

The qualified expert: competences, training and experience requirements

*M. Coeck⁽¹⁾, J. Delhove⁽²⁾, L. de Thibault de Boesinghe⁽³⁾, H. Drymael⁽⁴⁾, H. Janssens⁽⁵⁾,
P. Kockerols⁽⁶⁾, K. Persyn⁽²⁾, P. Smeesters⁽⁷⁾, M. Sonck⁽⁴⁾, J. Van Cauteren⁽²⁾, H. Vanmarcke⁽¹⁾*

⁽¹⁾SCK•CEN, Mol, Belgium

⁽²⁾AV Controlatom, Vilvoorde, Belgium

⁽³⁾Universiteit Gent, Gent, Belgium

⁽⁴⁾Association Vinçotte Nuclear, Brussel, Belgium

⁽⁵⁾XIOS Hogeschool Limburg, Diepenbeek, Belgium

⁽⁶⁾EC-Joint Research Centre-IRMM, Geel, Belgium

⁽⁷⁾Federal Agency for Nuclear Control, Brussel, Belgium

Abstract

The Belgian Society for Radiation Protection (BVS.ABR) has set up a working group in an attempt to clarify and to formalise the requirements for the recognition of qualified experts in Belgium. The working group has made a review of the competences of the qualified expert, as defined in the Belgian regulation, and has discussed possible alternatives related to the initial training, the experience and the continuous refreshment of the knowledge. A report was issued in 2004, making the synthesis of the discussions and presenting recommendations for the Belgian Authorities.

The paper presents the conclusions of these investigations. On the basis of this Belgian framework, considerations and suggestions are also made in the perspective of a better harmonisation of the competences and the related requirements at a European level.

1. Introduction

In 2003-2004 the Belgian Society for Radiation Protection (BVSABR) has set up a working group in order to clarify and to formalise the requirements for the recognition of qualified experts in Belgium.

The main incentive for taking this initiative was the ambiguity of the current regulatory framework that led to regular discussions and differences in the interpretation, as regularly experienced by members of the Society. The Society had also received from the Belgian Authorities (Federal Agency for Nuclear Control) a request to make a proposal for guidelines regarding the additional (continuous) training of experts once they are qualified.

As a result of its discussions and investigations, the working group issued a report (ref.[1]) with recommendations and suggestions that could clarify the requirements and allow a more uniform approach for the assessment of qualified experts.

The synthesis of the report of the working group presented in this paper will address:

- the competence of the qualified expert, i.e. the fields for which he is empowered;
- the basic (initial) training requirements;
- the experience requirements;
- the additional (continuous) training requirements.

The report was transmitted to the authorities and the recommendations will be considered in the revision of the regulation (ref.[2]).

A supplementary value of the work is that some of the suggestions could be put in a broader European perspective. They give some ideas or elements that could help in the discussion about the harmonisation of the requirements regarding qualified experts. This point will be addressed in the conclusion at the end of the paper.

2. Competences of the qualified expert

Before commenting in the next chapters about the skills of the qualified expert, based on his training and experience, it is useful to outline first his 'field of competences', i.e. the areas for which he is

empowered. This seems to be important, as the field of competences of qualified experts is not always straightforward, it is not understood in the same way in the different countries of the European Union, and it has even known an evolution in the recent Belgian regulation.

Basically the management of the radiation protection can be divided into two areas:

- the '*occupational radiation protection*', which covers the surveillance of the external and internal exposures on the workplace and the ALARA measures taken to reduce these exposures. The usual ICRP-terminology speaks about the 'protection of the *worker*';
- the '*environmental radiation protection*' or the radiological surveillance of the releases and waste streams and the measures taken to avoid that radioactive material could be lost from the 'controlled circuits'. This area stays in ICRP-terminology for the 'protection of the *public*'; the more recent ICRP approaches tend to extend this to the protection to the whole environment, including the assessment of impacts on animals and plants.

Although it is a usual practice that these two management areas are grouped within one service and thus belong to the competence of the qualified expert, the rule is not general and it happens in some countries that both competence areas are split over two different services. The European Directive 96/29/Euratom (ref.[3]) does not exclude this, providing qualified experts are concerned in the discharge of the duties.

Besides radiation protection, '*nuclear safety*' should also be considered as a closely related field of interest. Under nuclear safety is understood: the technical and organisational measures taken in order to prevent nuclear accidents or in order to mitigate its consequences.

Indeed, the measures taken for ensuring reactor safety, criticality safety, safety of the installations, ... pursue also the protection of the workers and of the public against the radiation hazards. For that reason it could be questioned if the surveillance of these measures could not also belong to the competence of a same expert. The early Belgian nuclear regulations were established in this way: on principle an expert will be qualified for both radiation protection and nuclear safety issues. The surveillance is assured by a common service, the 'health physics service'.

This integration of radiation protection and nuclear safety is in line with a more recent trend that is also pursued by the European Commission (ref.[5]). It seems to be advantageous as it is a guarantee for a coherent management. The question is nevertheless if the person leading the common service should have a qualified expertise in both radiation protection and nuclear safety, or if part of this expertise could not be delegated.

It seems also logic that radiation protection and nuclear safety should be further integrated in the broader frame of the general management of '*occupational health and safety*' (OH&S) within a facility, or even wider the management of '*health, safety and protection of the environment*'. Mainly for historical reasons this is not always seen as such: in many facilities there is still a clear separation between the management of radiation protection and nuclear safety issues and the management what is the called 'conventional safety'. This is regrettable, regarding the loss of synergies and the permanent interaction between radiation hazards and 'conventional' hazards on the workplaces. The separation contributes also to the mystification of radiation hazards, as they tend to be considered as 'un-conventional' and thus somewhat 'extra-natural'.

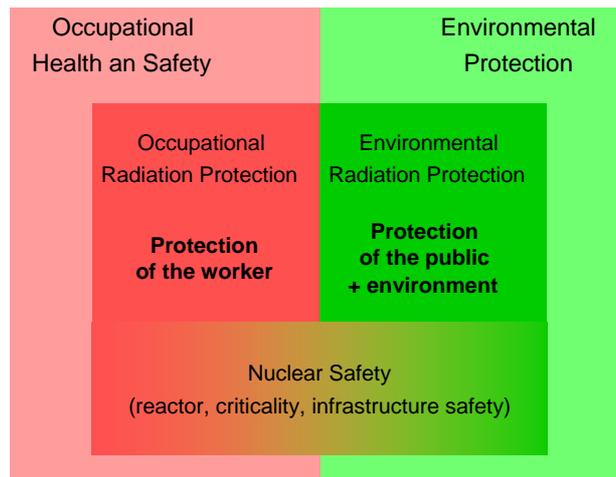


Figure 1 : Overall image of the health, safety and protection of the environment issues.

In order to ensure a common and coherent management of OH&S as a whole, the recent Belgian regulation has imposed in 2001 that the head of the 'health physics service' should be the same person as the head of the 'service for prevention and protection at work' (the OH&S service). This could be seen as a step in the good direction, but in practice this leads to organisational problems. The head of the OH&S service has to be enabled as expert in both conventional safety, radiation protection and nuclear safety issues. As the enabling of a new expert should be coupled with thorough training and experience requirements, it becomes very tedious and it necessitates long-term planning for preparing such an 'overall' expert. Only big installations can afford this. Once nominated, the 'rare pearl' ('perle rare' as said in French) is relatively sure of his position as he is difficult to be replaced, but this is not necessarily an advantage in our society where flexibility is an asset.

The working group concludes that it is indeed wishful that radiation protection and nuclear safety are integrated in the common management system of the occupational health and safety. There must be a common policy, a common steering and objectives and actions that are balanced depending on the overall risk level. But it should be possible to delegate the expertises, depending on the specificities of the installation. The OH&S service should be able to delegate the expertise in radiation protection and in nuclear safety to specific experts that are qualified in this field.

This point of view is in line with the current general safety regulation that describes the organisation of the 'internal service for prevention and protection' (ref. [6]) and allows that the head of the service relies on other expertises in specific domains. In major installations or in installations where the specific risk is significant, the expert will be a staff member of the OH&S service. In other cases the support can come from an 'external service for prevention and protection' or in specific domains from an external expert.

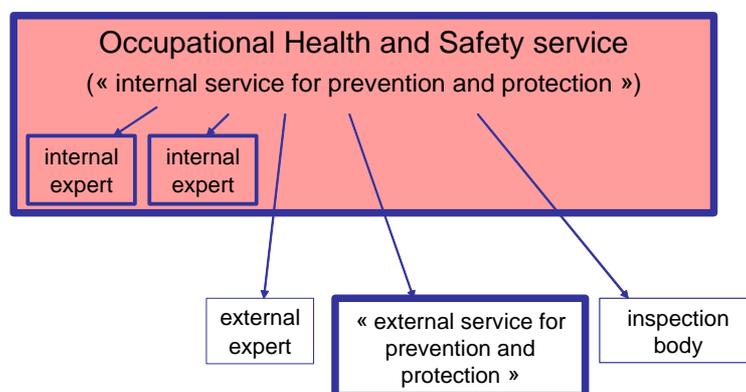


Figure 2 : Principle of the delegation of the expertise according to the current safety regulation

3. Basic training requirements

In the current Belgian regulatory framework, the candidate expert for a 'health physics service' must demonstrate that he has acquired enough basic knowledge in radiation protection and in nuclear safety.

The required knowledge in nuclear safety will be linked to the type of installation. It will be an important issue for the major nuclear installations (the 'class 1' installations in the regulation terminology): e.g. in fuel fabrication plants the criticality safety will be a major aspect, for nuclear reactors the focus will also go on reactor safety, etc... In smaller nuclear installations ('class 2' installations) nuclear safety issues are less complex but may not be forgotten.

On the other hand the knowledge in radiation protection has a more 'generic' character, although here also some specificity exists.

Taking this into consideration, it can be stated that for the recognition as expert for the 'health physics' service following specific training requirements can be expected:

- (a) a training in radiation protection, that could be generic and cover different subjects, with a minimal duration of 120 h as already prescribed (ref.[2], ref.[4], ref.[8]) ;
- (b) a training in nuclear safety that will depend on the type of installation.

When assessing the application file of a candidate expert and the basic training that he has followed, the existing training programs in Belgium must be taken into consideration. It must be observed that most of the trainings at universities or at high schools are either focussed on nuclear physics, either on radiation protection, either on nuclear safety issues. Especially for class 1 installations only one single training programme was found covering both (a) and (b). In many cases it would therefore not be very pragmatic to ask each candidate expert to restart a heavy full-scope training cycle, independently of the courses he has already followed. This would lead to several unnecessary overlaps.

Therefore the working group suggests that in the evaluation of the application files and the fulfilment of the basic training requirements as stated above, not only the initial training at the university or the high school should be taken into consideration, but also the complementary project works, facultative courses and other training courses in Belgium or abroad. A condition is that these works or trainings should have been concluded by an evaluation by a jury or by a knowledge test.

The working group proposes also that a kind of formalism should be introduced on how the fulfilment of the basic training requirements should be presented, in order to allow a clear and uniform evaluation of the application file by the Authorities.

4. Experience requirements

The demonstration of a sufficient level of professional experience should be an important aspect taken into account for the recognition, at least at the same level of importance as the basic training. It is therefore quite astonishing that, while there is a lot of attention on training requirements, experience is only vaguely addressed in the current Belgian regulation. The European Directive (ref. [3]) and the linked Communication for the implementation (ref. [4]) are also very discreet on this topic.

As the experience should be a fundamental requirement for any recognition of experts, the working group found it necessary that this point would be more explicitly addressed and quantified, either in the regulatory framework, either in an accompanying guideline from the Authorities. It is proposed to define a minimum professional experience of 3 years for the 'class 1' installations (nuclear reactors, fuel plants, waste processing plants, ...) and of 1 year for 'class 2' installations.

5. Additional (continuous) training

For many professions, various systems have been established in order to assess as objectively as possible the level of the additional continuous training that has been followed during job practice. In general, the assessment systems belong to one of the following categories:

- the allocation of 'points', dependent on the training that was followed ;
- the organisation of refresher courses, followed by an exam ;
- the assessment based on an application file.

The systems based on the allocation of points are widely applied within the medical sector. The method has the advantage to allow a pure quantitative appraisal, which should be the best guarantee for objectivity. The system gives also the ability for a rapid treatment of the applications, as principally only the scoring has to be assessed.

It is nevertheless well-known that the systems have a major inconvenience: in frequent cases the necessity for 'scoring' is a major motivation for attending trainings, the content and the added value of the training being subordinate. It must be noted in addition that a pure quantitative assessment that can be quickly processed is not an absolute necessity for qualified experts in the nuclear sector, as the number of files (certainly in Belgium) is rather limited and the appraisal is anyway made by a committee set up for a quantitative but also qualitative assessment.

An alternative system is the organisation of official refresher courses, which will be concluded by an exam. This approach is e.g. followed in Germany for the prolongation of the recognition of the 'Strahlungschutzbeauftragte' (ref.[7]).

The system is also criticised, as it is in practice very difficult to establish refresher courses that are enough focussed on the real necessities of the experts in the various fields of their activities. The system that is developed in Germany with different type of courses depending on various types of installations is not sustainable in a small country as Belgium.

For these reasons, the working group believes that the current system applied in Belgium for qualified experts that requires a periodic introduction of an application file (in most cases every six years), should be maintained. The application file must contain the proves that the expert has undertaken all the necessary steps to update and further improve his expertise. The documentation in the file must allow a quantitative and qualitative appraisal by an independent committee that is set up by the Authorities.

Nevertheless the working group recommends that the current system should be upgraded, by providing guidance on what is expected in terms of:

- minimal time that should be spend on training ;
- contents, subjects to be covered.

Further on the working group suggests that, here also, a kind of formalism is introduced on how the fulfilment of the requirements should be presented, in order to guarantee the uniformity of the assessment.

Concerning the minimal time that should be spend on training, a difference should be made between:

- external training actions like external courses, colloquia, seminar, workshops ;
- internal training initiatives (given or followed training sessions, technical or scientific reports, procedures or publications from which it can be clearly deduced that they have contributed to the continuous improvement of the expert skills).

For radiation protection the minimal time spend should be 120 h over six years for 'class 1' installations and 60 h over six years for 'class 2' installations. At least half of this time should be dedicated to external training actions. But the working group believes that internal training initiatives can also be taken into consideration, they have the advantage to be more specific and focussed on the topics for which the expert should be qualified. If they are taken into consideration, these internal trainings must anyway be proven (be documented).

Concerning the content of the trainings in radiation protection, following domains can be addressed:

- *regulation* (Belgian regulation, European directives, recommendations from international commissions and norms),
- *fundamentals of the radiation protection* (radiobiology, epidemiologic studies, ICRP-methodology),
- *ALARA and prevention in radiation protection* (analysis of exposures, measures for the reduction of the exposures)
- *radiation measurement techniques* (radiation measuring devices, measuring methods, external dosimetry),

- *contamination-risk assessment* (biological analysis, metabolic studies, internal dosimetry, interne and external decontamination techniques)
- *environmental aspects* (characterisation of waste and effluents, releases, impact studies from releases and radiological accidents),
- *social and ethical aspects* (risk perception, communication and consultation, ethical choices, ...).

In order to guarantee the diversity of the training, the working group believes that at least four of these domains should be covered during a normal recognition period of six years. And it can be also opportune that, depending on the necessity, the Authorities prescribe one or more domains or subjects, depending on the circumstances (e.g. a revision of the regulation), on the type of installation or on the individual skills of the expert.

For the nuclear safety training a similar approach could be followed.

It should be noted that, besides the usual regulatory and technical domains, the working group has also taken into consideration the social and ethical aspects, like risk perception, communication of risks, etc. This reflects the growing interest for these issues in the nuclear sector.

6. Conclusion

The debates within the working group of the Belgian Society for Radiation protection have led to a set of recommendations that are explained in this paper. A priority has been given to a pragmatic approach that pursues efficiency, but minimises unnecessary burdens due to a too rigorous 'canvas'.

The conclusions of this reflection can be summarized in the following points:

- the competence over radiation protection and nuclear safety should be seen in the broader frame of the management of the health, safety and environmental issues in general; nevertheless this is not meaning that the expertise should be combined in one single person; delegation to qualified experts in specific areas should remain possible;
- the requirements for the appraisal of the basic and additional continuous training should be better formalised with a clear guidance, but the appraisal should be based on both quantitative as qualitative criteria, with enough flexibility to deal with the specificities of the installation, the background of the expert and varying circumstances in the domains of interest;
- the professional experience of an expert is probably as important as the basic training he received; experience requirements should be more emphasized in the regulatory framework.

As mentioned in the introduction it is worthwhile to notice that some of these considerations could be used as 'input ideas' in the debate about the mutual recognition of qualified experts in the European Union.

For the moment, various systems are in place in Europe for the recognition of qualified experts. Not only the qualification criteria, but even the competence area of the qualified expert is not understood in the same way in the different Member States. It seems therefore unlikely that one could pursue a single and unique approach valuable in all Member States, at least not in a short or medium term. A common uniform system is probably even not wishful, as the differences can sometimes be explained by specificities of the countries, like the organisation structure of the regulatory bodies, etc...

It seems nevertheless feasible that in each country an organism or committee would be appointed to assess, on a case by case basis, candidatures of experts from other countries and to judge them on an equivalence basis. The assessment should be realised in a pragmatic and flexible way. In order to stimulate flexibility the possibility should exist to:

- limit the expertise to a specific area, a specific installation or a specific period of time ;
- base the evaluation of the basic training on a quantitative but also qualitative appraisal and have the possibility to impose additional specific courses in areas of interest, without necessarily imposing a full-scope training programme;
- consider also the experience as an important requirement.

The general working rules of such a assessment bodies should be rather uniform over the Member States and could be mapped out by the European Commission.

References

- [1] Annalen van de Belgische Vereniging voor Stralingsbescherming – Annales de l'Association belge de Radioprotection – Rapport du groupe de travail 'réglementation' à l'Agence Fédérale de Contrôle Nucléaire – Verslag van de werkgroep 'regelgeving' aan het Federaal Agentschap voor Nucleaire Controle – Vol.29, n°2 bis, 2004
- [2] Koninklijk besluit van 20 juli 2001 houdende algemeen reglement op de bescherming van de bevolking, van de werknemers en het leefmilieu tegen het gevaar van de ioniserende stralingen - Arrêté royal du 20 juillet 2001 portant règlement général de la protection de la population, des travailleurs et de l'environnement contre le danger des rayonnements ionisants – 2001
- [3] Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation – OJ L159 Volume 39- 1996
- [4] Communication from the Commission concerning the implementation of Council Directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation – 98/C 133/03 – 1998
- [5] Occupational Radiation Protection in the European Union: Achievements, Opportunities and Challenges – Augustin Janssens, Pascal De Boodt – IRPA 11 – 2004
- [6] Koninklijk besluit van 27 maart 1998 betreffende de Interne Dienst voor preventie en bescherming op het Werk - Arrêté royal du 27 mars 1998 relatif au Service Interne pour la Prévention et la Protection au Travail - 1998
- [7] RdSchr.v.17.9.82 – Durchführung der Strahlenschutzverordnung ; Richtlinie über die Fachkunde im Strahlenschutz – 1982
- [8] Advies van de Belgische Vereniging voor Stralingsbescherming BVS betreffende de kwalificatie van de bevoegde deskundige in stralingsbescherming – Avis de l'Association belge de Radioprotection ABR concernant la qualification de l'expert comptant en radioprotection – 1998

Corresponding Author:

Pierre Kockerols
European Commission
Joint Research Centre
Retieseweg 111
B-2440 Geel
Belgium
T: +32 14 571278
F: +32 14 584273
e-mail: pierre.kockerols@cec.eu.int