

Pursuant to Article 16 (1), Articles 17 and 18 of the Law on Radiation and Nuclear Safety in Bosnia and Herzegovina (Official Gazette of BiH 88/07), the director of the State Regulatory Agency for Radiation and Nuclear Safety issues

REGULATION ON RECOGNITION OF THE QUALIFIED EXPERT STATUS

Article 1 (Subject)

This regulation lays down requirements for natural and legal persons regarding recognition of the qualified expert status, responsibilities of the qualified expert, criteria and procedure for recognition of the expert status, the contents of the application form, the contents and layout of the certificate of recognition of the expert status, obligations of the authorization holder, the syllabus of the required knowledge for recognition of the expert status, and as well other important matters relating to recognition of the qualified expert status.

Article 2 (Objective)

This regulation aims to establish and maintain the system of recognizing the status of qualified expert in radiation protection, in radioactive waste management or in the transport safety of radioactive material.

Article 3 (Definitions)

The terms, as used in this regulation, mean:

- a) **Qualified expert:** An individual with appropriate expertise in a relevant specific field. It is an individual with the necessary knowledge and relevant training to carry out physical, chemical or radiochemical tests enabling doses to be assessed, and to give an expert opinion in order to ensure effective protection of individuals and the correct use and operation of protective and measuring equipment, and is responsible for technical aspects of radiation protection of exposed workers and members of the public.
- b) **Qualified radiation protection expert:** Based on the professional assessment, measuring and assessment, qualified radiation protection expert (hereinafter: radiation protection expert) gives an expert opinion to the authorization holder about the matters relating to occupational exposure and public exposure. It is an individual having the knowledge, training and experience needed for an expert opinion in the field of radiation protection in order to ensure effective protection of individuals, and who has met all criteria for recognizing the status of radiation protection expert, as defined in this regulation.
- c) **Qualified expert in radioactive waste management:** Qualified expert in radioactive waste management (hereinafter: expert in radioactive waste management) is an individual having the specific knowledge, experience and competency to give an expert opinion to the authorization holder and the operator of the storage facility for radioactive waste, which is relevant for the safe management of radioactive waste and radiation protection of the

environment. It is an individual who has met the criteria for recognizing the status of expert in radioactive waste management, as defined in this regulation.

- d) **Qualified expert in the transport safety of radioactive material:** Qualified expert in the transport safety of radioactive material (hereinafter: expert in transport safety) is an individual who gives an expert opinion to the authorization holder, which is relevant for the safe transport, packing, loading and unloading of radioactive material. It is an individual who has met all criteria for recognizing the status of expert in transport safety, as defined in this regulation.
- e) **Engaged suitable qualified expert:** An individual who has met all criteria for recognizing the qualified expert status and whom the holder of authorization for practices involving radiation sources must engage as an expert with necessary knowledge and experience relevant for specific type of activities carried out by the authorization holder.
- f) **Medical practices:** Dental roentgenology, diagnostic and intervention radiology, radiotherapy, and nuclear medicine (diagnostics and therapy).
- g) **Non-medical practices:** Non-destructive testing – radiographic testing (industrial radiography), industrial radiation used for sterilization, well examination, measuring with portable measuring instruments, detection or analytical techniques (thickness, density, level, humidity, etc.), measuring with fixed measuring instruments, detection or analytical techniques (thickness, density, level, humidity, etc.), non-medical application of open radioactive sources, and the production of radiation emitting devices and accessory equipment.

Article 4

(Responsibilities of the experts)

- (1) The radiation protection expert, as classified by individual practices, is:
 - a) Radiation protection expert in medical practices;
 - b) Radiation protection expert in non-medical practices;
 - c) Radiation protection expert in higher education and scientific & research work.
- (2) The radiation protection expert shall conduct all tests required for dose assessment and provide the legal person with a professional and independent expert opinion in the field of radiation protection in occupational exposure and public exposure in accordance with applicable regulations in one of the practices referred to in paragraph (1) in which the expert is recognized.
- (3) The radiation protection expert shall conduct all tests required for dose assessment and provide the legal person with a professional and independent expert opinion in the field of radiation protection in occupational exposure and public exposure, in accordance with applicable regulations in other practices that are not listed in paragraph (1).
- (4) After the status recognition, the expert in radioactive waste management shall provide the legal person and the operator of storage facility for radioactive waste with an expert opinion on radioactive waste management and radiation protection of the environment in accordance with applicable regulations.
- (5) After the status recognition, the expert in transport safety shall provide the legal person with an expert opinion on the transport of radioactive material in accordance with

applicable regulations.

- (6) The expert shall send a copy of the expert opinion to the State Regulatory Agency for Radiation and Nuclear Safety (hereinafter: Agency) simultaneously with a copy for the legal person.

Article 5

(Certificate of status recognition)

- (1) To perform as an expert in accordance with applicable regulations, the candidate for status recognition must obtain the certificate of recognition of the qualified expert status.
- (2) The contents and layout of the certificate referred to in paragraph (1) are determined by the Agency.
- (3) The contents and layout of the certificate are shown in Annex 1, which is an integral part of this regulation.
- (4) The certificate must be kept legible and it shall be placed on a visible location in the premises of the legal person or the authorization holder.

Article 6

(The first recognition of the status)

The legal, i.e., natural person, shall submit evidence on the fulfillment of general and specific requirements, and submit the evidence list for the purpose of recognizing the expert status.

A. GENERAL REQUIREMENTS FOR STATUS RECOGNITION

(a) Education:

- 1) The candidate for radiation protection expert in medical practices shall submit a proof on a completed faculty of natural sciences and mathematics – department of physics – or a faculty of electrical engineering, with minimum 240 ECTS.
- 2) The candidate for radiation protection expert in non-medical practices shall submit a proof on a completed faculty of mechanical engineering or a faculty of natural sciences and mathematics – department of physics or chemistry – or a faculty of electrical engineering, with minimum 240 ECTS.
- 3) The candidate for radiation protection expert in higher education and scientific & research work shall submit a proof on a completed faculty of mechanical engineering or a faculty of natural sciences and mathematics – department of physics or chemistry – or a faculty of electrical engineering, with minimum 240 ECTS.
- 4) The candidate for expert in radioactive waste management shall submit a proof on a completed faculty of mechanical engineering or a faculty of natural sciences and mathematics – department of physics or chemistry – or a faculty of electrical engineering, with minimum 240 ECTS.

- 5) The candidate for expert in the transport safety of nuclear material shall submit a proof on a completed technical faculty or a faculty of natural sciences and mathematics, with minimum 240 ECTS, and on the possession of an ADR license.

(b) Work experience

- 1) The candidate for radiation protection expert in medical practices is an individual:
 - i. occupationally exposed to ionizing radiation;
 - ii. with three years of experience in medical physics (in diagnostic radiology or nuclear medicine or radiotherapy).
- 2) The candidate for radiation protection expert in non-medical practices is an individual:
 - i. occupationally exposed to ionizing radiation;
 - ii. with three years of experience in industrial application of radiation sources or three years of experience in radiation protection.
- 3) The candidate for radiation protection expert in higher education and scientific & research work is an individual:
 - i. with five years of experience in the use of radiation sources in higher education and scientific & research work;
- 4) The candidate for expert in radioactive waste management is an individual:
 - i. occupationally exposed to ionizing radiation;
 - ii. with five years of experience in radioactive waste management.
- 5) The candidate for expert in the transport safety of radioactive material is an individual with three years of experience in the transport of radioactive material.

B. SPECIFIC REQUIREMENTS FOR STATUS RECOGNITION

- 1) The candidate for radiation protection expert in medical practices shall submit a proof of a radiation protection training equivalent to a course of at least three hundred (300) hours under the basic syllabus and additional part relating to medicine, which are shown in table 1 of Annex 2 of this regulation and make its integral part.
- 2) The candidate for radiation protection expert in non-medical practices shall submit a proof of a radiation protection training, equivalent to a course of at least eighty (80) hours under the basic syllabus and additional part relating to general industry, which are shown in table 1 of Annex 2 of this regulation and make its integral part.
- 3) The candidate for radiation protection expert in higher education and scientific & research work shall submit a proof of a radiation protection training, equivalent to a course of at least eighty (80) hours under the basic syllabus and additional part relating to research and training, which are shown in table 1 of Annex 2 of this regulation and make its integral part.

- 4) The candidates for radiation protection experts referred to in paragraphs (1), (2) and (3) shall demonstrate practical competency in the five elements from the basic syllabus for which the level of Detailed Understanding (DU) is required, and which are listed in table 1 of Annex 2, as follows: 10c, 11b, 11c, 11e and 12f.
- 5) The candidate for expert in radioactive waste management shall submit a proof of a training in radioactive waste management, equivalent to a course of at least eighty (80) hours under the basic syllabus, which is shown in table 1 of Annex 3 of this regulation and make its integral part.
- 6) The candidate for expert in radioactive waste management shall demonstrate practical competency in the six elements from the basic syllabus for which the level of Detailed Understanding (DU) is required, and which are listed in table 1 of Annex 3, as follows: 10c, 11b, 11d, 12d, 13a and 13c.
- 7) The candidate for expert in radioactive waste management whose status of a radiation protection expert is already recognized shall submit evidence for the requirements listed in table 1 of Annex 3, as follows: 10c, 10d, 10e, 10f, 11b, 11d, 11e, 11f and 12a.
- 8) The candidate for expert in the transport safety of radioactive material shall submit a proof of training in transport of radioactive material, equivalent to a course of at least eighty (80) hours under the basic syllabus, which is shown in table 1 of Annex 4 of this regulation and makes its integral part.
- 9) The candidate for recognition of the expert status must submit a proof for each item listed in the basic syllabus and the additional part.

C. EVIDENCE LIST FOR STATUS RECOGNITION

- 1) The candidate for recognition of the expert status shall submit evidence of competency in their field.
- 2) The candidate for recognition of the expert status shall prove their competency by making the evidence list on a prescribed form and submitting it to the Agency.
- 3) The candidate for recognition of the expert status shall fill out all fields listed on the form the contents and layout of which are determined by the Agency.
- 4) The contents and layout of the evidence list are shown in Annex 5 of this regulation and make its integral part.

Article 7

(Administrative procedures)

- (1) The legal or natural person shall submit the application for recognition of the expert status to the Agency.
- (2) The application consists of:

- a) the application form shown in Annex 6;
- b) certified copy of an identification document;
- c) the required documentation for general requirements, specific requirements and the evidence list referred to in Article 6.

Article 8
(Use of the title)

The candidate whose expert status is recognized by the Agency may use the title "radiation protection expert," "expert in radioactive waste management" or "expert in the transport safety of radioactive material" in their work, professional introduction, and write it after their full name.

Article 9
(Procedure for status recognition)

The procedure for status recognition and evaluation of the candidate who or for whom the legal person applied for recognition of the expert status will be conducted by the commission for status recognition, which shall be established by the Agency.

Article 10
(Commission for status recognition)

- (1) The chair and members of the Commission for recognition of the expert status (hereinafter: commission) shall be appointed under a procedural decision issued by the Agency director for a two-year period, with a possibility of reappointment.
- (2) The commission consists of five members, three of whom are external and two from the Agency.
- (3) The commission members must have at least seven years of experience in radiation protection and the application of radiation sources.
- (4) At least one of the commission members must be a recognized radiation protection expert in their country of origin.
- (5) One of the commission members must have a university degree in law and a work experience in radiation protection.
- (6) The commission will adopt its rules of procedure at its constituting session.

Article 11
(Criteria for the selection of the commission members)

In addition to the provisions from Article 10, the commission members shall meet the following general criteria:

- a) being active in their field of work;
- b) act independently and remain impartial;
- c) actively contribute to the field of their work at the national and international levels.

Article 12
(Commission sessions)

- (1) The commission works and makes decisions in the sessions that are convened as needed.
- (2) As an exception, the commission may hold a conference call session.
- (3) The sessions shall be convened by the commission chair, and the minutes of the commission's work will be taken.
- (4) As needed, the sessions may be audio recorded.
- (5) The minutes of the commission's work shall be kept in the Agency archive for the period defined in applicable regulations.

Article 13
(Convening the sessions and adopting proposals)

- (1) The commission chair shall send to the commission members invitations for the session including a proposal of the agenda one week before holding the session.
- (2) The session may be held if more than one half of the commission members are present.
- (3) Voting at the session of the commission shall be open, and the proposals of decisions shall be adopted by simple majority of all commission members.
- (4) A member of the commission who dissents from the decision may request that his dissenting opinion, including an explanation, be entered into the minutes.

Article 14
(Secretary of the commission)

Administrative duties relating to the work of the commission will be performed by the secretary of the commission, who shall be appointed by the Agency director from among the Agency personnel under a procedural decision.

Article 15
(First recognition of the status)

- (1) The commission shall adopt the proposal of decision on the first recognition of the expert status within 30 days from the date of receiving the application referred to in Article 7.
- (2) The commission shall submit the proposal of the decision referred to in paragraph (1) to the Agency director, who shall issue the final procedural decision on the status recognition within seven days from the date of receiving the proposal.
- (3) The candidates whose expert status is recognized will be issued a certificate on status recognition.

- (4) The first recognition of the expert status is limited to a five-year period.

Article 16

(Register of experts)

- (1) The Agency maintains a register of individuals with recognized expert status.
- (2) The register of individuals with recognized expert status and legal persons in which the experts are employed will be published on the Agency's official Internet site.

Article 17

(Non-fulfillment of requirements)

- (1) If the committee has established that a candidate has not fulfilled the requirements for the first recognition of the expert status, it will make a relevant proposal of procedural decision.
- (2) The proposal of procedural decision shall be submitted to the Agency director.
- (3) The Agency director shall issue the final procedural decision rejecting the application for status recognition, which will be sent to the legal or natural person.
- (4) The explanation of the procedural decision referred to in paragraph (3) shall indicate the criteria for status recognition that have not been met.

Article 18

(Appeal)

- (1) If a candidate was refused recognition of the expert status, the legal or natural person has the right to appeal.
- (2) The appeal shall be sent to the Agency within 15 days from the date of receiving the procedural decision rejecting the recognition of the expert status.
- (3) In case referred to in paragraph (2), the Agency director shall issue a procedural decision on the establishment of a second-instance commission of three members, which will review the appeal in question.
- (4) The second-instance commission shall submit a proposal of procedural decision to the Agency director, who will issue the final procedural decision on appeal within 15 days from the date of receiving the proposal, and the final decision will be sent to the legal or natural person.
- (5) The appeal procedure is conducted on the principles of administrative proceeding.

Article 19

(Repeated procedure)

If the expert status has not been recognized to a candidate, the legal or natural person may reinitiate the procedure for status recognition within at least six months from the date of issuing the procedural decision referred to in Article 18(4).

Article 20

(Revoking the recognition of expert status)

- (1) The Agency may revoke the recognition of expert status if an expert:
 - a) refuses to give the requested expert opinion;
 - b) falsifies the information in the application for recognition of the expert status or in the documents the expert has signed during their work;
 - c) uses the methods or procedures that do not meet the existing accepted professional standards;
 - d) fails to appropriately supervise or instruct the individuals who conduct tests or collect data under the expert's supervision, i.e., signature;
 - e) fails to submit adequate documentation to the Agency;
 - f) fails to submit relevant evidence of initial or continuous training and work experience.
- (2) In cases referred to in paragraph (1) the Agency director shall establish a separate three-member commission in which one of the members shall be an expert, and which will establish the facts and adopt a relevant proposal on revoking the recognition.
- (3) Based on the commission proposal, the Agency director shall issue a procedural decision revoking the recognition, which will be sent to the legal or natural person.

Article 21

(Appeal against the revocation of recognition)

- (1) The legal or natural person has the right to appeal if the recognition of expert status has been revoked.
- (2) The appeal shall be sent to the Agency within 15 days from the date of receiving the procedural decision revoking the recognition of expert status.
- (3) In that case, the Agency director shall issue a procedural decision establishing a second-instance commission of three members, which will review the grounds of the initial procedural decision.
- (4) The second-instance commission shall submit a proposal of procedural decision to the Agency director, who will issue the final procedural decision on appeal within 15 days from the date of receiving the proposal.
- (5) The appeal procedure is conducted on the principles of administrative proceeding.
- (6) After the revocation of the recognition of expert status, the legal or natural person may not

apply for status recognition for the relevant candidate for the next three years.

Article 22

(Renewal of the status recognition)

- (1) The legal or natural person shall submit the application for renewal of recognition of the expert status after the expiry of the first five-year period of status recognition.
- (2) Within six months before the expiry of the first recognition of expert status, the Agency shall inform the legal or natural person in writing that the certificate validity period will expire and that it is necessary to renew the certificate.
- (3) The legal or natural person shall submit the application for renewal of the status recognition within three months before the validity of the first recognition expires.
- (4) The validity period for the renewed status recognition is five years.

Article 23

(Requirements for the renewal of status recognition)

- (1) The legal or natural person shall submit evidence on continuous training and professional development of the candidate to the Agency commission for review with the aim of renewing the status recognition.
- (2) In addition to the certificate on the first status recognition, the evidence referred to in paragraph (1) shall contain:
 - a) clear understanding of the expert's role;
 - b) detailed knowledge of the relevant legislation;
 - c) knowledge of the legislative development in the past period; and
 - d) knowledge of technological advances relevant for the expert's field of work.

Article 24

(Obligations of the authorization holder)

- (1) The holder of authorization for practices involving radiation sources whose activities require the engagement of an expert shall engage a relevant expert for some assignments.
- (2) The authorization holder may engage the legal person which employs a radiation protection expert on the basis of a contract on business and technical cooperation.
- (3) The authorization holder may engage an expert on full-time basis or as a consultant, depending on the contents of the requested expert opinion and under the relevant contract.
- (4) The authorization holder shall engage a consultant–external associate under a contract with the legal person employer of the expert or with a natural person.
- (5) The authorization holder shall ensure that the expert has access to all information and

premises that are needed for expert's work. The information shall include a clear statement about the contents of the required expert opinion.

- (6) Using a particular form, the authorization holder shall inform the Agency about the engaged suitable expert within 30 days from the date of engaging the expert.
- (7) The contents and the layout of the form are determined by the Agency.
- (8) The form referred to in paragraph (7) is shown in Annex 7, which is an integral part of this regulation.

Article 25
(Guidelines)

- (1) The Agency shall issue the Guideline for filling the application form and the Guideline for creation of evidence list, which the candidate for recognition of the expert status shall follow.
- (2) The guidelines will be published on the Agency's official web page.

Article 26
(Foreign citizens)

- (1) A foreign citizen may apply for recognition of the expert status if their labor status is legally regulated in Bosnia and Herzegovina.
- (2) The applicant for recognition of the expert status shall meet the provisions of this regulation in the field in which they apply for recognition of the expert status.
- (3) All evidence required for status recognition shall be submitted in one of the official languages in Bosnia and Herzegovina.

Article 27
(Transitional provisions)

- (1) Legal persons shall harmonize their business with the provisions of this regulation within three months from the date of entering this regulation into force.
- (2) Any non-compliance with this regulation will be punished in accordance with applicable regulations.

Article 27
(Entering into force)

This regulation shall enter into force on the eighth day following the date of its publication in the Official Gazette of BiH.

Ref. no.
Sarajevo,

/14

2014

DIRECTOR
Emir Dizdarević

ANNEXES

Annex 1: Certificate of recognition of the expert status

BOSNA I HERCEGOVINA
Državna regulatorna/regulativna
agencija za radijacijsku i
nuklearnu sigurnost



БОСНА И ХЕРЦЕГОВИНА
Државна регулаторна
агенција за радијациону и
нуклеарну безбедност

State Regulatory Agency for Radiation and Nuclear Safety

Pursuant to Article 16(1), Article 17 and Article 18 of the Law on radiation and Nuclear Safety in Bosnia and Herzegovina, the State Regulatory Agency for Radiation and Nuclear Safety issues

CERTIFICATE on recognition of the expert status

.....
(name of the candidate who has met the criteria for recognition of the expert status)
.....

(expert's title and practices)

Director
.....

Sarajevo,(date).....

This certificate is valid until / /20 .

Certificate no.:

Annex 2: Basic syllabus and additional part

Table 1: Syllabus of the required knowledge for the radiation protection expert

Topics of basic syllabus and additional part	Contents	Level of required knowledge
1. Fundamentals of atomic and nuclear physics	<ul style="list-style-type: none"> • Natural and artificial (man-made) radioactivity. Fundamental laws. • Nature and properties of radiation. • Nuclear reactions. Cross section of nuclear reaction. Nuclear fission. • Radiation emitting electronic devices. • Characteristics of radiation sources and radiation emitting electronic equipment used in medicine, scientific research and industrial radiography. • Protection from ionizing radiation sources • Calculation for protective barriers <ul style="list-style-type: none"> ○ Charged particles. <i>Bremsstrahlung</i> (braking radiation). ○ Electromagnetic radiation. <ul style="list-style-type: none"> ▪ Calculation of protection for point sources, calculation of protection for larger sources of simple geometry ○ Neutrons <ul style="list-style-type: none"> ▪ Consideration of neutron activation mechanisms in the calculation for protective barriers. 	BU(*)
2. Fundamentals of radiation biology	<ul style="list-style-type: none"> • Mechanisms of ionizing radiation effects on living organisms. • Radiosensitivity of cells. • Cell response to radiation. Modifying factors. • Overall response of the system and organs to radiation. Somatic and genetic effects. • Damage caused by ionizing radiation effects. • Epidemiological studies. 	BU
3. Interaction of radiation with matter	<ul style="list-style-type: none"> • Charged particles, photons, neutrons • Types of nuclear reactions • Induced radioactivity 	BU
4. Biological effects of radiation	<ul style="list-style-type: none"> • Deterministic biological effects of ionizing radiation • Stochastic biological effects of ionizing radiation • Relation dose – response • Effects of whole body irradiation 	BU

	<ul style="list-style-type: none"> • Effects of partial irradiation 	
5. Detection and measurement methods (including measurement uncertainty and detection limits)	<ul style="list-style-type: none"> • Physical principles of detection. • Detection and measurement systems. • Quality control, calibration and verification of the system for detection and measuring. • Counting statistics and errors. Unreliability. Detection limits. Statistical processing of results. 	BU
6. Quantities and units (including the regulatory dosimetric quantities)	<ul style="list-style-type: none"> • Quantities and units • Types of doses (absorbed dose, equivalent dose, effective dose, committed dose) • Dose limits and restrictions • Dosimetric calculations 	BU
7. Main standards in radiation protection (epidemiology, LNT hypothesis for stochastic and deterministic effects)	<ul style="list-style-type: none"> • Total response of the system and organs to radiation. Somatic and genetic effects. Stochastic and deterministic effects. • Damage caused by ionizing radiation effects. • Epidemiological studies 	BU
8. ICRP principles		
8a. Justification	<ul style="list-style-type: none"> • Justification of practice 	BU
8b. Optimization	<ul style="list-style-type: none"> • Optimization of protection 	BU
8c. Dose limitation	<ul style="list-style-type: none"> • Dose limits 	BU
9. Practices and interventions (including background radiation)	<ul style="list-style-type: none"> • Practices and interventions 	BU
10. Legal basis	<ul style="list-style-type: none"> • Conceptual framework (ICRP main framework, justification / optimizations / dose limits, protection system for interventions) • International organizations (IAEA, ICRP, ICRU, UNSCEAR, OECD) 	GK ^(*)
10a. International recommendations/conventions		
10b. EU legislation	<ul style="list-style-type: none"> • Relevant EURATOM directives from the field of radiation protection 	GK
10c. Legislation in Bosnia and Herzegovina (including competent authorities)	<ul style="list-style-type: none"> • Law • Regulatory body • Regulatory system 	DU ^(*)
10d. Other relevant legislation	<ul style="list-style-type: none"> • Regulation on the radiation protection in occupational exposure and public exposure 	BU
11. Operational radiation protection		
11a. Types of radiation sources (sealed, open, X-ray devices, accelerators)	<ul style="list-style-type: none"> • Types of radiation sources – open and sealed • Radiation sources – natural and manufactured • Use of radiation sources (medicine, research, industry, accelerators, nuclear medicine, radiotherapy, etc.) 	BU
11b. Assessment of hazards and risks (including	<ul style="list-style-type: none"> • Radiation risk associated with radiation installations during routine activities and in 	DU

environmental impact)	<p>emergencies.</p> <ul style="list-style-type: none"> • External irradiation. • Contamination. Pathways of incorporation, deposition and elimination from the human body. • Environmental impact. Radiation sources. Exposure pathways. • Analysis of radiation hazards of the installation. • Radiation safety measures associated with the design (site selection, designing, selection of sources and devices, measuring instruments, protection systems). 	
11c. Minimization of risk	<ul style="list-style-type: none"> • Establishment of work standards, access and stay in the areas with radiation risk • Contamination of workers – reduction /minimization / extraordinary measures • Appropriate balance between dose to workers and dose to population • Control of exposure 	DU
11d. Control of release into the environment	<ul style="list-style-type: none"> • Radiation monitoring, contamination, effluents and radioactive waste • System for restricting release into the environment • Methodology for calculating release into the environment for liquid and gas effluents • Atmospheric and hydrological dispersion • Radiological analytical studies • Program of monitoring environmental radiation 	BU
11e. Monitoring: area, personal dosimetry (external, internal, biological)	<ul style="list-style-type: none"> • Main personal dosimetric systems. Characteristics and application. • Direct and indirect methods of establishing internal contamination. Dose assessment. • Dosimetry of the workspace and area. • Biological indicators. • Maintenance, verification and calibration of the system for detecting and measuring ionizing radiation. • Dosimetric and medical surveillance of exposed workers. 	DU
11f. Critical dose concept / calculation of dose to critical group	<ul style="list-style-type: none"> • Defining the critical group • Assessment of dose to critical group 	GK
11g. Ergonomy (user-friendly design and the look of instruments)		GK
11h. Operational rules and emergency planning	<ul style="list-style-type: none"> • Relevant aspects of documented procedures for radioactive waste management 	BU

response	<ul style="list-style-type: none"> • Personnel formation and training 	
11i. Procedures for radiation emergencies	<ul style="list-style-type: none"> • Relevant aspects of emergency planning response • Reporting requirements • Investigation of incidents • Requirements for environmental monitoring in radiation emergencies 	BU
11j. Remediation activities / decontamination	<ul style="list-style-type: none"> • Post-incident monitoring • Remediation measures • Post-incident protection of the public • Availability of equipment, and methods for action in case of spill of radioactive material; other incidents 	BU
11k. Analysis of past incidents, including lessons learned		GK
12. Organization of radiation protection		
12a. Role of radiation protection experts, technical services, radiation protection department and radiation protection officer	<ul style="list-style-type: none"> • Role of radiation protection experts, technical services, radiation protection department and radiation protection officer 	BU
12b. Safety culture		BU
12c. Communication skills	<ul style="list-style-type: none"> • Effective communication 	BU
12d. Keeping records (sources, doses, unusual occurrences)	<ul style="list-style-type: none"> • Keeping records under the legislation • Contents, format and maintaining records 	BU
12e. Approvals for work and other authorizations		BU
12f. Establishment of areas and classification of workers	<ul style="list-style-type: none"> • Classification of exposed workers and areas, depending on associated risk • Controlled and supervised areas 	DU
12f. Quality control/audit	<ul style="list-style-type: none"> • Role of radiation protection expert in audit 	BU
12g. Cooperation with contractors	<ul style="list-style-type: none"> • Expert opinion for the authorization holder about the procedures for contractors and visitors in order to meet applicable provisions 	GK
13. Radioactive waste management		
13a. Management principles	<ul style="list-style-type: none"> • Options for radioactive waste management 	GK
13b. Disposal principles	<ul style="list-style-type: none"> • Options for radioactive waste disposal 	GK
13. Transport	<ul style="list-style-type: none"> • Transport of radioactive material in accordance with applicable regulations 	GK
14. Security of radioactive material	<ul style="list-style-type: none"> • Understanding where to obtain needed advice • Security requirements for radiation sources 	BU

	<p>during their use, storage and transport in accordance with the applicable regulation</p> <ul style="list-style-type: none"> • Understanding the purpose and use of the security plan • Understanding the protection of sensitive information 	
<p>15. Additional part</p> <p>15a. General industry:</p> <p>(a) Use of sealed sources: - specific problems relating to:</p> <ul style="list-style-type: none"> • controlled access, particularly in case of remote locations • transport (outdoor radiography, mobile sources) • accidental exposure of the workers other than exposed workers • safety culture (proper handling) • potential hazards of specific sealed sources • practical examples of past accidents and wrong use <p>(b) Use of open sources</p> <ul style="list-style-type: none"> • hazards in the use of isotopes (including careless use) • special aspects of waste management (including release to the air and in liquid condition) • specific hazards associated with background radiation <p>15b. Research and training</p> <ul style="list-style-type: none"> - Potential hazards facing researchers and trainers - Design of experiments (their understanding) - Accelerators (particular 		<p>BU</p> <p>BU</p> <p>BU</p>

<p>problems in the research/training environment)</p> <ul style="list-style-type: none"> - Particular problems with X-rays (e.g., crystallography) - Hazards in the use of isotopes (including careless handling) <p>15c. Medical application</p> <ul style="list-style-type: none"> - Types and use of various diagnostic and therapeutic procedures - Awareness of the need to protect patients, particularly of the relevant EU and BiH legislation on radiation protection in medical exposure, including requirements regarding potential exposure and equipment. - Specific problems in the control of exposure: <ul style="list-style-type: none"> a) personnel, visitors, population b) management of hospital waste c) project design for special facilities (special purpose premises) 		<p>BU</p>
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- (*) **GK** – General knowledge
- (*) **BU** – Basic understanding
- (*) **DU** – Detailed understanding

Annex 3: Basic syllabus

Table 1: Syllabus of the required knowledge for the expert in radioactive waste management

Syllabus topics	Contents	Level of required knowledge
1. Fundamentals of atomic and nuclear physics	<ul style="list-style-type: none"> • Structure of the atom and composition of the nucleus • Stable and unstable isotopes, activity • Types of radioactive decay • Nuclear fission • Half life and decay constant • Radiation balance • Effects of time, distance and protective barriers 	BU ^(*)
2. Fundamentals of radiation biology	<ul style="list-style-type: none"> • Fundamentals of radiation chemistry • Radiation effects on cells and tissues 	BU
3. Interaction of radiation with matter	<ul style="list-style-type: none"> • Charged particles, photons, neutrons • Types of nuclear reactions • Induced radioactivity 	BU
4. Biological effects of radiation	<ul style="list-style-type: none"> • Deterministic biological effects of ionizing radiation • Stochastic biological effects of ionizing radiation • Relation dose – response • Effects of whole body irradiation • Effects of partial irradiation 	BU
5. Detection and measurement methods for assessment of radioactive waste and environmental monitoring (including measurement uncertainty and detection limits)	<ul style="list-style-type: none"> • Principles and theory of detection and measuring (effectiveness, basic radiation, geometry, statistics) • Types of detection instruments (gas, ionization chambers, scintillators, termoluminescence, neutron detectors) • Selection of detection instruments • Interpretation of results obtained from measuring instruments 	BU
6. Quantities and units (including the regulatory dosimetric quantities)	<ul style="list-style-type: none"> • Quantities and units • Types of doses (absorbed dose, equivalent dose, effective dose, committed dose) • Dose limits and restrictions • Dosimetric calculations 	BU
7. Main standards in	<ul style="list-style-type: none"> • Linear hypothesis for stochastic effects 	BU

radiation protection (epidemiology, LNT hypothesis for stochastic and deterministic effects)	<ul style="list-style-type: none"> • Threshold hypothesis for deterministic effects • Epidemiological studies 	
8. ICRP principles		
8a. Justification	<ul style="list-style-type: none"> • Justification of practice 	BU
8b. Optimization	<ul style="list-style-type: none"> • Optimization of protection 	BU
8c. Dose limitation	<ul style="list-style-type: none"> • Dose limits 	BU
9. Practices and interventions (including background radiation sources)	<ul style="list-style-type: none"> • Practices and interventions 	GK ^(*)
10. Legal basis		
10a. International recommendations/conventions	<ul style="list-style-type: none"> • Conceptual framework (ICRP main framework, justification / optimizations / dose limits, protection system for interventions) • International organizations (IAEA, ICRP, ICRU, UNSCEAR, OECD) 	GK
10b. EU legislation	Relevant EURATOM directives in the field of radioactive waste management	GK
10c. Legislation and regulation in Bosnia and Herzegovina (including competent authorities)	<ul style="list-style-type: none"> • Law • Regulatory body • Regulatory system 	DU^(*)
10d. Other relevant legislation relating to radiation sources and radioactive waste	<ul style="list-style-type: none"> • Regulation on the control of HASS and orphan sources • Regulation on radioactive waste • Regulation on monitoring of radioactivity in the environment 	BU
10e. Other legislation relating to radioactive material	<ul style="list-style-type: none"> • Radiation emergency plan 	
10f. Other legislation relating to radioactive waste	<ul style="list-style-type: none"> • Strategy of radioactive waste management 	
11. Operational radiation protection		
11a. Types of radiation sources (sealed, open, accelerators excluding X-ray devices)	<ul style="list-style-type: none"> • Types of radiation sources – open and sealed • Radioactive sources – natural and manufactured • Use of radiation sources (medicine, research, industry, accelerators, nuclear medicine, radiotherapy, 	BU

	etc.)	
11b. Assessment of hazards and risks (including environmental impact)	<ul style="list-style-type: none"> • Methods for assessing radiological impact • Pathways of radioactive release possibly leading to public exposure: <ul style="list-style-type: none"> ○ External ○ Air – direct ingestion ○ Air – deposition, followed by ingestion through foods ○ Air – inhalation ○ Water – direct ingestion (drinking water) ○ Liquid – ingestion by intake of foods ○ Contact • Bioaccumulation effects • Radiation impact on other types 	DU
11c . Minimization of risk	<ul style="list-style-type: none"> • Control of radioactive waste 	GK
11d. Control of release into the environment	<ul style="list-style-type: none"> • Understanding of the requirements from the Regulation on radioactive waste • Keeping records of radioactive material • Investigation in case of radiation incidents • Understanding the system for reporting on radiation sources and releases 	DU
11 e. Monitoring: area, personal dosimetry (external, internal, biological)	<ul style="list-style-type: none"> • Individual monitoring methods • Monitoring of the workplace – instruments and methods of control • Knowledge of the instrument calibration procedures 	GK
11 f. Critical dose concept / calculation of dose to critical group	<ul style="list-style-type: none"> • Defining the critical group • Assessment of dose to critical group 	BU
11g. Ergonomy (user-friendly design and the look of instruments)		GK
11h. Operational rules and emergency planning response	<ul style="list-style-type: none"> • Relevant aspects of documented procedures for radioactive waste management 	BU
11i. Procedures for radiation emergencies	<ul style="list-style-type: none"> • Relevant aspects of emergency planning response 	BU

	<ul style="list-style-type: none"> • Reporting requirements • Investigation of incidents • Requirements for environmental monitoring in radiation emergencies 	
11j. Remediation activities / decontamination	<ul style="list-style-type: none"> • Post-incident monitoring • Remediation measures • Post-incident protection of the public • Availability of equipment, and methods for action in case of spill of radioactive material; other incidents 	BU
11k. Analysis of past incidents, including lessons learned		GK
12. Organization of radiation protection		
12a. Role of experts	<ul style="list-style-type: none"> • Role of expert in radioactive waste management • Role of radiation protection expert 	BU
12b. Safety culture		BU
12c. Communication skills	<ul style="list-style-type: none"> • Effective communication 	BU
12d. Keeping records (sources, doses, unusual occurrences)	<ul style="list-style-type: none"> • Keeping records under the legislation • Contents, format and maintaining records 	BU
12e. Approvals for work and other authorizations		GK
12f. Establishment of areas and classification of workers	<ul style="list-style-type: none"> • Controlled and supervised areas 	GK
12g. Quality control/audit	<ul style="list-style-type: none"> • Role of the expert in quality control / audit • Role of external auditors • Cooperation with inspection 	BU
12h. Cooperation with contractors	<ul style="list-style-type: none"> • Expert opinion for the authorization holder about the procedures for contractors and visitors in order to meet the provisions on radioactive waste management and the regulation on monitoring of radioactivity in the environment 	GK
13. Radioactive waste management		
13a. Radioactive waste management (RWM)	<ul style="list-style-type: none"> • Sources of radioactive waste, types of waste, waste 	DU

	<p>classification, RW characterization</p> <ul style="list-style-type: none"> • Principles of RW management: dilution and dispersal, concentration, storage for decay, clearance from control. • RW hierarchy: <ul style="list-style-type: none"> ○ Reduction ○ Minimization ○ Reuse ○ Recycle ○ Disposal • Storage options for RW • Treatment options for RW • Handling the unused sealed sources: technical options and safety aspects 	
13b. Radioactive waste testing	<ul style="list-style-type: none"> • Methods of sampling and minimizing secondary waste • Testing methods: <ul style="list-style-type: none"> ○ Uncertainties and limitations in testing data ○ Keeping test records 	BU
13c. Radioactive waste disposal	<ul style="list-style-type: none"> • Options for radioactive waste disposal 	DU
14. Transport	<ul style="list-style-type: none"> • Transport of radioactive material <ul style="list-style-type: none"> - Packing of radioactive material and waste for transport - Security of radioactive material in transport 	GK
15. Environmental monitoring	<ul style="list-style-type: none"> • Environmental monitoring: atmosphere, water, other environmental indicators, verification of compliance with reference levels for the environment, testing techniques • Equipment needed for radiation monitoring of the environment • Methods of sampling and analysis for measuring radioactivity in the environment • Mapping and presentation of environmental data • Source monitoring: external radiation, liquid and gas effluents, verification of compliance with limits of release into the environment • Application to various sources 	BU

16. Security of radioactive material	<ul style="list-style-type: none">• Understanding where to obtain needed advice• Security requirements for radioactive sources during their use, storage and transport in accordance with the applicable regulation• Understanding the purpose and use of the security plan• Understanding the protection of sensitive information	BU

Annex 4: Basic syllabus

Table 1: Syllabus of the required knowledge for the expert in the transport safety of nuclear material

Syllabus topics	Contents	Level of required knowledge
<p>1. General preventive and safety measures</p>	<ul style="list-style-type: none"> • Necessary knowledge includes requirements from the provisions of the Regulation on the safe transport of radioactive material and the Regulation on the security of nuclear material and radioactive sources • Preparation of the instruction on radiation protection in transport, transport security, and security plan • Knowledge of the consequences that could be caused by an accident involving radioactive material • Knowledge of the main causes of accidents 	<p>BU^(*)</p>
<p>2. Provisions relating to the type of transport based on the national law, EU standards, international conventions and treaties, particularly with regard to the following</p>	<p>1. Classification of dangerous (radioactive) material:</p> <ul style="list-style-type: none"> - Classes of dangerous material and principles of its classification, - Nature of transported radioactive material and objects, - Their physical chemical and toxicological properties. <p>2. General requirements for packing of radioactive material, including packages (transport containers):</p> <ul style="list-style-type: none"> - Package types, codification and labeling/markings, - Requirements for packages and package testing, - Package condition and occasional checks. <p>3. Markings and labels for radioactive material:</p> <ul style="list-style-type: none"> - Marking the packages, UN numbers, - Labels, filling the labels in, and transport index, - Affixing and removing labels, - Placarding and marking the vehicle. <p>4. References in transport documents:</p> <ul style="list-style-type: none"> - Information needed for transport documents, - Consignor's declaration of compliance of the 	<p>BU</p> <p>BU</p> <p>BU</p> <p>BU</p>

	shipment.	BU
	5. Ways of sending the shipment and limitations for shipping:	
	<ul style="list-style-type: none"> - Transport in large freight containers, - Transport of containers. 	BU
	6. Passenger transport	BU
	7. Prohibitions and caution measures relating to the transport of other goods together with radioactive material	BU
	8. Segregation of various material	BU
	9. Restrictions of the amounts of material in transport and exempted amounts	BU
	10. Loading and stowage:	
	<ul style="list-style-type: none"> - Loading and unloading (filling ratios), - Stowage and segregation. 	BU
	11. Cleaning and/or decontamination before loading and after unloading	BU
	12. Crew/Personnel/Drivers: in-service training	BU
	13. Documents in the vehicle:	
	<ul style="list-style-type: none"> - Transport documents, - Documented procedures/instructions, - Certificate of conformity/homologation of the vehicle, - Certificates of drivers trainings (ADR), - Approval for the transport of radioactive material, - Instruction on radiation protection, and security plan for the transport of radioactive material, - Other documents. 	BU
	14. Safety procedures/instructions: implementation of procedures, and protective equipment for the driver	BU
	15. Monitoring obligation: parking	BU
	16. Traffic regulations and restrictions	BU

	<p>17. Accidental releases of radioactive material into the environment</p> <p>18. Requirements for transport equipment</p>	
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- (*) **GK** – General knowledge
- (*) **BU** – Basic understanding
- (*) **DU** – Detailed understanding

Level of knowledge / Number of hours	Definition
GK / 1 – 5	General knowledge – A lower level of knowledge is required. The knowledge that the topics exist and awareness of their importance for the work process. Also the knowledge how and where to find help for a given topic if necessary.
BU / 6 – 10	Basic understanding – A medium level of knowledge is required. Basic understanding of the topics in such details which allow the expert to apply them in order to become familiar with them and the work process. If necessary, further research of knowledge resources and their application in less familiar circumstances is possible.
DU / 11 – 15	Detailed understanding – A high level of knowledge is required. A good understanding of the topics and basic principles and their application in the relevant context. Ability to apply the knowledge working in the range from basic principles to the situations in new or unfamiliar fields of work, and ability to establish and affect short- and long-term results that arise out of the application of knowledge.

Annex 5: Evidence list

Evidence list

No.	Items
1.	List of contents , in which all evidence are indexed.
2.	Summary , in which every major item of evidence is summarized into a brief additional paragraph for the purpose of clear identification of competencies it supports.
3.	Reference table 1^(*) , which connects the relevant evidence with the topics listed in the Basic syllabus .
4.	Reference table 2 , which connects the relevant evidence with the required practical competency and work experience .
5.	Reference table 3 , which shows those evidence that demonstrate the candidate's competency to give an adequate expert opinion to the authorization holder or employer.

^(*) Reference tables 1, 2 and 3 are given in the **Guideline for creation of evidence list**.

Annex 6: Application form

APPLICATION FORM

for recognition of the qualified expert status

1. CANDIDATE'S PERSONAL INFORMATION

CANDIDATE	Last name	First name	Title
DATE OF BIRTH	Day	Month	Year
CANDIDATE FOR EXPERT IN	Radiation protection in: a) medical practices b) non-medical practices c) higher education and scientific & research work	Radioactive waste management	Transport safety of radioactive material
LEGAL PERSON'S ADDRESS AND RESPONSIBLE PERSON	Town: Street and no.: Phone Landline: Mobile: E-mail: Signature of the responsible person and stamp:		
CANDIDATE'S CONTACT INFORMATION	Phone Landline: Mobile: E-mail:		

2. CANDIDATE'S QUALIFICATIONS AND TRAINING

2.1. Education degrees, diplomas

Faculty

Title			
Faculty, town, country			
Qualification			
Graduation date			
Area of study			

Master's

Title			
Faculty, town, country			
Qualification			
Date of degree			
Field of research			
Thesis title			

Doctorate

Title			
Faculty, town, country			
Date of degree			
Field of research			
Dissertation title			

2.2. Additional information: Projects, publications

2.3. Relevant trainings, courses and scientific conferences that you have attended

Organizer	Course title and program	Duration (in hours)	Training dates	Evaluation of participants
				Yes/No
				Yes/No
				Yes/No

2.3.1. Indicate given evaluation marks, if any:

Course title	Training dates	Methods for evaluating participants	Your results

2.4. Membership in professional and scientific associations

Association	Membership	Type of membership	Year

3. INFORMATION ABOUT WORK EXPERIENCE

3.1. Positions (last 5 years, beginning from the current employment)

From day/month/year			To day/month/year			Employer and address	Position title	Description of duties

3.2. Current organizational responsibility (Indicate the chart)

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3.3. Relevant trainings and courses where you were trainer, and whom you have trained

Organizer	Training/course title and program	Duration (in hours)	Training dates	Persons you trained

3.3. Beginning of work with radiation sources

Day	Month	Year

4. CANDIDATE'S STATEMENT

I hereby declare that my evidence list has been made in accordance with the Guideline for creation of evidence list, and that it contains all items from the evidence list referred to in Annex 5.

5. DATE OF APPLICATION

Day	Month	Year

Candidate's signature

Annex 7: Form for expert engagement

**FORM
for expert engagement**

Authorization holder:

Licence number:

Address:

Phone: Fax: E-mail:

Authorization holder's practices	Mark with X
Medical:	
- dental roentgenology	
- diagnostic and intervention radiology	
- radiotherapy	
- nuclear medicine (diagnostics and therapy)	
Veterinarian science	
Non-medical:	
- non-destructive testing – radiographic testing (industrial radiography)	
- industrial radiation for the purpose of sterilization	
- well examination	
- measuring with portable measuring instruments, detection or analytical techniques (thickness, density, level, humidity, etc.)	
- measuring with fixed measuring instruments, detection or analytical techniques (thickness, density, level, humidity, etc.)	
- non-medical application of open radioactive sources	
- manufacturing of sources	
- manufacturing of radiation emitting devices and accessory equipment	
Scientific & Research	

Full name of the engaged expert

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Number of the Agency certificate of recognition of the expert status

.....

Legal person employer of the expert

.....

Place:

Date:

(Stamp)

Director: