

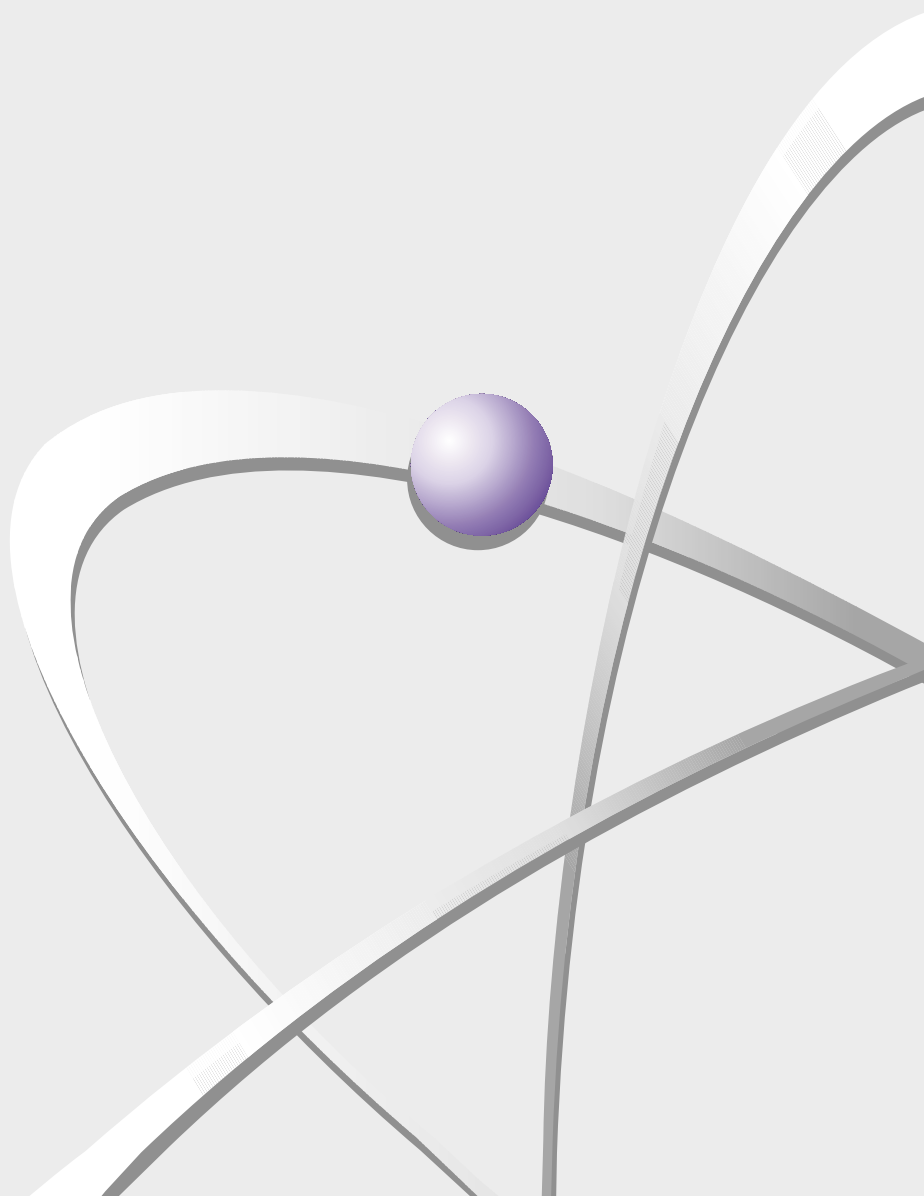
# ANNUAL REPORT Synthesis

NUCLEAR REGULATORY AUTHORITY



2002

ARGENTINA



The NUCLEAR REGULATORY AUTHORITY (ARN) was established as an autonomous body reporting to the President of Argentina by Act 24,804 known as the Nuclear Activity National Act, which came into force on April 25, 1997, and is empowered to regulate and control the nuclear activity with regard to radiation and nuclear safety, physical protection and nuclear non-proliferation issues. It must also advise the Executive on issues under its purview.

The objective of the Nuclear Regulatory Authority is to establish, develop and enforce a regulatory system applicable to all nuclear activities carried out in Argentina. The goals of this regulatory system are:

- To provide an appropriate standard of protection for individuals against the harmful effects of ionizing radiation.
- To maintain a reasonable degree of radiological and nuclear safety in the nuclear activities performed in Argentina.
- To ensure that nuclear activities are not developed with purposes un-authorized by the law and regulations resulting therefrom, as well as by the international agreements and the non-proliferation policies adopted by Argentina.
- To prevent the commission of intentional actions which may either have severe radiological consequences or lead to the unauthorized removal of nuclear materials or other materials or equipment subject to control.

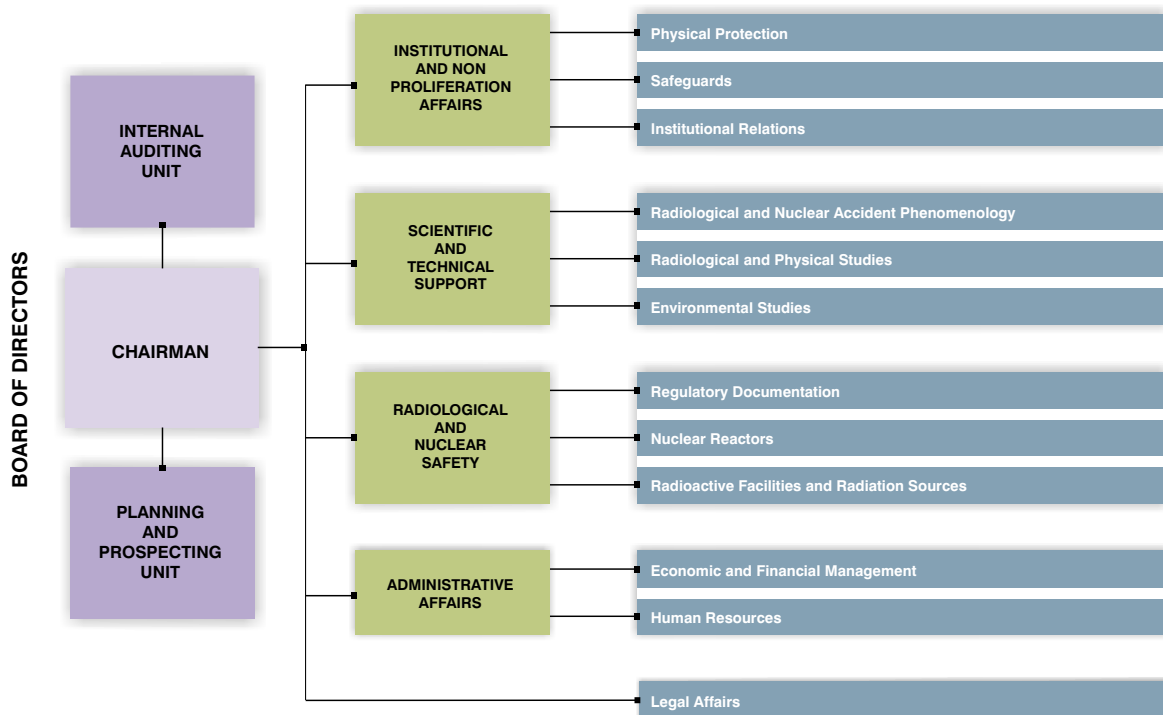
Articles 1, 7, 14, 15, 16, 18, 25 and 26 of Act 24,804 provide a detailed description of the functions, powers and duties vested in the ARN. Decree 1390/98 regulating said Act defines its scope and procedures facilitating its enforcement.

The Nuclear Activity National Act establishes that the direction and management of the Nuclear Regulatory Authority are performed by a Board of Directors. The Board of Directors is composed of six members appointed by the Executive, two of which shall be respectively proposed by the Senate and the House of Representatives. The term of office of each Director shall be six years, with one third of them being chosen every second year. Selection criteria for the Director's office are based upon the candidate's technical and professional qualifications in the specific field.

In the frame of the National Plan for the Modernization of the Public Sector, adopted by the national government in October 2001, the number of members of the Board of Directors was reduced to three. At present the Board is formed by a Chairman, a 1<sup>st</sup> Vice-Chairman and a 2<sup>nd</sup> Vice-Chairman.



The organization chart below shows the ARN organizational structure approved on January 11, 1999:



## THE REGULATORY SYSTEM

In its capacity as the national authority on all issues relating to radiation and nuclear safety, non-proliferation assurances, physical protection and transport of radioactive materials, the ARN grants licences, authorizations and permits, as appropriate, in connection with practices associated with radiation sources. In addition, the ARN performs control activities to ensure that persons responsible for each practice comply with the provisions set forth in the standards and other regulatory documents.

### Radiation and Nuclear Safety

The organization (owner or operator) in charge of the design, construction, commissioning, operation and decommissioning stages of a nuclear facility shall take full responsibility for the radiation and nuclear safety of the facility in question. No event affecting radiation and nuclear safety shall relieve such organization from its responsibility in each stage of the project.

As far as the licensing process is concerned, facilities are divided, according to the associated radiological risk and the technological complexity involved, into Type I, II or III facilities (previously classified as major and minor facilities). For Type I and II facilities, the ARN grants operation licences, while for Type III facilities the ARN has a registration system.

According to current regulations, three types of licences are required for Type I or major facilities: Construction Licence, Operation Licence and Decommissioning Licence. For nuclear power plants, a commissioning licence is also mandatory.

Personnel of the major facilities occupying positions with significant influence on safety shall hold both Individual Licences and Specific Authorizations. Two types of regulatory documents are issued for the purpose of certifying the ability of a person to hold a position in the facility operation chart. To be accepted for performing a key safety-related responsibility in a given facility, the applicant needs in addition to the licence a specific authorization which must be requested to the ARN. For this purpose, the applicant shall prove a specific knowledge of the facility in question, be suitably trained for the particular job and have an adequate psychophysical fitness.

For the operation of Type II facilities, the organization responsible for the practice involving radioactive material or ionizing radiation shall apply to the ARN for an operation authorization. In addition, all responsible persons involved are required to hold a specific individual permit applicable to a given practice.

## **Safeguards**

Safeguards and nuclear non-proliferation assurances are another aspect in the Argentine regulatory system. They constitute a set of requirements and procedures applicable to nuclear materials and other nuclear-related materials, equipment and information, aimed at ensuring, with a reasonable degree of certainty, that such elements are not diverted to an unauthorized use, and that the international commitments in this field are appropriately observed.

Safeguards may be national or international in nature; international safeguards can be regional or global in scope. National safeguards are defined by the provisions set forth in the regulatory framework adopted by each State. For Argentina, the ARN has established the guidelines of the Argentine Accounting and Control System for nuclear materials and other nuclear-related materials, equipment and facilities. As far as the international safeguards and non-proliferation assurances are concerned, their application proceeds in accordance with the commitments and agreements on non-proliferation of nuclear weapons adopted by Argentina. In this case, safeguards may be applied by regional or global international organizations and are aimed at detecting, at a timely manner and with a reasonable degree of certainty, that "significant quantities" of nuclear materials are not diverted to purposes banned by the agreements by virtue of which those safeguards are applied.

In this regard, it is worth mentioning the "Agreement between the Argentine Republic and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy" signed in Guadalajara in 1991. By virtue of this agreement an agency was created, designated as "Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials" (ABACC) whose essential objective is the implementation of the "Common System of Accounting and Control of Nuclear Materials" aimed at ensuring that nuclear materials are not diverted for the manufacturing of nuclear weapons or other nuclear explosive devices.

Immediately after the entry into force of the bilateral agreement, the agreement between both countries, ABACC and the International Atomic Energy Agency (IAEA) for the application of safeguards (referred to as the Quadripartite Agreement) was concluded. This agreement commits the IAEA to applying safeguards in both countries for all nuclear materials in connection with all nuclear activities in Argentina and Brazil, based on the "Common System of Accounting and Control of Nuclear Materials".





## Physical Protection

The Argentine regulatory system also envisages, with special attention focussed on the national regulatory function, the physical protection against robbery, removal or unauthorized use of nuclear materials, and sabotage against nuclear facilities. In this respect, the ARN takes full responsibility for requiring the Responsible Entity to implement a complete physical protection system applicable to nuclear facilities and materials in accordance with the regulatory requirements set forth by the ARN. Physical protection has become a matter of international interest and cooperation. In particular, the "Convention on Physical Protection of Nuclear Material", regarding international transport of these materials, was opened to signature on March 3, 1980, in the IAEA's headquarters in Vienna and the United Nations headquarters in New York; Argentina adopted this Convention under Act 23,620 and then ratified it.

## Transport of Radioactive Material



Accidental conditions of transport: mechanical test

All international, regional and national organizations responsible for regulation of land, air, river and sea transport of hazardous materials have endorsed the safety criteria contained in regulation AR 10.16.1. relating to "Transport of Radioactive Materials", the text of which is identical to the aforesaid IAEA Regulations. Regulation AR 10.16.1. provides persons, goods and environment with an appropriate safety level during normal transport of radioactive material, as well as in the event of any accident. In order to protect workers and public under normal transport conditions, this regulation sets forth requirements which essentially limit the dose rate in the vicinity of the packages to be transported and the non-fixed contamination in their external surface.

## AR Regulatory Standards

In accordance with the provisions of article 16, section a) of Act 24,804, the ARN shall have power to "establish regulations relating to radiation and nuclear safety, physical protection and nuclear materials use control, the licensing and control of nuclear facilities, international safeguards and transport of nuclear materials with regard to its radiation and nuclear safety and physical protection aspects".

Regulatory standards in Argentina have a performance basis: they are not prescriptive in nature, but they define the accomplishment of safety objectives. How such objectives are achieved depends on the adequate decisions taken by the organization in charge of the design, construction, commissioning, operation and decommissioning of the facility; such organization must demonstrate to the Regulatory Authority that the technical means it proposes actually accomplish the objectives set in the standards.

The Regulatory Standards in force on December 31, 2002 are listed below:

- AR 0.0.1. Licensing of Type I installations
- AR 0.11.1. Licensing of personnel of Type I installations
- AR 0.11.2. Psychophysical aptitude requirements for specific authorizations
- AR 0.11.3. Retraining of personnel of Type I installations
- AR 3.1.1. Occupational exposure in nuclear power plants
- AR 3.1.2. Limitation of radioactive effluents in nuclear power plants
- AR 3.1.3. Radiological criteria relating to accidents in nuclear power plants
- AR 3.2.1. General safety criteria in the design of nuclear power plants
- AR 3.2.3. Nuclear power plant fire protection
- AR 3.3.1. Nuclear power plant reactor core design
- AR 3.3.2. Nuclear power plant heat removal systems
- AR 3.3.3. Nuclear power plant pressure primary circuit
- AR 3.3.4. Nuclear power plant fuel performance
- AR 3.4.1. Safety-related protection and instrumentation system in nuclear power plants
- AR 3.4.2. Nuclear power plant shutdown systems
- AR 3.4.3. Nuclear power plant confinement systems
- AR 3.5.1. Emergency electric power supply in nuclear power plants
- AR 3.6.1. Nuclear power plant quality system
- AR 3.7.1. Documentation to be submitted to the Regulatory Authority prior to the commissioning of a nuclear power plants
- AR 3.8.1. Pre-nuclear commissioning of nuclear power plants
- AR 3.9.1. General criteria for operational safety in nuclear power plants
- AR 3.9.2. Communication of significant events in nuclear power plants
- AR 3.10.1. Protection against earthquakes in nuclear power plants
- AR 3.17.1. Nuclear power plant decommissioning
- A.R. 4.1.1. Occupational exposure in nuclear research reactors
- AR 4.1.2. Limitation of radioactive effluents from nuclear research reactors
- AR 4.1.3. Accident related radiological criteria in nuclear research reactors
- AR 4.2.1. Design of critical assemblies
- AR 4.2.2. Design of research reactors
- AR 4.2.3. Fire protection in research reactors
- AR 4.5.1. Electric power supply system design for research reactors
- AR 4.7.1. Documentation to be submitted to the Regulatory Authority prior to the commissioning of a research reactor
- AR 4.7.2. Documentation to be submitted to the Regulatory Authority prior to the commissioning of a critical assemblie
- AR 4.8.1. Pre-nuclear commissioning of critical assemblies
- AR 4.8.2. Pre-nuclear commissioning of research reactors
- AR 4.9.1. Critical assembly operation
- AR 4.9.2. Research reactor operation
- AR 5.1.1. Occupational exposition in Type I accelerators
- AR 5.7.1. Documentation to be submitted to the Regulatory Authority prior to the commissioning of a particle accelerator
- AR 6.1.1. Occupational radiation safety in Type I radioactive installations
- AR 6.1.2. Limitation of radioactive effluents in Type I radioactive installations
- AR 6.2.1. Radiation safety for design of industrial irradiation plants with a mobile underwater radioisotope source
- AR 6.7.1. Documentation to be submitted to the Regulatory Authority prior to the commissioning of an industrial irradiation plant
- AR 6.9.1. Industrial irradiation plant operation with a mobile underwater radioisotope source
- AR 7.9.1. Operation of industrial gammagraphy equipments
- AR 7.11.1. Individual licences for industrial gammagraphy equipment operators
- AR 8.2.1. Use of sealed sources in brachytherapy
- AR 8.2.2. Operation of linear electron accelerators for medical use



- AR 8.2.3. Cobalt-therapy equipment operation
- AR 8.2.4. Use of unsealed radioactive sources in nuclear medicine
- AR 8.11.1. Individual licences for use of radioactive material or ionizing radiation in human beings
- AR 8.11.2. Minimal requirements to obtain medical individual permits
- AR 10.1.1. Basic Radiation Safety Standard
- AR 10.12.1. Radioactive waste management
- AR 10.13.1. Basic standard on the physical protection of nuclear materials and installations
- AR 10.14.1. Assurances of non-diversion of nuclear materials and of material, installations and equipment of nuclear interest
- AR 10.16.1. Transport of radioactive materials

### **AR Regulatory Guides**

The Regulatory Guides in force on December 31, 2002 are listed below:

- Guide AR 1 Dosimetric factors for external irradiation and internal contamination, and emergency levels in foods
- Guide AR 2 Schedules of requirements for the transport of specified types of radioactive material consignments
- Guide AR 3 Specific functional conditions to be verified by the specialized physician according to psychophysical performing score
- Guide AR 4 Design of nuclear research reactors
- Guide AR 5 Operation of industrial gammagraphy equipments: Contents of a training course to obtain individual permits
- Guide AR 7 Design of critical assemblies

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## **FACILITY CONTROL**

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In Argentina there are two nuclear power plants in operation, one under construction, three critical assemblies, three research and isotope production reactors, 25 major radioactive facilities and more than 1,600 facilities for medical, industrial, research and training purposes which use radioactive materials or sources. Those facilities are intended for various purposes such as electric power generation, radioisotope production, basic and applied research, or the use of ionizing radiation in the field of medicine and industry. Such various facilities are located all around the country and their complexity and radioactive material inventories vary significantly.

The ARN's regulatory activities aimed at controlling those facilities include analyzing design and operation-related documents, permanently assessing safety during operation, and verifying by means of regulatory inspections and audits the compliance with the provisions of the licence concerned. The analysis and assessment tasks are performed by staff members skilled in the field of radiological and nuclear safety who use modern information technology for data management and are acquainted with the use of calculation codes, in order to validate, based on their own independent criteria, documentation supplied by the licensee.

The ARN's control action also includes a program of routine and non-scheduled inspections for monitoring all activities related to safety and verification of compliance with the provisions of the relevant licence.

Routine inspections are associated with the supervision of the facility's regular activities, process monitoring and verification of compliance with the provisions of binding documents. As far as nuclear power plants are concerned, inspections are basically conducted by ARN's resident inspectors relying on the technical support provided either by the ARN analysis and assessment teams or by teams working for the ARN under agreements or contracts.



Non-scheduled inspections are carried out both in the event of specific circumstances and when the need arises to increase the inspection effort. In such cases inspections are conducted by experts in a variety of disciplines, either from the ARN or other ARN-related institutions.

Facilities subject to regulatory control are listed in the following table:

Facilities under regulatory control	Number
Nuclear power plants in operation	2
Nuclear power plant under construction	1
Research reactors	3
Critical assemblies	3
Particle accelerators	4
Radioisotope or radioactive source production plants	5
High-dose irradiation plants	2
Facilities pertaining to nuclear fuel cycle	13
CNEA's waste management area	1
Teletherapy centres	68
Brachytherapy centres	57
Nuclear medicine centres	309
Gammagraphy facilities	67
Industrial applications	309
Research and education centres and other applications	350
Linear accelerators in medical use	45
Radioimmunoassay laboratories	408
Radioactive material import/export	65
<b>Total number of facilities</b>	<b>1712</b>

CNEA: National Atomic Energy Commission

The distribution of the inspections carried out by the ARN in 2002 by area under regulatory control, as measured in person-days of inspection, is shown below.

#### Total Inspection effort

Area under regulatory control	Person-days
Radiation and nuclear safety	3107
Safeguards	598
Physical protection	116

#### Radiological and nuclear safety inspections

Type of facility	Person-days
Nuclear reactors	1465
Type I radioactive facilities	138
Medical applications	720
Industrial applications	714
Research and training and others	70





## Safeguards Inspections

Type of facility	Person-days
Nuclear reactors	481
Type I radioactive facilities	102
Research facilities	15

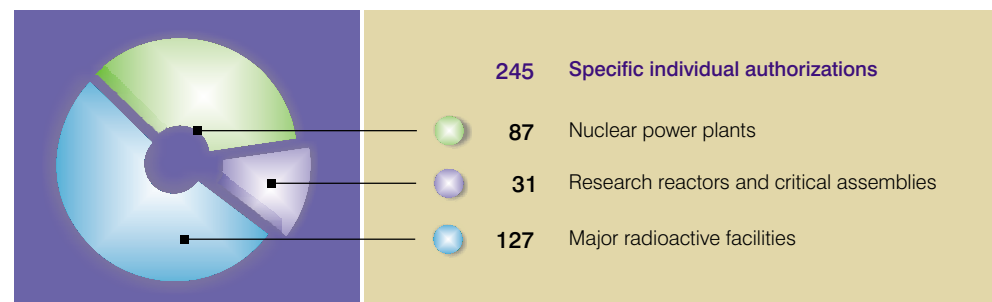
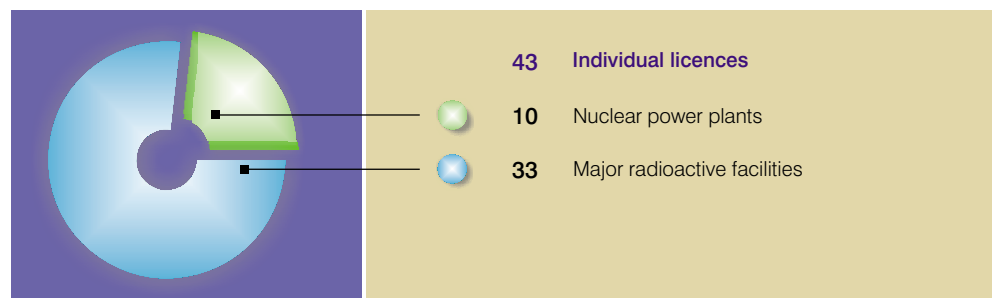
## Physical protection inspections

Type of facility	Person-days
Nuclear reactors	43
Type I radioactive facilities	73

The ARN performed in 2002 its obligation to cooperate with ABACC for implementation of the "Common System of Accounting and Control of Nuclear Materials", by contributing 11 inspectors who carried out 161 person-days of inspection in Brazilian facilities.

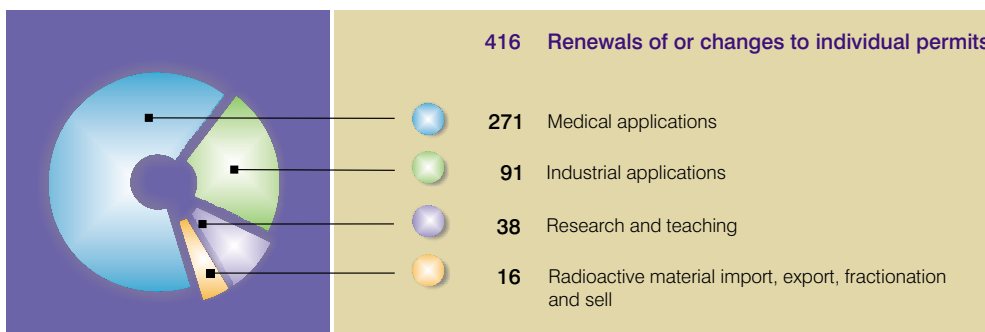
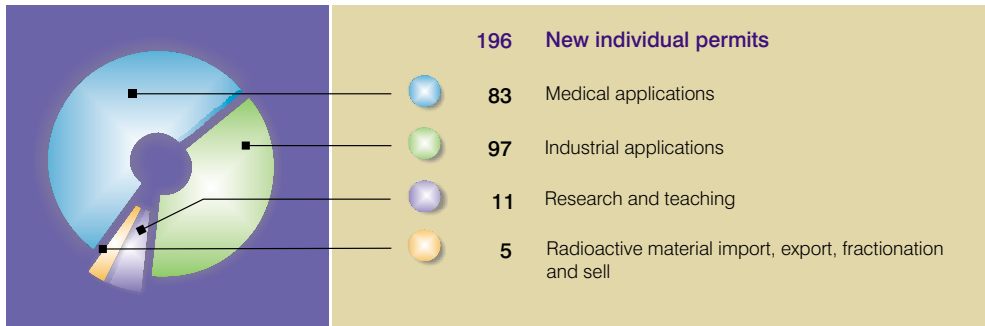
## Individual licences and specific individual authorizations

During 2002 the ARN issued 43 individual licences and 245 specific individual authorizations for Type I facilities, the distribution of which is shown in the following figure:



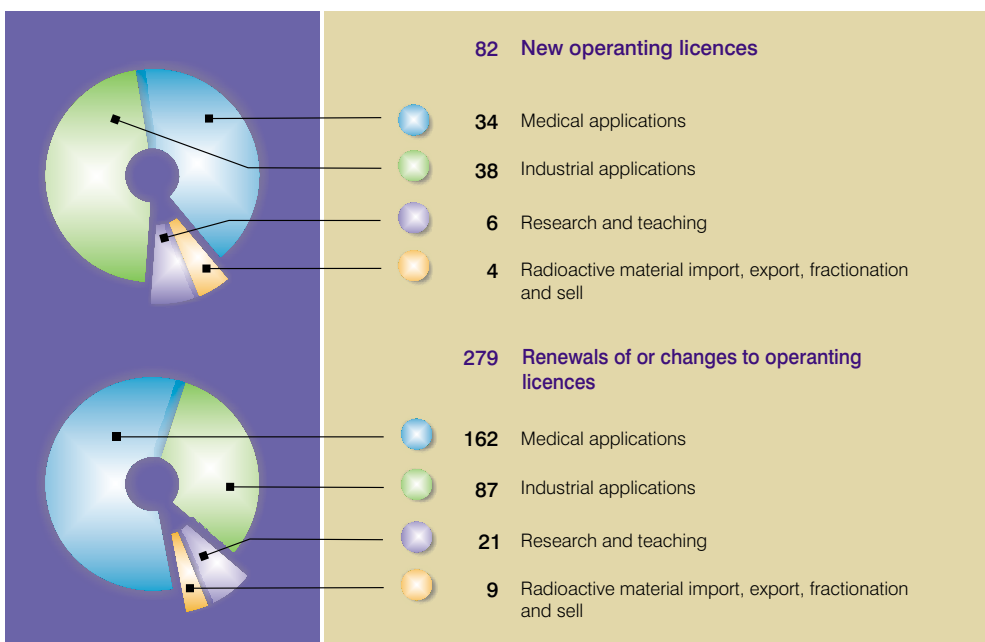
## Individual permits

In 2002 the ARN granted 196 new individual permits and 416 renewals of or changes to previously existing permits, as detailed in the figure below.



## Operation Licences for Facilities

In 2002 the ARN granted 196 new operating authorizations and 416 renewals of or changes to previously existing authorizations, as follows:



## EMERGENCY SYSTEM

All ARN-regulated activities involving the use of ionizing radiation must have emergency procedures or plans. Such procedures or plans are a condition within the process of licensing and controlling those activities.

The ARN establishes the emergency criteria and evaluates the radiological and nuclear emergency plans and procedures developed by the facilities under control.

Which actions are to be taken, who will take them and how they will be taken are the highlights of the emergency plan on which intervention is based. This plan contains all procedures to be followed in the event of an accident condition. For Type I facilities, the licensee shall have an emergency plan in place prior to commissioning. For Type II facilities, emergency procedures are required to minimize the consequences of possible accidents.

In the event of radiological emergencies in facilities other than nuclear power plants, the ARN will take the necessary steps through its own Radiological Emergency Intervention System (SIER). The SIER is intended to:

- Advise personnel in charge of relevant installations in the event of an emergency.
- Advise public authorities involved in the control of radiological emergencies.
- Act in the event of emergencies which may arise in minor facilities and practices where accidents can not be adequately controlled or may affect the public, as well as in the event of radiological emergencies in public areas.

The SIER has a primary intervention group which is on duty in weekly shifts all year round. The SIER has the specific equipment and necessary logistic infrastructure to ensure a prompt and efficient intervention in the event of an accident with possible radiological consequences.

In addition, the ARN has signed cooperation agreements with other organizations such as the Federal Police, the Border Guard and the Coast Guard, so as to take common actions in the event of an emergency.

In compliance with the provisions of Act 24,804 and its regulating decree, the ARN has created through Resolution 25/99 issued by the Board of Directors the Nuclear Emergency Intervention System (SIEN), which serves as a complement to the previously created SIER. The implementation of the SIEN coincides with the creation (by Decree 1,250/99) of the Federal Emergency System (SIFEM). The SIEN's structure allows for the ARN to join the SIFEM as a participant organization.

The main features of ARN's SIEN and SIER emergency intervention systems are summarized in the following chart:

System	Objetives
SIEN Nuclear Emergency Intervention System	To act in the event of emergencies resulting from accidents in nuclear power plants, the consequences of which extend to the outside of the facility. To participate in planning and training stages aimed at intervention in emergencies. To take actions within the Federal Emergency System (SIFEM).
SIER Radiological Emergency Intervention System	To act in the event of radiological emergencies arising in minor facilities and practices or involving the public. To act in the event of radiological emergencies in public areas. To advise public authorities and users.



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## OCCUPATIONAL SURVEILLANCE

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Basic criteria supporting radiological safety establish that: all practices involving the use of ionizing radiation shall be adequately justified, radiological protection shall be optimized, dose limits and constraints shall be complied with, the likelihood of accidents (potential exposures) shall be kept at a minimum level.

The ARN assesses information related to occupational exposure in all the relevant and the most important of the minor facilities. This work allows the ARN to define behavioral indicators for radiological protection systems, to identify trends, to verify compliance with dose limits, and to make comparisons among different practices.

In 2002, the total number of workers subject to control in the different facilities reached 2350, with 84.9 % of them pertaining to the nuclear power plants.

The resulting collective dose to major facility workers was 16 man Sv. In the Embalse nuclear power plant (CNE) and Atucha I nuclear power plant (CNA I) no workers exceeded 50 mSv in 2002.

The total number of workers in research reactors and critical assemblies reached 113. The annual collective dose to workers involved in the operation of these facilities was 0.05 man Sv.

In the remainder facilities, the annual collective dose was 0.27 man Sv.

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## ENVIRONMENTAL SURVEILLANCE

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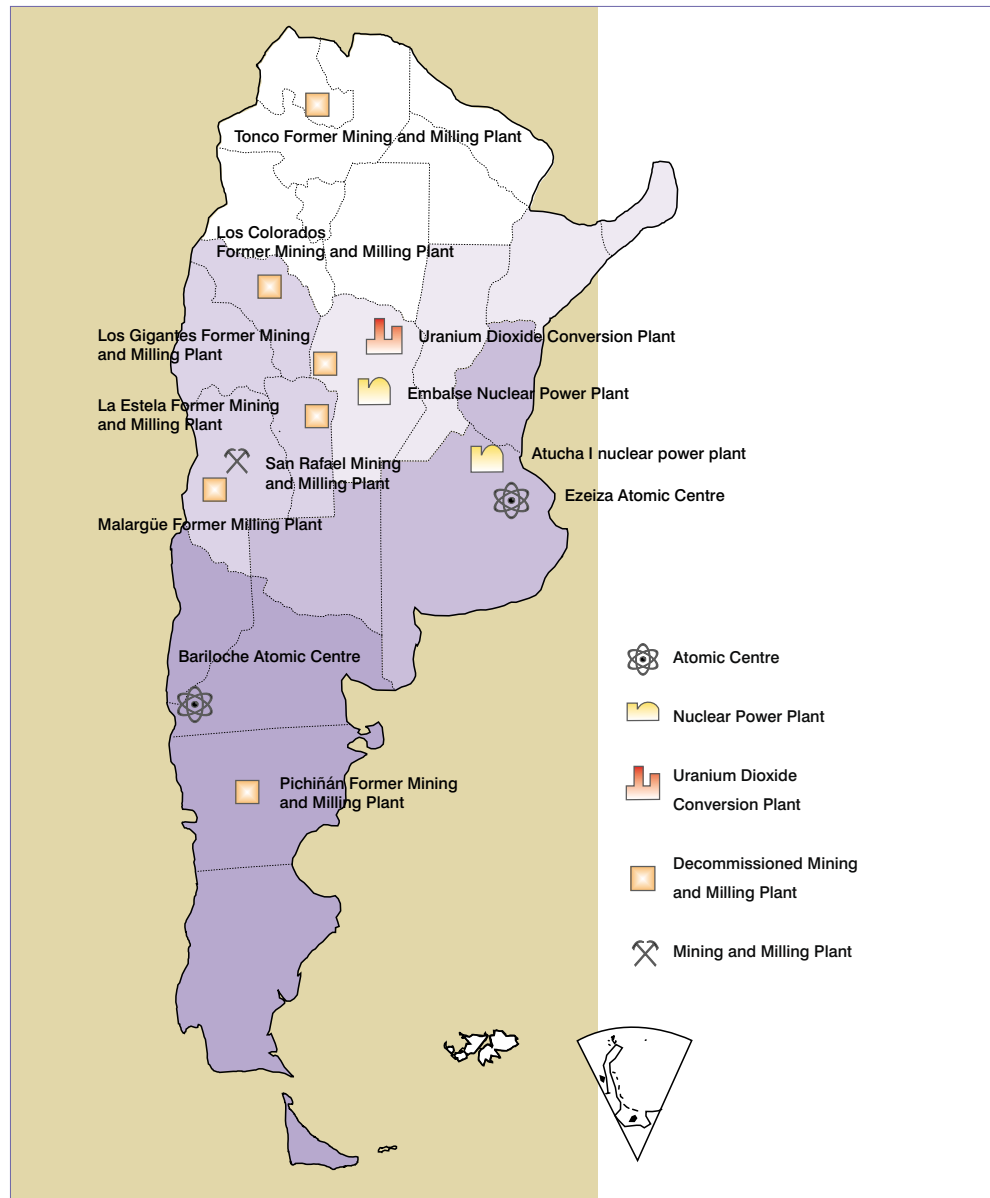
The ARN performs environmental monitoring of areas around the different nuclear facilities, fully independently from monitoring carried out by the facilities themselves. In 2002, such a monitoring was carried out in the surroundings of Atucha I and Embalse nuclear power plants, Ezeiza and Bariloche atomic centres, San Rafael uranium ore mining plant, Cordoba uranium ore milling plant and the following decommissioned plants for mining and milling of uranium ores: Malargüe, Los Gigantes, La Estela, Los Colorados, Tonco and Pichiñan. The facilities under environmental control are shown in the map below.

In the surroundings of Atucha I and Embalse nuclear power plants, representative samples were taken of the different compartments within the radionuclide transfer environmental matrix. In order to evaluate the environmental impact of the liquid discharges, samples of river and lake water, sediments and fish were collected and analyzed. To assess the environmental impact of gaseous emissions, samples of locally produced food, such as milk and vegetables, were taken and analyzed. Grass was analyzed as an indicator of radioactive material deposition. On account of their importance from the radiological point of view, radionuclides analyzed were mainly the radioactive fission products (cesium 137, strontium 90, iodine 131) and neutron activation products (tritium and cobalt 60).

No environmental pollution was detected in 2002 attributable to nuclear power plant operation, except for very low activity levels of cobalt 60 and cesium 137 in some sediment and fish samples.

Environmental monitoring was also carried out for CNEA's Ezeiza Atomic Centre. As done for the nuclear power plants, representative samples of the different compartments of the environmental matrix were collected in the surroundings of the Atomic Centre and then analyzed. No radionuclides were detected in the environment attributable to the operation of the atomic centre, except for some sediment samples.





The ARN has continued to periodically perform environmental monitoring in the areas surrounding the operating and decommissioned facilities for the mining and milling of uranium ores. Monitoring was conducted at currently operating Cordoba plant, San Rafael uranium ore mining plant, as well as the following decommissioned plants: Malargüe, Los Gigantes, La Estela, Los Colorados and Tonco. To assess the radiological environmental impact of the operation of the various facilities, surface water, sediment and ground water were sampled. Natural uranium concentration and radium 226 activity were determined, as was radon gas emission rate for uranium mill tailings, on account that uranium, radium 226 and radon maintain the highest potential to produce radiological exposure. The results obtained show that no environmental pollution exists attributable to the monitored facilities.

In the course of year 2002, the ARN continued to carry out the radon concentration measurement program directed to monitor houses in different cities of Argentina, so that exposure incurred by members of the public could be estimated. For houses monitored from 1983 to 2002 all around the country, the radon concentration mean value resulted in  $36.9 \text{ Bq/m}^3$ . Studies performed show that radon levels in Argentine houses are well within the permissible values.



In 2002 the radioactive effluent release during operation of CNA I and CNE nuclear power plants represented 14% and 3% of the respective annual dose constraints.

Environmental sampling near Ezeiza Atomic Centre



The resulting doses to individuals of the critical group for Atucha I and Embalse nuclear power plants reached respectively 0.004 and 0.002 mSv. These doses represent 2% of the annual dose constraints for a particular facility.

The resulting doses to individuals of the critical group in the remaining major facilities were less than a tenth of the annual dose constraints for each particular facility.

## ARN LABORATORIES

The ARN performs various scientific and technological tasks to support its regulatory activity. For this purpose, the ARN relies on appropriate laboratories, equipment and skilled personnel whose work consists in implementing and validating the corresponding methodologies within different working sectors.

The ARN has various laboratories at the Ezeiza Atomic Centre, located in Ezeiza, province of Buenos Aires. Those laboratories cover an area of 2,000 m<sup>2</sup> and work on physical dosimetry, radiopathology and biological dosimetry, radiochemical analyses, uranium particle detection, iodine 129 detection, radon measurement, environmental samples processing, and internal contamination assessment. Those facilities also include measurement laboratories (whole body counter, gamma and alpha spectrometry laboratory, gross alpha and beta activity measurement laboratory, and low background activity counter), electronic support laboratories and filter efficiency determining laboratories.

Various activities supporting the regulatory and development control functions are performed within the following specific areas:

- Physical dosimetry.
- Internal contamination.
- Biological dosimetry.
- Radon measurement techniques.
- Program of medical assistance on radiation protection.
- Diagnostic and prognostic indicators applicable to accidental overexposure.
- Prenatal irradiation effects on developing central nervous system.
- Remote surveillance and monitoring system.
- Filter tests.



- Development of techniques aimed at detecting undeclared nuclear activities.
- Nuclear tests detection techniques.

In the framework of the Comprehensive Nuclear Test Ban Treaty, a gamma spectrometry laboratory is in operation which serves as a primary laboratory within the international network set forth in that Treaty.

For the purpose of developing radionuclides identification and analysis techniques within the context of international safeguards, works are being carried out for the installation of an ion accelerator. Such electrostatic accelerator (FN model - High Voltage Electrostatic Corporation) was donated to the ARN by the University of McMaster, Ontario, Canada, and is currently being assembled at CNEA's Ezeiza Atomic Centre.

The radiochemical laboratories process samples obtained from environmental monitoring and inspections. The different types of samples, including waters, soils, sediments, vegetables, filters and biological samples such as urine, feces and nasal wipes, are analyzed in order to determine different alpha and beta emitter radionuclides.

In the radiation measuring laboratories, routine and special measurements in thyroid, lungs and the whole body are performed. Measurements associated with environmental studies, inspections and audits are also conducted.

In the field of physical dosimetry, routine measurements of personnel dosimetry and special measurements in reactors, critical assemblies and accelerators for medical use and for research are carried out.

These laboratories are regularly involved in international intercomparison programs aimed at keeping up the required operating standards.



Measurements of natural uranium samples

## INSTITUTIONAL RELATIONS

In compliance with its regulatory function, the ARN maintains a close and varied interaction with domestic and foreign, governmental and non-governmental organizations, as well as with international agencies. Such an interaction has the following objectives:

- To facilitate the exchange of experiences and information as well as the participation in developing international recommendations to address issues related to radiological and nuclear safety, nuclear non-proliferation assurances and physical protection.
- To establish and develop technical cooperation agreements.
- To promote cooperation in order to improve effectiveness and efficiency of the international safeguards system through the participation of experts and the development of specific techniques in the country.

Furthermore, the ARN is actively involved in negotiating international instruments in connection with nuclear regulatory activities as well as in their subsequent implementation. In addition, the ARN contributes to the articulation of Argentine regulatory policies upheld in different international forums.

The negotiation of local and international agreements has always been one of the most important tasks within the context of the ARN's institutional relations. The ARN is currently involved in the execution of numerous agreements signed with local and foreign universities, public hospitals, the Federal Police and the Coastguard, as well as with American, Canadian, Spanish and Swiss regulatory authorities, among other countries.

## LOCAL AGREEMENTS

Universities	Security Forces
University of Buenos Aires, Faculty of Exact Sciences University of Cuyo University of San Juan University of Buenos Aires, Faculty of Engineering Higher School Institut of the Army National Technological University	Federal Police - Firemen Department Border Guard Coastguard
Hospitals	Others
San Martín Hospital Burnt Person Hospital Navy Hospital	Province of Mendoza's Ministry of the Environment National Atomic Energy Commission National Institut for Seismic Studies Municipality of Neuquén Argentine Society of Radiation Protection Government Office of Public Health Custom General Direction

## INTERNATIONAL AGREEMENTS

Countries	Institutions
Switzerland HSK	Hauptabteilung für die Sicherheit der Kernanlage
United Kingdom NRPB	National Radiological Protection Board
South Africa CNS	Council for Nuclear Safety
Canada AECSB	Atomic Energy Control Board
U.S.A. NRC	Nuclear Regulatory Commission
France CEA	Commissariat à l'Energie Atomique
Spain CSN	Consejo de Seguridad Nuclear
Armenia ARNA	Armenia's Nuclear Regulatory Authority
Egypt NCNSRC	National Centre for Nuclear Safety and Radiation Control
Germany GRS	Gesellschaft für Anlagen und Reaktorsicherheit
Italy ANPA	Agenzia Nazionale per la Protezione dell' Ambiente
Australia ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
	ABACC Brazilian-Argentine Agency for Nuclear Material Accountancy and Control
	DOE U.S. Department of Energy
	NRC U.S. Nuclear Regulatory Commission
	EPRI U.S. Electric Power Research Institute
	IPSN France's Institut de Protection et de Sûreté Nucléaire
	----- Canada's McMaster University
	----- University off Pisa - Italy



The ARN attaches great importance to its link with the International Atomic Energy Agency (IAEA). This link can be defined by three essential aspects:

- Attendance to regular meetings of the IAEA's "policy-making" organs;
- Participation in meetings of high-level expert committees advising the IAEA Director-General on issues in connection with nuclear safety and safeguards, as well as in activities related to negotiation or implementation of international agreements significant for nuclear safety; and
- Contributing experts for technical assistance missions in various countries, preparing safety-related publications and providing training for foreign trainees.

It is worthy of note that Argentina is one of the few member countries of the four technical committees working within IAEA's Secretariat-established process for the preparation and review of safety standards. Those committees are as follows:

- Radiation Safety Standards Committee (RASSC)
- Nuclear Safety Standards Committee (NUSSC)
- Waste Management Safety Standards Committee (WASSC)
- Transport Safety Standards Committee (TRANSSC)

Officers of the ARN are also members of other important committees, in particular the Standing Advisory Group on Safeguards Implementation (SAGSI) and the Commission on Safety Standards (CSS).

The ARN is a member of the Latin American Forum of Nuclear Regulatory Organizations and the Network of Regulators of Countries with Small Nuclear Programmes (NERS).

Adherence to the Comprehensive Nuclear Test Ban Treaty (CTBT) adopted by the United Nations General Assembly in September, 1996, requires continuous work to be performed by different sectors in the ARN. For the purpose of verifying compliance with the essential obligations set forth in the Treaty, an International Monitoring System envisaging the use of various detection techniques is established. For radionuclide and infrasound techniques, the ARN is the Argentine responsible organization.

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## TRAINING

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The ARN undertakes as a permanent activity the training of specialists in radiation and nuclear safety, safeguards and physical protection, by means of training courses and the participation in local and international congresses and expert meetings. The training activity is carried out through the Training Department in charge of defining, organizing and coordinating courses, workshops and follow-up seminars.

### **Postgraduate Course**

The Postgraduate Course in Radiation Protection and Nuclear Safety organized in accordance with the provisions of an agreement with the University of Buenos Aires (UBA) and the Ministry of Health under the auspices of the IAEA, has uninterruptedly taken place on a yearly basis since its inauguration in 1980. Since then, a total number of 590 professionals have been granted a degree, half of them foreigners. The course consists of two modules relating to radiation protection and nuclear safety, and running respectively for 25 and 10 weeks. Both modules run on a daily seven-hour basis. 20 participants attended the course in 2002; 15 of them were from Argentina while 10 came from the rest of Latin America.



Participants in the 23th Postgraduate Course in Radiation Protection and Nuclear Safety



### Training Course for Technicians

A course in radiation protection is provided to train technicians from public and private institutions. This course runs for eight weeks on a daily seven-hour basis. In the 2002 edition, participants belonged to the Nuclear Regulatory Authority, the National Atomic Energy Commission, the Border Guard, NASA S.A., the Firemen Department and (under IAEA's fellowships) from Uruguay and Paraguay Republic.

### Specialized Courses

In addition to general courses in Radiation Protection and Nuclear Safety mentioned above, different ARN groups provide specific courses, for example the following:

- Transport of radioactive material
- Safeguards, for IAEA and ABACC inspectors
- Aerosol monitoring, for CTBT International Surveillance System operators
- Medical response in radiation accidents

These courses run for a period of 1 to 4 weeks on a daily full-time basis. They take place every 2 years, on average.

Training courses provided by the ARN during 2002 are shown in the following table:

Name of the Course	City	Duration/Date
Postgraduate Course in Radiation Protection and Nuclear Safety	Buenos Aires	
a) Module I "Radiation Protection"		April, 1 to August, 23
b) Module II "Nuclear Safety"		August, 25 to October, 31
Radiation Protection (Technician Level)	Buenos Aires	September, 2 to October, 31







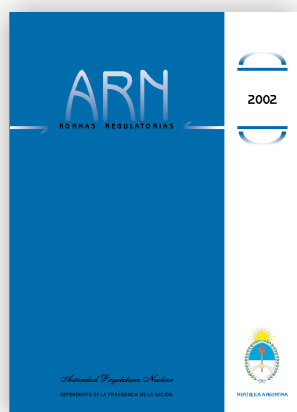
Name of the course	City	Duration/Date
Radiobiology Applied to Radiotherapy	Santa Fe	October
Radiation Protection Module – Course in Radioisotope Methodology and Applications (CNEA)	Buenos Aires	May/June
Radiation Safety Module - Master's Degree in Nuclear Reactors (CNEA/UTN)	Buenos Aires	May/June
Diagnosis and Treatment of Burn Injuries (Radioinduced burn injuries module)	Buenos Aires	Annual
Illicit Traffic of Radioactive Material	Formosa	September, 26
Prevention of Illicit Traffic of Radioactive Material	Buenos Aires	March, 27 to 29 June, 19 to 20 June, 24 to 26
Regional Training Course for Regulators on Radiation Protection and Safety in Industrial and Research Irradiators	Buenos Aires	August, 5 to 9
Regional Training Course for Instructors on Evaluation and Response to Nuclear Emergencies	Buenos Aires	November, 25 to 29
Third Workshop for the Development of a Legal Framework Governing the Safety of Radioactive Waste Management, Physical Protection of Nuclear Material and the Safe Transport of Radioactive Material	Buenos Aires	November, 25 to 29

Furthermore, the ARN gives every year the radiation protection modules for the following courses: “Course in radioisotope methodology and Application” (CNEA) and courses in “Radiotherapy Physics” and “Dosimetry in Radiotherapy” (CNEA). Courses relating to ionizing radiation industrial applications are provided at the request of radioactive material users.

The ARN has an Information Centre comprising two functional units allowing the public to access specialized literature on radiation and nuclear safety, safeguards and physical protection through both ARN's own databases and remote data banks, or by means of periodicals and specific textbooks.

### ARN Publications

The following institutional publications are regularly edited by the ARN in printed and compact disk form:



#### AR Standards

This publication contains the text of the regulations currently in force relating to radiological and nuclear safety, safeguards, physical protection and transport of radioactive material.

Separate printouts of each standards and the complete set in CD-version are also provided.

### Annual Technical Reports

The ARN Technical Reports contain all works published and/or submitted to congresses by the ARN's different working groups in the field of radiological and nuclear safety, safeguards and physical protection. They also include works performed under agreements between the ARN and universities or other local and foreign organizations.

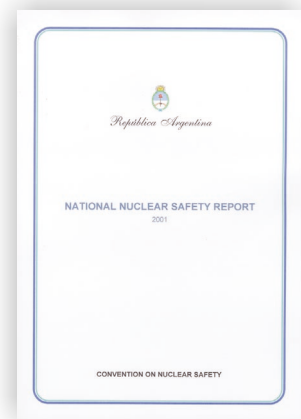
The Technical Reports are edited on a yearly basis since the creation of the Regulatory Authority.



### National Nuclear Safety Report

This report has been written according to the guidelines established in the frame of the Convention on Nuclear Safety, the objective of which is to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation. Argentina signed the Convention on Nuclear Safety, adopted by a Diplomatic Conference held in Vienna, on June 17, 1994, and adopted the Convention through Act 24,776 passed by Parliament on February 4, 1997.

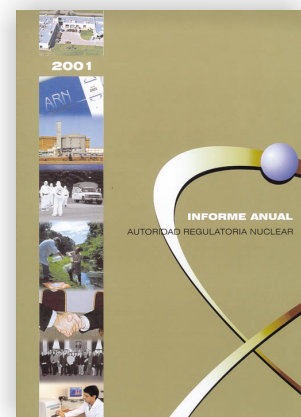
This report describes the actions performed by Argentina since the start of its nuclear activities, such that compliance with provisions of the Convention above can be verified.



### Annual Reports

Annual reports summarize the main regulation and control activities regarding radiological and nuclear safety, safeguards and physical protection which are carried out each year at all facilities and for all practices involving ionizing radiation throughout the country.

This report, regularly sent to Parliament since 1997, describes the Argentine regulatory system, the facilities under control and the main regulatory activities performed by the ARN during the period from January 1 to December 31 each year. Annexes containing all licences, operating authorizations and transport certificates issued and inspections performed during the year at medical, industrial and research and teaching facilities are included.

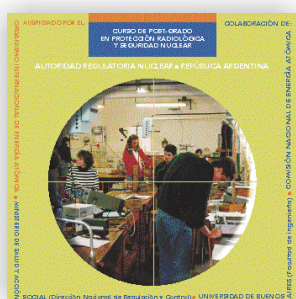




### Radiation Protection in Medical Applications of Ionizing Radiation

This book, is intended to provide professionals and technicians working on medical applications of ionizing radiation with the main elements of radiation protection.

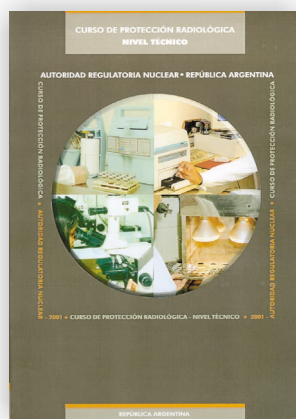
The first chapters relate to dosimetric magnitudes and techniques and describe the biological effects of radiation and the fundamentals of radiation protection. The rest of the book relates to the main radioprotection aspects in radiodiagnostic, nuclear medicine and radiotherapy.



### Postgraduate Course in Radiation Protection and Nuclear Safety

This CD contains the main radiation protection and nuclear safety-related subjects required for educating and training professionals working for regulatory organizations or in tasks relating to radiation application in medicine, industry, research and teaching.

The book is intended for participants in the Postgraduate Course in Radiation Protection and Nuclear Safety given by the Nuclear Regulatory Authority, the Ministry of Health and the University of Buenos Aires Faculty of Engineering under the auspices of the IAEA.



### Course in Radiation Protection for Technicians

The handbook of the radiation protection course for technicians, given by the ARN, contains in 18 chapters and an annex basic and specific topics of the protection against harmful effects of ionizing radiation.

This publication, which develops the syllabus of the course, is also of interest to persons wishing an introduction to the subject.



### Regulatory Activities

This text describes the regulatory system developed by ARN to fulfil the objectives set forth in Act 24,804. Through 8 chapters, details are given on the organization of the institution, the regulatory framework, the methods used for the control of installations, the system to face radiological and nuclear emergencies, the environmental surveillance effected by ARN and the laboratories it operates.

The final sections are devoted to the relations that it maintains with other national and foreign institutions, and its activities in the areas of education, training and technical informaton.

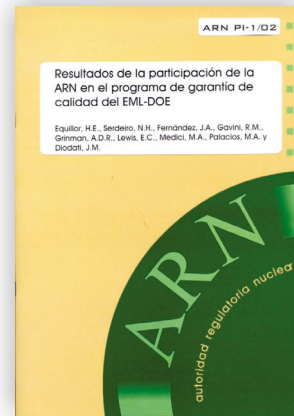


## Internal Publications

These publications contain preliminary information on different technical issues regarding radiation protection, safeguards and physical protection.

Papers concerned are eventually submitted to congresses or published in international journals.

At the end of the year they are included in the annual Technical Report.



## INFORMATION SYSTEMS

Since 1995 the Nuclear Regulatory Authority counts with an information network allowing both internal and external communication.

This network supports 220 work stations and is divided in two local area networks, one located in the ARN Headquarters and the other one in Ezeiza Atomic Centre.

The main objectives of the information network are as follows:

- To allow users at any ARN department to work on group projects, share documents, access databases or any other type of available information within the network.
- To automate the workflow contemplated in the ARN administrative processes.
- Maintain a common system for network management.

Operating Systems used are: Netware 4.1, Windows NT 4 and SCO Unix 5.04, which are supported by Servers with Multiprocessor, redundant disk and source array. For connection to the Internet a 64 kbps and a 128 kbps radio links are used which connect the ARN Headquarters and the Ezeiza Atomic Centre to Retina (Red Teleinformática Académica), the Internet service provider.



### Intranet

The ARN has developed and maintains in operation an Intranet intended to function as the central file for all technical information necessary to accomplish the objectives set forth by the law. The Intranet is accessed through the internal information network.

Thus, technical information on radiation and nuclear safety, safeguards and physical protection as well as general administrative information may be accessed from ARN's 220 work stations on a permanent basis.



The use of the Intranet in ARN's daily work has allowed information to be quickly and permanently accessed by the different working groups, thus resulting in a more efficient execution of the ARN's annual work programme.

### ARN Web Site

ARN Web page address is:

<http://www.arn.gov.ar>

In addition to general information on the ARN, the following specific information may be obtained in the ARN Web page: AR Standards, AR Guides, Licensing and Inspection Fee Regime, Sanction Regime, Press Releases, Laws and Decrees relating to the regulatory sector, licences and operating authorizations issued, Training Courses, Technical Reports, Annual Reports and National Report for the Convention on Nuclear Safety.



## HUMAN AND ECONOMIC RESOURCES

The organizational structure of the ARN is made up of 197 established posts and 3 posts pertaining to the Board of Directors. In the course of the year 2002 nineteen qualified contract workers were engaged. By the end of the year the number of trainees at the ARN was 21.

Out of the total staff, 65% are university-degree holders. 85% of the total staff is devoted to specialized scientific and technical tasks within the ARN's sphere of activities, while the remaining 15% performs support and administrative work.

The total budget allocation for the ARN approved by Administrative Decision 19/02 for the year 2002 was \$ 16,261,000 funded by Treasury Department contributions, Specific Resources and internal and external transfers. As this initial budget was modified by Administrative Decisions (76/02 and 91/02), the ultimate budget allocation for the year 2002 was \$ 18,498,648.