at the interface between different fields</p>	<p>solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields</p>	<p>work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams</p>
Level 8^[4]	<p>Knowledge at the most advanced frontier of a field of work or study and at the interface between fields</p>	<p>The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice</p>	<p>Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research</p>

Compatibility with the Framework for Qualifications of the European Higher Education Area

The Framework for Qualifications of the European Higher Education Area provides descriptors for cycles. Each cycle descriptor offers a generic statement of typical expectations of achievements and abilities associated with qualifications that represent the end of that cycle.

1. The descriptor for the higher education short cycle (within or linked to the first cycle), developed by the Joint Quality Initiative as part of the Bologna process, corresponds to the learning outcomes for EQF level 5.
2. The descriptor for the first cycle in the Framework for Qualifications of the European Higher Education Area corresponds to the learning outcomes for EQF level 6.
3. The descriptor for the second cycle in the Framework for Qualifications of the European Higher Education Area corresponds to the learning outcomes for EQF level 7.
4. The descriptor for the third cycle in the Framework for Qualifications of the European Higher Education Area corresponds to the learning outcomes for EQF level 8.

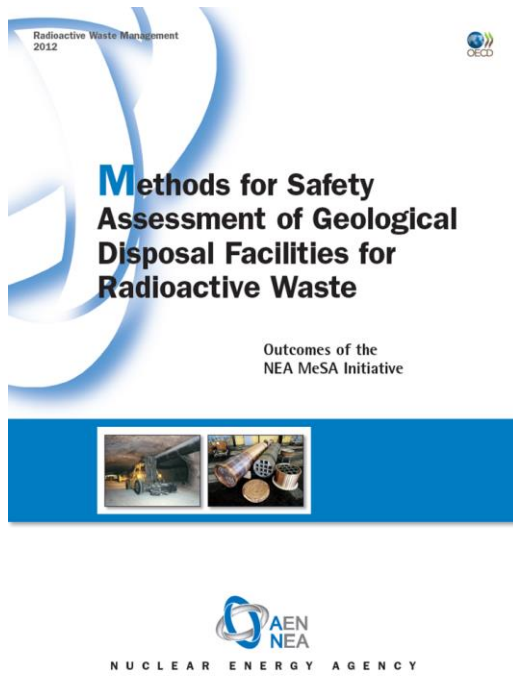
Briefly, the ECVET is based on learning outcomes, ECVET points, Credits expressed in Memoranda of Understanding and Learning Agreements.

ECVET is based on:

- **Learning outcomes**, which are statements of knowledge, skills and competence that can be achieved in a variety of learning contexts.
- **Units** of learning outcomes that are components of qualifications. Units can be assessed, validated and recognised.
- **ECVET points**, which provide additional information about units and qualifications in a numerical form.
- **Credit** that is given for assessed and documented learning outcomes of a learner. Credit can be transferred to other contexts and accumulated to achieve a qualification on the basis of the qualifications standards and regulations existing in the participating countries.
- **Mutual trust and partnership** among participating organisations. These are expressed in **Memoranda of Understanding and Learning Agreements**.

b. Literature and input from the waste management agencies

Several documents dealing with safety assessment and safety case for geological disposal facilities are available. The information have been used to construct the job profile “Safety Engineer – Assessment and Performance Analysis for construction license of a selected site”. Then, the profile was reviewed and enriched with the contribution of Petrus3 members as well as non-formal members of the Pterus3 consortium but with strong experience in the field of radioactive waste management. Examples of literature sources used in the study are given below:



[PETRUS-III]

Deliverable DI.3 Version n°1

Dissemination level:

Date of issue of this report: 24/07/15



8/12

The Use of Numerical Models in
Support of Site Characterization and
Performance Assessment Studies
of Geological Repositories



IAEA Safety Standards

for protecting people and the environment

Disposal of Radioactive Waste

Specific Safety Requirements

No. SSR-5



IAEA Safety Standards

for protecting people and the environment

Fundamental Safety Principles

Jointly sponsored by



Safety Fundamentals

No. SF-1



[PETRUS-III]

Deliverable DI.3 Version n°1

Dissemination level:

Date of issue of this report: **24/07/15**



10/12

The prepared job profile is given below:

Ref.	Job Title	Occupational Category
PETRUS3	Safety Engineer – Assessment and Performance Analysis for construction license of a selected site	<i>Professional (Engineer/Expert)</i>
Phase / Area	Alternate job title(s) – specialisations	Functional Category
Radioactive Waste Disposal	<i>Safety analysis coordinator for transport modelling</i>	<i>Specialist in hydrogeological modelling</i>
Role / Functions		
<p><i>The safety engineer specialised in integrating and analysing site specific geochemical and hydrogeological data as an input data for carrying out numerical modelling and calculations for dose estimation under various likely scenarios for the [future] repository.</i></p>		
<ul style="list-style-type: none"> To produce scoping models and perform numerical simulations to provide phenomenological and conceptual description of the behaviour of the repository system and of each repository and geological component during the (evolution of the repository) operating and post-closure periods, in space and time (thermal, hydraulic, chemical, mechanical, gas, radiation and biological processes and the potential release and transfer of radionuclide/toxic substances into biosphere), including related uncertainty analyses. 		
JOB REQUIREMENTS		
KNOWLEDGE (Cognitive competence)		EQF level (1-8)
Understand the specific characteristics of the host rock contributing and harming the containment and the isolation of the emplaced waste form/s (understand the requirements contributing to safety and safety functions)		6
Able to understand the impact of the processes (THMCGRB) and their coupling on the evolution of the components and the global repository		5-6
Understand the migratory processes and potential transport paths/routes from the waste container to the biosphere		6
Understand the basis of hydrological processes/groundwater flow, geochemistry including microbial processes and solute chemistry		5-6
Able to carry out simple models for scoping calculations within the current repository context for flows and radionuclide transportation		6
Able to apply the basics of reliability and risk management for a repository system (probabilistic/deterministic approach?)		6
Understand the basic radiation and nuclear safety principles for containment and isolation (ALARA, SAHARA, graded approach, multi-barrier concept, ...).		5
Master the basics of radioactivity and of the nuclear fuel cycle and its safety		4
Understand the physical and radiological characteristics of the waste form and the radionuclides from the waste form/s		4
SKILLS (Technical and functional competence)		EQF level

[PETRUS-III]

	(1-8)
Able to analyse and integrate basic scientific knowledge from various sources (bench-, field experiments) in order to select relevant input data and models for applications	6
Select, use and improve the appropriate simulation tools and codes for calculations (common codes: Porflow, Feflow, Aster, Comsol, Fluent, PhreeqC, PHAST)	6
Interpret the outcomes of the simulations in support of safety arguments and identify the related uncertainties in the outcomes	6
Physical and numerical conceptualisation of the normal and altered scenarios	5-6
Able to manage all kinds of uncertainties in the models, using deterministic and multi-parametric probabilistic approach	6
Provide solutions to improve the system design and progressive management of disposal operations during the active control period of the repository	5-6
Use complementary information (multiple arguments, performance indicators) to strengthen the outcome interpretation from the modelling	5-6
COMPETENCE (Attitude; behavioural and personal competence)	EQF level (1-8)
Able to work and coordinate interdisciplinary calculation team consisting of own staff and consultants	6
Able to integrate interdisciplinary data and able to synthesize results	5-6
Able to think analytical	5
Willing to take and demonstrate accountability	5
Able to recognise safety culture behaviour	5

DRAFTED BY:	DRAFT EXTENDED IN 1ST REVIEW:	2ND REVIEW:
A. ABDELOUAS	MARJATTA PALMU	GROUP REVIEW
30.09.2014	11.11.2014	23.04.2015

[PETRUS-III]

Deliverable DI.3 Version n°1

Dissemination level:

Date of issue of this report: **24/07/15**

