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EURATOM Research and Training on Nuclear Energy

WD.05 Report on the lessons learnt from on the job training

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WP4 : On-the-Job Training (OJT)

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SUMMARY

Competency and skills in radiation protection (RP) can only be obtained through practical experience such as that offered by on-the-job training (OJT) and/or work experience (WE).

- Two-thirds of the EU-Members have already anchored some kind of OJT and/or WE in their national legislation
- Some have levels or classifications for OJT/WE
- However - clear definitions for OJT and WE are necessary in all EU countries
- Training providers for all RP practices are available – in part for foreign trainees as well but should be compiled and published in more detail

Requirements for the successful performance of OJT are

- proper facilities and infrastructure
- scheduled programme (syllabus, learning objectives) and supervision by an experienced mentor
- assessment of the acquired competency
- a minimum timeframe, which is unified in all Member States
- flexibility in each practice with respect to educational background
- mutual recognition in all Member States
- willingness of end users (nuclear power plant (NPP); research centre, hospital) to offer OJT on an international basis, and
- follow-up with WE

OJT should remain a part of the remodelled ERPC.

1 Introduction

Occupational, public and environmental RP are a major challenge in industrial applications of ionising radiation (both nuclear and non-nuclear) as well as in other areas such as medicine and research. For various reasons, as is the case with all nuclear expertise, there is a general decline in the number of radiation protection experts (RPE). Therefore, maintaining a high level of competency in this field is crucial for future applications of ionising radiation and ensuring the protection of workers, the public and the environment. A sustainable education and training (E&T) infrastructure for RP is an essential component in combating this decline in expertise and in ensuring the continuation of a high level of radiation protection knowledge in the future.

The ENETRAP project (European Network on Education and Training in Radiological Protection) aims at bringing together different ideas and approaches in order to better integrate and harmonise national education and training activities on a European level. Work Package 4 (WP4) has the task of exploring the issue of on-the-job training (OJT).

1.1 Motivation

“Competence means, being able to do, so demanding competence means demanding ’ability’. An individual can only be able if he is armed with the relevant knowledge and skills.” (Stewart 2005).

OJT and Work Experience (WE) are important aspects of competence at all levels in RP E&T. And not only since the ETRAP2005 Conference in Brussels during which most participating EU countries confirmed that, in addition to theoretical knowledge, practical experience is a key element of RP E&T. This statement was then acknowledged and reconfirmed in the Conference Declaration.

The conference asked end users, including academic institutions and research centres in coordination with the relevant authorities, to put their recommendations into practice, including organising OJT as “in-house training inspection”.

OJT is a very relevant topic for investigation within the framework of ENETRAP.

1.2 Scope and Objectives

It was necessary in this WP4 to define the specific added value of theoretical training and OJT. Subtask 4.1 is collecting information while Subtask 4.2 is providing specific input for WP7, “Validation of the results and recommendations for a pilot course”.

1.2.1 Objectives

- to gather information on the capacities to welcome trainees, in terms of subjects, number of places, timing, etc., of training providers and other organisations;
- to examine lessons learned from previous experience related to OJT;
- to develop new OJT approaches in RP.

1.2.2 Description of the work

- to identify field(s) in which OJT is required (and provided);
- to provide and analyse feedback from case-studies using existing OJT programmes;
- to evaluate the legislative requirements with regards to RP OJT in various EU Member States;
- to compare different practical approaches to OJT in the EU Member States;
- to investigate practical transformation, e.g. position in industry, practical experience, short-term job opportunities;
- to examine the possibility of OJT opportunities for young scientists, in particular from Central and Eastern European countries.

2 OJT and WE

The following definitions are used by “Council Directive 96/29/EURATOM” to identify OJT and WE:

On-the-Job Training: a form of training in which the trainee works at a suitable environment where the facility or the infrastructure needed for the OJT is available, under the supervision of an experienced supervisor/expert (hands-on experience).

Work Experience: time spent actively working within a specific practice gaining in-depth knowledge of the practice and experience in relevant RP issues.

Practical exercises during training courses do not generally fulfil the definition of OJT/WE in which the duration of OJT/WE is usually several weeks, months or even years.

2.1 The EU's approach to OJT

2.1.1 Council Directive 96/29EU (1996)

The wording in the Basic Safety Standards is very general, e.g. only 'training' is mentioned.

2.1.2 Council Directive 97/43/EU (1997), Article 7 No. 3

- Member States shall ensure that practitioners and those individuals mentioned in Articles 5 (3) and 6 (3) have adequate theoretical and practical training for the purpose of radiological practices, as well as relevant competence in RP. For this purpose Member States shall ensure that appropriate curricula are established and shall recognize the corresponding diplomas, certificates or formal qualifications.
- Individuals undergoing relevant training programmes may participate in practical aspects for the procedures mentioned in Article 5 (3).

2.1.3 98/C 133/03, Communication from the Commission concerning the implementation of Council Directive 96/29/Euratom (1998). Annex 1: Basic and Additional Training for Qualified Experts

"Training by itself is not sufficient. It needs to be supplemented by appropriate practical experience, the duration of which will depend on the complexity of the field of work. It is not possible to recommend any specific duration for either the training or the practical experience needed, as the survey indicate a wide diversity of current practice in Member States".

Annex 1 of this directive provides as minimum requirement a basic syllabus for training in radiation protection and emphasises the importance of practical experience.

2.2 The IAEA's approach to OJT

2.2.1 IAEA Safety Standards Series No. RS-G-1.4 (2001)

In this report, professional and job categories are classified into

- Qualified Experts (QE),
- Radiation Protection Officer (RPO),
- Radiation Protection Workers (RPW),
- Qualified Operators and
- Health Professionals (Regulatory Body, Emergency Response Personnel).

OJT is considered essential for qualified operators and emergency response personnel, which usually require several years of supervised WE in a specific expertise.

Section 3 of this Safety Standards describes the categories of persons to be trained and recommends the minimum requirements for educational level, training and work experience.

Work experience provides the trainee with certain knowledge and skills (Section 3.10). However, in some cases, these skills need to be developed before a person is considered able to carry out certain designated functions independently or to assume designated responsibilities. Trainees should, therefore, work under supervision for a prescribed period of time until they have acquired sufficient experience and self-confidence to be able to perform the desired function or discharge their responsibilities reliably. The amount and type of work experience necessary for a person to be qualified for a particular function or responsibility depends on the job category and practice. The trainee's WE should to be formally assessed by a supervisor to ensure its relevance for a particular function or responsibility (Section 3.11).

2.2.2 On-the-Job Training in Radiation Protection and Waste Safety (2003)

This report is aimed at harmonising and resolving implementation procedures for OJT according to the recommendations of the Advisory Group on "Strategic Approach to Education and Training in Radiation and Waste Safety", which met in 2001. In this report, OJT is defined as training in which the participant works at a suitable institute (facility where the infrastructure needed for OJT is available), under the supervision of an experienced supervisor/expert (hands-on experience in a facility within a practice). The training needed to become a QE consists of three parts:

I. Basic Training (e.g. PGEC training course)

II. Specialised Training (ST) in a specific practice and OJT

III. OJT

Part 3, as well as a portion of Part 2, is devoted to OJT.

The implementation of OJT is based on fellowships restricted to three months and which are awarded as part of a technical co-operation project (TC) to university graduates or their equivalent, and to individuals at technician level in the requested field. The fellowships are mainly for project-oriented OJT subject to the availability of funds and/or suitable training opportunities.

The analysis needs for IAEA training courses on ST and OJT is compiled for QEs, RPOs and RPWs and subject to the practice. The responsibilities of the host organisation for implementing training, general recommendations as well as the format for the candidates' reports and host certification are outlined in more detail. Examples of OJT was developed in "Authorization and Inspection of Radiation Sources in Nuclear Medicine" (6 to 8 weeks) and for "Radiation Protection for Industrial Radiographers" and provided in the appendices of IAEA Safety Report No. 20.

2.2.3 Training for Radiation Protection Officers - IAEA Training Course Series (DRAFT 2005)

While the previous report mainly addressed requirements for QEs, guidance on training requirements for RPOs was developed during a consultant's meeting held from 14 to 18 June 2004. The consultants affirmed their hope that these training recommendations would also

facilitate the mutual recognition of RPO qualifications between Member States.

Suitable qualifications for RPOs would be a combination of training provided, i.e.

1) Attendance in a RPO course, which is divided into a core syllabus and supplementary modules for relevant practices, as well as passing the associated examination, and

2) The amount of work experience and/or OJT the person has acquired.

The combination of these two elements makes it possible to assess the person's competence.

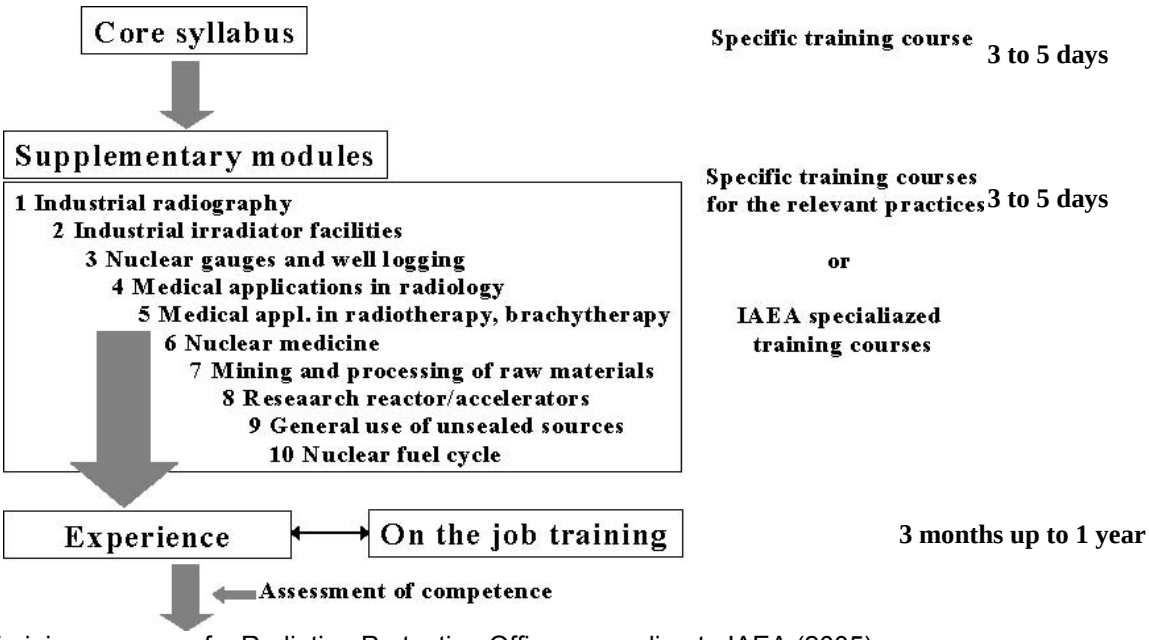

Figure 1. Training process of a Radiation Protection Officer according to IAEA (2005)

The duration of OJT would depend on the complexities of the practice and the RPOs previous WE. The suggested duration for OJT is three months maximum; however it should be flexible for each practice. While OJT for radiotherapy may extend for 12 weeks, the same may not be true for nuclear gauges.

A training plan based on identified practical competencies and including a list of topics to be covered and tasks to be carried out would be prepared. Recommendations were given for the assessments made during and at the conclusion of OJT. Guidance on the minimum recommended duration of RPO training components, including OJT for different types of practices, is given in Table 1.

3 Setting up the Questionnaire

3.1 Objective

ENETRAP's WP2, WP3 and WP4 need input from as many countries as possible – preferably from each of the EU Member States, the New Member States and Applicant Countries. The main instrument used for obtaining this input was the distribution of a questionnaire (see

www.sck.cen.be/enetrap under “documents”). The questionnaire was sent out to 31 countries in July 2005 and a supplemental request concerning OJT was sent in January 2006. This represents the first phase of the ENETRAP project.

The objective of the questionnaire was to elicit detailed information in order to

- assess the actual training needs in EU Member States and Candidate States
- understand the various regulatory aspects and consequently propose minimum requirements for mutual recognition of RPEs and RPOs
- collate details of the various training and education activities available in EU Member and Candidate States, and
- review the content, structure and methods of these training and education activities.

3.2 Description

The following questions from the questionnaire were devoted especially to OJT: C11 to C17, D4, D5 and E8 (in part). Other questions might also provide useful information.

The objective of the questions in Section C, National Capabilities for RP E&T, was to assess whether or not national capabilities for RP E&T fully supported national RP requirements and whether they were of any benefit in supporting RP requirements in other countries.

Specifically:

- wording and definition of OJT and WE with respect to national regulations (C13)
- legal basis for OJT and WE (C12)
- levels or classification for OJT and WE for RPEs or RPO with regard to radiation applications in different areas (C14, C15)
- available training events utilising OJT (C11)
- competency acquired during OJT (C16), and
- training providers and the possibility of providing OJT to trainees from other countries (C17)

The questions in Section D, “Regulatory Requirements”, should provide a picture of regulatory requirements for the training and qualification of RPEs, RPOs and RPWs, thereby facilitating the identification of any disparity in the qualification of such persons in EU Member and Candidate States.

Specifically:

- the availability of regulatory guidance for minimum education levels, training, WE and/or OJT for the different categories and sectors of work (D4 to D6)
- time limitations for the recognition of RPEs or RPOs and duration and content of OJT activities necessary for keeping recognition according to practice (D5).

Section E, “Recognition”, a picture of the recognition criteria is questioned. The objective here is to find a common denominator for the mutual recognition of RPEs, RPOs and RPWs. Questions concerning formal systems, mechanism and recognition requirements, re-recognition and mutual recognition within the European Union.

4 Statistical Evaluation and Analysis

4.1 General Aspects

By December 2006, 29 questionnaires had been returned.

- 24 from Member States (all except Slovakia as New Member)
- 2 from Applicant Countries (Bulgaria and Croatia) and
- 2 from ad joint Non Member States (Norway and Switzerland).

Our evaluation is made accordingly. Questionnaires have not been returned by Slovakia and Romania. Turkey has not been considered in the evaluation.

Responses to questions regarding OJT and WE did not deliver sufficient information to make a comprehensive evaluation. To ensure the correctness of the information provided and to inquire into supplementary information, all addressees were asked to correct/complete draft tables in January 2006. So far, answers have been received from seven countries.

All answers with respect to OJT are compiled and fully reproduced in Table 13**.**

Additionally, web-links provided in the questionnaires and extractions from ETRAP conference contributions have been used to collect additional data on OJT/WE.

4.2 Legal basis for OJT

In order to better interpret the countries' answers, a clear definition and wording of the terms "on-the-job training" and "work experience" is precondition.

4.2.1 Question C13

Question C13 asks "Whether the wording in the glossary of the questionnaire fully reflects the definition used within the national regulations of the different countries".

As expected, different definitions according to national regulations (where available) have been reported. Some countries like Germany use 'expert knowledge', 'practical experience' and 'work experience'. In Bulgaria, 'practical experience', 'clinical experience' and 'clinical work' are used in part with different meanings than OJT or WE.

Some countries only define OJT (in Italy for QE), others only define WE, while Lithuania and Malta do not have any official definition.

Some countries make no distinction between OJT and WE (Greece) while others accept practical exercises used in RP courses as OJT (see the footnotes of Table 2).

Therefore, the terms 'OJT' and 'WE' are weighed equally in the various questions.

In a second step, different requirements of OJT and WE for RPOs and RPEs were questioned.

Similarly, different terms for Radiation Protection Personnel (RPP) were mentioned in the questionnaires, i.e.

- RPE: Radiation Protection Expert
- QE: Qualified Expert

- RPO: Radiation Protection Officer
- MPE: Medical Physics Expert
- RPA: Radiation Protection Adviser (IRE)
- Radiation Protection Supervisors (UK)
- RPW: Radiation Protection Worker

Additional terms used by IAEA are Qualified Operators, Health Professionals, Regulatory Body, Emergency Response Personnel.

4.2.2 Question C12

Question C12 asks, “Specify which piece(s) of legislation provide the current legal basis for On the Job Training (OJT) and/or work experience”, results are summarised in Table 2 (first column).

Other than Croatia, Cyprus, Ireland, Lithuania, Luxembourg, Malta, Norway and Portugal, Netherlands and United Kingdom, all countries have legislative requirements for OJT.

The legal basis in most countries is adapted from Commission Communication, EU document 98/C 133/03.

In most Member States, OJT and WE are

- provided and are required for most medical fields, especially for medical physicists where a period of WE or OJT is obligatory in most cases;
- partly reported to be in use at NPPs and other nuclear installations e.g. by Germany (upon specific request) and by France in part (EDF); not stated by most Member States but probably in use and part of any NPP operational RP programme according to international IAEA regulations.

4.2.3 Question C16

Question C16 asks “Is there an assessment of the competency acquired during the OJT? If “Yes”, please comment on the assessment methods.”

The assessment of competency and specification of assessment methods are summarised in Table 2 (last column).

Twelve countries reported having a procedure for assessing competency acquired during OJT, at least in part. In most cases, it was in the form of written and/or oral examinations. In some cases, the examination was also a practical examination. In Switzerland, for instance, it involves conducting RP intervention after an incident with an open radioactive source. This exercise includes planning, preparation, performing measures, monitoring and documentation. In Ireland, OJT for industrial radiographers is both practical and theoretical.

The following countries have a legal basis for OJT but do not have a procedure for assessment: Austria, Belgium, Finland, Italy, Norway, Slovenia and Sweden.

Medical physicists, on the other hand, are required in most countries to take an examination.

In Bulgaria, the Czech Republic and Poland, the examination is performed by the professional examination commission of an administrative body.

4.2.4 Questions C14, C15 and D4

Question C14: Are there different levels or classifications for OJT and/or work experience of RPEs and/or RPOs recognised in your country with regard to the complexity of the radiation applications in different areas, such as medicine, industry, research, nuclear fuel cycle etc.?

Question C15: If the answer to C14 is "Yes", please specify these different levels in terms of prior education, duration and content of the OJT and/or work experience, etc…. How is completion verified?

Similar answers were given to Question D4: Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories as specified in question D1 and/or for the different sectors of work as specified in question B1?

Sixteen countries refer to having different levels or classifications for OJT and/or WE.

However, only a few countries gave detailed information on the kind of classification with regard to radiation applications in different areas. The data from countries giving more a detailed characterisation is summarised in Table 3 (RPOs) and in Table 4 (RPEs).

These countries categorise OJT/WE for RP either with respect to risk level, type of practice or education.

In the Czech Republic and Germany, the minimum time period for OJT depends on the combination of risk level and education. Germany, in particular, has a very detailed classification for RPOs.

In Italy, the minimum duration of OJT/WE for RPOs depends on the risk level of the radioactive source, e.g.

- ***low risk level:*** X-ray generators < 400 keV
- ***intermediate risk level:*** classified electron generators with energies up to 10 MeV, radioactive sources and neutron generators with emission rates < 10^4 n/s
- ***high risk level:*** nuclear facilities, neutron sources with emission rates > 10^4 n/s, accelerators with energies > 10 MeV and large radioactive sources for medical therapy or industrial sterilisation.

In general, RPEs need WE/OJT. The duration of OJT of RPE is based on (in decreasing importance)

1) Risk level (Germany, Czech Republic, Italy, The Netherlands, Lithuania)
2) Type of practice (Germany, Slovenia, Lithuania)
3) Education (Germany partly, Latvia, Czech Republic)

4.2.5 Question D5

Question D5 asks "If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT activities necessary for keeping the recognition?"

From the answers to the questions, it cannot always be concluded that OJT, itself, plays a part in professional recognition.

Yes: 17 countries

No: 10 countries (Croatia, Cyprus (but planned), Denmark, Finland, Greece, Malta, Luxembourg, Portugal, Switzerland, the Netherlands (but planned)),

N A: 1 country (Italy)

There are time limitations at least in some fields: Austria and Denmark (medicine only); Belgium (only general rules but not fixed in regulation); Bulgaria, Czech Republic, Estonia, France, Germany, Hungary and Ireland (only for RPEs and not for persons acting as RPOs); Latvia and Poland (RPO requires 3 years, an RPE requires 5 years – prolongation by the Certification Commission is possible): Lithuania (for RPOs); Norway (only for RPOs in industrial radiography); Slovenia, Spain and Sweden (not required for RPEs in NPP or medicine but is required in other fields); United Kingdom (only for RPEs)

4.2.6 Question E8/5: evidence for OJT for re-recognition required

Here, as well, it is not clear whether OJT/WE is intended for re-recognition.

Yes, without an exam of any kind: Austria (refresher course), Belgium, Estonia, Finland (no course, but authorities check up if a person fulfils the qualifications), Hungary, Latvia, Slovenia, United Kingdom

Yes, with exam of any kind: Bulgaria, Czech Republic, Germany, Sweden

4.3 National Capabilities for OJT

4.3.1 Question C11

Question 11 asks “Are there any training events that make use (either entirely or in part) of On the Job Training (OJT)?”.

The necessity of WE and OJT in training areas for industry and research, medicine and nuclear technology is listed in Table 2 (columns 2, 3 and 4 respectively).

The answers, however, do not differentiate whether or not the training event mentioned in the questionnaire is part of national regulation. Therefore, Table 2 lists all denoted training events.

OJT in medicine is necessary in 16 countries. In industry, OJT is available in 9 countries.

4.3.2 Question C17

Question C17 asks, “Regarding OJT, do you have specific training providers such as research centres, power plants, hospitals, big industrial companies, and what are the capacities in terms of numbers of trainees and the possibility of providing OJT to trainees from other countries?”.

All countries except Belgium, Croatia, Cyprus, Denmark, Estonia, Ireland, Lithuania, Luxembourg, Malta, Norway, Portugal, Sweden and the Netherlands may offer training providers for national workers as well as for trainees from other countries. Difficulties are expected in Finland and Hungary due to language barriers. Training providers include Research Centres, Universities, NPPs, Medical Centres and Hospitals and Authorities.

OJT opportunities for NPPs are usually provided only for local employees but might be opened to foreign personnel upon request (for example, the Biblis NPP in Germany).

Detailed programmes for OJT exist in Germany, for example at the Biblis NPP and the University of Cooperative Education (BA/FZK Karlsruhe). The two examples are described in more detail in Chapter 4.4. A detailed recommendation for "Industrial Radiographers and for Authorization and Inspection of Radiation Sources in Nuclear Medicine" has been made by the IAEA. There is not enough information from other Member States to make comparisons.

The availability of training providers in the different field of activities are compiled below, additional information from ETRAP2005 contributions are integrated (Table 5).

It has been suggested, that a part of training on the work floor be replaced by computer simulation techniques (Vermeersch 2005).

4.3.3 Question D6

Question D6 asks, "Is there a system(s) in place for the accreditation of a) training providers? and b) training schemes?".

Yes 15 countries: Bulgaria, Czech Republic, Estonia (only training providers, not scheme), Finland, France, Germany, Greece, Hungary, Latvia, Lithuania, Norway (only providers), Poland, Slovenia, Spain and Switzerland.

No 13 countries: Austria, Belgium, Croatia, Cyprus, Denmark, Ireland, Italy, Malta, Portugal, Luxembourg, Sweden, the Netherlands and the UK.

4.4 Examples

4.4.1 Implementing OJT for the education of RPEs

In a survey (Mitchell 2005), a total of 28 nuclear-related MSc programmes were identified in the European Community. Of these, 17 are in RP, 5 are in radiochemistry, 4 are in radioecology and 2 are in radiometrics. These programmes are spread out over 11 Member States in 26 separate universities and institutes. Some of the programmes include exercises, laboratory work and RP OJT.

Two examples of OJT being used during education were mentioned in responses to the questionnaire.

One was the "University of Surrey Model" in Guildford, UK. This Master's course in Radiation Protection and Environmental Protection (REP) includes 60 hours in radiation laboratories and an additional 5-week project (30 hours) under supervision plus a one-day seminar presentation. Altogether, students work in radiation laboratories (Regan 2005) for 10 weeks.

The other example was at the University of Heidelberg. A 3-week practical training course at the Karlsruhe Training Centre, in participation with the Research Centre, is a prerequisite for the successful completion of the Master's Course in Radiochemistry. This type of OJT, under the umbrella 'Kompetenzerhaltung Kerntechnik' (Continuing Expertise in Nuclear Technology), is made up of 120 hours of practical exercises and work in radiation protection. The handling of open radioactive substances is carried out under the supervision of a QE.

The rigorous Erasmus PAN programme (Practical Approach to Nuclear Techniques) includes practical work whereby European partners share access to large nuclear facilities in order to conduct safety training, e.g. reactors, accelerators, hospitals and various laboratories within the MSc cycle.

Another intensive implementation of OJT during RP education is conducted at the University of Cooperative Education in Karlsruhe, Germany. This example is described in more detail in Chapter 4.4.3.

4.4.2 Implementing OJT for the education of RPOs

Practical experience both as OJT and WE (a precondition for gaining the qualified competence in RP necessary for acting as an RPO) is reported in detail in the German Regulations and Guidelines (GL). Since no other detailed information was given in the questionnaires, this system is used here as an example and is described in more detail below.

Legal requirements used as guidelines for qualified competence in RP are divided into

- Industry and Research
- Medicine
- Nuclear Technology.

The minimum period of "practical" (vocational) experience depends on the vocational education and the type of practice and varies from some months (i.e. for small sources) up to two years (i.e. medical physicists or RP personnel in NPPs) or three years (i.e. for medical therapy, which may be included in the physician's professional training as a specialist in a specific therapeutic field). Vocational experience can be either WE or OJT as no supervision is explicitly defined.

In addition, adequate education and task-specific training courses in RP are necessary. The basic guidelines to fulfil legal requirements are compiled in Table 6.

4.4.2.1 Industry and Research

Expert knowledge, including OJT/WE, required for RPOs in Germany is defined in the Guidelines for "Qualified Competence in Radiation Protection" under 'Industry and Research' and is summarised in Table 7a, 7b and 7c. This knowledge is divided into

- application of sealed radioactive sources
- non-destructive testing with sealed radioactive sources, and
- application of unsealed radioactive sources.

The minimum period of vocational experience depends on the vocational education and varies from 0 to 24 months, the latter for 'skilled workers' handling radioactive activities > 10exp5 times the clearance level.

4.4.2.2 Medicine

Requisite competence in medicine, in general, consists of

- theoretical knowledge
- OJT / practical experience, and

- successful attendance on a special accredited course.

Germany is the only country that provided details on OJT and practical experience in the questionnaire.

During the ETRAP2005 Conference, however, a presentation was given describing a two-month training program for radiographers and radiological technologists from developing countries at the EHSAL European University College Brussels (Mol 2005). The programme is part of an international training program (ITP) conducted at the Flemish Interuniversity Council and includes theoretical seminars in dosimetry and RP alternated with 'hands-on' training in the skills-lab radiology. It was reported that the mix of theoretical and practical work is highly appreciated.

With respect to RP, legal requirements in Germany for medical personnel are fixed by guidelines (see Table 6) and are defined in terms of education, training courses and practical experience. OJT, as part of expert knowledge (Sachkunde), has to be done under the supervision of an QE (see Table 8). Vocational precondition is the education as approbated medical doctor. A medical physicist must have a university degree in science or technology.

The requisite qualification is necessary for all medical doctors working as qualified RPOs and for all those otherwise applying unsupervised radioactivity to humans.

The length of OJT required for doctors and other persons working in the medicine (other than medical physicist experts) depends on the type of radioactive substances being handled and the kind of radiotherapy, respectively: A comprehensive compilation of OJT activities and training courses with recognition is given in Table 8 according to practice and application area.

A precondition for operating accelerators for medical purposes or for loading devices with radioactive sources in nuclear medicine is the availability of a medical physicist expert (MPE).

The minimum time requirement of OJT for MPEs is

- 6 months in nuclear medicine
- 6 months in brachytherapy (sources, after loading equipment)
- 6 months in teletherapy (accelerators, irradiation equipment).

4.4.2.3 Nuclear technology

Legal requirements in Germany for personnel in nuclear technology with respect to RP are defined in the NPP Guidelines (see Table 6) in terms of education, vocational experience and training courses for

- RPOs: full or limited responsibility ("Gesamtbereich" or "eingeschränkter Bereich"),
- management, e.g. plant manager, division head, shift personnel, training officer, head of quality assurance, security officer and physical protection officer
- emergency staff.

An example of the practice of Qualification in Radiation Protection in German NPPs is given in Table 9.

German NPPs distinguish between the following types of RP expertise (listed in decreasing responsibility):

Strahlenschutzbeauftragte in Kernkraftwerken (SSB)	Radiation Protection Expert and Officer
Strahlenschutzingenieur	Radiation Protection Engineer
Strahlenschutzfachkraft	Skilled Labour in Radiation Protection (Strahlenschutzwerker (RPW) in Switzerland)
Strahlenschützer	Radiation Protection Worker according to the EU definition.

The practice of qualification distinguishes between OJT under supervision in a fixed training programme and WE. Both practices are required for RPOs (SSB in NPPs, which, according to EU definitions corresponds to an RPE) and Skilled Labour in RP.

Practical implementation of the regulations is conducted according to a generalised scheme (Figure 2).

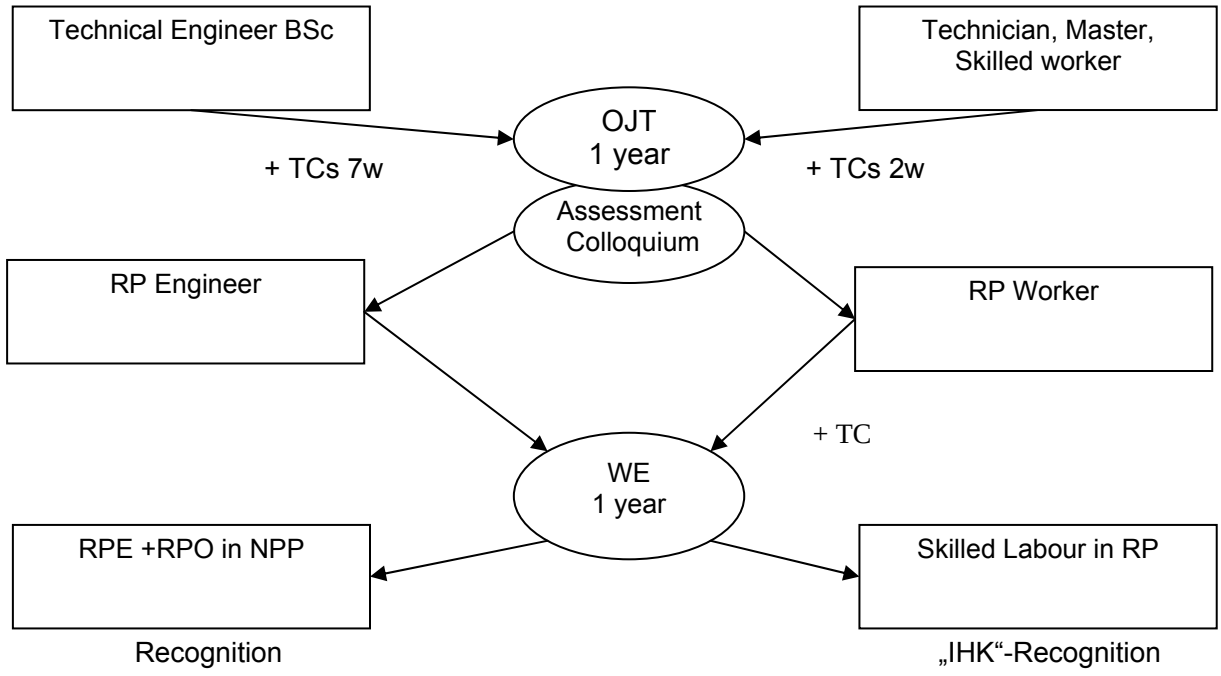

Figure 2. Scheme for the implementation of the qualification in Radiation Protection in NPPs in Germany

For persons responsible for RP in NPPs (Categories 1 to 4), a minimum of 1 year OJT is obligatory. A fixed programme with respect to topic and time duration under supervision of the Section Head with final oral colloquium has to be absolved. In addition, the successful participation in RP training courses (from two weeks for RPWs to two months for RPOs) is necessary and is based on the degree of responsibility. In order to become a RPO in a NPP, the candidate must be a RP engineer. The duration of OJT and WE is one year each.

OJT in German NPPs is also offered to persons from other NPPs and could also be offered to personnel from foreign countries upon request (that is, at least at the Biblis NPP).

The procedure is recognised and compatible for any German NPP. In 2005, the Working Group on 'Practical Radiation Protection' ("Arbeitskreis Praktischer Strahlenschutz" of the VGB "Verein für Grosskesselbetreiber") initiated a campaign the goal of which is to harmonise the education and mutual recognition of NPP RPP in Germany, Switzerland, and Belgium.

4.4.3 University of Cooperative Education Model

The University of Cooperative Education (BA "Berufsakademie" Karlsruhe), a German state university located in Karlsruhe (Baden-Wuerttemberg) and Riesa (Saxony) has integrated very rigorous OJT in its RP programme.

The cooperative practical training for the so-called "Radiation Protection Engineer" at the Department of Environmental Engineering and Radiation Protection has two interconnected parts: theoretical semesters with academic courses at the University of Cooperative Education and practical work semesters in the students company providing "the centre for on-the-job Training". The student is contracted by his employer and is thus both a full-time student and full-time employee. Phases of course work (theory) – normally of 12 weeks duration in a term of six months – alternate with periods of on-the-job training of equal duration. Cooperating firms include

- Research Centre Karlsruhe
- Nuclear Engineering and Analytics Rossendorf
- GSI, Darmstadt
- Philippsburg and Biblis NPPs
- Cancer Research Centre, Heidelberg
- State Institute for Radiation Protection and Environmental Engineering (LfU)
- Paul Scherrer Institute (Switzerland)

and other partners.

A fixed programme with respect to topics to be trained and duration is agreed between University of Cooperative Education and the cooperating companies (Table 10). Interdisciplinary key topics for OJT in radiation protection are due to a scheduled job rotation system. Training locations include as well medicine and regulatory fields. Table 11 represents the fields of activities of the practice-integrated study phase at Research Centre Karlsruhe with the responsible training locations, and time duration. The participants' achievements are recorded and the competence of the trainee is formally assessed after each OJT period. Supervisors are official Radiation Protection Officers or Experts with Competence as RPO.

The study culminates after 3 years in a Bachelor's of Science (BSc) or 'Radiation Protection Engineer'. In addition, the degree recognises the technical qualification as RPO according to German regulations in most fields of industry and research as well as for medical physicist experts.

In the near future it is planned to offer a supplementary Master's course (1 year) in RP in the same dual mode as German pilot project. This may serve in a later stage as well on an International/European scale as has already been initiated with partners from Canada (Chalk River), USA (Los Alamos), South Africa (Groote Schuur Hospital) and Switzerland (PSI). The

programme will as well include OJT according to a fixed schedule. Thus, the RPE – as defined by the EU – can be acquired in parallel to job performance either directly following a BSc or after a phase of vocational work experience.

5 Conclusions and Recommendations

Practical experience, both as OJT and WE, is a key element of E&T RP – and not only since the ETRAP Conference Declaration.

Therefore, appropriate qualification for responsible RPP (RPEs, RPOs, QEs and MPs) must incorporate theoretical knowledge as well as the ability and competency to practice RP. Theoretical knowledge is obtained through the successful completion by examination of suitable education and RP training courses. These training courses should provide a suitable mixture of theory and practical exercises.

Competency and skills are a second, essential element of RP E&T and can only be acquired by appropriate OJT followed by a period of WE.

From the statistical evaluation and analysis, it can be concluded that OJT and WE are generally required for RPEs as well as for RPOs but only in special cases for RPWs. In general according to the questionnaire, the strictest regulations with respect to practices are in medicine and nuclear technology. The minimum duration of OJT and WE in medicine, where an RPO is likely to be a medical physicist, is in the range of 1 to 2 years. The same timeframe is required for RPOs (QE) in NPPs.

Based on feedback from students and trainees of existing OJT programmes at the University of Surrey (UK), University of Cooperative Education (Germany), PAN courses (The Netherlands) and participants of Saclay and IAEA courses, it can be concluded that OJT has become very well accepted. OJT provides better chances for future job opportunities and increases international flexibility among EU partners (e.g. BA Karlsruhe students have job functions in Geneva, Grenoble, the Czech Republic, South Africa, Canada and others). Mutual recognition of OJT facilitates the exchange of RP specialists for example as done for skilled workers at NPPs in Germany, Switzerland and Belgium.

OJT requires a suitable environment where the necessary facilities and infrastructure are available. In addition, direct supervision by an experienced mentor is imperative. Therefore, opportunities and time for this kind of training are usually limited, as well because of financial considerations, as trainees usually require financial support. The responsibilities of host organisations and trainees must be fixed. The duration of OJT activities is typically several weeks up to several months and, in most practical cases, an additional period of time for gaining work experience is obligatory. In WE training activities, employees actively work within a specific practice and gain in-depth knowledge of the practice and experience in relevant RP issues.

OJT should follow a scheduled programme with respect to topic (syllabus, learning objectives) and time duration. A training plan based on identified practical competencies and including a list of topics to be covered and tasks to be carried out should be prepared. A minimum requirement of OJT for each practice should be harmonised for all Member States. A period of several weeks to several months for an RPO and RPE, respectively, seems to be appropriate, as this is what is already being practiced by most institutions providing such E&T activities. This timeframe is also comparable to the IAEA's approach and would help to facilitating the mutual recognition. However, there should be room for flexibility for each practice.

The participant's progress and achievements should be recorded on a checklist of topics and tasks. On completion of the training, the competence of the trainee should be formally assessed, the purpose of which is to verify whether the participant has acquired competence in all the areas defined as the learning objectives of the training. To fulfil this purpose, the assessment could be done in two parts:

- continuous evaluation by the supervisor during OJT (working report, training files, operational records, OJT checklist), and
- an assessment of practical skills based on performance during daily routine operation.

A format of the certificate should be defined in order to assure the recognition of OJT.

WE should be fixed in its duration in accordance to educational background (e.g. in Germany) or to the type of practice (see IAEA) and risk level (e.g. in Italy).

Since OJT is not available in some EU Member States (Cyprus, Malta, Lithuania etc) and is often not or not comprehensively available for all practices in one country, a detailed list of institutes that could provide suitable OJT for foreign trainees should be compiled and published by the European Commission or another suitable platform. Experiences could be provided as well by IAEA. This would facilitate OJT opportunities for young scientists, in particular from Central and Eastern European countries.

OJT should remain part of a remodelled European Radiation Protection Course (ERPC). It could be split into a core part – according to the basic part of the former ERPC – and supplementary modules according and in conjunction with the modular training part of ETRP (industrial applications like radiography, irradiator facilities, gauges and well logging; medical applications; research reactors/accelerators; use of unsealed sources, waste management, decommissioning, etc.). The more specific supplementary modules should contain an equilibrated part of OJT. Training providers of modules of ERPC should as well take care for accompanying OJT.

For the European Master in Radiation Protection, a combination of theory and practice as OJT is recommended. In addition, a minimum amount of WE for trainees from the industry with an 'insufficient' educational background might be pre-requisite. This dual E&T approach could follow a BSc in (Nuclear) Science directly or after some practical WE in a company. An example of this approach is the dual education of the Karlsruhe BA system.

Concerning possible topics for an OJT programme, they could be drawn from the experience in various Master's courses. For RPOs, topics might be drawn from practical exercises in the existing training modules and extended to a larger scale (see Table 12).

In the revision of the EU Basic Safety Standards, RP E&T should be covered in a separate chapter that includes OJT. In the guidelines for implanting the BSS, OJT should be specified, e.g. content of OJT (syllabus, learning objectives), availability of necessary facilities and infrastructures as precondition for OJT, assessment of the competence of the participant, format of certificate, recognition of OJT, responsibilities of host organisation and trainees.

Acknowledgement

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7 List of Tables

8 List of Abbreviations

BSS	Basic Safety Standards
E&T	Education and Training
EDF	Electricité de France
ENETRAP	European Network on Education and Training in Radiological Protection
ETRAP2005	3rd International Conference on Education and Training in Radiological Protection
EU	European Union
GL	Guidelines
IAEA	International Atomic Energy Agency
ITP	International Training Programme
MPE	Medical Physics Expert
MSc	Master of Science
NPP	Nuclear Power Plant
OJT	On-the-job training
PGEC	IAEA Post Graduate Education Courses
PSI	Paul-Scherer Institute
QE	Qualified Expert
RP	Radiation Protection
RPA	Radiation Protection Adviser
RPE	Radiation Protection Expert
RPO	Radiation Protection Officer
RPW	Radiation Protection Worker
SSB	Strahlenschutzbeauftragte (Radiation Protection Officer)
ST	Specialised training
TC	IAEA Training Cooperation Project
VGB	German Association of Power Plant Operators (Verein für Großkesselbetreiber)
WE	Work experience
WP	Work Package

9 Tables

Table 1. Guidance on the minimum recommended duration of the RPO training components including OJT for different type of practices (IAEA)

Type of Practice	Minimum Experience including OJT* in months	Global Duration of Training**
Industrial radiography	12	53 + visits
Industrial irradiator facilities	6	50
Nuclear gauges and well logging	4	51 + visits
Medical applications in radiology	6	54
Medical applications in radiotherapy and brachytherapy	12	63
Nuclear medicine	6	67
Mining and processing of raw materials	3	53
Research Reactors/Accelerators		
General use of unsealed sources (including research facilities and the use of tracers)	6	67
Nuclear fuel cycle	To be defined	

* The recommended duration of on the job training component is at maximum 3 months

** Includes the duration of the core syllabus, additional exercises for core module and supplementary module, and visits.

Table 2. Legal basis and necessity for OJT / WE

Country	Legal basis for OJT/WE	OJT/WE in Industry	OJT/WE in Nuclear Reactors	OJT/WE in Medicine	Assessment and methods of OJT/WE (C16)
Austria	Yes	No	Yes	No[1)]	No
Belgium	Yes[2) 3)]	-	-	Yes	No
Bulgaria	Yes			Yes	Yes, exam.
Croatia	No	-	-	-	-
Cyprus	No		No	No	No
Czech Republic	Yes	Yes	Yes	-	Yes, exam.
Denmark	Yes			Yes	Yes
Estonia	Yes	Yes (Exposed workers)	-	Yes	Yes, partly
Finland	Yes	-	-	Yes	No
France	-	-	-	Yes	Yes
Germany	Yes	Yes	Yes	Yes	Yes
Greece	Yes	-	-	Yes	Yes, exam.
Hungary	Yes[4)]				Yes, exam.
Ireland	No[4)]				-
Italy	Yes	Yes	No	Yes	No
Latvia	Yes	Yes (Exposed workers)		Yes	Yes, some cases
Lithuania	No[5)]				-
Luxembourg	No	-	-	-	-
Malta	No	No	No	No	-
Norway	Yes	-	-	Yes	No
Poland	Yes	Yes	Yes	Yes	Yes
Portugal	-	-	-	-	No
Slovenia	Yes	Yes	Yes	Yes	No
Spain	Yes		Yes		Yes, some cases
Sweden	Yes	Yes	Yes	Yes	No
Switzerland	Yes	Yes	Yes	Yes	Yes, pract. exercise
The Netherlands	No[4)]			Yes[4)]	-
UK	No[4)]				-

1) Regulatory body may demand for OJT, not obligatory
2) OJT required for periodical renewal of the recognition
3) Experience only vaguely addressed in the Belgian regulation
4) OJT as part of a course
5) OJT only for staff of RPC

Table 3. Analysis for OJT / WE in Radiation Protection – RPO

Country	Classification of			Minimum Duration of OJT/ WE	Assessment	Additional Vocational Education and/or Training Course (TC)
	Risk Level	Practice	Education			
Czech Republic	4 levels	No	Depending on risk level: Secondary education or BSc	1-6 y	Yes (written + oral)	1 y
Slovenia	No	a: Medicine b: Veterinary c: Industrial radioisotopes d: open sources, other practices	Depending on risk level	NPPs: 5 y Others: 3 y	Yes	NPP: At least 200 h TC on special RP programme Others: At least 4 h more training than workers and special training if specified in the "safety assessment" documents
Latvia	2 levels	No	Second. educ. BSc MSc PhD	17y (WE) 13y 10y 7y	Yes	Industrial : Secondary educ. Medical : High medical educ.
Lithuania	3 for medicine 2 for techn. appl.	Yes	4 y BSc 6 y MSc	no	Yes	Training course
Germany	Yes Classified in detail	Yes Classified in detail	Yes Partly, depending on risk level	Depending on education: No techn. degree 3–24 m Skilled worker: 0-24 m	Yes	Necessary for: medical area < 1 w high risk level industry: 1-2 w Nuclear Power Plants: 1-6 w

y =year, m =month, w = week

Table 4: Analysis for OJT / WE in Radiation Protection – RPE

Country	Classification of			Minimum Duration of OJT/ WE	Assess-ment	Additional Vocational Education and/or Training Course (TC)
	Risk Level	Practice	Education			
Italy	low	No	---	low: 4 m	---	Level 1, 2: 3 y (BSc)
	medium			medium: 8 m		
	high			high: 12 m		Level 3: 5 y
Slovenia	---	a Health Physics	University degree	a: 7 y	No	a: References on ionising radiation
		b Dosimetry	University degree	b: 5 y	No	b: References on dosimetry
		c Medical Phys.	University degree	c: 5 y	No	c: Specialisation and references on medical physics
		d Occup. Health	University degree	d: 5 y	Yes	d: Specialisation on occupational medicine and retraining every 3 years
Latvia	---	---	Secondary educ.	17 y (WE)	Yes (Expert Attestation Committee)	
			BSc	13 y		
			MSc	10 y		
			PhD	7 y		
The Netherlands	5			Level 3 (significant risk): 500 h / 2 y	Yes	level 3: high vocational education, 5 w training
				Level 2 (high risk applic.): 1000 h / 2 y		level 2: academic education, 20 w training
Lithuania	medium		MSc	3 y	Yes	Training course
	high					

y = year, m = month, w = week

Table 5: Training providers reported for OJT

Research Centres	Austria, Bulgaria, Germany, Italy, Slovenia, Switzerland , France
Universities	Austria, Bulgaria, Czech Republic, Germany
Nuclear Power Plants	Bulgaria, Slovenia, Germany, France
Medical Centres and Medical Universities, Hospitals	Bulgaria, Czech Republic, Italy, Greece, Latvia, Portugal, France, Slovenia, Germany, UK, Latvia, Belgium
Authorities	Greece*
Other Organizations	UK, Spain, Czech Republic, Poland
No details or specific training providers	Cyprus, Malta, Lithuania, Belgium, Ireland, Estonia, Ireland, Norway, Portugal, Sweden, The Netherlands

*GAEC provides OJT for regulators and inspectors

Table 6: Legal requirements: Guidelines (GL) concerning the qualified competence in Radiation Protection in Germany

Industry and Research
GL on the „Qualified Competence in Radiation Protection“ GL on the „Qualified Competence for the Operation of Non-Medical X-Ray Units“
Medicine
GL “Radiation Protection in Medicine” according to the Radiation Protection Ordinance GL on the „Qualified Competence according to the X-Ray Ordinance“ GL on “Medical Surveillance of Occupationally Exposed Persons” GL on “Radiation Protection in Veterinary Medicine”
Nuclear Technology
GL on the „Qualified Competence of Personnel in Charge of Radiation Protection in NNP and other Nuclear Installations” 3.6.1 (1990) GL on the “Demonstration of Qualified Competence of NPP Personnel” 3.2 (1993) GL on the “Demonstration of Knowledge of Workers During Operation of NPP” 3.27 (2000) GL on the “Demonstration of Qualified Competence of Research Reactor Personnel” 3.3 (1994) GL on the “Qualified Competence of Responsible Personnel in Plants for Production of Fuel Elements for NPP”

Table 7a: Expert knowledge – Application of sealed radioactive sources

Expert knowledge CL : clearance level		Minimum period of vocational experience dependent on the vocational education in months				Radiation protection course
Vocational education		no	sw	e, m	gu, gc	Duration
2	Application of sealed radioactive sources					
2.1	Use and storage of devices with r. s. ($A \leq 10^5$-times the CL)	3	0	0	0	14 h
2.2	Handling of r. s. ($A \leq 10^5$-times the CL)	12	3	3	0	26 h
2.3	Handling of r. s. (if not covered by 2.1 or 2.2)	-	12	6	3	39 h

sw: skilled worker; e,m: engineer, master

gu, gc: graduate from university, technical college; no: no technical degree

- not provided by the corresponding vocational education;

Table 7b: Expert knowledge – Non-destructive testing with sealed radioactive sources

Expert knowledge		Minimum period of vocational experience dependent on the vocational education in months				Radiation protection course
Vocational education		no	sw	e, m	gu, gc	Duration
3	Non-destructive testing (with sealed radioactive sources)					
3.1	Radiation protection supervisor with restricted competence (at changing places of work) (RPA)	12	6	3	3	32 h
3.2	Radiation protection supervisor with overall responsibility	-	12	6	3	38 h

sw: skilled worker; e,m: engineer, master;

gu, gc: graduate from university, technical college; no: no technical degree

- not provided by the corresponding vocational education;

Table 7c: Expert knowledge – Application of unsealed radioactive sources

Expert knowledge CL : clearance level		Minimum period of vocational experience dependent on the vocational education in months				Radiation protection course
Vocational education		no	sw	e, m	gu, gc	Duration
4	Application of unsealed radioactive sources					
4.1	Handling of r. s. ($A \leq 10^5$-times the CL)	24	9	6	3	39 h
4.2	Handling of r. s. ($A > 10^5$-times the CL)	-	24	9	6	54 h
4.3	Handling of nuclear materials	-	-	9	6	60 h

sw: skilled worker; e,m: engineer, master;
gu, gc: graduate from university, technical college; no: no technical degree
- not provided by the corresponding vocational education;

Table 8: OJT for medical doctors and other personal in the medical area in Germany (except Medical Physicist Experts) m = month; h = hour

Field of Application	OJT	TC in RP	Recognition
handling open radioactive substances medical examination and medical treatment	36 m (minimum 18 m medical examination minimum 6 m medical treatment with unsealed radioactive sources)	basic training 24 h specialised training: unsealed sources 24 h	yes, oral
handling open radioactive substances, only medical examination	30 m	basic training specialised training: unsealed sources 24 h	yes, oral
handling open radioactive substances, only medical treatment of special organs	18 m (minimum 12 m in the region of the organ treated)		yes, oral
teletherapy and brachytherapy	36 m (min. 12 m radiation therapy planning, min. 12 m working with teletherapy equipment, min. 12 m after loading equipment)	basic training 24 h specialised training: tele therapy 28 h specialised training: brachy therapy 20 h	yes, oral
brachytherapy	24 m (min. 12 m radiation therapy planning including eventually 3 m endovascular radiation therapy)	basic training 24 h specialised training: brachytherapy 20 h	yes, oral
Brachytherapy, only therapy of eye tumors with sealed sources	12 m (+ proof of 25 applications)	basic training 24 h specialised training: brachytherapy 20 h	yes, oral

Field of Application	OJT	TC in RP	Recognition
brachytherapy only therapy of organs with sealed sources (prostate, brain)	18 m (+ proof of 50 applications)	basic training 24 h specialised training: brachytherapy 20 h	yes, oral
teletherapy	24 m (min. 12 m radiation therapy planning, min. 12 m accelerator)	basic training 24 h specialised training: teletherapy 28 h	yes, oral
endovascul. radiotherapy (for persons without expert knowledge)	6 m	basic training 24 h specialised training: brachytherapy 20 h	

Table 9: Practice of qualification in Radiation Protection in German NPPs

Class. N°	Type of Expertise	Education	TC in RP **	OJT	Work Experience	Recognition
1	"Radiation Protection Officer"	Technical Engineer (B Sc)	S 3 (2 w), S300 (5 w)	1 – 2 y	1 y	yes (RPO)
2	„Radiation Protection Expert"	Technical Engineer (B Sc)	S 3 (2 w)	1 – 2 y	-	(recognized only among NPP's)
3	Skilled Labour in RP	Technician, Master, Skilled Worker	S 3 (2 w), IHK* (1– 2 m)	1 y	1 y	yes
4	RP Worker	Technician, Master, Skilled Worker	S 3 (2 w)	1 y	-	-
5	Personnel without supervision „Worker II"	Vocational Education („Berufsabschluss")	S 2 (1 d)	-	3 m	-
6	Personnel being supervised „Worker I"	Vocational Education	S 1 (2 h)	-	3 m	-

w = week; m = month; y = year, h = hour

* Chamber for Industry and Commerce
** Training course modules provided at FTU-FZK

Table 10: Interdisciplinary key qualifications of the practical phases (OJT) in Radiation Protection at BA Karlsruhe

Radiological – Technical Devices, Open and Sealed Radioactive Substances and Sources	Duration [weeks]
Instruments, Plants, Practices, Handling, Testing, Disposal	2
Nuclear Medicine (therapy, diagnostic, radiology)	6
Radiation Medicine (therapy, diagnostic, radiology)	6
Isotope Laboratories, Nuclear Technology, Access, Locks, Clearance, Control	2
Nuclear Fuel Cycle Plant (e.g. NPP)	2
Safety and Monitoring Management	2
Quality und Radiation Protection Management	2
Involvement in Evaluations, Assessments and Expertises	2
Thesis	12
Total	36

- Companies not being in a position to practice any of these key items have to cooperate with other partners.
- After each OJT phase an assessment is performed.

Table 11: Overview on OJT in the practical phase of BA education at Research Center Karlsruhe

Subject of Study	Responsible Institution	Average Duration [weeks]
Radiological waste water laboratory, compartment air monitoring	Central Safety Department, Waste Water Lab.	3
Operative radiation protection in the Institutes of the Research Center (nuclear research)	Central Safety Department and others	3
Operative radiation protection in the Central Decontamination Department of the Research Center (conditioning of radioactive wastes)	Central Decontamination Department	4
Radiation protection at dismantling of nuclear pilot plants	Pilot Plants	2
Administrative radiation protection	Central Safety Department	2
Nonradiological occupational health and safety	Central Safety Department	2
Whole body counter (internal dosimetry)	Dosimetry Group, Medical Department	4
Radiochemistry	Central Safety Department, Analytical Laboratory	6
Spectrometry	Central Safety Department, Analytical Laboratory	6
Emission control and environmental surveillance	Central Safety Department	3
Clinical radiation protection	Hospital, mostly in the Region of Karlsruhe*	10
External dosimetry	Central Safety Department, Dosimetry Group	5
Clearance of radioactive materials	Central Safety Department, HDB	2
Student research project	Research Center Karlsruhe	12
Diploma thesis	Research Center Karlsruhe	13

* out of Research Center

Table 12: Examples for OJT in the Revised ETRP-Course

Topic (incomplete selection)	Type	Duration
Core Module: Selected Topics for OJT		
- Shielding Calculations, Use of Shielding Materials	Exercise, Case Study	Minimum 1 day each, total 1 to 2 weeks
- Portable Dosimeters, Evaluation and Interpretation of Results	Demonstration, Exercise	
- Management of Personal Dose Records, Dose Reduction Measures and Follow-up Measures	Exercise, Case Study	
- Routine Monitoring Programme (internal, external)	Exercise, Laboratory	
- Contamination Monitoring, Use of Radiation Dose Meters	Exercise, Case Study, Laboratory	
+ others		
Supplementary Modules **a) Unsealed Sources (Examples)**		
- Preparation of Shipping Documents for Transport (Road/Air)	Exercise, Case Study	Minimum 1 to 2 days each, total 1 to 2 weeks
- Incorporation Measurements: Whole Body Counting Facilities	Technical Visit, Exercises	
- Search and Recovery of Lost Sources, Analysis of Accidents with Radiation Sources	Simulation	
- Visit to Facilities, Organisational Chart with RP Personal	Technical Visit	
+ others		

Topic (incomplete selection)	Type	Duration
b) Medical Area		
- Work with Radiographers	Demonstration, Exercise	Minimum 1 to 2 days each, total 1 to 2 weeks
- Work with Generators and Labelling	Laboratory, Exercise	
- Visit to Facilities	Technical Visit	
- Analysis of Accidents in Medical Exposure	Case Study	
+ others		

Table 13: Complete answers to questions with respect to OJT and WE

Country	C11. Are there any training events that make use (either entirely or in part) of On the Job Training (OJT)?	C12. Specify which piece(s) of legislation provide the current legal basis for On the Job Training (OJT) and/or work experience	C13. If the wording of the terms “on the job training” and “work experience” in the glossary does not reflect fully the definition in your national regulation, please comment
Austria	No	Work experience is demanded by the radiation protection law.	-
Belgium	No	(see art. 73.2 last paragraph of Royal Decree 2001) OJT is required for the periodical renewal of the recognition.	
Bulgaria	Yes, Each postgraduate training includes OJT	Ordinance No.31/28.06.2001 on the Post Graduate Training in the Health Care System (Ministry of Health): "Art.11.(3) The syllabus includes: 1. mandatory theoretical and practical training and their duration in terms of the specialty acquiring forms spec. in Art.10, not shorter than that spe. in Annex 1; 2. the distribution in fields and modules on the medical science and practice and their duration." Ordinance for Patient Protection at Medical Exposure (not yet in force): "Art.27 (1) 2. The MPE has 3 years at minimum practical work in the corresponding field (RT, NM, RD).."	practical experience, clinical experience or clinical work do fully reflect the wording cited above
Croatia	Yes, According to the regulation on training of professionals in the field of radiation protection State Office of Radiation Protection (Regulatory Authority) organizes courses in radiation protection for professionals operating radiation sources. Partly these courses are OJT because senior	REGULATIONS ON THE CONDITIONS AND METHOD OF PROFESSIONAL TRAINING FOR INDIVIDUALS ENGAGED IN PRACTICES WITH IONIZING RADIATION SOURCES (Official Gazette No. 67/2000)	-

Country	C11. Are there any training events that make use (either entirely or in part) of On the Job Training (OJT)?	C12. Specify which piece(s) of legislation provide the current legal basis for On the Job Training (OJT) and/or work experience	C13. If the wording of the terms “on the job training” and “work experience” in the glossary does not reflect fully the definition in your national regulation, please comment
	professionals deliver lectures and share practical experience on working place.		
Cyprus	No	Not Available	No comment
Czech Republic	Yes, During the one or two years of obliged "work experience" in management of relevant ionizing radiation sources or in performance of tests in facilities of relevant licensees there is also required additional professional training (course) for selected personnel, who will supervise the work in controlled areas. The courses (term of which is usually 1 week) are allowed to be conducted only by the licensee of SONS. To get licence for conducting of such courses, the requirements given in	See C7 and C11. The legal bases is given in the Section 6 of the Decree No.146/1997 Coll. (amended by No.315/2002 Coll.), which executes the requirements of Atomic Law - the Act no.18/1997 Coll of 24 January 1997. Text of the Atomic Law and appropriate Decrees are accessible at the electronic address : www.sujb.cz	Czech legislation doesn´t require any experienced supervisor /expert to be appointed for guiding a "selected worker" neither during his / her obligatory initial training nor during the term of his /her one or two years practice (work experience) in handling the corresponding ionizing radiation sources

Country	C11. Are there any training events that make use (either entirely or in part) of On the Job Training (OJT)?	C12. Specify which piece(s) of legislation provide the current legal basis for On the Job Training (OJT) and/or work experience	C13. If the wording of the terms “on the job training” and “work experience” in the glossary does not reflect fully the definition in your national regulation, please comment
	Section 9 paragraph 1 letter n) of the Act and by Section 12 of the Decree No.146/1997 (amended by No.315/2002) shall be fulfilled. Not sure		
Denmark	Yes, 1) RPE at the Regulatory Authorities, 2) RPE at Danish Decommissioning, 3) Medical physicists	Medical physicists: "Guideline concerning the education of Medical physicists" (Vejledning om uddannelse af hospitalsfysikere, VEJ nr 122 af 20/07/1995). It describes in general terms what should be learned in the three-years education programme (only in Danish).	
Estonia	Often On the Job Training is used. Partly the training consists of the general lectures and continues with on the job training.	Regulation of Minister of the Environment: Requirements for Exposed Workers Radiation Safety Training (unfortunately no translation available).	They reflect fully the definiton.
Finland	Yes, Training of a hospital physicist include OJT (see also point C7 above: A hospital physicist who is also qualified as a RPO for general use of radiation in the medical sector, can be recocgnised as a		

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	Medical Phyiscs Expert. The radiation protection training of a medical physicist is defined in Guide ST 1.7, Annex B, and that of the RPO in Guide ST 1.8, Annex B)		
France	, The courses described in C2 (Master and technician courses) make use of On the Job Training. For the Master: half of the year (30 ECTS) are dedicated to OJT. At technician level : 1 or 3 months of OJT (2 different courses for 2 different levels of technicians) *The Specific course for the Medical Physicists also makes use of OJT in hospitals (32 weeks), as well as those of physicians or all medical staff.*		
Germany	Yes, University of	Guideline “Expert Knowledge - Technical Applications” according to the German	Expert knowledge,

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	Cooperative Education, Karlsruhe, Department of Safety Engineering (Radiation Protection) - practical part	Radiation Protection Ordinance (Fachkunde-Richtlinie Technik nach StrlSchV; 2004) • Guideline “Expert Knowledge - Technical Applications” according to the German X-ray Ordinance (Fachkunde-Richtlinie Technik nach RöV; 2003) • •Guideline “Radiation Protection in Medicine” according to the Radiation Protection Ordinance (Richtlinie Strahlenschutz in der Medizin nach StrlSchV; 2002) • Guideline “Radiation Protection in Medicine” according to the X-ray Ordinance (Richtlinie Strahlenschutz in der Medizin nach RöV, 2005) • Guideline "Veterinary Medicine" (Richtlinie Strahlenschutz in der Tierheilkunde, 2005) • Guideline "Proof of the Technical Qualification of Nuclear Power Plant Personnel" (1993) • Guideline "Proof of the Technical Qualification of Research Reactor Personnel" (1994) • Guideline Relating to Programs for the Preservation of Technical Qualification of Responsible Shift Personal on Nuclear Power Plants (1993) • GuidelineT"echnical Qualification of Radiation Protection Officers at Nuclear Power Plants and other Facilities for Fission of Nuclear Fuels" (1990) • Guideline " Technical Qualification of Responsible Personnel in Facilities for the Production of Fuel Elements for Nuclear Power Plants" (1995)	practical experience, work experience The german definitions in the various guidelines do not always define if supervision is necessary (OJT) or not (work experience)
Greece	Yes, On the Job Training in a Hospital providing medical applications of ionizing radiations as well as in GAEC are prerequisites for the	the piece of the Greek Radiation Protection Regulations providing the current legal basis for OJT and work experience is presented in the 1.1.7 paragraph of the Regulations. An English version of the text is available in the GAEC's site at the address:www.eeae.gr.	The two terms are identical

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	successful completion of the post graduate course on Medical and Radiation Physics leading to the M.Sc. degree. Moreover, GAEC provides On the Job Training to the regulators and the inspectors participating in the Post Graduate Educational Course on "Radiation Protection and the Safety of Radiation Sources" .		
Hungary	Yes, Refresher radiation protection courses compulsary in every 5 year professionally workshop	Decree of the Minister of Health 16/2000, Decree of the Minister of Health 31/2001.	N/A
Ireland	Yes, For licensees in the industrial sector e.g. industrial radiographers, nuclear moisture density gauge users, irradiation facilities etc. training is usually a combination of course / seminar work	None	

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	and on the job experience. in the Medical Physics area, the training always incorporates an "On the Job" training component in association with the academic/course based approach.		
Italy	Yes, A programme of OJT under the direction of the qualified expert of the facility is required, together with the specific education level (C.6), to sit the examination at the Ministry of Labour: 1° Level : 120 days at an infrastructure approppriate for 1° Level (see C.6) 2° Level : as 1° Level plus 120 days at an infrastructure approppriate for 2°	The legal basis specifically for the OJT needed to be recognised as Qualified Expert is given in the Appendix V of Legislative Decree D.Lgs. 230/095 "Attuazione delle direttive 89/618/Euratom, 90/641/Euratom, 92/3/Euratom e 96/29/Euratom in materia di radiazioni ionizzanti" (in English "Implementation of directives 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom in the field of the ionizing radiations") and following upgrades The relevant information relating to this OJT is given in C.11	OJT defined in the glossary does reflect the meaning in the national legislation for what concerns the Qualified Expert. Work Experience is not defined in this context.

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	Level (see C.6) - total 240 days 3° Level : as 2° Level plus 120 days at only two specific infrastructures appropriate for 3° Level (see C.6): nuclear plant and centres with accelerator - total 360 days No other particular requirement is given in the national legislation for the structure / organization of the OJT		
Latvia	Yes, Employers are delivering on-job training	The employer is responsible for enhancing skills of the staff (regulations and law on radiation safety) "Work with ionising radiation sources is managed by the operator’s authorised job manager (RPO), who possesses an adequate level of knowledge to perform physical, technical or radiochemical measurements, and makes an assessment of ionising radiation doses and effectively protects workers and members of the public against ionising radiation by correct application of protective measures. The job manager… ensures that workers involved in practices using ionising radiation sources are sufficiently trained to implement protective measures, is aware of circumstances and of the requirements of normative acts, and is informed of potential risk related to given practices" (from Act on Radiation Safety and Nuclear Safety). "Employers … ensure that the qualifications of employees and the RPO conform to	

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		the duties to be performed" (from Cabinet regulation No.290 (adopted 3 July 2001))	
Lithuania	Yes, On the job training is done for the members of staff of the Radiation Protection Centre, licensees are also giving on the job instructions to fresh members of staff.	No special legislation is availble except for the general requirments for such training.	These definitions are not given in the national legislation.
Luxembourg	No	(Legislation in French attached)	(not defined under national legislation)
Malta	No	Not mentioned in current legislation	Not mentioned in current legislation
Norway	RPE's qualification are in general based on an OJT on top of a masters degree in physics.	From the Radiation protection regulations. Section 33 Requirements as to competence and training Undertakings which employ radiation for the following specified purposes shall have personnel with the following competence: a) For x-ray diagnostics subject to an approval requirement under section 5, a medical practitioner with specialist competence in medical radiology or a dentist with specialist competence in maxillofacial radiology. b) For other x-ray diagnostics, a medical practitioner or dentist trained in radiation protection relevant for the apparatus in question. c) For high- and medium-energy radiation therapy, a medical practitioner with specialist competence in oncology. d) For nuclear medical examinations, a medical practitioner with specialist competence in nuclear medicine. e) For nuclear medical therapies, a medical practitioner with specialist competence in	

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		oncology or nuclear medicine. f) For dental x-rays (with tube voltage not exceeding 75 kV), a dentist or dental nurse; for special examinations, a dentist with relevant specialist competence. g) For skin therapy with tube voltage not exceeding 15 kV x-ray radiation, a medical practitioner with specialist competence in dermatology. h) For use of x-ray appliances in chiropractic activity, a medical practitioner or chiropractor trained in radiation protection relevant for the apparatus in question. i) For medical therapy of skin diseases with UV radiation, a medical practitioner. Undertakings using radiation for medical purposes that require authorisation under section 5 shall have personnel with a scientific competence at the level of master’s degree and additional competence in medical physics. To section 33: As regards radiation therapy and nuclear medicine (section 5 e) and f)), scientific personnel should be permanently attached to the undertaking in a number commensurate with the scale of the undertaking, such that professionally responsible persons can be designated, cf the comments to section 38, to attend to radiation protection and radiation use and to dosimetric measurements and quality control of apparatus and equipment. "Scientific personnel" usually means a physicist with three years' theoretical and practical in-depth study of medical physics, with at least one of these years spent in clinical practice. Scientific personnel with professional responsibility must have a further two years' clinical experience. As regards x-ray diagnostics requiring approval under section 5, such personnel should be associated with the organisation in order to facilitate necessary consultation on corresponding conditions, including dosage and image quality assessments, in connection with the development of examination protocols. The undertaking should also have engineering competence or services, commensurate with the scale of the undertaking, to take care of necessary technical maintenance. Where radiation therapy is concerned, it is recommended that a minimum of two radiation therapists should carry out patient	

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		treatment on a joint basis in order to ensure correct use in accordance with procedures applying at any time. Doctors who use x-ray apparatus for guidance in connection with operations, interventions, endoscopy etc., must have the training needed to give them an understanding of parameters that affect image quality and radiation doses to patients and personnel. Such training must include purely technical aspects of the apparatus as well as work technique (distance, apparatus geometry etc).	
Poland	Yes, in the Institute of Atomic Energy, where research reactor is operating	& 4 of quoted Regulation	
Portugal	No		
Slovenia	Not sure	Rules on the requirements of using ionising radiation sources in healthcare (OJ RS no. 111/03) provide demands on ensuring continuing education and training after qualification, especially in cases of clinical use of new techniques.(no English translation available). The curricula should be defined in radiological procedures programme. Radiation Protection and Nuclear Safety Act RPNSA (OJ 102/04), art. 28.2 The competent expert may be any individual who fulfils the following conditions: - has completed university level study, - has acquired at least seven years work experience in the area of ionising radiation since completing university study. Art.30.2: A competent dosimetry expert can be any individual who fulfils the following conditions: has completed university level study and has acquired at least five years work experience in the area of dosimetry since completing university study.	Periodical trainings for all RWs and RPOs are provided by approved institution (see also C1)

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		Art. 49.2: An appointed medical physics expert may be any individual who fulfils the following conditions: has completed university level study ensuring appropriate knowledge in the area of medical physics and has acquired at least five years work experience in the area of medical physics. Rules on health surveillance of exposed workers (OJ RS, No.2/2004), art. 24 (no English translation available): specialisation in health medicine + 5 years of working experience in health surveillance of exposed workers + approved training course every 3 years	
Spain	Yes	http://www.csn.es/plantillas/frame_nivel1.jsp?id_nodo=245&&&keyword=&auditoria=F	
Sweden	Yes, To become a Medical Physicist you have to practice at hospital at least during 10 weeks	SSI FS 2000:6 (http://www.ssi.se/forfattning/PDF_Eng/2000-6e.PDF) and the approval for the RPE contains a sentence: the RPE shall continously follow the development in the specific area and follow the foundation of new regulations and then needed update the knowledge.	
Switzerland	Yes, The RPE Candidate has to work for at least 4 weeks in different RP-job in another nuclear installation	http://www.admin.ch/ch/d/sr/8/814.501.261.de.pdf, http://www.hsk.ch/deutsch/files/pdf/R-037_D.pdf	
The Netherlands	Yes, Industrial Radiography Not sure	no legal basis for On the Job Training, only 20 % of Time spend in Practices is needed	All courses have to follow practice (20% of course time), mostly

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			measurements, within level 2 and the Training for Medical Physics as a OJT
UK	Yes, AURPO scheme (although this a relatively minor component of the scheme) www.aurpo.org/training	Not applicable	Not applicable

Country	C14. Are there different levels or classifications for OJT and/or work experience of radiation protection experts and/or RPO recognised in your country with regard to the complexity of the radiation applications in different areas, such as medicine, industry, research, nuclear fuel cycle etc?	C15. If the answer to C14 is “Yes”, please specify these different levels in terms of prior education, duration and content of the OJT and/or work experience, etc…. How is completion verified?
Austria	Yes	RPO in medicine have to have a university degree (natural sciences or medical science).
Belgium	No	
Bulgaria	yes	For RPE In the medical field for example: the clinical experience of minimum 3 years is specified up to RT, NM and RD For RPO a special cource in RP under the Low of Safety use of Nuclear energy is sufficient
Croatia	No	
Cyprus	Yes	The answer in C14 is yes, as far as the syllabus on Radiation Protection is concerned.
Czech Republic	No	
Denmark	Yes	To become RPE at the authorities you would need an acedemic background, OJT and the acedemic course mentioned in C4 and C6. Medical physicists need to go through a 3-years education programme. Danish Decommisioning has prepared - and got the authorities approval - for a programme on the site for RPE's that are to work with decommissioning (C6).
Estonia	No	
Finland	No	
France	Yes	The content and the duration of the education of the "Personne Compétente en Radioprotection" (could be considered as RPO) depend on the area of activity (nuclear sector, medical sector and non nuclear industry) and also on the type of sources (sealed or unsealed).
Germany	Yes	see attached paper completion verified by "Fachkundebescheinigung" (certificate of expert knowledge)
Greece	No	One year On the Job Training in the Radiodiagnosis, Radiotherapy and Nuclear Medicine departmens of Hospitals specified by the Ministry of Health is required in order somenone to acquire the M.Sc. degree on Medical Radiation Physics. The completion of the OJT is verified by the departments of the Hospital involved. In all other cases the different levels

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		for OJT of radiation protection experts or radiation protection officers are defined ad hoc.
Hungary	Yes	
Ireland	Yes	Industrial and Education sector. The requirements for nomination of an RPO would vary depending on the specific practices. The requirements for qualifications and experience increase with increasing complexity and risk. General and practice specific RPO courses would be attended as required. Nomination is required in writing on a specific form which has to be signed by a senior management representaive.
Italy	Yes	The different programmes of OJT for the different levels of expertise are given in C.11 and the relating prior education levels are given in C.6. The education requirements are characterised by the usual verification system of any university course. The programmes of OJT (start, duration, facility where the training is carried out, the qualified expert in charge of the training) are communicated to the provincial office of the Ministry of Labour by the trainee. The employer that is responsible of the facility where the training tooks place provides the trainee with a certification of completion of the OJT. The facility hosting the trainee are recognized as sites where ionizing radiation are used in compliance with the national legislation. No other verification for the OJT is necessary.
Latvia	Yes	According the Cabinet regulation No.290 (adopted 3 July 2001)): "The minimum qualifications of the RPO shall conform to at least one of the following criteria: 1) higher technical education as well as: 1. completed accredited vocational higher or secondary further education programme in the field of radiation safety and nuclear safety; 2. work experience of at least three years, including the time spent to acquire education in matters of radiation safety and nuclear safety; and 3. certificate attesting the conformity of knowledge to the specifics of activities to be carried out; 2) higher medical education and a certificate in the speciality of diagnostic radiologist; or 3) higher medical education and a certificate in dentistry."

Country	C14. Are there different levels or classifications for OJT and/or work experience of radiation protection experts and/or RPO recognised in your country with regard to the complexity of the radiation applications in different areas, such as medicine, industry, research, nuclear fuel cycle etc?	C15. If the answer to C14 is “Yes”, please specify these different levels in terms of prior education, duration and content of the OJT and/or work experience, etc…. How is completion verified?
		In the cases of "such sources of ionising radiation the maintenance of which does not require direct presence of employees, and the power of ionising radiation exposure dose during the working hours at a distance of one metre is less than 1 μSv/h, the minimum qualifications of the RPO shall be as follows – general secondary or secondary vocational education and completed accredited vocational secondary further education programme in the field of radiation safety and nuclear safety, as well as work experience of at least five years. RPO shall be certified by:a certification commission for RPO …". radiation safety expert and radiation safety and nuclear safety expert shall have appropriate training in order to carry out operations with sources of ionising radiation and experience in performing or managing of such operations: 1) persons with secondary vocational education – at least 17 years; 2) persons with bachelor's degree or higher vocational education – at least 13 years; 3) persons with master's degree – at least 10 years; and 4) persons with PhD in science – at least 7 years. RPE shall be certified by:a expert attestation committee.
Lithuania	No	
Luxembourg	Yes	Essentially valid for Medical Physics Expert (dental radiology, diagnostic radiology, nuclear medicine and radiotherapy) (generally dependant on legislation of the Member State, where basic training and accreditation was done)
Malta	Yes	As already mentioned in C6, the newly set up criteria includes work experience for the different specific practices, the duration of which was set dependent on risk/ complexity of practice. erification will be carried by the supply of documentation and reviewing each application
Norway	-	-
Poland	Yes	All details are given in Regulations: 1.on the positions…. and on radiological protection inspectors; 2.on nuclear regulatory inspectors

Country	C14. Are there different levels or classifications for OJT and/or work experience of radiation protection experts and/or RPO recognised in your country with regard to the complexity of the radiation applications in different areas, such as medicine, industry, research, nuclear fuel cycle etc?	C15. If the answer to C14 is "Yes", please specify these different levels in terms of prior education, duration and content of the OJT and/or work experience, etc…. How is completion verified?
		(www.paa.gov.pl/regulations/positions.htm;www.paa.gov.pl/regulations/Reg_inspectors.htm
Portugal	No	
Slovenia	Yes, Please see C1 and C12	Please see C1 and C12
Spain	Yes	There are different levels of contents and duration taking into account the sector, and the responsability of the workers.
Sweden	Yes	SSI FS 2000:6 (http://www.ssi.se/forfattning/PDF_Eng/2000-6e.PDF)
Switzerland		
The Netherlands	No	
UK	No	Not applicable

Country	C16. Is there an assessment of the competency acquired during the OJT? Please tick the appropriate box	C16 part 2: If “Yes” please comment on the assessment method(s). Is the objective of the assessment to test the knowledge or the job competency or to confirm if learning objectives have been achieved?	C17. Regarding OJT, do you have specific training providers such as research centres, power plants, hospitals, big industrial companies, and what are the capacities in terms of numbers of trainees and the possibility of providing OJT to trainees from other countries?
Austria	No		Research centers and univerisities provide OJT for trainees from other countries (approx. 30 per year).
Belgium	No		No. Practical exercises are included in most courses, but this is not to be considered as “real” OJT.
Bulgaria	Yes in all cases: State exam	Both	Up to a list issued by the MoH: Medical Universities, NCRRP, Military Medical Academy, some big hospitals, also at the Nuclear Plant Kozloduy, but also at other Universities. It is forthcoming licensing of several organisation to provide specialised traininig.
Croatia	Yes, in all cases: There is a final written exam for those participating to the OJT	The objective is the assesment of the knowledge.	Training courses in radiation protection are organized only by the State Office of Radiation Protection. Lecturers and trainers are recognized experts for specific field engaged by State Office for specific event.
Cyprus	No		No
Czech Republic	Yes in all cases: The assesment of the competency acquired during the (obligatory) one or two year term of work experience is executed by the Professional Examining Commission of the State Office for Nuclear Safety	The assesment of the competency of the by Professional Examining Commission of the State Office for Nuclear Safety is regulated by the Section 9 of the Decree No.146/1997 Coll. (with amendment by No.315/2002 Coll.).	Courses required by SONS can be provided only by subjects which have "licence of SONS to perform a professional training of selected personnel working with ionising radiation sources" (Section 12 of Decree No.146/1997 Coll. amended by No.315/2002 Coll.). There is given what the licensee must submit to SONS as evidence on the way of training the selected personnel. Among the licensees (at present time there is 11 such licensees in CR) there are the power plant as well as technical university and

Country	C16. Is there an assessment of the competency acquired during the OJT? Please tick the appropriate box	C16 part 2: If “Yes” please comment on the assessment method(s). Is the objective of the assessment to test the knowledge or the job competency or to confirm if learning objectives have been achieved?	C17. Regarding OJT, do you have specific training providers such as research centres, power plants, hospitals, big industrial companies, and what are the capacities in terms of numbers of trainees and the possibility of providing OJT to trainees from other countries?
			medical training centre. They provide courses with the programmes (authorized by SONS) for the persons of their appropriate branches.
Denmark	Yes, some Cases: for Medical physicists	The 3-years education programme has to be approved by the Educational Committee of the Danish Society for Medical Physics by presenting documentation for the competences aquired before formal recognition as 'Medical Physicist* can be granted by the National Board of Health	No
Estonia	Yes, some cases; Depends from the regulations inside the institution. At least there will be assessment talk with the person responsible for the OJT.	No. Practical exercises are included in most courses, but this is not to be considered as “real” OJT.	No. Practical exercises are included in most courses, but this is not to be considered as “real” OJT.
Finland	No		Due to the working language (Finnish), would be very difficult to arrange in practice
France	Yes, some cases; It is the case for the medical physicists. I am not sure for the other ones.	For the medical physicits : The student has to acquire some professional competences during his OJT period, under the supervision of a senior medical physicist. This supervisor must attest, by signing "competence sheets" that the student has acquired the relevant competences and is now able to work by his own.	It is not possible for me to give you the capacities in terms of number of trainees, but there are in France a large number of providers of OJT. Among them : CEA, EDF, IRSN, all industries involved in fuel cycle, a large number of big hospitals and especially those devoted to cancer treatment. All of them already provide OJT for student of the academic courses mentioned above.
Germany	Yes in all cases: the competent authorities are responsible for checking the required knowledge Yes – some cases: University of	Written practical training reports to confirm if learning objectives are achieved	On request, OJT is offered by research centers (2 to 3), yes: both, national and foreign participants

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	Cooperative Education, Karlsruhe, Department of Safety Engineering (Radiation Protection) http://www.ba-karlsruhe.de		
Greece	Yes, some cases	The competency of the Medical Radiation Physicists acquired during the OJT is assessed with the final exams organised by the Ministry of Health. The objective of the assessment is to test the knowledge and the job competency as well as to confirm that the learning objectives have been achieved.	Certain hospitals specified by the Ministry of Health are the OJT providers for the approximately 50 Medical Radiation Physicists coming from the post graduate course operated by GAEC or other similar courses running abroad each year. GAEC is also OJT provider for the 15 regulators and inspectors from other countries participating in the Post Graduate Educational Course on "Radiation Protection and the Safety of Radiation Sources".
Hungary	Yes, all cases	Written exam	Yes, first of all Hungarian speaking trainees
Ireland	Yes, some cases	This is particularly relevant for the training of industrial radioagraphers. The assessments are practical and theroetical in nature and would cover the job itself and radiation protection matters. There is no formal assessment of the training at present in the Medical Physics sector.	No specific training providers.
Italy	No		All the centres (hospitals, research centres, etc.), that are recognized as sites where ionizing radiation are used in compliance with the national legislation, can host students for the OJT needed for the recognition of the Qualified Expert. Actually, information about their capacities of hosting trainees is not available.

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Latvia	Yes, some cases		There is Latvian Oncology Centre in Riga. It performs OJT for oncology specialists from other oncology hospitals of Latvia (for example, work with linear accelerator). OJT in Latvian Oncology Centre could be accessible for trainees from other countries, but capacity is not enough. It could be organised depending on individual cases
Lithuania	Yes, some cases	Interviews and informal assessment of progress made and ability of the appropriate person to work.	No
Luxembourg	Yes, some cases: if required in Member State, where relevant education took place		(radiographer school)
Malta	No		No specific RPE OJT training provided.
Norway	No		No
Poland	Yes, all cases		Yes,see C11 and Central Lab. for Radiological Protection (Their capabilities are rather limited)
Portugal	No		
Slovenia	No	Everything goes through the Expert Commission, which is nominated by the Ministry of Health	Training describes in C1 is provided by approved organisations "Jožef Stefan" Institute and Institute of Occupational Safety. Both organisations have some facilities to provide practical part of the courses. NPP Krško, University Medical Centre Ljubljana and Institute of Oncology Ljubljana to some extent offer their support
Spain	Yes, some cases		We have enough specific training providers
Sweden	no		
Switzerland	Yes, some cases	For RPO the assessment includes an exercise in the practices (for example a	The Paul Scherrer Institute provides supplementary to the RP-School a lot of

Country	C16. Is there an assessment of the competency acquired during the OJT? Please tick the appropriate box	C16 part 2: If “Yes” please comment on the assessment method(s). Is the objective of the assessment to test the knowledge or the job competency or to confirm if learning objectives have been achieved?	C17. Regarding OJT, do you have specific training providers such as research centres, power plants, hospitals, big industrial companies, and what are the capacities in terms of numbers of trainees and the possibility of providing OJT to trainees from other countries?
		RP-intervention after an incident with an open radioactive source including planning, preparation, performing measures, monitoring and documentation)	installations where the OJT or exercises in a 1:1 scope are possible. On demand there are capacities to offer such training to around 10-20 interested persons.
The Netherlands	No		
UK	Not applicable		there is no formalised structure for this in the UK. However, there are a number of large establishments/organisations that occasionally support OJT on request. Not possible to specify capacity

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
Austria	Yes, Medical physicists (Radiotherapy)	Yes, Radiation protection training courses	OJT
Belgium	Yes	No	Yes, require only training, no personal qualification
Bulgaria	Yes, Regulation of the conditions and procedure for acquiring professional qualification and for the procedure for issuing licenses for specialized training and certificates for qualification use of nuclear energy (promulgated in State Cazette 74, 2004 - Decree of the Council of Ministers 209, 6 August 2004).	Yes, NRA - Ordinance for the Radiation Protection in Activities with IR Sources (PMC No.200/4.08.2004): Art.3 The radiation protection in activities with ionizing radiation sources (IRS) through:…10. available procedures and responsible staff for reporting and control of IRS". Art.116 (2) the persons working in the RP office and responsible for the RP of the IRS sites should have been trained in specialized course and possess a qualification (certificate, qualified) diploma from a person/institution, licensed by the NRA for specialised training."	Same Ordinance: "Art.8 Each person from the staff, working with IRS is obliged: …7. to possess a certificate to exercise activities with IRS, issued from a person/institution, licensed by the NRA for specialised training for activities with IRS."
Croatia	No	Yes, There are some specific stipulations for RPOs in regulations	Yes, there are specific stipulations related to the basic knowledge on radiation protection in regulations (see regulations in attachment).
Cyprus			Yes, Syllabus is in the Greek Language. If you require it let us know and we will

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
			translate it in English
Czech Republic	Yes, In CR there is not distiguish RPE and RPO qualification - our legislation defines "selected personnel". For different types of activities "particularly important from the viewpoint of radiation protection" (Section 3 paragraph 2 of the Decree No.146/1997 Coll. amended by No.315/2002 Coll) there are different requirements for qualification of selected personnel (Section 4 paragraph 4 of the Decree No.146/1997 Coll. amended by No.315/2002 Coll).	Yes, see RPE	Yes, Section 24 paragraph 1 letter d) of the Decree No. 307/ 2002 Coll. On Radiation Protection Requirements
Denmark	Yes, Legislation concerning the use and handling of radioactive material in all fields describes that RPE must be suitable trained and qualified within: Ionizing radiation, measurement techniques, biological effects of ionizing radiation, principles for radiation protection, practical radiation protection and national legislation.	Yes, legislation concerning the use of radioactive material describes that RPO must be suitable trained and qualified. The qualification varies extensively depending on area of work.	Yes, Must be informed and trained by the RPE or RPO.
Estonia	Yes, the details can be found in the Radiation Act (2004), which English translation is added.	Yes, the requirements are given in the regulation of the minister of the environment, no translation available.	Yes, require only training, nor personnal qualification.
Finland	Yes, see attached Guides ST 1.4 and ST 1.8	Yes, see attached Guides ST 1.4 and ST 1.8	Yes, see attached Guides ST 1.4 and ST 1.8
France	No	Yes, The only person "suitably trained in RP" required by the French legislation is called "Personne Compétente en radioprotection", that could be considered as a RPO. This person is mandatory for all industry/hospital that uses ionizing radiation. He is usually an employee of this industry/hospital. He has to	Yes, Medical physicists (regulatory text of November 19,2004), industrial radiographers (regulatory text of June25, 1987), drivers of radioactive materials (according to the ADR legislation). All the radiation workers must be trained every 3 years on the hazards of ionizing radiations. This training period is adapted to the job (and associated risk) and organized under the responsibility of the

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		attend a short course and to pass an exam at the end. Duration and content of this course is defined in the legislation, and depend on the area of activity (medical sector, nuclear sector or non nuclear industry) and on the type of sources (sealed or unsealed) The regulatory text (from October 26, 2005) is joined to this questionnaire.	employer. It can be organized within the hospital/industry if qualified persons are available to train their colleagues or by an external institution.
Germany	Yes, see attached paper	Yes, see attached paper	Yes, see attached paper
Greece	Yes, RPEs working in hospitals are expected to have an M.Sc. degree in Medical Radiation Physics	Yes, RPOs are considered as responsibles for radiation sources in industrial and research applications of ionizing radiations and must have adequate knowledge on radiation protection verified by the GAEC.	Yes, Radiation workers are expected to be adequately educated and trained on radiation protection issues.
Hungary	Yes	Yes	Yes
Ireland	Yes, Article 19 of S.I. No 125 of 2000. Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000. (www.irishstatutebook.ie/ZZSI125Y2000.html) Article 19 (2): The undertaking shall appoint in writing one or more suitable persons to perform the functions expressed by this Order to be performed by a radiation protection adviser and a reference in this Article to a suitable person shall be construed as a reference to a person having the knowledge and training needed to carry out physical, technical or radiochemical tests	Yes, it is a condition of a licence issued by the RPII that the licensee shall appoint a Radiation Protection Officer. The licence condition states: "The Radiation Protection Officer (RPO), currently appointed by the licensee, is named in Schedule 3 [of the licence]. In the event of a change being envisaged, the licensee shall forward to the Institute the name, qualifications, position within the	Yes, Article 20 of S.I. No. 125 of 2000. Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000 (www.irishstatutebook.ie/ZZSI125Y2000.html). Article:20 (2): The undertaking shall ensure that sufficient and appropriate training in the field of radiation protection is provided for exposed workers, apprentices and students

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
	enabling doses to be assessed and to give advice in order to ensure effective protection of individuals and the correct operation of protective equipment	company and evidence of competence of the proposed new appointee."	
Italy	Yes, Quality Expert are trained and qualified as presented in the previous section	No	Yes, Occupationally exposed workers must have received a formation about the risks to which they are exposed, the radiation protection provisions, etc. The employer assures the formation of workers with the collaboration of the Qualified Expert. A verification at the end of the formation course is required
Latvia	Yes According to the government regulation No.149 (adopted 9 April 2002, amended 4 November 2003): "A radiation safety expert and radiation safety and nuclear safety expert shall have appropriate training in order to carry out operations with sources of ionising radiation and experience in performing or managing of such operations: 1. persons with secondary vocational education – at l east 17 years; 2. persons with bachelor's degree or higher vocational education – at least 13 years; 3. persons with master's degree – at least 10 years; and 4. persons with a PhD in science – at least 7 years."	Yes According to the Cabinet regulation No.290 (adopted 3 July 2001) : “The minimum qualifications of the RPO shall conform to at least one of the following criteria: 1. higher technical education as well as: 1.1. completed accredited vocational higher or secondary further education programme in the field of radiation safety and nuclear safety; 1.2. work experience of at least three years, including the time spent to acquire education in matters of radiation safety and nuclear safety;	Yes According to the Cabinet regulation No.290 (adopted 3 July 2001) : "Employees must have general secondary or vocational secondary education and a completed accredited vocational secondary further education programme in the field of radiation safety and nuclear safety. The Medical Treatment Law shall determine education and qualification requirements for employees who work with sources of ionising radiation in medical diagnostics, therapeutic radiology and in dentistry. Accredited vocational secondary or higher further education programmes in the fields of radiation protection and nuclear safety shall

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		and 1.3. certificate attesting the conformity of knowledge to the specifics of activities to be carried out; 2. higher medical education and a certificate in the speciality of diagnostic radiologist; or 3. higher medical education and a certificate in dentistry. In the cases of "such sources of ionising radiation the maintenance of which does not require direct presence of employees, and the power of ionising radiation exposure dose during the working hours at a distance of one metre is less than 1 μSv/h, the minimum qualifications of the supervisor shall be as follows – general secondary or secondary vocational education and completed accredited vocational secondary further education programme in the field of radiation safety and nuclear safety, as well as work experience of at least five years."	include: 1. theoretical studies of the requirements prescribed by regulatory enactments with respect to radiation safety and nuclear safety, and ensuring the protection of the health of employees; and 2. theoretical studies and practical training on safe working methods, radiation safety and nuclear safety.”

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
Lithuania	No	Yes person (service) responsible for radiation protection (radiation protection officer) -Person (service) having an appropriate training and qualification in the field of protection and safety, which is appointed by the licensee for organization of implementation of requirements of protection and safety, and whose capacity to act in that respect is recognized by the regulatory authority	Yes, worker (radiation worker) - Person working under contract of employment with sources of ionizing radiation or affected by them and subject to exposure, when doses are above the limits prescribed to members of public
Luxembourg	Yes, but no training specifications are given in national legislation	Yes, national legislation defines responsible person for exploitation but gives no training specifications	Yes, art. 6.3.4 RGD 14.12.2000
Malta	Yes, definition of QE in our legislation: “qualified expert” means a person having the knowledge and training needed to carry out physical, technical or radiochemical tests enabling doses to be assessed, and to give advice in order to ensure effective protection of individuals and the correct operation of protective equipment, and whose capacity to act as a qualified expert is recognized by the Board. A qualified expert may be assigned the technical responsibility for the tasks of radiation protection of workers and members of the public"	Yes, The legal text where RPO is mentioned is: (4) A radiation employer shall – a) appoint one or more suitable radiation protection supervisors for the purpose of securing compliance with these Regulations in respect of work carried out in any area made subject to local rules pursuant to paragraph (1); and	Yes, The legal text in regulation is: Every radiation employer shall ensure that exposed workers, apprentices and students who, in the course of their work or studies are obliged to use sources, are given suitable and sufficient information, instruction and training on: (a) the health risks involved in their work including:

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		b) set down in the local rules the names of such individuals so appointed.	the general radiation protection procedures and precautions to be taken and, in particular, those involved with operational and working conditions in respect of both the practice or work activity in general and each type of work station or job to which they may be assigned, and, (ii) the importance of complying with the technical, medical and administrative requirements;
Norway	There is a general requirement for an RPO, and for some sectors the RPO is required to have academic qualifications. In addition there is requirements for an Qualified Expert acording to the EU-patient directive- There is no explicit reference to an RPE in our legislation	Yes, from the Radiation Protection Regulations Section 8 Requirements on the radiation protection officer Undertakings which apply or install ionising radiation sources, except radiation sources and areas of use mentioned in the annex, shall designate one or more persons who shall be able to: a) Use measuring equipment and evaluate the measurement results. b) Guide the employees in the safe use of the radiation sources and	Yes, From the radiation protection regulations: Section 7 Competence, instructions and procedures Undertakings shall ensure that employees and other associated persons who install or work with radiation sources, or who may be exposed to radiation, shall have sufficient competence in the field of radiation protection and safe use of radiation sources and measuring and protective equipment. The undertaking shall prepare instructions and work procedures in writing which ensure

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		protective and measuring equipment. The same applies to undertakings which apply or install UVC sources, class 4 laser products or other powerful sources of non-ionising radiation which may lead to exceeding of exposure limits stated in existing norms or international guidelines. In the case of particularly extensive use of ionising radiation, the radiation protection officer must be able to carry out or have others carry out physical, technical and radiochemical measurements and assessments in order to determine radiation doses, and must also be able to assess health risks and consequences associated with various accident situations which may arise.	proper radiation protection and prevent persons from being exposed to levels which exceed limits stated in applicable standards or international guidelines.
Poland	Yes	Yes, RPO corresponds to nuclear	Yes

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		regulatory inspector (in Poland)	
Portugal	Yes, The legislagion to be prepared preview that the RPE should have the physics course of a University and a education and training with a duration of 300 h in class + 6 months of internship	Yes, The legislagion to be prepared preview that the RPO should be an engineering, physician, medical and a education and training of 100 h in class including 10% of this time dedicated to practical sessions.	Yes, These workwers should have the secundary level studies
Slovenia	Yes: In addition to general provisions on education and work experience for RPE (see C6 and C2) there is an accreditation procedure prescribed by Rules on approving of work organizations, services and approved experts to perform professional tasks in the filed of ionising radiation (OJ RS, No. 18/2004). Candidate has to submit a written application (including professional references) to the special commission appointed by minister of health. The commission decides case by case	Yes, RPOs have to undergo training described in C1. Legislative basis for both RPOs and RWs is the Act, art. 23. (foundations for protection against radiation) (1) During carrying out of a practice involving radiation, an employer must ensure the following in relation to the protection of exposed workers, probationers and students against radiation (hereinafter: protection against radiation): the training of exposed workers, probationers and students, who use radiation sources or work in monitored and controlled areas, the updating of their knowledge and regular testing of qualifications in relation to the procedures of protection against radiation;	Yes, The same legislative framework applies also for RW. In addition to training in radiation protection education of RW is defined. College degree is required for working with X-ray devices in medicine and secondary school degree is required for workers in medicine (except x-ray), veterinary, industrial radiography, activities with open sources.

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
		(2) The training of exposed workers, probationers and students may be carried out by persons who have obtained an authorisation to perform the work of an approved expert in protection against radiation as described in Article 27 of this Act. The scope of training and syllabus are defined by Rules on the obligations of the person carrying out a radiation practice and person possessing an ionising radiation source (OJ RS, No. 13/2004). In addition Rules define the education of RPOs for separate practice/activities. College degree is prescribed for RPOs in medicine and veterinary, industrial radiography and for activities with open sources that involve higher risk. In other activities/practices RPO have to have secondary school degree. Type of education is prescribed as well.	
Spain	Yes	Yes	yes
Sweden	Yes, SSI FS 2000:1, 2, 3, 4, 6, 7, 8, 9, 11 (http://www.ssi.se/forfattning/eng_forfattlista.html)	No	Yes, SFS 1988:220, SSI FS 2000:1, 2, 3, 4, 7, 8, 9, 10

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is "Yes", please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
Switzerland	Yes, Article 6 and 31 from the RP-Law, Article 18 RP-Ordinance	Yes, Article 11-15 (medical sector),16 (nuclear sector),17 (emergency organisations) RP-Ordinance	Yes, Article 10 RP-Ordinance
The Netherlands	Yes, See Appendix under A and D	Yes, See Appendix under A and D	Yes
UK	Yes, Ionising Radiations Regulations 1999 (IRR99) Reg 14 of IRR99 requires to consult suitable Radiation Protection Advisers (RPA). Within the regulations an RPA is defined as : ".. an individual who, or body which, meets such criteria of competence as may from time to time be specified in writing be specified by the Executive". The criteria of competence referred to are detailed on HSE's Statement on Radiation Protection Advisers, which can be found at - www.hse.gov.uk/radiation/ionising/rpa/statementrpa.htm • Radioactive Substances Act 1993 Employers wishing to hold radioactive materials or to	Yes, Ionising Radiations Regulations 1999 Regulations 17(4) of IRR99 requires that employers appoint at least one RPO ("RPS" in the UK); RPSs are required to receive appropriate training so that they can fulfil the task adequately. What constitutes adequate training is not strictly defined – it is up to the employer to demonstrate that training provided is appropriate for the circumstances – but some guidance has been provided by the regulator. See www.hse.gov.uk/pubns/irp6.pdf Radioactive Substances Act 1993 Certificates of Registration / Authorisation (see above) include the requirement for competent supervision. In the UK the implementation of the	Yes, Both IRR99 and RSA93 (via the conditions of use etc) require that workers receive information, instruction and training as appropriate.

Country	D1. Within your country is there legislation in place that requires certain persons to be suitably trained and qualified? If the answer to any of the specifications (RPE, RPO, Workers) is “Yes”, please provide brief details, specifying any differences in equirements/qualifications (also per sector when appropriate RPEs	D1. RPOs	D1. Radiation Workers
	accumulate/dispose of radioactive waste may only do so if they hold a Certificate of Registration or Certificate of Authorisation issued by the Regulator (in this case the Environment Agencies). Such certificates specify the conditions under which the employer may keep/dispose of radioactive material; these conditions include a requirement to consult with a “suitable RPA* or other such Qualified Expert$”. * as defined in the previous answer see response to question C8	HASS Directive has resulted in the High Activity Sealed Radioactive Sources and Orphan Sources Regulations 2005. The latter makes provision for changes to the conditional arrangements specified in Certificates of Registration/Authorisation., one aspect of which is the strengthening of roles of those responsible for supervision etc, including more clearly defined training requirements. The relevant guidance is appended.	

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
Austria	Yes	Yes, RPE in medicine have to attend refresher courses.
Belgium	No, There exists a regulatory guidance. Recommendations were formulated by the BVS-ABR working group (see annex 1).	Yes, FANC operates general rules; not literally mentioned in the Royal Decree (see also annex 2)
Bulgaria	Yes, for Nuclear Power Plant and for Medical field	Yes, up to 5 years period
Croatia	No	No
Cyprus	No	However the Authority has this point in mind
Czech Republic	No, There have not been issued any official SONS document with syllabi of requirements for the scope of knowledge and skills of selected pesonnel of different categories and different sectors of work. But when the person enters for examination before appropriate Professional Examining Commission of the SONS she /or he / obtain, in adition to invitation to examination, also the the list of the SONS demands for the appropriate branch (i.e.for appropriate category and sector of the work).	Yes, The authorisations shall be granted for the selected personnel working with sources of ionizing radiation for activities with very significant sources of ionizing radiation for a period of two to eight years, and for the activities for other activities period of one to ten years. For persons with direct responsibility for radiation protection
Denmark	Yes, For RPE, See C12	
Estonia	No	Yes
Finland	Yes, Guide ST 1.8	No
France	Yes, The "RPO" called "Personne compétente en radioprotection" must attend to a short course, including theory and practical works and exercices. Duration and content of this course is defined in the legislation (text of October 25,2005), and depend on the area of activity (medical sector, nuclear sector or non nuclear industry) and on the type of sources. The theoritical module is common and lasts 5 days. The practical module depends on the sector and the type of the sources. For example: in nuclear sector it lasts 5 days, but only 2 days for sealed sources used in non nuclear industry, and 3 days for medical sector using unsealed sources. No OJT is needed to be qualified as "Personne competente en Radioprotection". A short exam is organized at the end of each module.	Yes, The qualification as "Personne competente en radioprotection ("RPO") is limited to 5 years. After that period the person has to attend to a short refresher training and to present a portfolio showing his activities in RP within the past 5 years.
Germany	Yes, see attached paper	Yes, training is to be refreshed every 5 years
Greece	Yes	No
Hungary	Yes, but only for the 3 levels of Radiation Protection Training	Yes, See C11, also RPE status is given for 5 years but the

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
	Courses	requirements for education, training or OJT-activities are not specified
Ireland	Yes, The RPII has issued guidance notes for individuals wishing to act as RPE/RPAs (www.rpii.ie/download/RPA_%20App_form_Guide.pdf) and RPOs (www.rpii.ie/download/RPO%20Role.pdf)	Yes, There is no time limit on persons acting as an RPO. In the case of the RPE/RPA the approval to act as an RPE/RPA will be valid for five years
Italy	Yes, The reference text is : D.Lgs. 230/95 of 17 March 1995 (with following upgrades) "Attuazione delle direttive 89/618/Euratom, 90/641/Euratom, 92/3/Euratom e 96/29/Euratom in materia di radiazioni ionizzanti" (in English: "Implementation of directives 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom in the field of the ionizing radiations") - Here education levels, basic syllabus and OJT are specified for the Qualified Expert (see C.6, C.7 and C.11). Need of information and formation courses is set for the radiation workers	
Latvia	Yes, In form of informative materials about legislation requirements and about documents which should be submitted for certification. Regulatory guidance is going to be a part of quality management system of Radiation Safety Centre.	Yes, According to the Cabinet regulations the recognition of RPE status is limited with 5-year period, but for RPO - with 3-year period. Then status could be prolonged by appropriate Certification Commision.
Lithuania	Yes, RPO Initial training: in objects of I, II, III risk category 270 hours, in object of IV, V risk category 60 hours; refreshing training every 5 years 30 hours. Radiation Workers Initial training and refreshing training every 5 years 30 hours	Yes, RPO mandatory training
Luxembourg	No	No
Malta	The following is part of the text in the guidance for QE approvals 6. Criteria for Qualified Experts The Radiation Protection Board has set the criteria for the different applications on the 3 generic requirements stated below: i. The Training, knowledge and experience of radiation protection listed in “Basic Syllabus for the Qualified Expert” as	No

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
	set out in Annex I of the Commission communication 98/C 133/03 ii. A degree in diagnostic radiography, medicine, or other physical science or a suitable combination of other qualifications and experience. iii. Sufficient work experience directly concerned with radiation protection practice. The specific criteria set for different applications is: 6.1 Diagnostic Radiology • Degree in physical science, diagnostic radiography, medical doctor. • 5 years full time work experience in a radiology department/clinic. • Attendance at radiation protection training course within the past four years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.2 Radiotherapy • Specialist post graduate training in radiotherapy physics to MSc level. • 7 years full time work experience in radiotherapy department. • Attendance overseas in specialist training courses appropriate to the Health Physics in a Radiotherapy 6.3 Nuclear Medicine • Degree in physical science, diagnostic radiography, medical doctor. • 5 years full time work experience in nuclear medicine department. • Attendance at radiation protection training course within the	

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
	past four years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.4 Dentistry • Degree in physical science, diagnostic radiography, registered dentist • 2 years full time work experience in dentistry. • Attendance at radiation protection training course within the past four years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.5 Veterinary Radiography • Degree in physical science, diagnostic radiography, registered vet • 5 years full time work experience in veterinary practice • Attendance at radiation protection training course within the past four years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.6 Non-Destructive Testing • Degree in physical science, independently qualified level II or Level III industrial radiographer • 5 years registered work • Attendance at radiation protection training course within the past five years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.7 Fixed Gauges and fixed screening devices • 2 years full time work experience with equipment	

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
	• Attendance at radiation protection training course within the past five year covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.8 Mobile Gauges and mobile screening devices • Degree in physical science, level II or Level III industrial radiographer • 5 years work experience with mobile equipment • Attendance at radiation protection training course within the past two years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.9 Research with unsealed sources • Degree in physical science, diagnostic radiography • 5 years full time work experience with unsealed sources. • Attendance at radiation protection training course within the past two years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.10 Research with x-ray equipment and sealed sources • Degree in physical science, diagnostic radiography • 5 years full time work experience with sealed/x-ray equipment sources. • Attendance at radiation protection training course within the past two years covering the required topics from: "Basic Syllabus for the Qualified Expert" as set out in Annex I of the Commission communication 98/C 133/03 6.11 Other applications • Criteria to be defined on a case by case bases	

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
	Individuals with other appropriate and equivalent qualifications, work experience and training for any of the above specific applications can be considered on a case by case basis.	
Norway	Yes, Given in a number of guidance documents like industrial radiography, use of open sources, radiation therpy etc. All in Norwegian only.	Yes, Strict requirements only for RPO's within industrial radiography, where we have a formal certification system for operators including RPO's.
Poland	Yes	Yes
Portugal	No	No
Slovenia	Yes, Educational level, syllabus, duration and level of training for RPOs and RWs are defined by Rules on the obligations of the person carrying out a radiation practice and person possessing an ionising radiation source (OJ RS, No. 13/2004). As already mentioned trainings are provided by approved organisations described in C1. See D1 as well	Yes 1) RPE Approval for RPE can be granted for maximal period of 5 years RPNSA (arts. 27,30,49) Approval for occupational health experts is limited by their periodically attendance at approved training course in health surveillance of exposed workers every 3 years.(Rules on health surveillance of exposed workers (OJ RS, No.2/2004), art 24) 2) RPO RPO status is not time limited but they have to pass the exam in radiation protection every 2-5 years (depending on the risk involved in the practice)
Spain	Yes, www.csn.es	Yes
Sweden	Yes, SI FS 2000:6 and in other regulations	Yes, There is no time limit for RPE at Nuclear power plants or in the medical field. In other fields there is a time limit of 5 years.
Switzerland	Yes	No
The Netherlands	Yes, Appendix D	No, not yet

Country	D4. Is regulatory guidance available that specifies the minimum educational level, training (for example, syllabus, the duration and level of training, assessment of trainees), work experience and/or On-the-Job-Training (OJT) and personal attributes that should be demonstrated for the different categories …	D5. If the recognition of RPE or RPO status is time limited in your country, is there legislation in place that specifies the duration and content of the education, training or OJT-activities necessary for keeping the recognition
UK	no	Yes: RPA certification is only valid for 5 years from the date of certification (implicit within the definition of an RPA in IRR99 and specified in HSE's Criteria of Competence). Re-certification is required at the end of that time • no: RPOs (RPSs) are not formally recognised – these are purely internal appointments by the employer. An individual's appointment is not time limited although the employer must be able to demonstrate that training provided remains adequate. Although there is no formal requirement for refresher training, general custom and practice is such that refresher training is advised at intervals not exceeding 5 years.

Country	D6. Is there a system(s) in place for the accreditation of a) training providers?	D6. Is there a system(s) in place for the accreditation of b) training schemes?
Austria	No	
Belgium	No	
Bulgaria	Regulation of the conditions and procedure for acquiring professional qualification and for the procedure for issuing licenses for specialized training and certificates for qualification for use of nuclear energy (Decree of the Council of Ministers № 209, 06 August 2004, promulgated in State Gazette № 74, 2004). The regulation defines the conditions and procedure for acquiring professional qualification for execution of activities in nuclear facilities, and facilities with sources of ionizing radiation, the positions for which qualification is required, the procedure for issuing licenses for specialized training and certificates for qualification, as well as the conditions and procedure for carrying out exams for acquiring qualification	see a)
Croatia	No	
Cyprus	No	
Czech Republic	Accreditation (licence) of training providers is executes by the regulatory body SONS - State Office for Nuclear Safety	The requirements on scope and way of performance of documentation for licence (i.e. for acreditation for professional training of selected personnel of workplaces with ionising radiation sources) are given in the Section 12 of the Decree No.146/1997 Coll. amended by No.315/2002 Coll. The documents submited to SONS shall contain : a) the methodology of lessons, including the procedures for evaluation and analysis of process of training the selected personnel, b) the training programmes determining the scenario of training in respect to the form content, scope, aims and the ways of their achievements, in particular the frame of training and the way of verification of knowledge, findings, skill, habitudes and postures obtained in all individual stages of the process of training.
Denmark	No	
Estonia	Yes, The training provider hat to present to the Minister of the Education and Science the following documents: training scheme, development plan for the training institution, statute	No, the records are maintained by the Ministry of the Education Audited training schemes are presented to the Ministry of the Education and Science in order to get the accreditation. After the

Country	D6. Is there a system(s) in place for the accreditation of a) training providers?	D6. Is there a system(s) in place for the accreditation of b) training schemes?
	of the training institution, proof about the availibility of the trainers/facilties, information about the registration of the institution in the local tax offices. These papers have to be presented to Ministry 7 months before the starting of the training. The answer will be given during 3 months.	accreditation the schemes have to be audited regulary by the experts.
Finland	Yes, See Chapter 3 of Guide ST 1.8 Names of authorised training providers (for RPO competence) is published in the Annual Report on Radiation Practices (see appendix 3 on the attached report of 2004)	See Chapter 3 of Guide ST 1.8
France	Yes, The trainer who will deliver the training and the qualification as "Personne Compétente en radioprotection" must be certified by a certification body : therefore he has to prove his competences both in radiation protection and in pedagogy. He is certified for a period of 5 years	Yes, Two certification bodies are allowed to certify trainers. The Ministry of Work receives the list of certified trainers by these two certifications bodies.
Germany	Yes, Training providers must be recognised by the competent authority. In addition, there is a voluntary quality management system according to the QSK (Qualitätsverbund der Strahlenschutz-Kursstätten, Association of Training Providers to assure the Quality of Radiation Protection Training) in which most of the training providers participate.	Yes, regulatory bodies maintain records
Greece	Yes, GAEC along with the National Universities are responsible for the accreditation of the training providers participating in the Post Graduate Course on Medical and Radiation Physics and in the the Post Graduate Educational Course on "Radiation Protection and the Safety of Radiation Sources".	Yes, as in a)
Hungary	Yes, licensed and recorded by the Office of the Chief Medical Officer	Yes, licensed and recorded by the Office of the Chief Medical Officer
Ireland	No	No
Italy	No	
Latvia	Yes, Training for medical physicists is delivered partially under the frame of the educational programme. The latter is accredited by the Ministry of Education and Science.	Yes, Training for medical physicists is delivered partially under the frame of the educational programme. The latter is accredited by the Ministry of Education and Science
Lithuania	Yes, Compulsory training of the workers and radiation protection officers can implement the nstitutions according to	Yes, Compulsory training is performing according training programmes wich are approved by the Director of Radiation

Country	D6. Is there a system(s) in place for the accreditation of a) training providers?	D6. Is there a system(s) in place for the accreditation of b) training schemes?
	the Classifier of Economical Activity Types – Qualification strengthening (80.42.30).	Protection Centre (RPC - Radiation Protection Regulatory Authority)
Luxembourg	No	
Malta	No	
Norway	Yes, There is a system for accreditation of radiation protection certification of personell within industrial radiography. RPO's and operators within industrial radiography must be certified by an accreditated certification body.	No, The records are primarely maintained by the certification bodies, and not by the regulatory body.
Poland	Yes	Yes
Portugal	No	
Slovenia	Yes a) Approval of training providers is defined by Rules on approving of work organizations, services and approved experts to perform professional tasks in the filed of ionising radiation (OJ RS, No. 18/2004) Approval can be granted only to the institution that employs at least one RPE, has detailed syllabus approved by SRPA (syllabus has to be in agreement with one prescribed by Rules; see D4), and has ISO 9001 certificate for providing training courses.	b) Syllabus and training scheme has to be approved by SRPA
Spain	Yes	Yes
Sweden	No	
Switzerland	Yes, see the Article 9 and Annex of the Ordinance about Education in RP http://www.admin.ch/ch/d/sr/8/814.501.261.de.pdf	Yes, see the Article 9 and Annex of the Ordinance about Education in RP http://www.admin.ch/ch/d/sr/8/814.501.261.de.pdf
The Netherlands	No	
UK	No	

Country	E7. Briefly outline the mechanism for pre-recognition	E8. With respect to E7 it would be helpful if you could answer the following specific questions: 2. Is evidence of practical experience required?	E8. With respect to E7 it would be helpful if you could answer the following specific questions: 3. Is evidence of practical experience on its own sufficient?	E8. With respect to E7 it would be helpful if you could answer the following specific questions: 5. Is evidence on OJT required?
Austria	The RPE has to attend refresher courses.	Yes	Yes	Yes
Belgium	Again, a file is to be submitted to the FANC including proof of work experience at the installation for which the application is valid. Recommendations are given for the introduction of formalities concerning the continuous training by the BVS-ABR.	Yes	No	No
Bulgaria	Formal cource and exam under the Regulation of the conditions and procedure for acquiring professional qualification and for the procedure for issuing licenses for specialized training and certificates for qualification for use of nuclear energy (Decree of the Council of Ministers № 209, 06 August 2004, promulgated in State Gazette № 74, 2004).	Yes	No	Yes
Croatia				
Cyprus				
Czech Republic	The examination before appropriate Professional Examining Commission of the SONS is required.	Yes	Yes	No
Denmark				
Estonia	The same procedure as applying for the	Yes	Yes	No

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	first license. However if there have not been any problems connected to the work of RPE, there might be no test of knowledge. It will be decided case by case by the licensing committee.			
Finland	A licensee presents for approval a person to become a RPE for the practice in question. For granting its approval, the regulatory authority (STUK) checks that the person has the qualifications spesified in Guide ST 1.8.			
France				
Germany	acceptance of the successful completion of refresher courses by the competent authorities	Yes	No	Yes
Greece				
Hungary	documents of the education, training courses, work experience, curriculum vitae, etc. renewal with new application	Yes	No	Yes
Ireland	The RPE/RPA approval scheme was launched in October 2005. The re-recognition mechanism will be developed at a later date			
Italy				
Latvia	RPE is re-recognised by the Radiation Safety and Nuclear Safety Expert Attestation Committee.	Yes	Yes	Yes

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Lithuania				
Luxembourg	Medical Physics Expert: on demand including continuous training, Regulator examination		No	
Malta	Re-Approval Candidates for re-approval to supply documented Continued Professional Development at least six months prior to the expiry date. The Continued Professional Development documentation should include 1 Proven record of work in the related area during the approved period. 2 Attendance to a radiation safety course/training in the related area.	Yes	Yes	No
Norway	-	-	-	-
Poland	Additional exam	Yes	No	No
Portugal				
Slovenia	RPE shall submit the written application to the Expert Commission. Application should include references from five years period, individual and annual reports etc.	Yes	No	No
Spain		Yes	No	Yes
Sweden	Renewal of the assessment	Yes	No	No

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Switzerland				
The Netherlands				
UK	RPA 2000 have a well-documented scheme for re certification. Full details can be found at www.srp-uk.org/rpa2000/rcs.doc	Yes	No	No