República Argentina

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

THIRD NATIONAL REPORT

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THIRD NATIONAL REPORT

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JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

THIRD NATIONAL REPORT[1]

On 19 December 1997, during the 41st Session of the General Conference of IAEA, Argentina subscribed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management agreed in Vienna in the course of the Diplomatic Conference held on 15 September 1997. The Honorable Congress of Argentina enacted Law Nº 25279 on 6 July 2000, ratifying the terms of the Joint Convention which came into effect on 18 June 2001.

The present National Report has been elaborated in accordance with Article 32 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, for its presentation as stipulated in Article 30 of said Joint Convention.

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND
ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

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[1] This version of the National Report is a translation of the official report in Spanish

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GLOSSARY

- *"CLASS B radioactive waste"* means those materials treated and conditioned containing low activity concentration of β/γ emitters with half lives lower than 30 years and non significant activity concentrations of α emitters;

- *"CLASS M radioactive waste"* means those materials treated and conditioned containing medium activity concentration of β/γ emitters with half lives lower than 30 years and non significant activity concentrations of α emitters;

- *"CLASS A radioactive waste"* means those materials treated and conditioned containing high activity concentration of β/γ emitters with half lives greater than 30 years and or significant activity concentrations of α emitters;

- *"clearable waste"* means those radioactive materials that can be removed from the regulatory control due to its activity concentration and or total activity, after a limited storage period for decaying;

- *"closure"* means the completion of all operations at some time after the emplacement of spent fuel or radioactive waste in a disposal facility. This includes the final engineering or other work required to bring the facility to a condition that will be safe in the long term;

- *"decommissioning"* means all steps leading to the release of a nuclear facility, other than a disposal facility, from regulatory control. These steps include the processes of decontamination and dismantling;

- *"discharges"* means planned and controlled releases into the environment, as a legitimate practice, within limits authorized by the regulatory body, of liquid or gaseous radioactive materials that originate from regulated nuclear facilities during normal operation;

- *"disposal"* means the emplacement of spent fuel or radioactive waste in an appropriate facility without the intention of retrieval;

- *"disposable waste"* means those materials that can not be dispersed in the environment due to its activity concentration and or total activity and therefore require treatment conditioning and final disposal;

- *"historical waste"* means those radioactive waste treated, conditioned or finally disposed applying criteria beyond the current regulatory frame and that require its re-assay;

- *"license"* means any authorization, permission or certification granted by a regulatory body to carry out any activity related to management of spent fuel or of radioactive waste;

- *"nuclear facility"* means a civilian facility and its associated land, buildings and equipment in which radioactive materials are produced, processed, used, handled, stored or disposed of on such a scale that consideration of safety is required;

- *"operating lifetime"* means the period during which a spent fuel or a radioactive waste management facility is used for its intended purpose. In the case of a disposal facility, the period begins when spent fuel or radioactive waste is first emplaced in the facility and ends upon closure of the facility;

- *"radioactive waste"* means radioactive material in gaseous, liquid or solid form for which no further use is foreseen by the Contracting Party or by a natural or legal person whose decision is accepted by the Contracting Party, and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework of the Contracting Party;

- *"radioactive waste management"* means all activities, including decommissioning activities, that relate to the handling, pretreatment, treatment, conditioning, storage, or disposal of radioactive waste, excluding off-site transportation. It may also involve discharges;

- *"radioactive waste management facility"* means any facility or installation the primary purpose of which is radioactive waste management, including a nuclear facility in the process of being decommissioned only if it is designated by the Contracting Party as a radioactive waste management facility;

- *"regulatory body"* means any body or bodies given the legal authority by the Contracting Party to regulate any aspect of the safety of spent fuel or radioactive waste management including the granting of licences;

- *"reprocessing"* means a process or operation, the purpose of which is to extract radioactive isotopes from spent fuel for further use;

- *"sealed source"* means radioactive material that is permanently sealed in a capsule or closely bonded and in a solid form, excluding reactor fuel elements;

- *"spent fuel"* means nuclear fuel that has been irradiated in and permanently removed from a reactor core;

- *"spent fuel management"* means all activities that relate to the handling or storage of spent fuel, excluding off-site transportation. It may also involve discharges;

- *"spent fuel management facility"* means any facility or installation the primary purpose of which is spent fuel management;

- *"State of destination"* means a State to which a transboundary movement is planned or takes place;

- *"State of origin"* means a State from which a transboundary movement is planned to be initiated or is initiated;

- *"State of transit"* means any State, other than a State of origin or a State of destination, through whose territory a transboundary movement is planned or takes place;

- *"storage"* means the holding of spent fuel or of radioactive waste in a facility that provides for its containment, with the intention of retrieval;

- *"transboundary movement"* means any shipment of spent fuel or of radioactive waste from a State of origin to a State of destination.

ACRONYMS

AECL	**Atomic Energy of Canada Ltd.**
AGE	**Ezeiza Radioactive Waste Management Area**
ALARA	**As Low As Reasonably Achievable**
ANSI	**America National Standard Institute**
ARN	**Nuclear Regulatory Authority**
ASECQ	**Spent Fuel Dry Storage System**
ASME	**American Standard Mechanical Engineering**
BSI	**British Standard Institute**
CAB	**Bariloche Atomic Centre**
CAC	**Constituyentes Atomic Centre**
CAE	**Ezeiza Atomic Centre**
CALPIR	**Advisory Committee for the Licensing of Personnel of Type I Installations**
CANDU	**Canadian Deuterium Uranium Reactor**
CFR	**Code of Federal Regulations**
CMFSR	**San Rafael Mining and Milling Complex**
CNA I	**Atucha I Nuclear Power Plant**
CNE	**Embalse Nuclear Power Plant**
CNEA	**National Atomic Energy Commission**
CSA	**Canadian Standards Association**
DCMFEI	**MTR Spent Fuel Central Storage Facility**
DIN	**German Standards Institute**
DLM	**Master Logical Diagram**
DOE	**US Department of Energy**
ENREN	**Former Nuclear Regulatory Body**
FACIRI	**Storage Facility for Research Reactors Spent Fuel**
HEU	**Highly Enriched Uranium**
IAEA	**International Atomic Energy Agency**
ICRP	**International Commission on Radiological Protection**
ISO	**International Standard Organization**
LWR	**Light Water Reactor**
MTR	**Material Testing Reactor**
NASA	**Nuclear Power Plant National Operator**
NORM	**Natural Occurring Radioactive Material**
NUSS	**IAEA Nuclear Safety Standards**
OSART	**Operational Safety Review Team**
PEGRR	**Radioactive Waste Management Strategic Plan**
PHWR	**Pressure Heavy Water Reactor**
PNGRR	**Radioactive Waste Management National Program**
PPR	**Radioisotope Production Plant**
PPRS	**Radiological Protection and Safety Program**
PRAMU	**Uranium Mining Environmental Restoration Project**
PSA	**Probabilistic Safety Assessment**
PSR	**Periodic Safety Review**
PTAMB	**Treatment and Conditioning Plant for Medium-Level and Low-Level Liquid and Solid Radioactive Wastes**
RA-0	**Argentine Reactor 0**
RA-1	**Argentine Reactor 1**
RA-2	**Argentine Reactor 2**
RA-3	**Argentine Reactor 3**
RA-6	**Argentine Reactor 6**
RWM	**Radioactive Waste Management**
RADWASS	**IAEA Radioactive Waste Safety Standards**
RWMRO	**Radioactive Waste Management Responsible Organization**
SAC	**Quality Assurance System**
SEU	**Slightly Enriched Uranium**
SFM	**Spent Fuel Management**
SIEN	**Nuclear Emergency Intervention System**
SIER	**Radiological Emergency Intervention System**
SIFEM	**Federal Emergency System**
SPDIN	**Nuclear Facilities Dismantling Sub Program**
USA	**United States of America**
WANO	**World Association of Nuclear Operators**

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

THIRD NATIONAL REPORT

SECTION A INTRODUCTION

A.1 Overview

The present National Report describes the actions taken in Argentina on the safety of spent fuel (SF) management and on the safety of radioactive waste (RW) management, in order to provide evidence of the fulfilment of the obligations derived from the Joint Convention. To facilitate the reading and a better understanding, it has been decided to include a summary of those parts of the two prior National Reports that are considered necessary in order to comply with this objective.

The uses and applications of nuclear energy began in Argentina in 1950, the year the National Atomic Energy Commission (CNEA) has been created, initially developing the research and development activities in basic areas. In the following years progress has been made with the development of nuclear technology, the operation of relevant facilities working on the production of radioisotopes for medical and industrial applications and the performance of tasks in connection with the nuclear fuel cycle, including mining and uranium processing activities, manufacturing of fuel elements for research and power reactors, production of heavy water and the operation of two nuclear power plants. In the past, reprocessing programs were undertaken at demonstrative scale.

As a result of such activities and of other activities performed in the nuclear field by other private and public entities, various types of radioactive waste have been and are generated, which are managed by applying the legal and regulatory provisions in force, in agreement with the obligations derived from the Joint Convention.

The legal framework applicable to radioactive waste management, integrates with the provisions of the National Constitution and with the legislation adopted by the National Congress by Act Nº 24804[1] which regulates the Nuclear Activity and Act Nº 25018[2] which determines the Radioactive Waste Management Regime. In addition, a number of provincial and municipal regulations exist with a significant impact on radioactive waste management activities in the country.

The National Act of Nuclear Activity assigns to CNEA the state ownership of spent fuel and the responsibility for the management of radioactive wastes, thus becoming the *Responsible Organization*. The same Act sets forth that the CNEA shall take full responsibility for the decommissioning of nuclear power plants and any other significant facility (Type I Facilities).

[1] Act Nº 24804 National Act of Nuclear Activity
[2] Act Nº 25018 Radioactive Waste Management Regime

Furthermore, the same Act creates the *Nuclear Regulatory Authority (ARN)*, which is empowered to regulate and supervise the nuclear activity in all matters related to radiological and nuclear safety, physical protection and safeguards. Likewise, it authorizes the ARN to supervise the use of nuclear materials, the licensing of persons and facilities and the verification of international safeguards.

Likewise, Act Nº 25018 appoints the CNEA as the implementing authority to perform all the activities related to radioactive waste management and sets up the *National Radioactive Waste Management Program* (PNGRR), responsible for the compliance with the specific *Strategic Plan*. To date the *Strategic Plan* has not been enacted as required by Act Nº 25018.

For a better understanding of the contents of this National Report, the definition of *radioactive waste* has been specified, understanding that it includes:

- **exempt radioactive materials (exemption/clearance)**: radioactive materials that on account of their concentration of radioactivity and/or total radioactivity may be released from regulatory control.

- **discharges**: liquid and gaseous effluents containing radioactive materials that originate from the normal operation of a facility and that due to their total activity may be discharged into the environment in a planned and controlled manner.

- **disposable radioactive wastes**: materials that on account of their concentration of activity and/or total activity, cannot be dispersed into the environment and therefore, require treatment, conditioning and final disposal.

A.2 National Program for Spent Fuel Management and Radioactive Waste Management.

As already has been mentioned, in 1998 the Argentine Government through Act Nº 25018 has appointed the CNEA as the application authority for matters related to radioactive waste management and determined the obligation to develop a *Strategic Plan for Radioactive Waste Management*, subject to the approval of the National Parliament.

This *Strategic Plan* outlines the commitments that the National Government must assume for the safety of Spent Fuel Management and Radioactive Waste Management, ensuring public health, the protection of the environment and the rights of future generations.

The *Strategic Plan* has been updated in March 2006 in order to include the provisions for Atucha II Nuclear Power Plant, in agreement with the recent decision of the Executive Power with reference to its termination.

The *Plan*, which at present covers the period from 2006 through 2095, recommends the course of action for the safe management of all waste produced in the performance of practices and those generated from decontamination and dismantling activities of nuclear and radioactive facilities. It

also proposes research and development plans associated to the technologies selected for all management stages, training of qualified human resources, availability of necessary funds for the fulfilment of the Plan and the inherent Social Communication[3] activities.

Thus, the document presents technological solutions that, in the light of the present knowledge, ensure an effective management of the generated radioactive waste.

Within this framework and in accordance with constant technological progress in the world, in the *Strategic Plan*, CNEA proposes the best solution in line with the evolution of knowledge and development, which shall be updated every three years.

Although spent fuel is considered a potential energetic resource due to its fissile material content, the decision on whether reprocessing shall form part of spent fuel management has not been made yet.

All activities included in the *Strategic Plan* which may entail a radiological hazard are regulated by ARN. The standards and regulations issued by ARN, are based on nuclear and radiological safety criteria, consistent with those adopted internationally on the matter.

On the other hand, the proposed *Strategic Plan* is encompassed within the environmental policy of our country that, in the case of waste management, takes into account the concurrent powers of the Nation, the Provinces and the Autonomous City of Buenos Aires. In this sense, Article 4 of Act Nº 25018 sets forth that the CNEA shall coordinate with the Provinces and the Autonomous City of Buenos Aires the enforcement of Radioactive Waste Management System, in order to make the management of radioactive waste produced by them possible and set up cooperation and advisory systems for the competent organizations.

With reference to the sites where the future facilities for the final disposal of radioactive wastes shall be located, Act Nº 24804 sets forth that the CNEA, in its role of Responsible Organization, shall propose the potential sites that may arise as a result of the studies performed in this sense. These sites will require the approval both by ARN as from the radiological and nuclear safety point of view and by a Law from the Provincial Government where the proposed repository would be placed.

A.3 Summary of the Main topics of the report

The structure of the Third National Report complies with the *Guidelines Regarding the Form and Structure of National Reports* approved in the Preparatory Meeting held in Vienna in July 2002 and its later updates.

Section A describes the scope of the nuclear activity developed in Argentina since 1950 as well as the legal and regulatory framework. It also makes reference to the *Strategic Plan for Radioactive Waste Management* (*Strategic Plan*), which refers to the safety of Spent Fuel Management and Radioactive Waste Management.

[3] Strategic Plan for Radioactive Waste Management

Section B sets out the policies for the safety of Spent Fuel Management and Radioactive Waste Management and includes a description of national practices in connection with said policies. As in Argentina such policies and practices have not suffered any significant change in the last decade, the content of this section does not present changes with reference to the declarations in prior National Reports.

Section C lays down the scope of application for Argentina of the terms of the Joint Convention, regarding spent fuels, naturally occurring radioactive materials (NORM) and disused sealed sources. For the same reasons as stated in the above paragraph, the content of this section does not reflect modifications with respect to the declarations in the two prior National Reports.

Section D describes the facilities destined for spent fuel management and radioactive waste management, including their respective inventories. Discharges and pertinent doses are included in Section F.

The Legislative as well as the Regulatory framework are explained in **Section E**, special emphasis is given to the implementation of safety measures and regulations. The structure and responsibilities of the Regulatory Body are also described.

Section F explains the obligations foreseen with reference to the responsibilities of the license holder, human and financial resources, quality assurance, operational radiation protection, emergency preparedness and decommissioning.

Section G deals with the safety of spent fuel management and the responsibilities defined by the Joint Convention regarding:

- General safety requirements
- Existing facilities
- Site of projected facilities
- Design and construction of facilities
- Safety Assessment of facilities
- Operation of facilities
- Final disposal of spent fuel

This section includes a brief description of the facilities, their condition and the actions taken or foreseen to improve safety.

Section H specifies the degree of compliance with the responsibilities foreseen for radioactive waste management on the following matters:

- General safety requirements
- Existing facilities and past practices
- Site of projected facilities
- Design and construction of facilities
- Safety Assessment of facilities

- Operation of facilities
- Institutional measures after closing

This section includes a brief description of the facilities, their condition and the actions taken to improve safety.

Also has been included in this Section is a summarized description of the situation of the Uranium mining wastes.

It should be noted that the spent fuel management facilities and radioactive waste management facilities are located in the same site, either in the Ezeiza Radioactive Waste Management Area (AGE), in Atucha Nuclear Plant I (CNA I) or in Embalse Nuclear Power Plant (CNE), therefore the contents of Section G also apply to Section H equivalent responsibilities, except for those cases where the latter are specific.

Section I covers the obligations and experiences inherent to cross - border movement provided in article 27 of the Joint Convention.

Section J makes reference to disused sealed sources provided in article 28 of the Joint Convention.

Section K describes the activities planned to improve safety and specifies the measures that are foreseen to be adopted in the future.

Section L includes the following Annexes:

- National Conventions, Laws, Regulations, Standards and Documents
- Radiological Safety re-evaluation of Ezeiza Radioactive Waste Management Area (AGE)
- Advanced Education and Training
- Agreements
- Joint projects with OIEA

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SECTION B POLICIES AND PRACTICES

B.1 Spent fuel management policy

In Argentina the Government exercises state ownership of special radioactive fission material contained in spent fuels from any origin: nuclear power plants and experimental, research and/or production reactors. (Article 2, Act Nº 24804).

In this sense, the decision to reuse fissile material contained in spent fuels or not has to be adopted before 2030. At such time the installation of the underground geological laboratory must have been started, which allows the design and construction of a deep geological repository, which must be operative by the year 2060 (Strategic Plan – Act Nº 25018).

With regard to spent fuels generated in the operation of research reactors or radioisotope production reactors and for which no further use is envisaged, the strategy considers two alternatives:

- ❖ Shipping to the country where the nuclear material was originally enriched, if possible.
- ❖ Treatment and conditioning for final disposal.

Here we may underline that the adhesion of Argentina to the RERTR Program (Reduced Enrichment for Research and Test Reactors) has determined that in December 2000, July 2006 and November 2007, all spent fuel from research and production reactors containing Highly Enriched Uranium (HEU), have been exported with destination to the Department of Energy of the USA (USDOE) in the frame of the *Spent Nuclear Fuels from Foreign Research Reactors Acceptance Program.*

B.2 Spent fuel management practice

The practice adopted in Argentina with reference to spent fuel management has been wet storage during the time necessary to allow for sufficient decay of the fission products and later interim dry storage.

In the case of CNE nuclear power plant, the spent fuel is stored in pools at the facility for a period of not less than six (6) years and is subsequently transferred to dry storage in concrete silos. (ASECQ). (See G. 2.2. and G. 2.3).

At the CNA I, the spent fuel has been subject to wet storage at the power plant itself. In March 2008 it is foreseen to finish the execution of the compact storage project (“re-racking”), whereby the available space for storage in pools will be 1808 positions.

Taking the following outline conditions into consideration:

- 0,72 SF/fpd – full power day - (including fault rate, heavy water degradation and Lithium treatment operations),

- 85% load factor,
- Reservation of 250 positions for core emptying.

results in an operation period to complete the pool capacity of 6.97 calendar years. Therefore, the available positions in the pools will be depleted by March 2015, and at that date a new option for the storage of spent fuel must be operative at CNA I.

With reference thereto, the NASA has prepared a report (RN IT 07/2007), which constitutes a report of the proceedings until that date by the NASA and the CNEA related to the interim dry storage alternative for spent fuel elements deposited in the CNA I pools.

Said report includes a comparative analysis of the conceptual idea exposed by the Special Projects Division of CNA I and the corresponding to the CNEA, indicating the complementary actions. The report is completed with the recommendations oriented towards a unique design and to speed up the following stages of the project.

The spent fuel originated by the operation of research and radioisotope production reactors is stored in a pool at the respective reactor site, until the fission products decay sufficiently and are later transferred to a temporary spent fuel wet storage facility (Central Deposit for Special Irradiated Fissionable Material - DCMFEI).

As mentioned above, at the date the present National Report, all spent fuels from research and production reactors containing Highly Enriched Uranium (HEU) provided by the USA have been returned to the country of origin.

For the remaining low enriched (20%) spent fuel, an initial complementary cooling stage in a water pool is planned and then the spent fuel will be moved to an interim dry storage stage, where it will remain until the final destination is decided.

Beyond the decision to be adopted, the Strategic Plan foresees the development of research and development activities related to the final disposition of spent fuels as well the high level waste contained therein.

B.3 Radioactive waste management policy

The policy to be applied to radioactive waste management is determined in the following assertions:

- ❖ The radioactive wastes originated from all nuclear applications performed in the country, including wastes derived from the dismantling of related facilities, will be managed safely.
- ❖ The allocation of responsibility for the development of radioactive waste operations, including the long term surveillance and institutional control required by the different applied final disposal systems, corresponds to the Responsible Institution and the Primary Responsible to whom the primary licences have been awarded.

- The management of radioactive wastes will be performed safely, ensuring the protection and the rights of present and future generations and the environment.
- The *Strategic Plan (PEGRR)* will be authorized, periodically reviewed and audited by the National Parliament.
- The establishment of a proper procedure to obtain and to manage the necessary financial resources in order to comply with the obligations arising from the performance of the assigned responsibilities with reference to this matter, considering that many of them imply costs deferred in time.
- An information registry and preservation system will be implemented, which must ensure total knowledge and control, in time, of inventories of radioactive wastes generated and to be generated from all nuclear activities in the country.
- Development of a public communication program.

In agreement with this policy, the following additional factors have been taken into account:

- The main responsibility for radioactive waste management corresponds to the National State through the *National Atomic Energy Commission (CNEA*).
- The regulation and the supervision of radioactive waste management are duties inherent to the National State performed by the *Nuclear Regulatory Authority (ARN)*
- The implementation of the policy on this matter will follow the guidelines of the *National Radioactive Waste Management Program*, with the responsibilities specified in Act Nº 25018, handling the radioactive waste management in the Republic of Argentina with an integrated perspective.

In order to achieve its objectives this *National Radioactive Waste Management Program* shall ensure the following:

- Identification and assessment of accumulated and projected waste inventories
- Adoption of the appropriate technological solutions for the safe management of such wastes, with scientific-technological support
- Definition of responsibilities and specification of obligations and interrelations of the involved parties, from the generation of waste to the final stage of management
- Definition of the required facilities for final disposal
- Public communication of its activities and the required information
- Assessment of the costs associated to all these activities, determination of the financial sources and the financial and management methods

The establishment of the *Strategic Plan for Radioactive Waste Management* (PEGRR) implies the definition of the treatment methodology and the final disposal technological systems for the different types of wastes. The review every three years of the *Strategic Plan* foreseen by Law provides the opportunity to introduce the modifications originated by the optimisation of the management in its technological aspects derived from scientific advances, or from the development of innovative technologies and eventual changes in the strategic definitions relative to spent fuel treatment.

The public communication program will contribute the required information so that the population may value the scope of the proposed plans as well as the benefits derived there from, providing the adequate environment for public participation in subjects of their concern.

Development and implementation costs of the *Strategic Plan* as well as the management and financing sources shall contemplate freeing future generations from those financial burdens attributable to those who at present benefit from the activities that originate such wastes.

B.4 Radioactive waste management practice - Criteria

The following criteria are applied to radioactive waste management:

- The radioactive materials that on account of their activity concentration and/or total activity may be considered exempt will be released from regulatory control.
- The optimized discharges of liquid and gaseous radioactive materials may be released into the environment in compliance with the authorized discharge limitations determined by the corresponding operation license.
- Those radioactive materials that on account of their concentration of activity and/ or total activity cannot be released into the environment will be treated and conditioned for their final disposal.

For the first case, the Nuclear Regulatory Authority sets the terms of reference for the acceptable doses for the release from regulatory control in accordance with the exemption criteria. Standard AR 10.1.1. *Radiological Safety Basic Standard*, determines that radioactive materials may be exempt in case the resulting effective dose for individuals most exposed does not exceed 10 μSv/ year and the effective collective dose does not exceed 1man-Sv / year.

In the second case, the Standard AR 6.1.2, *Radioactive Effluents Limitation Standard for Type I Radioactive Facilities*, determines that:

- The release of radioactive material to the environment should be as low as may be reasonable.
- The effective annual dose in the critical group due to radioactive effluent discharge should not exceed 0.3 mSv.

The authorized discharge limits are defined for each facility and are included in the respective Operating Licenses.

Finally, the Standard AR 10.12.1 determines the general and particular criteria for waste generators and for those responsible for their management. This standard regulates the management of wastes that on account of their nature and/or activity cannot be released into the environment.

B.4.1 Criteria applied to define and classify radioactive waste by categories.

The definition and classification of radioactive waste are related to the *technological system* for the final disposal proposed for each one of the resulting categories.

The Argentine *Strategic Plan* has provided three types of technological systems for final disposal:

- Engineered Improved Surface System, for radioactive waste requiring isolation periods of up to approximately fifty (50) years.
- Monolithic Near-Surface Repository, for radioactive waste requiring isolation periods of up to three hundred (300) years.
- Deep Geological Repository, for radioactive waste requiring isolation periods in excess of three hundred (300) years.

On the basis of the analysis performed afterwards, it has been decided to opt for the design of a near – surface concrete repository for low level wastes that require a 50 year institutional control, based on the construction of cells and a near surface concrete repository adding another engineering barrier consisting of concrete containers, for the medium level waste with institutional control foreseen for 300 years. And, this project also foresees the need to dispose of very low level waste, mainly originated by the dismantling of nuclear facilities, for which it has been decided to opt for surface systems with engineering improvements, where apart from 200 litre drums other types of containers could be accepted.

In agreement with such criteria and with the *only purpose of categorizing* the radioactive wastes mentioned in the reported existing inventories are defined as follows:

CLASS B Radioactive Waste: those materials treated and conditioned, containing β/γ emitters and half-life of up to 30 years with radioactive concentration lower than 37 GBq/t and concentrations lower than 370 MBq/t from α emitters.

CLASS M Radioactive Waste: those materials treated and conditioned containing β/γ emitters and half-life of up to 30 years with radioactive concentration in excess of 37 GBq/t and lower than 3.7 TBq/t and concentrations lower than 370 MBq/t from α emitters.

CLASS A Radioactive Waste: those materials containing β/γ emitters and half-life in excess of 30 years and/or whose activity is in excess of 3.7 TBq/t and/or whose concentration from α emitters exceeds 370 MBq/t.

Notwithstanding the above classification, it is to be mentioned that the reference values assigned to a final disposal facility are specifically established in the respective operational license.

B.4.2 Origin of radioactive wastes

The origin of wastes included in each one of the categories stated in Section B.4.1 is the following:

Class B Wastes (Low Level)

Low level wastes, conditioned under quality assurance procedures, packed in 200 liter metallic drums especially designed and finally disposed of in near surface final disposal systems. Such wastes include:

- solid and liquid wastes generated from nuclear power plants, isotope production facilities, research and isotope production reactors and facilities related to the fuel cycle;
- non-compactable waste from the operation of both nuclear power plants conditioned directly in cement matrices;
- sealed short lived spent radiation sources (τ<5 years), conditioned in industrial drums and embedded in cement matrices and
- liquid and solid biological wastes generated in research centers, medical applications, etc., treated and conditioned in accordance with specific techniques that are appropriate for the type of waste.

Class M Wastes (Intermediate Level)

These are represented by spent exchange resins and filters used in the cleaning systems of nuclear power plants primary circuit. To date, the resins as well as the filters are stored at the facilities of the nuclear power plants, awaiting the conditioning process for their final disposal.

A secondary volume of intermediate activity waste consists of spent conditioned sealed sources, conditioned structural material from the partial dismantling of a reactor for the production of radioisotopes and some structural material generated from the industrial production of Co^{60}. Such wastes are not conditioned and remain stored at an interim storage facility awaiting its final disposal in an intermediate level repository which has not been built yet.

Class A Wastes (High Level and/or Long Lived)

These are fission products contained in spent fuel generated from the operation of nuclear power plants and spent fuel used in research and production reactors. The cooling channels parts with "stellite" replaced at CNA I Nuclear Power Plant should also be considered within this category.

Besides, alpha emitters from the experimental development of mixed oxide fuel (MOX) and other material containing long lived isotopes as those used in medicine (Radium tubes, cells and needles, Pu pacemakers, etc.) and in industry (neutron sources) are also within this type of waste.

Waste from Uranium Mining

This waste comes from the operation of several mines, from which at present only one continues in operation. Such wastes are the result of processed material called "tailings" or more commonly "mill tailings". This is finely divided material, from which the uranium it contained has been extracted. The tailings together with low-grade ore (not subject to economic exploitation) and the sterile of the mines, are called "mining waste".

B.4.3 Practices applied for radioactive waste management

Radioactive waste management practices have been laid down in the *Strategic Plan* and are based on the consideration of different alternatives for final disposal and taking into account technical, operational and financial factors.

Parts of these practices include the minimization and segregation of wastes at the same generator facilities. Based on the performed segregation, treatment and conditioning technologies are applied to each type of waste according to the final disposal alternative foreseen.

Low Level Waste (Class B)

In the case of *compactible solid radioactive waste* generated from the operation and maintenance of Nuclear Power Plants, the treatment consists in reducing the waste volume compacting it in 200 L drums. *Non-compactible solids* such as metal parts, debris, etc. are stored in 200 L drums.

With reference to low level *liquid wastes* generated from nuclear power plants, the management is different for each plant on account of the different technologies used. At CNA I, liquid wastes generated from operation and maintenance activities are collected in tanks, characterized and concentrated by evaporation; concentrates as well as sludge from the cleanup of tanks are immobilized in cement matrixes and conditioned in 200 L drums. In the case of CNE, liquid wastes originated from operation and maintenance activities are treated in resin beds, discharging the low activity current into the environment on the basis of planned and controlled procedures, following pre-established procedures and within the frame of authorized constraints of discharges. Spent resin beds, classified as intermediate level radioactive wastes, are stored at the facilities of each Power Plant, until their conditioning and final disposal.

Repository for low level radioactive wastes

The practice applied until now for the *final disposal* of *Low Level* (*Class B)* solid radioactive wastes has consisted in the disposal of conditioned waste packages in *engineering enhanced surface semi containment systems* located in the premises Ezeiza Radioactive Waste Management Area (AGE), operated by National Atomic Energy Commission (CNEA) as Management Organization. Although the system was developed considering a 50 year post-closure institutional control of the final disposal system, the results of the re-evaluation of the AGE Radiological Safety, recently presented to the ARN, suggest the convenience to extend said institutional control period, mainly due to the presence of historical wastes.

In the case of *very low level liquid waste*, the practice at the AGE consists in the absorption of radionuclides by silt-calcareous soil beds with a high content of high retaining capacity clays, thus certain radionuclides with short half-life decayed to negligible levels during their permanence in the bed volume.

The disposition of *structural wastes* which on account of its size cannot be conditioned in drums is made directly at the AGE's *Structural Material Final Disposal System*, conceived to handle low level specific activity waste (generally metal pieces coming from contaminated areas) which are periodically immobilized with a concrete casting in order to avoid dispersion.

At AGE all final radioactive waste disposal activities have been discontinued since 2001 (see H.2.4) in order to perform the above mentioned Radiological Safety re-evaluation.

Intermediate Level Wastes (Class M)

In the case of ***Intermediate Level*** *(Class M)* wastes a monolithic near surface repository is foreseen, similar to those in operation in L'Aube, France and El Cabril, in Spain. This type of repository is based on the use of multiple, redundant and independent barriers, completing the model with the application of approximately 300 years of institutional post-closure control. Wastes will be immobilized in cement matrices and packed in 200 L drums and / or in special concrete containers.

In the meantime, *intermediate level solid wastes* originated from operation and maintenance activities of both nuclear power plants are stored at the facilities of each Power Plant awaiting treatment and conditioning in accordance with compatible procedures in compliance with the waste acceptance requirements determined by the Managing Organization.

At AGE, there is a especially designed interim storage facility where non-conditioned wastes may be stored prior to their processing as well as conditioned waste packages awaiting their transport and/or final disposal.

In the case of conditioned waste packages with high exposure rate, high performance concrete containers have been developed, to provide suitable shielding for their safe handling.

Intermediate level radioactive waste repository

Several geological studies have been performed on some preselected areas. Also, data is being collected and new information obtained in order to create a data base for the analysis of mathematical modeling in sedimentary and granitic environments.

As stated in prior Reports to the Joint Convention, in order to pass the next technical stage of the project, it is indispensable to comply with the political management actions with local and provincial authorities that have to approve the feasibility of the geological field studies in the preselected areas. It is also required to implement the Social Communication Program to inform the population and the decision makers on the different aspects of the Project. In this manner, it is expected to count with the comprehension of the importance of the Project, as well as the

participation of the society, required for the approval by Law of a site that is apt for the erection of the repository for intermediate and low level wastes.

In agreement with the dispositions of the last version of the *Strategic Plan* for radioactive waste management, forwarded in March 2006 to the National Parliament, it has been necessary to begin with the repository for intermediate, low and very low level wastes, all located in the same site. In this manner, it is expected to comply with the terms defined in the *Strategic Plan*, with the obligations imposed by Act Nº 24018 and with the need to guarantee the maintenance of nuclear power generation.

In this sense, it is considered important to select, among the systems in operation at international level, those that adapt best to the needs of the country and that also guarantee a high degree of technical reliability through their performance. This is how the Spanish design has been identified, which also has the French model as reference.

Through the frame convention in force with ENRESA (Spanish Company for Radioactive Waste Management) a Specific Agreement has been entered and signed through which the PNGRR receives the necessary technical assistance to define and design its own Repository project.

During the year 2007, the PNGRR has developed the conceptual engineering of the Project, with the assistance of four Spanish experts, defining the scope of the project and the conditions thereof. An activity schedule has also been prepared, for the development of the basic engineering of the Project during the years 2008 and 2009, and a participation program for ENRESA in the latter.

On the basis of the analysis that has been carried out, the decision has been taken to opt for the design of a near surface concrete repository for low activity waste that requires 50 year institutional control, based on the construction of cells and a near surface concrete repository with another added engineering barrier, that consists in concrete containers, for intermediate activity wastes with institutional control foreseen for 300 years. This project also considers the need to dispose of very low level wastes, mainly originated from the dismantling of nuclear installations, and therefore it has been decided to opt for surface systems with engineering improvement, where other types of containers could also be accepted, apart from the 200 L drums.

<u>High Level Wastes (Class A)</u>

With respect to *High Level and / or Long Lived Wastes* generated in the final stage of the nuclear fuel cycle, spent fuel is temporarily stored until a decision is adopted on its reprocessing or final disposal.

The PEGRR foresees to perform studies for the siting, construction and operation of a Deep Geological Repository. The deadline to adopt a decision on the possible reprocessing or final disposal of the SF is subject to the completion of the studies for the siting of the Deep Geological Repository which have to be concluded at the latest by 2030.

Low and Intermediate Level of Long Lived Radioactive Wastes

Duly treated and conditioned ***Low and Intermediate Level of Long Lived Radioactive Wastes*** shall also be disposed of in the deep geological repository.

Deep Geological Repository

As already has been informed, the need to have a deep geological repository in Argentina is foreseen in the very long term, therefore the activities that are being performed are all included in the R+D Plan (see Section K.3.1 – R&D Activities).

Most of these activities constitute permanent lines, some of them have already been started in the past and informed in due time, and others must be considered in the future. For each new issue in particular CNEA's internal capacities require evaluation, as well as the capacities of the other scientific and technical organizations and universities, in order to join other investigation groups through cooperation agreements and specific agreements.

If the reprocessing (closed cycle) option is adopted for wastes generated from the last stage of the cycle, high level wastes separated at that stage would be conditioned in especially designed glass matrices and containers and finally disposed of in the deep geological repository.

If on the contrary, the closed cycle option is not acceptable, SF shall be conditioned and finally disposed of in the deep geological repository.

Until the Low, Intermediate and High Level Waste Repositories are available, wastes awaiting final disposal are stored in buildings especially designed for this objective.

Discharges of effluents

Operating licenses granted by the ARN to the respective facilities, specify the authorized discharge constraints on liquid and gaseous effluents.

The facilities have storage and decay tanks for liquid effluents where they are controlled and inventoried. These liquid wastes are discharged into the environment in accordance with the operative restrictions set forth in the corresponding Operating Licenses.

In the case of gaseous discharges, their liberation is performed in compliance with the activity measurements and restrictions imposed by the Operating Licenses.

SECTION C SCOPE OF APPLICATION

As in the previous reports, this Third National Report deals with safety applied for the management of spent fuel and radioactive waste originated from all the uses of nuclear energy, both inside and outside the Fuel Cycle, including wastes originated from nucleoelectrical generation, manufacturing of nuclear fuel, mining and uranium processing, production of radioisotopes for medical purposes, industrial uses, research and development activities, including controlled and planned radioactive discharges derived from the normal operation of the facilities where the above mentioned practices are performed.

The present National Report also deals with safety of disused sealed sources.

This National Report is not applicable to naturally occurring radioactive material (NORM) originated outside the fuel cycle

As has been stated in prior National Reports, Argentina has no reprocessing plants in operation and such plants are not included in near future plans.

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SECTION D LISTS AND INVENTORIES

This section includes information on Spent Fuel and Radioactive Waste Management facilities and their respective inventories.

D.1 Spent fuel management facilities

The existing spent fuel management facilities are the following:

SITE	FACILITY
Atucha I Nuclear Power Plant	I & II Pool Building
Embalse Nuclear Power Plant	Storage pool
	Storage silos (ASECQ)
Ezeiza Radioactive Waste Management Area (AGE)	Central SF Storage Facility from research reactors (DCMFEI)

A brief description of each one of these facilities is shown in *Section G.2 Existing facilities*

D.2 Spent fuel inventory

D.2.1 Atucha I Nuclear Power Plant

INVENTORY until Dec 31, 2007					
SYSTEM	QUANTITY	U Nat	ULE	Pu(*)	FP (*)
		t	t	t	TBq
Pool I	8,054	1,230.85		4.12	2.00E+06
Pool II	1,532		238.41	1.06	9.52E+06
TOTAL	9,586	1,230.85	238.41	5.18	1.15E+07

(*) Estimates obtained by means of a calculus program, on the basis of SF burn-up, residence time, position in the core and the decay time.
FP = Fission products

D.2.2 Embalse Nuclear Power Plant

INVENTORY until Dec 31, 2007				
SYSTEM	QUANTITY	U Nat	Pu (*)	FP (*)
		t	t	TBq
Pool	42,277	802.07	2.89	1.88E+07
Silos	70,200	1,320.59	4.79	3.06E+06
TOTAL	112,477	2,122.66	7.68	2.19E+07

(*) Estimates obtained by means of a calculus program, on the basis of SF burn-up, residence time, position in the core and the decay time.
FP = Fission products

D.2.3 Ezeiza Radioactive Waste Management Area (AGE)

DCMFEI – INVENTORY until Dec 31, 2007				
SYSTEM	**QUANTITY**	**MTR kg**	**PINS (*) kg**	**ITEMS kg**
Tubos (LEU)	**108**	**119.59**		
Tubos (LEU)	**232**		**14.19**	
Tubos (HEU)	**98**			**5.67**
TOTALES	**438**	**119.59**	**14.19**	**5.67**

* Pins: Research reactors pin type fuel

D.3 Radioactive waste management facilities

The existing (*) radioactive waste management facilities at this date are the following:

SITE	FACILITY
Atucha I Nuclear Power Plant	Treatment & Conditioning of Liquid Radioactive Waste System
	Facility for Immobilization by Cementation of Liquid Radioactive Waste & Non-compactable Structural Solid Radioactive Waste
	Treatment & Conditioning of Solid Radioactive Waste System
	Storage System for Mechanical Filters from the Reactors Primary Circuit
	Storage System for Exhausted Ionic Exchange Resin Beds
	Discharge System for Gaseous Radioactive Waste
Embalse Nuclear Power Plant	System for the Treatment & Conditioning of Solid Radioactive Waste
	Storage Installations for Solid Radioactive Waste
	Exhausted Resin Storage Tanks
	Liquid Radioactive Waste Treatment System
	Gaseous Radioactive Waste Treatment Facility
Ezeiza Atomic Center	Plant for Decay, Pre-treatment and Discharge of Active Liquids from the Radioisotope Production Plant - PPR
Ezeiza Radioactive Waste Management Area (AGE)	Low Activity Solid Radioactive Waste Treatment Facilities
	Deposit for Temporary Storage of Radioactive Sources and Wastes
	Handling Yard and Stowage of Items
	System for Final Disposal of Structural Solid Radioactive Waste and Sealed Sources (*)
	Semi containment System for Solid Radioactive Waste (*)
	Semi containment System for Very Low Activity Liquid Radioactive Waste and very short periods (*)

(*) These facilities have concluded their operations. Once the AGE Radiological Safety re-evaluation is completed, the respective Closure Licenses will be requested.

A brief description of each facility is shown in *Section H.2 Existing Facilities and previous practices.*

D.3.1 List of facilities with Wastes from Mining and Processing of Uranium Minerals

Wastes from Mining and Processing of Uranium Minerals are at the following facilities:

SITE	FACILITY
MALARGÜE (Province of Mendoza)	Malargüe former industrial complex 1954 - 1986
HUEMUL (Province of Mendoza)	Huemul Mine: operations discontinued in 1974.
CÓRDOBA (Province of Córdoba)	Córdoba industrial complex started operating in 1982
LOS GIGANTES (Province of Córdoba)	Los Gigantes former mining industrial complex 1982 - 1989
PICHIÑÁN (Province of Chubut)	Pichiñan former mining industrial complex 1977 – 1981
TONCO (Province of Salta)	Tonco former mining industrial complex 1964 – 1981
LA ESTELA (Province of San Luis)	La Estela former mining industrial complex 1982 - 1990
LOS COLORADOS (Province of La Rioja)	Los Colorados former mining industrial complex 1993 - 1997

A brief description of each one of these facilities is shown in *Section H.2.6 Wastes from Mining and Processing of Uranium Minerals.*

D.4 Radioactive waste inventory.

The following is the radioactive waste inventory until December 31, 2007. In the case of inventories with incomplete records corresponding to historical wastes, they have been prepared with information based on the analysis of the processes that originated them.

D.4.1 Atucha I Nuclear Power Plant

ATUCHA I NUCLEAR POWER PLANT				
STORED WASTE	ACTIVITY (GBq)			VOLUME
	Co 60	Cs 137	Actinides	(m^3)
Non-conditioned solids	- - - - - -	- - - - - -	- - - - - -	0.00
Conditioned solids	- - - - - -	- - - - - -	- - - - - -	215.60
Exhausted resin beds	- - - - - -	- - - - - -	- - - - - -	79.80
Filters	- - - - - -	- - - - - -	- - - - - -	15.99

D.4.2 Embalse Nuclear Power Plant

EMBALSE NUCLEAR POWER PLANT				
STORED WASTE	ACTIVITY (GBq)			VOLUME
	Co 60	Cs 137	Actinides	(m^3)
Non-conditioned solids	- - - - -	- - - - -	- - - - -	20.00
Conditioned solids	- - - - - -	- - - - -	- - - - -	397.56
Structural	- - - - -	- - - - -	- - - - -	47.96
Exhausted resin beds	- - - - -	- - - - -	- - - - -	195.98
Filters	- - - - -	- - - - -	- - - - -	58.10

D.4.3 Pilcaniyeu Technological Complex

PILCANIYEU TECHNOLOGICAL COMPLEX		
STORED WASTE	Natural Uranium	
	Mass (kg)	Vol (m^3)
Process waste	5.2	3.6
Structural waste	- - - - -	24.0
Operational waste*	317.9	64.5

(*) Includes wastes containing partially recoverable Uranium

D.4.4 Uranium Dioxide Manufacturing Complex

URANIUM DIOXIDE MANUFACTURING COMPLEX		
STORED WASTE	Natural Uranium	
	Mass (kg)	Vol (m^3)
Filters & Pre-filters (*)	--------	------
Operational waste	90	26
Processing Waste (RS)**	3.185	121

* Dismantling of Filters and Prefilters continues in order to reduce the volume of contaminated material, therefore, filter & pre-filter inventory is null. This radioactive waste is now part of the operational waste inventory.

** Processing Wastes stored with the purpose of recovering the uranium remaining therein.

D.4.5 Ezeiza Radioactive Waste Management Area (AGE)

EZEIZA RADIOACTIVE WASTE MANAGEMENT AREA (AGE)												
WASTE MANAGEMENT SYSTEM		SPECIFIC RADIONUCLIDES										
		ACTIVITY (MBq) (*)										VOLUME
		Co^{60}	H^{3}	Sr^{90}	Cs^{137}	Ni^{63}	C^{14}	Actinides	Ra^{226}	U Nat		(m^3)
DISPOSED OF	SSRRS or LLSWT	7.01E+05	4.68E+06	1.79E+04	8.85E+05	7.32E+03	6.98E+02	1.40E+04	0.00E+00	3.79E+04		1,583.8
	SSRRL or LLLWT	8.44E+02	0.00E+00	8.53E+04	4.16E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		1,200.0
	SDFFSYRE or CP	9.81E+04	8.74E+03	4.74E+04	1.63E+06	4.73E+02	5.30E-02	8.07E+05	6.60E+05	8.54E+01		140.5
	TOTAL	**8.00E+05**	**4.69E+06**	**1.51E+05**	**2.93E+06**	**1.17E+03**	**7.32E+03**	**8.21E+05**	**6.60E+05**	**3.80E+04**		**2,924.3**
STORED	A1 or M1	6.60E+08	1.87E+07	1.63E+06	1.42E+08	8.16E+04	3.42E+02	7.03E+06	3.04E+05	1.81E+03		267.1
	A2 or TN	3.96E+05	8.73E+01	1.31E+04	1.61E+06	0.00E+00	2.25E+00	2.29E+04	3.03E+03	2.18E+03		87.3
	A3 or DS	1.23E+05	8.70E+05	7.59E+01	8.95E+03	0.00E+00	0.00E+00	2.40E+01	0.00E+00	0.00E+00		124.6
	A4 or IRWS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+06	0.00E+00	0.00E+00	0.00E+00		13.4
	TOTAL	**6.60E+08**	**1.96E+07**	**1.64E+06**	**1.44E+08**	**8.16E+04**	**1.37E+06**	**7.05E+06**	**3.07E+05**	**3.99E+03**		**492.4**

(*) The records have been completed with estimates based on the respective processes.

SSRRS: Semi-containment System for Solid Radioactive Wastes
LLSWT: Low Level Solid Waste Trenches (abbreviation used in NEWMDB)
SSRRL: Semi-containment System for very low activity Liquid Radioactive Wastes and very short periods
LLLWT: Low Level Liquid Waste Trenches (abbreviation used in NEWMDB)
SDFFSYRE: System for the Disposal of Structural Solid Radioactive Wastes and Sealed Sources
CP: Concrete Pits (abbreviation used in NEWMDB)
A1: Deposit for Interim Storage of Radioactive Sources and Wastes
M1: (abbreviation used in NEWMDB)
A2: Handling Yard and Stowage of Packages
TN: (abbreviation used in NEWMDB)
A3: Drums Storage
DS: Drums Storage (abbreviation used in NEWMDB)
A4: Infected Radioactive Waste Storage (DRIR)
IRWS: Infected Radioactive Waste Storage.

SECTION E LEGISLATIVE AND REGULATORY SYSTEM

E.1 Implementation of measures

The country has a legal framework approved by the National Congress that regulates all nuclear activity, including radioactive waste management and spent fuel management. The administrative and regulatory structure that has been implemented with reference to this issue is constituted in the following manner:

- An Independent Regulatory Body
- A National Organization which is responsible for radioactive waste management, for the determination of the manner in which nuclear power plants and any other relevant facility will be decommissioned and holds the ownership of the special fissionable materials contained in irradiated fuel elements
- An appropriate set of radiological and nuclear safety "regulatory standards".
- A system to grant licenses
- A control system to verify the compliance with the regulatory standards and radiological and nuclear safety requirements
- A sanction system for cases of non-compliance of licenses, standards or other requirements
- A clear assignation of responsibilities

E.2 Legislative and Regulatory Framework

E.2.1 Legal Framework

No major changes have been made to the Legal System and Regulatory Framework described in the 2nd National Report to the Joint Convention. For a better understanding of the subject, a summary of its background and a detail of the present situation are provided.

E.2.1.1 Background

The CNEA (National Commission of Atomic Energy) was created in 1950 by Decree Nº 10936/50. One of CNEA's specific responsibilities was the control of all public and private nuclear activities to be performed in the national territory.

Later, various legal regulations have defined CNEA's competence also as the Regulatory Body for nuclear and radiological safety matters, especially regarding the protection of individuals and of the environment against exposure to the harmful effects of ionising radiation, safety of nuclear facilities, and control of the destination of nuclear material. In this regard, the specific regulations were Decree Act Nº 22498/56, ratified by Act Nº 14467 and Decree Nº 842/58.

Act Nº 14467 determined CNEA's competence to issue the necessary regulations for the permanent control of the activities related to radioactive substances and to provide the necessary means to control the existence, marketing and use of materials related to peaceful applications of atomic energy.

Furthermore, Decree Nº 842/58 has approved the regulation for the *Use of Radioisotopes and Ionising Radiation Regulation* and made it effective to govern the use and application of radioactive materials and the radiations they emitted or which were originated by nuclear reactions and transmutations. The use of *X Rays* generators was excluded from the competence of the CNEA, since it is of exclusive concern of the Ministry of Health.

The sustained growth of nuclear activity in the country made it necessary to strengthen the independence of the Regulatory Body with respect to the other activities of the CNEA. In 1994, by Decree Nº 1540/94 the National Executive Power created the National Nuclear Regulatory Authority (ENREN) to perform the regulation and surveillance of nuclear activity, transferring the complete staff, equipment and facilities from CNEA's Regulatory Affairs Management to ENREN. As from 1997, the ENREN adopted the present denomination of Nuclear Regulatory Authority (ARN).

E.2.1.2 Present situation

The present legal framework is formed by the National Constitution, the treaties and conventions, laws and decrees as stated below and by the regulatory standards described in E.2.2.1.

- **National Constitution**, specifically Art. 41 which sets out that:

  Art. 41.- *All inhabitants are entitled to the right of a healthy and balanced environment fit for human development and that productive activities may meet present needs without endangering those of future generations; and they have the duty to preserve it. As a first priority, environmental damage shall bring about the obligation to remediate as determined by law.*

  The authorities shall provide for the protection of this right, the rational use of natural resources, the preservation of the natural and cultural heritage and of the biological diversity and shall also provide for environmental information and education.

  The Nation shall issue the standards that include the minimum protection budgets and those complementary regulations required for the provinces, without altering their local jurisdictions.

  The admission into the national territory of actually or potentially dangerous wastes and of radioactive wastes is forbidden.

- **International Treaties and Conventions:** The Argentine Republic has adhered as contracting party, to a number of bilateral and multilateral international instruments, which imply different commitments and obligations in the nuclear field for the State. These are strict commitments and obligations regarding the control of: **(a)** the non-proliferation of nuclear weapons; **(b)** nuclear and radiological safety; **(c)** spent fuel and radioactive waste safe management; **(d)** physical protection of nuclear materials; and **(e)** cooperation in case of nuclear accidents and radiological emergencies. A list

of the treaties and conventions subscribed by the Argentine Republic is listed in Annex L.1.1.

- **Act Nº 24804**, enacted in 1997. This Act determines that the National State will establish the nuclear policy and perform research and development activities through the CNEA and regulatory and surveillance actions through the ARN, successor of the ENREN. The law also provides that the CNEA is the national organization which, among other duties, advises the National Executive on the definition of the nuclear policy, is responsible for radioactive waste management, determines the manner in which nuclear power plants and any other relevant facility shall be decommissioned and holds the ownership of the special radioactive fissionable materials contained in irradiated fuel elements.

- **Annex I to Decree 1390/98** that regulates Act Nº 24804.

- **Act Nº 25018**, enacted in 1998. Determines CNEA's responsibilities, as Responsible Organization for Radioactive Waste Management. It also provides that CNEA shall perform the corresponding activities observing the restrictions established by the ARN, complying with all regulations, national, provincial and issued by the City of Buenos Aires. For the effective implementation of this Act the following are pending:

  a) The Act that approves the Strategic Plan for radioactive waste management (Art. 9, Act Nº 25018)
  b) The Act that regulates the management and control of the Fund for radioactive waste management and final disposal. (Art. 14, Act Nº 25018)

E.2.2 Regulatory Framework

E.2.2.1 National requirements and provisions on Radiological Safety

The Nuclear Regulatory Authority (ARN) was created by Act Nº 24804 and is the organization responsible for the regulation and control of nuclear activities in order to:

- Protect the individuals against the harmful effects of ionising radiations and maintain a reasonable degree of radiological and nuclear safety in the nuclear activities performed in the Argentine Republic.

- Ensure that nuclear activities are not performed with purposes not authorized by this Act and regulations resulting there from, as well as by international agreements and the non-proliferation policies adopted by the Argentine Republic.

- Prevent intentional actions which may either have severe radiological consequences or lead to the unauthorized withdrawal of nuclear material or other materials or equipment subject to control.

In this sense, Act Nº 24.804, Art. 7 determines that the ARN is in charge of the regulation and control of the nuclear activity in all aspects regarding radiological and nuclear safety, physical protection, control of the use of nuclear material, licensing and control of nuclear facilities and international safeguards, as well as the advisory role for the National Executive Power in the corresponding matters. In addition Act Nº 24804 Art. 10 sets forth that the regulation and control of nuclear activity in said aspects is subject to national jurisdiction and Art. 14 determines that the ARN shall act as an independent agency under the jurisdiction of the Presidency of the Nation. Besides Act Nº 24804, Art. 16 grants the ARN the following powers, among others: the power to issue regulatory standards in matters of its competence, to grant licenses, permits or authorizations to facilities and persons, to conduct regulatory inspections and assessments, and to impose sanctions in the corresponding cases (for further details see Section E.3 of this report).

To the closing date of this National Report the regulatory system of the ARN ([1]) is constituted by 62 standards and 7 regulatory guides. ARN's standards include the licensing of radioactive nuclear facilities and its staff, together with several radiological protection requirements, nuclear safety, use of radioactive sources, radioactive waste management, safeguards, physical protection and transport of radioactive materials requirements. The text of these regulatory standards may be found in the web site http://www.arn.gov.ar.

The basic regulatory approach of the regulatory standards is focused on performance, that is, they define the compliance of safety objectives, complementing with prescriptive requirements. In this sense, the manner to achieve said objectives is mainly based on good engineering judgement, on the qualifications of designers, constructors and operators and on the appropriate decisions taken by the Responsible Organization.

The standard AR 10.1.1, Basic Radiological Safety Standard (Revision 3, 2001), determines the requirements and provisions on the matter which are consistent with the recommendations of the International Commission on Radiological Protection (specifically with issue N° 60).

Although the regulatory system has not undergone major changes since the 2nd National Report to the Joint Convention, the Regulatory Organization has continued updating current regulations, especially modifying the following standard:

Table 1 - Updating of Standards during 2005-2007

CODE	DENOMINATION
AR 7.11.1	Individual permits for industrial gammagraphy equipment operators (Rev. 2)

In addition the following regulatory standards have been incorporated:

([1]) called AR Standards

Table 2 – New Standards introduced during 2005-2007

CODE	DENOMINATION
AR 2.12.1	Radiological safety criteria for radioactive waste management arising from mining industrial facilities (Rev. 0)
AR 7.9.2	Operation of radiation sources for industrial applications (Rev.0)
AR 7.11.2	Individual licenses for operators of radiation sources for industrial applications (Rev.0)
AR 8.11.3	Individual licenses for specialists and technicians in radiotherapy physics (Rev.0)
AR 10.13.2	Physical security standard for sealed sources (Rev.0)

E.2.2.2 Licensing System

Hereinafter the fundamental concepts of the system presented at the 2nd National Report to the Joint Convention are summarized.

In Argentina the licensing system for radiological safety is defined in the Basic Standard AR 10.1.1. Radioactive waste management facilities, spent fuel facilities of nuclear power plants and spent fuel management facilities of research reactors are categorized by this standard as Type I or relevant. Therefore, in the licensing stage of these facilities as well as in the licensing of their staff, the standards *AR 0.0.1 Licensing of Type I Facilities* and *AR 0.11.1 Licensing of staff of Type I facilities* are applicable.

The regulatory standards (AR Standards) determine that the construction, operation and decommissioning of Type I facilities cannot be started without the corresponding licenses requested by the Responsible Organization and granted by the Regulatory Body. The licenses are granted after the ARN has performed an independent evaluation of the safety conditions foreseen and presented in the corresponding “Safety Report”.

The validity of said licenses is subject to the compliance with the conditions set forth therein and with the standards and requirements issued by the Regulatory Body. Failure to comply with one or more of these standards, conditions or requirements may cause the ARN to suspend or cancel the corresponding license, in accordance with the sanction system in force.

The staff of a nuclear or radioactive facility has to be properly trained and qualified in accordance with their duties at the facility. The ARN requires that all staff assigned to significant safety-related tasks is licensed and has specific authorizations to perform the assigned duties. The Standards AR 0.11.1 and AR 0.11.2 determine the criteria and procedures to grant individual licenses and specific authorizations to the staff that will perform tasks that require licenses in nuclear and radioactive facilities. Said standards also set out the terms and conditions according to which the ARN, prior review and report from its Advisory Boards, will grant these licenses and authorizations.

Based on regulatory criteria, international experience and the recommendations made by the IAEA, a gradual modification process for the validity of the Operation Licenses for Type I facilities has begun. They are being changed from an indefinite or permanent period of time to an expiration term. In order to condition their renewal a limited term is determined, among other requirements, to a global re-assessment of safety at regular intervals (Periodic Safety Reviews) (PSR). This is a complementary tool to the continuous safety revision performed routinely by the persons responsible for the facilities and by the Regulatory Nuclear Authority. The validity period is determined in the Operation License itself.

E.2.2.3 Prohibition to operate without a license

Act Nº 24804, Art. 9 provides that in order to develop a nuclear activity any natural or legal person shall, among other requirements, comply with ARN's regulations in its scope of competence and request a license, permit or authorization that will enable him to perform his activities and comply with the obligations in safeguards or non-proliferation matters that Argentina has subscribed or will subscribe in the future.

E.2.2.4 Control system

Since the beginning of nuclear activities in the country and in order to verify that nuclear and radioactive facilities comply with the standards, licenses and requirements in force, the Regulatory Authority has determined a control system. At present the control system includes regulatory evaluations, inspections and audits. If necessary, the ARN requires the implementation of corrective measures, and in case they are not complied this may lead, as a last step, to impose the sanctions provided in the regulatory system.

E.2.2.4.1 Documentation and Reports

During the licensing process, the Responsible Organization has to submit to the ARN the documentation related to radiological and nuclear safety it has created. The main components of said documentation in the case of an Operation License for a nuclear power plant, which includes the management of the radioactive waste and the spent fuel generated by said facility, are as follows:

- Safety Report.
- Operation Policies and Principles Manual.
- Quality Manual.
- Operational Organization Chart and Tasks and Duties Manual.
- Operation Manual.
- Emergency Plan.
- Radiological Safety, Waste Management and Environmental Monitoring Manual.
- Maintenance Manual.
- Probabilistic Safety Assessment.
- Management of Operational Experience Program.
- Staff Training Manual.

- Education and training requirements for staff performing Specific Duties.
- Preliminary Plan for the Decommissioning of the Facility.
- Any other documentation related to radiological and nuclear safety, safeguards and physical protection.

The above documentation has to be kept permanently updated and the modification proposals must be forwarded to the Regulatory Authority.

The license and the above mentioned documentation constitute the Mandatory Documentation. On the other hand, any other standard, requirement, recommendation, request of information or letter, issued by the Nuclear Regulatory Authority in connection with radiological and nuclear safety, safeguards and physical protection, is also mandatory.

In addition, the License granted by the ARN determines the periodical reports that the Organization that is responsible for the facility has to submit to the Nuclear Regulatory Authority. In the case of an Operation License for a nuclear power plant, the communications related to Radiological and Nuclear Safety includes the following, among other topics:

- Occurrence of an abnormal event.
- List of non-relevant events occurred, in accordance with the provisions of the Operational Experience Management Program.
- Activity values of each radionuclide discharged to the environment and results of environmental monitoring sample tests.
- Inventory of solid radioactive waste processed and stored.
- Values of the doses received by the staff exposed due to their work.
- Report on the Emergency Plan annual application drill: development, results and experiences learnt.
- All evidence or information which in the criteria of the Responsible Organization shows: weakness or degradation in the quality of components, equipment and systems which are important for safety or different risks in magnitude or nature, from those foreseen in the Final Safety Report or in the Probabilistic Safety Assessment.

In the other nuclear and radioactive facilities, requirements related to the Mandatory Documentation and Reports are graded in accordance with the hazard involved.

E.2.2.4.2 Regulatory inspections and audits

Act Nº 24804 authorizes the ARN to perform regulatory inspections and evaluations, carried out by their staff as from the beginning of the regulatory activities in the country, in the following manner:

- *Routine inspections*: are performed essentially by inspectors. Their objective is to verify that the Responsible Organization complies with the boundaries and conditions determined in the operating license.

- *Special inspections*: are performed by experts in different matters (dosimetry, implementation and control, etc.) in coordination with the inspectors. They have different objectives as, for example, the supervision of preventive maintenance tasks during scheduled shutdowns.
- *Technical evaluations*: consist in the analysis of data collected during inspections or from other sources. For example, evaluations of the radiological safety of specific practices at nuclear or radioactive facilities to detect their potential weaknesses and identify possible measures to reduce doses of the staff or of the public or to improve the safety level.
- *Regulatory audits*: are performed in accordance with written procedures and are scheduled to review organizational, operational and procedural aspects related with nuclear and radiological safety.

E.2.2.5 Specific Regulatory Actions

The regulatory actions that may be taken by the ARN regarding a particular facility may originate from*:*

- The results of regulatory inspections and evaluations performed at the facility.
- The knowledge of abnormal events that have occurred at the facility or at a similar facility.
- The results of independent technical evaluations.

In such cases, the ARN sends a regulatory document to the Responsible Organization in the form of a requirement, recommendation or request for additional information, as the case may be; in this document the ARN urges the Responsible Organization to take the required corrective measures within a determined term. These documents have the following scope:

- *Requirement*: is a regulatory order that the Responsible Organization must comply in the requested manner.
- *Recommendation*: is an order which differs from a requirement in that the Responsible Organization has certain flexibility to comply by means of alternative solutions (for example, engineering alternatives) which ensure, at least, the same result required by the recommendation. These alternative solutions must be proposed to the ARN for their evaluation.
- *Request for additional information:* is a regulatory order whereby more details of the documentation provided are required, for example, the explanation of an assertion, and the demonstration of the result of calculations or additional documentation.

E.2.2.6 Sanction system

Non-compliance with the Regulatory Standards and requirements set out in the respective licenses or permits authorizes the ARN to impose the appropriate Sanction System. Article 16 of Act Nº 24804 authorizes the ARN to impose sanctions which shall be graded according to the importance of the fault as follows: warning, fines (which shall be proportional to the importance of the fault and the potential damage), suspension of the license, permit or authorization or its cancellation. For these purposes, the ARN is authorized to lay down the relevant procedures that may apply in case of violation of the standards to be issued in the exercise of its competence, ensuring the constitutional guarantees of due process and the defence rights.

The sanction system represents the last link of the safety chain. The ARN considers that if the regulatory system is really effective and the Responsible Organizations fully exercise their responsibilities, the application of sanctions and fines should occur only in exceptional cases. The contrary would suggest, among other things, the presence of errors in the regulatory measures. In this sense, an informal ARN function is to make Responsible Organizations and Primary Responsible aware of their responsibility regarding safety, in order to increase the communication of safety culture at all levels of the organization structure.

E.2.2.7 Clear assignment of responsibilities

Act Nº 24804, in its Art. 31, sets out that the responsibility for the radiological and nuclear safety of a facility rests without excuse on the holder of the license, permit or authorization. Its compliance with the provisions of the above mentioned Law or with the regulatory standards or requirements that may derive from it, do not exempt the holder from said responsibility or from making all that is reasonable or compatible with its possibilities in favour of radiological and nuclear safety, safeguards and physical protection. The holder of a license, permit or authorization may delegate, in whole or in part, the execution of tasks, but continues having the full responsibility determined by this Act.

Concerning the responsibilities of the radioactive waste generator and the transference of said wastes to the managing organization, Act Nº 25018 in its Art. 6 determine that the National State, through the authority in charge of the application of this Act (CNEA), shall assume the responsibility for radioactive waste management. The generators of this waste must provide the necessary resources to perform it in due time and manner. The generator will be responsible for the conditioning and safe storage of waste generated by the facility he operates, in accordance with the conditions set out by the application authority, until they are transferred to the CNEA, with the obligation to give immediate notice to the ARN on any event which could result in an incident, accident or operation failure.

Article 7 of Act Nº 25018 authorizes the CNEA to determine the acceptance criteria and the transference conditions for radioactive waste that may be necessary to assume the corresponding responsibility. This article also determines the approval requirement by the ARN for these transference conditions.

Article 8 sets out that the transference to the CNEA of radioactive waste, and in particular of irradiated fuel elements, shall be made at the time and in accordance with the procedures laid down by the CNEA, with the prior approval by the ARN. In no event, shall the operator of the generating installation be exempted from the responsibility for contingent civil and / or environmental damages until the transference of the radioactive waste is completed. Therefore and in agreement with Decree 1390/98 which regulates the provisions of Act Nº 24804, said transference defines the limit of responsibility of the operator of the generating facility, with reference to radioactive and irradiated fuel elements.

E.3 Regulatory Body

E.3.1 Duties and competence of the Regulatory Body

In Argentina nuclear development started in 1950. All nuclear activities performed in the country until the year 1994 were controlled by the National Commission of Atomic Energy (CNEA) through its regulatory branch: the Management of the Regulatory Branch. The applied regulatory system was defined by Act Nº 14467 and its Regulatory Decree Nº 842/58.

In 1994 the National Government, considering that the regulation and supervision of nuclear activities should be reserved to the National State, assigned the exclusive performance of these duties to an independent agency, in order to differentiate the role of the controller from that of the controlled parties. Thus, Decree Nº 1540/94 creates the National Nuclear Regulatory Body (ENREN – Ente Nacional Regulador Nuclear), to perform regulatory and control duties of the nuclear activity, transferring the complete staff, equipment and facilities from CNEA's Regulatory Branch.

In 1997 the National Parliament enacted the National Law of Nuclear Activity (Act Nº 24804), creating the NUCLEAR REGULATORY AUTHORITY (ARN) with the object to regulate and to control the nuclear activity, receiving the transference of all ENREN's resources.

The Nuclear Regulatory Authority acts as an independent agency under the jurisdiction of the Presidency of the Nation and is subject to a public controlling system. As provided by Art. 7 of the Act, it is responsible for the regulation and control of the nuclear activity on matters of radiological and nuclear safety, physical protection as well as the control of the use of nuclear materials, licensing and supervision of nuclear facilities and international safeguards. The above stated Law sets out that the regulation and control of nuclear activities are "subject to national jurisdiction". The ARN also acts as an advisory body to the National Executive Power in matters of its competence.

Act Nº 24804 assigns a wide set of faculties and responsibilities to the ARN. Among the most important are the following:

- Issue the regulatory standards with reference to nuclear and radiological safety, physical protection and control of the use of nuclear materials, licensing and supervision of nuclear facilities, international safeguards and transport of nuclear materials regarding nuclear and radiological safety and physical protection.

- Grant, suspend and cancel licenses for the construction, commissioning, operation and decommissioning of nuclear power plants.

- Grant, suspend and cancel licenses, permits or authorizations for mining and uranium concentration matters, safety of research reactors, relevant accelerators, and relevant radioactive facilities, including facilities for radioactive waste management and nuclear applications in medical and industrial activities.

- Undertake inspections and regulatory evaluations at the facilities subject to ARN regulation, with deemed necessary frequency.

- Impose sanctions, which shall be graded according to the seriousness of the fault and which may imply confiscating nuclear or radioactive materials, the preventive closure of the facilities subject to regulation if nuclear activities are performed without the appropriate license, permit or authorization or upon the detection of serious non-compliance of the nuclear and radiological safety and physical protection of materials and nuclear facilities.

- Create, in accordance with international parameters, nuclear and radiological safety standards for the staff working at nuclear and radioactive facilities and grant the specific licenses, permits and authorizations to perform the task subject to license, permit or authorization.

- Evaluate the environmental impact of any licensed activity, such as monitoring activities, review and follow-up of any impact, evolution or possibility of environmental harm that may result of the licensed nuclear activity.

It should also be noted that Annex I to Decree N° 1390/98, that regulates the above mentioned Act, provides that for a better compliance of its duties, the Nuclear Regulatory Authority shall approve contingency plans, for the case of nuclear accidents, programs to deal with emergencies and when necessary, offer the corresponding training to workers and neighbours. These plans must foresee an active participation of the community. The Security Forces and the representatives of civil institutions of the area where these procedures take place shall report to the officer to be appointed by the Nuclear Regulatory Authority for said purpose. National, provincial and municipal authorities that may have any involvement in the creation of these plans must comply with the guidelines and criteria defined by the Nuclear Regulatory Authority organization which for these purposes shall exercise the powers determined by the Convention on Nuclear Safety.

Act Nº 24804 and Annex I of regulatory Decree Nº 1390/98 grant the ARN the necessary legal competence to determine, develop and apply a regulation and supervision system for all nuclear activities performed in the country. In order to ensure an appropriate level of control, said legal competence is complemented by an adequate technical competence.

For this reason, as from the beginning of the regulatory activities in the country, it has been considered imperative to have qualified staff, so that with their level of knowledge and

experience awards the Regulatory Body its own independent criteria in all aspects of nuclear and radiological safety, safety in the transport of radioactive materials and in radioactive waste management, as well as safeguards and physical protection. For the same reason and as mentioned above, when the Regulatory Body was created, all human resources and materials were transferred to it from CNEA's regulatory branch.

It may be underlined as well that the ARN is authorized to contract experts who may advise on aspects specifically related to the performance of its functions. Therefore, the global strategy of the Argentine regulatory system is concentrated on the following basic aspects:

- Training of staff involved in radiological, nuclear, transport and waste safety, safeguards and physical protection, either belonging to the ARN or at facilities performing practices subject to its control, also offering collaboration to IAEA's training programs.

- Periodical creation and revision of the corresponding standards.

- Undertaking of regulatory inspections and audits to verify the fulfilment of the granted licenses and authorizations.

- Independent execution of studies and tests related to the licensing of regulated installations.

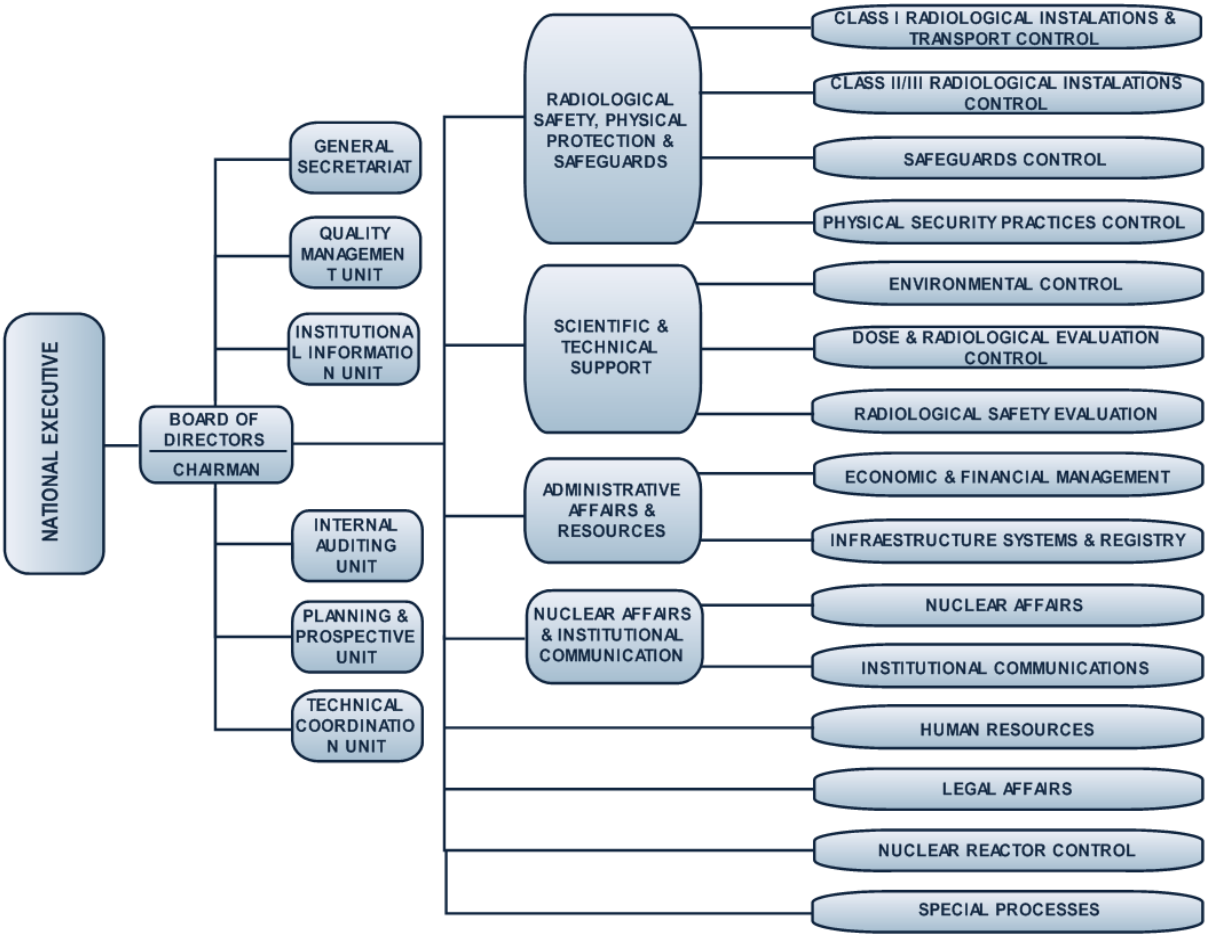
- Development of scientific and technical aspects related to radiological, nuclear, transport and waste safety.

E.3.2 Nuclear Regulatory Authority Organizational Structure and Human Resources

The Nuclear Regulatory Authority is managed by a Board of Directors constituted by a Chairman, a 1st Vice-Chairman and a 2nd Vice-Chairman reporting to the General Secretariat of the Presidency of the Nation. The Chairman also performs ARN's executive duties.

ARN's organic structure in force is shown in Figure I.

Figure I: ARN's 2007 Organization Chart



The main tasks performed by the *Radiological, Physical Protection and Safeguard Management* are the regulatory inspections and the evaluations concerning the Radiological Safety of Radioactive Facilities (medical, research and industrial facilities), Transport, Safeguard control and Nuclear Safety control.

The *Scientific and Technical Support Management* provides specialized technical support for regulatory and evaluation inspections and is responsible for developments in matters related to radiological, nuclear and radioactive waste management safety.

The *Nuclear Affairs and Institutional Communication Management* participate in the definition and implementation of the country's policies on regulatory issues in the national and international forum that may correspond. It ensures the correct institutional relationship at national and international level, tending to a better compliance of ARN's regulatory functions. It promotes the coverage of image communication and of the regulatory institutional policy in the different sectors and for the interested actors. Taking into account the role of the ARN, it manages the solution of conflicts in the national nuclear area and institutional crisis that involve media or political aspects. It promotes internal and external communication of the institution in order to improve the regulatory actions.

The *Administrative Affaires and Resources Management* offers administrative and accounting support to ARN's regulatory tasks.

The *Nuclear Reactors Control Division*, as well as the *Human Resources* and *Legal Affairs* Divisions report directly to the Board of Directors. The *Nuclear Reactors Control Division* is in charge of the inspections and technical evaluations of the Nuclear Power Plants in operation and of the research reactors.

The ARN has increased its staff, from 202 agents at the end of the year 2002 to 312 in April 2007. The important increase of the staff, mainly young professionals, has been due to the need to cover positions left vacant by professionals that have retired and to cover the issues of the new Special Processes unit.

From the 312 persons working at the ARN, 80% are professionals and technicians that perform technical tasks in their areas of competence or who are in training programs and the remaining 20% perform administrative tasks. 7% of ARN's staff occupies high rank positions and counts with 20 or more years of training in regulatory activities.

The geographical distribution of all employees of the ARN is presented in Table 3:

Table 3 – Geographical Distribution of ARN's employees

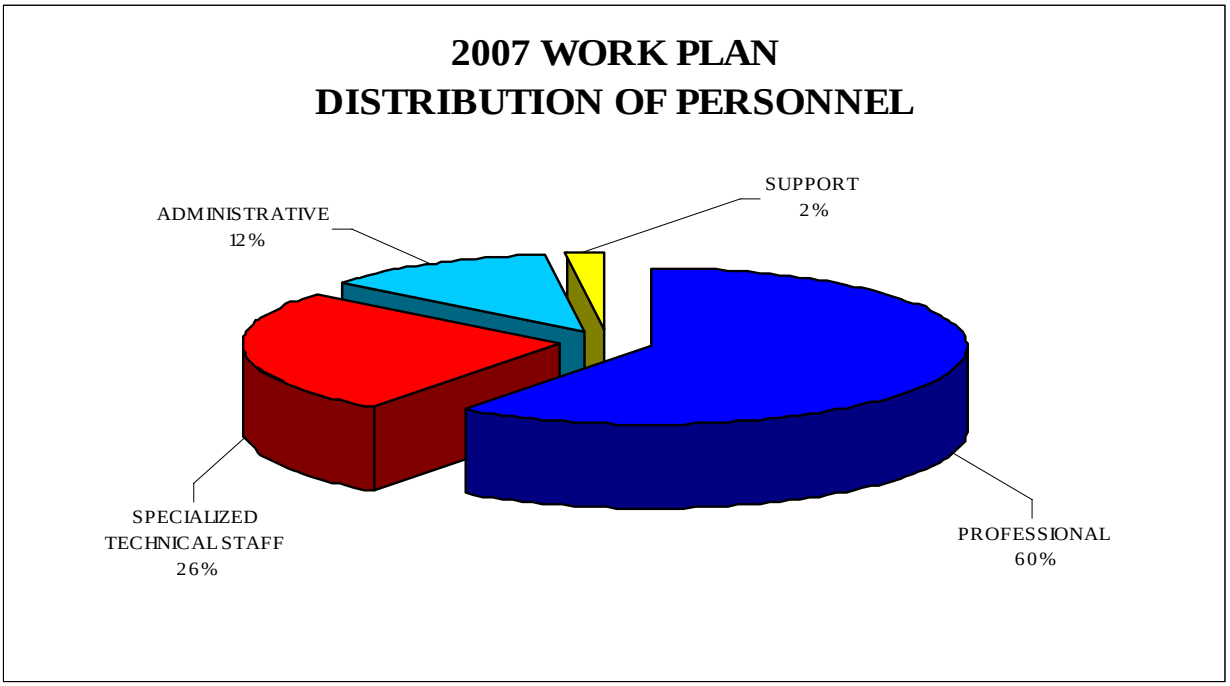
HEADQUARTERS	**69 %**
EZEIZA ATOMIC CENTER	**23 %**
ATUCHA II NUCLEAR POWER PLANT	**5 %**
NUCLEAR POWER STATIONS (CNA I AND CNE)	**1 %**
INTERNATIONAL ORGANIZATIONS (OIEA, ABACC, WHO)	**2 %**

E.3.3 Resources assigned to the regulatory control of facilities under surveillance

The distribution of ARN's workforce assigned to safety inspection and evaluation tasks, directly related to the safety of regulated facilities is described in the *Annual Work Plans*. These *Plans* discriminate efforts according to the different type of performed activities, directly or indirectly related to the safety of the facilities: inspections and evaluations of nuclear safety, radiological safety, radioactive waste management safety and transport of radioactive material safety, safeguards and physical protection, scientific support, radiation measurements, environmental studies, electronics, administration, legal, information technology, planning, training and institutional relations.

Figure II shows the distribution of staff per type of activities: professional, technical, administrative, and support.

Figure II – Distribution of ARN's staff by type of activities in 2007



On the other hand, the regulatory control of Spent Fuel Management and Radioactive Waste Management is performed as part of the global inspection and evaluation tasks of facilities controlled by the ARN. Notwithstanding, an estimate has been made of the load that this activity represents with respect to total human resources assigned to inspection, evaluation and measuring tasks.

A summary of the control, evaluation and measuring activities on spent fuel management and radioactive waste management discriminating the effort per activity performed in different sectors of the ARN is shown below. Table 4 illustrates the mentioned estimates.

Table 4 Estimate of Human Resources assigned annually by the ARN for the regulatory control of radioactive waste management (RWM) and spent fuel management[2] (SFM)

Organizacional Unit	Total man-days of activity	Specific man-days in RWM/SFM	Integrated total percentage
1. Radiological Safety Evaluation Division. **1.a Extra activity 1**: Ad-hoc group for the evaluation of Uranium presence in Ezeiza waters. **1 .b Extra activity 2:** Ad-hoc group for the evaluation of the present management of radioactive waste generated at nuclear power plants.	1,683	**1:** 450 **1.a:** 200 **1.b:** 300	4.5
2. Control of Type I Radioactive Facilities and Transport Division.	1,573	230	1.1
3. Control of Type II and III Facilities Division	4,961	260	1.2
4. Nuclear Reactors Control Division. **4.a Extra Activity 1**: Ad-hoc group for the evaluation of the present management of radioactive waste generated at nuclear power plant.	3,685	**4:** 50 **4.a:** 150	1.0
5.a Physical Protection of practices Division	836	40	0.2
6.a Safeguard Control Division	2,244	380	1.8
7.a Environmental Control Division	5,940	735	3.5
TOTAL	**20,922**	**2,795**	**13.3**

❖ Radiological Safety Evaluation Division

- To perform radiological safety evaluations by means of applying different exposure scenarios and, in authorized facilities and practices, identify and evaluate behavior indicators of radiological safety systems with the object

[2] Includes control of facility discharges

to facilitate and create the foundations of said regulatory decision making process.
- To carry out research and development tasks for the application in the regulatory scope.

Ad-hoc group for the evaluation of the present Radioactive Waste Management generated in the Argentine Nuclear Power Plants

In December 2005 the General Secretariat of the Board of Directors of the ARN informed that it had decided to perform an evaluation of the present transitory radioactive waste management generated by the nuclear power plants. For said task an ad-hoc group has been constituted with professionals from the Radiological Safety Division and the Nuclear Reactor Control Division.

The results of said analysis concluded that it was fundamental to implement a system to improve the characterization of the radioactive waste generated and in transitory storage by the power plants, as well as the improvement of the corresponding registration system.

❖ Type I Radioactive Facilities and Transport Control Division

- Control of radiological safety of Type I radioactive and nuclear facilities, excluding nuclear reactors.
- Verify the compliance of the licenses, standards and requirements in force and perform all regulatory actions that may correspond.
- Participate in the licensing of said facilities and its staff.
- Control the compliance of the standards and requirements applicable to the safe transport of radioactive materials.
- Perform all radiological safety evaluations necessary for regulatory objectives.

❖ Radioactive Type II and III Facilities Control Division

- Control the radiological safety and physical security of Type II and III Facilities.
- Verify the compliance of the licenses, standards and requirements in force and perform the corresponding regulatory steps.
- Participate in the licensing of said facilities and their staff.
- Perform the radiological safety and physical security evaluations necessary for regulatory objectives.

❖ Nuclear Reactors Control Division

- Control the radiological and nuclear safety of the nuclear power plants, research reactors and critical compounds.
- Verify the compliance of the licenses, standards and requirements in force and perform the corresponding regulatory steps.
- Participate in the licensing of said facilities and their staff.
- Perform the radiological and nuclear safety evaluations that may correspond.

❖ Physical Protection on Practices Control Division

- Control the compliance of the national standards and international conventions in force with reference to physical protection of nuclear materials and facilities and the physical security of the radioactive materials and perform all regulatory steps that may correspond.
- Participate in the licensing of the radioactive and nuclear facilities.
- Identify, coordinate and implement regulatory steps for the prevention of illegal traffic and malicious actions on nuclear materials and non nuclear radioactive materials, the associated facilities and the transport of said materials.
- Perform the physical protection and security evaluations required for the regulatory objectives.

❖ Safeguards Control Division

- Control the safeguards of the facilities and nuclear materials, and other materials and equipment and information of nuclear interest, warranting that they are not used for not authorized or unknown objectives.
- Verify the compliance with the standards and the assumed international commitments and perform all regulatory steps that may correspond.
- Participate in the licensing of nuclear facilities.
- Perform the safeguards evaluation required for regulatory objectives.

❖ Environmental Control Division

- Participate in the regulatory control of the degree of compliance of the appropriate level of the protection of individuals, the verification of the different radiological parameters of interest and the evaluation of the radiological environmental impact, by means of models, measurements and evaluations of the natural or technological radionuclides, present in the environment, in different biological matrices and in samples originated in the surveillance of the facilities under control.
- Perform the tasks pertinent to research and development of application in the regulatory scope.

Ezeiza drinking water measurement

Due to a claim of presumed contamination of the underground waters in the neighbourhood of the Ezeiza Atomic Centre (CAE), the Federal Court of First Instance in Criminal and Correctional Matters Nº 1 of Lomas de Zamora, in charge of Federal Judge Dr. Alberto Santamarina, has requested an expert's report of samples of water from the 47 wells in use from the districts of Ezeiza, Esteban Echeverría and La Matanza. For said task the Judge has appointed an expert that does not belong to the CNEA or to the ARN. The 439 samples taken by said expert have been measured by the ARN between March 9th and June 8th 2004.

The Expert has produced several reports, including the "Expert Report Nº 6" which in the opinion of the ARN presents basic technical and technological errors with reference to the

evaluation of the radiological protection level of the population. As a consequence of said situation, the ARN has produced several technical reports during 2005. Simultaneously, neighbours, schools and companies in the area of the CAE have requested measurements of water samples corresponding to the addresses. At the same time, other national and international organizations have issued technical reports consolidating the work and the results presented by the ARN.

Finally, the National Government, upon the request of the Judge of the case, has asked several organizations from the United Nations and specialized International Scientific Institutions, coordinated by the IAEA, to prepare an international expert's report. The conclusions of said international expert's report were the following:

"With reference to its objectives, the international expert's report has allowed to conclude as follows, with a high degree of certainty:

- ✓ *There is no anthropogenic (of human origin) contamination with radioactive elements in surface soil, in the subsoil, nor in the surface or underground waters used for the supply of water for human consumption in the area constituted by the districts of Ezeiza, Esteban Echeverría and La Matanza of the Province of Buenos Aires (Argentina). In particular, no presence of enriched or impoverished uranium has been detected.*
- ✓ *There is natural uranium in the Puelche acquiferous, as a result of natural geochemical processes.*
- ✓ *The radioactivity levels measured in the underground waters comply with the international standards of radiological protection and, therefore, do not represent any danger for human health.*
- ✓ *The water for consumption supplied to the population of the above mentioned neighbourhoods does not contain radioactive elements at levels that may be harmful for the health.*
- ✓ *Upon the results of the performed measurements of the water samples, no damaging sanitary effects are foreseen due to the exposure to ionizing radiation. Sanitary statistics back this conclusion.*
- ✓ *As there is no anthropogenic contamination with radioactive elements, no contamination whatsoever may be attributed from this type of activities that have been performed or that are being performed at the EAC site.*
- ✓ *The Argentine Nuclear Regulatory Authority adequately regulates the activities of the Ezeiza Atomic Center.*

Apart from the radiological risk, uranium may also mean a chemical risk. The scientific basis to evaluate this danger is still in preparation and until now there is only a preliminary orientation level by the WHO. Although the international expert report was limited to the radiological aspects, it has been observed that in some water samples the concentration of natural uranium exceeds the preliminary orientation values determined by the WHO of natural uranium on the basis of its chemical toxicity. Some underground samples taken from the Puelche acquiferous have a uranium content that exceeds the preliminary orientation by the WHO, but comply with the reference level determined by the pertinent Argentine standards."

E.3.3.1 Qualification of the Nuclear Regulatory Authority (ARN – Autoridad Regulatoria Nuclear) staff

To the date of completion of this National Report, ARN's professional members of the staff have to pass a Postgraduate Course in Radiological Protection and / or a Course in Nuclear Safety as part of their initial training. This initial training is then complemented with on the job training as well as with the participation, both at national and international level, in specific courses, congresses, seminars and research projects.

E.3.3.2 Maintenance of the Regulatory Body's competence

The ARN subscribed an Agreement Program with the Public Management Under - Secretariat in which a commitment matrix for Management Results is determined in order to develop an integral quality management system, the evaluation of the staff's performance and a plan of human resources needs.

E.3.3.3 Training activities

The ARN organizes and coordinates courses, workshops and seminars in its area of competence. The teaching staff is mainly constituted by specialists from the ARN and from other associated institutions, with wide experience in their fields of expertise. These training activities are offered both to ARN's staff and to the staff of national and foreign institutions.

The Postgraduate course on Radiological Protection and Nuclear Safety started in 1977 and has taken place on a yearly basis between 1981 and 2002. It is organized in cooperation with the University of Buenos Aires, the Ministry of Public Health and the International Atomic Energy Agency.

As from the year 2003, the following two new postgraduate courses have been given: "Radiological Protection and Security of Radiation Sources" and "Nuclear Safety". The academic framework is provided, by means of an agreement, by the School of Engineering belonging to University of Buenos Aires and sponsored by the International Atomic Energy Agency. The objective of the first mentioned course is the training of professionals in radiological protection and in regulatory aspects concerning their performance in national regulatory organizations. The second course is aimed at providing initial academic training for future experts in nuclear safety. Table 5 shows the professionals graduated between 1980 and 2007, discriminated by country of origin.

The ARN also offers Radiological Protection training courses for the technical staff of the ARN, of the CNEA and of other public and private institutions that require them. In addition, the ARN provides national and international training courses in specific areas, such as: Safe transport of radioactive material, Safeguards for national inspectors of the IAEA and the ABACC and operators, Monitoring of aerosols for International Surveillance System operators, Physical protection of nuclear facilities and materials, Physical security of sources; Illicit traffic prevention, Medical response in case of accident by radiation.

Table 5: Postgraduate courses on Radiological Protection and Nuclear Safety. Participants between 1980 and 2007, ordered by country of origin

Argelia	4	**Argentina**	346	**Bolivia**	25
Brasil	32	**Colombia**	30	**Costa Rica**	12
Cuba	44	**Chile**	30	**Ecuador**	32
El Salvador	9	**España**	1	**Filipinas**	7
Guatemala	14	**Haiti**	6	**Marruecos**	1
México	25	**Nicaragua**	9	**Panamá**	15
Paraguay	15	**Perú**	41	**Polonia**	1
Rep. Dominicana	7	**Rumania**	1	**Uruguay**	20
Yugoslavia	1	**Venezuela**	37	**Vietnam**	1
Zaire	2	**Honduras**	2		
					Total: 770

E.3.3.4 Quality Management System

The ARN has determined, documented and implemented a Quality Management System in agreement with the requirements determined in the IRAM-ISO 9001:2000 Standard. The facts and requirements of said system are described in the "Quality Manual of the ARN". In this document the Board declares the Quality Policy, the commitment with the Quality Management System, the Management by Processes and Constant Improvement, among others.

On the one hand, the Board has decided to start the discussion, interpretation and implementation of the IAEA Standard "GS–R-3 Management System for Facilities and Activities".

The Quality Management System is implemented on the basis of the approach by processes. Therefore, seven (7) regulatory or main processes and four (4) support processes have been identified.

The analysis and follow up of these processes are performed through internal quality audits, executed by persons who are independent from the process to be audited and who also have the adequate qualifications. During 2006 and 2007 eleven (11) internal audits have been carried out, in which twenty nine (29) non conformities have been identified, thirteen (13) observations and seventy seven (77) opportunities for improvement.

At present, the ARN has certified Graduate Courses in Radiological Protection and Nuclear Safety under the IRAM-ISO 011:2000 standards and has credited Laboratory techniques under Standard IRAM_ISO 17025:2005. On the other hand, the "Protection against Ionizing Radiations during the Transport of Radioactive Materials" Process is about to be certified.

<u>Documentation Management:</u>

Until December 2007, ninety two (92) documents have been approved and thirty (30) documents are under preparation process.

The ARN has a Document and Registry Control system and a system for Information Security.

Interest group Satisfaction

The ARN performs the follow up and measurement of the satisfaction of the users by means of evaluations of the surveys and analysis of the complaints and suggestions. With respect to other groups of interest, it analyzes the continuity and compliance of the agreements and accords and the participation of the staff in shared activities.

E.3.3.5 Financial resources

Besides an efficient structure and qualified staff, the ARN requires the necessary financial resources for the effective compliance of the regulatory objectives. In this regard, Act Nº 24804 provides in its Art. 25 that these resources shall originate mainly from:

- Annual regulatory fees
- Contributions from the National Treasury determined for the budget of each fiscal year, and
- Other funds, assets or resources that may be assigned according to applicable laws and regulations

Art. 26 of said Law determines the annual regulatory fee payable by the holders of an authorization or permit or by corporate bodies whose activities are subject to ARN's surveillance, specifying the fees for nuclear power plants and authorizing the ARN to determine the fees applicable to other regulated activities.

In this sense the ARN approved a "Licensing and Inspection Fee System" that sets out the respective fees for the issuance of licenses and permits in accordance with the facility or practice, as well as the annual fee for the operation of said facilities or practices.

The System determines an annual fee during the operation of each facility or practice by means of a simple formula which takes into account two factors: the "Regulatory Effort" stated as the number of inspection / evaluation hours that the ARN assigns to the regulatory control of the facility or practice and the cost of said effort based on the monetary value of the hour of inspection / evaluation, which is determined on an annual basis.

On a yearly basis the ARN prepares a budget project, which includes a list of the inflow provisions from regulatory fees and justifies request of funds to the National Treasury. This budget is published in the Official Bulletin in order to clearly indicate the manner in which the funds from persons and institutions shall be used which are bound to pay regulatory fees.

The budget prepared by the ARN for the 2007 fiscal year was $47,082,000 as shown in Table 6.

Below, several charts show the budgetary distributions of the execution of the work plan for 2007, of expenses according to different criteria. Figures III and IV show the budget distribution

of regulatory tasks by type of inspection and by type of task, and Figure V shows budget distribution by item.

ITEM	VALUE IN AR$
1. Staff	24,388,000
2. Input	1,540,000
3. Services	12,019,000
4. Equipment	2,042,000
5.1 Scholarships	350,000
5.9 Transfers Abroad	6,293,000
9. Other Expenses	450,000
TOTAL	47,082,000

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Figure III - Budget distribution of regulatory tasks by type of inspection

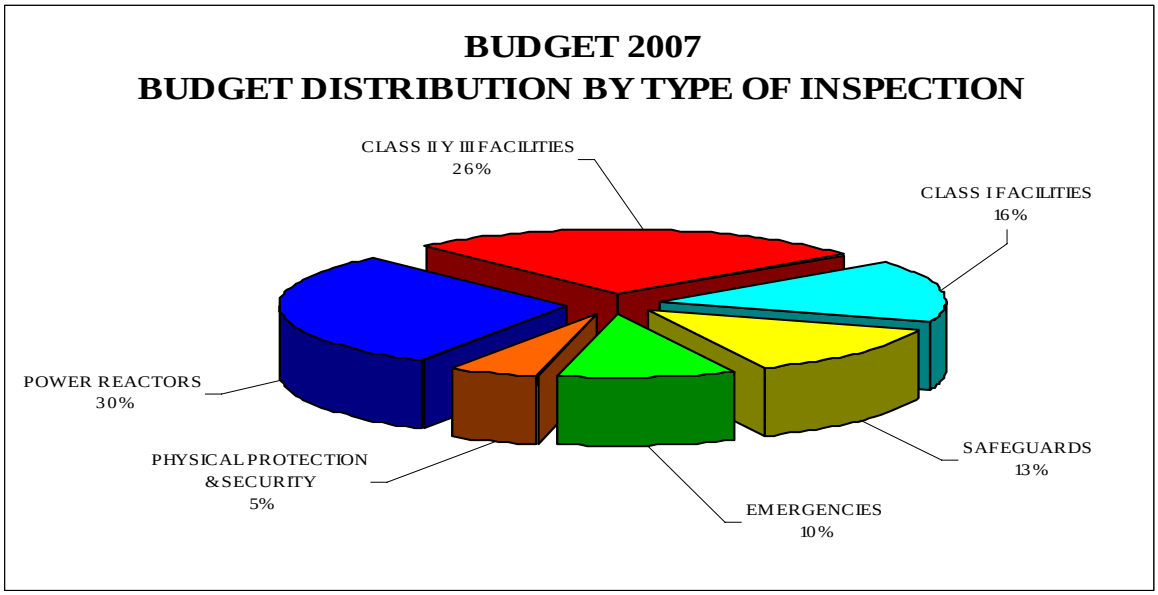


Figure IV - Budget distribution by type of task

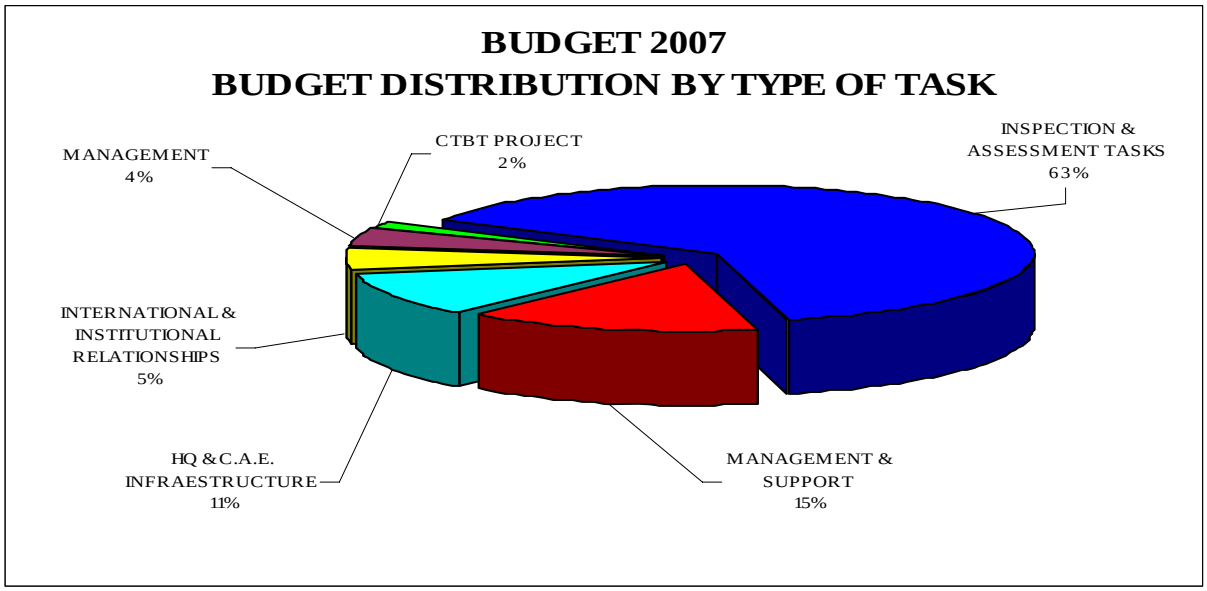
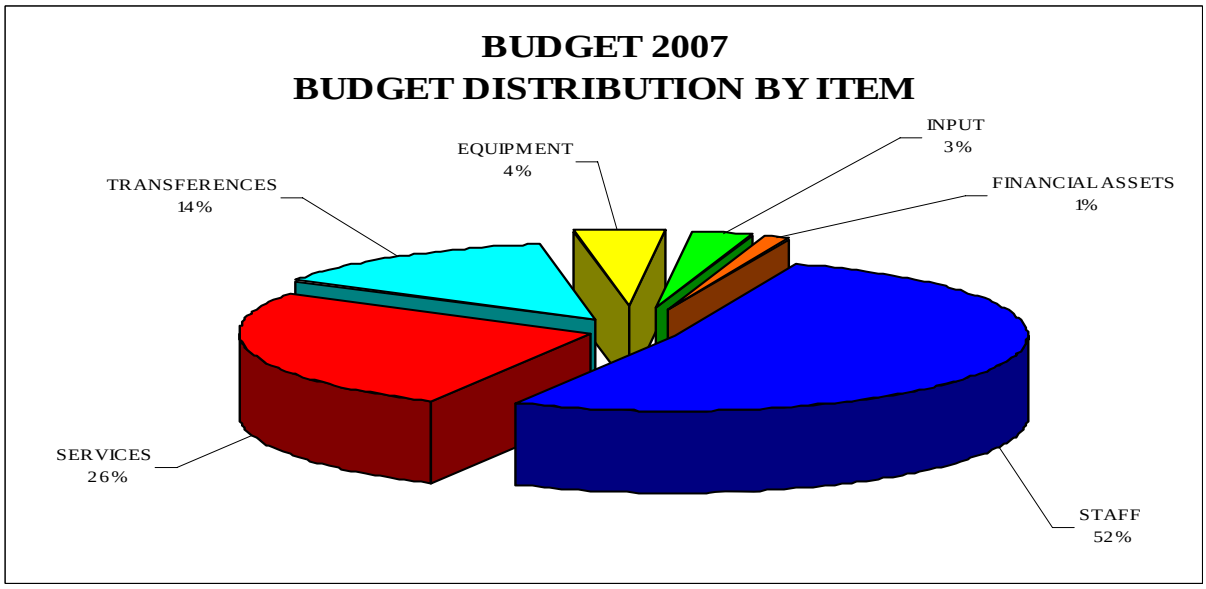


Figure V - Budget distribution by item



E.3.4 Relationship with other organizations

In the period 2005-2007, the ARN continued with cooperative activities with other organizations, with agreements in force. Within this framework, with the Latin American Forum of the Radiological and Nuclear Regulatory Organizations, with IAEA's participation, a Spanish American radiation safety network has been created, which allows the exchange of information between regulatory organizations in the region in order to contribute with the objective of attaining a high regional radiation safety level.

The national and international agreements and accords are presented in ARN's Annual Reports.

In addition, ARN's specialists usually participate, as nominated experts, in the following international committees and programs:

- Commission on Safety Standards "CSS" (IAEA).
- Radiation Safety Standards Committee "RASSC" (IAEA).
- Nuclear Safety Standards Committee "NUSSC" (IAEA).
- Waste Management Safety Standards Committee "WASSC" (IAEA).
- Transport Safety Standards Committee "TRANSSC" (IAEA).
- Permanent Advisory Group on Safeguards Implementation "SAGSI" (IAEA).
- United Nations Scientific Committee on the Effects of Atomic Radiations "UNSCEAR" (UN).
- International Commission on Radiological Protection (ICRP).
- Brazilian-Argentine Permanent Committee on Nuclear Policies.

E.3.5 Annual reports

Every year the ARN submits to the National Executive Power and to the Parliament of the Nation a Report on the activities performed the previous year, in agreement with the dispositions Art. 16 of the National Act of Nuclear Activity.

These Reports describe the main supervisory and regulatory activities performed by the ARN in nuclear and radiological matters, safeguards and physical protection during the previous calendar year.

In order to give the widest possible coverage to the activity carried out and to the use of the assigned budget resources, the Report is also forwarded to public libraries, national universities, regulatory bodies, officers in health, energy and environmental areas and to the main users of radioactive material. Since 1998 the contents of the Annual Reports are published in the institutional web page (www.arn.gov.ar).

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SECTION F OTHER GENERAL SAFETY PROVISIONS

F.1 Responsibility of the license holder

F.1.1 Background

Nuclear activity started in Argentina in the 1950´s. At that time the facilities did not have the magnitude and complexity they have nowadays. The responsibility for nuclear and radiological safety fell on an individual, usually the head of the nuclear facility who, assisted by his staff or by contracting third party services, performed all safety-related activities. When the facilities had the appropriate means and equipment, and the staff was trained, the Regulatory Body granted the person responsible for them the pertinent operation license.

Even though the above mentioned concepts are still essentially valid for small nuclear facilities, a number of improvements have been introduced to the regulatory system throughout the years. Thus, when the characteristics of operation of the nuclear facilities so require it, the Regulatory Body demands that the people who must occupy specific positions in the operation staff must undergo special training and hold an individual license. Furthermore, training requirements for the operating staff were increased. See Section E.2.2.2.

On the other hand, in the case of more important and complex nuclear facilities, the Regulatory Body considered that, in order to ensure their operation with a safety level similar to the one said facilities were originally conceived, having the necessary number of trained operating staff was not enough to achieve it. Therefore, it was required to periodically review the design and operational aspects of important facilities and to introduce, whenever necessary, modifications in terms of safety as advised by state-of-the-art technology. In response to such considerations the Responsible Institution was formed.

F.1.2 Responsible Institution and Primary Responsible

The ARN requires that each nuclear facility shall be supported by an organization able to provide the appropriate support to the staff of the plant in tasks inherent to radiological, nuclear and radioactive waste management safety, such as the review of operating procedures, maintenance of safety systems, technical modifications to the plant, etc. This responsibility falls on the Responsible Institution, which in the case of nuclear power plants is Nucleoeléctrica Argentina S.A. (NA-SA), responsible for the operation of Atucha I Nuclear Power Plant (CNA I) and Embalse Nuclear Power Plant (CNE) including storage systems of nuclear fuels and management of waste generated in these facilities. CNEA is the Responsible Institution for Ezeiza Management facilities and for CAE’s Decaying, Pre-treatment and Controlled Discharge of Radioactive Effluents Plant as well as for a number of significant facilities, including several research reactors.

AR 0.0.1 and AR 10.1.1 regulatory standards set the responsibilities of the Responsible Institution, amongst which the most significant are:

- The Responsible Institution shall make every reasonable effort in accordance with its possibilities to ensure safety, complying at least with ARN's regulatory standards. Such responsibility also includes design, construction, commissioning, operation and decommissioning of the facility.
- Fulfilment of the regulatory standards and procedures is a necessary but not a sufficient condition concerning the responsibilities of the Responsible Institution, which shall make every reasonable effort, within its possibilities, to ensure safety. The Responsible Institution shall also comply with the regulatory standards and requirements set by other competent authorities that are not related to nuclear activities as for example the conditions concerning the release of chemical effluents. (see Section H.1)
- The Responsible Institution may be in charge of the operation of more than one nuclear facility and delegate totally or partially the execution of tasks, however, it shall be fully responsible for them.
- In every nuclear facility the Responsible Institution shall appoint a person from its staff, called the Primary Responsible, who shall be directly in charge of the radiological and nuclear safety of the facility as well as of the compliance with the licenses and regulatory requirements applicable thereto. In the case of nuclear power plants in operation, their directors are the Primary Responsible.
- The Responsible Institution shall provide the necessary assistance to the Primary Responsible so that the Primary Responsible may exercise its responsibilities. The Responsible Institution must supervise the Primary Responsible to verify that it complies with its safety-related responsibilities.
- The Responsible Institution shall submit to the ARN the necessary technical documentation to allow assessment of the safety of the nuclear facility whose license is required.
- No modification altering the design, operating characteristics or the mandatory documentation included in the operating license of a nuclear facility related to radiological or nuclear safety may be made without ARN´s prior authorization.
- The Responsible Institution and the Primary Responsible shall facilitate the inspections and audits required by the ARN.
- Any change in the organizational structure of the Responsible Institution that may impair its capacity to comply with its responsibilities shall require ARN's prior consent.

Apart from the responsibilities of the Responsible Institution and of the Primary Responsible, the ARN has set the responsibilities of the employees who work at the facility. In this regard, regulatory standard AR 10.1.1 sets that employees are responsible for their compliance with the procedures established to ensure their own protection as well as the protection of other employees and of the public. This condition is consistent with the recommendations of the International Atomic Energy Agency (IAEA).

F.1.3 Regulatory control of fulfilment of license holder's responsibilities

Since its creation in 1958, the Regulatory Body controls the compliance with the standards, licenses and authorizations issued. In order to verify that licensees comply with their responsibilities, the ARN performs different types of controls as follows:

- The ARN is permanently updated about the operational organizational structure. In case there is any modification to it, the Responsible Institution shall send to the ARN a document stating the new operational organizational structure, the missions, functions and requirements of the staff. It is clear that every proposed change must be duly justified. The ARN evaluates the documents and its corresponding justifications and, in the case of not finding any observations, the document shall enter into force when the facility has the capacity to cover all the posts to be licensed.
- Regulatory standard AR 0.11.1 determines the requirements to be fulfilled by nuclear facilities staff to obtain an individual license or specific authorization. See Section E.
- The procedure to grant individual licenses and specific authorizations allows the ARN to control the skilfulness of the people that have to be in charge of safety-related responsibilities in the facility. Said skilfulness is re-assessed whenever the specific authorization is renewed.
- The individual license may be cancelled or revoked by the ARN if during the performance of the duties, non-compliance with any of the conditions required for its granting is demonstrated. Likewise, the specific authorization may be modified, cancelled or revoked in accordance with the terms of Section E.2.2.6. In addition, the ARN regularly verifies the compliance of the Primary Responsible with its obligations regarding the safety of the facility, especially its compliance with the applicable standards, conditions of the operating license and any other requirement related to radiological safety, all of which is carried out through evaluations, regulatory inspections and audits performed by ARN´s resident inspectors and analysts, and whenever necessary, with the assistance of external experts.
- The ARN has set a sanction system to be applied in case of non-compliance with any regulatory requirement as specified in Section E.2.2.6.

F.2 Human and Financial Resources

Introduction

National Commission of Atomic Energy (CNEA), as set forth in prior National Reports, is the National Government responsible organization for SF Management as well as for any other radioactive waste generated in the national territory. For that purpose, the *National Program for Radioactive Waste Management* was developed through Act Nº 25018, which set the CNEA as the responsible authority for the development and periodic updating of a *Strategic Plan for Radioactive Waste Management.* This Act foresees the creation of a *Fund for Radioactive Waste Management and Final Disposal* in order to provide for the financial resources necessary for the

implementation of the *Strategic Plan.* To date, the fund has not yet been set since the Law that will regulate its management and control has yet to be enacted, as provided by Article 14, Act Nº 25018. See section H.1.7.

The *Strategic Plan* was updated in March 2006, including the completion of Atucha II Nuclear Power Plant, which was then reviewed by the ARN with a favourable opinion, thus highlighting the need of its approval by Law in order to continue defining the new repositories. The above mentioned plan was sent to the Secretary of Energy. To date, the *Plan* has been reviewed by the NASA without being objected; therefore it is now the Secretary of Energy that must approve it, approval that is still pending.

Both financial and human resources are essential for the assurance of safety conditions of nuclear facilities. Consequently, the Regulatory Body requires that all staff working at SF and radioactive waste management facilities shall be properly trained and qualified in accordance with the tasks performed, and that the staff assigned to safety-related tasks shall hold a license and the Specific Authorization permit.

In the case of SF and radioactive wastes generated by nuclear power plants, the Responsible Institution that reports to the Regulatory Body for the operation of Nuclear Power Plants (NASA), has the responsibility not only to have trained and qualified personnel in accordance with the current legal and regulatory framework, but also to provide the financial resources necessary for the development of operation activities, which include the disposal of radioactive wastes and the storage of SF until those responsibilities are transferred to the CNEA.

Financing of the National Program for Radioactive Waste Management

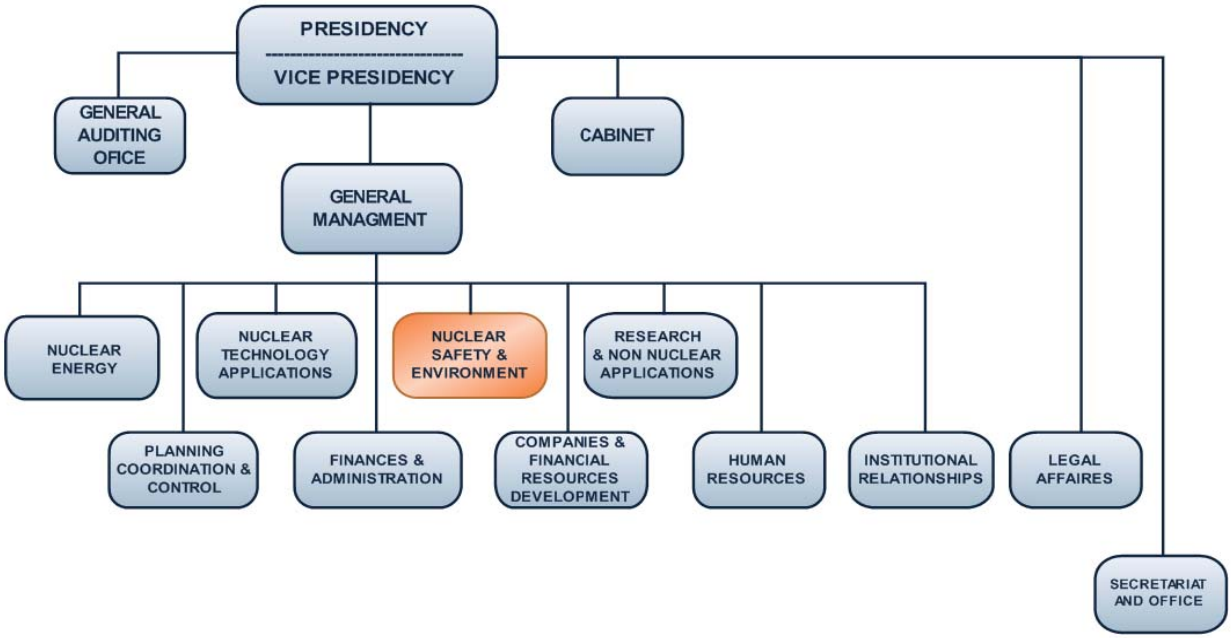
The *Strategic Plan* has not yet been approved by the Honourable National Congress. Nevertheless, during the year 2004 the National Executive Power decided to encourage the completion of Atucha II Nuclear Power Plant (CNA II), a decision that modified the technical and economic equations of the *Strategic Plan,* extending its scope, which implied that the criteria for its development had to be reformulated. The feasibility of the *Strategic Plan* is highly linked to the pertinent integration of the *Fund for Radioactive Waste Management and Final Disposal*.

In 2006, the CNEA sent to the National Executive Power, to be considered by the Honourable National Congress, a new version of the *Strategic Plan for Radioactive Waste Management*, which contains the above mentioned changes.

Until the *Strategic Plan* is approved, the CNEA complies with its obligations regarding radioactive waste management by using financial resources from the National Treasury.

CNEA Organizational Structure and Human Resources

CNEA's organizational structure has suffered some changes regarding what was reported in the 2nd National Report. Under this new context both The *National Program of Radioactive Waste Management* and the *PRAMU* now report directly to the Nuclear Safety and Environment Management.

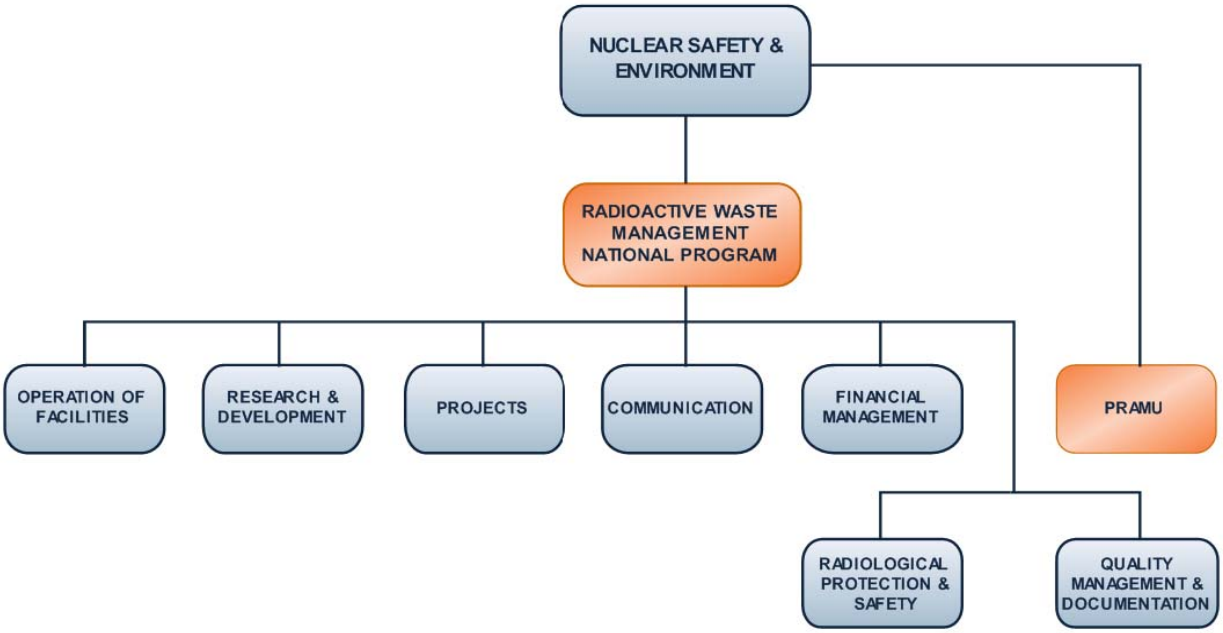


In 2006 another significant change was made related to the Radiation Protection and Safeguards area, which used to report directly to CNEA's Presidency and is now reporting to the Nuclear Safety and Environment Management.

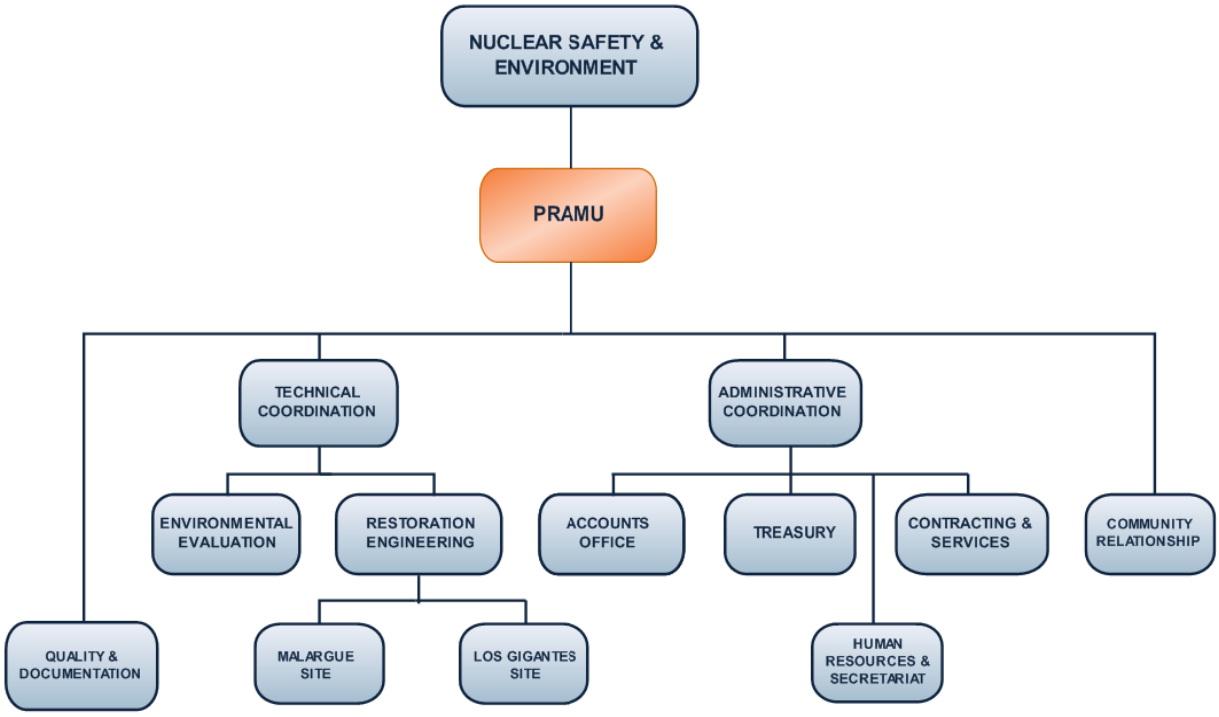
The *National Program of Radioactive Waste Management (PNGRR)* takes full responsibility for the management of radioactive waste generated at CNEA's own facilities, the facilities of external generators -nuclear power plants and small generators- as well as for the management of SF from research reactors.

Hereinafter follows *PNGRR* and *PRAMU* organizational structure.

RADIOACTIVE WASTE MANAGEMENT NATIONAL PROGRAM



URANIUM MINING ENVIRONMENTAL RESTORATION PROJECT (PRAMU)



The total number of CNEA employees assigned to SF and radioactive waste management reaches 94 people. The following tables show the distribution of the assigned financial resources and the staff by objectives .

CNEA´s Financial Resources for RWM and SFM *

ITEM	RESOURCES ($)
Research & Development	240,000
SF and Radioactive Waste Management	325,000
Proposed Improvements	5,880,000
Staff	7,000,000
Total	**13,445,000**

*** RWM: Radioactive Waste Management - SFM: Spent Fuel Management**

CNEA´s Human Resources for RWM and SFM *

RANK	QUANTITY
Professionals	48
Technicians	34
Fellowships	12
Total	**94**

*** RWM: Radioactive Waste Management**
SFM: Spent Fuel Management

Training of Human Resources

Most employees have taken a postgraduate course on Radiation Protection and Nuclear Safety for professionals or the Radiation Protection Course for technicians organised and directed by the ARN (For further details see Section E.3.3.3, where training activities are explained which are carried out by the CNEA since its beginnings).

NASA members of staff, who perform specific duties at nuclear power plants, are re-trained in accordance with the requirements set by Regulatory Standard AR 0.11.3. In order to comply with those requirements, at the beginning of each calendar year, NASA sends to ARN the retraining program to be developed in each period. The program includes the courses of study for each specific duty, time schedule, list of topics, lecturers appointed, and assessment of courses.

As there are no full scale simulators at either power plant, practical training is given abroad, in the case of Embalse Nuclear Power Plant (CNE), training is carried out in Gentilly-2 simulator, in Canada; and in the case of Atucha I Nuclear Power Plant (CNA I), in Angra II, in Brazil.

In addition, staff is encouraged to attend and participate in courses, seminars, and training at universities and other science and technical institutions. For some specific matters regarding nuclear issues, it has been possible to train them abroad through scientific and training visits and attendance to specialization courses and seminars. See *Section L.3 "Advanced Education and Training."*

Besides, every year the National Program for Radioactive Waste Management (PNGRR) staff participates in teaching Training Courses on Radioactive Waste Management, at Radiochemical Master Course given at CNEA's Institute of Nuclear Studies together with National Technological University, and in the Specialization on Nuclear Energy Technological Applications career at CNEA's Instituto Balseiro together with University of Buenos Aires.

In order to take advantage of the experience gained by other countries, through national and international organizations, several actions have been taken:

- Participation in Conferences, Seminars, Technical Meetings and Workshops; 8 national and 12 international ones. See *Section L.3.2 "Conferences, Seminars, Technical Meetings and Workshops."*
- Continuation of international agreement with ENRESA-SPAIN and execution of 2 new ones. See *Section L.4.1 "International Agreements."*
- Execution of 9 new national agreements and continuation of 2 ongoing agreements. See *Section L.4.2 "National Agreements."*
- Execution of 7 projects within the framework of the Cooperation Programs jointly with the International Atomic Energy Agency. See *Section L.5 "Joint projects with the IAEA."*

Training of fellowship holders

The National Program for Radioactive Waste Management has a staff of fellowship holders devoted to the main lines of research and development carried out at CNEA three Atomic Centers and at CNEA headquarters, all of them under the direction of specialized professionals in specific disciplines.

Some fellowship holders have completed postgraduate courses at CNEA Educational and Training Institutes; therefore, they have a supplementary training prior to their commitment to the assigned lines of research and development. Fellowships for professionals may include advanced courses or master or doctoral thesis. In the case of technical fellowship holders, they are researcher's assistants. Scholarships have also been granted to advanced students of other disciplines.

Most of the issues dealt with by scholarship holders during 2007 correspond to areas assisting the National Plan for Radioactive Waste Management, especially those regarding research and development.

F.3 Quality Assurance

F.3.1 Introduction

In the Argentine Republic the application of an adequate quality management program during the design, construction, commissioning, operation and decommissioning stages of a nuclear facility is a regulatory requirement. With this purpose AR 3.6.1 regulatory standard *"Nuclear Power Plant Quality System"* issued by the ARN determines the quality system requirements applicable to Nuclear Power Plants which, with the appropriate modifications, also apply to other nuclear facilities that generate and manage radioactive wastes. Also, AR 3.7.1 regulatory standard "*Schedule for the Documentation to be submitted prior to the commissioning of a nuclear power plant*" determines the time when the Responsible Institution has to submit the program and the quality manual to the Regulatory Body.

Furthermore, the licenses for the operation of facilities set that during said stage they shall have quality management programs; said quality management programs and manuals are mandatory for the facility.

The Regulatory Body controls the implementation of quality programs through the Responsible Institution.

In the case of spent fuel management and radioactive waste management facilities located within the site of nuclear power plants, they are subject to quality standards set for nuclear power plants in a General Quality Management Program.

F.3.2 Nucleoeléctrica Argentina Sociedad Anónima (NASA)

Since the organization of NASA in 1994 (Decree Nº 1540/94), it has developed its nuclear activity in connection with the operation of both CNA I (Atucha I Nuclear Power Plant) and CNE (Embalse Nuclear Power Plant); it is also responsible for the construction, commissioning and operation of Atucha II Nuclear Power Plant (CNA II).

NASA, as the Responsible Institution, has a General Quality Assurance Program, which is the reference framework for specific quality assurance programs of each organizational unit. The program is described in the *General Quality Assurance Manual*, which was approved and made effective in November 1997. The Regulatory Body requirements and those established in IAEA 50-C-Q document and other applicable safety guides were taken into account to elaborate the General Quality Assurance Program.

Since then, the *General Quality Assurance Manual* has been reviewed on different opportunities. Review 1 incorporates a new Quality Policy approved by the Board of the Responsible Institution.

Currently, organizational units are adapting their specific manuals to said review.

As mentioned above, the *General Quality Assurance Manual rev.1* complies with the requirements of AR 3.6.1 regulatory standard "*Nuclear Power Plant Quality System*", and IAEA Practice Code 50-C-Q.

Table 7 shows the present status of the General Quality Assurance Program updated to 2007.

Table 7 – NASA' Quality Assurance Program Status

ORGANIZATIONAL UNIT	DOCUMENT	REVIEW	Nº OF PROCEDURES
NASA	General Quality Assurance Manual	Review 1	18 about General Matters
CNA I	General Quality Assurance Manual for Operation	Review 3	260
CNE	General Quality Assurance Manual for Operation	Review 5	638
CNA II	General Quality Assurance Manual for Construction	Review 3	132

F.3.3 National Commission of Atomic Energy (CNEA)

CNEA's Quality Management System

CNEA's new quality management structure is formed by a *Quality Management division* which depends on the *Control, Coordination and Planning Management,* which in turn depends on the *General Management.* Said *Management Division* has the responsibility, among others, to coordinate the Quality Management activities carried out at CNEA and to gather the corresponding information.

Said coordination is carried out through a quality net whose nods are led by those responsible for the quality areas operating at different levels of the structure.

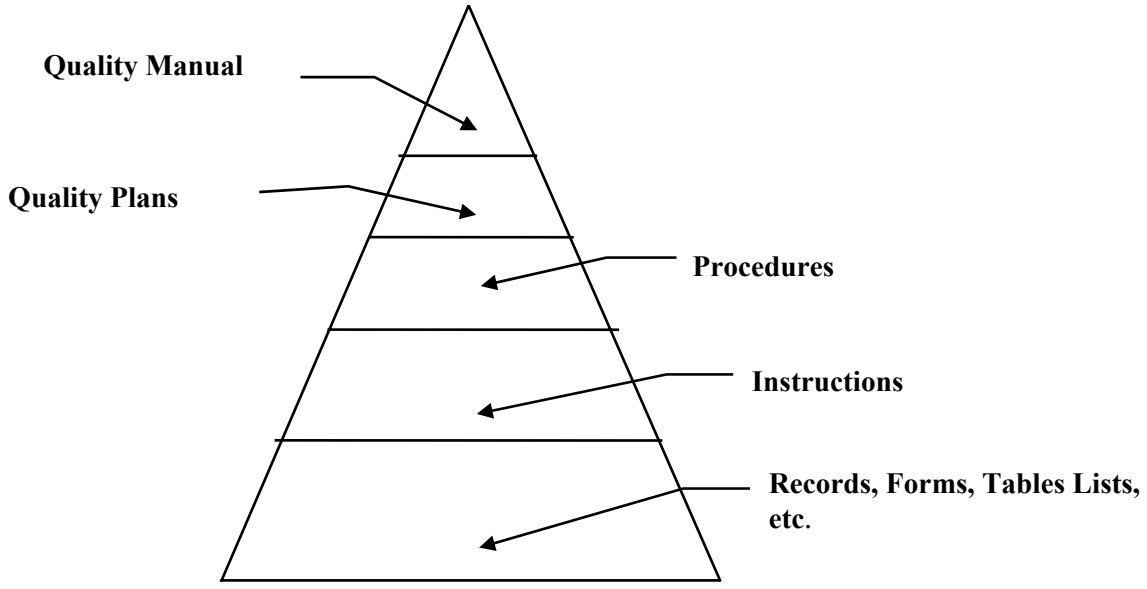
Especially, at the *Nuclear Technology Application Management Division* and at the *Nuclear Management and Environment Division* there work the *Quality Management Units* which coordinate the implementation of the quality management systems of the sectors within them and the quality management internal audits in each one of them.

CNEA has set a quality policy which, at the time of writing this report, is being reviewed in order to update it.

The quality system of the institution is documented through CNEA's Quality Management Program which shows the quality policy and the standard quality management procedures.

CNEA's Quality System documentation is completed by the one issued at different levels of the organization, such as: general procedures, management system manuals, operative procedures standards and quality plans developed in accordance with CNEA's applicable standards, particularly ARN regulations and requirements.

Each sector with a quality management system has a hierarchic structure similar to the following:



Quality Manual: Describes the pertinent activities of the sector, clarifying the scope of each one of them.

Quality Plans: They describe the special characteristics of the sector when manuals are used from another higher hierarchical sector, from which it depends; or when special projects are carried out within the quality management system.

Procedures: They describe the management system procedures. They can have different characteristics: standard, general, and operational and can be issued either by their own sector or by a higher hierarchical sector.

Instructions: They describe more specific activities than those stated in the procedures, either technical or managerial ones, issued by their own sector or by a higher hierarchical level.

Records: They are documents showing results obtained or supplying evidence of activities carried out.

The scope of the documents of the quality management system of each sector depends on several factors such as the size of the sector, types of activities carried out and their degree of complexity, and issues regarding regulatory requirements and safety.

Every sector having a management system forms their organizational structure with a board, which manages the sector and a quality responsible, who implements the system. In some situations, the quality responsible is part of the board.

Sectors that comply with management system standards, such as ISO 9001, ISO 17025, etc. are subject to an internal audit system in accordance with CNEA standards.

CNEA sectors that generate and manage radioactive waste or spent fuels are subject to audits and inspections of different kinds, characteristics and origins which include technical aspects and management systems:

- Inspections by the Nuclear Regulatory Authority (ARN).
- Audits by the National General Audit. (AGN)
- Audits by the National Auditing Committee (SIGEN).

They are also subject to external audits by qualified or accredited laboratories; facilities are audited by clients and third parties.

Gradually, the CNEA is trying to get qualification, peers evaluation, certification and accrediting of all its sectors. These activities are being progressively carried out according to institutional priorities.

Internal qualifications are carried out by CNEA’s Qualification Committee of Laboratories and Nuclear Facilities (CoCaLIN), whose antecedents go back to the decade of the 1980’s with the

creation of the Qualification Committee for Fuel Cycle Management Processes. The Qualification Committee of Laboratories (CoCaLab) was created in 1995 and, later on, it broadened its scope by creating CoCaLIN. On October 12, 2007, through Provision Nº 144/07, the General Management Division updated CoCaLIN constituency to have it suited to the new organization.

To date, two calibrating laboratories and two testing laboratories have been accredited.

In Argentina, accreditations are carried out by the Argentine Accreditation Agency (OAA) which has been recognized by international institutions as the International Laboratory Accreditation Cooperation (ILAC), International Accreditation Forum (IAF) and Inter American Accreditation Cooperation (IAAC).

In the near future, it is foreseen the certification of a facility and of an engineering service according to ISO 9001 standard. Based on experience acquired on obtaining the above mentioned certifications, other activities to obtain certifications of other facilities and services will be planned.

Certifications are granted by Certifying Agencies accredited by the Argentine Accreditation Agency (OAA).

National Program for Radioactive Waste Management (PNGRR).

The PNGRR, organization implemented by the CNEA in order to comply with its waste management responsibilities, has designed a *Quality System* for all radioactive waste management stages to ensure that the conditioned waste complies with the acceptance requirements both for its transport and for its interim storage. Acceptance requirements are based on criteria established by the Regulatory Body.

The *Quality System* lies within the framework of CNEA´s Quality Management standard policy. The responsibility to prepare *Quality System* procedures and their compatibility with CNEA's Quality Management Program is carried out by the Documentation and Quality Management Division which reports to PNGRR head. To date, the *Quality System* includes 60 operational procedures which correspond to several activities developed in the Program.

Also, in order to have an efficient access to documentation, a Data Base was implemented where, in addition to the procedures mentioned, specifications and layout of the facilities and the regulations and legislation issued by regulatory and other authorities provide the frame for radioactive waste management. At the moment, the Data Base has 980 records.

CNEA's waste generators and spent fuels comply with all the management system procedures of the National Program for Radioactive Waste Management (PNGRR).

According to regulations issued by the Regulatory Body, all sectors managing radioactive waste must submit safety reports including the description of their management systems in order to obtain the pertinent operation licences.

Nuclear Facilities Dismantling Subprogram (SPDIN)

In 2001, the CNEA set up the *Nuclear Facilities Dismantling Subprogram* which defines the organization and activities to be performed regarding dismantling activities. The Quality Management System developed by the SPDIN includes administrative, operational and safety areas. The procedures included are still under review.

Uranium Mining Environmental Restoration Project (PRAMU)

For restoration activities of uranium mining sites, in 2000, the CNEA developed the *Uranium Mining Environmental Restoration Project* -PRAMU- which defines the organization and activities to be performed in the management of waste derived from uranium mining. The Quality Management System developed by PRAMU will include different project areas. To date, two general procedures and a work instruction are in force, and a quality manual is under process.

Table 8 shows the present status of the CNEA's General Quality Assurance Program updated to December 2007.

Table 8 - CNEA' Quality Assurance Program Status

ORGANIZATIONAL UNIT	DOCUMENT	Nº OF PROCEDURES
CNEA	General Quality Assurance Manual*	26
PNGRR (Waste)	Quality Assurance Manual	60
PRAMU	Quality Assurance Manual (in preparation)	3
SPDIN	Quality Assurance Manual	25

CNEA´s Quality Policy, CNEA´s Standard Procedures and Management General Procedures

F.4 Operational Radiological Protection

Since the presentation of the last National Report up to date there have been no changes either in the general criteria or in the Radiological Protection standards timely reported.

Basic radiological protection criteria applicable in the country establish that:

- Practices using radiation shall be justified.
- Radiological protection has to be optimised.
- Established limits and dose constraint levels shall be met.

- ❖ Accidents shall be adequately envisaged, but if they occur emergency procedures must be implemented so that their radiological consequences can be mitigated.

The criteria of the Regulatory Body concerning radiological safety in spent fuel and radioactive waste management facilities have been defined in the following standards:

AR 10.1.1	Basic Radiation Safety Standard
AR 10.12.1	Radioactive Waste Management
AR 3.1.1	Occupational Exposure in Nuclear Power Plants
AR 3.1.2	Limitation of Radioactive Effluents in Nuclear Power Plants
AR 4.1.1	Occupational Exposure in Nuclear Research Reactors
AR 4.1.2	Limitation of Radioactive Effluents in Nuclear Research Reactors
AR 6.1.1	Occupational Radiation Safety in Type I Radioactive Facilities
AR 6.1.2	Limitation of Radioactive Effluents in Type I Radioactive Facilities

Dose limits for the public

The annual effective dose limit for members of the public is 1 mSv in one year and is applicable to the average total effective dose to the critical group due to all facilities and practices. Equivalent annual dose limits are 15 mSv and 50 mSv for crystalline and skin, respectively.

Dose constraints for the public

For design purposes, the Regulatory Body has established a constraint of 0.3 mSv for the annual effective dose of the critical group.

Annual discharge limits for each facility are calculated in such a way as not to exceed the annual dose restriction value of 0.3, while keeping, at the same time, the concept of reducing discharges as much as it is reasonably possible.

When the annual dose in the critical group does not exceed 0.1 mSv and the annual collective dose does not exceed 1 man-Sv, the Regulatory Body does not require demonstration regarding the fact that the discharge systems have been optimised.

Occupational dose limits

Dose limits for workers are as follows:

- ❖ The effective dose limit is 20 mSv year. This value shall be considered as the average in 5 consecutive years (100 mSv in 5 years), not exceeding 50 mSv in any single year.
- ❖ The equivalent dose limit is 150 mSv year for crystalline and 500 mSv year for skin.

The dose limit is applicable to the sum of the dose due to external exposure in the period under

consideration plus the committed dose from intakes in the same period.

These limits have been in effect since January 1995, and since then the value of the accumulated effective dose is computed for the five-year average dose control.

F.4.1 Conditions for Radioactive Material release

In accordance with regulatory standards, the systems used for the containment of radioactive effluents shall be optimised.

When optimisation is made by means of a cost-benefit analysis, 10,000 U.S. dollars per man-Sievert is used which is the constant value between the social cost and the collective dose.

According to a regulatory requirement, the Regulatory Body determines that, in addition to the operation License, the discharges of radioactive effluents to the environment shall be as low as it is reasonably achievable and shall not exceed the restrictions established in terms of the following “discharge formula”.

$$\sum_i \frac{A_i}{K_i} < L$$

where:

A_i is the activity of *i* nuclide discharged to the environment in the period under consideration

K_i is a constant value of activity, stipulated for *i* nuclide, for a given facility

L is the limit for this sum of fractions, with different values for the different periods considered; $L = 10^{-2}$ in a day, $L = 3 \times 10^{-1}$ in three months and $L = 1$ in a year.

K_i value is estimated for each facility, radionuclide and type of discharge (gaseous and liquid) using specific models which allow to estimate the doses in the critical group, taking into account the characteristics of the sites and the location of critical groups.

This assessment method makes it possible to ensure that, provided said inequality is respected, dose constraints to the public shall not be exceeded.

Gaseous and liquid discharges that occur during normal operation of the facilities are permanently controlled and monitored. If significant deviations from the historical averages or growing trends of the activities discharged on a yearly basis are detected, they must be duly analysed and justified.

The Regulatory Body performs an audit program of declared discharges made by the operator and an environmental monitoring in the surroundings of the facilities, which include activity measurements of activity in water, sediment, vegetable, fish and milk samples, and other samples of the surrounding biosphere.

Table 9 shows the annual average activity discharged to the environment with gaseous and liquid effluents corresponding to the 2003-2007 period, discriminated by type of discharge and group of radionuclides for the 13 facilities authorized to perform controlled and planned discharges (nuclear power plants, research reactors and Type I radioactive facilities). Information on the annual dose constraint fraction is also included that represented such liquid and gaseous discharges in the critical group.

Table 9 - Average Gaseous and Liquid Discharges in the 2003-2007 Period

ANNUAL AVERAGE CONTROLLED DISCHARGES IN THE PERIOD 2003-2007												
FACILITY	LIQUIDS					GASEOUS						
	TOTAL ACTIVITY (Bq)				% of	TOTAL ACTIVITY (Bq)						% of
	H 3	β/γ	total α	Nat Uranium	DC (*)	Nob Gas	Aeros	H 3	Iodines	C 14	Nat Uranium	DC (*)
CNA I	1,6E+15	3,0E+11	1,8E+09	-----	0.37	3,0E+14	5,5E+06	9,0E+14	1,5E+08	4,7E+11	-----	1.43
CNE	1,2E+14	3,8E+09	-----	-----	1.07	4,1E+13	4,6E+07	3,5E+14	2,3E+05	4,4E+11	-----	0.07
UO2 MANUFACTURING PLANT - UDMP	-----	-----	-----	1,3E+09	0.08	-----	-----	-----	-----	-----	7,5E+06	0.06
RA3	-----	1,8E+08	-----	-----	2.6	3,3E+13	2,4E+09	-----	1,5E+08	-----	-----	4.33
RADIOISOTOPES PRODUCTION PLANT - PPR	-----	ND	-----	-----	ND	-----	-----	-----	1,8E+09	-----	-----	5.67
Mo99 PRODUCTION PLANT - PPMo 99	-----	-----	-----	-----	-----	6,0E+12	<DL	-----	<DL	-----	-----	0.07
SEALED SOURCES PRODUCTION PLANT - PFS	-----	-----	-----	-----	-----	-----	<DL	-----	-----	-----	-----	<0.01
CICLOTRON	-----	-----	-----	-----	-----	-----	9,7E+11	-----	-----	-----	-----	0.08
CONUAR	-----	-----	-----	1,1E+07	0.13	-----	-----	-----	-----	-----	3,9E+05	<0.01
ENRICHED URANIUM LABORATORY - LUE	-----	-----	-----	-----	-----	-----	3,3E+02	-----	-----	-----	-----	<0.01
RA1	-----	<DL	-----	-----	<0.01	-----	-----	-----	-----	-----	-----	-----
ALFA FACILITY - FAC ALFA	-----	-----	ND	-----	ND	-----	7.6	-----	-----	-----	-----	<0.01
RA6	-----	5,1E+07	-----	-----	<0.01	<DL	<DL	-----	<DL	-----	-----	<0.01

(*) DC: Anual Dose Constraint = 0,3 mSv
DL = Detection Límit
ND = No Discharges
----- = Not Authorized
NOTE: The Anual Dose Constraint is set for all the installations in the Site

F.4.2 Occupational Exposure

The Radiological Protection criteria adopted by the Regulatory Body to control the dose received by workers is consistent with ICRP's recommendations.

AR 3.1.1, AR 4.1.1 and AR 6.1.1 regulatory standards set different criteria to ensure that the occupational dose to workers stays as low as reasonably achievable and lower than the established dose constraints.

In practice and according to what 10.1.1 regulatory standard determines, it is considered that dose limit levels have not been exceeded when the following conditions are met:

$$\frac{H_p(d)}{L_{DT}} \leq 1$$

and

$$\frac{H_p(10)}{20mSv} + \sum_j \frac{I_j}{I_{L,j}} \leq 1$$

where:

$H_p(d)$ is the individual equivalent dose at a depth of 0.07 mm and 3 mm for skin and crystalline, respectively, integrated in a year.

L_{DT} is the limit of equivalent dose in skin or crystalline, as appropriate.

$H_p(10)$ is the individual equivalent dose at a depth of 10 mm from the skin surface, integrated in one year.

I_J is the intake value of nuclide *j* during a year.

$I_{L,J}$ is the annual intake limit for nuclide *j*, resulting from the division of 20 mSv by the dosimetric factor of effective dose commitment for workers, per intake unit of the mentioned radionuclide.

Occupational doses shown in Table 10 are global values that include the doses to which workers were exposed to during operational and maintenance activities at the facility subject to individual monitoring; therefore, the doses are significantly lower that were received during radioactive waste management and spent fuel storage activities. In the case of doses to AGE staff, doses reported correspond exclusively to radioactive waste management activities.

Table 10 - Occupational Exposure at Radioactive Waste Management Facilities

ANNUAL OCCUPATIONAL DOSES AVERAGED OVER THE PERIOD 2003-2007		
TYPE I INSTALLATION	**Collective (man Sv)**	**Average (mSv)**
CNA I	**4.413**	**5.08**
CNE	**2.287**	**2.54**
RA-1	**0.004**	**0.21**
RA-3	**0.044**	**1.15**
RA-6	**0.005**	**0.17**
RADIOISOTOPES PRODUCTION PLANT - PPR	**0.065**	**1.45**
Mo^{99} PRODUCTION PLANT - PPMo^{99}	**0.026**	**2.17**
SEALED SOURCES PRODUCTION PLANT - PPFS	**0.137**	**5.50**
CICLOTRON	**0.017**	**0.71**
UO_2 MANUFACTURING PLANT - UDMP	**0.000**	**0.00**
CONUAR	**0.022**	**0.51**
ENRICHED URANIUM LABORATORY - LUE	**0.003**	**0.21**
ALFA FACILITY	**0.002**	**0.28**
RADIOACTIVE WASTE MANAGEMENT AREA - AGE	**0.029**	**1.37**

F.4.3 Radiological protection and nuclear safety at the CNEA

The National Atomic Energy Commission (CNEA) responsible for the management of spent fuel and radioactive waste generated in the national territory is also the Responsible Institution for the operation of nuclear and radioactive facilities at several Atomic Centers.

In 2004 the *Radiological Protection and Safety Program (PPR&S)* was developed in order to provide an organization and an organic coordination of the activities related to radiological protection and safety carried out at the CNEA. The purpose of this program is to strengthen the policies for strict compliance and control of current legislation and regulations on this matter.

In order to achieve a profit from the operational experience and a continued improvement of quality and safety at all CNEA's facilities, a *Safety and Security Review System (SRS)* was designed and implemented.

F.4.3.1 Radiological Protection and Safety Program

It is made up by 7 Permanent Programmatic Activities (APP) and by 4 Subprograms.

Permanent Programmatic Activities are as follows:

- *CNEA's Safety Committee*
  Its aim is to review and to assess safety conditions under which institutional activities are performed, and to advise the pertinent actions regarding radiological and nuclear safety, hygiene and safety at work and physical protection of nuclear materials and facilities.

- *Joint Convention*
  Includes activities related to the fulfilment of obligations under the Joint Convention on Safety of Spent Fuel Management and Radioactive Waste Management applicable in Argentina.

- The other five are: *Agreements, Relations with other Organizations and Institutions, Technical Assistance, Safeguards and Program Management*.

Subprograms deal with everything related to each one of their involved areas by encouraging studies, developing optimisation actions, and improving and monitoring the development and the results of activities inherent to it. The areas competing to each one of them are as follows:

- *Radiological and Nuclear Safety*
- *Hygiene and Safety at Work*
- *Emergencies and Physical Protection*
- *Skilled Human Resources*

F.4.3.2 Safety Review System

In order to achieve a systematic improvement of safety by reviewing and assessing safety conditions under which activities are performed, the pertinent actions are proposed regarding Radiological Safety, Physical Protection, and Safety and Hygiene at Work.

The system consists in the analysis and processing of information in connection with the safety of facilities and their siting (Atomic Centers and buildings). The system is based on *Regular Operational Reports (IPO)* which allow a technical review to a greater or lesser extent depending on the significance of events and their impact on operational safety.

IPOs contemplate, according to circumstances, one or all of the following:

- ❖ Failures and deviations registered.
- ❖ Changes or modifications made.
- ❖ Operational experience.
- ❖ Innovations and future projects.
- ❖ Condition of the documentation of the facility.

F.5 Emergency Preparedness

F.5.1 Introduction

As specified in the previous National Reports, the Regulatory Body requires the Responsible Institution to develop a response plan for radiological or nuclear emergencies. The Emergency Plan must contemplate the application of protective measures to prevent and/or mitigate the possible radiological consequences from nuclear accidents. The significance and scope of the plan depend on the type of nuclear facility. Every nuclear facility must have an internal emergency plan; likewise those facilities where an accidental situation may have radiological or nuclear consequences on nearby residents shall also have an external emergency plan.

Planning and preparation of response in emergency situations are regulated by the AR 10.1.1, AR 3.7.1 and AR 4.7.1 regulatory standards, the operating licenses and the requirements made to the Responsible Institution and to the Primary Responsible for the facilities.

F.5.2 Structure of the emergency plan at national level

National Law of Nuclear Activity (Act N° 24804) and its regulatory Decree Nº 1390 of November 1998 provides the ARN the legal frame to approve and to intervene in contingency plans in case of nuclear accidents.

Municipal, provincial and national authorities that could have any connection with the preparation of said plans shall comply with the guidelines and criteria defined by the ARN, which shall exercise all the power set by the Convention on Nuclear Safety passed by Act Nº 24776.

In December 2002, the interim version of the National Nuclear Emergency Plan was approved within the purview of the Federal Emergency System (SIFEM) and the National Department of Civil Protection, updated in accordance with the Nuclear Activity Law requirements. One year later, the Provincial Nuclear Emergency Plan was approved for the province of Córdoba, where the Embalse Nuclear Power Plant is located. The approval of the Provincial Nuclear Emergency Plan for the Province of Buenos Aires, where Atucha I Nuclear Power Plant and Ezeiza and Constituyentes Atomic Centers are located, is still pending.

In the case of Nuclear Power Plants, the Municipalities that could be directly affected by a nuclear accident within a range of 10 km have a Municipal Plan for Nuclear Emergencies. This is the case of the town of Lima and areas close to CNA I, and the towns of La Cruz, Embalse, Villa del Dique and Villa Rumipal, near CNE.

In the case of Atomic Centers, where most facilities operate with a relatively low radioactive inventory, potential accidents at each facility are assessed and characterized in safety reports (design base accidents). Their potential radiological consequences would only affect its own facilities, and in extremely serious cases the Atomic Center.

Nevertheless and as previously mentioned, agreements have been signed with public authorities to implement protection measures, thus defining the responsibilities and functional relations of the organizations responsible for implementing the different protection measures.

The system used to communicate the protection measures to the public in case of accidents has been developed in the last years.

F.5.3 International agreements

By the end of 1986, Brazil and Argentina signed the Argentine-Brazilian Cooperation Agreement. Annex II to Protocol 11 thereof includes the *Reciprocal Cooperation and Assistance in Case of Nuclear Accidents and Radiological Emergencies Program*.

In February 1990, Argentina adhered to the *Convention on Early Notification of a Nuclear Accident* and the *Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency*. The Regulatory Body is the contact and the Competent Authority of both instruments.

Likewise, Argentina is a member and contact of the *Network for Medical Attention to Overexposed Persons* of the Pan-American Health Office.

F.5.4 Nuclear Power Plants Emergency Plans

In the case of spent fuel and radioactive waste management facilities located in nuclear power plants, the emergency plans of the plants contemplate the application of protective measures to prevent and/or mitigate the possible radiological consequences derived from nuclear accidents that might occur in those facilities. The emergency plans of nuclear power plants were described in the 1st National Report and have been fully developed in the reports of the Convention on Nuclear Safety.

F.5.5 Atomic Centres Emergency Plans

As stated in previous National Reports, the CNEA, as the responsible organization for the operation of nuclear and radioactive facilities, sets out a general procedure to develop Emergency Plans (*CNEA-PN00O01 Facilities Emergency and Evacuation Plan).* This document sets the general guidelines which Atomic Centers and Principal Branch Offices shall adopt and comply with under CNEA's jurisdiction.

F.6 Decommissioning

F.6.1 Introduction

As stated in the previous report, documentation corresponding to planning stages prior to decommissioning have been started taking into account both nuclear power plants, which will probably generate the greatest volume of radioactive waste, and research reactors and other less important facilities.

F.6.2 Regulatory aspects

The legal and regulatory framework of nuclear activities described in Section E of this National Report is applicable to decommissioning activities of nuclear facilities. Therefore, there apply the criteria and radiological safety standards, waste management, quality and safety culture concepts applied to the operation of the nuclear facilities.

One of the main requirements of the regulatory system is that it is not possible to start construction, commissioning, operation and decommissioning of a significant nuclear facility if it does not have the pertinent license requested by the Responsible Institution and issued by the Regulatory Authority.

Specifically, Act Nº 24804, Nuclear Activity Law, sets forth in article 16 (b) that the Nuclear Regulatory Authority is authorized to grant licenses for the decommissioning of nuclear facilities.

The above mentioned law and its regulating Decree determine, among other issues, CNEA's liability as responsible organization for the decommissioning of nuclear power plants and, also, the obligations of the agency that operates said facilities during that stage.

AR 0.0.1 regulatory standard "Licensing of Type I facilities" sets out that a license issued by the ARN is required in order to proceed to the decommissioning of nuclear facilities.

Also, AR 3.17.1 regulatory standard "Nuclear power plant decommissioning" determines the basic requirements for the decommissioning of those facilities. The main conditions are as follows:

- The **Responsible Institution**, holder of the Decommissioning License, is responsible for planning and providing the resources required for the safe decommissioning of the nuclear power plant.

- The **Decommissioning Program** shall consider the necessary institutional arrangements and foresee appropriate radiological protection in each stage. The Regulatory Authority's prior approval is required to implement the Program.

- The **Decommissioning Program** shall include all necessary steps to ensure an appropriate radiological protection with minimum surveillance after decommissioning.

- The **Responsible Institution** will be able to delegate the decommissioning activities, either totally or partially, to third parties, but it shall continue being responsible for them. During the decommissioning process, the **Responsible Institution** shall contemplate and submit to ARN's consideration, the following:

  - Project management
  - Site management
  - Roles and responsibilities of involved organizations
  - Radiological protection
  - Quality assurance
  - Segregation of wastes, conditioning, transport and final disposal
  - Surveillance after partial decommissioning stages have concluded
  - Physical Protection, Safeguards and non-proliferation commitments

F.6.3 Background

All along the nuclear activity in Argentina, dismantling and decommissioning activities have been performed, namely:

- Dismantling of RA-2 Critical Facility at CNEA Constituyentes Atomic Center, 1984-1989. The building that housed the reactor is now open for unrestricted use.
- Dismantling of the internal parts of the tank, nuclear and conventional instrumentation of RA-3 radioisotope production reactor at CNEA Ezeiza Atomic Center, 1988-1990. These tasks were carried out as part of the program to increase the power of said reactor, which is at present in operation.
- Removal and repair of internal parts of CNA I reactor due to the breakage of R06 fuel channel in 1988. Removed elements have been stored at CNA I.
- Decontamination of several CNA I components (main pumps and heat exchangers) as well as development and use of remote and cutting techniques.

As specified in prior National Reports, in compliance with the Nuclear Activity Law, Act Nº 24804, the responsibility for decommissioning activities and for the manner in which nuclear facilities are decommissioned lies on the CNEA. In order to comply with this mandate and carry out the necessary activities, in 2000, the CNEA developed the *Nuclear Facilities Dismantling Subprogram* (SPDIN).

It is worth pointing out that the head of CNEA's *Nuclear Facilities Dismantling Subprogram* is an advisory member of IAEA's *Technical Expert Group on Decommissioning - TEGDE-* since its organization in the year 2003.

F.6.4 Planning of Dismantling and Decommissioning of significant nuclear facilities

As it has been stated in the afore mentioned report, even though there is no specific date on which any relevant nuclear facility in Argentina shall definitely end its operation activities, planning their dismantling and decommissioning is still in progress.

The following tasks are currently in progress:

- The program regarding Disposal Aspects of Low and Medium Level Decommissioning Waste has been completed for RA-1 experimental reactor and the preparation and layout of documentation of RA-3 and RA-6 reactors has been started.
- Planning and costing out CNE decommissioning is being developed.
- A preliminary plan for decommissioning in compliance with requirements set by the ARN for CNA II is being developed.

F.6.5 Development of dismantling technology

The “cold” testing scheme of the industrial equipment for vibratory mechanical decontamination has been finished within the frame of the cooperation project with the U.S.A. State Department.

Besides, the development of techniques to remove contaminated layers from existing concrete structures and metallic compounds is still in progress.

F.6.6 Financing

As stated in prior reports and as determined by Decree Nº 1390/98, regulatory of Act Nº 24804 regarding Nuclear Activity, the funds to meet decommissioning expenses of each nuclear power plant would be set up with contributions of the company that was to operate it if the nuclear power plant was privatised. If the operation of the nuclear power plants is not privatised, the responsibility to finance the decommissioning of Nuclear Power Plants, research reactors, and other significant nuclear facilities is assumed by the National Government with its own funds.

F.6.7 Human resources

There have been participations in events and work meetings sponsored by the International Atomic Energy Agency:

- Participation in the fourth *Technical Expert Group on Decommissioning* meeting – TEGDE- IAEA.
- Participant and panellist at the International Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities. 11-15 December 2006, Athens, Greece.
- Participant at the first meeting of the International Decommissioning Network organized by the IAEA.

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SECTION G SAFETY IN SPENT FUEL MANAGEMENT

G.1 General Safety Requirements

We wish to underline that in general the contents of Section G are valid for Section H homologous requirements, except in cases in which the latter are specific.

The general safety requirements associated with spent fuel management have not been modified with respect to the requirements described in the previous National Reports. A summarized presentation of these requirements may be found in Section H – Safety in Radioactive Waste Management, as they do not reflect substantial differences.

G.2 Existing Facilities

As described in previous Reports, spent fuel (SF) management consists in wet or dry storage, depending on each case. Wet storage is performed in pools or tubes for the period required for the decay of the fission products in order to allow its subsequent temporary dry storage.

At the present date, the existing SF storage facilities are the following:

SITE	FACILITY
Atucha I Nuclear Power Plant (CNA I)	Pool Building I and II
Embalse Nuclear Power Plant (CNE)	Storage Pool
	Storage Silos (ASECQ)
Ezeiza Radioactive Waste Management Area (AGE)	Central Storage for Spent Fuel from research reactors (DCMFEI)

G.2.1 CNA I Spent Fuel Storage Pools

These spent fuels are originated at the CNA I Nuclear Power Plant, type PHWR, with an installed capacity of 357 MW (e) that has started operating in 1974.

Every CNA I spent fuel is temporarily stored under water. The Power Plant has two fuel storage areas known as Pool Buildings:

- Pool Building I
  Constituted by two decay pools P1 and P2, plus a handling pool or work area.
  Designed Storage capacity: 3240 positions

- Pool Building II
  Constituted by four decay pools P4, P5, P6 and P7
  Designed Storage capacity: 6944 positions

Storage of spent fuel takes place in pools, which are lined in stainless steel that is several millimeters thick, in a double tier arrangement. Fuel elements hang from stainless steel *racks*.

In order to collect and orient possible leaks through the welded seams and to be able to locate their origin, small concrete channels are left below the steel lining. Prior to lining, the walls are coated with an appropriate kind of waterproof paint.

In case leaks should exist, they are checked at the inspection station located at the lowest level of the building. This leak detection system includes the floor and gate sealing frames.

Handling of spent fuels within the pools is performed using an overhead travelling crane with a telescopic mast fitted with the fuel handling tools. By maneuvering the crane and/or the telescopic mast it is possible to reach all points inside the pool.

As explained in the 1st National Report, in 1998 the Responsible Organization (NASA) has conducted a Safety Survey of the Power Plant due to a change introduced in the type of fuel and the resulting increase in the fuel burning rate. The Safety Survey included the spent fuel handling and storage systems and the management of waste generated during operation of the Power Plant. The results of the Safety Survey were presented in the First National Report. The ARN conducted an independent evaluation of spent fuel storage pools, in relation to criticality prevention, and requested a detailed study on this aspect to the NASA. In December 2004, the NASA responded to this request confirming that there are no criticality risks due to the introduced modifications.

With respect to the frequency at which the safety revisions are conducted, the ARN has adopted the *Periodic Safety Review* (PSR) methodology for Type I Facilities as well as the limitation of the period of validity for the Operation Licenses, as stated in Section E.2.2.2.

In order to optimize the wet storage of spent fuel, at the CNA I a *Spent Fuel Compact Storage* project has been started, with the following data:

- Project start – up date: March 2002
- Degree of progress: 85%
- Estimate conclusion date of the project: March 2008

Total capacity achieved in the pools:

Pool Building I: no compact storage has been performed
Pool Building II: compact storage has been performed
Modified capacity for compact storage: 8304 positions.

Total increase of positions for compact storage: 1360.

- Free positions on December 31, 2007
  Pool Building I: 30 positions
  Pool Building II: 1778 positions

- Estimate dates on which all positions of pool buildings I and II will be used up:

  Under the following conditions:

  - 0.72 ECG/fpd _full power day- (includes failure rate, heavy water degradation and lithium treatment operations)
  - 85% Load factor and
  - reserve for 250 positions for core drainage,

  the number of calendar years in operation until the Pools are saturated then results: (1808-250)/(365x0.72x0.85)=6.97 years (slightly more than 83 months).

Therefore, the available positions in the pools will be used up by March 2015, and at said date a new option for the storage of spent fuel must be available.

Criticality evaluation studies have been performed, and the results are described in the following reports:

- "Calculation of the Sub-criticality Levels at the Irradiated Fuel Storage pool in Atucha I". The performed study shows that in the pools of the CNA I there is no Criticality risk for Fuel Element LEU 0.85% and with additional conservative hypothesis of infinite fresh fuel elements of 37 bars.

- "Verification of the Criticality Calculations in Atucha I Pool performed with MCNP for a selection of experimental reference cases". The study concluded that the safety margins for the pools, calculated in an extremely conservative manner, exceed 200 mk for normal situations and 50 mk for accidental situations.

G.2.2 CNE Spent Fuel Storage Pools

These CANDU type spent fuels are originated in the CNE Nuclear Power Plant (CANDU 600) that started operations in 1984.

The storage of these spent fuels is performed in a concrete pool coated with epoxy resin . The original pool capacity represented 10 years of operation at 80% of the reactor power. This storage capacity was reduced to 45144 positions, corresponding to 8 years of operation, when the Dry Storage System worktable (ASECQ) was installed.

Failed fuel elements are encapsulated and stored under water in the failed fuel storage pool. Unloading and transfer of spent fuel is remotely controlled. Other fuel handling operations in the service building as well as in the storage pools are carried out manually under water using long

reach tools assisted by cranes and power hoists. Spent Fuel elements are stored under water in stainless steel trays.

As stated in the 2nd National Report in November 2003, the Level I Revision-1 of the Probabilistic Safety Analysis (PSA) for CNE was concluded.

The study conducted on other sources different from the reactor core contemplated the safety analysis of *Spent Fuel Elements Handling and Storage Systems*. The object of the analysis was to identify the system failure or combination of failures that could lead to a possible uncontrolled emission of radioactive products, with implications that may affect the staff and / or imply a discharge outside the Plant.

As result of the analysis, the following events have been identified in the *SF Transfer System at the Spare Part Machine*: spillage of heavy water due to diverse failures in the machine, without compromise for the spent fuel element cooling and failure in cooling due to jamming in air of two elements during their transfer to the spent fuel port, with the resulting damage of cladding and release of radioactive material, this last event is very improbable.

In the case of *SF Transfer and Storage System*, the events to be underlined resulting from the study were: jamming of two spent fuel elements during the transfer from the port to the discharge pool with damage of cladding due to lack of cooling and the resulting release of radioactive material and damage in the pool coating due to failure of the water cooling system or temperature variations due to replenishment in case of reduction of water level.

As has already been mentioned with reference to the frequency of Safety Revisions, the ARN has adopted the *Periodic Safety Reviews* (PSR) methodology for Class I Facilities as well as the limitation of the period of validity for the Operating Licenses. In the particular case of CNE, the implementation of the PSR and the above mentioned limitation were effective when the new Operation License issued by the ARN had been granted to the CNE by means of Resolution Nº 116/07 dated October 29, 2007.

G.2.3 Storage Silos for Spent Fuel (ASECQ), of the CNE.

The Dry Storage System (ASECQ) integrated to the CNE facilities, comprises a pool work table, SF handling tools, pool shield with its transport cart, cranes, transfer building (including the operation cell), the tractor vehicle for the transport to the silos field, the transport cart, spent fuel baskets, flasks and a set of silos for storage of spent fuels after six years of cooling in pools. The capacity of each silo is 540 spent fuel elements housed in 9 baskets, with 60 fuel elements per basket. This system is in operation since 1993. A total of 240 silos are planned to be built to store the spent fuel generated during the whole lifetime of the power plant. At present, out of 184 silos already built, 130 are full.

The Probabilistic Safety Assessment (PSA) conducted at the request of ARN and completed in November 2003 also includes the study of the Spent Fuel Dry Storage System (ASECQ).

In this case, there have been studied possible failures or combinations of failures of said system

that could lead to a potential uncontrolled emission of radioactive products, including the events that could affect the staff as well as the events implying a discharge outside the facility. For that purpose, there have been studied the maneuvers performed in pools, in the operation cell as well as the accidental falling of transfer flasks during transfer movements to the silo storage area. Two events were considered relevant: falling of a grid with 60 spent fuel elements with cladding cracking and the exposure of the pool operator when removing the shield while the operation cell gate is partially open.

Upon request of the ARN, the (ASECQ) system has been included in the *"Ageing Management Program for Power Plant Components and Systems Related to Nuclear Safety"*. As a consequence thereof, a surveillance plan for baskets, interior lining and concrete structure of all the ASECQ silos system was incorporated. In addition to this surveillance action, a periodic measurement of aerosol and noble gases content inside the silos is conducted.

The surveillance plan continues normally since it has been in force until the present date, no abnormality whatsoever has been observed in the analysis of the behavior of these components.

G.2.4 Centralized Storage of Spent Fuel from Research Reactors (DCMFEI)

The "Central Storage of Special Irradiated Fissionable Material" DCMFEI is located at the Ezeiza Radioactive Waste Management Area (AGE) and is the only facility existing in Argentina designed and built to store the SF from its research reactors. It comprises underground storage of 2.10 m long and 0.141 m diameter stainless steel tubes, with capacity to hold two spent fuel elements type MTR or one control element in each tube. The tubes are closed with lead filled steel plugs and a sealing device for safeguarding reasons.

April 2003 was the formal beginning of the *Storage Facility for Irradiated Fuel from Research Reactors (FACIRI)* project described hereinafter. The object of this project is to have a temporary storage facility for irradiated fuels to replace the present DCMFEI, this system will have important safety improvements.

This new storage system was conceived in order to have a better control of the SF conservation condition and adequate monitoring of the water quality.

The documentation corresponding to the Preliminary Safety Report for this facility was submitted to the ARN together with the Construction License application.

DESCRIPTION OF THE FACIRI PROJECT

The FACIRI has been conceived as a facility for temporary centralized wet storage of spent fuels definitively unloaded from the reactors RA-0, RA-1, RA-3 and RA-6. The spent fuels showing failures will be encapsulated before being stored.

Wet storage will offer complementary cooling of the discharged spent fuels.

Description of the facility

The FACIRI storage capacity, 552 SF distributed in 2 columns, is based on the depth of the pool (16 m) and in the design of the grids that are piled one upon the other, forming a column of grids.

The pools will have a double stainless steel lining that will hold the water where the fuels are stored. This double contention will substantially increase the confining capacity of the pools.

The facility will have a treatment system that will allow the maintenance of the quality of deionized water at adequate levels in order to preserve the integrity of the spent fuels during their storage.

One of the pools will have a monitoring station, which by means of an underwater camera will allow visual inspection of the stored spent fuels.

Safety objectives in the design of the facility

The design of the FACIRI will ensure that the spent fuels are received, handled, stored, inspected and removed in a safe manner, maintaining sub criticality, confining the radioactive material, offering protection against radiation and dissipating the heat generated by decay, complying, additionally, with the requirements concerning conventional safety and physical security.

Confinement

The confinement barriers are formed by aluminum cladding or encapsulation of SF, the pool water, the interior stainless steel lining, the exterior stainless steel lining and the concrete pool walls, to prevent the migration to ground waters in case the radionuclides should be dispersed in the pool water due to an eventual failure in stored SF's and to prevent the entrance into the pool of low quality water from the ground waters.

Dry storage of spent fuel from research reactors

As has already been mentioned, a subsequent stage to the wet storage (FACIRI Project) is the transfer of SFs from research reactors to a temporary dry storage system.

G.3 Siting of SF and Radioactive Waste Management Facilities

As mentioned in the previous National Reports, the safety requirements for a site to be used for spent fuel management have not been modified.

In the case of the FACIRI installation, the construction will be performed within deactivated facilities inside the Ezeiza Atomic Center and therefore, the evaluation of the site is identical to the one corresponding to the mentioned atomic center.

G.4 Design and Construction of the Facilities

As mentioned above, the design requirements for spent fuel management facilities have not been changed.

In the case of the research reactor spent fuel storage system (FACIRI) the design has complied with the ARN standards and IAEA guidelines for this type of facilities.

The *FACIRI Project* was presented to the IAEA and was accepted by said Organization as a technical cooperation project.

In this respect, it may be mentioned that the NASA has prepared a report (RN IT 07/2007) describing the acts performed to this date by the NASA and the CNEA in relation to the temporary dry storage alternative of spent fuels deposited in the pools of the Autcha I Power Plant. (See section B.2)

G.5 Safety Evaluation of Facilities

The requirements for the safety evaluation of spent fuel and radioactive waste management facilities have not been changed since the presentation of the previous National Reports, except with reference to those expressed in section E.2.2.2 of the present National Report.

G.6 Operation of the Facilities

As mentioned above, the safety requirements applied to the operation of spent fuel and radioactive waste management facilities have not been modified with respect to the previous National Reports.

G.7 Final Disposal of Spent Fuel

At present, the safety requirements stated in the 1st National Report continue in force, as long as spent fuels are stored in facilities specifically designed and operated for that purpose.

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SECTION H SAFETY IN RADIOACTIVE WASTE MANAGEMENT

H.1 General safety requirements

The following paragraphs summarize the scope of the general safety requirements in radioactive waste management generated in Argentina.

H.1.1 Criticality and removal of residual heat generated during radioactive waste management

Radioactive waste stored or disposed of in the Argentine Republic does not require any particular measures associated with heat removal or criticality factors on account of their radiological characteristics (half-life periods, radionuclides, energies and activity concentrations), they are classified as low and intermediate level.

H.1.2 Minimisation of radioactive waste generation

In Argentina, minimisation of radioactive waste must comply with two conditions:

- Reduce radiation doses
- Reduce costs

For that purpose, the minimisation of generated waste volumes is taken into account and in consequence the contents of activity and volume from the different streams. Also, as part of the minimisation strategy for waste to be managed, the recycling and reuse of contaminated or active materials is envisaged. One example is the reutilization of stored radioactive sources, provided their use is justified according to regulatory criteria applied in the country.

H.1.3 Interdependence between different radioactive waste management stages

Operational procedures associated with the treatment and conditioning stages take into account the interdependence between the different management stages (e.g. transport, temporary and long term storage and, in some cases, final disposal).

In the planning of the management stages of different types of radioactive wastes, various acceptation requirements based on their interdependence have been set forth for each one of said stages.

H.1.4 Efficient protection to individuals, the society and the environment

The standard AR 10.12.1 – “Radioactive Waste Management” determines general requirements in order that the management activities are performed with an appropriate level of radiological protection for individuals and for the preservation of the environment for current and future generations. The criteria to achieve this objective are:

Dose and risk restrictions: The main objective is to ensure that individual risks are below the appropriate levels (Standard AR 10.1.1) and that the radiological impact remains as low as reasonable achievable (ALARA).

Optimization of protection systems: Radiological protection systems used for radioactive waste management must be optimized taking into consideration the reduction of the effective dose, the cost of different options, uncertainties associated with long periods and dose restrictions as limiting condition (Standard AR 10.12.1, criterion 20).

Responsibilities: Disposable radioactive waste generators (operators of nuclear facilities and users of radioactive material) are responsible for the management of the waste generated by them with an appropriate level of protection for workers and for the public (Standard AR 10.12.1, criterion 24).

Liquid and gaseous waste: In order to comply with the discharge limits established by the regulations in force, liquid and gaseous radioactive wastes must be treated by decay or retention, if necessary (Standards AR 3.1.2 and AR 6.1.2).

Solid wastes: The final disposal of solid radioactive wastes is to be performed using, when appropriate, a multiple barrier system (Standard AR 10.12.1, criterion 19). The closure of a final disposal facility for radioactive wastes or any system related to said facility must have ARN's prior authorization (Standard AR 10.12.1, criterion 36). The responsibility of the operator of the facility extends until the final stages of closure, post-closure and institutional control during the period determined by the ARN (Standard AR 10.12.1, criterion 37). When the Responsible Organization applies for the construction and operation licenses, it must provide evidence that the necessary steps have been taken in order that the system complies with the safety requirements in all its stages, including closure and subsequent stages (Standard AR 10.12.1, criterion 30 and 31).

Safety evaluation of the disposal systems: Safety evaluation of the final disposal systems must cover the design, construction and operation and closure stages, as well as the condition after closure and their future evolution. Safety evaluation may be presented in terms of doses for normal scenarios, in terms of risk for probabilistic events or by another safety indicator considered appropriate for the required confinement period at ARN's satisfaction (Standard AR 10.12.1, criteria 30 to 33).

Information to be supplied to the Nuclear Regulatory Authority: The responsible organization for the facility that generates the wastes or for the waste management facility shall keep an updated inventory of the wastes during the operation stage and forward regular reports on those inventories to the ARN. Files with the inventories must be submitted to the ARN at the end of their activities. (Standard AR 10.12.1, criteria 27 and 35).

H.1.5 Biological, chemical and other risks associated with radioactive waste management

In agreement with the General Environmental Act Nº 25675 of the Argentine Republic the provinces determine the specific requirements to be satisfied by all industries located in their territory.

Each management facility must comply with general and specific requirements determined by the competent application authority in environmental matters, with jurisdiction over the site of the facility.

For example, the Province of Córdoba has Act Nº 7343 on *Guiding Principles for Preservation, Defence and Improvement of the Environment* which has jurisdiction over the CNE located in this province.

H.1.6 Avoid actions with greater impact on future generations than permitted for the present generation

Article 1 of Act Nº 25018 contemplates the rights to safety of future generations (see L.1.3.2.).

The standard ARN 10.12.1, in its criterion 32, determines that the estimate doses to be received by future generation in connection with the final disposal facilities shall not exceed the dose restrictions determined at the beginning of the isolation period.

On the other hand, with the objet to foresee that the present technologies in use for radioactive waste management do not imply a potential risk for future generations, diverse studies and evaluations are carried out during the pre-operational, operational and post-operational stages of the facilities which shall continue during the institutional control stage.

H.1.7 Avoid imposing undue burdens on future generations

The internationally accepted ethical principle whereby the beneficiaries of the application of a practice should bear the total cost of the management and final disposal of generated wastes, has been contemplated in Act Nº 25018. In its article 13 this Act provides the legal foundations for the existence of a fund for the management and final disposal of radioactive waste based on the contribution of the generators, taking into account as well the deferred costs of spent fuel and radioactive waste management. In this sense, Art. 11 of the same Act considers the recovery of sites affected by industrial mining activities of Uranium minerals.

The creation of the radioactive waste management *Strategic Plan* determined by Act Nº 25018, contemplates the legal, technical and financial requirements to avoid imposing undue burdens on future generations.

Although the provision in the legal framework provides for the creation of the funds already mentioned, at the date of preparing this National Report, such funds where not actually constituted.

H.2 Existing facilities and previous practices

H.2.1 Introduction

The first two National Reports provided details on some of the actions taken into consideration for the safety evaluation of the radioactive waste management facilities that are located in the following sites:

- Ezeiza Radioactive Waste Management Area (Ezeiza Atomic Center)
- Waste Decay and Treatment Facility corresponding to the Radioisotopes Production Plant (Ezeiza Atomic Center)
- Atucha I Nuclear Power Plant
- Embalse Nuclear Power Plant
- Mining Wastes

Hereinafter follows a description of the present condition of said evaluations, some of which have been completed and others are still in progress.

H.2.2 Facilities of Atucha I Nuclear Power Plant

As stated in the previous reports, the execution frequency of the safety revisions for Type I facilities responds to the *Periodic Safety Review - PSR* methodology. Likewise, the ARN has determined the limitation of the validity period of the operation licenses as stated in Section E.2.2.2 of this National Report. The application of these measures is effective for CNA I since December 2003.

Within this framework and as part of the Probabilistic Safety Analysis for Atucha I Nuclear Power Plant (APS IT 911), performed by means of the construction of a Master Logical Diagram (MLD) in July 2000, it has been concluded that the dose associated to the events related to the safety of the radioactive waste management systems, is two order of magnitude below the dose constraint value determined as reference value. Said report also includes the Handling and Storage System for Spent Fuels.

H.2.3 Facilities of Embalse Nuclear Power Plant

In coincidence with the above, upon request of the ARN a probabilistic safety analysis of the radioactive waste management of the CNE (APS-IT.F001/ 002/003/004/005 and 006 Rev. 0) has been carried out, with the object to identify, by means of the construction of a Master Logical Diagram (MLD), the failures or combinations of failures of said systems that might lead to an uncontrolled potential emission of radioactive products, including events affecting the staff and/ or that may imply a discharge outside the plant.

The following systems were considered:

- *Liquid Radioactive Wastes Management System*
- *Solid Wastes Management System*

- *Gaseous Wastes Management System*

In the study made on the *Radioactive Liquid Waste Management System* and in the framework of the events stated in this study, the following may be mentioned:

- Spillage in the radioactive liquid waste service building from failures in the collection, storage and discharge system. These are events which have consequences for the operator, with low occurrence probability, as a combination of detection failures and omission errors by the staff, must take place.
- Uncontrolled emissions of liquid wastes due to errors in measurements or during the discharge operations of tanks.
- Spillage in the concentrator enclosure due to pipe and control failures. These failures are not expected to have significant radiological consequences.
- Liquid waste emissions from the concentrator either by drops dragged by the gaseous emission or from treatment of liquids with higher than acceptable radioactive content. The probability of occurrence and the study of the consequences from these failures showed their scant relevance.

The study has considered the occurrence of the events during the normal operation of the plant and in case of operation with a damaged fuel element.

The events considered for the study of *Solid Waste Management* that might lead to exposure accidents and / or staff contamination cases, were:

- Undue exposure of operators during handling of filtering elements while the elements were introduced into the storage pit, caused by human errors.
- Resin spillage due to failure of a transfer line.

According to the results of the performed analysis we may conclude that the failures during processing, storage or management of solid wastes generated in the plant would not imply any risk to the public.

One of the outstanding events in the study conducted on *Gaseous Waste Management* to be mentioned is:

- Tritium emission due to dryer failure. A leak of heavy water in the moderator enclosure would lead to a tritium content increase in the recovered water in the dryers belonging to the heavy water recuperation system.

The operative experience concerning the radioactive content in gaseous effluents shows that even under abnormal situations such as failure in fuel elements, the Daily Discharge Limit has not been exceeded.

As stated above, the ARN has adopted the *Periodic Safety Review (PSR)* methodology for Type I facilities as well as the limitation of the period of validity of the operation licenses, as mentioned

in Section E.2.2.2 of this National Report. For the particular case of CNE, the implementation of the PSR and the above mentioned limitation is effective as from the date of issue of new operation license by the ARN, awarded by Resolution 116/07 dated October 29, 2007.

H.2.4 Ezeiza Radioactive Waste Management Area (AGE)

The Ezeiza Management Area (Area de Gestión Ezeiza – AGE) is the facility exclusively destined to the treatment, conditioning and final disposal of low level solid and liquid radioactive wastes. In the year 2006 the CNEA has decided the permanent suspension of the operation of the final disposal systems as these systems had already concluded their operative stage, independently from the results of the safety evaluation (see Section K.3.1). At the AGE, the temporary storage of all low and medium level conditioned wastes is performed, awaiting the construction of an appropriate repository as foreseen in GRR Strategic Plan. The same facility is also used to store disused sealed sources, as well as the SF from the RA3 Research and Production Reactor. The AGE is located in the Province of Buenos Aires within the Ezeiza Atomic Center in an area covering 8 hectares.

Safety Re-evaluation of the Ezeiza Radioactive Waste Management Area (AGE)

The changes that took place in the last years in factors affecting the operational capacity of the Ezeiza Radioactive Management Area, were reported to the Joint Convention in the 1st and 2nd National Reports. Among these changes we may mention that rainfall has increased in the area of influence, resulting in higher hydric load with the consequent elevation of the water table in the area, added to higher positive pressure exerted by the underground aquifer. Apart from these climate changes, the behaviour of the soil and groundwater, changes in the social and economic aspects have to be taken into consideration, resulting from higher demographic growth rates and the appearance of new developments in lands close to the Atomic Centre where the AGE is located.

Taking these factors into consideration, the CNEA, as Responsible Organization, having already decided to suspend the final disposal system operation for solids in 1999, in the year 2001 decided to do the same with the Final Disposal systems for liquids and structural wastes, with the object to start with the safety re-evaluation of the AGE.

For more details, in Section K.3.2 see the Safety re-evaluation topic of the Ezeiza Radioactive Waste Management Area (AGE).

In March 2006, based on the elapsed operation time and taking into account prior considerations, it was decided to end the operations of the Final Disposal Systems for solid, liquid and structural wastes. At the end of 2007**,** when the results of the safety re-evaluation of the *Final Disposal for Solid Waste Systems* were forwarded to the ARN, the decision of the Managing Organization was anticipated presenting the request for the Closing License for all Final Disposal systems, once the re-evaluation of the safety of the Ezeiza Management Area was completed.

Special effort has been made to increase the physical safety and early intrusion detection measures, as the interior facilities of the AGE (among others, the storage of SF from research reactors and disused sealed sources) located in the 8 Ha area.

Here the situation as of December 31, 2007 of the AGE facilities is described, in relation to the 2nd National Report.

AGE Facilities for treatment, conditioning and storage

- **Treatment of Low Radioactive Level Waste Plant**

As from July 2001, a project is being carried out using the original plant building facilities, which will allow for the use of the necessary infrastructure for the treatment and conditioning of liquid and solid low and medium level radioactive wastes (PTAMB project).

The PTAMB will allow for the treatment and conditioning of the all solid and liquid low and medium level wastes, generated by the country in productive activities, medical applications and research and development, verifying the compliance of the acceptance criteria specified for each facility and the quality of the conditioned product.

The waste originated in the nuclear power plants will continue being treated and conditioned at their facilities.

The main processes to be performed at the PTAMB will be:

- Compacting
- Cementation
- Volume reduction (filters, compactable containers, etc.)
- Sludge Process
- Resin Process
- Transfer of Liquid Waste from the transport containers to the Cementation premises tanks.
- Activated Coal Waste Process
- Organic Liquid Waste Process
- Adjustment process of liquid wastes
- Cemented Waste Test Tube Preparation
- Solids cuts
- Liquid reduction (evaporator)
- Characterization and adjustment tasks
- Washing of the facilities to pass from processing medium level wastes to low level wastes.

The infrastructure of the plant includes cells with the necessary equipment to perform the main waste treatment and conditioning processes, including process cells for the storage of liquid wastes, for the cementing of solids, crushing, volume reduction and for the cementing of liquids.

It also has a volume reduction press by means compaction of low density solid matrices, a processed drum decontamination cabin and facilities, a solid cut cabin and an evaporator cell.

❖ **Deposit for Temporary Storage of Radioactive Sources and Wastes**

The operation conditions of this deposit have not changed with relation to the description given in the previous National Reports. In order to improve the operational doses and optimise storage areas, the stowage of items yards are divided in sectors. The stored inventories of Radioactive Wastes and disused sources have also been increased.

The achieved improvements with respect to control systems of the access to the AGE in general may be underlined, as well as the physical storage safety of sources in particular.

❖ **Handling Yard and Stowage of Items**

In the previous National Reports this reinforced concrete platform has been described, designed for the reception, control and management of temporary stored radioactive wastes waiting to be characterised, treated and conditioned.

From this area, the transfers to the Deposit for Temporary Storage of Radioactive Sources and Wastes are performed.

As mentioned before, improvements were introduced in the low level liquid radioactive wastes systems of transfer and reception from the Radioisotope Production Plant, modifying the transfer system by a system that uses the vacuum suction method.

AGE final disposal facilities

❖ **Semi-containment System for Solid Radioactive Waste**

In the previous National Reports it has been informed that the Semi-containment System is constituted by two trenches, according to the following details:

Trench Nº 1 completed its useful life in 1988 when the closure cover was completed. **Trench Nº 2** started operating in 1988 and its closure had been foreseen for the year 2005, but its operation was suspended in 1999.

Since the year 2000 as a result of a claim widely echoed by the media, court proceedings have been filed to investigate a presumed contamination of underground drinking water sources produced by the AGE facilities. The permanent controls and monitoring carried out by the ARN show that such contamination does not exist (See *Ezeiza drinking water measurement* – Section E.3.3, page E-18).

The Strategic Plan foresees the construction of a new repository for low level wastes that will be located in the same area were the medium level waste repository will be built. Works relative to the first stage to search and select the site and areas to locate these repositories are under way.

❖ **Semi-containment System for very low level Radioactive Liquid Waste**

The system comprises three trenches with sand enhanced calcareous lime bed that allow the radionuclide concentration decay to non-significant levels before they reach an environment accessible to the public.

The liquid Radioactive Wastes generated at the Ezeiza Atomic Center production plants were piped to the AGE where they were unloaded into the trenches.

Trenches started operation in 1971; two of them completed their useful life in 1986. As has been described in the previous reports, the issue of the Operation License in 1995 determined to consider all liquid wastes stored until said date as historical.

On account of the factors that have affected the area in the last years, in June 2001 the decision was taken to suspend the operation of the third trench.

❖ **System for the Disposal of Structural Solid Radioactive Wastes and Disused Sealed Sources.**

In the previous reports the existence of two underground silos were mentioned, where structural parts from contaminated areas were disposed of and some types of disused sealed sources.

The existence of two additional silos has also been reported, one of them for structural and biological wastes and the other dedicated to wastes with transuranium elements. These two silos are not considered in the AGE operation license because they were out of operation before the license was issued.

At the present date, the situation of these disposal systems has not been modified with relation to the descriptions in the previous National Reports.

H.2.5 Facilities at the Ezeiza Atomic Center

Decay, Pre-Treatment and Discharge Plant for Active Liquids from the Radioisotope Production Plant

This facility has been conceived to provide easier decay of the liquid Radioactive Liquid Wastes generated in the Radioisotope Production Plant and the Reactor RA-3[1] containing short periods and low activity radionuclides. This type of liquid Radioactive Wastes may be discharged to the environment if its level of activity does not exceed the discharge restrictions authorised by the Nuclear Regulatory Authority (ARN). Until June 2001, the liquid Radioactive Wastes that cannot be discharged were directed for disposal to the AGE Semi Containment System for Liquid Radioactive Wastes. Since then changes have been implemented in the processes of the Radioisotope Production Plant and in the radioactive waste management of the plants, so that the

[1] At present this facility does not transfer its liquid effluents to this installation.

residence time in the storage decay tanks is sufficient for their subsequent discharge into the environment.

H.2.6 Mining Wastes and Processing of Uranium Minerals

Once the industrial treatment stage of uranium mineral for the production of the commercial concentrate (yellow cake) is completed, the left over mineral wastes are called “processing tailings” or more usually “mineral tailings”. They consist of divided ores, from which the uranium they contained was extracted. They constitute the “mining wastes”, the mineral of very low grade, not economically apt for exploitation (marginal mineral) and the sterile materials originated when the mining fields are uncovered.

Argentina is committed on environmental restoration of the sites where uranium mining activities have taken place and the National Commission of Atomic Energy has implemented the *Uranium Mining Environmental Restitution Project* (PRAMU), widely described in the 1st and 2nd National Reports.

Its purpose is that in all sites in which uranium mining activities were carried out the environment may be the object of the best possible restitution in terms of economic and technical feasibility. In the first place, studies are conducted to identify the problem of each site, determining the potential and actual impacts, the possible contamination routes, the elements present, etc. On the basis of internationally accepted techniques, the possible specific solutions to manage the tailings and the restoration of each site are developed.

As mentioned in the previous National Reports, the sites under study are:

- MALARGÜE (Prov. of Mendoza)
- HUEMUL (Prov. of Mendoza)
- CÓRDOBA (Prov. of Córdoba)
- LOS GIGANTES (Prov. of Córdoba)
- PICHIÑÁN (Prov. of Chubut)
- TONCO (Prov. of Salta)
- LA ESTELA (Prov. of San Luis)
- LOS COLORADOS (Prov. of La Rioja)

These sites are the result of the uranium mining activity that took place as from the years 1951/52 to the present date.

The CNEA and the ARN conduct periodic environmental surveys in the areas around the industrial mining complexes that process uranium mineral.

The following is a brief summary of the present situation in the different listed sites:

MALARGÜE: The former Malargüe Industrial Complex was in operation between 1954 and 1986. 700,000 tons of uranium treatment tailings are deposited at the site that must be managed within the location. Management in this case includes the relocation, neutralisation and

encapsulation of mineral tailings with a multilayer cover using materials found in the area. The whole system is complemented with an underground draining system to prevent contact of the water table with the inferior engineering barrier.

The restoration activity implies the performance of the following tasks:

- Construction of complementary works such as: dismantling and demolition of the existing facilities; construction of surface drainage to collect and contain surface runoff water from part of the City of Malargüe; construction of an underground drainage to depress the phreatic water levels and maintain the wastes separated from the underground waters in the long term; concrete construction of offsets of the area irrigation system that contributed to maintain the phreatic level; decontamination of the contaminated area floors, prior to the encapsulation; construction of an inspection camp and control laboratories of the works, including a new access road.

- Conditioning of the floor of the new site, including ground levelling and compacting, placement of a compacted alluvial material layer; placement of compacted soil layer and a low permeability compacted clay layer with capacity to fix radionuclides and other ions.

- Construction of the encapsulate cut off wall around the whole perimeter excavating a 1 meter deep and 12 meter wide trench filled with rock to prevent any failure of the clay layer due to seismic action and facilitate compaction of the internal layers of the management floor.

- Tailing Management: mineral tailings, contaminated soils and demolition materials are placed on top of the compacted clay layer, neutralised with lime and compacted to an adequate proctor density.

- Coverage of tailings with a compacted clay layer, a compacted soil layer and as a final cover, a layer of rock which will be filled with limed soil which will constitute the basis before placing autochthonous pastures. The cover will limit radon gas emissions and gamma radiation exposure to allowed values and prevent the entrance of rainwater to the containment system, acting as barrier against weathering.

- Area decontamination and rehabilitation by excavating the sectors affected by the industrial activity and backfilling with non contaminated vegetal soil to obtain exposure values below the established limits. Removed contaminated soils will be managed together with the mineral tailings.

- Reforestation and landscaping of the site and determination of restrictions to assure the preservation of the implemented protection barriers.

- Verification period of 20 years, maintaining the surveillance and monitoring the behaviour of the adopted solution in order to detect any modification that cannot be accepted by the system. At the end of this period, a regular control plan without permanent surveillance will be implemented.

The works performed until this date include preliminary and base uranium mineral tailings management works, the management of the contaminated floor material of the area of the first pilot plant of the site, the management of the contaminated material resulting from the dismantling of the facilities and the demolished and cut up masonry.

As alluvial defence material free from contamination has been used, surface and underground drainages were built, 610 meters of irrigation offsets were rectified and cast in concrete, new irrigation offsets were cast in concrete and the Sector 1 encapsulation floor was conditioned.

An agreement with the Argentine Army allows the extraction of the adequate materials from its lands, to contribute towards the encapsulation. An access bridge to the rock quarry was built as well, a car-port deposit was built on the camp; the underground drainage piping was cleaned up and the trees following the alignment were removed; a cattle grid was built on the access road to the control area.

With reference to performed complementary works the following may be mentioned: decontamination of Sector 1 encapsulation floor; construction of the site inspection camp and control laboratories of the works and its new access road; construction of the encapsulation cut off wall in the first encapsulate sector and the commencement of the management of contaminated materials.

By means of the execution of partial works the cleaning tasks of the contaminated soils within the site have been completed (except the area where the tailings are located) and the construction of the cut off wall along the length of the whole encapsulation perimeter. The conditioning works of the encapsulation floor were performed with different degrees of progress in sections 1, 3 and 4. In section 1 the final disposal of the contaminated soil has begun (neutralised with lime), as well as of the demolition materials.

The estimate progress of the execution of the project is 30%, while the environmental monitoring tasks are performed constantly.

HUEMUL: The mine has been in operation until 1974. In 1976, after an inspection by the Mining Police, the Mining Authority admitted that the mine was abandoned, and this act meant the termination of the operator exploitation rights and liabilities. Nevertheless, the CNEA has the responsibility of managing the radioactive wastes according to the terms of the National Act for Radioactive Waste Management (Act Nº 25018).

As mining wastes, loads of gathered sterile material and low-assay value ore were accumulated. Mine entrances and accesses were temporarily closed. The buildings and infrastructure facilities, were eventually transferred to the Province of Mendoza. The product resulting from the mining activity, are 19,500 m^3 of exploitation sterile materials and 2,500 m^3 of marginal materials.

In the year 2001, the CNEA installed warning signs and built a 335 m long perimeter safety fence isolating a sector with probability of collapses.

CÓRDOBA: At the site were at the beginning, uranium concentration and development of associated processes took place, at present an UO_2 production plant and a CNEA group for geology and support of other activities are in operation. As result of these activities, the site was left with 57,600 tons of treatment tailings that must be managed. If the tailings are moved and the site is restored, it will be converted into a green area. In the meantime, the monthly phreatic monitoring and the sampling for analysis of the existing pit grid continue and qualitative and quantitative monitoring of the results is being conducted.

LOS GIGANTES: Los Gigantes Mining and Industrial Complex has been in operation in the eighties and ended in 1989. The exploitation and production of the Complex were performed by a third party through a concession agreement. The materials deposited on the site as exploitation products, are: 2,400,000 tons of tailings, 1,000,000 tons of sterile materials and 600,000 tons of marginal ore. Although there are no nearby towns, the presence of the mentioned materials requires special treatment.

The works carried out are mainly related to treatment of liquid effluents left from the industrial activity. For this purpose, the Cordoba Environmental Department authorised the construction of a 20,000 m^3 auxiliary dam; its construction started by the end of 2003 and ended in 2004.

TONCO: Between the years 1964 and 1981, the CNEA operated the Tonco Mining and Industrial Complex supplied from nearby Don Otto, Los Berthos and M.M. de Güemes ore deposits, with an inventory of treatment tailings once the activity stopped of 500,000 tons. For its restitution, the site requires actions envisaged in third place after Malargüe and Los Gigantes - Córdoba, taking into consideration not only the time, but also the magnitude of the work. The weather conditions, the geographic characteristics and the low population level make the restitution of the site easier.

The following tasks are performed systematically: environmental maintenance, mining work fencing, inspection, signposting, surface water and sediment monitoring.

PICHIÑAN: A uranium concentration plant operated in this site with ore being supplied by Los Adobes and Cerro Condor mines, close to the site. The plant was in operation between 1977 and 1981 and upon its closure, a temporary management of the 145,000 tons of treatment tailings was made.

At present, the site is under administrative surveillance and environmental monitoring operations including sampling along the Chubut River.

LA ESTELA: The former La Estrella Mining and Industrial Complex ended its activities in the year 1990 and the mine as well as the tailings received temporary treatment. At the site are 70,000 tons of tailings and 1,140,000 tons of steriles. Rationalisation and safety works were

conducted in the mine by covering materials and changing slopes and banks, while the tailings were covered and fenced in and the industrial facilities dismantled.

LOS COLORADOS: The former Los Colorados Mining and Industrial Complex was in operation between 1993 and 1997. When the operation ended, a total of 135,000 tons of tailings and 1,000,000 of steriles were left; temporary works for environmental repair were made with results acceptable to the ARN. The latter included: covering of the loads gangplank with silt argillaceous soil; dismantling and decontamination of all facilities and topographic levelling with gentle slopes to prevent erosion.

Financing of the Uranium Mining Environmental Restitution Project

The CNEA, as responsible institution for the exploitations and operation of the deposits and for the plants involved in the Uranium industrial production, has tackled the environmental restitution project of the sites destined to that end with resources from the National Treasure within the framework of the execution provisions for public works. Nevertheless, the budgetary situation prevented the implementation at a rhythm of work in accordance with the proposed objectives.

In the search for appropriate financial support, the CNEA requested the assistance of the World Bank (WB) to finance the project and in this manner ensure the support of a plan that mainly requires continuity, needing stronger institutional capacity for the CNEA, in order to be able to lead the project. Once the works are concluded, this will allow not only the performance of the required monitoring, but also the development of engineering solutions at the facilities where they are still required.

The negotiation with the WB was initiated in 1997, with an extended interruption period due to the economic crisis of the last years. At present, all technical and documentary aspects requested by the Bank have been complied, and the CNEA is expecting that in the month of July 2008 the project will be dealt with by the Board of Directors of the Bank.

While this takes place, the works are being executed at the rhythm permitted by the resources of the National Treasury financing.

The San Rafael Mining Industrial Complex deserves separate consideration. As a consequence of its current situation, at present it does not integrate a PRAMU restitution site. Nevertheless the PRAMU Engineering Group executed the management project for the liabilities generated until the present date, and the new wastes produced by the stated reactivation.

SAN RAFAEL: The San Rafael Mining and Industrial Complex (CMFSR – Complejo Minero Fabril San Rafael) is in a stand-by situation, out of operation since 1995. The CNEA, as operator, in June 2004 has filed an Environmental Impact Evaluation document (EIA – Evaluación de Impacto Ambiental) required by the Province Legislation and is awaiting a decision in order to restart its productive activity.

After the above presentation, the Provincial Environmental Department has requested the separation of the EIA, in order to analyze in first instance the correction work of the water in the quarries and the solid wastes, leaving the evaluation of the possibility to restart the production for a second instance.

The documents have been duly filed, and now the end of the pertinent evaluations is expected, in order that the Province may authorize the requested correction works.

The studies contemplate the management of wastes, according to the following methodology:

Solid Wastes

- *Mineral Tailings*: dry management is foreseen together with residual acidity lime neutralisation followed by compaction to minimise permeability and create, in the long run, stability in the containment system. A multilayer cover will be built on the tailings that, in addition to prevent rainwater seepage, will act as a radon emission and gamma radiation barrier.
- *Precipitation Sludge*: the precipitation sludge resulting from the above operation will be corrected by the maintenance and dam reconstruction works which are being performed; the sludge generated in the future will be accumulated together with liquid effluents on waterproofed surfaces. When the operation is completed and the liquids have been evaporated, the precipitate will be stabilised with rocks and finally completed with the placement of a multilayer cover with the same purpose as described for mining tailings.
- *Marginal Ores*: existing marginal ores plus those generated during mining operations will be managed during the operational stage, placing them in the final management areas, in this manner preventing temporary intermediate accumulations.

Liquid Effluents

- *Liquid Effluents generated by the process:* the liquid effluents generated by the process will be lime neutralised, the ammonium will be removed and then be returned to the process.
- *Quarry Water*: the quarry water generated due to inactivity will be processed as soon as said management is authorized, treated with anionic resins to remove U and precipitation to remove Ra and As. Then it will be managed by filtration in a dumping field inside the site. The quarry water to be generated during future production will be used as process water.

Management of effluents

In relation to the existing treatment effluents accumulated in the site, the use of optimized processes is foreseen, to reduce contaminant emission to the lowest feasible level and perform management actions of the generated wastes as reactivation works progress, reducing at the same time the global production costs.

- *Quarry Water*: the existing quarry water: 1,000,000 m^3 will be treated using the above described methodology.
- *Mineral Tailings*: the change of the present soil slopes is foreseen to improve long term structural stability, placing a multilayer cover to prevent the filtration of rain water into the system and in this manner, reduce radon emissions (1,895,000 tons of treatment tailings).
- *Marginal Ores*: their use is foreseen for the stabilisation of existing precipitation dams (411,000 tons of marginal ore).
- *Precipitation Sludge:* Their stabilisation is foreseen using passive marginal ores. Later they will be covered with waterproof membranes on which new precipitate accumulation dams will be built. Other precipitate accumulation sectors will be used, after stabilisation and conditioning, for the accumulation of mineral tailings (265,000 m^3 of precipitation sludge).

Works already completed

Some of the completed tasks at this date within the framework of the above mentioned management are:

- Definition of quarry water treatment.
- Preliminary *Project for liquid and solid effluents management for the San Rafael Industrial Complex*.
- Project for a spillage field to allow evaporation and infiltration of treated liquids.
- Study on the tailing dam area.
- Conduction of geotechnical surveys of the projected area for the construction of the leaching pool.
- EIA presentation required by the province to treat quarry water and solid wastes.
- Restoration of dams 8 and 9, authorized as maintenance works, in prevention of unforeseen climatic events.
- Filing of the authorization request for the restoration the complete evaporation dam area, contributing to the treatment of the quarry water, once authorized.

H.3 Site of the Projected Facilities

The considerations corresponding to this point are the same that have been described in Section G.3.

H.4 Design and construction of the facilities

The considerations corresponding to this point are the same that have been described in Section G.4.

Facilities at Atucha II Power Nuclear Plant

As stated in the Second National Report, in 2004 the National Government announced the consolidation of the validity of the nuclear-electric option for our country. Among these works is the completion and start up of Atucha II Nuclear Power Plant.

Detailed information on the design and construction characteristics of said Nuclear Power Plant, including the management systems for spent fuel and radioactive wastes, has been presented to the Nuclear Safety Convention in April 2008.

H.5 Evaluation of the safety of the facilities

The considerations corresponding to this point are the same that have been described in Section G.5.

H.6 Operation of the Facilities

The considerations corresponding to this point are the same that have been described in Section G.6.

H.7 Institutional measures after closure

The institutional measures to be applied after the foreseen closure of the low level radioactive waste disposal systems have been described in the previous National Reports.

The Standard AR 10.12.1 Radioactive Wastes Management describes the safety criteria to be complied with by the facilities in all phases of disposal, including after their closure.

Although all operations of the final disposal facilities of the AGE have been concluded, as stated in the *Report on Radiological Safety Evaluation of the Semi-containment Systems for Solid Wastes (Systems T1 and T2)*, presented to the ARN in November 2007 (see section K 3.2. *Re-evaluation of the Ezeiza Radioactive Waste Management-AGE*) at present there are no Radioactive Waste management facilities under Institutional Control.

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SECTION I TRANSBOUNDARY MOVEMENTS

In Argentina the Standard AR 10.16.1 *Transport of Radioactive Materials* agrees with the *IAEA (TS –R-1) Regulation for the Safe Transport of Radioactive Materials*. This standard determines the regulations with reference to the transboundary movements of radioactive wastes and spent fuel.

There are also national and international standards in force that regulate the transport of dangerous materials by land, air and water.

The transport by road and railway is governed by the following legal instruments:

- *National Transport and Transit Regulation*, enacted by Decree Nº 692/92
- *Transit Law*, Nº 24449, regulated by Decree Nº 779/95
- Resolution Nº 195/97, on *Technical Standards for the Transport of Dangerous Goods by Road*
- Other regulations determined by the National Transport Secretariat

For maritime, river and air transport, the Argentine Republic has adopted the regulations of the *International Maritime Organization* (*IMO),* of the *International Civil Aviation Organization (ICAO)* and of the *International Air Transport Association (IATA),* incorporating the *Regulation for the Safe Transport of Radioactive Materials* of the IAEA, edition 1996 (revised).

The agreements signed by Argentina and ratified by law on transboundary movements are the following:

- The Chicago Agreement on Transport of Dangerous Goods by Air, in the framework of the International Civil Aviation Organization (ICAO).
- SOLAS Agreement, MARPOL, International Maritime Code, International Code for the Safety in the Transport of Irradiated Nuclear Fuel, Plutonium and High Activity Wastes in Packages on Board of Vessels (INF Code), under the International Maritime Organization (IMO).
- Convention on the Physical Protection of Nuclear Materials, in the framework of the International Atomic Energy Agency (IAEA).
- Agreement between the Argentine Republic and the Federative Republic of Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the International Atomic Energy Agency for the application of Safeguards (Four Parties Agreement).

As previously mentioned (see Section B.1) the only transboundary movements that have taken place were associated with exports of SF containing HEU to the United States of America in the framework of the A*cceptance Program of Spent Nuclear Fuels from Foreign Research Reactors.*

As at the moment the Argentine Republic does not contemplate the reprocessing of spent fuel, no transboundary movements are expected in connection with said process.

For the case of the transport of radioactive sealed sources, see further details in Section J.

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SECTION J DISUSED SEALED SOURCES

J.1 Introduction

Although the activities involving radioactive materials and sources start at the beginning of the fifties, it was Decree Nº 842/58 that has approved the *Regulation for the Use of Radioisotopes and Ionising Radiations* and made it effective to govern the use and application of radioactive substances and the radiations providing from them or from nuclear reactions and transmutations. At present, this decree has been replaced by the legal and regulatory framework described in Section E.2.

The Standard AR 10.1.1, "Basic Radiological Safety Standard" determines the basic radiological safety requirements for nuclear activities performed in the country, including the sealed sources, both in use or in disuse. This standard classifies the facilities in three levels, according to the radiological hazards associated to the practices with radioactive material and assigns different degrees of control.

The Regulation determines that the holder of a licence or authorization is responsible for the compliance with the standards, requirements, licenses, authorizations and permits issued by the ARN. On one side, the ARN performs regulatory inspections and audits to verify that the holders of the licenses comply with their respective responsibilities, with the purpose of detecting non compliances with the standard and situations that might derive in radiological accidents.

On the other side, the procedure to grant licenses for the management of radioactive sources in any of the utilization cycles, allows the ARN to control that the persons using radiation sources have the necessary qualifications and work in accordance with the responsibilities related to radiological safety or physical security of the radioactive sources. These qualifications are re-evaluated with regulatory inspections and audits and each time the corresponding license is renewed.

Therefore, the existing regulatory system for the control of radioactive sources, in use as well as in disuse, acts preventively to avoid the loss of control thereon and subsequently, minimizing the existence of orphan sources.

It may be underlined that the Argentine Republic has adhered to the "*Code of Conduct on Technological and Physical Security of the Radioactive Sources*" in the 2003-2004 period. This event reinforces the determination of the country of exercising an effective control of radiation sources.

J.2 Basic requirements for radiological safety

The basic radiological safety requirements for the use of radioactive sources are described in the standard AR 10.1.1. Additionally, the ARN determines that:

- Radioactive sources cannot be purchased, imported, owned, transferred, stored, used, sold, exported or disposed of unless the source owner has previously obtained a licence or authorization granted by the ARN for this purpose.
- Only facilities having appropriate resources may handle radioactive sources and the members of staff require adequate knowledge and training.
- Licence holders shall keep a detailed and updated inventory of radioactive sources and their movements, systematically verifying the measures to prevent human intrusion in storage sites of radioactive sources.

The specific requirements for the storage of radiation sources are shown in Section J.4.

J.3 Actions aimed at an adequate control of radioactive disused sources

The criteria determined by the ARN for radioactive disused sources for long periods of time are the following:

- The storage of radioactive disused sources is allowed only *ad interim*, as long as the holder of the license is able to demonstrate that he has a specific program for its reuse or to use it in replacement of another source existing at the facility.

- In this case, the holder of the license must define a temporary storage area as deposit over which he has adequate control to prevent non-authorized access and physical protection measures to avoid the theft thereof. On the other hand, he must keep adequate records of the regular controls made in the temporary place of storage.

In case the holder of the license does not have an adequate place for temporary storage of the radioactive sources or in case of any other situation determined by the ARN, the sources must be sent to a facility especially licensed and operated by the CNEA for this purpose, for its storage in custody. See Section H.2.4

J.4 Special actions aimed at maintaining an appropriate control of the radioactive sources

The ARN maintains agreements with security forces and with organizations responsible for the control of the borders and airports to prevent the entrance to or exit from the country of undeclared radioactive sources.

Within this context, the ARN has entered agreements with the customs authorities to ensure that:

- The imports or exports of radioactive materials are performed with ARN’s authorization.
- Importers of industrial plants, measurement instruments and laboratory equipment that could include radioactive sources must previously submit a declaration stating the content of such type of sources, presenting the corresponding authorization by the ARN to the customs authorities.

- In the case that radioactive sources are deposited in custom premises for more than 30 days, the ARN must be notified to arrange for the storage at CNEA's authorized facilities.

In order to prevent the illicit trafficking of radioactive sources, to detect orphan sources and to avoid the imports of materials contaminated with radioactive substances, the ARN is promoting the installation of radiation monitors at borders and harbours. It also recommends the installation of this type of monitors in industries engaged in metal founding in order to detect orphan sources, prior to the beginning of the founding process.

The ARN pays special attention to cases where it is not possible to ensure the control of radiation sources, as for example, in the case of bankruptcy of companies that have sources and a legal action orders an attachment on their assets. In those cases the ARN and the Justice act together to confiscate the involved sources and send them to a safe storage, to prevent accidental situations.

In the case of exports of radioactive sources and before granting the authorization for the pertinent export, the ARN interacts with the Regulatory Authorities of the countries involved. In the case of sources of Type I and II, the procedures recommended by the *Guidelines on Imports and Exports of Radioactive Sources* by the IAEA are applied. In the case of sources of other categories, the procedures issued by the Regulatory Authorities of the importing countries are taken into account.

J.5 Physical security of sealed sources in use or in disuse

The security systems for radioactive sealed sources include physical security measures. These measures are destined to prevent intentional acts conducting to the loss of control of these radiation sources.

In January 2007, the ARN has issued the Standard AR 10.13.2 "Physical Security Standard for Sealed Sources" Rev. 0, which at present is under implementation. In said standard the following measures are contemplated or implicit:

- In the case of a facility with high radioactive inventory (from the threshold mentioned for Type I, in accordance with the IAEA Safety Guide, Nº RS-G-1.9 "Categorization of radioactive sources"), the possibility to create a Physical Security System similar to the physical protection systems currently implemented in facilities with nuclear material is contemplated.

- In the case of radioactive sources not contemplated in the Type I Security Guide by IAEA Nº RS-G-1.9, the ARN has provided the adoption of physical security measures to ensure the early detection or awareness of those events, in order to place said radioactive sources or materials under its regulatory control system. Such physical security measures are mentioned in IAEA TECDOC-1355 "Security of Radioactive Sources".

- For the transport of sources, extra physical security measures are applied, in addition to the radiological safety measures, to prevent or adopt corrective actions in case of fraudulent acts involving sources with activities above a reference value.

- Since 1991 and prior to IAEA-INFCIRC 225 / Rev. 4, the ARN is paying special attention not only to the early detection of potential sabotages to facilities containing nuclear materials, but also in case of robbery and theft of radioactive sources and the early detection of the generated fraudulent acts.

In this regard, the ARN is carrying out different activities in the areas of prevention, legislation, response, training and exchange of information; including not only the control of nuclear material but also the physical security aspects of radioactive sources.

At the end of the year 2007, within the ARN a “Physical Security Committee” has been created, with the object to define global policies and strategic guidelines for the country and for the region, analyzing and performing evaluations with respect to the different national and international instruments and initiatives related with the regulatory activities.

The ARN has concluded that the most effective security measures for early prevention or detection are the permanent contact and exchange of information between the ARN and the border control organizations, intelligence services and security forces, as essential elements of a systemic process that implies full knowledge and the assumption of responsibilities by all organizations that constitute the “Control System”.

Equally important is the coordination of monitoring activities including explicitly discouraging and electronic measures, which are analysed and considered in accordance with a case-by-case evaluation, as well as the prompt action of the radiological emergency system and the training of the non-specialized organizations involved.

In facilities with high inventories or in the cases of transport of radioactive sealed sources with high activities and until the above mentioned studies are concluded, the ARN requires, on a case-by-case basis, the application of specific physical security measures. These measures are equivalent to the physical protection measures for the transport of nuclear materials, requiring that the users of said sources adopt prudent management measures.

Although as from the beginning of 2007 the Standard AR 10.13.2 “Physical Security Standard for Sealed Sources” Rev.0 is under implementation, in October 2003 the CNEA has issued Directive PF-02 – *Physical Security of Radioactive Sources*, which determined the dispositions of said Standard, being mandatory for all facilities under its responsibility where practices are performed that include the use and/or storage of radioactive sources in use or in disuse.

J.6 Penalty system

The sections E.2.2.5 and E.2.2.6 describe the regulatory actions and the applicable penalty system for the use of radiation sources.

J.7 Abnormal events and emergencies

The Argentine regulations determine that the persons or organizations using radiation sources must implement emergency plans or procedures. The criteria determined by the ARN to be used in case of emergencies, includes the evaluation of scenarios for situations such as: theft or loss of the source, breakage of the integrity of the shielding containing the radioactive source, fire, explosions or any other event that could affect the safety of the radiation source.

The ARN also verifies that all organizations intervening in case of a radiological emergency are able to assume their responsibilities.

The ARN operates the *Intervention System in case of Radiological Emergencies* providing permanent assistance during the 24 hours of the day and is highly prepared to comply with their tasks. This team is adequately equipped to perform its duties, carrying out periodic tests to check the correct operation of all parts of the System.

The ARN has cooperation agreements with other organizations that would intervene in case of an emergency, mainly with the Federal Emergency System (SIFEM) and with the National Gendarmerie.

J.8 Readmission to the country of decayed sealed sources

The import of decayed radioactive sources is only authorized by the ARN on a case-by-case basis, when the importer duly justifies its use, in agreement with the radiological security criteria determined by the applicable regulations and the compliance with the legal obligations in force.

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SECTION K PLANNED ACTIVITIES TO IMPROVE SAFETY

K.1 Introduction

This section describes the safety improvement actions in matters related to SF and radioactive waste management, in regular activities as well as for those that are in execution stage or for those that have been completed in the period between the presentation of the 2nd National Report and the present date.

K.2 Regular activities

The permanent activities for the improvement of safety are common to all management facilities and include the following topics:

- Updating of documentation
- Updating of the organization
- Operative inspection programs
- Emergency Plans
- Education, training and re-training of operating staff
- Quality assurance program
- Preventive, predictable and corrective maintenance program

K.3 Management Safety Improvements

In addition to regular activity projects mentioned above, other projects and modifications have been developed and put into practice, which contribute to improve safety. Some of them are:

K3.1 Activities completed or in progress

ATUCHA I NUCLEAR POWER PLANT

Within the framework for Atucha I Nuclear Power Plant spent fuel management, the NASA has prepared a report (RN IT 07/2007), which constitutes a review of the work that has been carried out until this date by the NASA and by the CNEA in relation to the temporary dry storage alternative for spent fuel elements stored in the pools of said power plant (See item B.2). The available positions in the pools will be used up in March 2015, and on that date a new option must be available for the storage of spent fuel. At present the project is under the pre-feasibility analysis stage, in charge of the Project Evaluation and Planning Management of the NASA. Once it has been built, all spent fuels which at present are in wet storage would be gradually transferred in accordance with the decay time.

With reference to radioactive waste management improvements at the CNA I, has been built a Temporary Storage Deposit (DAT) which is in operation for compactable and non-compactable wastes conditioned in 200 L drums, following the corresponding CNEA guidelines.

Other changes or improvements introduced at this Nuclear Power Plant have been the spent fuel compact storage project, which is in operation, and the extension of the temporary storage

facility for used filters as had been announced in the 2nd National Report. Additionally, an area next to the Plant premises for the temporary storage of Class B (low activity) waste is in operation, and shall remain operational until the corresponding repository is available.

EMBALSE NUCLEAR POWER PLANT

The spent fuel dry storage system in silos (ASECQ) has been included, at ARN's request, in the "Ageing Management Program for Components and Systems of the Nuclear Power Plant Associated to Nuclear Safety". The surveillance plan of canisters, internal cladding and concrete structure of all ASECQ System silos was incorporated in the framework of this program.

The performance of the surveillance, since it has been in force, continues normally until this date; no abnormality has been observed in the behaviour analysis of these components.

EZEIZA RADIOACTIVE WASTE MANAGEMENT AREA

- **Intermediate and Low Level Solid and Liquid Radioactive Waste Treatment and Conditioning Plant (PTAMB)**

The Preliminary Safety Report (IPS) has been completed, corresponding to the remodelling of the Treatment and Conditioning of Intermediate and Low Level Radioactive Waste Treatment, which has been presented to the ARN for evaluation. During the year 2007, the detailed engineering has been completed, and during 2008 the proceedings will be filed in order to obtain the corresponding construction license.

- **Storage Facility for Irradiated Fuel from Research Reactors (FACIRI)**

The main objective of this project is to have a new interim storage facility for spent fuel named "Storage Facility for Irradiated Fuel Elements from Research Reactors" (FACIRI), that will replace the present "Central Deposit for Special Irradiated Fissionable Material" (DCMFEI) improving the safety conditions of this facility substantially.

At present the detailed engineering of special tools has been completed for the discharge, movement and positioning of the spent fuel elements in the pools of the FACIRI that must operate under water at four to sixteen meters deep. The detailed engineering of the covers of the pools and inspection paths of these ditches have been completed, beginning the technical – administrative processes to bid the execution of these works.

An exhaustive evaluation of the condition of the stainless steel covers of the ditches at the FACIRI has been performed, for the sake of potential improvements and repairs.

The construction of the internal components of the FACIRI has begun (baskets and their support structure), in agreement with the detailed engineering and technical specifications prepared by the CNEA. The progress at the end of the period has reached 60%. The mounting at the FACIRI is expected to be performed in 2008. The payment of this provision is made with contributions from the IAEA through the Technical Cooperation Project of the IAEA ARG/3/010 "Interim Storage of Spent Fuels from Research Reactors."

With the above mentioned contribution from the IAEA, training scholarships abroad have also been awarded for human resources staff, as part of the preparation plan of the staff that will operate the facility.

The design of the new armour-plated container for irradiated spent fuels has been completed, to improve the transference thereof between facilities of the Ezeiza Atomic Centre (RA-3, DCMFEI and FACIRI).

With respect to the mandatory documentation, the report of the physical protection system design of the facility has been completed, and a preliminary version of the design information questionnaire for Safeguards, have both been forwarded to the ARN for consideration.

➨ **Safety Re-evaluation of the Ezeiza Radioactive Waste Management Area (AGE)**

In the previous National Reports, the execution of a re-evaluation of AGE's Radiological Safety has been described.

As has been informed in the last Revision Meeting, the final report corresponding to the Semi-Contention Systems for Solid Wastes (also called Trenches 1 and 2) has been presented in November 2007 to the Nuclear Regulatory Authority. See Section K.3.2.

REPOSITORY FOR INTERMEDIATE LEVEL WASTE

As mentioned in the previous reports, Argentina decided to build a near-surface monolithic repository with engineered barriers for intermediate level radioactive waste. At present, selection and characterization activities of an adequate site to locate the repository are being carried out, which should be operational by the year 2023, in agreement with the chronogram proposed in the last version of the *Strategic Plan*, prepared in March 2006.

This repository will be used for the final disposal of the intermediate level conditioned radioactive wastes that are accumulated in different temporary storage facilities, as well as for those generated by the dismantling of existing nuclear power plants.

In the same site, a new low level radioactive waste final disposal near-surface system shall be built, which should be operational by 2020 and which shall replace the present systems located in AGE. At the same site, it is also projected to dispose of very low activity wastes, mainly originated from the dismantling of nuclear facilities, therefore it has been decided to opt for surface systems with engineering improvements.

Some of the actions taken since the 1st National Report until this date, consistent with the proposed objectives, are the following:

- Works corresponding to the final part of the first stage of the search and selection of sites and areas to locate an intermediate level radioactive waste repository were carried on. The data of sectors surveyed in the preceding decade was updated. Finally, a first selection of the factors (and their relative weight) to

be considered for the objective evaluation of different selected areas was performed.

- The studies to evaluate the long-term behaviour of an especially formulated concrete container to be used in different applications associated to intermediate level waste management still continue.

- Research and Development projects are in progress to complete the studies on the behaviour of concrete used as engineered barriers in intermediate level radioactive waste repositories and on the immobilization of exhausted resins in cement matrices.

- The required tasks for the presentation of Argentina's superficial water system, using data provided by the National Water Institute (INA), are carried on.

- A modelling project of water circulation in fractured crystalline rock has been started, and a survey of fractures with the objective of validating the postulated model is in its early stages.

As marked in Article 12 of Act Nº 24804, once the site is chosen, on one hand, it must be analyzed by the ARN with the object to issue the corresponding construction license, and on the other hand, it requires the approval by the provincial government of the location selected, by means of a respective law. Besides, a public hearing must be called, in order to provide the pertinent information related to the future location of the repository, in agreement with the terms of Article12 of Act Nº 25018.

DEEP GEOLOGICAL REPOSITORY

As has already been mentioned, the activities that are performed with reference to this topic have been included in the Research and Development activities described further on.

Most of said activities constitute permanent lines, some have already been started in the past, and informed in due time, and others must be performed in the future. For each new issue the internal capacities of the CNEA and of the other science and technical organizations and universities must be evaluated, to other research groups through specific and cooperation agreements.

As example, some execution lines are described below:

- The Geographic Information System continues, and progress has been made in the digitalization of geological information of several regions of the country, including hydro geological data, granitic rocks, geological structures, information on quaternary and active volcanism and application of exclusion criteria, as well as distribution data of the population in the country.
- Completion of a study on quaternary volcanism in Argentina to exclude volcanic areas. A data base was prepared with the coordinates of "active" and "holocene" volcanoes, on the sides of both Argentina and Chile, to cover the

volcanic arc of the mountain range and define exclusion areas. This task was concluded in the year 2003.

- The preparation of a national inventory of geological formations suitable for the location of deep geological repositories for high level wastes was continued.
- The study of different compositions of ferrous phosphate glasses and the determination of the effect of the presence of uranium oxides, for the immobilization of high level wastes contained in research reactors spent fuel is under progress.
- The study for the conversion of radioactive elements into a ceramic form with sintered uranium, as an alternative process for the immobilization of high level wastes contained in research reactor spent fuels (CERUS Process) is also in progress.

PLAN OF ACTIVITIES FOR RESEARCH AND DEVELOPMENT

On the basis of the above mentioned areas, hereinafter the projects foreseen for the next three year period are listed. Some of the stated activities have been started in the past, and must be continued in the coming years to be completed in order to achieve the expected results. Others will be started during the year 2008:

PRE - DISPOSAL

A. *Characterization*

- Development of characterization methods for radioactive wastes and quality assurance of conditioned radioactive wastes packages.

B. *Treatment and conditioning*

- Development of new materials to immobilize low and intermediate level wastes (ceramic compounds, polymers), as well as spent resins.
- Development of a method for the treatment of oils by chemical methods and spent ionic exchange resins.
- Comparative evaluation of compacting, super-compacting and incineration methods.
- Analysis of the different strategies for the management of radioactive sources in disuse.
- Analysis of the different strategies for the active carbon and filters management used in nuclear power plants.
- Analysis of the different strategies for the management of wastes generated from the dismantling of nuclear facilities.
- Study of ferro phosphate glasses for the immobilisation of high level wastes.

C. *Storage:*

- Evaluation of the behaviour of conditioned packages prepared for long term storage.

❖ FINAL DISPOSAL

D. *Engineering of the facilities:*

- Conceptual design of a repository, near surface concrete type, for intermediate and low level wastes.
- Evaluation of the different alternatives for the disposal of very low level wastes.
- State of the art knowledge in deep geological repositories for high level wastes (sealing of galleries, interaction container – bentonite, monitoring of the repository).

E. *Environmental Management:*

- Environmental characterization and re-evaluation of the safety of the Ezeiza Management Area (AGE), where final disposal systems exist for different types of radioactive wastes.
- Environmental characterization of a new site for intermediate and low level waste repositories with the objective to dispose of the environmental base line prior to waste disposal.
- Analysis of technological alternatives of remedial actions in case of detection of the need for eventual corrective actions in final disposal systems.

F. *Geological barriers*

- Location studies for repositories for low, intermediate and high level radioactive wastes.

G. *Engineering barriers*

- Study of metallic isolation and confinement materials.
- Study of cement materials as engineering barriers.
- Study of clay materials as engineering barriers.

❖ SPENT FUELS

H. *Generated by nuclear power plants:*

- Conceptual design of a dry storage system of the spent fuels from the Atucha I Nuclear Power Plant.
- Analysis of a centralized temporary storage system for spent fuels from the nuclear power plants of Argentina.
- Evolution studies of the spent fuel of nuclear power plants under storage conditions.
- Characterization and behaviour of the spent fuel from nuclear power stations.

I. *Generated by research reactors:*

- Corrosion studies and monitoring of spent fuels from research reactors in wet storage.

- Analysis of different dry storage strategies for spent fuels from research reactors.
- Conditioning processes studies considering the final disposal of spent fuels from research reactors.

K.3.2 Commitments of previous Revision Meetings

The commitments adopted by Argentina in previous meetings on progress referred to:

- ✓ re-evaluation of the Ezeiza Radioactive Waste Management Area (AGE).
- ✓ approval of the Radioactive Waste Management Strategic Plan.
- ✓ setting up of the Funds for Waste Management, and for Dismantling and Closure.
- ✓ coordination at national and provincial level of the legislation related to the movement of wastes in the national territory.

are under the following conditions:

Re-evaluation of the Ezeiza Radioactive Management Area (AGE)

In the year 1999, the CNEA analyzed the need to perform a safety re-evaluation of the Ezeiza Management Area as a consequence of changes in the factors that could affect the operations of the final disposal systems.

Among them, the intensification of the rainfall in the region is to be mentioned, producing higher water refill which, together with higher positive pressure on the Puelche underground waters, have determined the increase of the level of the ground water in the area.

Due to these new climate characteristics, to the behaviour of the soil and of the ground waters, the changes of the social and economical aspects must be added, as they respond to a larger demographic growth and to the development of new projects in the properties neighbouring the Atomic Centre where AGE is located.

In consequence, in the year 2000, after approximately thirty years of operation of the older systems, the decision was taken to perform a complete environmental characterization of the AGE which, added to the radiological monitoring required for the Operation License, was intended to facilitate the study of a larger number of environmental parameters. This has been carried out within the site and in the surrounding areas, increasing the monitoring points, introducing improvements in the applied technologies and performing specifically designed hydro geological, geochemical and geophysical studies.

To complete the team of multi - disciplinary professionals oriented to the execution of the specific project and to improve the environmental management of the site, graduates in hydrogeology, mathematics and radiochemistry have been hired. The staffs have been trained during the years 2000, 2001 and 2002 in the country and in the USA within the framework of the Scientific and Technological Cooperation Agreement between the CNEA and US Department of Energy (US-DOE).

Since then, the design of a joint project has been under way with the US-DOE, through which the CNEA may have access to new environmental characterization, monitoring and modelling technologies; acquire state of the art field measuring and well control instruments, laboratory equipment, modelling software and hire specific services by experts, apart from the constant training of the staff at important laboratories in the USA. All this has been performed with the permanent technical assistance of the US-DOE through an expert appointed for this task.

In this manner, in January of the year 2003 the "***Characterization, Monitoring and Modelling of Sites***" project has formally started with the US-DOE technological assistance, sponsored by the Joint Coordinating Committee for Radioactive and Mixed Waste Management (JCCRM) within the framework of the Technological and Scientific Cooperation Agreement between CNEA and US-DOE, with the collaboration of the Florida State University of the USA.

As has been informed, in the year 2001 the CNEA has decided to suspend the injection of very low level liquid wastes into the semi-contention systems which had been used until that date, as well as the operation of the disposal systems for structural wastes and sealed sources, as a consequence of the decision adopted in the year 1999 with reference to the suspension of the final disposal of low level solid radioactive wastes. This would allow the closure of the mentioned facilities and the performance of the proposed safety re-evaluation.

In March 2004, the authorization of the ARN has been requested for the total closure of the still non covered sector belonging to the Semi-contention system for Low Level Solid Radioactive Waste (T2), with the object to perform the safety evaluation of said system under the same conditions of environmental evolution as the other systems of the AGE.

In August 2004, the ARN authorized the total closure of the not covered sector of the referred T2, determining some specific requirements to the CNEA with reference to the safety evaluation of the T1 and T2 existing Systems.

In the year 2005, in reply to an investigation request on the alleged contamination of the drinking water attributed to the Ezeiza Atomic Centre, the intervening judge ordered the removal of all drums deposited in the not covered sector of the T2 System. (For further information see ***Measuring of drinking water in Ezeiza*** in Section E, page 16).

However, the ARN has maintained the requirement for performing the radiological safety evaluation of the two trenches even though, in order to comply with the order issued by the judge, the covering of the System T2 would not be performed as had been requested by the CNEA and agreed with the ARN at the time.

The prevision is that these drums are to be stored in containers and moved to a especially designed deposit for their long term storage, until a new repository exists.

In compliance with the requirement by the ARN, in November 2007, the CNEA presented the *Report on the Radiological Safety Evaluation of the Semi-contention Systems for Solid Wastes (Systems T1 and T2).*

For the year 2008, the CNEA has planned the completion of the environmental studies associated to the radiological safety evaluation of the other final disposal systems of the AGE, as in March 2006 it has been decided to end the operations of the three final disposal systems, avoiding to continue disposing of radioactive wastes at said site.

Preliminary conclusions of the radiological safety re-evaluation of the systems T1 and T2

The results of the radiological characterization performed at the Ezeiza Management Area (AGE) and surroundings indicate the presence of some radionuclides, in higher than expected concentrations, but limited to a sector of the near surface ground waters close to the T1 and T2 systems. Nevertheless, it may be stressed that those concentrations are not of radiological concern. As from the evaluation of the performed measurements, it is presumed that the observed particularities would proceed from the southern sector of T1. It may be underlined that this trench has been built following the criteria in use in the sixties, with very different degrees of demand and climate conditions from the current ones. It may be pointed out that the climate conditions in those times were very different and that in the last years the rainfall has become more intense in the whole area, producing larger water recharge and the increase of the ground water level in the area.

The final disposal facilities for solid wastes at the AGE have been conceived as semi-contention systems, and the gradual migration of the radio nuclides could be expected slowly enough in order to allow for its decay before reaching the geographical limits of the CAE.

The surrounding of the system is perfectly outlined and marked by a natural hydro geological boundary within the site owned by the Atomic Centre, with the certainty that there exists no impact whatsoever beyond the Ezeiza Atomic Centre limits.

Especially, any possible impact in the Puelche aquifer may be discarded due to its very low vulnerability because of its depth, to the great thickness of the separation from the higher aquifers and to the positive pressure performed by said aquifer.

Likewise, it must be taken into account that the CNEA expects to complete the environmental characterization of the AGE in the year 2008 and to perform the radiological safety evaluation of the final disposal systems. Later, the ARN will be requested to issue a final closure license of all disposal facilities, maintaining the operation license for the facilities dedicated to activities previous to waste management, such as storage, treatment and conditioning, quality assurance, etc.

Especially as result of the present safety evaluation referred only to the Semi-Contention Systems of Solid Radioactive Waste, known as Trenches 1 and 2, the application consequences have been evaluated in the scenarios of normal liberation and intrusion at the end of a 50 year institutional control period, as had been foreseen in the mandatory documentation corresponding to an operation license, with a posterior liberation of the use of the land for unrestricted objects. These premises, revised in agreement with the evolution of the characteristics of the site, concerning climate, hydro geological as well as demographic aspects, must be updated.

The interpretation of the preliminary results obtained with the mentioned evaluation, suggests the extension of the institutional control period beyond the period foreseen in the mandatory documentation corresponding to the Operation License issued in 1995, mainly due to the presence of historical wastes. However, it is important to underline that the context of this evaluation corresponds to highly extreme conditions, applying very conservative scenarios, as it is necessary to count with a safety margin due to the uncertainties of a long term evaluation.

The details of the activities performed since the presentation of the Second National Report and the activities planned for the 2008-2009 two year period are stated in Section L.2.

Approval of the Radioactive Waste Management Strategic Plan and Integration of the Funds for Waste Management, Dismantling and Closure.

The *Radioactive Waste Management Strategic Plan* will be in force upon approval by the National Parliament. This approval has not been issued until the conclusion date of the present National Report (December 2007). The *Strategic Plan* has been prepared as determined by Act Nº 25018. This Plan will reflect the different stages of the strategy adopted in Argentina on SF fuel management and radioactive waste management.

The plan describes the steps to be followed and the estimated costs, covering the period from 2007 to 2095. The strategy presents a set of technological solutions that in the light of current knowledge make an efficient and safe compliance with the objectives determined by Law possible.

As stated in the previous report, with the decision to encourage the completion of Atucha II Nuclear Power the terms of the Radioactive Waste Management Strategic Plan (PEGRR) had to be analyzed.

In consequence, a revised version of the PEGRR, approved by the President of the CNEA, has been submitted to the consideration of the authorities of the National Executive Power.

Although the legislative measure to approve said Plan has not been passed yet, as required by Act Nº 25018 – *Radioactive Waste Management System*, the text of the respective Project for the Act is under preparation.

The text of the document has been analyzed by the ARN and has also been considered by the operating company of the nuclear power plants, NASA, as main generator of radioactive wastes. Neither body has received objections. The text of the Plan has been sent, as information, to the National Parliament with the annual report corresponding to the year 2005.

Integration of the Funds for Waste Management and for the Dismantling and Closure

The integration of the Funds for Radioactive Waste Management and Final Disposal is delayed as it is strongly related to the approval of the PEGRR.

With reference to the fund with the necessary resources to cover the dismantling and closure activities of the nuclear power plants, it is tied to the contributions of the company that will

operate them in case they should be privatized. As long as said privatization does not take place, the responsibility to finance the retirement from service of said nuclear power plants, of the research reactors and other relevant nuclear facilities will befall of the National State, and will have to use its own funds.

Coordination at national and provincial levels, of the legislation about the movement of waste in the national territory

At the closing date of this report no important progress has been made in the coordination activity of the legislation related to the movement of radioactive waste within the national territory. Different opportunity factors have not allowed taking concrete steps towards the proposed objective.

K.4 Synoptic Summary

In agreement with the determinations of the document *Guidelines relative to the Form and Structure of the National Report (item 12, part II of Annex to INFCIRC 604/Rev1)* a synopsis of the Present Conditions in Argentina in relation to the contents of this Third National Report is included in the next page.

ARGENTINA THIRD NATIONAL REPORT OVERVIEW

Type of Liability	Long Term Management Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Fuel	▪ NPP: Reprocessing decision deferred (dead line 2030) ▪ RR: Send back to origin country. If not, RR disposal	▪ NPP: Operator (by law) ▪ RR: Operator (state budget) ▪ RWM: Fund (created, integration pending)	▪ CNA I: NPP Wet Storage ▪ CNE: NPP 6 yr Wet Storage ▪ CNE: NPP Dry Storage ▪ RR: Wet Storage (DCMFEI)	▪ CNA I: Dry Storage ▪ RR: Wet Storage (FACIRI)
Nuclear Fuel Cycle Waste	▪ Disposal	▪ Facility Operator (by law)	▪ LLW: Storage + Disposal (*) ▪ LLW: Management Facility ▪ ILW: Storage	▪ LILW: Centralized Repository ▪ HLW: Deep Geological Repository (feasibility) ▪ LILW: Management Facility (PTAMB)
Non Power Wastes	▪ Disposal	▪ Waste Generator	▪ LLW: Storage + Disposal (*) ▪ ILW Storage	▪ LILW: Centralized Repository ▪ LILW: Management Facility (PTAMB)
Decommissioning Liabilities	▪ Decommissioning Plan (regulatory requirement)	▪ Facility Operator (by law) ▪ Decommissioning Fund (created, integration pending)	▪ None	▪ LILW: Centralized Repository ▪ VLLW: Centralized Repository
Disused Sealed Sources	▪ Reuse ▪ Disposal	▪ Source User	▪ Storage + Disposal (*) (Short Lived) ▪ Storage (Long lived)	▪ LILW: Centralized Repository ▪ HLW: Deep Geological Repository

(*)These disposal facilities are nowadays in the closure step/phase

SECTION L ANNEXES

L1 Legal Regulations related to the Nuclear Activity in the Argentine Republic

L1.1 International Agreements, Conventions and Treaties

Decree-Law Nº 5071: 15 May 1957. Ratification of the International Atomic Energy Agency Statute. (Official Bulletin of the Argentine Republic of 22 May 1957)

Law Nº 15802: 25 April 1961 - 5 May 1961 Ratification of the Antarctic Treaty. (Official Bulletin of the Argentine Republic of 16 May 1961)

Law Nº 17048: 2 December 1966. Approval of the Vienna Convention on Liability for Nuclear Damage, 1963.
(This Convention was modified and Complemented by a Protocol and a Supplementary Convention approved by **Law Nº 25313**)
(Official Bulletin of the Argentine Republic of 16 December 1966)

Law Nº 21947: 6 March 1979. Approval of the Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matters.
(Official Bulletin of the Argentine Republic of 9 March 1979)

Law Nº 22455: 27 March 1981. Approval of the agreement related to civil liability within the sphere of nuclear sea transport.
(Official Bulletin of the Argentine Republic of 6 April 1981)

Law Nº 22507: 7 October 1981. Approval of the treaty concerning the prohibition of placing nuclear weapons and other weapons of massive destruction on sea and ocean beds, and their underground, which was signed in London, Moscow, and Washington on 11 February 1971.
(Official Bulletin of the Argentine Republic of 13 October 1981)

Law Nº 23340: 30 July 1986 - 19 August 1986. Approval of the treaty regarding nuclear weapons test-ban in the atmosphere, in the outer space and in submarine waters.
(Official Bulletin of the Argentine Republic of 25 February 1987)

Law Nº 23620: 28 September 1988 - 20 October 1988. Approval of the Convention on the Physical Protection of Nuclear Materials.
(Official Bulletin of the Argentine Republic of 2 November1988)

Law Nº 23731: 13 September 1989 - 6 October 1989. Approval of the Conventions on Early Notification of a nuclear accident and on assistance in the case of nuclear accident or radiological emergency.
(Official Bulletin of the Argentine Republic of 13 October 1989)

Law Nº 24272: 10 November 1993 - 7 December 1993. Approval of the treaty for the prohibition of nuclear weapons in Latin America and the Caribbean (TLATELOLCO Treaty)
(Official Bulletin of the Argentine Republic of 14 December 1993)

Law Nº 24448: 23 December 1994 - 13 January 1995. Approval of the Treaty on Non-Proliferation of Nuclear Weapons (TNP).
(Official Bulletin of the Argentine Republic of 20 January 1995)

Law Nº 24776: 19 February 1997 - 4 April 1997. Approval of the Convention on Nuclear Safety adopted in Vienna, Republic of Austria, on 20 September 1994.
(Official Bulletin of the Argentine Republic of 11 April 1997)

Law Nº 25022: 23 September 1998 - 23 September 1998. Approval of the Comprehensive Nuclear Test-ban Treaty adopted by the General Assembly of the United Nations.
(Official Bulletin of the Argentine Republic of 28 October 1998)

Law Nº 25279: 6 July 2000 - 31 July 2000. Approval of the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management adopted in Vienna.
(Official Bulletin of the Argentine Republic of 4 August 2000)

Law Nº 25313: 7 September 2000 - 6 October 2000. Approval of the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damages and the Convention on Supplementary Compensation for Nuclear Damages, as adopted in Vienna (Modifies and complements the Vienna Convention approved by **Law Nº 17048**)
(Official Bulletin of the Argentine Republic of 18 October 2000)

Law Nº 25837: 26 November 2003 - 19 February 2004 (de facto). Approval of an agreement subscribed with the Provisional Technical Secretariat of the Preparatory Commission of the Organization for the Comprehensive Nuclear Test-ban Treaty regarding the Activities with International Surveillance Facilities at the Service of the Above Treaty.
(Official Bulletin of the Argentine Republic of 20 February 2004)

L 1.2 Cooperation Agreements in the Field of Peaceful Uses

Law Nº 17938: 21 October 1968. Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Oriental Republic of Uruguay** on 8 July 1968.
(Official Bulletin of the Argentine Republic of 25 October1968)

Law Nº 18255: 10 June 1969. Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Republic of Peru**.
(Official Bulletin of the Argentine Republic of 18 July 1969)

Law Nº 18436: 7 November 1969. Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Republic of Paraguay**.
(Official Bulletin of the Argentine Republic of 19 November 1969)

Law Nº 18814: 14 October 1970. Approval of the Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Republic of Bolivia**.
(Official Bulletin of the Argentine Republic of 23 October 1970)

Law Nº 19505: 23 February 1972. Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Republic of Colombia**.
(Official Bulletin of the Argentine Republic of 18 July 1972)

Law Nº 21896: 30 October 1978. Approval of the Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Government of the Republic of Ecuador**.
(Official Bulletin of the Argentine Republic of 3 November 1978)

Law Nº 22314: 31 October 1980. Complementary Agreement on Scientific and Technical Cooperation regarding Peaceful Uses of Nuclear Energy subscribed with the **Republic of Venezuela**.
(Official Bulletin of the Argentine Republic of 7 November 1980)

Law Nº 22494: 10 September 1981. Cooperation Agreement subscribed with the **Federative Republic of Brazil** for the development and application of Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 16 September1981)

Law Nº 22886: 31 August 1983. Cooperation Agreement in the Field of Peaceful Uses of Nuclear Energy subscribed with the **Republic of Chile**.
(Official Bulletin of the Argentine Republic of 14 September1983)

Law Nº 23387: 25 September 1986 - 10 October 1986. Approval of the Cooperation Agreement in the Peaceful Uses of Nuclear Energy subscribed with the **Fed. Soc. Republic of Yugoslavia** on 23 September 1982.
(Official Bulletin of the Argentine Republic of 4 March 1987)

Law Nº 23712: 13 September 1989 - 6 October 1989. Approval of the Cooperation Agreement in the Peaceful Uses of Nuclear Energy subscribed with the **Popular Republic of China**.
(Official Bulletin of the Argentine Republic of 12 October 1989)

Law Nº 23914: 21 March 1991 - 16 April 1991. Approval of the Agreement subscribed with the **Republic of Turkey** for the cooperation in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 22 April 1991)

Law Nº 24046: 5 December 1991 –11 December 1991. Approval of the Agreement with the **Federative Republic of Brazil** on the Exclusive Peaceful Use of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 24 December 1991)

Law Nº 24048: 5 December 1991 – 2 January 1992. Approval of an Additional Protocol to the Agreement subscribed with the **Federative Republic of Brazil** for the Exclusive Peaceful Use of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 9 January 1992)

Law Nº 24113: 5 August 1992. Approval of the Agreement between the **Argentine Republic**, the **Federative Republic of Brazil**, the **Brazilian - Argentine Agency for Accounting and Control of Nuclear Materials** and the **International Atomic Energy Agency** for the application of safeguards (Quadripartite Agreement).
(Official Bulletin of the Argentine Republic of 7 September 1992)

Law Nº 24161: 30 September 1992 - 26 October 1992. Approval of the Agreement subscribed with the **Republic of Indonesia** on cooperation in the Peaceful Uses of Atomic Energy.
(Official Bulletin of the Argentine Republic of 2 November1992)

Law Nº 24217: 2 June 1993 - 24 June 1993. Approval of the Agreement subscribed with the **Government of Romania** on cooperation in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 1 July 1993)

Law Nº 24253: 13 October 1993 – 12 November 1993. Approval of the Agreement subscribed with the Government of the **United Soviet Socialist Republic** on cooperation in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 18 November 1993)

Law Nº 24645: 29 May 1996 – 26 June 1996. Approval of Agreement subscribed with the **Government of the Republic of Guatemala** on development in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 28 June 1996)

Law Nº 24646: 29 May 1996 – 26 June 1996. Approval of the Agreement subscribed with the **Government of Canada** on cooperation in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 28 June 1996)

Law Nº 24647: 29 May 1996 – 26 June 1996. Approval of the Cooperation Agreement subscribed with the **Government of France** on Peaceful and non-explosive Use of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 1 July 1996)

Law Nº 24860: 13 August 1997 –10 September 1997. Approval of the Agreement subscribed with the **Government of the Republic of Korea** on cooperation in the Peaceful Uses of Nuclear Energy. (In force as from 19 September 1997).
(Official Bulletin of the Argentine Republic of 16 September 1997)

Law Nº 24861: 13 August 1997 –10 September 1997. Approval of the Agreement subscribed with the **Government of the Kingdom of Thailand** on cooperation in the Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 16 September 1997)

Law Nº 24862: 13 August 1997 –10 September 1997. Approval of the Agreement subscribed with the **Government of the United States of America** on Peaceful Uses of Nuclear Energy. (In force as from 16 October 1997).
(Official Bulletin of the Argentine Republic of 17 September 1997)

Law Nº 24869: 13 August 1997 – 11 September 1997. Approval of the Cooperation Agreement related to Peaceful Uses of Nuclear Energy subscribed with the **Atomic Energy European Community** (EURATOM). (In force as from 29 October1997).
(Official Bulletin of the Argentine Republic of 18 September 1997)

Law Nº 24980: 03 June 1998 – 10 July 1998 (De facto). Approval of the Cooperation Agreement subscribed with the **Government of the Kingdom of Morocco** regarding Peaceful Uses of Atomic Energy.
(Official Bulletin of the Argentine Republic of 15 July 1998)

Law Nº 24981: 03 June 1998 – 10 July 1998 (De facto). Approval of the Cooperation Agreement subscribed with the **Government of the Republic of Costa Rica** for the development and application of Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 15 July 1998)

Law Nº 25285: 13 July 2000 – 6 December 2000. Approval of the Cooperation Agreement on Peaceful Uses of Nuclear Energy subscribed with the **Republic of Armenia.**
(Official Bulletin of the Argentine Republic of 13 December 2000)

Law Nº 25286: 13 July 2000 – 6 December 2000. Approval of the Cooperation Agreement on Peaceful Uses of Nuclear Energy subscribed with the **Hellenic Republic.**
(Official Bulletin of the Argentine Republic of 13 December 2000)

Law Nº 25776: 13 August 2003 – 12 September 2003. Approval of the Agreement subscribed with the **Government of the Socialist Republic of Vietnam** on Peaceful Uses of Nuclear Energy.
(Official Bulletin of the Argentine Republic of 13 September 2003)

Law Nº 25809: 05 November 2003 – 28 November 2003. Approval of the Cooperation Agreement regarding Peaceful Uses of Nuclear Energy subscribed with the **Republic of Bulgaria**.
(Official Bulletin of the Argentine Republic of 02 December 2003)

Law Nº 25842: 26 November 2003 – 9 January 2004. Approval of the Cooperation Agreement for the promotion of nuclear science and technology in **Latin America** and **the Caribbean**, adopted in Vienna by the IAEA Board of Governors.
(Official Bulletin of the Argentine Republic of 15 January 2004)

Law Nº 26014: 16 December 2004 – 10 January 2005. Approval of the Agreement with **Australia** on cooperation in the Peaceful Uses of Nuclear Energy subscribed in Canberra, Australia, on 8 August 2001.
(Official Bulletin of the Argentine Republic of 14 January 2005)
In force as from 12 January 2005.
(Official Bulletin of the Argentine Republic of 16 March 2005)

L.1.3 National Laws

L.1.3.1 Law Nº 24804/97 National Law of Nuclear Activity

CHAPTER I
Nuclear Activity. Duties of the National Government
Criteria for Regulations. Jurisdiction.

ARTICLE 1.-The National Government, through the National Commission of Atomic Energy and the Nuclear Regulatory Authority, shall define the policy and be responsible for research and development, regulation and surveillance functions in the nuclear field.

All productive oriented nuclear activities related to research and development, which may be commercially organized, shall be performed by the National Government or by the private sector.

The nuclear policy shall meet all the obligations assumed by the Argentine Republic as a party to the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Tlatelolco Treaty), the Treaty on Non-Proliferation of Nuclear Weapons (TNP), the Agreement between the Argentine Republic and the Federative Republic of Brazil through the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the International Atomic Energy Agency (IAEA) for the Application of Safeguards, in addition to the commitments signed by Argentina as a member of the Nuclear Suppliers Group and the National Regime for the Control of Sensitive Exports (Decree Nº 603/92).

ARTICLE 2.-The National Commission of Atomic Energy created by Decree Nº 10936 dated 31 May 1950 and reorganised by Decree-Law Nº 22498/56, which was ratified by Law Nº 14467, shall continue operating as an autarchic organism within the jurisdiction of the President of the Nation, and shall be responsible for:

a) Advising the Executive Power on nuclear policy issues.

b) Promoting training of highly specialised human resources, and scientific and technological developments in the nuclear field, which include the promotion and development programs for technological innovations.

c) Fostering technology transfer programs for technologies acquired, developed and patented by the Institution in compliance with the non-proliferation commitments signed by the Argentine Republic.

d) Exercising the responsibility of radioactive waste management activities in compliance with the specific legislation.

e) Defining the procedures for decommissioning of nuclear power plants and any other relevant radioactive facility.

f) Providing the services requested by nuclear power plants and other nuclear facilities.

g) Exercising the rights of property of the National Government on special fissionable materials included in irradiated fuel elements.

h) Exercising the rights of property of the National Government on special fissionable materials, which might be admitted or developed in the country.

i) Developing, building and operating experimental nuclear reactors.

j) Developing applications for radioisotopes and radiation in biological, medical and industrial uses.

k) Performing mineral prospecting for nuclear use, without excluding the private sector from said activity.

l) Developing materials and manufacturing processes for fuel elements to be used in advanced cycles.

ll) Developing basic and applied research programs in basic sciences of nuclear technology.

m) Subscribing cooperation programs with third countries, through the Ministry of Foreign Affairs, International Trade and Worship, for the programs mentioned in the above item, and for fusion technology research and development programs.

n) Fostering and developing any other study and scientific application for nuclear transmutations and reactions.

ñ) Continuously updating of technical information on nuclear power plants during all their stages, and ensuring its optimum use.

o) Establishing direct relations with other foreign institutions that share similar goals.

p) Signing agreements with nuclear power plant operators in order to carry out research work.

ARTICLE 3.-The National Commission of Atomic Energy shall manage its administrative, financial, proprietary and accounting matters in accordance with the contents of this Law and the regulations issued for such purpose by its Board of Directors. The Commission shall be subject to the public control regime.

The staff of the Commission shall be subject to the Labour Contracts Law and to the special conditions established in the regulations.

ARTICLE 4.-The duties of the Board of Directors of the National Commission of Atomic Energy shall be:

a) To perform the necessary actions in order to comply with the objectives and functions established in this Law.

b) To approve general work plans, strategic projects and annual budgets to be submitted to the National Executive Power.

c) To approve the annual activities report.

d) To advise the National Executive Power on matters related to atomic energy and its applications.

e) To establish relations with foreign institutions or with regional or international agencies that share similar goals, including the participation of the Ministry of Foreign Affairs, International Trade and Worship.

f) To accept assets and donations.

g) To sign agreements with public or private entities for the execution of the plans aimed at the achievement of the Commission's goals.

h) To propose the Commission's organisational structure to the Executive Power.

ARTICLE 5.-The Chairman of the Board of Directors of the National Commission of Atomic Energy shall be vested with every necessary executive power to comply with the laws and regulations ruling the Institution and the resolutions issued by the Board of Directors. The Chairman shall:

a) Undertake the legal representation of the National Commission of Atomic Energy for all administrative, judicial and extrajudicial matters.

b) Manage and administer the Institution.

c) Summon and chair the meetings of the Board of Directors.

d) Present general work plans, strategic projects and annual budget drafts to the Board of Directors to be submitted to the National Executive Power.

e) Grant general and special mandates.

f) Integrate, either by himself or through representatives, national, provincial or sectorial commissions dealing with the tasks of the Institution, including environmental matters.

g) Inform the Board of Directors about the general distribution of the annually granted budget.

h) Inform the Board of Directors about the compliance with plans, projects and other scheduled activities.

i) Propose to the Board the Commission's organisational structure at the levels not defined by the Executive Power.

j) Appoint, promote, sanction and dismiss staff according to the applicable laws and regulations.

k) Appoint and promote staff that will perform hierarchical and co-ordination activities.

l) Appoint and send representatives, and nominate on assignment qualified personnel, to participate in regional or international conferences, meetings or congresses.

m) Partially delegate, to the internal bodies he may designate, the faculties entrusted to him by this Law.

ARTICLE 6.-Resources of the National Commission of Atomic Energy shall be made up by the following revenues:

a) Contributions from the National Treasury as determined for each fiscal year and by special laws.

b) Proceeds resulting from its own activities in the field of production and from the services rendered.

c) Subsidies, legacies, inheritances, donations and transfers received for any concept.

d) A royalty fixed by the National Executive Power aimed at financing research and development activities performed by the National Commission of Atomic Energy, calculated as a percentage of the income obtained from the sale of electric power generated by nuclear power plants in charge of Nucleoeléctrica Argentina S.A. (corporation) or by whoever legally substitutes it.

e) Interests and benefits accrued from the management of its own funds.

ARTICLE 7.-The Nuclear Regulatory Authority shall be responsible for regulating and controlling nuclear activities regarding radiological and nuclear safety, physical protection and controlled use of nuclear materials, licensing and surveillance of nuclear facilities, and

compliance with international safeguards. The Nuclear Regulatory Authority shall also be an advisor to the Executive Power on issues within its field of expertise.

ARTICLE 8.-The Nuclear Regulatory Authority shall have regulatory and control responsibilities, as stated in this Law in order to:

a) Protect human beings from harmful effects of ionising radiation.

b) Ensure that nuclear activities carried out in the Argentine Republic comply with radiological and nuclear safety requirements.

c) Ensure that nuclear activities are not to be performed for purposes other than those authorised by this Law, and that regulations issued in the future comply with international commitments and Argentina's policy on non-proliferation of nuclear activities.

d) Prevent intentional actions that could lead to severe radiological consequences or to unauthorized decommissioning of nuclear materials or other materials, or equipments subject to regulation and control, as stated in this Law.

ARTICLE 9.-To develop any type of nuclear activity, all individuals and legal persons shall:

a) Comply with regulations issued by the Nuclear Regulatory Authority within its jurisdiction and, in order to operate, to apply for a license, permit or authorisation.

b) Comply with all the safeguards and non-proliferation agreements subscribed or to be subscribed in the future by the Argentine Republic.

c) Accept civil liabilities of nuclear power plant operators, as defined in the Vienna Convention on Civil Liability for Nuclear Damage, ratified by Law Nº 17048, for a total amount of eighty million US Dollars (U$S 80,000,000) per nuclear accident in each nuclear facility. This amount shall be guaranteed by an insurance policy or a financial warranty, to the satisfaction of the Executive Power or whoever shall be appointed by the Executive Power; the National Government shall be responsible for the remaining liability.

   The Executive Power is hereby authorised to adjust the amount of the liability above mentioned if the conditions stated in the Vienna Convention on Civil Liability for Nuclear Damage are amended, provided said amendment is ratified by law.

   Nuclear damages, as defined in the Vienna Convention on Civil Liability for Nuclear Damage, ratified by Law Nº 17048, shall mean loss of human lives, bodily injuries and material damages directly or indirectly caused by radioactive properties, or by radioactive properties in combination with toxic, explosive or other hazardous properties of nuclear fuels, or by radioactive products or radioactive waste in a nuclear facility or nuclear products arising from or originated by said facility or sent to it, or other ionising radiation released from any other source of radiation within a nuclear facility.

   It is considered that the operator of a nuclear facility shall be liable for nuclear damages in case of:

i) Damages caused to the operator's employees and to the contractor and subcontractor's employees as a result of the nuclear accident at a nuclear facility that is operated by said company;

ii) Damages caused by the nuclear accident to International Atomic Energy Agency's officials while developing tasks to comply with the safeguards stated in the international agreements signed by the Argentine Republic;

iii) Damages caused by nuclear products when such accidents do not occur within a facility or during transportation, if at the time of the nuclear accident, said products were stolen, lost, jettisoned, or abandoned.

All operators of nuclear power plants shall contribute to a Fund for Decommissioning of Nuclear Power Plants. The funding, management and control of this Fund shall be determined by the National Executive Power.

ARTICLE 10.-As established in Article 11 of this Law, regulation and surveillance of nuclear activities concerning matters defined in Article 7 are submitted to the national jurisdiction.

ARTICLE 11.- Every new site for a relevant nuclear facility shall require a construction license authorizing its location issued by the Nuclear Regulatory Authority and approved by the Provincial Government in whose jurisdiction the new facility is scheduled to be built.

ARTICLE 12.-The National Commission of Atomic Energy shall suggest the location of the repositories for high, medium and low-activity waste. The site shall be approved by the Nuclear Regulatory Authority regarding radiological and nuclear safety, and the Provincial Government in whose jurisdiction the suggested site is located shall pass a law approving the site. Said requirements shall be prior and essential for any approval requests.

ARTICLE 13.-The location of radioactive waste treatment plants and of their corresponding temporary and final repositories managed by the National Commission of Atomic Energy or by the Corporation Nucleoeléctrica Argentina S.A. have in operation at the time this Law is enacted, including their expansion and routes of access by land, sea, air and river, shall require no additional authorization to continue operating, and all deliveries to, or shipments from said repositories, shall not require any special approval from the National Congress or from Municipal or Provincial authorities in whose jurisdiction the repository or routes of access are located.

CHAPTER II
Nuclear Regulatory Authority

ARTICLE 14.-The Nuclear Regulatory Authority shall operate as an autarchic entity within the jurisdiction of the President of the Nation. Said Authority shall succeed the National Board of Nuclear Regulation.

ARTICLE 15.-The Nuclear Regulatory Authority shall hold autarchy and shall have full juridical capacity to act both in Public and Private Law.

Its property shall be constituted by assets to be transferred to the National Board of Nuclear Regulation and by those acquired in the future for any concept. It shall have its headquarters in

the City of Buenos Aires. The Authority shall approve its own organisational structure with prior intervention of the Public Functions Secretariat of the Presidency of the Nation.

ARTICLE 16.-The Nuclear Regulatory Authority shall have the following duties, attributions and obligations:

a) Issuing regulatory standards related to radiological and nuclear safety, physical protection and control of the use of nuclear materials, licensing and surveillance of nuclear facilities, international safeguards and transport of nuclear materials as far as radiological and nuclear safety and physical protection are concerned.

b) Granting, suspending and revoking construction licenses, commissioning, operation and decommissioning of nuclear power plants.

c) Granting, suspending and revoking licenses, permits or authorisations concerning Uranium mining and concentration, safety of research reactors, relevant accelerators, relevant radioactive facilities, including the facilities for waste or radioactive waste management, and nuclear applications in medical and industrial activities.

d) Performing regulatory inspections and evaluations of facilities subject to regulation of the Nuclear Regulatory Authority, with the periodicity it deems necessary.

e) Proposing to the Executive Power the transfer, extension or replacement of a concession for the use of a State-owned nuclear facility whenever there exist elements that advise to do so, or its expiration when based on non-compliance with the rules issued regarding radiological and nuclear safety matters.

f) Bringing civil or criminal lawsuits before the competent courts when licensees or authorisation or permit owners do not comply with what is ruled by this Law, as well as requesting for search warrants and for the aid of the police whenever such actions are deemed necessary to duly exercise the faculties granted by this Law.

g) Applying sanctions, which shall be graded according to the severity of the infringement; such as warnings, fines to be applied according to the severity of the fault and regarding the potential damage involved, suspension of a license, permit or authorisation or their revocation. Said sanctions shall be appealable for the sole purpose of remand before the National Administrative Contentious Court of Appeals.

h) Establishing procedures for the application of sanctions corresponding to the violation of rules issued while exercising its competence, thus ensuring the principle of due process of Law.

i) Disposing the seizure of nuclear or radioactive materials, as well as the preventive closure of facilities subject to regulations of the Nuclear Regulatory Authority, whenever they lack the due license, permit or authorisation, or whenever gross negligences are detected regarding the compliance with radiological and nuclear safety standards or with the protection of facilities.

   In this context, gross negligence means acts involving a serious threat to the safety of the population or to the environmental protection, or whenever the application of physical protection or safeguards measures cannot be guaranteed.

j) Protecting restricted information in order to ensure a trustworthy preservation of technological, commercial or industrial secrets, and an appropriate application of safeguards and of physical protection measures.

k) Establishing, in accordance with international parameters, radiological and nuclear safety standards for overland, river, sea or air transport of nuclear and radioactive materials, and for physical protection of transported materials.

l) Establishing, in accordance with international parameters, radiological and nuclear safety standards related to staff working in nuclear facilities and granting specific licenses, permits and authorisations that qualify for performance of functions subject to licenses, permits or authorisations.

ll) Defining a procedure for consultation with owners of licenses for relevant nuclear facilities whenever new regulatory standards are proposed or the existing ones are modified.

Such procedure shall foresee that modifications to the existing standards and the issuing of new ones are supported by an evaluation criterion based on the cost/benefit ratio arising from the application of the new standard.

m) Evaluating environmental impact produced by any licensed activity, which involves monitoring, analysis and follow-up activities concerning the incidence, evolution or possibility of environmental damage that may arise from the licensed nuclear activity.

n) Submitting an annual report to the National Executive Power and the Honorable National Congress on activities performed, including suggestions about measures to be adopted for the benefit of public interest.

ñ) Requesting information to all license, permit or authorisation owners on topics subject to regulation.

o) In general, performing any other action aimed at achieving a better performance of duties and at accomplishing the purposes of this Law and its regulations.

ARTICLE 17.-The Nuclear Regulatory Authority shall be managed and administered by a Board of Directors of six (6) members as follows: a Chairman, a Vice-Chairman and four (4) voting members.

ARTICLE 18.-Members of the Board of Directors of the Nuclear Regulatory Authority shall be appointed by the Executive Power, two of them as proposed by the House of Deputies and the Senate, respectively. Said members must have a technical and professional background in this field. They shall be entitled to a six (6) year period, and one third of them shall be renewed every two (2) years. They shall only be removed on ground basis by the Executive Power and they may be successively and indefinitely appointed.

In the case of the first appointment, the Executive Power shall fix the term of duration by drawing lots.

ARTICLE 19.-Members of the Board of Directors of the Nuclear Regulatory Authority shall have full-time dedication and shall be subject to incompatibilities in force for public officials.

License, permit or authorisation owners as per this Law and individuals with any direct interest connected with this matter cannot be appointed as members of the Board.

ARTICLE 20.-The Chairman of the Board shall be entitled to such position during a six (6) year period and may be appointed successively and indefinitely for legal periods. He shall be the legal representative of the Nuclear Regulatory Authority. In case of impediment or temporary absence, the Vice-Chairman shall replace him.

ARTICLE 21.-The Board of Directors shall be legally competent with a quorum of four (4) of its members, while one of them must be its Chairman or Vice-Chairman. Its resolutions shall be adopted by simple majority. In case of a draw, the Chairman or the person replacing him shall have a double vote.

ARTICLE 22.-The duties of the Board of Directors of the Nuclear Regulatory Authority shall be:

a) To exercise and to control the fulfilment of statutory rules and regulations governing the Authority's activities.

b) To issue the Board's regulations for its performance.

c) To administer all matters related to the Authority's staff.

d) To prepare annual budgets and to estimate resources to be submitted to the Honorable National Congress through the Executive Power for its approval along with the general budget of the Nation.

e) In general, to perform any other action aimed at a better fulfilment of its duties and at accomplishing the purposes of this Law and its regulations.

ARTICLE 23.-The Nuclear Regulatory Authority shall manage its administrative, financial, proprietary and accounting matters in accordance with the contents of this Law and the regulations issued for such purpose by its Board of Directors. The Authority shall be subject to the public control regime.

ARTICLE 24.-The Nuclear Regulatory Authority shall draft an annual budget proposal that shall be published and submitted to individuals bound to pay the regulatory rate foreseen in Article 26 of this Law, who shall be able to formulate grounded objections within thirty (30) calendar days after such publication.

ARTICLE 25.-Resources of the Nuclear Regulatory Authority shall be made up by the following revenues:

a) Regulatory rate created by Article 26 of this Law.

b) Subsidies, inheritances, legacies donations and transfers received for any concept.

c) Interests and benefits accrued from the Management of its own funds.

d) National Treasury contributions as determined for each fiscal year.

e) Any other funds, assets or resources assigned to it by virtue of applicable laws and regulations.

ARTICLE 26.-Licensees owners of an authorisation or permit, or legal persons whose activities are subject to the control of the Authority shall pay in advance an annual regulatory rate to be approved through the general budget of the Nation.

In the case of nuclear power plants, such annual regulatory rate shall not be higher than a sum equivalent to the annual average price of one hundred megawatt-hour (100 Mw/h) at the Wholesale Electric Power Market, fixed on the basis of prices in force during the previous year. Said sum shall be paid for every megawatt of nuclear nominal power installed capacity until withdrawal of irradiated fuel from the reactor is finished during its decommissioning by the operator in charge of the facility.

Furthermore, new nuclear power plants shall also pay, annually and in advance, regulatory rates corresponding to construction and licensing process, which shall be approved by the Executive Power.

For the rest of licensees that are owners of an authorisation or permit subject to regulation, the Nuclear Regulatory Authority shall establish the corresponding regulatory rates for licensing and inspection, which shall not exceed zero point five percent (0.5%) of their income, or an equivalent indicator of the activity subject to regulation of the previous fiscal year.

Arrears of payment of the rate or fines foreseen in Article 16, item g) shall be automatic and shall accrue punitive interests as established by the enforcement authority. A debt certificate indicating lack of payment issued by the Nuclear Regulatory Authority shall be sufficient to bring an executive lawsuit before the Civil and Commercial Federal Courts.

ARTICLE 27.-Staff of the Nuclear Regulatory Authority shall be submitted to the Labour Contracts Law and to special conditions established in the regulations, while the Basic Juridical Regime for Public Function shall not be applicable.

ARTICLE 28.-The Nuclear Regulatory Authority shall rule according to procedures established in the Administrative Procedure Law and its regulatory provisions as regards its relations with individuals and with Public Administration.

ARTICLE 29.-Whenever, as a result of instituting legal procedures on own initiative or as a result of denunciation by third parties, the Nuclear Regulatory Authority considers that any act by a nuclear facility licensee, by an authorisation or permit owner, or by a legal person somehow subject to regulation and control as well as by those using or producing nuclear technology or managing nuclear wastes violate this Law, its regulations or resolutions issued by the Nuclear Regulatory Authority, it shall notify all interested parties, being said Authority empowered to take preventive actions as deemed necessary prior to solving the existence of such violation.

CHAPTER III
Definitions

ARTICLE 30.-As used in this Law, the following terms shall have the definitions assigned to them hereunder:

a) ***Nuclear activities:*** Use of nuclear transmutations at a macroscopic scale.

b) ***Nuclear material:*** Plutonium 239, Uranium 233, Uranium 235, Uranium enriched in Isotopes 235 or 233, Uranium containing an isotopic mix equal to the one found in nature, Uranium depleted in Isotope 235, Thorium with nuclear purity or any material containing one or more of the above.

c) ***Nuclear facility:*** Concept understood in the terms defined by Article 1, item j, of the Vienna Convention on Civil Liability for Nuclear Damage approved by Law Nº 17048.

d) ***Relevant nuclear facility:*** It includes nuclear reactor, critical facility, relevant radioactive facility and relevant accelerator, as defined or to be defined by the Nuclear Regulatory Authority.

e) ***Restricted information:*** Any information delivered by an applicant or by a license, permit or authorisation owner to the Nuclear Regulatory Authority that is to be treated confidentially in virtue of legal or contractual obligations assumed by them or related to:

I. Processes and technologies for the production of special fissionable material;

II. Specific application of safeguards;

III. Specific protection systems applied in nuclear facilities.

f) ***Special fissionable material:*** Plutonium, Uranium 233, Uranium enriched in Isotopes 235 or 233 and any other material containing one or more of the above mentioned elements.

g) ***Production of special fissionable material:*** Chemical separation of special fissionable material from other substances or production of special fissionable materials by means of isotopic separation methods.

CHAPTER IV
General Provisions

ARTICLE 31.-The responsibility for nuclear and radiological safety, safeguards and physical protection remains unfailingly with the license, permit or authorisation owner. Fulfilment of this Law and of rules and requirements arising from them do not exempt him from such liability or from doing everything that may be reasonable and consistent with his possibilities in favour of radiological and nuclear safety, safeguards and physical protection.
The license, permit or authorisation owner may totally or partially delegate the execution of the tasks, but he still keeps the entire responsibility established in this Article.

ARTICLE 32.-The National Government shall be the sole owner of special fissionable materials contained in irradiated fuel elements when activities encompassed by this Law are performed, as well as of any special fissionable materials admitted or developed in the country.

ARTICLE 33.-Articles 2, 5, 9, 11, 16 and 17 of Decree-Law Nº 22498, dated 19 December 1956, are annuled.

CHAPTER V
Privatisations

ARTICLE 34.-It is declared as subject to privatisation nuclear power generation activity performed by the Corporation "Nucleoeléctrica Argentina Sociedad Anónima (Nucleoeléctrica Argentina S.A.)", as an indivisible productive unity, either directly or in association with other entities, including its various aspects (construction, commissioning, operation, maintenance, decommissioning of nuclear power plants), as well as management and execution of nuclear power plant construction being performed by the Corporation "Empresa Nuclear Argentina de Centrales Eléctricas Sociedad Anónima (ENACE S.A)".

This privatisation shall ensure the completion of the nuclear power plant, currently under construction, within a maximum term of six (6) years after the enactment of this Law.

ARTICLE 35.-"Nucleoeléctrica Argentina Sociedad Anónima (Nucleoeléctrica Argentina S.A.)", or the society constituted for the execution of privatisation authorized in the previous article, shall maintain up to twenty per cent (20%) of its capital and at least one (1) share as property of the National Government, and their possession as well as the exercise of corporate rights shall remain with the Ministry of Economy and Public Works and Services.

The company´s employees shall receive from said capital the percentage that shall be fixed in the framework of the programme of participated property foreseen in Law Nº 23696.

The National Government shall be the permanent owner of one (1) share of the society and its affirmative vote shall be required to take any decisions related to:

a) An expansion of capacity of an existing nuclear power plant and/or the construction of a new one.

b) Decommissioning for non-technical causes of a nuclear power plant, either temporarily or definitively.

ARTICLE 36.-Activities related to nuclear fuel cycle aimed at nuclear power generation, either at an industrial or research scale, and at the production and applications of radioisotopes and radiation presently performed by the National Commission of Atomic Energy, either directly or in association with other entities, are declared as subject to privatisation, considering them both as a whole or as any of their constituent parts.

ARTICLE 37.- Corporations shall be constituted for the purpose of the privatisations mentioned in Article 36, and the National Government shall hold at least one (1) share and the right to veto any decisions involving discontinuation of such activities.

ARTICLE 38.-The licensee of the nuclear power plants or the corporation created for the purpose of privatisation authorised by Article 34 shall hire its supply of heavy water from the Industrial Plant for the Production of Heavy Water ("Planta Industrial de Agua Pesada - PIAP") installed in Argentina and shall be responsible for the restitution of heavy water hired for Embalse Nuclear Power Plant, according to technical quality features and prices of the international market.

ARTICLE 39.-Privatisation processes authorised in this Chapter shall be subject to conditions established by Law Nº 23696, by Article 96 of Law Nº 24065, by Article 14 of Law Nº 24629 and by this Law.

ARTICLE 40.-Nuclear Power Plants shall use nuclear fuel originated or elaborated from radioactive minerals of mines located in the country.

ARTICLE 41.-This Law shall be enforced as from the date of its publication in the Official Bulletin.

ARTICLE 42.-To be communicated to the Executive Power.

L.1.3.2 Law Nº 25018/98 National Law on Radioactive Waste Management Regime

General Provisions

ARTICLE 1.- This law sets forth the basic instruments for an adequate radioactive waste management that, in this aspect, assure the protection of the environment, public health and the rights of posterity.

ARTICLE 2.-For the purpose of the present law, Radioactive Waste Management means the ensemble of the necessary activities to isolate from the biosphere radioactive waste derived exclusively from the nuclear activity performed in the Argentine territory, the time required for the decay of its radioactivity to such a level that its possible re-entrance to the biosphere does not imply risks for man and his environment. Such activities will have to be performed in complete agreement with the limits established by the NUCLEAR REGULATORY AUTHORITY and with all the corresponding national, provincial and City of Buenos Aires regulations as well as with the international agreements.

ARTICLE 3.-For the purpose of this law, radioactive waste means all radioactive material, combined or not with non-radioactive material, which has been used in productive processes or applications, for which no immediate subsequent uses are foreseen in the same facility, and which, because of its radiological characteristics, cannot be dispersed in the environment in accordance with the limits established by the NUCLEAR REGULATORY AUTHORITY.

ARTICLE 4.-The NATIONAL COMMISSION OF ATOMIC ENERGY (CNEA) is the enforcement authority of this law and will co-ordinate everything related to its application with the provinces or the City of Buenos Aires, as may correspond.

ARTICLE 5.-In all the activities of radioactive waste management the NATIONAL COMMISSION OF ATOMIC ENERGY will have to comply with regulatory standards referred to radiological and nuclear safety, physical and environmental protection and international safeguards established by the NUCLEAR REGULATORY AUTHORITY and with all the corresponding national, provincial and City of Buenos Aires regulations.

Responsibility and Transference

ARTICLE 6.-The National State, through the enforcement authority of the present Law, shall assume the responsibility of the radioactive waste management. The generators of radioactive waste will have to provide the necessary resources to undertake it in due time and manner. The generator shall be responsible for the safe conditioning and storage of the waste generated by the facility operated by him, in compliance with the conditions determined by the enforcement authority, until its transference to the NATIONAL COMMISSION OF ATOMIC ENERGY, and

shall notify the NUCLEAR REGULATORY AUTHORITY immediately about any situation that could lead to an incident, accident or operation failure.

ARTICLE 7.-The NATIONAL COMMISSION OF ATOMIC ENERGY shall establish the radioactive waste acceptance criteria and transference conditions that are necessary to assume its responsibility, and these will have to be approved by the NUCLEAR REGULATORY AUTHORITY.

ARTICLE 8.-The transference to the NATIONAL COMMISSION OF ATOMIC ENERGY of radioactive wastes, particularly irradiated fuel elements, will be done at the time and according to the procedures determined by the NATIONAL COMMISSION OF ATOMIC ENERGY with the prior approval by the NUCLEAR REGULATORY AUTHORITY. Under no circumstances the operator of the generating facility will be released from the responsibility in case of eventual civil and / or environmental damages until the transfer of radioactive waste has been accomplished.

ARTICLE 9.-The NATIONAL COMMISSION OF ATOMIC ENERGY, must prepare, within a term of SIX (6) months as from the enacting of the present Law, to be updated every THREE (3) years, a Strategic Plan for Radioactive Waste Management which will include the National Programme of Radioactive Waste Management created by Article 10 of the present Law. This Plan and its updated versions will be forwarded to the NATIONAL EXECUTIVE POWER who, after consulting with the NUCLEAR REGULATORY AUTHORITY, will send it to the NATIONAL CONGRESS for its enactment.

Likewise, it will annually present to the National Congress a report on the tasks performed, the progress of the strategic plan and the need of its update.

National Program of Radioactive Waste Management

ARTICLE 10.-The NATIONAL COMMISSION OF ATOMIC ENERGY through the National Programme of Radioactive Waste Management created by this Law must:

a. Design the strategy of radioactive waste management for the Argentine Republic and the places under its jurisdiction.
b. Propose the research and development lines related to technologies and methods of radioactive waste management of high, intermediate and low level.
c. Plan, co-ordinate, execute and assign the necessary funds, and control the execution of research and development projects related to radioactive waste management.
d. Study the need to establish repositories and facilities for the management of wastes of high, intermediate and low level generated by nuclear activity of the public or private sector.
e. Promote studies on safety and preservation of the environment.
f. Project and operate the systems, equipment, facilities and repositories for the management of wastes of high, intermediate and low level generated by nuclear activity of the public or private sector.
g. Construct, by itself or by third parties, the systems, equipment, facilities and repositories for the management of waste of high, intermediate and low level generated by nuclear activity of the public or private sector.
h. Propose the acceptance criteria and transference conditions of radioactive waste for the repositories of high, intermediate and low level.
i. Determine the procedures for the collection, segregation, characterisation, treatment, conditioning, transport, storage and final disposal of radioactive wastes.

j. Manage the waste originated by the nuclear activity of the public or private sector, including those generated at the closure of facilities, those derived from uranium mining and those originated in abandoned mining deposits and out of service industrial plants.
k. Implement, maintain and operate an information and recording system containing the documentation to allow the identification in a reliable and continuous form of the waste generators and transporters and other participants in all the stages of the management. It must also include the inventory of all radioactive waste existing in the country. Copies of the documentation, corresponding to their respective jurisdiction, must be forwarded to the competent authorities of the provinces and the City of Buenos Aires for their information.
l. Prepare contingency plans for incidents, accidents or operation failures and evacuation programmes for emergencies.
m. Permanently inform the community about the scientific and technological aspects of radioactive waste management.
n. Exercise the long term responsibility on the radioactive waste repositories.
o. In the case of a nuclear emergency act as a support to the services of civil protection in the manner and circumstances that may be required.
p. Perform the necessary technical and financial studies, taking into account the deferred costs derived from radioactive waste management, with the objective to establish the adequate economic policy.
q. Perform any other activity needed to comply with the objectives of the management.

ARTICLE 11.- The National Programme of Radioactive Waste Management will incorporate the recovery of the sites affected by the activities of extraction, grinding, concentration, treatment and elaboration of radioactive minerals originated in exploitation deposits and their respective manufacturing plants, as well as from abandoned mining deposits or out of service industrial plants.

The application of the principle “as low as possible environmental impact” must be integrated with complementary programmes of sustainable development for directly affected communities and shall continue under the evaluation procedures of environmental impact determined by the provinces or the City of Buenos Aires, as may correspond.

ARTICLE 12.- In the case that the NATIONAL COMMISSION OF ATOMIC ENERGY proposes the need to locate facilities for the final disposal of radioactive waste of high, intermediate or low level, the selected sites will have to be previously approved as an essential requisite by the law of the province or the City of Buenos Aires, as may correspond, in agreement of the NUCLEAR REGULATORY AUTHORITY.

For this purpose, the corresponding studies of environmental feasibility will have to be undertaken containing a description of the proposal and of the direct and indirect potential effects that it could cause to the environment, indicating in this case the adequate measures to avoid or minimise the risks and / or negative consequences and informing about the scopes, risks and benefits of the project.

A public hearing shall be called with a notice of no less than TEN (10) calendar days, through a media of regional circulation giving the pertinent information related to the future site.

Financing of Radioactive Waste Management

ARTICLE 13.-This Law creates the Fund for the Management and Final Disposal of Radioactive Waste to be constituted when this Law is enacted and whose exclusive destiny will

be the financing of the National Programme of Radioactive Waste Management under the responsibility of the NATIONAL COMMISSION OF ATOMIC ENERGY.

Said Fund will be integrated with the contributions of the radioactive waste generators in the form to be determined by the regulation, according to Article 10, item p) of this Law respecting the principles of equity and equilibrium according to the nature, volume and other characteristics of the generation. Such contributions will be integrated at the shortest term as from the generation of the corresponding wastes.

ARTICLE 14.- Taking into account the existence of deferred costs in the radioactive waste management, the National Congress will promulgate a law regulating the administration and control of the fund foreseen in Article 13 of this Law.

ARTICLE 15.- This Law revokes the Fund for Final Repositories of High Activity Nuclear Wastes created by Decree Nº 1540/94. The existing resources shall be transferred to the Fund established by this Law.

ARTICLE 16.- To be communicated to the Executive Power.

L.1.4. *Standards for the Nuclear Regulatory Authority with reference to the National Report*

STANDARD AR 0.0.1. Revision 2
Licensing of Type I facilities.

STANDARD AR 0.11.1. Revision 3
Licensing of the staff of Type I facilities

STANDARD AR 0.11.2. Revision 2
Psychophysical aptitude requirements for specific authorizations

STANDARD AR 0.11.3. Revision 1
Re-training of the staff of Type I facilities

STANDARD AR 2.12.1. Revision 0
Radiological safety criteria for the management of radioactive waste generated by mining industrial facilities

STANDARD AR 3.1.1. Revision 2
Occupational exposure in nuclear power reactors

STANDARD AR 3.1.2. Revision 2
Radioactive effluent limitation in nuclear power reactors

STANDARD AR 3.1.3. Revision 2
Radiological criteria related to accidents in nuclear power reactors

STANDARD AR 3.2.1. Revision 2
General safety criteria for the design of nuclear power reactors

STANDARD AR 3.2.3. Revision 2
Nuclear power reactors fire protection

STANDARD AR 3.3.4. Revision 1
Nuclear power reactors fuel performance

STANDARD AR 3.6.1. Revision 2
Nuclear power reactors quality system

STANDARD AR 3.8.1. Revision 1
Nuclear power reactors commissioning

STANDARD AR 3.9.1. Revision 1
General safety criteria for the operation of nuclear power reactors

STANDARD AR 3.17.1. Revision 2
Nuclear power reactors decommissioning

STANDARD AR 4.1.1. Revision 0
Occupational exposure in nuclear research reactors

STANDARD AR 4.1.2. Revision 1
Limitation of radioactive effluents from nuclear research reactors

STANDARD AR 4.1.3. Revision 2
Radiological criteria related to accidents in nuclear research reactors

STANDARD AR 4.2.3. Revision 2
Research reactors fire protection

STANDARD AR 4.8.1. Revision 1
Critical assemblies commissioning

STANDARD AR 4.8.2. Revision 1
Research reactors commissioning

STANDARD AR 4.9.1. Revision 1
Critical assemblies operation

STANDARD AR 4.9.2. Revision 2
Research reactors operation

STANDARD AR 6.1.1. Revision 1
Occupational exposure in Type I radioactive facilities

STANDARD AR 6.1.2. Revision 1
Limitation of radioactive effluents in Type I radioactive facilities

STANDARD AR 10.1.1. Revision 3
Basic radiological safety standard

STANDARD AR 10.12.1. Revision 2
Radioactive Waste Management

STANDARD AR 10.13.1. Revision 1
Basic standards on physical protection of nuclear materials and facilities

STANDARD AR 10.13.2. Revision 0
Physical safety standard for sealed sources

STANDARD AR 10.14.1. Revision 0
Assurance of non deviation of nuclear materials and of materials, facilities and equipment of nuclear interest.

STANDARD AR 10.16.1. Revision 1
Transport of radioactive materials

L.1.5 Quality Assurance Manual

The list of the code, title and summary of the 42 operative procedures that are part of the 60 procedures of the quality assurance system of the PNGRR (see F.3.3. *Table 8 – General Quality Assurance Program Status)* is the following:

GR-IC-PN-020 Revision 1
Instruction and training plan for the licensing of the staff in the radioactive waste management area at the Ezeiza Atomic Center (AGE)

Description in detail of the training plan of the staff that will cover positions that require a license in the operation of the facilities, equipment and devices at the AGE (Ezeiza Management Area).

GR-IC-PN-021 Revision 1
Code of Practice in the radioactive waste management area at the Ezeiza Atomic Center (AGE)

Determination of the responsibilities, attributions and obligations of the staff that works at the Ezeiza Management Area (AGE), as well as the general procedures to be respected for the operation of the area.

GR-IC-PN-022 Revision 1
Monitoring Plan of the radioactive waste management area of the Ezeiza Atomic Center (AGE)

Determination of the routines for sample taking, measurement and evaluations for the verification of the isolation of the radio nuclides and the protection of the staff, the public in general and the environment.

PO-00P3C-001 Revision 0
Emergency procedures applicable to the activities in the radioactive waste management area of the Ezeiza Atomic Center (AGE)

Description of abnormal situations that may be foreseen in the different AGE facilities and of the respective counter-proceedings in order to mitigate their consequences.

GR-IS-IF-024 Revision 1
Description of the facilities at the radioactive waste management area at the Ezeiza Atomic Center (AGE)

Description of the different facilities of the AGE, their location and operative capacity.

IS-14-RZ-50 Revision 1
Final Report on the Safety of the temporary storage deposit for radioactive sources and wastes

Determines the safety criteria applied for the design, construction and operation of the temporary storage deposit for radioactive sources and wastes.

GR-IS-PO-052 Revision 0
Procedure for the operation of the semi-containment system for solid radioactive wastes

Determines the procedure for the final disposal of packages containing solid low activity radioactive waste.

GR-IS-PO-053 Revision 0
Procedure for the operation of the semi-containment system for liquid radioactive waste

Determines the evacuation procedure of liquid low activity radioactive waste in the semi-containment system of liquid radioactive waste at the AGE.

GR-IS-PO-054 Revision 0
Procedure for the operation of the final disposal system for structural radioactive waste and sealed sources

Determines the final disposal procedure of solid low activity structural radioactive waste in the final disposal system for structural radioactive wastes and sealed sources at the AGE.

GR-IS-PO-055 Revision 1
Procedure for the final disposal of biological radioactive wastes under conditioned deregulation

Determines the practice methodology for the final disposal of solid biological radioactive wastes considered as conditioned deregulated.

GR-IS-PO-057 Revision 1
Procedure for the conditioning of sealed sources in disuse

Determines the practice methodology to proceed to the conditioning of sealed sources, as from their reception until their temporary storage or final disposal, as may correspond.

GR-IC-IF-060 Revision 0
Report on the protection against fire in the radioactive waste management area of the Ezeiza Atomic Center (AGE)

Analyzes the different AGE facilities in relation to the existence of combustible materials and their fire load, determining the characteristics of the mitigation systems.

GR-IC-IF-062 Revision 1
Characterization of the location of the radioactive waste management area at the Ezeiza Atomic Center (AGE)

Describes the characteristics of the location of the radioactive waste management area at the Ezeiza Atomic Center (AGE).

GR-IS-PO-064 Revision 1
Procedure for the operation of the Handling Yard and stowage of packages

Determines the mechanism for the verification, admission, manipulation of packages in the Handling Yard and stowage of packages at the AGE.

PO14RZ26 Revision 2
Procedure for the inspections and control tests associated with the radioactive waste management at the AGE

Determines the procedure for the inspection and control tests for the verification of the acceptance requirements determined for the not conditioned and conditioned packages of low and intermediate activity wastes in their different management stages.

PON14RZ27 Revision 1
Service request and acceptance requirement for low and intermediate activity radioactive waste management at the AGE

Determines the guidelines for the service request for radioactive waste management and the requirements for the acceptance of the packages containing low and intermediate activity radioactive wastes, for posterior management at the AGE.

PO14RZ28 Revision 0
Procedure for the radiological monitoring of trucks loaded with urban waste

Determines the activities to perform the radiological monitoring of trucks loaded with urban waste.

PO14RZ29 Revision 2
Proceedings for the documentation originated by the radioactive waste management and sealed sources in disuse that are admitted at the AGE

Determines the mechanism for the proceedings of the documentation originated during the collection services as well as during the treatment, conditioning and location operations of the radioactive wastes admitted at the AGE.

PO14RZ30 Revision 1
Procedure for the collection, transport and transference of liquid radioactive wastes denominated *tellurides*

Determines the procedure for the collection, internal transport and transference of liquid radioactive waste produced by the Radioisotope Production Plant denominated *tellurides.*

GR-IS-PR-007 Revision 1
Procedure for the transport of spent fuels and irradiated control bars between the RA 3 reactor and the Central Deposit for Irradiated Special Fissionable Material

Describes the conditions, operations and documentation to be prepared in case of transferring the spent fuels and the control bars.

GR-IS-RQ-008 Revision 3
Acceptance conditions for the transport of solid radioactive waste

Determines the acceptance conditions for the transport of packages containing solid radioactive waste.

GR-IS-IN-015 Revision 1
Access conditions for individuals and vehicles to the radioactive waste management area at the Ezeiza Atomic Center (AGE)

Determines the acceptance conditions: identification of individuals and vehicles, radioactive material transport equipment, registry and filing, for the access to the AGE.

PO14RZ16 Revision 2
Compacting procedure for low activity solid radioactive wastes

Determines the conditions and requirements of the compacting activities of low activity solid radioactive waste.

DD-SNA03C-001 Revision 3
Missions, tasks and requirements of the "Radioactive Waste Management" Area of the Ezeiza Atomic Center

Determines the missions and tasks of the operative positions and the requirements to be complied in order to perform the specific tasks corresponding to the "Radioactive Waste Management" Area.

PO14RZ19 Revision 2
Procedure for the conditioning, long term storage of Radon 226 sources in disuse

Determines the requirements and conditions that must be complied for the conditioning, long term storage of Radon 226 sources in disuse that are admitted at the AGE.

PO-00P3D-001 Revision 1
General Requirements for the final disposal of low activity conditioned radioactive waste

Determines the general requirements that must be complied by the low activity conditioned radioactive wastes for their final disposal.

PO-00P3D-002 Revision 1
Acceptance conditions of drums containing radioactive liquid wastes cemented for final disposal

Determines the acceptance requirements and conditions for low level liquid wastes immobilized by cementation for their final disposal.

PO-00P3D-003 Revision 1
Cementation process conditions used for the immobilization of low level liquid radioactive wastes generated by the CNA I

Determines the cementation process conditions at the Atucha I Nuclear Power Plant, for the immobilization of sludge or liquid radioactive wastes, in order to comply with the requirements determined by the PNGRR.

PO-00P3D-004 Revision 1
Acceptance conditions for the transport of low level solid radioactive waste

Determines the requirements and conditions to be complied for the transport of low level solid radioactive waste.

PO-00P3D-005 Revision 1
Adjustment procedure at the plant of lab developed formulations for the immobilization of liquid waste

Determines the adjustment procedure at the plant of lab developed formulation for the immobilization of low level concentrated or sludge liquid wastes, in order that the solidified product complies with the general requirements (PO-00P3D-001) and with the acceptance conditions (PO-00P3D-002) determined by the PNGRR for the final disposal in the repositories to be determined in due time.

PO-00P3D-006 Revision 1
Documentation with reference to the immobilization of low activity level radioactive waste generated at CNA I

Confirm all controls inherent to the cementation process of low level liquid wastes generated by the CNA I, by means of a series of forms used as documents, in order to guarantee that the characteristics of the conditioned product respond to the acceptance conditions for their final disposal.

PO-00P3D-007 Revision 1
Requirements and controls of the components of the cementing matrix in the immobilization of liquid radioactive wastes

Determines the requirements and controls to be complied by the different materials to be used in the formulation of the cementing matrix, prepared during the immobilization of low activity liquid wastes generated at the CNA I.

PO-00P3D-008 Revision 1
Requirements for the reception and storage of materials used in the immobilization of liquid radioactive wastes

Determines the criteria for the reception and storage of materials to be used in the cementation process of low level liquid wastes generated at the CNA I, as well as of those used in the preparation of the interior linings of the drums.

PO-00P3D-009 Revision 1
Requirements and controls for the components of the concrete layering of the drums for the immobilization of liquid radioactive wastes

Determines the requirements and controls to which the materials to be used in the manufacturing of the layering of the drums must be submitted.

PO-00P3D-010 Revision 1
Manufacturing of the layering for the drums

Determines the manufacturing process for the layering of the drums to be used in the immobilization process of low activity wastes generated at the CNA I.

PO-OOP3D-011 Revision 1
Operation and inspection stages during the cementation process of low level liquid radioactive wastes

Determines the development of activities for the operations and inspection of the PNGRR during the different stages of the immobilization process of low level liquid wastes generated at the CNA I.

PO-OOP3D-012 Revision 1
Control of the layering of the drums

Determines the conditions under which it is considered that the fresh mix has reached the required characteristics.

PO-OOP3D-013 Revision 1
Mix conditions

Determines the conditions under which it is considered that the fresh mix has reached the required characteristics.

PO-OOP3D-014 Revision 1
Control of the fresh mix and sampling

Determines the procedure to determine the properties of the fresh mix in order to optimize the quality of the final product and the sampling methodology for the manufacturing of test tubes to be used in the product characterization

PO-OOP3D-015 Revision 1
Hardened product control

Determines the procedure to determine the properties of the hardened product that must be controlled in the storage area

PO-O3E-001 Revision 0
Preparation of the Eu-152 patron

Obtain an extended source to calibrate the geometry of homogeneous packages of a gamma explorer, by segments.

PO-O3E-002 Revision 0
Determination of the total alpha activity concentration in CNAI resins. Uncertainty calculation and recommendations on the expression of the final result

Describes the method used to determine the concentration of the total alpha activity in organic ionic exchange resins, uncertainty calculation and recommendations on the expression of the final result.

L.1.6 Emergency Plans

PN00O011 Revision 0
Emergency and evacuation plan of the CNEA facilities

Determines the methodology and requirements to be complied by each nuclear facility of the CNEA for the control of emergency situations, in order to protect lives and property, mitigate consequences and minimize the operation failure of the facilities.

PG 14 OZ 15 - Revision 0
Emergency and evacuation plan for the Ezeiza Atomic Center

Determines the guidelines for the organization and standardization of the behaviour of the sections and staff in such a manner that in case of emergency situations they are prepared to act correctly and with precision

PG 13 O 006 - Revision 0
General emergency and evacuation plan for the Constituyentes Atomic Center

Determines the guidelines to organize and standardize the behaviour of the sections and staff in such a manner that in case of emergency situations they are prepared to act correctly and with precision

PG 12 S 100 - Revision 4
Emergency Plan for the Bariloche Atomic Center

Determines the guidelines to organize and standardize the behaviour of the sections and staff in such a manner that in case of emergency situations they are prepared to act correctly and with precision.

PN 00 51 Revision 0
Guidelines for the preparation of the Evacuation Plan of the Buildings of the CNEA

Determines the general guidelines for the implementation of the Evacuation Plan in buildings, adapting it to the characteristics of the persons therein and the tasks they perform.

L.2 Safety re-evaluation at the Ezeiza Radioactive Waste Management Area (AGE)

L.2.1 Performed activities

The activities performed in the 2005-2007 period for the safety re-evaluation process of the *Semi-containment Systems for Low Level Solid Radioactive Wastes* Nº 1 and Nº 2 of the AGE, are the following:

- Sampling of the water from new and pre-existing wells to measure the total gamma activity and the contents of natural uranium and tritium in aquifers.

- Measuring devices for the constant level of the three aquifers of the characterized system have been installed. Periodical measurements of the level with portable instruments (probe) have also been carried out.

- Monthly measurements in situ of parameters such as pH, temperature and conductivity at the aquifers of the area have been performed

- "Batch" type studies were carried out to estimate the distribution coefficients (K_d) of different radio nuclides of interest (U, Pu, Cs, Co and Sr) in soil samples from the AGE.

- New monitoring wells have been built for the subsurface aquifer to increase the density of the information improving the definition of the contaminating element and for the sampling of sediments in order to obtain stratigraphic characteristics.

- A social economic survey has been carried out to evaluate the demographic projection for a 10Km radium around the AGE.

- A conceptual flow model has been defined for the ground water and for the transport of radio nuclides. The behaviour of the hydrological system has been evaluated and the possible movement of the involved species.

- The Safety Re-evaluation has been concluded for the trenches of solid wastes Nº 1 and Nº 2 of the AGE: characterization of the wastes of the final disposal systems, determination of the source term, development of exposure routes and scenarios, application of a numerical model for the underground water flow (visual MODFLOW), interpretation of the results and analysis of the consequences.

L.2.2 Planned Activities

The above activities have complied with the objective that has been initially proposed, that is, the safety re-evaluation of the T1 and T2 Systems. The present objective is to conclude the AGE re-evaluation, taking into consideration the other disposal systems. With this objective the tasks will be performed according to the following chronogram:

First semester 2008:

In order to make progress in the AGE characterization process and improve the evaluation results of the facilities, the following tasks will be performed:

- New perforations will be made, 7 (seven) at the underground aquifer and 1 (one) at the Pampa aquifer. The older existing perforations at the AGE (29) will be subject to cleaning and development works. Adequate lids will also be provided and platforms will be built at the bases to avoid any damage during any other tasks to be carried out in the sector.

- Installation of an automatic meteorological station to obtain AGE related data

- Continuation of the routine monitoring tasks:

  - Water sampling in new and pre-existing wells to measure total gamma activity and the contents of natural uranium, tritium and other radio-nuclides of interest in aquifers
  - Aquifer level measurement by means of constant level meters and portable probe
  - Monthly measurements in situ of parameters such as pH, temperature and conductivity in the aquifers of the area

As first stage of the safety re-evaluation, the historical wastes disposed of in the systems to be evaluated will be characterized, adjusting and updating the radioactive inventories when required. Those wastes disposed of before the issue of the licence of the facilities (1995) are considered to be historical.

The final disposal systems belonging to the AGE that will be evaluated in this second stage are the following:

- Semi-containment system of liquid radioactive waste
- Structural solid radioactive waste disposal facilities and sealed sources
- Trans-uranium shaft
- Structural and biological shaft

Second semester 2008:

- Analysis of each facility in particular. Use history. Surrounding environmental conditions. Relationship with the aquifers and the non saturated area. Constructive characteristics of the facilities.
- Adapting of the new conditions to the flow and transport model

Year 2009

Safety re-evaluation of each facility:

- Determination of the source term
- Development and justification of scenarios and exposure routes
- Application of the numerical ground water flow and radio nuclide transport model (Visual MODFLOW)
- Interpretation of the results and analysis of consequences

L.3 Training and Instruction

L.3.1 Training of the staff

The training of the staff is a permanent activity within the PNGRR. The attendance and participation of the CNEA staff in courses, seminaries and training at universities and other scientific and technical organizations is fostered.

For some issues in particular the training at organizations abroad has been implemented, through scientific visits, training and attendance at courses and seminaries. This activity has been financed mainly through the International Atomic Energy Agency (IAEA), without any expense for the National Treasury.

As example, for the year 2007 we may mention the following:

- Scientific visit to the low and intermediate activity radioactive waste repository in "El Cabril", Spain, owned by ENRESA, in the month of May.

- Training stay for two young professionals through the Manpower project, for a period of one month at the "Australian Nuclear Science and Technology Organisation (ANSTO)", Australia, from 2 to 27 July, receiving training on spent fuel management from research reactors

- Course organized by the IAEA denominated "C7-INT-9/173 Interregional Training Course on Concepts of Underground Research Facilities, Transport and Retardation Processes in Fractured Rocks" in Meiringen, Switzerland, October 15 – 24.

- In company training at Consultores Ortega García, in Valencia, Spain, with the object to progress in the conceptual design of the Geographic Information System (SIG) of the PNGRR, September 23-29.

- Scientific visit at the Angra II Electronuclear Nuclear Power Plant, Angra, Brazil, July 1-4, to attend the spent ionic exchange resin bituminization campaign in order to extend the information on the existing experiences in the use of the mentioned process, that was foreseen for the Atucha II Nuclear Power Plant.

- Training course of Water Quality Management in Experimental Reactors and Spent Fuel Storage Facilities, organized by the IAEA, at the Jozef Stefan Institute, in Ljubljana, Slovenia, December 10-14.

The following are some examples of the training courses given in the country, in which the participation of the staff has been stimulated:

- Training Course on "Geographic Information Systems Level I", at the Geographic Sciences Training Center (IGM).

- Training Course on "Geographic Information Systems Level II", at the Geographic Sciences Training Center (IGM).

- Training Course on "Digital Processing of Satellite Images Level I" at the Geographic Sciences Training Center (IGM).

- Training Course "PASI: Pan American Advanced Studies Institute on Interfacial Fluid Dynamics: From Theory to Applications" organized by UNCPBA (ARG), National

Science Foundation (USA); U.S. DOE (USA), New Jersey Institute of Technology (USA), Conicet (ARG), ANPCyT (ARG).

- Course on "Methodology and Application of Radio nuclides" UNSM (National University of San Martín) – CNEA - Dan Beninson Institute.

- Professional Updating Course "Image Interpretation Principles for the Analysis of Natural Resources and Uses of the Earth" Photo Interpretation Laboratory. School of Agronomy. University of Buenos Aires. Buenos Aires.

- Postgraduate Course "Underground Hydrology" corresponding to the Master in Irrigation and Drainage. School of Agrarian Sciences. University of Cuyo, Mendoza.

- Postgraduate Course "Modelling of the Dispersion of Contaminants in Soil, Water and Air", Professor Jorge A. Sábato Institute. UNSAM, Buenos Aires.

- Radiological Protection Course – Technical Level given by the ARN at the CAE, Buenos Aires.

- Course on the "Implementation of the ISO 9001:2000 Standard" given by the CNEA.

L.3.2 Conferences, seminars, technical meetings and workshops

With the object to keep the knowledge in the different disciplines related to the specific issued updated and to promote the exchange of information, the members of the staff of the CNEA have participated in the following events:

L.3.2.1 National

- "Environmental Monitoring of the Waters of the Tonco-Amblayo deposits, in the province of Salta" CONAGUA 2007.

- Autumn 2007 Meeting of the Nuclear Fuel Cycle Management; CAC - CNEA.

- Spring 2007 Meeting of the Nuclear Fuel Cycle Management; CAC - CNEA.

- Seminar "Energetic Technologies without Greenhouse Effect Gas Emissions" Master in Energy Management. IEDS-CNEA. Buenos Aires.

- Workshop: "Design and Analysis of Data Bases and Application of Contaminant Transport Models." CAC-CNEA – UNSAM. Buenos Aires.

- Second workshop organized by the PNGRR on "Conceptual and Numerical Modelling for Radioactive Waste Repositories: Theoretical and Experimental Studies for Site Selection" CNEA, Buenos Aires.

- "Seventh Metallurgy and Materials Congress SAN/CONAMET 2007", San Nicolás.

- "XXXIV Annual AATN Meeting", Buenos Aires, Argentina.

L.3.2.2. International

- Conference on Fuel Management from Research Reactors (RRFM2007), March 11 – 15 2007.

- First Coordination Meeting IAEA TC Project RLA/4/020, CAC – CNEA, Buenos Aires, March 26 – 30, 2007.

- IAEA Technical Meeting "Remediation Technologies Applied to Uranium Mining Projects", San Rafael, Mendoza, Argentina, December 10-14.

- Corrosion NACExpo 2007, 62th. Annual Conference, NACE International, The Corrosion Society, Nashville, Tennessee, USA, March 11-15.

- "International Radioactive Waste Technical Committee (WATEC) 2007 (7^{th}) Meeting."

- ASME Conference PVP2007, Session: OAC-2-6 Packaging Materials – 2, San Antonio, TX, USA, July 23-27.

- "International Rilem Workshop on Integral Service Life Modelling of Concrete Structures." Guimaraes, Portugal.

- MRS2007, Symposium on the Scientific Basis for Nuclear Waste Management XXXI, Vol. 0985-NN08-09, Sheffield – England, September 16 – 23, 2007.

- "Public communication activities related to radioactive waste repository workshop", organized by the IAEA and the CDTN, Belo Horizonte, Brazil, September 24 – 28.

L.4 Agreements

Two international agreements continue in force, and a new cooperation agreement has been signed, with the object to facilitate the access to the experience achieved in other countries.

L.4.1. International Agreements

- Agreement with the Department of Energy of the USA, for the technical exchange and cooperation in the area of radioactive and mixed waste management. It is in force since May 1996, for ten years. In the year 2006, this agreement has not been renewed. By recommendation of the USDOE, an Agreement has been subscribed with the Lawrence Berkley National Laboratory in order to maintain the technical advice from the same expert in the environmental characterization project of the Ezeiza Management Area, in order to complete the safety re-evaluation of the site.

- Agreement with the Empresa Nacional de Residuos Radiactivos S.A. (ENRESA), Kingdom of Spain, for the cooperation in the field of radioactive waste management and storage. This agreement is in force since December 2001, for a term of three years, and it has been renewed in February 2005. In November 2006 the Specific Agreement Nº 2 has been signed, to progress in the technical definition of the repository of intermediate level radioactive waste with the technical assistance of Spanish experts that have designed, built and who are operating facilities of this type.

- Bilateral Argentine – Brazilian agreement on Computational Mechanics between the National Laboratory of Scientific Computing (Rio de Janeiro – Brazil) and the Computational Mechanics Division of the CAB (Bariloche – Argentina) CONICET/CNPq since 1991, renewed every year.

L.4.2 National Agreements

- Rent extension agreement of plots in the Los Gigantes area in the province of Córdoba occupied by the facilities of the former Los Gigantes Industrial Mining Complex.

- Agreement with the Instituto Nacional del Agua (INA) (National Water Institute) for the performance of hydrological, hydro-chemical and hydro-geological sampling in the Los Gigantes area in Córdoba, making progress with the environmental impact evaluation of the site.

- Safety Agreement with the National Gendarmerie for the custody of the former Malargüe Industrial Complex.

- Agreement with the General Staff of the Army for the extraction of materials for the Malargüe management.

- Specific Agreement with the National Technological University (UTN) for engineering and technological consulting services in the geotechnical area.

- Cooperation Agreement with the Municipality of Malargüe to implement the Air Quality Monitoring Program.

- Specific Technological Collaboration Agreement CNEA – National Institute of Industrial Technology, corresponding to the Research and Development Projects “Immobilization of Resin Beds of Spent Ionic Exchange Generated at the Nuclear Power Plants” and “Long Term Behaviour Study of Engineering Barriers to be used in Intermediate Level Radioactive Waste Repositories.”

- Frame Agreement between the CNEA and the National Water Institute to determine a reference frame in order that both institutions may perform joint activities and projects, using the experience in their respective specialties.

- Signature of the Letter of Understanding between CNEA – INTA (National Institute of Industrial Technology) to perform Research and Development work corresponding to the "Water circulation model in sedimentary rock areas" project.

- Frame Service Agreement between the National Commission of Atomic Energy and the National University of San Martín.

L.5 Joint Projects with the IAEA

- Coordinated Research Program (CRP) named "Spent fuel corrosion from aluminium lined research reactors, under wet storage (Phase II)"

- Coordinated Research Program (CRP) named "Deferred breakage induced by Hydrogen in Zircaloy claddings from power reactor fuel"

- Coordinated Research Program Nº ARG-12428 named: "New developments and improvements in the processing of radioactive waste problematic currents" at the beginning of 2007 a final report has been prepared and the research program has been completed.

- Permanent updating and report project of the Data Base on Radioactive Waste Management by the IAEA (Net Enabled Waste Management Data Base) with the object to create a net of radioactive waste inventories of the participating countries, with yearly updating.

- Interregional IAEA INT/9/173 project Excellence Centers Net on Training and Radioactive Waste Management Technology Demonstration in Underground Research Facilities.

- Technical Cooperation Project of the OIEA ARG/3/010 "Temporary Storage of Spent Fuels from Research Reactors". Biannual project started in 2005 that is related to and complemented with the "Storage of MTR fuel elements" Infrastructure Project. The ARG/3/010 continued open in 2007 for the execution of resources assigned to the construction of storage grids at the FACIRI.

- Regional Technical Cooperation Project RLA/4/020 "Engineering of a Transport Project for Spent Fuels from Research Reactors." Biannual project that has been started in 2007 (that may be extended for two more years) related to and complemented with the development activity of a Transport Package of Spent Fuels from Research Reactors Project denominated RLA4018, with the object to validate its design to be licensed by the Nuclear Regulatory Authority.

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