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# EDUCATION AND TRAINING APPRAISAL IN RADIATION PROTECTION AND SAFETY (EduTA)

## MISSION

**TO**

## GREECE

Athens, Greece

*10 to 14 June 2024*

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

IAEA
Education and Training Appraisal in Radiation Protection and Safety
EduTA

Education and Training Appraisal in Radiation Protection and Safety

EduTA

# REPORT OF THE EDUCATION AND TRAINING APPRAISAL IN RADIATION PROTECTION AND SAFETY IN GREECE

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## EXECUTIVE SUMMARY

In September 2023 the Greek Atomic Energy Commission (EEAE) sent a request to the IAEA Division of Radiation, Transport and Waste Safety to carry out an Education and Training Appraisal in radiation protection and safety (EduTA). Greece already hosted an EduTA mission in 2008, and a follow-up mission in 2015.

The aim of the mission was to appraise the status of national provisions and infrastructure for education and training in radiation protection and safety, to identify possible ways of improvement to meet IAEA safety standards and to effectively address national education and training needs. In particular, the scope of the mission included two core EduTA modules: the legal and regulatory framework for education and training in radiation protection and safety, and the national infrastructure to build competence in line with the national framework.

The EduTA specific module on the Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources (PGEC) was also included. The PGEC has been run in Greece since 2023. The course is funded by IAEA and is open to English-speaking participants from IAEA Member States in the Technical Cooperation region of Europe. A Long-Term Agreement in this area was signed in July 2011 between Greece and the IAEA (through the Department of Technical Cooperation).

The EduTA mission was carried out from 10 to 14 June 2024, and was supported by the IAEA Technical Cooperation project RER9162 "Strengthening Education and Training Infrastructure in Radiation Protection".

The EduTA team concluded that Greece has established a comprehensive legal and regulatory framework for education and training in radiation protection and safety. It provides for the role and functions of the Radiation Protection Expert (RPE) with a focus on the advisory nature of the role, in line with the provisions in IAEA safety standards for the Qualified Expert (in radiation protection). A process has been established for RPE recognition although this is currently based on education, training, and experience requirements rather than on required competences, as these have yet to be established. Criteria to evaluate the evidence submitted in the process for attaining recognition (e.g., professional experience) are also being developed. The role of the Radiation Protection Officer (RPO) is also clearly specified in the legislation and regulations with a focus on the oversighting nature of the role, in line with the provisions in IAEA safety standards for the RPO. However, while the RPO is defined as an individual who is "technically competent", the necessary competences are not specified. Education and training requirements have been established for the designation of the RPO, depending on the RPO 'category' (involvement of medical exposure; authorization of the practice via registration or licensing). Nevertheless, the type and content of training required to ensure the development of the necessary competences (once defined) has yet to be specified for all the categories of RPOs.

Among the health professionals, roles and responsibilities of medical physicists have been defined, with the associated required competences in radiation protection being inferred by these definitions. However, the development scheme for medical physicists is somewhat different from international guidance and practice.

In relation to radiological medical practitioners, requirements for competence, education and training have been established for practitioners specialising in diagnostic radiology, radiotherapy, nuclear medicine, and interventional radiology. Similar requirements have been established for interventional cardiologists. In addition, the required knowledge in radiation protection of practitioners in the practical aspects of medical radiation procedures, may be provided within the organization. Currently, guidelines for such training programmes are available for some radiological medical practitioners.

In relation to the medical radiation technologist, the role and responsibilities have been defined, as well as the education and training scheme to build the required competence.

For referring medical practitioners, education in radiation protection is covered by a general module on radiation protection (both for doctors and dentists) in undergraduate programs.

Generally, for all health professionals involved in medical exposures, there are no formal mechanisms to ensure that their competences (particularly in radiation protection of patients in medical exposure) are maintained and updated.

For regulatory staff, job descriptions which include the minimum education, training, experience and competence requirements are available for each position within EEAE. The training and retraining needs of the regulatory personnel are analysed on an annual basis according to the relevant procedure of the Quality Management System (QMS) and a training plan is prepared and implemented to cover the needs identified. Additionally, guidance has been developed with respect to appropriate training and evaluation of inspectors.

All the above requirements that have been established for the different categories of personnel (particularly the RPE, RPO and health professionals) are systematically applied, and compliance is verified during authorization, review and assessment, and during the inspection of facilities and activities. Employers and licensees ensure that workers are trained in radiation safety. However, explicit provisions in the legislation or in the regulatory requirements are needed to ensure training is repeated for occupationally exposed workers at appropriate intervals. Explicit provisions should also be introduced to ensure employers maintain appropriately updated records of the training provided to individual workers.

Greece has established a national policy and strategy. This strategy is entitled, "EEAE Strategy for the provision of education, training and retraining in radiation protection" and was first approved for the period 2015-2023. It was reviewed and updated in 2023 to incorporate a provision for "occupationally exposed workers, including emergency service personnel" covering the period 2024 -2030.

The national strategy incorporates the 4 main phases outlined in IAEA SRS-93. However, while the strategy document does indicate to some degree how some of these phases will be taken forward, for example, by involving external organisations, it is perhaps a rather generic description of high-level processes. The strategy and the training programme should take into consideration the activities that help support an understanding of education and training needs, the establishment of requirements, and the process of competence development requirements. Such work is currently being put into practice by EEAE.

In order to bring the education and training provisions in line with the IAEA safety standard a set of recommendations (5) and suggestions (7) have been provided by the EduTA team and agreed with national counterparts. The recommendations and suggestions are detailed in the Appendix IV of this report and are summarized here below for easy reference:

- The EEAE should identify the specific competence needed by RPEs to fulfil their roles, and should consider further detailing the criteria for the evaluation of the applications for the recognition and re-recognition of the RPE;
- The EEAE should identify the specific competence needed by RPOs to fulfil their roles, and should establish the objectives and content of the RPO re-training;
- The EEAE should ensure that the employers, registrants and licensees are required to provide all workers with adequate and periodic training, and to maintain records of training.
- The EEAE should consider progressing the work already started to provide guidance on the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety.
- The Minister of Health should consider aligning the clinical training of medical physicists with international practices;
- The EEAE should consider continuing the work to develop guidelines for training and re-training programmes in radiation protection for all the health professionals.
- The EEAE should consider further developing the national strategy on education and training, including an action plan to monitor its delivery and progress.

Details about the findings and conclusions that provide the basis for the recommendations and suggestions, are provided in sections 4 and 5 of this report (EduTA core appraisal modules). Section 6 provides the findings and the proposals for the improvement of the PGEC (EduTA specific appraisal

module). Annex IV provides a detailed overview of all the recommendations, suggestions, good practices, and proposals associated with the different areas of the appraisal.

## 1. BACKGROUND

In September 2023 the Greek Atomic Energy Commission (EEAE) sent a request to the IAEA Division of Radiation, Transport and Waste Safety to carry out an Education and Training Appraisal in radiation protection and safety (EduTA).

Greece hosted EduTA missions in 2008 and 2015, but due to the evolution of IAEA safety standards and national regulatory framework, and the significant updates of the EduTA questionnaire and process since then, the mission was considered as an initial (full scope) mission.

The aim of the mission was to appraise the status of national provisions and infrastructure for education and training in radiation protection and safety, to identify possible ways of improvement to meet IAEA safety standards and to effectively address the national education and training needs.

The questionnaire was sent out to EEAE with the request to fill out the core modules (Module A on the legal and regulatory framework for education and training, Module B on the national strategy for education and training). Module C on the Provisions for the Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources (PGEC) was also included as Greece hosts a PGEC in English under the auspices of IAEA. The course is open to participants from the IAEA Technical Cooperation region of Europe.

Since the first PGEC was organized in Greece in 2003, EEAE has acted as an IAEA Regional Training Centre in radiation protection (RTC). A Long-Term Agreement in this area was signed in July 2011 between EEAE and the IAEA (through the Department of Technical Cooperation).

The EduTA mission was carried out from 10 to 14 June 2024. The EduTA was supported through the IAEA Technical Cooperation project RER9162 “Strengthening Education and Training Infrastructure in Radiation Protection”.

## 2. OBJECTIVES AND TERMS OF REFERENCE OF THE EduTA MISSION

The primary objectives of the EduTA are:

- To review the national legal and regulatory framework for education and training in radiation protection and safety against relevant IAEA safety standards.
- To evaluate the status of the national mechanisms, approaches and capability for building competence in radiation protection and safety in respect to the above framework.
- To provide recommendations and suggestions for improvement in the above areas.

In this framework, the terms of reference of this appraisal mission were:

- To review, together with the counterpart, the information provided in Modules A, B and C of the EduTA questionnaire, covering the legal and regulatory framework for education and training in radiation protection and safety, the national strategy for education and training, and provisions for the Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources;
- To provide an opportunity to continuously improve the provisions and overall infrastructure for education and training in radiation protection and safety.

## 3. CONDUCT OF THE MISSION

An initial informal EduTA team meeting took place on Sunday, 9 June 2024 in the hotel where the team stayed, led by the EduTA Team Leader and the EduTA Team Coordinator. Discussions encompassed the general overview, the scope and specific aspects of the mission, and clarified the basis for the review and the background, context and objectives of the EduTA. The review methodology was clearly explained. The agenda for the mission was presented to the team. As required by the EduTA guidelines, the reviewers presented their initial impressions of the information provided by the national

counterpart in preparation of the mission, and highlighted significant issues to be addressed during the mission.

The EduTA entrance meeting was held on Monday, 10 June 2024, with the participation of EEAE senior management and staff, and participants from other national stakeholders. Opening remarks were made by Mr Christos Housiadas, Chairperson of EEAE. The EduTA team leader, Ms Joanne Stewart, presented the scope and objectives of mission. Presentations on the national legal and regulatory framework for education and training in radiation protection and safety, and on the education and training infrastructure to build competence in radiation safety, were provided by the National Contact Point, Mr Sotiris Economides (RTC Director, EEAE) and Eleftheria Carinou (Director, Directorate of Licensing and Regulatory Inspections, EEAE).

During the EduTA mission, a review was conducted for all the areas within the agreed scope with the objective of providing EEAE and other relevant stakeholders with recommendations and suggestions for improvement of the education and training framework and, where appropriate, identifying good practices. The review was conducted through meetings, interviews and discussions, visits to facilities and direct observations of the national legal, governmental and regulatory framework for safety.

The EduTA team performed its review according to the mission programme given in Appendix II.

The EduTA exit meeting was held on Friday, 14 June 2024. The results of the mission were presented by the EduTA team leader, Ms Joanne Stewart. Closing remarks were made by Mr Christos Housiadas, (Chairperson, EEAE).

# 4. LEGAL AND REGULATORY FRAMEWORK FOR EDUCATION AND TRAINING IN RADIATION PROTECTION AND SAFETY

## 4.1 Establishment of national requirements (Responsibilities of government and regulatory body)

*The regulatory framework*

There is a well-structured regulatory framework in Greece addressing the requirements for radiation protection and safety. The main requirements relating to roles and responsibilities and to education, training and development of competence are specified in regulation [1,2,3]. The primary regulatory body for matters relating to radiation protection and safety is EEAE.

It is noted that as an EU Member State, Greece is subject to the EU Basic Safety Standards for protection against the dangers arising from exposure to ionizing radiation.

*Qualified expert and radiation protection officer*

• Qualified Expert (in radiation protection)

In Greece, the equivalent role of the Qualified Expert in radiation protection (as defined in the IAEA Safety Standards), is the Radiation Protection Expert (RPE). The RPE is defined as '*an individual having the knowledge, training and experience needed to give radiation protection advice in order to ensure the effective protection of individuals*'[1]. The role and expectations of the RPE are specified in regulation (Article 82, ref [1]), with a focus on the advisory nature of the role. In order to have the status of an RPE, individuals must be recognized by the regulatory body as having satisfied certain criteria, however, the competences necessary to fulfil the role are not specified.

There are two categories of RPE: a) RPE-A, for practices involving medical exposures (including non-medical imaging exposure using medical radiation equipment) and b) RPE-B for non-medical practices which includes veterinary applications, research purposes, industrial applications, education, radioactive waste management and NORM.

The basic criteria for RPE recognition are as follows [2]:

- a higher education degree (BSc minimum, any subject);
- completed postgraduate education in a subject related to radiation protection;
- proven experience in providing radiation protection advice in the field of recognition.

And specifically, for those wishing to be an RPE in the medical sector (i.e. RPE-A):

- holding a professional license to practice as a Medical Physicist.

There is an established process for RPE recognition whereby applicants must submit evidence to an independent committee set up by EEAE (which is the recognition body) to show completion of the basic criteria required (as summarised above). In practice, this is a 'passive' recognition process, based on the submission of documentation. It is understood that the evidence submitted in support of the requirement for proven experience is reviewed by the committee, but there are no criteria upon which to judge the acceptability of this evidence, or to assess professional or technical competence.

RPE recognition is valid for a period of 7 years. In order to retain recognized status (re-recognition) an RPE must provide proof of (non-academic) training in radiation protection matters. A minimum of 60 hours over the 7-year period must be completed [2]. However, the objective of such training and the expected content is not specified.

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** General requirements have been established for the recognition of the RPE; however, they are not always relevant to radiation protection and safety (e.g., academic degree). In particular, the required competences (in terms of knowledge, skills and attitudes) have not been established. | |
| **(1)** | **BASIS: GSR Part 3 Requirement 2, para. 2.21(a,b) states that** *"The government shall ensure that requirements are established for: (a) Education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety; b) the formal recognition[12] of qualified experts;"*<br>[12] *'Formal recognition' means documented acknowledgement by the relevant authority that a person has the qualifications and expertise required for the responsibilities that he or she will bear in the conduct of the authorized activity.* |
| **(2)** | **BASIS: GSR Part 3 Requirement 3, para 2.32 that "***The regulatory body shall ensure the application of the requirements for education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety***."** |
| **(3)** | **BASIS: GSR Part 3 Requirement 4, para 2.44 that "***The relevant principal parties and other parties having specified responsibilities in relation to protection and safety shall ensure that all personnel engaged in activities relevant to protection and safety have appropriate education, training and qualification so that they understand their responsibilities and can perform their duties competently, with appropriate judgement and in accordance with procedures."* |
| **R1** | **Recommendation: The EEAE should establish specific competences needed to fulfil the role of RPE** |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** General requirements have been established for the recognition of the RPE with an established process for RPE recognition, based on the submission of documentation by the applicant to the recognition body. However, there are no criteria upon which to judge the acceptability of this evidence, or to assess professional or technical competence. | |
| **(1)** | **BASIS: GSR Part 3 Requirement 2, para. 2.21(a,b) states that** *"The government shall ensure that requirements are established for: (a) Education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety; b) the formal recognition[12] of qualified experts;"*<br>[12] *'Formal recognition' means documented acknowledgement by the relevant authority that a person has the qualifications and expertise required for the responsibilities that he or she will bear in the conduct of the authorized activity.* |
| **(2)** | **BASIS: GSR Part 3 Requirement 3, para 2.32 that "***The regulatory body shall ensure the application of the requirements for education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety***."** |
| **(3)** | **BASIS: GSR Part 3 Requirement 4, para 2.44 that "***The relevant principal parties and other parties having specified responsibilities in relation to protection and safety shall ensure that all personnel engaged in activities relevant to protection and safety have* |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| | *appropriate education, training and qualification so that they understand their responsibilities and can perform their duties competently, with appropriate judgement and in accordance with procedures."* |
| **S1** | **Suggestion: The EEAE should consider detailing further the criteria for the evaluation of applications for the recognition and re-recognition of the RPE, ensuring the relevance of the criteria in respect to radiation protection and safety.** |

• Radiation Protection Officer

The Radiation Protection Officer (RPO) is defined in Greece as '*individual who is technically competent in radiation protection matters relevant for a given type of practice to supervise or perform the implementation of the radiation protection arrangements*' [1]; this is fully in line with IAEA safety standards. The RPO role is clearly specified in legislation (Article 84, [1]) as one of oversight on behalf of the undertaking and the range of expected tasks are detailed.

Although the RPO is defined as an individual who is "technically competent", the necessary competences are not specified. Education and training requirements have been established [2] for a number of RPO categories, namely:

- Practices involving medical exposures that require registration;
- Practices involving medical exposures that require licensing;
- Practices that require registration that do not involve medical exposures;
- Practices that require licensing that do not involve medical exposures.

Generally, the minimum level of education for the RPO is a BSc (any subject) but this varies according to the category of RPO. Initial training in radiation protection is required for all categories although what this training should address is rather vague, and only specified for two of the categories. There is a requirement for the re-training of RPOs and there are generic provisions for this in all 4 categories, based on hours required (40- 60) over a certain time period (5 or 7 years). However, as the competences necessary to fulfil the role are not specified, the content and format of the training required is open to interpretation and may not always be appropriate for the specific needs of the RPO.

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** General training requirements have been established for the designation of the RPO; however, they are not specific to the competences (in terms of knowledge, skills and attitudes) required by the RPO. | |
| **(1)** | **BASIS: GSR Part 3 Requirement 2, para. 2.21(a) states that** *"The government shall ensure that requirements are established for: (a) Education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety;"* |
| **(2)** | **BASIS: GSR Part 3 Requirement 3 para 2.32 that "***The regulatory body shall ensure the application of the requirements for education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety***."** |
| **(3)** | **BASIS: GSR Part 3 Requirement 4 para 2.44 that "***The relevant principal parties and other parties having specified responsibilities in relation to protection and safety shall ensure that all personnel engaged in activities relevant to protection and safety have appropriate education, training and qualification so that they understand their* |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| | *responsibilities and can perform their duties competently, with appropriate judgement and in accordance with procedures."* |
| **R2** | **Recommendation: The EEAE should establish the competences necessary to effectively fulfil the role of the RPO; these should reflect the expected tasks and activities associated with each RPO category.** |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** General training requirements have been established for the designation of the RPO. There is a requirement for re-training of RPOs with generic provisions for all four categories of RPO, based on training hours required over a certain time period. However, the competences necessary to fulfil the role are not specified, the content and format of the training required is open to interpretation and may not always be appropriate for the specific needs of the RPO. | |
| **(1)** | **BASIS: GSR Part 3 Requirement 2 para 2.21(a) states that** *"The government shall ensure that requirements are established for: (a) Education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety; (b) The formal recognition of qualified experts*" |
| **(2)** | **BASIS: GSR Part 3 Requirement 3 para 2.32 that "***The regulatory body shall ensure the application of the requirements for education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety***."** |
| **(3)** | **BASIS: GSR Part 3 Requirement 4 para 2.44 that "***The relevant principal parties and other parties having specified responsibilities in relation to protection and safety shall ensure that all personnel engaged in activities relevant to protection and safety have appropriate education, training and qualification so that they understand their responsibilities and can perform their duties competently, with appropriate judgement and in accordance with procedures."* |
| **(4)** | **BASIS: GSR Part 1 (Rev.1) Requirement 11, para. 2.36 states that** *"The government: …c) Shall make provision for adequate arrangements for increasing, maintaining and regularly verifying the technical competence of persons working for authorized parties."* |
| **R3** | **Recommendation: The EEAE should specify the objectives of RPO re-training along with the topics to be covered within that re-training.** |

*Health professionals*

- Medical physicists

The roles and responsibilities of medical physicists have been defined, with the associated required competences in radiation protection being inferred by these definitions. This can be found in reference [4].

An individual interested in sitting the examinations to obtain a professional license to practice as a Medical Physicist must a) have successfully completed a MSc course in Medical Physics covering at least diagnostic radiology, nuclear medicine and radiotherapy (Article 34, par 3, point (ab) of [5]), and

b) have completed 12 months on the job training in public hospital medical facilities (Article 34, par 3, point (ac) of [5]), with the 12-month period comprising of:

- 4 months in a Diagnostic Radiology facility;
- 4 months in a Nuclear Medicine facility;
- 4 months in a Radiotherapy facility.

On completion of this training the aspiring Medical Physicist must pass written examinations conducted by a 5-member scientific committee appointed by the Minister of Health. These examinations mainly focus on practical issues and cover the following fields: a) physics of diagnostic radiology, b) physics of nuclear medicine, c) physics of radiotherapy, and d) radiation protection.

The professional certificate (license) is issued by the Ministry of Health and the holder of the certificate is permitted to work in any field of medical physics.

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** The clinical training for Medical Physicists currently only lasts one year, during which time all the sub-specialities are covered. This is only partially in line with IAEA guidance regarding minimum requirements for the education and clinical training of a clinically qualified medical physicist. | |
| **(1)** | **BASIS: SSG-46, para. 2.128 states that** *"More details on education, training, qualification and competence of medical physicists is given by the IAEA [26, 40–43]."* *[26] (HHS No 25) para. 6.2(b) states that "Clinical training for a period of not less than two years in one of the specialties of medical physics in the form of a structured residency programme, supervised by a senior CQMP: Examples of medical physics clinical training programmes can be found in the IAEA's Training Course Series Nos 371, 472 and 503 [27–29]. Clinical training for each additional specialty should be accomplished by a period of not less than one year. The clinical training programmes developed for each specialty should emphasize the roles and responsibilities of the CQMP in the respective discipline, as described in Sections 2–4."* |
| **S2** | **Suggestion: The Minister of Health should consider extending the clinical training of medical physicists to a period of not less than two years in one of the specialities of medical physics, or three years in two of the specialties of medical physics.** |

• Radiological Medical Practitioner

The areas of specialization include, among others:

- Diagnostic Radiology;
- Radiation Therapy;
- Nuclear Medicine;
- Interventional Radiology;
- Interventional Cardiology.

The requirements for the competence, education, and training for practitioners specialising in Diagnostic Radiology are defined in Article 1, par. 3 of [6].

The requirements for the competence, education, and training for practitioners specialising in Radiotherapy are defined in Article 1, par. 4 of [6].

The requirements for the competence, education, and training for practitioners specialising in Nuclear Medicine are defined in Article 1, par. 31 of [6] and Article 1 of part (5) of [7].

The requirements for the competence, education, and training for practitioners specialising in Interventional Radiology are defined in Articles 2, 3 and 6 of part (1) of [8].

The requirements for the competence, education, and training of Interventional Cardiologists are defined in Article 2 of [9].

In addition, article 18, par.1 of [1], requires that authorized parties ensure that practitioners involved in the practical aspects of medical radiological procedures have adequate education, information, and theoretical and practical training for medical radiological practices, as well as relevant competence in radiation protection. As such, the Ministry of Education, Religious Affairs and Sports in consultation with EEAE and MoH, ensures that appropriate educational programmes are available and their respective diplomas, certificates and competence qualifications are recognized.

Evidence was provided during the meeting that educational programmes in radiation protection are included in the following radiological medical practitioner specializations: Diagnostic and Interventional radiology [6], Nuclear Medicine [7], Radiotherapy [48]. No educational programmes in radiation protection are included for interventional cardiologists, or for other radiological medical practitioners such as orthopaedists, urologists, etc.). Furthermore, article 15, par. 2 and article 27, par. 2 of [2] specify that the required knowledge in matters of radiation protection of the health professionals involved in the practical aspects of medical radiation procedures (required according to article 18 of [1]) may be provided within the organization by a holder of a professional license of Medical Physicist. This person would preferably have appropriate experience and have previously worked in the relevant organization. The training given would be based on a programme based on EEAE guidelines, and taking into account relevant European and international recommendations.

For all the specializations, trainees are certified based on an evaluation by a special committee that is appointed by the Minister of Health.

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** The required knowledge in radiation protection matters of the health professionals involved in the practical aspects of medical radiation procedures, as required according to article 18 of [1], may be provided within the organization by a holder of the professional license of Medical Physicist. This person would preferably have appropriate experience and have previously worked in the relevant organization. The training given would be based on a programme based on EEAE guidelines, and taking into account relevant European and international recommendations. At the moment there are EEAE guidelines for fluoroscopy guided intervention (medical and non-medical personnel) and for dental radiology. | |
| **(1)** | **BASIS: [IAEA Safety Standards GSR part 3, Req. 3, para 2.32] states that** *"The regulatory body shall ensure the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety"* |
| **S3** | **Suggestion: The EEAE should consider continuing the work to develop guidelines for training programmes in radiation protection for all the categories of radiological medical practitioners involved in medical radiation procedures** |

- Radiopharmacists

It was understood that there are no radiopharmacists working as health professionals at present.

- Medical Radiation Technologists

The education and training requirements for the Medical Radiation Technologist are specified in article 1 of [10]. The roles and responsibilities of the Medical Radiation Technologists that reflect the required

competences for their employment in diagnostic radiology, nuclear medicine and radiotherapy facilities are specified in part 3 of [11].

Furthermore, article 15, par. 2 and article 17, par. 2 of [2] specify that the required knowledge in radiation protection matters of the health professionals involved in the practical aspects of medical radiation procedures, as required according to article 18 of [1], may be provided within the organization by an individual holding a professional license as a Medical Physicist. This person would preferably have appropriate experience and have previously worked in the relevant organization. The training given would be based on a programme based on EEAE guidelines, and taking into account relevant European and international recommendations.

• Referring Medical Practitioner

According to article 4, point 89 of [1], "referrer" means a medical doctor or dentist who is entitled to refer individuals for medical radiological procedures to a practitioner, in accordance with national requirements.

Education in radiation protection is covered by a general module on radiation protection (both for doctors and dentists) in undergraduate academic programs [46].

• General findings (all health professionals)

In relation to maintaining the competence (particularly in radiation protection of patients in medical exposure), no national programme is in place to ensure re-training for the health professionals involved in medical exposures.

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** No national programme is in place to ensure re-training for health professionals involved in medical exposures. | |
| **(1)** | **BASIS: SSG 46 para. 2.136** states that: "Health professionals should maintain their core competencies, including radiation protection and safety, and should keep abreast of new developments in medical uses of radiation. One way to achieve this is through formal continuing medical education or continuing professional development programmes" |
| **S4** | **Suggestion: The EEAE should consider making provision for re-training programmes for all health professionals.** |

*Other personnel*

In relation to personnel not covered in the categories in the previous sections, national counterparts provided information on the consultants who are involved in the safe transport of dangerous goods. This role has been outlined, and education and training requirements have been established [12]. The mechanism and the related requirements for certification of the consultants for the safe transport of dangerous goods are provided in the same regulation [12].

*Regulatory staff*

The roles and responsibilities of the different EEAE Directorates and Units, and the required competences and education requirements for the different categories of personnel at EEAE are described in the Presidential Decree 67/2022. These are also reflected in the relevant job descriptions included in the integrated Quality Management System (QMS) used by EEAE. This system is certified in accordance with ISO 9001:2015, and incorporates all EEAE functions and accreditations in accordance with ISO/IEC 17025 and ISO/IEC 17020. EEAE is also certified in accordance with ISO

29993:2017 in relation to the design, development and provision of non-formal education and training in radiation protection and nuclear security.

Job descriptions which include the minimum education, training, experience and competence requirements are available for each position within EEAE. The training and retraining needs of the regulatory personnel are analysed on an annual basis according to the relevant procedures in the QMS, and a training plan is prepared and implemented to cover the needs identified. Additionally, guidance has been developed with respect to appropriate training and evaluation of inspectors.


SUMMARY

A legal and regulatory framework has been established that provides for the role, functions and certification process of the Radiation Protection Expert (RPE). There is a focus on the advisory nature of the role, in line with the provisions in IAEA safety standards for the Qualified Expert (in radiation protection). There are two categories of RPE: RPE-A, for practices involving medical exposures and RPE-B for non-medical practices (e.g., veterinary applications, research purposes, industrial applications, education, radioactive waste management and NORM). A process has been established for the RPE recognition, based on education, training and experience requirements; however no competence requirements have been established or criteria upon which to judge the acceptability of the evidence submitted in the process for the recognition (e.g., professional experience).

The RPO oversighting role is also clearly specified in the legislation and regulations, in line with the provisions in IAEA safety standards. Although the RPO is defined as an individual who is "technically competent", the necessary competences are not specified. Education and training requirements have been established for the designation of the RPO, depending on the RPO 'category' (practices involving medical exposure; authorization of the practice via registration or licensing). However, the type and content of the training required has not been specified for all the categories of RPOs.

The following areas have been identified for further improvement with regards to the requirements for education, training and competence of RPE and RPO:

- Competence requirements for RPE and RPO;
- Criteria for the evaluation of the applications for the recognition and re-recognition of the RPE;
- Purposes and content for the re-training of RPO.

Among the health professionals, roles and responsibilities of medical physicists have been defined in relevant legislation and regulations, with the associated required competences in radiation protection being inferred by these definitions. In order to gain a professional license to practice as a medical physicist, it is necessary to have completed a MSc in medical physics covering at least diagnostic radiology, nuclear medicine and radiotherapy. It is also necessary to complete a 12-month on-the-job-training, comprising of 4 months in a diagnostic radiology facility, 4 months in a nuclear medicine facility, and 4 months in a radiotherapy facility.

The following area has been identified for further improvement with regards to the requirements for education, training and competence of medical physicists:

- Clinical training of medical physicists aligned to international guidance and good practice.

In relation to radiological medical practitioners, requirements for competence, education, and training have been established for practitioners specialising in diagnostic radiology, radiotherapy, nuclear medicine, and interventional radiology. Similar requirements have been established for interventional cardiologists. In addition, the knowledge in radiation protection of the practitioners in the practical aspects of medical radiation procedures, may be provided within the organization by a holder of a professional license of medical physicists, based on a training programme drawn up with EEAE guidelines, considering relevant European and international recommendations.

The following area has been identified for further improvement with regards to the requirements for education, training and competence of radiological medical practitioners:

- Guidelines for training programmes in radiation protection for all the categories of radiological medical practitioners involved in medical radiation procedures.

In relation to the medical radiation technologist, the roles and responsibilities have been identified, as well as an education and training scheme to build the required competence.

For referring medical practitioners, education in radiation protection is covered by a general module on radiation protection (both for doctors and dentists) in undergraduate academic programs.

Generally, for all health professionals involved in medical exposures, there are no formal mechanisms to ensure that their competences (particularly in radiation protection of patients in medical exposure) are maintained and updated.

The following area has been identified for further improvement with regards to the requirements for education, training and competence of all health professionals:

- Re-training programmes for all health professionals.

In relation to the personnel not covered in the categories above, national counterparts provided information on the consultants who are involved in the safe transport of dangerous goods. This role has been outlined, education and training requirements have been established, and the mechanism for the certification is provided in the relevant regulation.

For regulatory staff, job descriptions which include the minimum education, training, experience and competence requirements are available for each position within EEAE. The training and retraining needs of the regulatory personnel are analysed on an annual basis according to the relevant procedure of the QMS, and a training plan is prepared and implemented to cover the needs identified. Additionally, guidance has been developed with respect to appropriate training and evaluation of inspectors.

### 4.2 Verification of the compliance with national requirements (Responsibilities of the regulatory body)

*Compliance during authorization, and review and assessment*

EEAE has established mechanisms to verify the competence of individuals responsible for the safety of authorized facilities and activities. These individuals include qualified experts, radiation protection officers, individuals with a role in medical exposures, and individuals or organizations designated to deal with emergency exposure situations or existing exposure situations. In practice, these compliance checks take the form of verifying whether (a) the relevant requirements for the formal recognition (e.g., of qualified experts) or the criteria set related to education and training for the designation of individuals (e.g., of radiation protection officers) are met, and (b) training programmes to develop competence and skills for the individuals with responsibilities for the safety of a facility or activity are implemented.

A request submitted to EEAE for authorization (registration or licensing) of facilities and activities (practices) with radiation sources must be accompanied by relevant information and documentation, as evidence of the training in radiation protection, competence and skills of the personnel involved in activities with radiation sources. This might include certificates of attendance of training courses and specialization relevant to the activity.

The submitted information is reviewed and assessed by EEAE according to the corresponding guidelines in EEAE's QMS, which are used as internal criteria for a comprehensive and consistent review and assessment of the applications for authorization. For practices subject to authorization under the amended Joint Ministerial Decision No. 45872/2019, EEAE has issued guidelines to assist registrants and licensees on what type of information and documentation to include in the application. These guidelines are also used by regulatory reviewers during the process. For the provision of training and retraining to individuals designated as radiation protection officers, the guidelines refer to Appendix IV of the same Joint Ministerial Decision. For practices for which registrants and licensees are required to seek advice from qualified experts in radiation protection, the availability of, and the

framework of cooperation of authorized parties with, such qualified experts is only demonstrated indirectly, through the documentation required to be signed by such experts, for instance the radiation protection and safety report.

EEAE has developed additional guidelines that specifically provide for the education, information and training in radiation protection for physicians involved in fluoroscopically guided procedures (such as diagnostic and interventional fluoroscopy, interventional radiological practices, and interventional cardiac practices), for non-medical personnel involved in practical aspects of medical procedures (e.g. operators, manufacturers, nurses, etc.), as well as for dentists, emergency workers, and workers subject to occupational exposure due to radon. These guidelines are issued pursuant to the provisions of the amended Joint Ministerial Decision No. 45872/2019, as amended, which requires individuals participating in practical aspects of radiation procedures to have knowledge in matters of radiation protection. Training should be based on a training programme drawn up through guidelines issued by EEAE. The guidelines stipulate general and specific areas of education, training and information provision for each of the above categories of worker, the indicative duration (in hours), an analytical description of the subjects to be covered, and the documentation to be submitted to EEAE. The full set of guidelines is not yet complete, however, the team was informed that EEAE plans to develop guidance for all other remaining authorized activities, such as non-medical applications (industrial, veterinary, security screening, etc.).

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** EEAE has developed guidelines stipulating general and specific areas of education, training and information to workers, the indicative duration (in hours), an analytical description of the subjects to be covered, and the documentation to be submitted to EEAE for authorization purposes. Currently, the guidelines provide for education, information and training of individuals in radiation protection only for medical and non-medical personnel involved in practical aspects of some medical procedures, dentists, emergency workers, and workers subject to occupational exposure due to radon. Other authorized activities, such as non-medical applications (industrial, veterinary, security screening, etc.), are not covered. | |
| **(1)** | **BASIS: GSR Part 3, Requirement 3, para. 2.32 states that** *"The regulatory body shall ensure the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety".* |
| **S5** | **Suggestion: The EEAE should consider progressing the work already started to provide guidance on the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety.** |

*Compliance during inspection*

EEAE implements a graded approach to inspection programmes. In exercising their duties, EEAE's inspectors use an extensive inspection checklist when conducting regulatory inspections concerning the education and training of workers potentially exposed to radiation. The checklist includes for example, adequacy of education and training in radiation protection, internal training programmes, retraining, frequency of education and training activities, and the provision of information in special categories of workers (e.g. female workers and emergency workers).

Although the retention of training records by employers is common practice and is assessed during authorization and verified during inspections, no specific legislative or regulatory provision in respect to this has been identified. The obligation on registrants and licensees to maintain appropriate records for education and training is outlined in the various sets of guidelines issued by EEAE on education, information provision and training. However, these guidelines do not constitute legally binding instruments.

*Compliance with provisions on individuals' qualification in medical exposure*

EEAE has established procedures to ensure that that practitioners and individuals involved in the practical aspects of medical radiological procedures can only assume their responsibilities if they are specialized in the appropriate area, if they meet the respective requirements for education, training and competence in radiation protection, and if they are named in a list kept up to date by the registrant or licensee.

SUMMARY

EEAE has established mechanisms to verify the competence of individuals who are responsible for the safety of authorized facilities and activities. This is done through the verification of the relevant requirements for the formal recognition or the criteria set related to education and training for the designation of individuals, and through the implementation of training programmes to develop competence and skills for the individuals with responsibilities for the safety of a facility or activity. The amount of the information to be submitted to support an application for authorization takes into account the type of facility or activity, in accordance with a graded approach.

EEAE has developed guidelines stipulating general and specific areas of education, training and information for workers, the indicative duration (in hours), an analytical description of the subjects to be covered, and the documentation to be submitted to EEAE for authorization purposes. Currently, the guidelines provide for education, information and training of individuals in radiation protection only for medical and non-medical personnel involved in practical aspects of some medical procedures, dentists, emergency workers, and workers subject to occupational exposure due to radon. Other authorized activities, such as non-medical applications (industrial, veterinary, security screening, etc.), are not covered.

The following area has been identified for further improvement as regards the compliance with national requirements on education and training during authorization:

- Guidance on the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety.

### 4.3 Application of national requirements (Responsibilities of the employer, registrants, licensees)

*Planned Exposure Situations*

Requirements are in place to ensure that the registrants and licensees make suitable arrangements to provide workers with training necessary to restrict potential exposures for planned exposure situations. In particular, the Presidential Decree No. 101/2018 defines training requirements for occupationally exposed workers, workers to be potentially exposed to orphan sources, emergency workers, and workers in the field of medical exposures. This Decree requires registrants and licensees to ensure that the operational protection of exposed workers is based, inter alia, on education and training, in accordance with prior evaluation of the nature and magnitude of the radiological risk to exposed workers; optimization of radiation protection under all working conditions, including occupational exposures as a consequence of practices involving medical exposures; classification of exposed workers into different categories; and control measures and monitoring relating to the different areas and working conditions.

Article 15 of the Decree sets out specific requirements for the provision of information, instructions and adequate training on radiation protection and safety to the occupationally exposed workers. Specifically, registrants and licensees must provide information to the occupationally exposed workers on the radiation health risks involved in their work, the general radiation protection procedures and precautions to be taken, the radiation protection procedures and precautions connected with the

operational and working conditions of both the practice in general and each type of work which they may be assigned to, the relevant parts of the emergency response plans and procedures, and the importance of complying with the technical, medical and administrative requirements.

Article 14 of the Decree refers to the provisions of Law 4982/2022 for the establishment of arrangements to ensure that the provision of training and information to exposed workers is repeated at appropriate intervals. As is the case for qualified experts, the Joint Ministerial Decision No. 45872/2019 provides requirements for "non-formal" training, for an individual to be qualified to be designated or re-designated as a radiation protection officer. However, these requirements only refer to the total number of hours of training in the field of radiation protection in general, (varying from 40 to 60 hours, to be delivered within a period of 5 to 7 years, based on the area of competence). In the absence of any other specific provision for a programme for retraining, this is considered as a means of continuous professional training for radiation protection officers. Apart from this provision, there is no other explicit provision in the legislation or in the regulatory requirements that provides for training to be repeated for occupationally exposed workers at appropriate intervals.

Apart from provisions in the guidelines issued by EEAE on education, information provision and training, the team was not able to identify any other legislative or regulatory requirement that employers should maintain appropriately updated records of the training provided to individual workers. The only provision identified in the legislation referring to the obligation of undertakings to keep up-to-date records, is for high-activity sealed sources.

Article 37 of the Decree sets minimum requirements for a controlled area, which includes laying down working instructions appropriate to the radiological risk associated with the sources and the operations involved, and providing specific training to all workers engaged in activities in which they are or could be subject to occupational exposure in connection with the characteristics of the workplace and the practices.

Moreover, registrants and licensees are required to inform exposed female workers on the importance of announcing pregnancy early on, in view of the risks of exposure for the foetus. Exposed female workers should also be made aware of the importance of informing their employer early on of their intent to nurse an infant, in view of the risks of exposure in nursing an infant after an intake of radionuclides or bodily contamination.

In the field of medical exposure, registrants and licenses are required to ensure that practitioners and individuals involved in the practical aspects of medical radiological procedures receive adequate education, information, and theoretical and practical training for medical radiological practices, as well as relevant competence in radiation protection. Registrants and licensees are also required to ensure that only individuals who have completed educational programmes set up by the Ministry of Education, Religious Affairs and Sports, with the cooperation of EEAE and the Ministry of Health, may participate in practical aspects of medical radiological procedures.

Occupationally exposed workers are required to ensure that they accept such information, training and education in radiation protection to enable them to conduct their work in accordance with the national requirements, and to enable them to put forward suggestions on ways to improve radiation protection in their workplace. Moreover, employees are obliged to apply health and safety rules for their own health and safety, as well as for the health and safety of other persons who could be affected by their acts, or omissions. They m.ust work in accordance with their training and appropriate instructions from their employer

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES |
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| **Observation:** Article 14 of the Presidential Decree No. 101/2018 refers to the provisions of Law 4982/2022 for the establishment of arrangements to ensure the provision of training. However, no explicit provision has been identified either in the legislation, or in the regulatory requirements, for employers to provide periodic re-training for occupationally exposed workers at appropriate intervals. |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **(1)** | **BASIS: GSR Part 3 Requirement 26, para. 3.110(a,b) states that** *"Employers, in cooperation with registrants and licensees: (a) Shall provide all workers with adequate information on health risks due to their occupational exposure in normal operation, anticipated operational occurrences and accident conditions, adequate instruction and training and periodic retraining in protection and safety, and adequate information on the significance of their actions for protection and safety; (b) Shall provide those workers who could be involved in or affected by the response to an emergency with appropriate information, and adequate instruction and training and periodic retraining, for protection and safety;"* |
| **(2)** | **BASIS: GSR Part 3 Requirement 21, para. 3.76(h) states that** *"Employers, registrants and licensees shall ensure, for all workers engaged in activities in which they are or could be subject to occupational exposure, that: (h) Suitable and adequate human resources and appropriate training in protection and safety are provided, as well as periodic retraining as required to ensure the necessary level of competence;"* |
| **R4** | **Recommendation: The EEAE should ensure that employers, registrants and licensees are required to provide all workers engaged in activities in which they are or could be subject to occupational exposure with adequate and periodic retraining in radiation protection and safety, in all exposure situations.** |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** The obligation on registrants and licensees to maintain appropriate records for education and training is stipulated in various sets of guidelines on education, information provision and training issued by the regulatory body. Although keeping records by employers, registrants and licensees on the training in radiation protection provided to individual workers, for a period as specified by the regulatory body, is a common practice that is assessed during authorization and verified during inspections, no other respective legislative or regulatory requirement has been identified. | |
| **(1)** | **BASIS: GSR Part 3 Requirement 26, para. 3.110(c) states that** *"Employers, in cooperation with registrants and licensees: (c) Shall maintain records of the training provided to individual workers".* |
| **(2)** | **BASIS: GSR Part 3 Requirement 42, para. 3.183 states that** *"Registrants and licensees shall maintain for a period as specified by the regulatory body and shall make available, as required, the following personnel records: (b) (b) Records of training of personnel in radiation protection (as required in para. 3.150(b))."* |
| **R5** | **Recommendation: The EEAE should ensure that provisions are established requiring employers, registrants and licensees to maintain records of training provided to personnel in radiation protection.** |

*Emergency Exposure Situations*

In an emergency exposure situation, the relevant requirements for occupational exposure in planned exposure situations are also applicable for emergency workers. Registrants, licensees and the emergency organizations are required to ensure that emergency workers, who are identified in the emergency response plan or management system as workers that could be involved in or affected by the response to an emergency, are given adequate and regularly updated information on the health risks their intervention might involve, and on the precautionary measures to be taken in such an event. This information shall take into account the range of potential emergencies and the type of intervention. EAEE has issued guidelines related to the training to be provided to emergency workers. When an

emergency occurs, the information given prior to the emergency shall be supplemented appropriately, based on the specific circumstances of the emergency. Moreover, registrants, licensees and the emergency organizations are required to ensure that the emergency workers receive appropriate training and participate in practical exercises as defined in the emergency management system, as well as appropriate radiation protection training and information.

Emergency workers who are liable to undertake actions whereby an effective dose of 50 mSv may be exceeded, are required to be clearly and comprehensively informed in advance by the registrant, licensee or the emergency organization of the associated health risks. They must also be aware that their actions are voluntarily. The registrant, licensee or the emergency organization shall provide, to the extent possible, the necessary training and exercises for the activities that emergency workers are to perform, otherwise they are prohibited from performing them.

As in planned exposure situations, no respective legislative or regulatory requirement has been identified to ensure that the response organization, registrants or licensees are required to provide periodic retraining or maintain records of the training provided for emergency workers engaged in activities in which they are, or could be, subject to emergency occupational exposure. However, EEAE's guidelines on the provision of training to emergency workers encourage response organizations and employers to maintain appropriate records of the training programmes they implement for these workers.

*Existing Exposure Situations*

Although no specific education and training provisions exist for workers undertaking remedial actions in areas with residual radioactive material arising from either past activities or after an emergency exposure situation has been declared ended, existing exposure situations of concern from a radiation protection point of view and for which legal responsibility can be assigned, are in general subject to the relevant requirements for planned exposure situations (Article 100 of the Presidential Decree No. 101/2018). For instance, workplaces where the exposure of workers to Rn-222 is liable to exceed an effective dose of 6mSv per year, these shall be managed as a planned exposure situation. In this respect, the training requirements specified for planned exposure situations are also applicable for all workers in workplaces with concentration of Rn-222 above the reference level. EEAE has issued guidelines on the exposure of workers to radon, which provides guidance on the information to be given to workers prior to their employment, and the training to be given at regular intervals, e.g. every three years. This training should include subjects such as exposure to radon, the risks involved, and the procedures and measures for radiation protection taken by the registrant or licensee. Furthermore, requirements apply to ensure that the workers accept information, instruction and training in protection and safety, enabling them to conduct their work in accordance with the national requirements.

SUMMARY

Requirements are in place to ensure that registrants and licensees make suitable arrangements to provide workers with training necessary to restrict potential exposures for planned exposure situations. However, there is no explicit provision in the legislation or in the regulatory requirements that provides for training to be repeated at appropriate intervals for occupationally exposed workers. Furthermore, there are no clear provisions to ensure that employers maintain appropriately updated records of the training provided to individual workers (the only provision identified in the legislation referring to the obligation of undertakings to keep up-to-date records, is for high-activity sealed sources).

In an emergency exposure situation, the relevant requirements for occupational exposure in planned exposure situations are applicable for emergency workers. Moreover, existing exposure situations of concern from a radiation protection point of view are, in general, subject to the relevant requirements for planned exposure situations.

The following areas have been identified for further improvement with regards to compliance with national requirements for planned exposure situations:

- Periodic retraining in protection and safety of workers in all exposure situations;
- Records of training protection and safety provided to the workers in all exposure situations.

### 4.4 Establishment of a national policy and strategy for education and training

*National policy and strategy*

Greece has established a national policy and strategy. This strategy is entitled, "EEAE Strategy for the provision of education, training and retraining in radiation protection" and was first approved for the period 2015-2023. It was reviewed and updated in 2023 to incorporate a provision for "occupationally exposed workers, including emergency service personnel" covering the period 2024 -2030.

The national strategy incorporates the 4 main phases as outlined in IAEA SRS-93, which are: analysis of needs, planning of a training programme based on the analysis of needs, delivery of the programme, and evaluation of the effectiveness of the programme. However, while the strategy document does indicate to some degree how some of these phases will be taken forward, for example, by involving external organisations, it gives a rather generic description of high-level processes (as they currently stand), rather than a bespoke national strategy for reaching a particular situation, or achieving certain goals by 2030. This fact makes it difficult to see how current, planned and potential activities, fit into the strategy. Conversely it is difficult to see if and how the strategy is actually having an effect on "shaping" the initiation, and ongoing development, of education and training activities.

A further observation is that neither the strategy (as written), nor the national training programme seem to take into consideration activities that help to support an understanding of education and training needs, the establishment of requirements, or the process of competence development (for example, the development of guidelines for the provision of training for various categories of personnel). In fact, such work is currently being taken forward by EEAE, and is good practice, but is not identified within the current strategy or programme.

| **RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES** | |
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| **Observation:** A national strategy has been established that provides a national education and training programme. The strategy document is a rather generic description of high-level processes, focusing on the training courses planned to be delivered, and does not seem to include those activities that help to support an understanding of education and training needs, the establishment of requirements, and the process for building and maintaining the competence (e.g., the development of guidelines for the provision of training and refresher training for various categories of personnel). | |
| **(1)** | **BASIS: IAEA SSG-44, para 4.233 states that: "***The government, through the designated body, should ensure that the education and training activities are coordinated, should start as soon as possible developing a systematic approach, and should consider establishing a national strategy for education and training. The following actions provide guidance on the development of this national strategy."*<br><br>*"Once the legal framework for safety is in place, specific qualification requirements should be established either by the regulatory body or by other governmental agencies or professional bodies, as appropriate….."* (para. 4.236)<br>"*Based on the inventory of facilities and activities, and the established minimum levels for competence in safety, the designated body in cooperation with relevant organizations should assess the number of persons to be trained in safety in each work activity. Consideration should be given not only to the existing situation but also to projected needs taking into account anticipated demands in the near future."* (para. 4.240) |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| | "*The development phase includes the production of appropriate training material including, inter alia, syllabi, timetables, lecture plans, lecture notes, practical workshop instructions and assignments, scenarios for exercises and drills, and training assessment tools such as examinations."* (para. 4.248)<br>*"The designated body, in cooperation with the training providers, should ensure the timely implementation of the education and training programme. While certain training activities may need to be offered regularly, either to address a large number of individuals or to ensure that refresher training is available to the target group of concern, other training activities may be needed just a few times (e.g. if the target group is small or if the topic is very specific)."* (para. 4.250) |
| **(2)** | **BASIS: IAEA SSG-46, para 2.119 and 220 states that: "***Medical uses of ionizing radiation involve a number of health professionals performing radiological procedures such as diagnostic examinations, interventional procedures and treatment. In each case, the radiation protection and safety associated with the radiological procedure depends greatly on the skills and expertise of those health professionals involved, as the patient is necessarily and deliberately exposed to radiation. In other words, the education, training, qualification and competence of the respective health professionals underpin radiation protection and safety in medical uses of ionizing radiation.*<br>*GSR Part 3 [3] places great emphasis on education and training for all persons engaged in activities relevant to protection and safety, with the responsibility placed on government to ensure that requirements for education, training, qualification and competence are established and that arrangements are in place for the provision of the necessary education and training. The development and implementation of a national strategy for education and training (see Ref. [35]) that is based on a national needs assessment can be useful in this context.(para. 2.120.)…."* |
| **S6** | **The EEAE should consider developing a more bespoke national strategy for education and training, elaborating on the four core steps and with respect to all national needs and all categories of personnel. A national strategy is a description of how the development of competence is to be supported or maintained; as such, the strategy may usefully include activities other than the direct delivery of training (e.g., development of guidance on training, etc.)** |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **Observation:** A national strategy has been established that provides a national education and training programme. The strategy document is a rather generic description of high-level processes rather than a bespoke national strategy for reaching a particular situation, or achieving certain goals by 2030. This fact makes it difficult to see how current, planned and potential activities fit into the strategy; conversely it is difficult to see if and how the strategy is actually having an effect on "shaping" the initiation, and ongoing development, of education and training activities. | |
| **(1)** | **BASIS: IAEA SSG-44, Action 57 states that:** *"The designated body, in cooperation with relevant organizations, should periodically evaluate the implementation of the national education and training programme."* |
| **(2)** | **BASIS: IAEA SSG-44, paras. 4.252 and 4.253 state that:** *"The results of the evaluation should be used as feedback to improve the national education and training programme. Where the evaluation indicates any areas of improvement, the causes should be determined and steps taken to rectify matters in future programmes."* |

| RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES | |
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| **(3)** | **BASIS: IAEA SSG-46, para 2.119 and 220 states that: "***Medical uses of ionizing radiation involve a number of health professionals performing radiological procedures such as diagnostic examinations, interventional procedures and treatment. In each case, the radiation protection and safety associated with the radiological procedure depends greatly on the skills and expertise of those health professionals involved, as the patient is necessarily and deliberately exposed to radiation. In other words, the education, training, qualification and competence of the respective health professionals underpin radiation protection and safety in medical uses of ionizing radiation.*<br>*GSR Part 3 [3] places great emphasis on education and training for all persons engaged in activities relevant to protection and safety, with the responsibility placed on government to ensure that requirements for education, training, qualification and competence are established and that arrangements are in place for the provision of the necessary education and training. The development and implementation of a national strategy for education and training (see Ref. [35]) that is based on a national needs assessment can be useful in this context.(para. 2.120.)…."* |
| **S7** | **Suggestion: The EEAE should consider the development of an action plan to support and monitor the delivery of the national strategy on education and training for all the categories of personnel.** |


SUMMARY

Greece has established a national policy and strategy. This strategy is entitled, "EEAE Strategy for the provision of education, training and retraining in radiation protection" and was first approved for the period 2015-2023. It was reviewed and updated in 2023 to incorporate a provision for "occupationally exposed workers, including emergency service personnel" covering the period 2024 -2030.

The national strategy incorporates the 4 main phases as outlined in IAEA SRS-93 (an analysis of needs, the design and development of the national training programme, followed by its implementation, and finally the evaluation). However, it seems to be a rather generic description of high-level processes, that does not clearly show if and how the strategy is actually having an effect on "shaping" the initiation, and ongoing development, of education and training activities. Furthermore, neither the strategy, nor the national training programme seem to include those activities that help to support an understanding of education and training needs, the establishment of requirements, and the process for building and maintaining competence (e.g., the development of guidelines for the provision of training and refresher training for various categories of personnel).

The following areas have been identified for further improvement with regards to the national strategy on education and training:

- Strategy including all the non-training activities that support the development of competence (e.g., development of guidance on training, etc.) for all the categories of personnel;
- Action plan to support and monitor the delivery of the national strategy on education and training for all the categories of personnel.

## 5. IMPLEMENTATION OF THE LEGAL AND REGULATORY FRAMEWORK FOR EDUCATION AND TRAINING

### 5.1 Analysis of education and training needs

A systematic methodology is in place for analysing education and training needs with the relevant information being collated from a number of sources.

EEAE maintains a national database to capture essential information. This includes: the number of organisations undertaking practices involving radiation and identifying the nature of the practices; the number of persons working with radiation; the number of persons working in the areas of radiation protection; information collated via the authorization process; and information collated during the course of inspections.

On the basis of the available information the education and training needs for the period 2024-2030 have been identified for the main non-medical (industrial and research) applications. The data presented for these applications appears to be robust and traceable to appropriate sources. However, a notable observation from the data was that no ongoing training needs, such as QEs supporting practices like industrial radiography, gauging and well logging, appear to have been identified. It was explained that no needs had been identified for these areas as under Greek legislation, authorized involved in these practices are not required to consult with a QERP as such consultations are only required for authorized practices. While this is understood, and such issues are outside the scope of this appraisal, further discussion on the matter identified a possible inconsistency in legislative requirements in this area, the resolution of which may have an impact of the analysis of training needs in this area.

No quantitative data is available with respect to training needs in the medical sector. It is understood that training needs are addressed within the medical sector itself and, as such this does not impact the EEAE or its collaborators. Nevertheless, there are concerns that this could result in a gap in the national overview and makes it more difficult to ensure (from a national perspective) that all training needs have been identified and, perhaps more importantly, that there are measures in place to address them appropriately. A similar issue was identified with respect to non-medical practices where (for some applications) there is an assumption that any required training will be provided" in-house" and any input from external providers is not required.

Overall suggestions on how to improve and strengthen the national strategy on education and training (therefore covering the analysis of education and training needs as well) have been provided in Section 4.4.

### 5.2 Design of the national education and training programme

A national training programme has been developed, and is currently being implemented, covering the period 2024-2030.

A range of education and training providers are available for building the competence of different categories of personnel, including: RPEs, RPOs and health professionals, occupational health (medical physicists, radiological medical practitioners, medical radiation technologists).

Overall suggestions on how to improve and strengthen the national strategy on education and training (therefore covering the design of the national education and training programme as well) have been provided in Section 4.4.

### 5.3 Development and implementation of the national education and training programme

A national training programme has been developed, and is currently being implemented, covering the period 2024-2030.

The programme makes provision for training for occupationally exposed workers, RPEs, (MPEs), RPOs and occupational health services, however it should be noted that only initial training is considered, and there is no provision for the delivery of any retraining. The programme does not extend

to health professionals in practices involving medical exposures as there is an expectation these needs will be addressed by organisations/personnel other than EEAE. This is therefore considered to be a gap in the programme and, in effect, makes this a programme of work for EEAE rather than a national programme for addressing identified needs.

Training for aspiring RPEs is via the IAEA-PGEC for which EEAE is host for the European region. Financial support is available to send RPEs (or other radiation protection specialists) abroad for specialist training if the becomes necessary).

Overall suggestions on how to improve and strengthen the national strategy on education and training (therefore covering the development and implementation of the national education and training programme as well) have been provided in Section 4.4.

### 5.4 Evaluation of a national education and training programme

The overall national training programme has been developed under the national strategy, for different categories of personnel in a range of practices. Training programmes have been developed for QE and RPO; for the latter, specific programmes have been developed for different type of practices.

With respect to medical exposures there is nothing within the national programme to ensure re-training for the health professionals involved in medical exposures nor is there a programme for re-training for RPOs in the medical field.

Overall suggestions on how to improve and strengthen the national strategy on education and training (therefore covering the evaluation of a national education and training programme as well) have been provided in Section 4.4.

SUMMARY

Greece has established a national policy and strategy. This strategy is entitled “EEAE Strategy for the provision of education, training and retraining in radiation protection” and was first approved for the period 2015-2023. It was reviewed and updated in 2023 to incorporate a provision for “occupationally exposed workers, including emergency service personnel” covering the period 2024 -2030.

Overall suggestions on how to improve and strengthen the national strategy on education and training, therefore following the steps on which a” national strategy should be based (i.e., analysis of needs, planning of a training programme based on that analysis of needs, the delivery of that programme and then the evaluation of the effectiveness of that programme) have been provided in Section 4.4.

## 6. SPECIFIC APPRAISAL

### 6.1 Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources

EEAE is one of the IAEA RTCs in radiation protection. Greece signed an LTA with IAEA in 2011 in the area of education and training in radiation, transport and waste safety. EEAE has hosted the PGEC under the auspices of IAEA since 2003. Currently, EEAE organizes the PGEC in collaboration with the following institutions with which it has signed MoUs:

- National Technical University of Athens – School of Mechanical Engineering
- Medical School – University of Athens
- Medical School – University of Ioannina
- National Centre for Scientific Research "Demokritos"

Formal procedures have been established for conducting the PGEC, in line with the QMS for education and training activities, based on ISO 29993:2017. The PGEC is fully aligned to IAEA Standard Syllabus (TCS-18, Rev 1, 2019). Adequate infrastructure (lecture rooms), laboratories (for the practical exercises), supporting material (slides/presentations, guides for practical exercises) are made available to the participants. The Learning Management System (LMS) is widely used for the online component of the course.

The local trainers and supervisors are selected on the basis of the QMS procedures. Criteria for the selection include the evaluation of CVs and educational qualifications, work experience in areas related to the subject to be taught, educational experience, and interviews.

Comprehensive records are kept on the course participants.

A systematic individual assessment of the competence of the participants is carried out. Participants take written examinations at the end of each PGEC part, and provide a report and a presentation on their work project.

SUMMARY

Greece signed an LTA with IAEA in 2011 in the area of education and training in radiation, transport and waste safety. Following that, the EEAE has formally become one of the IAEA RTCs in radiation protection. Under this framework, the EEAE has been hosting the PGEC under the auspices of IAEA since 2003.

Adequate infrastructure is available to host the course in line with IAEA Standard Syllabus, in collaboration with relevant national organizations. The course is organized reflecting IAEA guidance in terms of evaluation of the lecturers, assessment of the participants, and organization of the work projects.

Formal procedures have been established for conducting the PGEC, in line with the QMS for education and training activities, based on ISO 29993:2017. External audits of the QMS are performed by an accredited certification body on an annual basis. Such audits also cover PGEC activities.

## APPENDIX I – APPRAISAL TEAM, LIST OF PARTICIPANTS

### Appraisal Team

| | |
|---|---|
| Joanne Stewart | United Kingdom (team leader, expert) |
| Marco Brambilla | Italy (expert) |
| Michael Tzortzis | Cyprus (expert) |
| Andrea Luciani | IAEA (team coordinator) |

### List of Participants

**EEAE**

| | | |
|---|---|---|
| Christos Housiadas | Chairman | |
| Efthymios Karabetsos | Director | Directorate of Training, Regulatory Policy, Infrastructure and Research |
| Eleftheria Carinou | Director | Directorate of Licensing and Regulatory Inspections |
| Sotiris Economides | RTC Director | Directorate of Training, Regulatory Policy, Infrastructure and Research |

**NCSR "Demokritos"**

| | | |
|---|---|---|
| Ion Stamatelatos | Researcher | Institute of Nuclear and Radiological Sciences, Energy, Technology and Safety |

**National Technical University of Athens**

| | | |
|---|---|---|
| Marios Anagnostakis | Professor | School of Mechanical Engineering, Section of Nuclear Engineering |
| Nikolaos Petropoulos | Assistant Professor | School of Mechanical Engineering, Section of Nuclear Engineering |
| Dimitrios Mitrakos | Assistant Professor | School of Mechanical Engineering, Section of Nuclear Engineering |
| Betty Rouni | Lecturer | School of Mechanical Engineering, Section of Nuclear Engineering |

**University of Athens**

| | | |
|---|---|---|
| Panagiotis Papagiannis | Assistant Professor | School of Medicine<br>Medical Physics Laboratory |
| Georgia Lymperopoulou | Lecturer | School of Medicine<br>A' Radiology Laboratory<br>Aretaieio Hospital |

| | | |
|---|---|---|
| Christina Armpilia | Laboratory Teaching Staff | School of Medicine<br>A' Radiology Laboratory<br>Aretaieio Hospital |
| Lia Angela Moulopoulos | Professor of Radiology and Chair | School of Medicine<br>A' Radiology Laboratory<br>Aretaieio Hospital |

**University of Western Attica**

| | | |
|---|---|---|
| Thanasis Bakas | Associate Professor | Department of Biomedical Sciences |

**GROUP PHOTO**

**The EduTA Team and the Greek Counterparts**

## APPENDIX II – MISSION PROGRAMME

***Legenda:***

| | | |
|---|---|---|
| Interviews/Reviews | Technical Visits | EduTA team individual/group work |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| **Monday** | | | |
| 09:00 | **Opening entrance meeting**<br><br>*Opening Remarks*<br>Main national counterpart's representative<br>Other counterparts' representatives<br>EduTA team leader<br><br>Self-introduction of all attendees<br>Presentation of the EduTA mission programme (EduTA team leader) | - Christos Housiadas<br>EEAE Chairman<br>- Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director, Directorate of Training, Regulatory Policy, Infrastructure and Research, EEAE<br>- Eleftheria Carinou, Director, Directorate of Licensing and Regulatory Inspections, EEAE<br>- Ion Stamatelatos, Researcher, Institute of Nuclear and Radiological Sciences, Energy, Technology and Safety, NCSR "Demokritos"<br>- EduTA Team | EEAE |
| 09:15 | **Presentation of EduTA**<br>- Scope/objectives of the mission<br>- Questionnaire<br>- Conduction of the mission | EduTA team leader | EEAE |
| 09:45 | **Discussion and clarifications** | All | EEAE |
| 10:00 | **Presentation(s) by main national counterpart and other counterparts on:**<br>- Overview of activities and facilities with use radiation sources in the host country<br>- National legal and regulatory framework for education and training in radiation protection and safety<br><br>with particular focus on the requirements for the personnel covered in A.1.1-A.1.5 of EduTA questionnaire | - Sotirios Economides<br>RTC Director, EEAE<br>- Eleftheria Carinou, Director, Directorate of Licensing and Regulatory Inspections, EEAE | EEAE |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| 10:30 | *Coffee Break* | | |
| 10:45 | **Presentation(s) by education and training provider(s)** on:<br>- Overview on the E&T infrastructure to build competence in radiation safety<br>  o Academic programmes<br>  o Training courses and providers<br>with particular focus on the E&T infrastructure described in B.2.1-B.2.5, B.3.1-B.3.5 of EduTA questionnaire | - Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director, Directorate of Training, Regulatory Policy, Infrastructure and Research, EEAE | EEAE |
| 11:15 | **Discussion and clarifications** | All | EEAE |
| 11:30 | EduTA Team clarifying **basic aspects of IAEA Safety Standards as included in EduTA questionnaire**<br>(e.g. - QE, RPO, MP: role and functions in respect to occupational / public / medical exposures;<br>- HPs in the scope of the EduTA;<br>- Employers/registrants/licensees responsibilities for training workers; etc.) | EduTA Team | EEAE |
| 11:45 | Interviews,<br>Review of the EduTA questionnaire, | - Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director, Directorate of Training, Regulatory Policy, Infrastructure and Research, EEAE<br>- EduTA Team | EEAE |
| 13:00 | *Break for Lunch* | | |
| 14:00 | Interviews,<br>Review of the EduTA questionnaire, | - Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director, Directorate of Training, Regulatory Policy, Infrastructure and Research, EEAE<br>- EduTA Team | EEAE |
| 17:00 | EduTA Team: discussion on the information gained during the day | EduTA Team | EduTA team's venue (e.g., hotel) |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| 17:30 | EduTA Team: individual work to draft report | EduTA Team | EduTA team's venue (e.g., hotel) |
| 19:00 | Adjourn | | |
| **Tuesday** | | | |
| 09:00 | Interviews,<br>Review of the EduTA questionnaire, | - Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director,<br>Directorate of Training,<br>Regulatory Policy, Infrastructure and Research, EEAE<br>- EduTA Team | EEAE |
| 11:00 | *Coffee Break* | | |
| 11:15 | Interviews,<br>Review of the EduTA questionnaire, | - Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director,<br>Directorate of Training,<br>Regulatory Policy, Infrastructure and Research, EEAE<br>- EduTA Team | EEAE |
| 13:00 | *Break for Lunch* | | |
| 14:00 | **Technical Visit** to E&T providers in radiation protection and safety:<br>- EEAE<br>- National Technical University of Athens | - Sotirios Economides<br>RTC Director, EEAE<br>- Marios Anagnostakis, Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Nikolaos Petropoulos, Assistant Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Dimitrios Mitrakos, Assistant Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Betty Rouni, Lecturer<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- EduTA Team | EEAE, NTUA |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| 16:30 | Review of the information collected during the visit and discussion with main national counterpart and visited organization's representatives | - Sotirios Economides<br>RTC Director, EEAE<br>- Marios Anagnostakis Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Nikolaos Petropoulos, Assistant Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Dimitrios Mitrakos, Assistant Professor<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- Betty Rouni, Lecturer<br>School of Mechanical Engineering<br>Section of Nuclear Engineering, NTUA<br>- EduTA Team | EEAE<br>NTUA |
| 17:00 | EduTA Team: discussion on the information gained during the day | EduTA Team | Hotel |
| 17:30 | EduTA Team: individual work to draft report | EduTA Team | Hotel |
| 19:00 | Adjourn | | |
| **Wednesday** | | | |
| 09:00 | **Technical Visit** to E&T providers in radiation protection and safety:<br>- School of Medicine, University of Athens | - Sotirios Economides<br>RTC Director, EEAE<br>- Panagiotis Papagiannis, Assistant Professor<br>School of Medicine<br>Medical Physics Laboratory, UA<br>- Georgia Lymperopoulou, Lecturer<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Christina Armpilia, Laboratory Teaching Staff<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Lia Angela Moulopoulos, Professor of Radiology and Chair<br>A' Radiology Laboratory | UA-SM |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| | | Aretaieio Hospital, UA<br>- EduTA Team | |
| 12:30 | Review of the information collected during the visit and discussion with main national counterpart and visited organization's representatives | - Sotirios Economides<br>RTC Director, EEAE<br>- Panagiotis Papagiannis, Assistant Professor<br>School of Medicine<br>Medical Physics Laboratory, UA<br>- Georgia Lymperopoulou, Lecturer<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Christina Armpilia, Laboratory Teaching Staff<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Lia Angela Moulopoulos, Professor of Radiology and Chair<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- EduTA Team | UA-SM |
| 13:00 | *Break for Lunch* | | |
| 14:00 | Interviews,<br>Review of the EduTA questionnaire, | - Sotirios Economides<br>RTC Director, EEAE<br>- Panagiotis Papagiannis, Assistant Professor<br>School of Medicine<br>Medical Physics Laboratory, UA<br>- Georgia Lymperopoulou, Lecturer<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Christina Armpilia, Laboratory Teaching Staff<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- Lia Angela Moulopoulos, Professor of Radiology and Chair<br>A' Radiology Laboratory<br>Aretaieio Hospital, UA<br>- EduTA Team | UA-SM |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| 17:00 | EduTA Team: discussion on the information gained during the day | EduTA Team | Hotel |
| 17:30 | EduTA Team: individual work to draft report | EduTA Team | Hotel |
| 19:00 | Adjourn | | |
| **Thursday** | | | |
| 09:00 | **Technical Visit** to E&T providers in radiation protection and safety:<br>- Department of Biomedical Sciences, University of Western Attica | - Sotirios Economides<br>RTC Director, EEAE<br>- Thanasis Bakas<br>Associate Professor<br>UWA-DBS<br>- EduTA Team | UWA-DBS |
| 12:30 | Review of the information collected during the visit and discussion with main national counterpart and visited organization's representatives | - Sotirios Economides<br>RTC Director, EEAE<br>- Thanasis Bakas<br>Associate Professor<br>UWA-DBS<br>- EduTA Team | UWA-DBS |
| 13:00 | *Break for Lunch* | | |
| 14:00 | EduTA Team: agreeing on preliminary conclusions and recommendations/suggestions (good practices, if applicable) | EduTA Team | EEAE |
| 16:00 | **Discussions between EduTA Team and main national counterpart on preliminary results** | - Sotirios Economides<br>RTC Director, EEAE<br>- EduTA Team | EEAE |
| 17:00 | Revisions of conclusions and recommendations /suggestions (good practices, if applicable) | EduTA Team | Hotel |
| 17:30 | EduTA Team: finalization of the draft report and preparation of the presentation | EduTA Team<br>EduTA Team leader | Hotel |
| 19:00 | Adjourn | | |
| **Friday** | | | |
| 09:00 | EduTA Team: finalization of the draft report and preparation of the presentation | EduTA Team<br>EduTA Team leader | Hotel |

| Time | Programme | Participants / Presenters | Venue |
|---|---|---|---|
| 11:00 | **Exit meeting**<br>EduTA Team leader present the first draft of the report including:<br>- Conclusions<br>- Recommendations<br><br>Feedback from main national counterpart<br><br>Discussion on the Action Plan (recommendations, responsible persons/ organizations, time frame)<br><br>*Closing Remarks*<br>Main national counterpart's representative<br>Other counterparts' representative<br>EduTA team leader | - Christos Housiadas<br>EEAE Chairman<br>- Sotirios Economides<br>RTC Director, EEAE<br>- Efthymios Karabetsos, Director, Directorate of Training, Regulatory Policy, Infrastructure and Research, EEAE<br>- Eleftheria Carinou, Director, Directorate of Licensing and Regulatory Inspections, EEAE<br>- EduTA Team | EEAE |
| 13:00 | End of mission | | |

**APPENDIX III – SITE VISITS**

- EEAE
- National Technical University of Athens
- School of Medicine, University of Athens
- Department of Biomedical Sciences, University of Western Attica

## APPENDIX IV - RECOMMENDATIONS (R), SUGGESTIONS (S) AND GOOD PRACTICES (GP) - PROPOSALS (P)

### IV.1 Core Appraisal

| Area | Sub-area | Recommendations (R), Suggestions (S) or Good Practice (GP) | |
|---|---|---|---|
| LEGAL AND REGULATORY FRAMEWORK FOR EDUCATION AND TRAINING IN RADIATION PROTECTION AND SAFETY | | | |
| **Establishment of national requirements** | **Qualified Expert (in radiation protection) and Radiation Protection Officer** | **R1** | **The EEAE should establish specific competences needed to fulfil the role of RPE.** |
| | | **S1** | **The EEAE should consider detailing further the criteria for the evaluation of applications for the recognition and re-recognition of the RPE, ensuring the relevance of the criteria in respect to radiation protection and safety.** |
| | | **R2** | **The EEAE should establish the competences necessary to effectively fulfil the role of the RPO; these should reflect the expected tasks and activities associated with each RPO category.** |
| | | **R3** | **The EEAE should specify the objectives of RPO re-training along with the topics to be covered within that re-training.** |
| | **Health professionals:** | | |
| | *Medical Physicist* | **S2** | **The Minister of Health should consider extending the clinical training of medical physicists to a period of not less than two years in one of the specialities of medical physics, or three years in two of the specialties of medical physics.** |
| | *Radiological Medical Practitioners* | **S3** | **The EEAE should consider continuing the work to develop guidelines for training programmes in radiation protection for all the categories of radiological medical practitioners involved in medical radiation procedures.** |
| | *All Health Professionals* | **S4** | **The EEAE should consider making provision for re-training programmes for all health professionals.** |

| Area | Sub-area | Recommendations (R), Suggestions (S) or Good Practice (GP) | |
|---|---|---|---|
| | **Other personnel** | **-** | **-** |
| | **Regulatory staff** | **-** | **-** |
| **Verification of the compliance with national requirements** | **Compliance during authorization, and review and assessment** | **S5** | **The EEAE should consider progressing the work already started to provide guidance on the application of the requirements for education, training and competence in protection and safety of all persons engaged in activities relevant to protection and safety.** |
| | **Compliance during inspection** | **-** | **-** |
| | **Compliance with provisions on individuals' qualification in medical exposure** | **-** | **-** |
| **Application of national requirements** | **Planned Exposure Situations** | **R4** | **The EEAE should ensure that employers, registrants and licensees are required to provide all workers engaged in activities in which they are or could be subject to occupational exposure with adequate and periodic retraining in radiation protection and safety, in all exposure situations.** |
| | | **R5** | **The EEAE should ensure that provisions are established requiring employers, registrants and licensees to maintain records of training provided to personnel in radiation protection.** |
| | **Planned Exposure Situations** | **-** | **-** |
| | **Planned Exposure Situations** | **-** | **-** |
| **Establishment of the national policy and strategy for education and training** | | **S6** | **The EEAE should consider developing a more bespoke national strategy for education and training, elaborating on the four core steps and with respect to all national needs and all categories of personnel. A national strategy is a description of how the development of competence is to be supported or maintained; as such, the strategy may usefully include** |

| Area | Sub-area | Recommendations (R), Suggestions (S) or Good Practice (GP) | |
|---|---|---|---|
| | | | **activities other than the direct delivery of training (e.g., development of guidance on training, etc.)** |
| | | **S7** | **The EEAE should consider the development of an action plan to support and monitor the delivery of the national strategy on education and training for all the categories of personnel.** |
| IMPLEMENTATION OF THE LEGAL AND REGULATORY FRAMEWORK FOR EDUCATION AND TRAINING | | | |
| **Analysis of education and training needs** | | **-** | **-** |
| **Design of the national education and training programme** | | **-** | **-** |
| **Development and implementation of the national education and training programme** | | **-** | **-** |
| **Evaluation of a national education and training programme** | | **-** | **-** |

**IV.2 Specific Appraisal**

| Proposals (P) | |
|---|---|
| POSTGRADUATE EDUCATIONAL COURSE IN RADIATION PROTECTION AND THE SAFETY OF RADIATION SOURCES | |
| - | - |

## APPENDIX V – COUNTERPART'S REFERENCE MATERIAL USED FOR THE REVIEW

References provided by counterpart prior to the mission (as per Table 2 in the EduTA Questionnaire provided by counterpart).

| No. | Title of the document |
|---|---|
| [1] | **Presidential Decree 101/2018 (Government Gazette A' 147/03.09.2018):** Transposition into Greek legislation of Directive 2013/59/EURATOM of the Council of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionizing radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom– Establishment of Radiation Protection Regulations. |
| [2] | **Joint Ministerial Decision 45872/2019:** Procedures for the Regulatory Control of Ionizing Radiation Practices -recognition of services and experts (As applicable, amended in accordance with Joint Ministerial Decision No.32083/2022, Government Gazette B' 1552/04.04.2022). |
| [3] | **EEAE Decision 4α/261/07-06-2019 (Government Gazette B' 2460/21.06.2019):** Defining mechanisms for the recognition of radiation protection experts, medical physics experts and occupational health services, authorization of dosimetry services and acceptance of radiation protection officers. |
| [4] | **Hellenic Association of Medical Physicists. Roles and responsibilities of Medical Physicist:** https://www.efie.gr/index.php/en/medical-physicist/the-role-of-mp-in-ionising-radiation. |
| [5] | **Law 4058/2012 (Government Gazette A' 63/23.03.2012):** Provision of security services by armed guards on merchant ships and other provisions. |
| [6] | **Ministerial Decision Γ5α/Γ.Π.οικ. 64843/2018 (Government Gazette B' 4138/20.09.2018):** Establishment, renaming of medical specialties, determination of duration and content of clinical training for obtaining the specialty. |
| [7] | **Ministerial Decision Γ5α/Γ.Π.οικ. 49507/2019 (Government Gazette B' 2836/05.07.2019):** Training for the medical specialty of Nuclear Medicine. |
| [8] | **Ministerial Decision Υ7α/Γ.Π οικ.28799/2012 (Government Gazette B' 1020/03.04.2012):** Defining the interventional radiology specialty. |
| [9] | **Ministerial Decision Γ5α/Γ.Π.οικ. 49499/2019 (Government Gazette B' 2857/05.07.2019):** Training for the medical specialty of interventional cardiology. |
| [10] | **Presidential Decree 160/2014 (Government Gazette A' 242/07.11.2014):** Determination of the conditions for practicing the profession Medical Radiation Technologist. |
| [11] | **Presidential Decree 164/1996 (Government Gazette A' 118/14.06.1996):** Professional Rights of Graduate Medical Radiation Technologists. |

| No. | Title of the document |
|---|---|
| [12] | **Joint Ministerial Decision Γ5/145078/2021 (Government Gazette B' 3202/21.07.2021):** Adaptation of Greek legislation to the provisions of Directive 2008/68/EC of the European Parliament and of the Council, regarding the internal transport of dangerous goods, as its annexes were adapted to scientific and technical progress by Directive (EU) 2020/1833 of the Commission. |
| [13] | **Presidential Decree 67/2022 (Government Gazette A' 173/12.09.2022):** Organization of the Greek Atomic Energy Commission (EEAE). |
| [14] | **IMS Job description scientific personnel EEAE** |
| [15] | **IMS procedure for the training and evaluation of EEAE personnel** |
| [15a] | **Guideline for training and evaluation of inspectors** |
| [16] | **Example of annual training plan for EEAE Ionizing Radiation Unit personnel** |
| [17] | **Inspection check list** |
| [18] | **Review and assessment guideline – Example 1** |
| [19] | **Review and assessment guideline – Example 2** |
| [20] | **Law 4982/2022 which amended Law 4310/2014 (Government Gazette A' 195/15.10.2022):** Establishment, development, management and operation of Business Parks - Unified regulatory framework for Organized Receptors of Manufacturing and Business Activities and other provisions to enhance development. |
| [21] | **Law 3850/2010 (Government Gazette A' 84/02.06.2010):** Ratification of the Code of Laws on Health and Safety at work. |
| [22] | **Law 4085/2012 (Government Gazette A' 194/12.10.2012):** Ratification of the Long-Term Agreement between the International Atomic Energy Agency and the Government of the Hellenic Republic to Support the Greek Atomic Energy Commission as a Regional Training Center in Europe for Radioactivity, Transport and Waste Safety. |
| [23] | **Approval of the national strategy on E & T** |
| [24] | **Training programme in radiological safety and radiation protection, safety in the transport of radioactive materials and safe management of radioactive waste** |
| [24a] | **Guidelines for education, information and training programs in radiation protection for practices involving medical exposure (Physicians involved in fluoroscopically guided procedures)** |
| [24b] | **Guidelines for education, information and training programs in radiation protection for practices involving medical exposure (Non-medical personnel)** |
| [24c] | **Industrial radiography- Lesson plan** |
| [24d] | **Transport of radioactive materials-Lesson plan** |
| [24e] | **Guidelines for the training of emergency workers** |
| [24f] | **Training seminar for occupational health services** |
| [24g] | **RPOs for practices operating radiation generators for security purposes-Lesson plan** |
| [24h] | **RPOs in organizations using radioactive sources for geological studies, industrial, research and educational purposes, calibration and metrological purposes-Lesson plan** |

| No. | Title of the document |
|---|---|
| [24i] | **Veterinary radiology-Lesson plan** |
| [25] | **PGEC Standard Syllabus** |
| [26] | **PGEC 2022-2023 timetable** |
| [27] | **EEAE QMS for E&T activities according to the requirements of the ISO 29993:2017 standard** |
| [28] | **Example of a course evaluation questionnaire** |
| [29] | **EEAE E&T QMS certificate** |
| [30] | **Example of a long-term evaluation questionnaire:** https://docs.google.com/forms/d/e/1FAIpQLSe7t7HwebRq-fDJ_2RTxUIKtnta9zp4UUPxsl3gwIlw0hY5tw/viewform?pli=1 |
| [31] | **Publication:** The impact of radiation protection training on the radiological safety and the related culture of exposed workers in Greece |
| [32] | **Example of MoU between EEAE and national institutions** |
| [33] | **EEAE Annual RTC report 2023 EEAE** |
| [34] | **Host Country Agreement** |
| [35] | **CLP4NET platform** https://www.iaea.org/resources/databases/cyber-learning-platform-for-network-education-and-training-clp4net |
| [36] | **Standardized table for RTCs-Greece** |
| [37] | **PGEC certificate** |

Additional references provided by counterpart prior or during the mission.

| No. | Title of the document |
|---|---|
| [38] | Approval of national strategy on E&T 2015 |
| [39] | Approval of national strategy on E&T 2023 |
| [40] | Circular Strategy E&T |
| [41] | Course syllabus Customs personnel |
| [42] | Undergraduate Program of the Department of Dentistry for students admitted from the 2020-2021 academic year onwards |
| [43] | Industrial radiography lesson plan |
| [44] | MP programme - UPATRAS |
| [45] | MP programme - NKUA |
| [46] | Educational programme for Physicians |
| [47] | Outside workers lesson plan |
| [48] | Radiation Oncology specialist training book |
| [49] | RPO Nucleonic control systems (NCS)_lesson plan |

| No. | Title of the document |
|---|---|
| [50] | Special Training Seminar for Class 7 Dangerous Goods Safe Transport Consultants |
| [51] | Veterinary radiology lesson plan |
| 52 | Radiology assistant - study guide |

## APPENDIX VI – IAEA REFERENCE MATERIAL USED FOR THE REVIEW


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3. INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, Occupational Radiation Protection, IAEA Safety Standards Series No. GSG-7, IAEA, Vienna (2018).
4. INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, PAN AMERICAN HEALTH ORGANIZATION, WORLD HEALTH ORGANIZATION, Radiation Protection and Safety in Medical Uses of Ionizing Radiation, IAEA Safety Standards Series No. SSG-46, IAEA, Vienna (2018).
5. INTERNATIONAL ATOMIC ENERGY AGENCY, Establishing the Infrastructure for Radiation Safety, Safety Standards Series No. SSG-44, IAEA, Vienna (2018).
6. INTERNATIONAL ATOMIC ENERGY AGENCY, A Methodology for Establishing a National Strategy for Education and Training in Radiation, Transport and Waste Safety, Safety Reports Series No. 93, IAEA, Vienna, (2018)
7. INTERNATIONAL ATOMIC ENERGY AGENCY, Managing Regulatory Body Competence, Safety Reports Series No. 79, IAEA, Vienna, (2014).
8. INTERNATIONAL ATOMIC ENERGY AGENCY, Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources, Training Course Series No. 18 (Rev. 1), IAEA, Vienna (2019)
9. INTERNATIONAL ATOMIC ENERGY AGENCY, Methodology for the Systematic Assessment of the Regulatory Competence Needs (SARCoN) for Regulatory Bodies of Radiation Facilities and Activities, IAEA-TECDOC-1860, IAEA, Vienna (2019)
10. INTERNATIONAL ATOMIC ENERGY AGENCY, Roles and responsibilities, and education and training requirements for clinically qualified medical physicists, Human Health Series No 25, IAEA, Vienna (2013)
11. INTERNATIONAL ATOMIC ENERGY AGENCY, Guidelines for the Certification of Clinically Qualified Medical Physicists, Endorsed by the International Medical Physics Certification Board (IMPCB) and the International Organization for Medical Physics (IOMP). IAEA Training Course Series No. 71, IAEA, VIENNA, (2021)

## APPENDIX IV – GLOSSARY

**competence** [IAEA SRS-79]

Competence is the combination of knowledge, skills and attitudes (KSAs) needed by a person to perform a particular job. All three are important and interrelate.

**Knowledge** is familiarity with something and can include facts, descriptions and information acquired through experience or education. It can refer to both the theoretical and the practical understanding of a subject.

**Skill** is the learned capacity to perform a task to a specified standard. Attitude is the feelings, opinions, ways of thinking, perceptions, values, behaviour and interests of an individual which allow a job or task to be undertaken to the best ability of that individual.

**Attitudes** cannot wholly be taught directly and are partly a consequence of the organizational culture.

Competence may be developed through a combination of education, (vocational) training and experience [SSG-75].

**facilities and activities** [IAEA GSR Part 3 – Definitions]

A general term encompassing nuclear facilities, uses of all sources of ionizing radiation, all radioactive waste management activities, transport of radioactive material and any other practice or circumstances in which people may be subject to exposure to radiation from naturally occurring or artificial sources.

**Facilities** includes: nuclear facilities; irradiation installations; some mining and raw material processing facilities such as uranium mines; radioactive waste management facilities; and any other places where radioactive material is produced, processed, used, handled, stored or disposed of — or where radiation generators are installed — on such a scale that consideration of protection and safety is required.

**Activities** includes: the production, use, import and export of radiation sources for industrial, research and medical purposes; the transport of radioactive material; the decommissioning of facilities; radioactive waste management activities such as the discharge of effluents; and some aspects of the remediation of sites affected by residues from past activities.

This term is intended to provide an alternative to the terminology of sources and practices (or intervention) to refer to general categories of situations. For example, a practice may involve many different facilities and/or activities, whereas the general definition (1) of source is too broad in some cases: a facility or activity might constitute a source, or might involve the use of many sources, depending upon the interpretation used.

The term facilities and activities is very general, and includes those for which little or no regulatory control may be necessary or achievable: the more specific terms **authorized facility** and **authorized activity** should be used to distinguish those facilities and activities for which any form of authorization has been given.

In the Fundamental Safety Principles (Safety Fundamentals), the term ‘facilities and activities — existing and new — utilized for peaceful purposes’ is abbreviated for convenience to facilities and activities as a general term encompassing any human activity that may cause people to be exposed to radiation risks arising from naturally occurring or artificial sources (see ICRP 103, para. 1.9).

**emergency exposure situation** [IAEA GSR Part 3 – Definitions]

A situation of exposure that arises as a result of an accident, a malicious act or other nexpected event, and requires prompt action in order to avoid or reduce adverse consequences.

Emergency exposures can be reduced only by protective actions and other response actions.

**existing exposure situation** [IAEA GSR Part 3 – Definitions]

A situation of exposure that already exists when a decision on the need for control needs to be taken.

Existing exposure situations include exposure to natural background radiation that is amenable to control; exposure due to residual radioactive material that derives from past practices that were never subject to regulatory control or exposure due to residual radioactive material deriving from a nuclear or radiological emergency after an emergency has been declared to be ended.

**medical exposure** [IAEA GSR Part 3 – Definitions]
Exposure incurred by patients for the purposes of medical or dental diagnosis or treatment; by carers and comforters; and by volunteers subject to *exposure* as part of a programme of biomedical research.

A ***patient*** is an individual who is a recipient of services of health care professionals and/or their agents that are directed at (1) health promotion; (2) prevention of illness and injury; (3) monitoring health; (4) maintaining health; and (5) medical treatment of diseases, disorders and injuries in order to achieve a cure or, failing that, optimum comfort and function. Some asymptomatic individuals are included. For the purpose of these Standards, the term 'patient' refers only to those individuals undergoing radiological procedures.

**occupational exposure** [IAEA GSR Part 3 – Definitions]
Exposure of workers incurred in the course of their work.

**public exposure** [IAEA GSR Part 3 – Definitions]
Exposure incurred by members of the public due to sources in planned exposure situations, emergency exposure situations and existing exposure situations, excluding any occupational exposure or medical exposure.

**planned exposure situation** [IAEA GSR Part 3 – Glossary]
A planned exposure situation is a situation of exposure that arises from the planned operation of a source or from a planned activity that results in an exposure from a source.

Since provision for protection and safety can be made before embarking on the activity concerned, associated exposures and their probabilities of occurrence can be restricted from the outset. The primary means of controlling exposure in planned exposure situations is by good design of installations, equipment and operating procedures. In planned exposure situations, a certain level of exposure is expected to occur.

**regulatory body** [IAEA GSR Part 3 – Glossary]
An authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

The national competent authority for the regulation of radioactive material transport safety [SSR-6] is included in this description, as is the regulatory body for protection and safety.