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Nuclear Safety Council Instruction IS-03, of the 6th of November 2002, on the qualifications required to obtain recognition as an expert in protection against ionising radiations

Published in the Official State Gazette (BOE), number 297, of the 12th of December 2002

Article 2.a) of Law 15/1980, of the 22nd of April, on the creation of the Nuclear Safety Council, after the modification introduced by the First Additional Provision of Law 14/1999, of the 4th of May, on Public Prices and Fees for services rendered by the Nuclear Safety Council, attributes to this public entity the faculty to "prepare and approve the instructions, circulars, and guides of a technical nature, relative to nuclear and radioactive facilities, and for those activities related to nuclear safety and radiological protection".

On the other hand, the Law on the creation of the Nuclear Safety Council, attributes to the Council, in Article 2.j), the function of awarding and renewing, "through the performance of tests, established by the Council itself, the Licenses for Operators and Supervisors of nuclear or radioactive facilities, the Diplomas for Head of Radiological Protection Services, and the accreditations to manage or operate X-ray facilities destined to medical diagnosis".

Until now, the Nuclear Safety Council has been approving recommendatory documents, in which it has informed the title-holders of facilities, and those entities that offer them services, on the criteria, procedures and qualifications required for the personnel to perform the actions that may proceed in order to guarantee radiological protection, in all the phases: construction, operation, dismantling and closure, of the facility in question.

In this recommendatory process, the Nuclear Safety Council approved the Safety Guide GS-7.2 "Qualifications to obtain the recognition as expert in protection against ionising radiations to assume responsibility for the corresponding Service or Technical Unit", with the understanding that the title of expert is attributed solely to the Head of the Radiological Protection Service or Technical Unit.

In this present Instruction, the guidelines are laid out regarding the minimum training and experience that the Nuclear Safety Council considers necessary for the candidates that wish to be recognised as experts in protection against ionising radiations, both for the persons responsible for the Service or Unit, as for the technical staff at their charge.

The approval of this Instruction answers the need to regulate the required training and experience both for those who request the diploma that accredits them as Heads of a Radiological Protection Service or Technical Unit, as for those persons under their charge, that in this Instruction are referred to as Expert Technicians in Radiological Protection, and to inform the interested persons in either of these levels as to the administrative procedures to be followed to obtain the corresponding qualifications.

By virtue of all this, and in conformity with the legal habilitation foreseen in Article 2.a) and j), of Law 15/1980, of the 22nd of April, on the creation of the Nuclear Safety Council, according to the new drafting provided in the First Additional Provision of Law 14/1999, of the 4th of May, and prior consultation with the affected sectors, following all the relevant technical reports, the Nuclear Safety Council, in its meeting of the 6th of November 2002, has agreed on the following:

First. Object and scope of application

The object of this present Instruction is to establish the minimum training and experience requirements that the Nuclear Safety Council considers necessary for the candidates who wish to be recognised as experts in protection against ionising radiations (henceforth "experts in radiological protection") both in regards of the persons responsible for the Radiological Protection Services or Technical Units, as for those persons who depend on them.

This present Instruction shall be applicable to those persons interested in obtaining the qualification of expert in radiological protection for the performance of activities entrusted to a Radiological Protection Service (SPR) *[given its initials in Spanish]* or Radiological Protection Technical Unit (UTPR) *[given its initials in Spanish]*.

Taking into consideration the degree of responsibility of the expert in radiological protection, this Instruction establishes two different levels.

Qualified expert with a diploma of Head of a SPR or UTPR, awarded by the Nuclear Safety Council, and Expert Technician in Radiological Protection, that shall be accredited by a certificate issued by the Head of the Service or Unit under whose direction the qualified person works.

Second. Definitions

The definitions of the terms and concepts used in this present Instruction shall correspond to those contained in the following legal documents:

Law 25/1964, of the 29th of April, on Nuclear Energy ("Official State Gazette", number 107, of the 4th of May, Article 2), as modified by Law 54/1997, of the 27th of November, on the Electricity Sector ("Official State Gazette", number 285, of the 28th of November).

Law 15/1980, of the 22nd of April, on the creation of the Nuclear Safety Council ("Official State Gazette", number 100, of the 25th of April), as modified by Law 14/1999, of the 4th of May, on Public Prices and Fees for services rendered by the Nuclear Safety Council ("Official State Gazette", number 107, of the 5th of May).

Royal Decree 1836/1999, of the 3rd of December, which approves the Regulation on Nuclear and Radioactive Facilities ("Official State Gazette", number 313, of the 31st of December).

Royal Decree 783/2001, of the 6th of July, which approves the Regulation on Health Protection against Ionising Radiations ("Official State Gazette", number 178, of the 26th of July).

Royal Decree 1891/1991, of the 30th of December, on the Facility and use of X-ray equipment for purposes of medical diagnosis ("Official State Gazette", number 3, of the 3rd of January 1992).

Royal Decree 1976/1999, of the 23rd of December, which establishes the Quality criteria for Radiodiagnosis ("Official State Gazette", number 311, of the 29th of December).

Royal Decree 1841/1997, of the 5th of December, with establishes the Quality criteria for Nuclear Medicine ("Official State Gazette", number 303, of the 19th of December).

Royal Decree 1566/1988, of the 17th of July, which establishes the Quality criteria for Radiation therapy ("Official State Gazette", number 206, of the 28th of August).

Royal Decree 413/1997, of the 21st of March, on Operational protection of external workers with exposure risk to ionising radiations due to intervention in the controlled areas ("Official State Gazette", number 91, of the 16th of April).

Third. Requirements and procedures to be followed to obtain the diploma of Head of a SPR or UTPR

3.1. Requirements.

3.1.1. Qualifications: An official Bachelor's degree, or a degree in Engineering or Architecture, or an officially recognised equivalent, in the case of non-national degrees.

3.1.2. Specific training. The following shall be required:

a) Training in the fundamental elements and the technology of radiological protection, equivalent to a three hundred hour course.

b) Knowledge in matters regarding safety and radiological protection, with respect to the type of facilities where services are going to be rendered.

3.1.3. Experience and practice. A minimum three-year experience must be demonstrated in the field of radiological protection. Nonetheless this time shall vary, depending on the type of facility in which services are to be rendered, as well as on the practical exercises carried out during the experience period. In this manner, the requesting candidate must present for the Nuclear Safety Council to evaluate, all those documents that truly accredit the degree of participation in the tasks developed in the field of radiological protection, and specifically the training in the specific techniques in question.

In the particular case that the candidate for diploma of Head of a SPR or UTPR requests this title to render services in an X-ray facility for purposes of medical diagnosis,

exclusively, a minimum six month experience must be proven within the field of control and/or monitoring of radiological safety of facilities for medical radiodiagnosis.

3.1.4. Medical aptitude. The candidate must possess a certificate of aptitude to be able to carry out activities that involve a risk of exposure, related to the job, according to what is established in Chapter IV of the Regulation on Sanitary Protection against Ionising Radiations, approved by Royal Decree 783/2001, of the 6th of July.

3.2. Administrative procedure.
3.2.1 Request. The interested party in obtaining the diploma of Head of a specific SPR or UTPR must request it, by means of a personal filing directed to the President of the Nuclear Safety Council, according to the model-guide included in Annex I, together with the following documents:

a) Copy of the national identity card (DNI) *[given its initials in Spanish]* or passport.
b) Information regarding the academic background and professional experience of the requesting party (whatever documents are considered adequate to accredit the qualifications mentioned in sections 3.1.1., 3.1.2., and 3.1.3 shall also be attached)
c) Certificate from the title-holder of the entity proposing the candidate who shall be responsible for the SPR or UTPR.
d) Certificate of medical aptitude, as specified in section 3.1.4.
e) Proof of payment of the corresponding fee.

3.2.2. Evaluation of the candidate. Once the documents referred to in point 3.2.1. have been presented correctly and completely, and given the favourable assessment of the Panel designed to this effect by the Nuclear Safety Council, the candidate shall be subjected to an aptitude examination which shall comprise a theoretical test on the subjects listed in Annex II and a practical test based on the topics that are listed in Annex III.

The Panel shall delimit the extent of the tests, and may even be able to exempt from the performance of some of them, depending on the scope of the requested diploma; on the basis of the experience and the specific training accredited by the candidate. In case the candidate does not successfully pass the required tests, there will be the option of resisting them.

3.2.3. Awarding the diploma. The Nuclear Safety Council shall issue a diploma for the candidates who, according to the Panel designed to this effect, fulfil the requirements, in terms of training and experience, and who have passed the established tests.

The diploma of Head of a SPR or UTPR shall be specific to a determined entity and for the activities authorised to this SPR or UTPR. Therefore, any modification that may alter the conditions of the concession of the aforementioned diploma, shall require a new request, and its approval by the Nuclear Safety Council. Furthermore, the termination of activities must be immediately communicated to the aforementioned organism.

Fourth. Requirements for the obtention of the recognition as expert technician in radiological protection

4.1. Requirements.

4.1.1. Academic background. A minimum academic level of superior level Vocational Training, or equivalent, is required. Those fields of specialisation that are related to the application of ionising radiations, or adequate training in the radiological protection and safety, shall be specially valued.

Similarly, knowledge is required on the fundamentals, and the technology of radiological protection, depending on the activity that is to be performed, divided into the two categories of facilities that is indicated as follows:

Category A: facilities referred to in Royal Decree 1836/1999, of the 3rd of December, which approves the Regulation on nuclear and radioactive facilities

Category B: facilities that operate under the protection of Royal Decree 1891/1991, of the 30th of December, on the installation and use of X-ray equipment for purposes of medical diagnosis.

Annexes IV and V, contain the programs for the training in theory and the contents for the practical classes for both categories, equivalent, in both cases, to a forty hour course (thirty hours on theory and ten on practical lessons).

4.1.2. Experience and practice. A minimum experience, or practice, of three months in tasks that are characteristic to the category chosen must be accredited, of which at least one must correspond to practice in the specific tasks of the working position to be performed.

4.1.3. Medical aptitude. The candidate that requests the classification as professionally exposed worker, must possess an aptitude certificate for the performance of the activities that involve a risk of exposure, associated to the working position, in accordance with what is established in Chapter IV of the Regulation on Sanitary Protection against Ionising Radiations, approved by Royal Decree 783/2001, of the 6th of July.

4.2. Certification. The Head of the SPR or UTPR shall certify the qualification of the expert technicians in radiological protection, guaranteeing the compliance with the training and experience requirements referred to in points 4.1.1 and 4.1.2, according to the model that is proposed in Annex VI.

Fifth. Continuous training

The updating of the norms on radiological protection, the implementation of new techniques that require the use of ionising radiations, the acquisition of equipment, and in general the application of the criteria of radiological optimisation, shall require continuous training and the updating of the working procedures of those persons that carry out tasks within the SPR or UTPR.

To this end, the Head of the SPR or UTPR shall adjust at all times his/her level of training and shall ensure, by means of the training and practice programs that may be necessary, that a level of competence is maintained insofar as the personnel of the SPR or UTPR, according to the assigned functions, and according to their responsibility.

Six. Archive

The SPR or UTPR must keep an updated and available archive for the Nuclear Safety Council, which shall contain the documents regarding the certification of the expert technicians in radiological protection. In this archive the following shall be included:

A copy of the academic qualifications and diplomas or certificates that accredit the training requirements highlighted in point 4.4.1.

Documents on the specific training courses attended, in compliance with what is required in point 4.1.1. (teaching plans that include: teachers, course programs and materials used, as well as the results of the exams that are set).

Documents that accredit the continuous training given to the SPR or UTPR staff, according to what is established in the Fifth point.

Seventh. Infractions and sanctions

Without prejudice to the civil, penal or other responsibilities that may be incurred, the failure to comply with the provisions of this Instruction, shall be sanctioned according to what is established in Chapter XIV of Law 25/1964, of the 29th of April, on Nuclear Energy, according to the wording given by the Fifth Additional Provision of Law 54/1997, on the Electricity Sector, as well as by the Fifth Additional Provision of Law 14/1999, of the 4th of May, on Public Prices and Fees for services rendered by the Nuclear Safety Council.

Single Transitory Provision. Regularisation period

The title-holder of a SPR or UTPR that, upon the entry in force of this present Instruction, should have persons, who under the direction of a Head, perform functions, on their own, that are proper to the SPR or UTPR, shall have a deadline of six months, starting from the date this Instruction enters in force, to regularize the situation of these persons, according to what is established in the Fourth point.

Single Repeal Provision

Any provision of equal or inferior rank that is contrary to this present Instruction shall be repealed.

Single Final Provision. Entry in force

This present Instruction shall enter in force on the day following its publication in the "Official State Gazette".

This I communicate to you for your knowledge and pertinent effects

Madrid, on the 6th of November 2002.
The President
María-Teresa Estevan Bolea

His excellency, the Secretary-General of the Nuclear Safety Council

ANNEX I
Model form for the request of the diploma of Head of a Radiological Protection Service

Applicant's details

Name._____ 1st Surname:_____
2nd Surname:_____

National Identity Card or Passport:_____

Academic
qualification:_____

Address (Street, number):_____

City:_____ Province;_____

Post Code:_____ Telephone number:_____/_____

Details of the facility, or in the case of a technical unit of radiological protection, the details of the entity to which it belongs

Facility or Entity:_____

Title-holder (Company or Organism):_____

Location:_____ City:_____

Province:_____ Post code:_____ Telephone:_____/___

Observations:_____
_____
_____

Signed in_____ on the, _____ of _____ _____

(Signature)

His excellency, the Secretary-General of the Nuclear Safety Council
Justo Dorado street, number 11 - 28040 MADRID

_____
On the reverse are listed the documents that must accompany this request.

The aforementioned reverse side:

1. Copy of the national identity card, or passport.

2. Documents that accredit the academic or professional background, and specifically the experience with ionising radiations. Double sided copies of the diplomas of any attended capacitation courses.

3. a) If the diploma is to be applied to a SPR:
Certificate of the title-holder of the installation, in which the missions that the requesting party shall perform within the facility, and for whose performance the Diploma must be applied, are detailed.

b) If the diploma is to be applied to a UTPR:

Certificate issued by the Director of the entity to which the UTPR belongs to, or sworn declaration in case it is the Director who is applying for the diploma, in which the missions that the requesting party shall perform within the facilities, and for whose performance the Diploma must be applied, are detailed.

4. Certificate of aptitude for the performance of those activities that imply a risk of exposure associated to the working position, in accordance to what is established in Chapter IV of the Regulation on Sanitary Protection against Ionising Radiations, approved by Royal Decree 783/2001, of the 6th of July.

5. Settlement form (model 801) duly paid (copy for the Nuclear Safety Council).

ANNEX II
Program for training in Theory for the obtainment of the diploma of Head of a Radiological Protection Service or Technical Unit

1. Basic concepts.
1.1. Natural and artificial radioactivity. Fundamental laws.
1.2. Nature and properties of radiation.
1.3. Nuclear reactions. Cross-section. Nuclear fission.
1.4. Interaction of radiation with matter.
1.5. Equipment that produce ionising radiations.
1.6. Radiological magnitudes and units.

2. Detecting and measuring ionising radiations.
2.1. Principles of physical detection.
2.2. Detection and measurement systems.
2.3. Quality control, calibration, and verification of detection and measurement systems.
2.4. Measurement statistics and errors. Reliability. Limits of detection. Statistical treatment of results.

3. Risks of ionising radiation.

3.1. External irradiation.

3.2. Contamination. Intake channels, deposit and elimination in the human organism.

3.3. Environmental impact. Sources that emit radiation. Exposure channels.

4. Radiobiology.

4.1. Action mechanisms of ionising radiation on living organisms.

4.2. Cellular radiosensitivity.

4.3. Cellular response to radiation. Cellular survival curve. Modifying factors.

4.4. Systematic, and total organic response to radiation. Somatic and genetic effects. Stochastic, and non-stochastic, or deterministic effects.

4.5. Damage caused by the action of ionising radiation.

4.6. Epidemiological studies.

5. Dosimetry.

5.1. Main personal dosimetry systems. Characteristics and scope of application.

5.2. Direct and indirect methods for the determination of internal contamination. Dose estimation.

5.3. Area dosimetry.

5.4. Biological indicators.

6. Radiological protection.

6.1. Objectives and principles.

6.2. Justification of activities that imply a radiological risk.

6.3. Optimisation of radiological protection.

6.4. Dose limitation.

7. Nuclear and radioactive facilities.

7.1. Nuclear facilities. Types and general characteristics.

7.2. Nuclear fuel cycle facilities. Types and general characteristics.

7.3. Radioactive facilities for scientific, medical, agricultural, commercial or industrial purposes. Categories. Characteristics of radioactive sources, equipment with radioactive sources, or equipment that generate ionising radiations, of common use in installations, such as:

- Industrial irradiation.
- Process control.
- Industrial radiology.
- Research.
- Teaching.
- Nuclear medicine.
- Radiation therapy.
- Medical diagnosis.

8. Intrinsic radiological protection.

8.1. Analysis of the facility's radiological risks.

8.2. Radiological safety measures linked to the project (site selection, design, selection of sources and radioactive apparatus, measurement equipment, protection systems...).

8.3. Specific applicable norms (UNE, CEI, ISO, CE brand, conformity certificate standards...).
8.4. Confinement of radioactive sources.
8.5. Shielding calculations:
a) Charged particles. Bremsstrahlung.
b) Electromagnetic radiation.
Shielding calculations for specific sources.
Shielding calculations for extensive sources of simple geometry.
c) Neutrons. Considerations on the mechanisms of neutronic activation in shielding calculations.
8.6. Auxiliary systems. Ventilation and filtration. Air conditioning. Waste management. Fire-fighting systems.

9. Operational radiological protection.
9.1. Radiological risks associated with the facilities, both during their normal operation, as well as in emergency situations.
9.2. Classification of professionally exposed workers, and of the working areas, on the basis of the associated risks.
9.3. Establishing working, access and stay-time standards in the areas with a radiological risk.
9.4. Monitoring and control over the movement, transportation and storage of the radioactive material.
9.5. Monitoring the radiation, contamination, effluents and radioactive waste.
9.6. Decontamination, description of techniques and processes.
9.7. Maintenance, verification and calibration of the detection and measurement systems of ionising radiations.
9.8. Medical and dosimetric monitoring of professionally exposed workers.
9.9. Training and re-training personnel.
9.10. Optimisation of radiological protection.
9.11. Quality control in facilities.
9.12. Participation in the planning and implementation of emergency drills.

10. Radiological protection of the public.
10.1. Discharge limitation systems.
10.2. Methodology for dose calculation in case of liquid and gaseous discharges.
10.3. Atmospheric and hydrologic dispersion.
10.4. Analytic radiological study.
10.5. Environmental radiological monitoring program.
10.6. Origin and management of solid radioactive waste.
10.7. Waste storage.
10.8. Dismantling of installations.

11. Standards and legislation.
11.1. Applicable legislation:
- Law 25/1964 on Nuclear Energy.
- Law 15/1980 on the Creation of the Nuclear Safety Council, modified by Law 14/1999.
- Law 54/1997 on the Electricity Sector, which modifies Law 25/1964 and Law 15/1980.

- Royal Decree 1836/1999, which approves the Regulation on Nuclear and Radioactive Facilities
- Royal Decree 783/2001, which approves the Regulation on Health Protection against Ionising Radiations.
- Royal Decree 1132/1990, which establishes the basic measures for the radiological protection of persons subject to medical examinations and treatments.
- Royal Decree 1891/1991, on the installation and use of X-ray equipment for purposes of medical diagnosis.
- Royal Decree 1976/1999, which establishes the Quality criteria in radiodiagnosis.
- Royal Decree 1841/1997, which establishes the Quality criteria in nuclear medicine.
- Royal Decree 479/1993, which regulates Radiopharmaceuticals for human use.
- Royal Decree 1566/1998, which establishes the Quality criteria in radiation therapy.
- Royal Decree 413/1997, on operational protection of external workers with a exposure risk to ionising radiations due to intervention in controlled areas.
- Royal Decree 220/1997, which creates and regulates the obtainment of the official title of Specialist in Medical Radio-physics.
- Ministerial Order of the Ministry of Health and Consumption, of the 12th of July 1982, on radiological explorations in Medicine and School Hygiene.
- Order of the Ministry of Relations with the Parliament and the Government Secretariat, of the 18th of October 1989, which annuls the systematic radiological explorations in preventive health check-ups.
- Regulation applicable to the transportation of radioactive goods.
- Nuclear Safety Council standards

11.2. National recommendations and standards:

- Nuclear Safety Council Guides.
- UNE Norms.
- Applicable technical publications from the Spanish Radiological Protection Society, Spanish Medical Physics Society, Spanish Nuclear Society...

11.3. International recommendations and standards:

- Applicable EURATOM Directives.
- ISO, CEI, EN… standards
- Recommendations of the International Commission for Radiological Protection.
- International Atomic Energy Agency, the OECD's Agency for Nuclear Energy...

ANNEX III
Practical training program for the obtainment of the diploma of Head of a Radiological Protection Service or Technical Unit

1. Description of the facilities. Verification of the systems involved in radiological protection.

2. Organisation of the Radiological Protection Service.

3. Classification of the places of work and dosimetry of exposed workers.

4. Verification of the radiation and contamination detectors.

5. Calculation of the dose due to external irradiation and estimation of the dose due to internal contamination that may be received by operating personnel.

6. Decontamination techniques applicable to persons, materials and equipment.

7. Sampling and measurement techniques for the estimation of the contamination of fluids.

8. Management of radioactive waste and effluents produced in the facilities.

9. Dose reduction programs. Optimisation of radiological protection.

10. Participation in the organisation of radiological protection within the Emergency Plan. Emergency drills. Action to be taken in case of accidents.

11. Continuous training programs for exposed workers.

12. Design of the facilities.

13. Verification of the equipment and the sources of radiation.

14. Operating procedures and control of the applicable techniques in the facility.

15. Register of X-ray facilities for medical diagnosis purposes.

16. Quality control in facilities.

ANNEX IV
Program for training in Theory for expert technicians in radiological protection of a Radiological Protection Service or Technical Unit

Category A: Nuclear and radioactive facilities

1. Ionising radiations: Nature of alpha, beta, X-ray, gamma and neutron radiations. Interaction of radiation with matter.

2. Magnitudes and units for the Detection and measurement of radiation. Basic statistics associated to the measurements. Measurement equipment.

3. Radiation risks. External irradiation and contamination. Radiotoxicity. Incorporation of the radionuclides in the human organism. Intake channels.

4. Biological effects of ionising radiations. Stochastic and non-stochastic or deterministic effects. Somatic and genetic effects. Acute irradiation syndrome.

5. Radiological protection: Concepts, objectives and principles. Dose limitation. Dose reduction programs for a specific practices. Basic criteria for the calculation of shieldings.

6. Operational radiological protection, according to what is established in the Regulation on health protection against ionising radiations. Functions and responsibilities of the personnel, both in normal operating conditions and in case of accidents.

7. Operational procedures, such as: reception, control, storage, and movement of radioactive material. Periodic verifications. Quality control. Radioactive waste management. Effluent monitoring. Action in case of a radiological incident or accident. Registers.

8. Legislation and basic standards in force, applicable to nuclear and radioactive facilities:

- Law 25/1964 on Nuclear Energy.
- Law 15/1980 on the creation of the Nuclear Safety Council, modified by Law 14/1999.
- Royal Decree 783/2001, which approves the Regulation on Health Protection against Ionising Radiations.
- Royal Decree 1836/1999, which approves the Regulation on Nuclear and Radioactive Facilities
- The regulation that applies to the transportation of radioactive materials.
- Nuclear Safety Council standards

9. Specific standards and laws that apply to the facilities in which services are going to be rendered: conditions for the authorisation and technical specifications for the installations, Operating Regulations and Emergency Plan.

Category B: X-ray installations for purposes of medical diagnosis

1. Basic concepts: production and qualities of X-rays. Nature of X-rays. Interaction of radiation and matter. Attenuation of X-rays. Formation of the radiological image.

2. Physical characteristics of the equipment and the radiation beams: generators, tubes, image systems and associated devices.

3. Magnitudes and units. Detecting and measuring radiation. Measuring equipment.

4. Existing risks in X-ray installations: direct, scattered and leaked radiation.

5. Biological effects of ionising radiations. Stochastic and non-stochastic or deterministic effects. Somatic and genetic effects. Acute irradiation syndrome.

6. Radiological protection: concepts, objectives and principles. Dose limitation system. Programs for dose reduction in a specific practice.

7. Operational radiological protection, according to what is established in the Regulation on health protection against ionising radiations. Functions and responsibilities of the personnel in normal operating conditions and in case of accidents.

8. Operational procedures, according to what is established in Royal Decree 1891/1991 on the installation and use of X-ray equipment for purposes of medical diagnosis.

9. Basic legislation and norms in force that are applicable to the medical radiodiagnosis facilities:

- Law 25/1964 on Nuclear Energy.
- Law 15/1980 on the creation of the Nuclear Safety Council, modified by Law 14/1999.
- Royal Decree 783/2001, which approves the Regulation on Health Protection against Ionising Radiations.
- Royal Decree 1132/1990, which establishes the basic measures for the radiological protection of persons subject to medical examinations and treatments.
- Royal Decree 1891/1991 on the installation and use of X-ray equipment for purposes of medical diagnosis.
- Royal Decree 1976/1999, which establishes the Quality criteria for radiodiagnosis.
- Nuclear Safety Council standards.

ANNEX V

Program of practical classes for the training of expert technician personnel in radiological protection belonging to a Radiological Protection Service or Technical Unit

Category A: nuclear and radioactive facilities

1. Verification prior to the use of ionising radiation detection equipment. Measuring radiation levels, environmental contamination levels and superficial contamination levels. Interpreting results.

2. Selection criteria for detection equipment on the basis of the type, energy and intensity of the incidental radiation.

3. Personal dosimeters. Type and characteristics. Dosimeters whose reading is performed by centres duly authorised by the Nuclear Safety Council and operational dosimeters for direct readings. Handling and precautions. Internal dosimetry, whole-body counters.

4. Checking variations in the dose produced by a specific source of radiation depending on the distance, time of exposure, shielding.

5. Handling encapsulated radioactive doses and non-encapsulated ones. Use of protection systems. Actions in case of incidents with radioactive contamination and in case of accidents. Decontamination procedures that are applicable to persons, materials and equipment.

6. Practical application of radioactive waste management: classification, storage, labelling and registering. Decay, dilution and controlled evacuation of liquid and gaseous radioactive waste.

7. Determination of the time factors, shielding factors and distances for different practical cases, depending on the average or estimated radiation levels.

8. Classification and signalling of work areas.

Category B: X-ray facilities for medical diagnosis

1. Verification prior to the use of the ionising radiation detection equipment. Measuring radiation levels. Interpreting results. Selection criteria for the radiation detection equipment.

2. Dose estimation that could be received by the operating personnel and members of the public, considering the weekly workload, the results of the radiation level measurements, the occupational and use factors. Checking the efficacy of structural shieldings and the devices for personal protection.

3. Classification and signalling of work areas.

4. Checking the variation in the dose rate produced by scattered radiation, depending on the size of the irradiated field and of the corresponding magnitudes, such as the power differential and current intensity.

5. Determination of the levels of scattered radiation that the operator would receive as a result of his/her position with respect to the emitting focus and the patient.

6. Parameters that intervene in the quality of the image. Quality control of generators and X-ray tubes (geometric parameters, radiation leakage, exposure time, tube efficiency, quality of the beam, grids, automatic exposure control). Quality control of the visualisation systems, image support, processing and storage. Quality control of the mammography equipment. Application of dose reduction programs and procedures to optimise radiological protection.

7. Use of the Spanish Radiodiagnostic Quality Control Protocol. Interpreting the results of the quality controls.

Annex VI
Certification model

Mr/Mrs/Miss..... Head of..... (Name of the SPR or UTPR)
..... CERTIFIES THAT.....
Mr/Mrs/Miss....., has received the adequate training as an expert technician in radiological protection for the performance of SPR or UTPR functions.

1. PERSONAL DETAILS	
NAME AND SURNAMES: ACADEMIC QUALIFICATIONS: DATE OF INCORPORATION IN THE SPR or UTPR: POSTION OR FUNCTION PERFORMED IN THE SPR or UTPR:	....
MODALITY	Nuclear and radioactive facilities Medical radiodiagnostic facilities

2. TRAINING IN RADIOLOGICAL PROTECTION				
	ENTITY	DURATION		EXAMINATION
		Theory(h)	Practical (h)	YES NO
1. NAME OF THE SPECIFIC PROGRAM (ANNEXES IV and V)				
.....	.....	.....	.....	
.....	.....	.....	.....	
2. NAME OF COURSES CERTIFIED BY THE NSC				
.....	.....	.....	.....	
.....	.....	.....	.....	
.....	.....	.....	.....	
3. OTHER TRAINING COURSES				
.....	.....	.....	.....	
.....	.....	.....	.....	
.....	.....	.....	.....	

3. EXPERIENCE IN RADIOLOGICAL PROTECTION		
ENTITY	WORK CARRIED OUT AND TYPE OF FACILITY	DURATION (Date: beginning-end)
.....	.....	.....
.....	.....	.....
.....	.....	.....

OBSERVATIONS: .....
.....

Signed in....., on the ....., of ....

SIGNATURE OF THE HEAD OF THE SPR or UTPR .....
STAMP OF THE ENTITY .....