Education and training of radiation protection experts

Gezondheidsraad
Health Council of the Netherlands

To the Minister of Social Affairs and Employment

Subject : Presentation advisory report ‘Education and training of radiation protection experts’
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Dear Minister,

What is the role of specially trained experts in the protection of workers against radiation? This question was posed by your predecessor to the Health Council of the Netherlands. I am pleased to herewith present you with the advisory report 'Education and training of radiation protection experts', that answers this question. The report has been drafted by one of the Health Council's permanent expert groups, the Standing Committee on Radiation and Health. In accordance with the request for advice I have presented this report today also to the Minister of Health, Welfare and Sport and to the Minister of Housing, Spatial Planning and the Environment.

The report gives recommendations for a reform of the system of training courses. The most important change is that a distinction is made between training for radiation protection expertise and training for knowledge in the area of radiation protection. Those who have completed training for radiation protection expertise can be registered as 'expert' as defined in the Decree on Radiation Protection. These persons are also responsible for protection measures in companies or institutions. The training for knowledge in the area of radiation protection is meant for professionals that handle equipment that emits ionising radiation.

It is the expectation that the proposed modifications will result in a more uniform and transparant educational system. Therefore I trust that this advisory report will provide a useful contribution to the quality of radiological protection in the Netherlands.

Yours sincerely,
(signed)
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Education and training of radiation protection experts

to:

the Minister of Social Affairs and Employment

the Minister of Health, Welfare and Sport

the Minister of Housing, Spatial Planning and the Environment

No. 2008/06E, The Hague, March 25, 2008

The Health Council of the Netherlands, established in 1902, is an independent scientific advisory body. Its remit is “to advise the government and Parliament on the current level of knowledge with respect to public health issues...” (Section 22, Health Act).

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INAHTA

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Executive summary

It is time for an evaluation of the system for radiation protection training

Exposure to ionising radiation may lead to damaging health effects. That is why individuals who use radioactive materials or equipment that emits ionising radiation, as well as those responsible for supervising them, must receive suitable training on the subject of radiation protection. Dutch legislation in this area is currently being revised as a result of new European directives on radiation protection.

Within the framework of this process, the State Secretary of Social Affairs and Employment asked the Health Council of the Netherlands to advise on the optimal system for training radiation protection experts, the requirements for such a system, and the proficiency requirements for educational curricula and continuing education programmes. The State Secretary also asked whether all persons with a valid certification in radiological protection must be included in the legally required register of radiation experts, or whether a smaller selection of these individuals will suffice. In this advisory report, the Standing Committee on Radiation and Health of the Council (hereafter referred to as 'the Committee') provides answers to these questions.

Different training is required for experts and qualified professionals

The Committee has come to the conclusion that the current educational and training system includes a number of positive elements that should be maintained. However, it is important to record the responsibilities and related educational requirements for each function more clearly than is currently the case. To this end, the Committee suggests differentiating between two groups of workers:

- radiation protection experts, who are also responsible for radiological protection measures in businesses or institutions, and
- radiological protection-qualified practitioners, capable of working with ionising radiation safely within the limits of their own jobs.

Radiation protection experts have both broad and specific knowledge of this area. They are responsible for the radiation protection of employees and the environment wherever ionising radiation is used within the company or organisation they work for. They are the individuals who qualify for registration as 'experts' as defined by the Decree on Radiation Protection; to this end, the Decree requires inclusion in a registry. As registered experts, they may also act as coordinating and supervising experts.

Radiological protection-qualified practitioners are those individuals who have to deal with one or more specific applications of ionising radiation as part of their job. They have acquired the knowledge required to safely perform certain tasks using sources of ionising radiation or in environments where radiation risks are present, but they are not necessarily considered 'experts' as defined by the Decree on Radiation Protection. However, this is a requirement if they also have supervisory tasks in the field of radiological protection or work independently. In such cases, they must have been trained as radiation protection experts.

Reform of the training system is necessary to accomodate the new classification

The Committee recommends modifying the current education and training system. The Committee suggests two levels of education for radiation protection experts, comparable to the current level 3 and 2 training, to be named 'Basic Radiation Protection Expert' and 'Top Radiation Protection Expert'. These courses should provide a general, broad education in radiological protection.

The ‘Basic’ training is modelled on the level 3 training, but without the link to working in a C-laboratory*; the training provides a sufficient basis for working as a radiation protection expert, including knowledge of open and closed sources and an understanding of organisational, procedural and administrative aspects.

The ‘Top’ training is the current level 2 training, a deeper and broader education than the ‘Basic’ curriculum.

Clearly defined criteria must apply to the level and content of the training. The Committee recommends that these educational objectives be determined by the Board of Experts on Radiation Expert Registration once this Board has been formally established and to secure this task for the Board. Additionally, the Committee recommends legislating that educational objectives must include organisational, procedural and administrative aspects.

Regarding radiological protection-qualified practitioners, a differentiation should be made between general and specific training. The Committee suggests naming the general training courses ‘Basic Radiological Protection’ and ‘Advanced Radiological Protection’. These courses can be modelled on the current level 5 and 4 training. The Committee also recommends further differentiation into ‘A’ (only knowledge of closed sources of radioactivity) and ‘B’courses (knowledge of open and closed sources).

It is desirable that certain professions are not given a general training course, but one tailored to the profession. The Committee proposes to create such courses named ‘Radiological Protection for (the profession in question)’. These courses should, where necessary, become an integral part of vocational education curricula.

These courses must also meet clearly defined criteria for level and content. The Committee recommends that the educational objectives for the general training courses be determined by the Board of Experts on Radiation Expert Registration and to secure this task for the Board. The educational objectives for these courses only need to include limited organisational, procedural and administrative aspects, that are tailored to practice.

Regarding profession-specific training courses in radiological protection, the Committee recommends including the educational objectives at the national level in the vocational education curricula, in consultation with radiation protection experts. These practical vocational courses in radiological protection do not

* A C-laboratory is a laboratory where working with open radioactive sources is permitted and that is categorised as class C, the lightest of three classes, based on a 1962 advisory report by the Health Council. In the ‘Guidelines for accreditation of training regarding radioactive materials and appliances of 20 November 1984’, the level 3 training is specifically focused on expertise relating to working with open radioactive materials in a C-laboratory.

need to include organisational, procedural or administrative aspects, with the exception of courses for professions wherein one may bear the responsibility for complying with licensing demands.

Continuing education programmes also need to be arranged by type of training

The Committee recommends periodical re-registration of registered radiation protection experts. By making continuing education programmes mandatory for re-registration, it is secured that knowledge is kept up to date. The nature of this further training depends on the level of expertise, and could be (also) organised by the Netherlands Society for Radiological Protection.

Continuing education for radiological protection-qualified practitioners should be organised by the professional societies. Additionally, where applicable, it is the responsibility of the license holder to ensure adequate and sufficient continuing education.

For groups of medical radiological protection-qualified practitioners that must be registered in accordance with the Individual Health Care Professions Act (BIG Act), the registration and re-registration currently dictated by the BIG Act is not suitable for ensuring proficiency, because it does not ask about continuing education. The BIG Act does leave room for this possibility. The Committee recommends modifying the requirements for re-registration in accordance with the BIG Act so as to include sufficient continuing education as a condition for re-registration. Additionally, quality visitation within medical professions may play an important controlling role, as may inspections by the Netherlands Health Care Inspectorate.

The scientific expertise declines

The Committee draws special attention to the decline in scientific expertise in the field of radiological protection. Sufficient numbers of qualified trainers are required for solid educational and training programmes.

Chapter 1

Introduction

1.1 Background

The regulations governing protection against ionising radiation have traditionally been based on the principle that those who use radioactive substances or equipment that emits ionising radiation, as well as those who supervise such sources and activities on behalf of the employer, must have received adequate training in the field of radiological protection.

To this end, a system of accredited courses was developed in the past in the Netherlands. This has been embedded in the regulatory structure and plays a crucial role in the daily practice of radiological protection in the Netherlands. A certificate from an accredited school at the required level is seen as evidence that one meets the requirements for expert status.

In order to meet changing demands of European directives and keeping in mind the desire for international harmonisation of recognition of experts in the field of radiological protection, a system of individual registration was created within the Decree on Radiation Protection[1]. This is primarily destined for experts who, based on this Decree and by means of licenses based thereon, have specific tasks and authorities for the coordination of radiological protection at licensed locations as well as the associated practical supervision.

Within the framework of this reform, the system of qualifications is undergoing critical evaluation. The question here is how best to assure the continued availability of the required expertise, both among registered radiation protection

experts and among those who must meet specific expertise requirements in the area of dealing with and protection against ionising radiation within their profession.

1.2 The current system

The Netherlands has a system of accredited courses in the field of radiological protection, at various levels, based on recommendations made by the Health Council.[2] According to the guidelines for accreditation of these courses[3] there are five levels, with the knowledge and experience required for a higher level automatically including all knowledge required for the levels below. These levels may be summarised as follows:

- Level 5 is the ‘lightest’, and covers use of x-ray equipment and low-risk radioactive sources.
- Level 4 covers the use of x-ray equipment and radioactive sources and other radiation emitting equipment, insofar as they entail a moderate risk. Levels 4 and 5 are subdivided into A and B courses. The A diploma does not require knowledge of working with open radioactive substances while the B diploma does.
- Level 3, according to the guidelines, is specifically focused on the use of open radioactive substances in a so-called C-laboratory.
- Level 2 covers significantly more expertise than required for level 3.
- Level 1 is focused on expertise in the field on an internationally accredited level, but was never implemented in practice.

This system of accredited courses meets the objective of ensuring suitable training and education for individuals in charge of management or supervision in the field of radiation protection. In practice, these individuals are referred to as ‘expert of level x’ or ‘level x expert’.

Additionally, this educational system also plays a crucial role within various professions that have specific expertise requirements when it comes to radiation protection. This primarily concerns professions in the medical sector. The Individual Health Care Professions Act (BIG Act)[4] dictates that specific actions may only be performed by those who are both competent and authorised. Medical interventions with ionising radiation fall into the category of ‘reserved actions’. Based on the Decree on Radiation Protection and the BIG Act, individuals who perform such actions must have suitable expertise in the field of radiological protection. This has lead to the creation of radiological protection courses specifically designed for physicians, in part following a Health Council

recommendation on the subject (the so-called 3M, 4M and 5M courses).[5] Additionally, accredited courses at various levels have been integrated in vocational training for some professions, for example dentists (level 5), clinical physicists (level 3), radiology technicians and nuclear medicine workers (level 4).

In order to underline the broad function of this system of accredited courses, it is also important to note that level 5 courses in particular are widely used for the necessary training of professionally exposed workers who are classified as category A workers according to the Decree on Radiation Protection. It is very common practice in the Netherlands to only give workers permission to perform radiological tasks with significant associated risks if they have completed at least a level 5 course.

1.3 KOAD reports

The Ministry of Social Affairs and Employment commissioned KOAD Consultancy to draft two reports on this subject. The first report describes a study of the changes to the educational objectives deemed necessary for the training courses for radiation experts.[6] The second report contains suggestions for decreasing the administrative load associated with the registration of radiation experts.[7]

The following proposals are made in the KOAD reports:

- Reduce the number of training levels to high (currently level 2), medium (currently level 3) and low (currently level 5).
- Review the educational objectives for these courses and add the 'OPA' aspects* to them.
- No longer apply level indicators to vocational courses, but formulate educational objectives focused on radiation protection during the performance of the profession. Some OPA aspects need only be included for professionals who do not collaborate with a radiation expert (dentists and veterinarians).
- The registration of experts could be limited to the following experts:
  - General coordinating expert for a complex license.
  - Responsible (coordinating) expert for a collective license, e.g. a hospital.
  - The local coordinating expert for a complex license for a complex organisation, e.g. multiple operating companies under a single licence or with multiple locations.
  - The expert for a single license requiring level 2, 3 or 4.
- Legally define further training requirements for all experts with a 'formal' role.

* Information on Organisation, Procedures and Administration.

1.4 Question and Committee

This prompted the State Secretary of Social Affairs and Employment to ask the Health Council for its advice regarding updating the educational system and the proposals made by KOAD Consultancy. The questions are:

- Do the courses indeed need to pay more attention than is currently the case to what KOAD calls Organisation Procedures Administrative and legal aspects?
- What advantages and disadvantages does the Health Council believe are associated with the further introduction of courses and expertise requirements focused on certain radiological applications and occupational groups? And how does the Health Council view the relationship of the existing system and requirements to the (currently centralised) approach with various levels of education?
- Does the Council feel it is desirable to modify the current levels within the educational system (levels 2 through 5) in order to improve the current system of radiation protection?
- How does the Council feel about introducing a registration system for a limited group of experts, as suggested in the KOAD report, combined with mandatory continuing education for other experts?

The request for advice also separately asked that the following be examined:

> The study by Abrahamse and Kops* suggests removing the courses aimed at clearly defined professional groups from the level system and organising profession-specific courses instead, such as radiological protection courses for radiologists and radiotherapists (instead of 3M) and a radiological protection course for dentists (instead of 5M). Another option would be to link courses to the applications, as suggested by the Health Council in 1996 in its advisory report 'Requirements for expertise in radiation applications in medicine' in Appendix F. This has the advantage of not requiring each speciality to create its own radiological protection course.
>
> This leads to the question for the Health Council to update its recommendations regarding expertise requirements for patient radiological protection and concisely describe the courses in question as they have done in the past in Appendix G for level 4M.

The complete request for advice is included in Annex A. The advisory report was written by the Standing Committee on Radiation and Health, a permanent Committee of Health Council experts. Because the Standing Committee acted as

* The KOAD researchers.

responsible Committee in this advisory report, it will hereafter be referred to as ‘the Committee’. The members of the Committee are listed in Annex B.

1.5 Reading notes

Chapter 2 maps out legislation and regulations in the field of radiation expertise. Chapter 3 is dedicated to answering the question of how best to structure the educational system. A limited modification can lead to a clarification of tasks and responsibilities. This also leads to requirements for the courses as well as for continuing education. Registration is also discussed.

Chapter 2

Regulations on radiation expertise

2.1 Legislation

2.1.1 European rules: the qualified expert

Dutch legislation in the area of radiological protection is based on Euratom directive 96/29.[8] This directive describes the ‘qualified expert’:

> Persons 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, whose capacity to act as a qualified expert is recognized by the competent authorities. A qualified expert may be assigned the technical responsibility for the tasks of radiological protection of workers and members of the public.

The definition of ‘expert’ in the Decree on Radiation Protection (that is based upon the Nuclear Energy Act), as described in the following section, does not match this definition completely. The Dutch legislation is based on a certain interpretation of the Euratom directive, but a different interpretation is also possible. The Euratom definition of ‘qualified expert’ is currently considered insufficient in radiation protection practice, precisely because it allows multiple interpretations.[9] This has resulted in a wide range of definitions of ‘qualified expert’ in various member states.[10] Internationally, there is therefore a desire for the Euratom definition to be revised in the coming update of the directive.

2.1.2 *The definition of expert in the Decree on Radiation Protection*

According to the Decree on Radiation Protection[1], all actions and tasks performed with ionising radiation must be performed by or under the supervision of an 'expert'. The Decree defines an 'expert' as follows:

A person who is, based on the involved task, registered as an expert in a registry as defined in Article 7, second paragraph.

Inclusion in a registry therefore determines expert status. Article 7, second paragraph, states that this registry is created by the government:

The tasks to be performed by an expert pursuant to this decree may only be performed by a person who is registered as an expert for the performance of the tasks involved in a registry to be identified by one of Our Ministers.

The fourth paragraph of Article 7 outlines the expertise requirements for registration in such a registry:

Requirements are set by Ministerial decree regarding skills and qualifications that must be met in order to be registered as an expert in a registry as defined in the second paragraph. The requirements set may be different for different tasks.

In Article 9, paragraph 2, expertise is also linked to actions:

By Ministerial decree, a certain degree of expertise may be required for certain actions.

Further specification of what expertise is required for which tasks (or actions) is not described in the Decree on Radiation Protection. A Ministerial decree to this end has yet to be drafted. The 'Regulation on Administrative and Organisational Measures for Radiation Protection'[11] does, however, describe tasks and responsibilities for two specific functions:

coordinating expert: expert as defined in Article 9, first paragraph, of the decree, who ensures – on behalf of the entrepreneur – that tasks take place within the framework of the regulations and who also coordinates the actions of the supervising experts;

supervising expert: expert as defined in Article 9, first paragraph, of the decree, who performs an action or task, or under whose supervision an action or task is performed.

Additionally, a 'radiation protection unit' is identified in this Regulation:

radiation protection unit: a radiation protection unit as defined in Article 12 of the decree.

Where paragraph 1 of the article in question reads:

By Ministerial decree, entrepreneurs, types of enterprises or locations are identified, in which a radiation protection unit, within which the expert works, is present and sets rules for the tasks, qualifications and working methods of a radiation protection unit.

The objective and tasks of the radiation protection unit are described in the commentary on Article 12 of the Decree on Radiation Protection.

In summary, the Decree on Radiation Protection and the Regulation on Administrative and Organisational Measures for Radiation Protection define a number of issues regarding expertise in the field of radiological protection, but do not set any training requirements for individuals formally recognised as experts.

2.1.3 *Legislation on education*

The regulations governing protection against ionising radiation have traditionally been based on the principle that those who use radioactive substances or equipment that emits ionising radiation, as well as those who supervise such sources, must have followed adequate training in the field of radiological protection. In the Netherlands, a system of courses was developed and embedded in the regulations via the 'Guidelines for accreditation of courses for radioactive substances and equipment experts of 20 November 1984'.[3] These guidelines define a system of accredited training courses at various levels of expertise, based on recommendations by the Health Council[2], as described in section 1.2. The Decree on Radiation Protection also refers to these ministerial guidelines.

2.1.4 *Training courses and the Euratom definition of 'qualified expert'*

In the Netherlands, the tasks assigned to the supervising expert and the radiation protection unit are roughly equivalent to the tasks described in the definition of 'qualified expert' in the Euratom directive 96/29.[8] Only those persons with a

diploma from an accredited course in radiological protection at level 2 or 3 have the expertise required to perform these tasks independently. Individuals who have obtained a diploma in radiological protection at levels 4 or 5 do not meet the Euratom directive's requirements for 'qualified expert', as they cannot 'carry out physical, technical or radiochemical tests enabling doses to be assessed'.

2.1.5 *Transitional rules*

Before the Decree on Radiation Protection came into force, experts were recognised as such if they had obtained a qualification from an accredited course on radiological protection.[11] As previously indicated, requirements will be set that must be met according to the Decree on Radiation Protection in order to be recognised as a qualified expert (by registration in a registry). As long as this registry and the registration requirements are not in place, current experts will remain recognised as such. To this end, transitional rules have been included in the Decree on Radiation Protection in Article 132, paragraphs 2 and 3:

2. Until a date to be determined by Ministerial decree, an individual possessing a qualification from a training course at those levels described in the Regulation on accredited courses for training experts in radioactive substances and equipment, as this regulation read until the date this decree came into force, and the guideline of 20 November 1984 for accreditation of training courses for radioactive substances and equipment experts, shall be considered an expert registered in a registry as defined in Article 7, second paragraph.

3. Until a date to be determined by Ministerial decree, a training course, accredited as described in the Regulation on accredited courses for training experts in radioactive substances and equipment, as this regulation read until the date this decree came into force, and the guideline of 20 November 1984 for accreditation of training courses for radioactive substances and equipment experts, shall be considered as a training course as defined in the second paragraph.

2.2 Profession-specific regulations

Gaining knowledge in the field of radiological protection is integrated in vocational training for a number of professions in the Netherlands. A number of (para)medical professionals may perform actions with ionising radiation. Based on the Health Care Professions Act (BIG Act) and the Decree on Radiation Protection, expertise in the field of radiological protection is required for this. The (para)medics from a large part of the more than 15,000 individuals in the Nether-

lands who must have formal knowledge of radiological protection for the performance of their duties.

In 1996, the Health Council published the advisory report ‘Requirements for expertise in radiation applications in medicine’.[5] In this report, the levels 5M, 4M and 3M were defined for (para) medics who use ionising radiation for diagnostic or therapeutic purposes. The individuals in questions are doctors (radiologists, radiotherapists, surgeons, cardiologists, pulmonologists, dentists and orthodontists), paramedics (radiology technicians and nuclear medicine workers) and clinical physicists. The expertise requirements proposed by the Health Council for these (para)medics included health and safety and environmental aspects in addition to requirements for patient protection. However, the goal was not to automatically equate these individuals with the ‘experts’ as defined in the Decree on Radiation Protection. Medics and paramedics who have completed a level 4 or 5 course do not meet the definition of ‘qualified expert’ in the Euratom directive.

The Health Council’s recommendations were implemented in licensing requirements, but the training requirements for (para)medics are not legally defined. The educational objectives for a number of vocational courses do include training requirements in the field of radiological protection, however.

Chapter 3

Organization of the educational system

3.1 Bottlenecks in the current system

As indicated in the KOAD reports, the legally defined levels of the training courses do not always correspond to the knowledge required in daily practice. The coordinating experts, in charge of coordinating radiological protection for collective and complex licenses, for example, meet the legal requirements. However, no suitable educational objectives have been formulated for the training courses regarding organisation, procedures and administration, aspects that are also important when performing coordinating tasks.

On the other hand, those who work with ionising radiation as part of their professions but bear no responsibility for coordinating radiological protection basically receive adequate training, but do not always meet all legal requirements. An example is the training (at level 5A) of dentists. This course rightly does not pay any attention to encapsulated sources of radioactive substances, but this formally means that the legal requirements for expertise at level 5A are not met. This also applies to other (para)medics who work with ionising radiation: radiologists, surgeons, cardiologists, pulmonologists, dermatologists, nuclear medicine physicians, radiology technicians and nuclear medicine workers. A similar situation exists in the industry, albeit on a smaller scale, for example in non-destructive research, among laboratory workers and in road construction.

In his request for advice, the State Secretary also indicates there is a lack of continuing education. The recommendation in the 1972 advisory report by the

Health Council[2] to make this mandatory was not followed when the current system of radiation experts was set up. According to the State Secretary, professional groups also did not get continuing education sufficiently going.

Finally, there is the issue of safeguarding expertise. To this end, general registration of everyone who has completed a training in radiological protection could be useful, but also entails high administrative costs.[7]

3.2 Previous proposals for system reform

In order to prepare for coming modifications to the system, the Ministry of Social Affairs and Employment asked KOAD Consultancy to draft two reports.

The first report discusses which educational objectives for radiation expert training courses the researchers consider necessary.[6] These are discussed in section 1.3. The second report includes proposals for decreasing the administrative load associated with registration of radiation experts.[7]

In the opinion of KOAD Consultancy, registration could be limited to the following experts:

- general coordinating expert for a complex license;
- responsible (coordinating) expert for a collective license, e.g. a hospital;
- local coordinating expert of a complex license in a complex organisation;
- the expert for a single license requiring level 2, 3 or 4.

3.3 Health Council recommendations

In the light of the KOAD proposals, what is the Committee's vision on structuring the educational system for radiation experts? What requirements must be met in terms of educational objectives, continuing education and registration? A simple and clear structure for the radiation expertise system and quality assurance are key starting points. What is currently working well must be maintained, but a number of things could be improved. Additionally, certain issues must be arranged differently or more clearly given changing European regulations. The Committee therefore recommends changing the current situation as follows.

3.3.1 Two types of expertise and two groups of workers

In order to clearly distinguish between the various tasks and responsibilities concerning protection against ionising radiation, the Committee makes the distinction between 'radiation protection expertise' and 'knowledge in the area of radiation protection':

- *Radiation protection expertise* includes all knowledge and skill required to work with applications that emit ionising radiation safely and in accordance with all legal regulations, and to bear responsibility for others that carry out such work.
- *Knowledge in the area of radiation protection* includes basic knowledge of health risks of exposure to ionising radiation and more extensive knowledge of working with specific applications. This knowledge is mainly practical in nature.

Various definitions and interpretations of the term ‘expert’ exist when it comes to regulations governing radiological protection. With the objective of clearly answering the questions in the request, the Committee differentiates between two types of experts based on the essential differences in function and tasks.

There are experts who perform advisory and operational tasks on behalf of the license holder, involving coordination of care for radiological protection and associated supervision. These coordinating and supervisory experts are called ‘radiation protection experts’. Provided they are registered, they meet the definition of ‘experts’ from the Decree on Radiation Protection.

Additionally, particularly in the medical sector, there are individuals who must have suitable expertise in the field of radiological protection in order to perform their professions in a responsible fashion, and within that context possibly manage others who work under their responsibility. They are called ‘radiological protection-qualified professionals’ in this advisory report. They do not automatically meet the definition of ‘experts’ from the Decree on Radiation Protection. However, this is a requirement if they also have supervisory tasks in the field of radiological protection or work independently. In such cases, they must have been trained as radiation protection experts.

Radiation protection experts

Radiation protection experts have both broad and specific knowledge of this area. Within their professional practice, they are responsible for the radiological protection of workers and the environment anywhere ionising radiation is used within the company or organisation they work for. This means that they fulfil the tasks of coordinating and supervising expert. If they are included in the registry as defined in the Decree on Radiation Protection (see 3.3.2), they qualify as ‘experts’ as defined in the Decree.

The need for various levels of radiation protection expertise remains, given the different ‘weights’ of various radiological applications and differences between types of licenses.

Education

The Committee recommends modifying the current training system. The Committee proposes two levels of education for radiation protection experts, comparable with current levels 3 and 2. The nomenclature is different, as the objectives have been adjusted (see below). The Committee suggests naming the training courses ‘Basic Radiation Protection Expert’ and ‘Top Radiation Protection Expert’. These training courses should provide a general, broad education in radiological protection.

The ‘Basic’ training is modelled on the level 3 training, but without the link to working in a C-laboratory*; it provides a sufficient basis for working as a radiation protection expert, including knowledge of open and closed sources and an understanding of organisational, procedural and administrative aspects.

The ‘Top’ course is the current level 2 training course, a deeper and broader education than the ‘Basic’ training.

A comparison between the existing and proposed classification is given in Annex C.

Training criteria

Clearly defined criteria must apply regarding the level and contents of the courses. The Committee recommends that these educational objectives be determined by the Board of Experts on Radiation Expert Registration, once this Board has been formally established, and to secure this task for the Board. Additionally, the Committee recommends legislating that those educational objectives must also include organisational, procedural and administrative aspects.

Radiological protection-qualified professionals

Radiological protection-qualified professionals are those individuals who have to deal with one or more specific applications of ionising radiation as part of their

* A C-laboratory is a laboratory where working with open radioactive sources is permitted and that is categorised as class C, the lightest of the three classes, based on a 1962 advisory report by the Health Council. In the ‘Guidelines for accreditation of radioactive materials and appliances degrees of 20 November 1984’, the level 3 course is specifically focused on expertise relating to working with open radioactive substances in a C-laboratory.

profession. Persons who have completed one of the general or specific courses in radiological protection listed below are not ‘experts’ as defined in the Decree on Radiation Protection, but have acquired adequate knowledge enabling them to safely perform certain actions with sources of ionising radiation or in environments with radiation risks.

Position within the company

Radiological protection-qualified professionals may only perform licensed actions with sources of ionising radiation under supervision or responsibility of a qualified radiation protection expert. Individuals who wish to be local supervising experts themselves must obtain a qualification in radiation protection expertise.

Education

The Committee recommends modifying the current training system for this group as well. A differentiation should be made between general and profession-specific training.

The Committee suggests naming the general training courses ‘Basic Radiological Protection’ and ‘Advanced Radiological Protection’. These courses can be modelled on the current level 5 and 4 courses. The Committee recommends to differentiate between ‘A’ (only knowledge of closed sources of radioactivity) and ‘B’ courses (knowledge of open and closed sources).

For certain professional groups it is desirable that they receive profession-specific instead of general training.The Committee therefore proposes to create such courses named ‘Radiological protection for (the profession in question)’. Where necessary, these courses should be integrated in vocational training and may be modelled on existing courses, such as the 3M and 4A/M courses.

A comparison between the existing and proposed classification is given in Annex C.

Training criteria

These courses must also meet clearly defined criteria for level and contents.

The Committee recommends that the educational objectives for the general training courses be determined by the Board of Experts on Radiation Expert Registration and to secure this task for the Board. The educational objectives for

these courses only need to include limited organisational, procedural and administrative aspects that are tailored to practice.

Regarding profession-specific training courses in radiological protection, the Committee recommends that the educational objectives be included at the national level by the professional societies, in consultation with radiation protection experts, in the educational objectives of the vocational training. These practical vocational courses in radiological protection do not need to include organisational, procedural or administrative aspects, with the exception of courses for professions in which one may bear the responsibility for complying with licensing demands. In table 1 of the report 'Guidelines on education and training in radiation protection for medical exposures' by the European Commission, specific educational objectives are recommended for various medical professions.[12] The Committee recommends using these as starting points when defining educational objectives.

3.3.2 *Registration: only for radiation protection experts*

To qualify as an 'expert' according to the Decree on Radiation Protection, the Decree requires registration. According to the Committee, this possibility is only available to the 'radiation protection experts'. Because of the link to mandatory continuing education, registration may contribute to the required quality assurance.

3.3.3 *Make continuing education mandatory*

The Committee recommends periodical re-registration of registered radiation protection experts. Continuing education should be linked to this re-registration. The nature of this continuing education depends on the level of expertise, and could be (also) organised by the Netherlands Society for Radiological Protection.

Continuing education for radiological protection-qualified professionals should be organised by the professional societies. Additionally, where applicable, it is the responsibility of the license holder to ensure adequate and sufficient continuing education. For several groups of medical radiological protection-qualified professionals it is mandatory that they are included in the BIG registry in order to perform actions with ionising radiation on patients. The registration and re-registration currently dictated by the BIG Act are not suitable for controlling proficiency in current practice, because it does not ask about continuing education. The BIG Act does leave room for this possibility, however. The Committee recommends modifying the requirements for re-registration in accordance

with the BIG Act so as to include sufficient continuing education as a condition. Additionally, quality visitation within medical professions may play an important controlling role, as may inspection by the Netherlands Health Care Inspectorate.

3.3.4 *Decline in scientific expertise*

Finally, the Committee would like to draw special attention to an important problem: the decline of scientific expertise in the field of radiation protection. Sufficient numbers of qualified trainers are required for solid education and training programmes. This problem has also been put on the European agenda.[9]

References

1 Besluit van 16 juli 2001, houdende vaststelling van het Besluit stralingsbescherming. (Decree of 16 July 2001, regarding determination of the Decree on Radiation Protection.) Staatsblad, 2001; 397 (in Dutch).

2 Health Council of the Netherlands. Deskundigheidseisen veilig werken met stralingsbronnen. (Expertise requirements for safe handling of radiation sources.) The Hague: Health Council of the Netherlands, 1972; publication 1972/12 (in Dutch).

3 Richtlijn voor de erkenning van opleiding deskundigen radioactieve stoffen en toestellen. (Directive for the accreditation of courses for the training of radioactive substances and equipment experts.) Staatscourant, 1984; 227(20 November 1984) (in Dutch).

4 Wet van 25 mei 1993, houdende regelen inzake beroepen op het gebied van de individuele gezondheidszorg (Wet op de beroepen in de individuele gezondheidszorg). (Act of 25 May 1993, regulating occupations in individual health care (Act on Occupations in Individual Health Care).) Staatsblad, 1993; 655 (25 May 1993) (in Dutch).

5 Health Council of the Netherlands. Deskundigheidseisen voor medische stralingstoepassingen. (Requirements for expertise in radiation applications in medicine.) The Hague: Health Council of the Netherlands, 1996; publication 1996/04 (in Dutch).

6 Abrahamse, JC and Kops, JAMM. Eindrapport van het in opdracht van het Ministerie van Sociale Zaken en Werkgelegenheid (SZW) uitgevoerde onderzoek naar nodige vernieuwing van de eindtermen van de opleidingen voor stralingsdeskundigen. (Final report of the study commissioned by the Ministry of Social Affairs and Employment into the necessary renewal of educational objectives for radiation expert training programmes.) 2003; KOAD 03-01 (in Dutch).

7 Abrahamse, JC and Kops, JAMM. Oriëntatie op verminderen administratieve lasten registratie stralingsdeskundigen. (Examining the possibilities for decreasing the administrative load associated with registering radiation experts.) 2004; KOAD 03-06 (in Dutch).

8 Council of the European Union. Council Directive of 13 May 1996 laying down basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation. Official Journal, 1996; L159(29/06/1996): 1-114.

9 European Platform on Training and Education in Radiation Protection. First EUTERP Platform Workshop “Qualifications and Requirements for Recognition of Radiation Protection Experts, Radiation Protection Officers and Radiation Workers”- Summary and Recommendations. 2007.

10 European Commission. The status of the radiation protection expert in the EU member states and applicant countries. Luxembourg: Office for Official Publications of the European Communities, 2003; Radiation protection 133.

11 Regeling administratieve en organisatorische maatregelen stralingsbescherming. (Decree on administrative and organisational measures in radiation protection.) Staatscourant, 2002; 45 (2 March 2002): 18-32 (in Dutch).

12 European Commission. Guidelines on education and training in radiation protection for medical exposures. Radiation Protection 116, 2000. Internet: http://ec.europa.eu/energy/nuclear/radioprotection/publication/doc/116_en.pdf. Consulted on 4-12-2007.

A Request for advice

B The committee

C Overview of training courses existing and new

Annexes

Annex **A**

The request for advice

On 12 November 2004, the President of the Health Council of the Netherlands received the following letter (reference A&G/W&B/2004/72940) from the State Secretary of Social Affairs and Employment:

Also on behalf of the Minister of Health, Welfare and Sport and the State Secretary of Housing, Spatial Planning and the Environment, I request your attention for the following.

The current system of radiation experts is being adjusted. This is necessary because radiation protection practice has developed over the years and the existing system of radiation expertise does not provide sufficient possibilities for addressing these changes.
The most important developments in this context are:

- The legally defined levels of education do not always match the educational objectives needed in daily practice. This applies in particular to:
  - coordinating experts in charge of coordinating radiation protection for joint and complex licenses.
  - professionals who work with radiation but do not bear any coordinating responsibilities. This includes certain medical specialties in particular.
- A lack of continuing education. The recommendation in the 1972 advisory report by the Health Council to make this mandatory was not followed when the current radiation expert system was set up. In general, continuing education did not develop on its own either.

In order to address these gaps, a registration system has been developed over the past years. Gradually, the belief developed that the initially planned size of the group to be registered should be decreased. This would also limit the administrative costs associated with introducing the system.

Over the past year, studies of how the latter objectives can be realised have been performed. The findings of this study are the basis for this advisory request. Two reports were published. The first report describes the levels of radiation expertise to be defined and the associated educational objectives for each. The second report describes the possibilities for minimizing the administrative costs associated with this issue by making the target group smaller.

Based on these study results, I would like to ask you the following questions:

- Do the courses indeed need to pay more attention than is currently the case to what Abrahamse and Kops call ‘O rganisation, P rocedures and A dministrative and legal aspects’?
- What advantages and disadvantages does the Health Council believe are associated with the further introduction of courses focused on certain radiological applications and profession-specific courses? How does the Council view the relation between the requirements per application and the (central) approach as defined by the educational levels?
  The study by Abrahamse and Kops suggests removing the courses aimed at clearly defined professional groups from the level system and organising profession-specific courses instead, such as radiological protection courses for radiologists and radiotherapists (instead of 3M) and a radiological protection course for dentists (instead of 5M). Another option would be to link courses to the applications, as suggested by the Health Council in 1996 in its advisory report ‘Requirements for expertise in radiation applications in medicine’ in Appendix F. This has the advantage of not requiring each speciality to create its own radiological protection course. This leads to the question for the Health Council to update its recommendations regarding expertise requirements for patient radiological protection and concisely describe the courses in question as they have done in the past in Appendix G for level 4M.
- Does the Council feel it is desirable to improve the current national system of radiation protection by modifying the current level system (2 through 5), for example in the way suggested in the report by Abrahamse and Kops? Does the Council have any other suggestions for simplifying the system?
- How does the Council feel about introducing a radiation expert registration system for a limited group of experts, as suggested in the report by Abrahamse and Kops, combined with mandatory continuing education for the other experts?

If you feel that certain topics require additional attention regarding training and assuring radiation expertise, I urge you to provide it. I am not expecting you to submit a detailed curriculum. I feel that is more a task for educators, based in part on your recommendations. I also ask that you take Euro-

pean and Dutch legislation into account as well as the guidelines published based on these regulations.

I look forward to your reply by 1 October 2005 at the latest.

Yours sincerely,
The State Secretary of Social Affairs and Employment,
(signed)
HAL van Hoof

Annex **B**

The committee

This advisory report was written by the Standing Committee on Radiation and Health, consisting of:

- Professor M. de Visser, *chairperson*
  Vice-President of the Health Council of the Netherlands, The Hague
  Professor of neuromuscular diseases, University of Amsterdam
- Dr. L.M. van Aernsbergen, *advisor*
  Physicist, Ministry of Housing, Spatial Planning and the Environment, The Hague
- Professor J.J. Broerse
  Professor emeritus of medical radiation physics, Leiden University Medical Centre
- Dr F.R. de Gruijl
  Biophysicist, Leiden University Medical Centre
- Professor M.G.M. Hunink
  Professor of clinical epidemiology and biostatistics, Erasmus MC Rotterdam
- Chr.J. Huyskens
  Radiation physicist, Eindhoven University of Technology
- Dr A. Keverling Buisman, *advisor*
  Physicist, Schoorl
- Professor A.J. van der Kogel
  Professor of radiobiology, University Medical Centre Nijmegen St Radboud

- Professor J.J.W. Lagendijk
  Professor of clinical physics, University Medical Centre Utrecht
- Professor J.W. Leer
  Professor of radiotherapy, University Medical Centre Nijmegen St Radboud
- Professor P.H.M. Lohman
  Professor emeritus of radiation genetics and chemical mutagenesis, Leiden University
- L.W. Meinders, *advisor*
  Netherlands Health Care Inspectorate, Ministry of Health, Welfare and Sport, The Hague
- Professor D. van Norren
  Professor of ophthalmic physics, Utrecht University
- Professor W.F. Passchier
  Professor of risk analysis, Maastricht University
- Professor T.J.F. Savelkoul
- Professor of medical toxicology and radiation hygiene, Leiden University Medical Centre
- A.M.T.I. Vermeulen, *advisor*
  Ministry of Social Affairs and Employment, The Hague
- Professor L. Verschaeve
  Professor of toxicology, University of Antwerp, Belgium
- Professor A. Vander Vorst
  Emeritus professor of electrical engineering, Louvain la Neuve, Belgium
- Professor A.A. van Zeeland
  Professor of molecular radiation dosimetry and radiation mutagenesis, Leiden University
- Dr. E. van Rongen, *secretary*
  Radiobiologist, Health Council of the Netherlands, The Hague

The Health Council and interests

Members of Health Council Committees are appointed in a personal capacity because of their special expertise in the matters to be addressed. Nonetheless, it is precisely because of this expertise that they may also have interests. This in itself does not necessarily present an obstacle for membership of a Health Council Committee. Transparency regarding possible conflicts of interest is nonetheless important, both for the President and members of a Committee and for the President of the Health Council. On being invited to join a Committee, members are asked to submit a form detailing the functions they hold and any other mate-

rial and immaterial interests which could be relevant for the Committee's work. It is the responsibility of the President of the Health Council to assess whether the interests indicated constitute grounds for non-appointment. An advisorship will then sometimes make it possible to exploit the expertise of the specialist involved. During the establishment meeting the declarations issued are discussed, so that all members of the Committee are aware of each other's possible interests.

Annex **C**

Overview of training courses existing and new

In the following table the general and a (not exhaustive) number of specific training courses are compared for the existing and new situation.

Existing	New		
1	--	--	--
2	Radiation Protection Expert	Top	general
3	Radiation Protection Expert	Basic	general
3/M for radiologists	Radiological Protection	for radiologists	specific
3/M for radiotherapists	Radiological Protection	for radiotherapists	specific
3 for specialists in nuclear medicine	Radiological Protection	for specialists in nuclear medicine	specific
3 for clinical physicists	Radiological Protection	for clinical physicists	specific
4A	Radiological Protection	Advanced A	general
4B	Radiological Protection	Advanced B	general
4A/M basic	Radiological Protection	for (professional group)	specific
4A/M	Radiological Protection	for (professional group)	specific
4 for radiology technicians and nuclear medicine workers	Radiological Protection	for radiology technicians and nuclear medicine workers	specific
5A	Radiological Protection	Basic A	general
5B	Radiological Protection	Basic B	general
5A/M	Radiological Protection	for (professional group)	specific
5 for dentists	Radiological Protection	for dentists	specific

Note: when the educational objectives of certain professsion-specific Radiological Protection training courses are equal to those of a course for Radiation Protection Expert, that profession-specific training course can be considered as a Radiation Protection Expert course. Those who have succesfully completed such course can register as ‘expert’ as defined by the Decree on Radiation Protection.