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

EIGHTH NATIONAL REPORT

2020-2023

Argentine Republic

Argentine Republic

NATIONAL AUTHORITIES

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VICEPRESIDENT OF THE COUNTRY
Dra. Cristina Elisabeth FERNÁNDEZ DE KIRCHNER

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Lic. Santiago Andrés CAFIERO

SECRETARY OF FOREIGN AFFAIRS
Emb. Pablo Anselmo TETTAMANTI

DIRECTOR OF INTERNATIONAL SECURITY, NUCLEAR AND OUTER SPACE AFFAIRS
Jimena SCHIAFFINO

CONTRIBUTORS TO DRAFTING AND REVIEW

National Report Coordination and Edition:

Ayelén GIOMI - Coordinator and National Contact Point
Laura KNIZNIK - Coordinator, Writer and Editor
Luciana PISATTI - Coordinator, Writer and Editor

Translation

Gringauz, L.
Kniznik, L.
Mancuso, R.
Manzini, A.

Translator Proofreader

BERNAVA, Virginia Inés

Nuclear Regulatory Authority

Arbor González, Agustín
Álvarez, D.E.
Amado, V.R.
Andrada, F.
Bossio, M.C.
Damico, B.
Dominguez C
Duarte M.L.
Medici, M.A.
Navia, F.
Novo, R.
Serdeiro, N.
Soberhart, L.
Sponton, P.
Truppa, W.
Vidal, D.
Valentino, L.
Zunino, P.

Argentine Atomic Energy Commission

Serquis, Adriana
Altinier, M.V.
Barari, E.
Blanco, M.S.
Caputo, B.
Chávez, A.
Falcón, G.
Ferrer, J.
Forte, A.F.
Gorini, I.
Gringauz, L.
Martín, D.
Ramirez, J.
Roque, D.
Veltrán, M.C.

Dioxitek Sociedad Anónima

Aráoz, Julio
Martínez N.
Navarro, G.

Nucleoeléctrica Argentina Sociedad Anónima

Antúnez, José Luis
Brenlla, L.
Burati, M.
Giovagnoli, F.
González, A.
Guala, M.
López, C.
Martínez, J.
Muñiz, C.
Muzen, A.
Pomerantz, M.
Saleb, S.
Sosa, B.

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

EIGHT NATIONAL REPORT

On December 19, 1997, during the 41st Session of the General Conference of IAEA, the Argentine Republic executed the JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT, agreed upon in Vienna during the Diplomatic Conference conducted on September 15, 1997. On July 6, 2000, the Argentine Congress enacted Law No. 25279 therefore ratifying the terms of the Joint Convention, which entered into force on June 18, 2001.

The present National Report was prepared in accordance with Article 32 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management to be submitted in compliance with Article 30 of the aforementioned Convention, and covers from January 1, 2020 to December 31, 2023.

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

Additional information may be required to the following address:
Comisión Nacional de Energía Atómica
Av. Del Libertador 8250, (C1429BNP), Ciudad Autónoma de Buenos Aires, Argentina
Tel.: (54 11) 4704-1045/1226/1229
Fax (54 11) 4704-1161
https://www.argentina.gob.ar/cnea

ACRONYMS

ACRE	**Special Restricted Crop Area**
AGE	**Ezeiza Radioactive Waste Management Area**
ALARA	**As Low As Reasonably Achievable**
APS	**Probabilistic Safety Analysis**
ARN	**Nuclear Regulatory Authority**
ASECQ	**Spent Fuel Dry Storage System**
CAB	**Bariloche Atomic Centre**
CAC	**Constituyentes Atomic Centre**
CAE	**Ezeiza Atomic Centre**
CANDU	**Canadian Deuterium Uranium Reactor**
CAREM	**Argentine SMR**
CMFSR	**San Rafael Mining and Milling Complex**
CNA I	**Atucha Nuclear Power Plant – Unit I**
CNA II	**Atucha Nuclear Power Plant – Unit II**
CNE	**Embalse Nuclear Power Plant**
CNEA	**Argentine Atomic Energy Commission**
COG	**CANDU Owner's Group**
CTP	**Pilcaniyeu Technological Complex**
DAIFRR	**Interim Storage Deposit for Spent Sources and Radioactive Waste**
DAP	**Long Term Storage Deposit**
DATRR III	**Temporaly Storage Deposit for Radioactive Waste**
DCMFEI	**Central Storage of Special Irradiated Fissionable Material**
DECRA-1	**Spent Fuel Storage from RA-1**
ECCS	**Emergency Core Cooling System**
ENREN	**Nuclear Regulatory Entity (Former Nuclear Regulatory Body)**
EPS	**Emergency Power System**
ESC	**Structures, Systems and Components**
EWS	**Emergency Water System**
FACIRI	**Research Reactors Irradiated Fuel Storage Facility**
GHC	**Demineralized water supply system**
HEU	**High Enriched Uranium**
ICRP	**International Commission on Radiological Protection**
IRRS	**IAEA's Integrated Regulatory Review Service**
ISO	**International Standard Organization**
KPF	**Liquid Radioactive Waste Treatment System**
KPK	**Liquid Waste Storage System**
LABCAR	**Radioactive Waste Characterization Lab**
LILW	**Low and Intermediate Level Waste**
LLW	**Low Level Waste**
LOOP	**Loss of Offsite Power**
LQMN	**Nuclear materials Chemistry Laboratory**
LUE	**Enriched Uranium Laboratory**
LWR	**Light Water Reactor**
MCNP	**Monte Carlo Neutron Particle Code– Calculation Code**
MDG	**Mobile Diesel Generator**
MTR	**Material Testing Reactor**
NA-SA	**Nuclear Power Plant National Operator (Nucleoléctrica Argentina)**
NEWMDB	**Net Enabled Waste Management**
NORM	**Natural Occurring Radioactive Material**
NPPs	**Nuclear power plants**
NUSS	**IAEA Nuclear Safety Standards**
OIEA	**International Atomic Energy Agency**
ORE	**Emergency Response Organization**
OSART	**Operational Safety Review Team**
PEGRR	**Radioactive Waste Management Strategic Plan**
PFS	**Sealed Source Production Plant**
PHWR	**Pressurized Heavy Water Reactor**
PMEB	**Handling Yard and Stowage of Items**
PNGRR	**Radioactive Waste Management National Program**
POEA	**Operating Procedures for Abnormal Events**

PPCC	**Cementing and Compacting Pilot Plant**
PPMo-99	**Molybdenum-99 Production Plant**
PPR	**Radioisotope Production Plant**
PPRS	**Radiological Protection and Safety Program**
$PPUO_2$	**Uranium Production Plant**
PRAMU	**Uranium Mining Environmental Restoration Project**
PTARR	**Treatment and Conditioning Plant of Radioactive Waste**
QMS	**Quality Management System**
RA-0	**Argentine Reactor 0**
RA-1	**Argentine Reactor 1**
RA-3	**Argentine Reactor 3**
RA-6	**Argentine Reactor 6**
RA-8	**Argentine Reactor 8**
RA-10	**Argentine Reactor 10**
RNA	**High Level Waste**
RNM	**Intermediate Level Waste**
RRSF	**Research Reactor Spent Suel**
RW	**Radioactive waste**
SAMG	**Severe Accident Management Guidelines**
SAMP	**Severe Accident Management Program**
SARPECQ	**Alternative Cooling System for Spent Fuel Assemblies**
SBO	**Station Black Ou**
SF	**Spent fuel**
SFE	**Spent fuel element**
SGA	**Plant firefighting system**
SHS	**Secondary Heat Sink**
SNR	**Sixth National Report**
SSRRS	**Semi-containment System for Solid Radioactive Wastes**
VLLW	**Very Low-Level Waste**

GLOSSARY

- "*Clearance of radioactive materials*" means those radioactive materials that, due to their activity concentration and/or total activity, can come out of regulatory control from regulatory body, either after a limited period of storage for decay to generic clearance levels, or due to their direct compliance with these levels or with the dose criteria for clearance.

- *"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.

- *"Historical waste"* means that radioactive waste treated, conditioned or finally disposed of applying criteria beyond the current regulatory frame and that require its re-assessment.

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

- *"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 it is required to take safety into consideration.

- *"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 materials in gaseous, liquid, or solid form for which the Contracting Party or a natural or legal person whose decision is accepted by the Contracting Party does not foresee any further use, and which the regulatory body

controls as radioactive waste according to the legislative and regulatory framework of the Contracting Party.

- *"Radioactive waste management"* means all activities, including decommissioning activities that relate to the handling, pre-treatment, 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 whose primary purpose 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 anybody 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 licenses.

- *"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 related 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.

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EIGHTH NATIONAL REPORT

SECTION A INTRODUCTION

A.1 Summary of the main topics of the report

The structure of this National Report complies with the established guidelines in the "Directives on the Form and Structure of the National Reports" (INFCIRC/604/Rev.4).

Section A describes the scope of the nuclear activity developed in Argentina since 1950, as well as the legal and regulatory framework.

Section B presents the policies about spent fuel and radioactive waste management, as well as the description of national activities associated to such policies.

Section C establishes the area of application of the Joint Convention for Argentina in relation to spent fuel, naturally occurring radioactive materials (NORM) and disused sealed sources.

Section D details both the facilities destined for spent fuel management and for radioactive waste management and their inventories. The discharges and respective doses are included in Section F.

Section E develops the Legislative and Regulatory frameworks, highlighting the implementation of safety measures and procedures. The structure and responsibilities of the Regulatory Body are also detailed.

Section F addresses the obligations foreseen on the license holder liability, human and financial resources, quality assurance, operational radiation protection, emergency preparedness and decommissioning activities.

Section G deals with safety in spent fuel management and the obligations prescribed by the Joint Convention regarding:

- General safety requirements
- Existing facilities
- Siting of projected facilities
- Design and construction of facilities
- Safety Assessment of facilities
- Operation of facilities
- Disposal of spent fuel

This section includes a brief description of the facilities, their state and the measures carried out or planned to improve safety.

Section H details the degree of compliance of the obligations foreseen regarding the management of radioactive waste, in the following topics:

- General safety requirements
- Existing facilities and past practices
- Siting of proposed facilities
- Design and construction of facilities
- Assessment of safety of facilities
- Operation of facilities
- Institutional measures after closure

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

A brief summary on the treatment of uranium mining waste was also included in this section.

In general, the contents of Section G are also valid for the equivalent obligations of Section H, except for those cases where the latter are specific.

Section I covers the obligations and experiences inherent to transboundary movements provided in Article 27 of the Joint Convention.

Section J deals with disused sealed sources provided in Article 28 of the Joint Convention.

Section K describes the planned activities to improve safety, specifying the measures to be adopted in the future.

Section L annexes the laws related to nuclear activity in the country, and the activities of Research and Development and Innovation (R&D&I) related to spent fuel and radioactive waste.

A.2 Overview

The present National Report describes the actions carried out in Argentina regarding the safety of spent fuel (SF) management and the safety of radioactive waste (RW) management, noting compliance with the obligations derived from the Joint Convention. To facilitate reading and for better understanding, it was decided to include in summary form the parts of the previous National Reports that are considered necessary.

The uses and applications of nuclear energy began in Argentina around 1950, year in which the National Atomic Energy Commission (CNEA) was created, beginning with research and

development activities in basic areas. In the following years, progress was made with the development of nuclear technology, the operation of relevant facilities dedicated to the production of radioisotopes for medical and industrial applications, and carrying out tasks inherent to the nuclear fuel cycle, including mining and uranium processing activities, manufacturing of fuel elements for research and power reactors, production and generation of nuclear power, production of heavy water and the operation of three nuclear power plants. Demonstration-scale reprocessing programs were also carried out in a timely manner.

These activities then gave rise to the creation of other entities, both state and private, in which radioactive waste of various characteristics is generated. The management of this waste is carried out in accordance with the current legal and regulatory standards, which are covered by the obligations derived from the Joint Convention.

The legal framework applicable to radioactive waste management is defined by the provisions of the National Constitution and the legislation enacted by the National Congress, mainly by Law No. 25279, which approved the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management; Law No. 25018, which establishes the Radioactive Waste Management Regime; and by Law No. 24804, which regulates the Nuclear Activity, as well as by laws related to the nuclear activity, in accordance with treaties, conventions, agreements and international conventions, and by national standards and regulations. In addition, accordingly with the Federal Government adopted in Argentina, a number of provincial and municipal regulations are in force that affect the development of spent fuel, radioactive waste and radioactive source management in the country.

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)**: release from the application of any further control by the Regulatory Authority of material with radioactive content used in licensed practices, authorized or registered by the Regulatory Authority.
- **Discharges**: planned, controlled and authorized emission of radioactive material to the environment.
- **Radioactive waste**: materials for which no further use is foreseen, and which contain radioactive substances with activity values such that exceed the authorized values established by the Regulatory Authority for their dispersion in the environment or the generic clearance levels, as applicable.

The Law No. 25018 appoints 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).

The National Law of Nuclear Activity No. 24804 assigns CNEA the state ownership of spent fuel and the responsibility for the management of radioactive waste, as well as the responsibility to determine the manner of decommissioning of nuclear power plants and all other relevant facilities (Type I facilities).

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

A.3 National Program for Spent Fuel and Radioactive Waste Management

As already mentioned, CNEA was appointed by the Argentine State as the application authority for matters related to spent fuel and radioactive waste management and determined the obligation to develop a *Radioactive Waste Management Strategic Plan (PEGRR)*. This Strategic Plan and its updates must be sent to the National Government which after consulting with the Nuclear Regulatory Authority, will send it to the National Congress for its approval. In this way, the requirements established in Law Nº 25.018 are fulfilled.

This PEGRR outlines the commitments that the National Government must assume regarding the safe management of spent fuel and radioactive waste, disused sealed sources and environmental remediation of those sites where uranium mining activities were developed, guaranteeing public health, environment protection and the rights of future generations.

The commitments assumed in the PEGRR are framed within the activities declared of national interest by law No. 26566.

Likewise, the PEGRR includes the adjustments corresponding to Atucha Nuclear Power Plants, Units I and II, research and production reactors, the waste generating facilities of CNEA, CONUAR S. A. and DIOXITEK S. A.; as well as the changes related to Uranium Mining Environmental Restoration Project (PRAMU) and Pilcaniyeu Technological Center and so on.

The PEGRR establishes the mechanisms and guidelines for the safe management of spent fuel and radioactive waste arising from all practices during the operation of a facility, as well as radioactive waste generated in the decontamination and dismantling activities of such nuclear and radioactive facilities. Moreover, it proposes to strengthen the Ezeiza Radioactive Waste Management Area’s (AGE) operation and decommissioning capacities, develop pre-feasibility studies for the repositories siting, develop studies in the framework of sites and former mining factory complexes remediation, and obtain the administration of the fund constituted with the pending contributions according to Article 13 of Law No. 25018 and the social communication activities inherent to it.

In addition, the PEGRR is encompassed within the environmental policy of our country, which, in the area of radioactive waste management, takes into account the concurrent powers of the Nation, the Provinces, the Municipalities and the Autonomous City of Buenos

Aires. In this sense, Article 4 of Law No. 25018 sets forth that CNEA shall coordinate with the Provinces and the Autonomous City of Buenos Aires the application of the Radioactive Waste Management Regime

Regarding the siting of future facilities for the final disposal of spent fuel and radioactive waste, Law No. 25018 sets forth that CNEA shall propose the need for siting of radioactive waste disposal facilities. These sites must be previously approved by the ARN, both in terms of radiological and nuclear safety, and by the Provincial Law authorizing the installation of the repository.

SECTION B POLICIES AND PRACTICES

B.1 Spent fuel management policy

In Argentina, due to its fissile material content, spent fuel is considered a potential energetic resource instead of being classified as a radioactive waste. Besides, the National State exercises ownership of the special radioactive fissile material contained in spent fuel, as established in Article 2 of Law No. 24804.

In relation to the PEGRR, at the end of 2023 work began on a new version, within the framework of a new organizational structure of the CNEA, given that the URANIUM MINING ENVIRONMENTAL REMEDIATION PROJECT (PRAMU) MANAGEMENT was incorporated into the PNGRR MANAGEMENT as the TECHNICAL DEPARTMENT FOR URANIUM MINING ENVIRONMENTAL REMEDIATION (DTRAMU). This version of the PEGRR aims to achieve a better integration and coherence with the responsibilities towards environmental restitution, in conceptual and temporal concordance with the new Strategic Plan of the CNEA that is currently in the process of elaboration.

The strategy for the management of spent fuel generated in research or production reactors presents three alternatives preceded by wet storage:

- Isotopic dilution of Uranium for its use in light-water power reactors
- Shipping to the country where the nuclear material was originally enriched, if possible
- Conditioning with isotopic dilution for final disposal in a Deep Geological Repository (DGR).

B.2 Spent fuel management practice

Regarding the management of the SF generated in power reactors, in Argentina the practice of wet storage is used during the time necessary for the fission products to decay sufficiently for their subsequent interim dry storage.

At the CNE, the SF is stored in the facility´s pools for a period of at least six (6) years and then it is transferred to the dry storage silo system until a repository is available.

At the CNA I, the SF is stored in wet storage at the power plant. The capacity was sufficient for the storage of CNA-I SF until 2015. In 2012, the ASECQ I, Dry Storage of Spent Fuel Elements I Project, was initiated, which consists in the construction of a building annexed to the Pool Building I of the CNA I. However, in anticipation that the project could not be completed before 2015, 1,435 SF with power less than 6,740 MWd/TnU and with a minimum decay of 33.5 years was transferred to the Unit II pools, allowing them to be stored until the completion of ASECQ I (see SECTION G.4.1).

In 2022 the ASECQ I operation began with a storage capacity for 2,844 SF; and as of 31 August 2023, a total of 486 SF elements were transferred.

At CNA-II, the SF that will be generated during its operation will be stored in wet storage in pools within the same NPP until a dry storage is available for that Unit (see SECTION G.2.2).

The ASECG II Dry Storage of Spent Fuel Elements II is currently in the design phase. It will consist of blocks of 40 silos where 37 SF will be deposited in each one, so that each block will hold a total of 1,480 SF. The silos will be underground and will be cooled by natural convection.

The SF generated in the operation of the research and radioisotope production reactors is stored in respective reactor pool. In the case of the SF generated in the RA-3 reactor, it is transferred to the wet storage facility known as FACIRI, which has had an Operating License since November 2016.

FACIRI has 608 storage lots and a capacity for 25 more years of operation of the RA-3 reactor, which generates an average of 13 spent fuels per year. In addition, it can house the SF of other operational research reactors in the country. The RA-3 fuels that were stored at the DCMFEI were transferred in their entirety to the FACIRI facility. The transfer was completed on 21 March 2019.

The SF containing low-enriched uranium LEU is stored in wet storage. It will remain there until a decision is made to isotopically dilute the uranium for its use in light-water power reactors, return it to the country that supplied the uranium or condition it with isotopic dilution for final disposal in a Deep Geological Repository.

Beyond the decision to be adopted, the PEGRR foresees the development of research and development activities related to the final disposal of both SF and high-level RW resulting from the reprocessing of power reactors' SF, and of intermediate-level RW resulting from the isotopic dilution conditioning of SF from research or radioisotope production reactors.

B.3 Radioactive waste management policy

The main guidelines of the policy applicable to radioactive waste management are:

- The RW generated exclusively from nuclear activities carried out in the country, including waste arising from the decommissioning of facilities, will be managed in a safely manner, ensuring the protection and rights of present and future generations, as well as the protection of the environment.
- The responsibility for the RW management lies with the National State through the CNEA. The generator will be responsible for the treatment, conditioning and safe storage of the waste generated by the operating facility according to

the requirements of the PNGRR, which must be complied until their transfer to the CNEA.

- The sustainable management to obtain and manage the necessary financial resources in order to comply with the obligations arising from the fulfilment of the responsibilities, considering that a large part of them will result in deferred costs over time.
- To have a system for recording and preserving information that ensures the complete knowledge and control over time of the inventories of radioactive waste produced and to be produced in all the country's nuclear activities.
- To have a Communication and Information Program that includes the development and implementation of plans to achieve stakeholders' participation and acceptance for the location and characterization of potential repository sites.

It should be noted that the regulation and supervision of RW management are functions of the National State, carried out by the Nuclear Regulatory Authority.

The implementation of the policy on this matter follows the guidelines of the National Radioactive Waste Management Program with the responsibilities specified in Law No. 25018. This makes it possible to address the management of RW in the Argentine Republic with an integrated vision.

In order to achieve its objectives, this National Program should address the following aspects:

- Identify and quantify accumulated and projected RW inventories.
- Adopt appropriate technological solutions for the safe management of RW, with scientific and technological support.
- Delimit responsibilities and establish the obligations and interrelations of the involved parties, from the generation of RW to its final management stage.
- Define the required final disposal facilities.
- Communicate its activities and provide relevant information to stakeholders.
- Assess the costs associated with these activities and determine the methods and the financial and management sources.

The PEGRR defines the treatment methodology and the technology required for the final disposal of the different types of radioactive waste. The updating of the PEGRR provided for in the Law allows the introduction of modifications arising from the management optimization, including scientific advances and the development of innovative technologies, as well as eventual changes in the strategic definitions related to the treatment of SF and RW.

The Communication and Information Program establishes the communication channels and provides the necessary information to enable the stakeholders to assess the scope of

the proposed plans, the benefits derived from them, and provide the appropriate environment for public participation. The Communication and Information Program includes the development and implementation of plans destined to influence public support for the siting of repositories at the potential sites in order to gain stakeholders participation and acceptance for the characterization of such sites.

Currently, the PNGRR reports on general practices in the SF and RW management at nuclear power plants and at the Radioactive Waste Management Area located at the Ezeiza Atomic Centre.

As part of the PNGRR policies, for the management of environmental liabilities at the Malargüe site, Mendoza, an extensive Communication and Information Program was carried out before, during and after the remediation was completed. Likewise, for the Los Gigantes site, a Communication Plan has been drawn up for when the management work is carried out. For the other sites to be remediated, the TECHNICAL DEPARTMENT OF URANIUM MINING REMEDIATION is developing the Communication Plans for when the liabilities management is performed.

The Communication and Information Program implemented at the Malargüe site involved the participation of the political and social sectors, among others. A sequence of activities was carried out in order to improve general awareness of the Uranium Mining Environmental Restitution Project at municipal, provincial and national levels. These activities had a positive impact on community participation and were favorable for public perception. Considering that each population and site has its particularities and different characteristics, it is necessary to involve the society and work with the provincial and municipal governments for the management of the sites to be remediated. In addition, the development of Communication Programs that are adjusted to the diagnoses and opinions of stakeholders and to the studies on community perception within an area of influence, allows for greater precision in the design of communication and information strategies.

B.4 Radioactive waste management practice - Criteria

The following criteria are applied for the radioactive waste management:

- The materials that contain or are contaminated with radioactive substances which, on account of their activity concentration and/or surface contamination, are feasible to obtain clearance authorized by ARN will be released from the regulatory control system.
- The systems for limiting discharges of liquid and gaseous radioactive effluents into the environment shall be optimized and the discharges shall comply with the authorized values established for each facility and for each significant radionuclide.

- Those radioactive materials that, due to their activity concentration and/or total activity, cannot be dispersed into the environment shall be treated and conditioned for their final disposal.
- ARN has the Regulatory Guide AR 6 "Generic Exemption Levels", Rev. 1, and the Regulatory Guide AR 8 "Generic Clearance Levels", Rev.1. Both regulatory guides are aligned with the General Safety Requirements, Part 3 - "Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards - No. GSR Part 3".

ARN states as a general criterion for clearance in Guideline AR 8, Rev. 1, that "materials may be cleared without further consideration provided that, in all reasonably foreseeable circumstances, the effective dose expected to be received by any individual from the materials cleared is of the order of 10 µSv/year". For situations with a low probability of occurrence, this dose may be as high as 1.0 mSv/year.

In addition, ARN has an Instruction on the "Content of the Clearance Request", which contains the information that the operator or user must submit to the Agency in order to carry out the corresponding assessment.

During the period 2020-2023, numerous clearance requests have been received from Type I and II facilities, promoting the minimization of RW and optimizing financial resources.

The Regulatory Standard AR 10.12.1 "Radioactive Waste Management", Rev.3, establishes the general and particular criteria for both those who generate RW and those responsible for their management. Its application corresponds to materials containing radioactive substances and which, due to their nature and/or activity, cannot be dispersed in the environment.

The Regulatory Standard AR 6.1.2 “Radioactive Effluents Limitation for Type I Radioactive Facilities”, Rev. 1, determines that at the design stage:

- The systems for limiting radioactive effluent discharges should be optimized, taking into account the cost of the various feasible alternatives and the collective effective doses due to the release of radioactive effluents over the lifetime of the facility.
- The effective annual dose in the critical group due to radioactive effluent discharge of each facility should not exceed 0.3 mSv.

In addition, since June 2013, ARN has established that, for the design of a nuclear power reactor, a nuclear research reactor or a Type I radioactive facility located on a multi-facility site, the discharges from all the facilities on the site should not result in an annual dose value greater than 0.5 mSv to the representative individual.

In the licensing process of each relevant facility, ARN determines the authorized gaseous and liquid effluents discharge values with which the facility must comply. These annual values are understood as an operational restriction and arise from the activity of each

significant radionuclide present in the discharge. For this purpose, the optimized discharge level is taken as reference, considering an appropriate flexibility margin that guarantees the public protection without interfering with the operation of the facility.

These values are established in the Operating Licenses granted by ARN to the respective facilities. In general, the facilities have effluent storage and/or decay tanks in order to control the effluent discharge into the environment in accordance with the that established in the license.

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

Argentina has adopted as a reference the classification system proposed by the International Atomic Energy Agency where six classes of radioactive waste are contemplated based mainly on long-term safety considerations and on disposal of the waste. While the generic relationship between the different classes of RW and the disposal options is envisaged, the acceptability of a RW for a particular disposal facility needs to be demonstrated by a safety analysis.

The conceptual RW classification scheme is used for the sole purpose of reporting radioactive waste inventories and organizing the information presented in the National Report. The activity content limits for each radioisotope will be established based on the safety assessment of the disposal site, once the site has been selected.

B.4.2 Origin of Radioactive Waste

The origin of the radioactive waste included in each of the categories stated in SECTION B.4.1 is as follows:

- EXEMPT WASTE (EW): Waste that is exempted from regulatory control in accordance with the principles of exemption. This waste meets the criteria for clearance, exemption or exclusion from regulatory control for radiation protection purposes.
- VERY SHORT-LIVED WASTE (VSLW): This is liquid and solid biological RW generated in research centers, medical applications, among others, and containing radioisotopes with half-lives of less than 100 days. Such is the case of ^{192}Ir, ^{99m}Tc, ^{131}I, ^{59}Fe and, therefore, it can be released from regulatory control after being stored until they decay below the authorized limits.
- VERY LOW-LEVEL WASTE (VLLW): Included in this category are RW generated from extracting and processing Uranium Ore. Ore tailings, together with very low-grade ore and material from the uncovering of the sites, are referred to as 'radioactive mining waste'. Contaminated soil and waste arising from the operation and decommissioning of nuclear facilities with activity levels slightly above those specified in the exemption levels are also included in this class.
-

❖ LOW LEVEL WASTE (LLW): This waste may be classified as:

a) Conditioned waste that is packaged in specially designed containers and securely stored in authorized facilities. These wastes include:

- Solid and liquid waste originated in NPPs, radioisotope production facilities, research reactors and nuclear fuel cycle facilities.
- Incompressible waste from the nuclear plants' operation and other facilities, conditioned directly in 200-litre drums.
- Wet solid waste (sludge) originated in the treatment of liquids from CNA I, conditioned on site with cement matrixes within 200-litre drums.
- Liquid waste from laboratories and radioactive facilities, containing radionuclides mostly beta and gamma emitters with activity concentrations such that no biological shielding is required for handling, conditioned with cementitious matrices in 200-litre drums.
- Short-lived decayed or disused sealed sources ($T_{1/2}$<5 years), conditioned in industrial drums by encapsulation in cement matrixes.
- Liquid and solid biological waste generated in research centers, medical applications, among others, treated and conditioned by specific techniques adequate to the type of waste.
- Waste originated from the decommissioning of nuclear power plants and other facilities from which they are decommissioned.

b) Unconditioned waste that it securely stored for further characterization and testing studies, in order to define the most appropriate treatment and conditioning strategy and in accordance with the definition of acceptance criteria for future disposal or long-term storage:

- Spent ion exchange resins and filters used in nuclear facilities.
- Decayed sealed sources from medical and industrial applications.
- Contaminated and/or activated structural elements originating from decommissioning of nuclear facilities.
- Liquids or organic waste from radioisotope production and from nuclear fuels manufacture, stored in stainless steel containers.
- Wet solids, such as sludges generated as a precipitation product from the liquid effluent treatment plant at CONUAR S. A. during fuel fabrication, which are placed in 200-litre drums.
- Spent ion exchange resins from the RA-3 reactor, which are drained at the facility itself and placed in 400-litre drums, and resins from the Semi-Industrial Irradiation Plant.

❖ INTERMEDIATE LEVEL WASTE (ILW): This class of waste consists of alpha emitters from the experimental development of mixed oxides (MOX) and various other materials containing long-lived radioisotopes, as those used in medicine:

^{226}Ra tubes, cells and needles, ^{238}Pu pacemakers, depleted-uranium shielding, among others, and those used in industry, such as neutron sources. So are resins and filters that do not comply with the limits established for low level waste.

- HIGH LEVEL WASTE (HLW): This type of waste is generated in the reprocessing of SF from power, research and production reactors. In addition, this classification also considers wastes with activity concentration levels high enough to generate significant amounts of heat due to radioactive decay (above 2 KW/m3).

B.4.3 Practices applied for radioactive waste management

The RW management practices are based on considering different disposal alternatives taking into account technical, operational and economic aspects.

Part of these practices include minimization and segregation of RW at the point of origin, carried out at the generator's facilities. Based on the segregation performed, treatment and conditioning technologies consistent with the intended disposal option are applied to each of the RW types.

Very Low Level Waste (VLLW)

In Argentina, uranium mining wastes are considered as VLLW and, depending on the characteristics of the site where they are located, they can be managed in situ or relocated to a more suitable site.

Low Level Waste (LLW)

In the case of compactable solid radioactive waste generated both in the operation and maintenance of nuclear power plants and in other nuclear and radioactive facilities, it is conditioned by volume reduction by pressing in 200-litre drums.

Non-compactable solids, such as cables, pipes, wood, masonry, equipment parts or tools, are stored in metal containers. Generally, 200-litre drums are used, or, in NPPs, larger prismatic containers are also used if the RW warrants it.

Wet solids, such as sludges from tank cleaning, have low dose rates and are therefore treated by common desiccation to lower the moisture content of the solids and stored in 200-litre drums.

The contaminated oils that are generated also have low level dose rates and are therefore disposed in 200-litre stainless steel drums or 50-litre stainless steel jugs and stored until they are conditioned.

As for the low-level liquid waste generated at the NPPs, management differs for each plant according to the different technologies used. At CNA I, liquid waste from operation and maintenance is collected in tanks and then characterized. At CNA II, liquid waste is collected and decontaminated using the Liquid Waste Storage System (KPK) and the Liquid Radioactive Waste Treatment System (KPF).

At CNE, liquid waste from operation and maintenance is treated through resin beds, discharging into the environment in a controlled and planned manner, in accordance with pre-established procedures and within the framework of the discharge values authorized by the Regulatory Body.

The spent resin beds and mechanical filters, which may be classified as LLW or ILW according to the limits established in the licenses of the future repositories, are stored in specially designed facilities at each plant, taking into account the time foreseen for the operating cycle of each particular plant, until they are treated and conditioned in accordance with procedures compatible with the acceptance criteria established by the Agency responsible for final disposal.

An interim storage facility is located at the AGE to store RW from small generators. The facility is specially designed to allow for the storage of unconditioned RW prior to processing, as well as conditioned waste packages awaiting transport to the disposal site.

The RW generated at the three NPPs are stored on site in specially designed facilities.

The practice applied for the disposal of solid low level radioactive waste remains as reported in the Seventh National Report to the Joint Convention.

Structural waste, which due to its size cannot be conditioned in drums, is directly disposed of in the AGE's System for the Final Disposal of Structural Materials, designed to house generally metal parts from contaminated areas (LLW), which are periodically immobilized with a concrete casting in order to prevent their dispersion.

This practice has not been carried out since final disposal was discontinued at the AGE. Structural solid RW that had been disposed of in that facility remains there, but the facility is not operational. Since 2001 structural solid RW has been stored in facilities suitable for this purpose.

Intermediate Level Waste (ILW) and High Level Waste (HLW)

Properly treated and conditioned ILW is disposed of together with the HLW. The fission products and actinides generated in the nuclear fuel during the operation of power, research and radioisotope production reactors are contained in the SF, which are safely stored in wet or dry storage at the NPPs until they are transferred to the CNEA. If the National State decides to reprocess them, high-level radioactive waste will be generated.

The PNGRR continues to carry out, together with other sectors of the CNEA, research and development lines that contemplate conditioning processes for both spent fuel management options, i.e. for reprocessing or disposal.

During 2020 and 2022, within the framework of the National Technical Cooperation Project with the IAEA, ARG9016, the foundations of the ConfinAR Geo Project were developed, the purpose of which is to implement a deep geological repository (DGR) for the final disposal of high and intermediate level radioactive waste and spent fuel. In 2023 the

PNGRR drafted the Preliminary Project, and, in October of the same year, the Draft Administrative Act was submitted to the NUCLEAR SAFETY AND ENVIRONMENT AREA MANAGEMENT (GASNYA) to enable the progress of the DGR. In December 2023, the Preliminary Project was approved by the CNEA by means of the Presidential Resolution N° 797/23, and the administrative procedures required for its development were initiated. Thus, the PNGRR Management has been empowered to start the design, planning and management activities of the ConfinAR Geo Project.

The PNGRR Management is currently working on the development of the project strategic plan, roadmap and overall R&D program, and on dialogue with stakeholders. In addition, in collaboration with the Raw Materials Exploration Management (GEMP), work is underway to compile and update the available geological information, define the site selection criteria and develop the preliminary generic safety case.

B.5 Communication policy for spent fuel and radioactive waste management

The foreword to the Joint Convention explains the need for and importance of informing stakeholders about issues related to the safety in spent fuel and radioactive waste management.

In 1998, when through Law No 25.018 the Argentine National State designated the CNEA as the enforcement authority for spent fuel and radioactive waste management, it established among its obligations "To permanently inform the community on the scientific and technological aspects of radioactive waste management", as indicated in Article N° 10, paragraph m) of the same Law.

Considering that contemporary society expresses the need to be informed about the management of RW and SF in the country, the CNEA, through the PNGRR, works with the different stakeholders to establish two-way communication channels, creating spaces for interaction and dialogue that provide truthful information to society and feedback on their demands, needs, uncertainties and proposals.

Taking into account local, regional and global experience, it is necessary to have the support of stakeholders in order to meet the needs inherent to the management of PW and SF.

The public communication policy for the management of SF and RW is implemented within the framework of the communication policy established by the CNEA in its Strategic Plan, in accordance with the PEGRR.

Regarding the communication actions conducted in the period covered by this Report, see SECTION K.3.3, which describes the articulation of a series of practices dedicated to disseminate, inform and communicate. Most of these actions are developed simultaneously with the work team of the Social Communication Management and the Public Participation Division of the PNGRR. Currently, the document with the guidelines for a Communication Program for the management of the SF and the RW is on process of preparation.

SECTION C SCOPE OF APPLICATION

This National Report deals with safety measures applied to the management of spent fuel and radioactive waste originated exclusively from nuclear activity carried out in Argentina, according to the scope of application of Article 2 of the Law No. 25018 "Radioactive Waste Management Regime", both inside and outside the fuel cycle, including radioactive waste derived from nuclear power generation; nuclear fuel manufacturing; uranium mining and processing; the production of radioisotopes for medical applications; industrial uses and research and development activities, as well as planned and controlled radioactive discharges, originated from the normal operation of the facilities in which the aforementioned practices are carried out.

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, due to what was mentioned in the first paragraph.

Furthermore, as it is mentioned in SECTION A.3, Argentina's historical stance does not preclude the possibility of reprocessing in the future, as a final decision has not been made yet on the matter.

SECTION D LISTS AND INVENTORIES

D.1 Spent fuel management facilities

The current spent fuel management facilities are the following:

SITE	FACILITY
CNA I	I & II Pool Building ASECQ I
CNA II	Pool Building (UFA)
CNE	Storage pool
	Storage silos (ASECQ)
CNEA	Storage facility of RA-1 fuel elements (DECRA-1)[1]
	Central Storage Facility for research reactors SF (DCMFEI)[1,2]
	Research Reactors Irradiated Fuel Storage Facility (FACIRI)

[1] Facility from the Ezeiza Radioactive Waste Management Area (AGE).
[2] Since March 21, 2019, the date on which the last MTR item was transferred to the FACIRI, this facility did not store CGRI.

A brief description of these facilities is shown of each of the facilities in Section G.2 Existing Facilities.

D.2 Spent fuel inventory

D.2.1 ATUCHA NUCLEAR COMPLEX

UNIT I

INVENTORY at 12/04/2023(*)			
SYSTEM	QUANTITY	Total U	Pu (**)
		kg	kg
Pools I & II	10,934	1,674,516.93	6,588.34
ASECQ	540	81,570.38	263.95

(*) Inventory consolidation date (PIV: Physical Inventory Verification, IAEA)
(**) Estimates obtained by means of a calculation code, on the basis of SF burn-up, residence time and position in the core.

UNIT II

INVENTORY at 08/28/2023(*)			
SYSTEM	QUANTITY	Total U	Pu (**)
		kg	kg
Pools	3,720	643,066.17	2,374.38

(*) Inventory consolidation date (PIV: Physical Inventory Verification, IAEA)
(**) Estimates obtained by means of a calculation code, on the basis of SF burn-up, residence time and position in the core.

D.2.2 EMBALSE NUCLEAR POWER PLANT

INVENTORY at 08/31/2023(*)			
SYSTEM	QUANTITY	Total U	Pu (**)
		kg	kg
Pool	31,413	587,335.21	1,981.97
Silos	135,540	2,530,044.24	9,223.45
TOTALES	166,953	3,117,379.45	11,205.42

(*) Inventory consolidation date (PIV: Physical Inventory Verification, IAEA)
(**) Estimates obtained by means of a calculation code, on the basis of SF burn-up, residence time, and position in the core.

D.2.3 RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT AREA FROM CAE (AGE)

INVENTORY AT 10/17/2023(*)		
TYPE	QUANTITY	Kg
PINS (**)	232	14.188
FILTERS (****)	120	17.728

(*) Inventory consolidation date (PIV: verification of physical inventory, IAEA).
(**) Pins: Fuel type needle of RA-1 Research reactor.
(****) Filters: From ^{99}Molybdenum Production Facility.

D.2.4 RESEARCH REACTORS IRRADIATED FUEL STORAGE FACILITY (FACIRI)

INVENTORY AT 10/06/2023(*)		
TYPE	QUANTITY	Kg
MTR (**)	265	332.592

D.3 Radioactive waste management facilities

SITE	FACILITY
Atucha Nuclear Power Plant Unit I	Liquid Radioactive Waste Treatment & Conditioning System
	Liquid Radioactive Waste Treatment System by Concentration
	Immobilization System by Cementation of Radioactive Waste
	Treatment & Conditioning System for Solid Radioactive Waste
	Storage Facilities for Solid Radioactive Waste
	Treatment & Storage System for Mechanical Filters from the Reactor's Primary Circuit
	Storage System for Exhausted Ion Exchange Resin
	Liquid Radioactive Waste Treatment & Conditioning System
	Interim Storage Facilities for Low Level and Intermediate Level Radioactive Waste
Atucha Nuclear Power Plant Unit II	Treatment & Conditioning System for Liquid Radioactive Waste
	Treatment & Conditioning System for Solid Radioactive Waste
	Treatment System by Concentration of Liquid Radioactive Waste
	Immobilization System by Cementation and Storage of Radioactive Waste, Exhausted Ionic Exchange Resin, and Mechanical Filters from the Reactor's Primary Circuit
	Interim Storage Facilities for Low Level and Intermediate Level Radioactive Waste
Embalse Nuclear Power Plant	Treatment & Conditioning System for Solid Radioactive Waste
	Solid Radioactive Waste Storage Facilities
	Exhausted Resin Storage Tanks
	Liquid Radioactive Waste Treatment System
	Gaseous Radioactive Waste Treatment Facility
	Facilities for Interim Storage of Low, Intermediate and High-Level Radioactive Waste
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)	Radioactive Waste Treatment and Conditioning Plant (PTARR)(**)
	Radioactive Sources and Waste Interim Storage Facility (DAIFRR)
	Handling Yard and Stowage of Items (PMEB)
	Long Term Storage Deposit (DAP)
	Final Disposal System for Structural Solid Radioactive Waste and Sealed Sources (*) (FDRRSEFS 1 y 2)
	Structural and Biological Well (*)
	Semi Containment System for Solid Radioactive Waste (*)
	Semi Containment System for Very Low Level and Very Short-Lived Liquid Radioactive Waste (*)
	Cementing and Compacting Pilot Plant (PPCC)
Pilcaniyeu Technological Complex	CTP Low Level Radioactive Waste Deposit
Uranium Dioxide Production Plant	Uranium Dioxide Production Plant Raw Material Deposit

(*) These facilities have concluded their operations.

(**) This facility is in the process of back-fitting.

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

D.3.1 List of facilities with waste from mining and processing of uranium ore

Mining waste and uranium ore processing waste appear in the following facilities:

SITE	FACILITY
MALARGÜE (Mendoza Province)	Malargüe Former Industrial Mining Complex (*) 1954-1986
HUEMUL (Mendoza Province)	Hüemul Site Stopped operating in 1974
CÓRDOBA (Córdoba Province)	Córdoba Mining Complex Began operating in 1982
LOS GIGANTES (Córdoba Province)	Former Industrial Mining Complex Los Gigantes (**) 1982 - 1989
PICHIÑÁN (Chubut Province)	Former Industrial Mining Complex Pichiñán 1977 – 1981
TONCO (Salta Province)	Former Industrial Mining Complex Tonco 1964 - 1981
LA ESTELA (San Luis Province)	Former Industrial Mining Complex La Estela 1982 - 1990
LOS COLORADOS (La Rioja Province)	Former Industrial Mining Complex Los Colorados 1993 - 1997
SAN RAFAEL (Mendoza Province)	San Rafael Mining and Milling Complex (***) 1979

(*) The “Tail Management and rehabilitation of the area, Malargüe site” was finished in June 2017.
(**) The production ended in 1995. The deposit still has reserves of 6200 tons of uranium that remain to be extracted. It is currently in the Environmental Liabilities Remediation stage according to the DIA (Resolution 259/19 SAyOT of July 15, 2019), work began on the implementation phase for the management of quarry water and solid waste. The Licensing under the figure of “Prolonged Shutdown” is being processed before the Nuclear Regulatory Authority.
(***) Site with engineering project for remediation “CLOSURE PLAN FOR THE SCHLAGINTWEIT DEPOSIT”, presented to the authorities of the government of the province of Córdoba.

A brief description of the management status of these facilities is shown in SECTION H.5 Waste from Mining and Processing of Uranium Ores.

D.4 Radioactive waste inventory

The following is the radioactive waste inventory until December 31, 2023. The presentation of data has been prepared with information in accordance with the shape of the NEWMDB of the International Atomic Energy Agency.

D.4.1 ATUCHA NUCLEAR POWER PLANT - UNIT I

ATUCHA NUCLEAR POWER PLANT - UNIT I											
Type of Waste	Place of Facility	Processed	Est.	Volume (m^3)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	No	Yes	127.36	100	0	0	0	0	0	0
LLW	Storage	Yes	Yes	952.2	100	0	0	0	0	0	0
HLW	Storage	No	Yes	50.29	100	0	0	0	0	0	0

Est. = distribution is an estimate, Proc. = Is the waste processed (Yes/No)? RO=Reactor Operations.
FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications, DF= Defense.
DC/RE=Decommissioning/Remediation, ND=Not Determined.

D.4.2 ATUCHA NUCLEAR POWER PLANT - UNIT II

ATUCHA NUCLEAR POWER PLANT - UNIT II											
Type of waste	Place of facility	Processed	Est.	Volume (m^3)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	No	Yes	24.69	100	0	0	0	0	0	0
LLW	Storage	Yes	Yes	143.0	100	0	0	0	0	0	0
HLW	Storage	No	Yes	1.638	100	0	0	0	0	0	0

Est. = distribution is an estimate, Proc. = Is the waste processed (Yes/No)? RO=Reactor Operations.
FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications, DF= Defense.
DC/RE=Decommissioning/Remediation, ND=Not Determined.

D.4.3 EMBALSE NUCLEAR POWER PLANT

EMBALSE NUCLEAR POWER PLANT											
Type of Waste	Place of Facility	Proc.	Est.	Volume (m^3)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	No	Yes	313.41	100	0	0	0	0	0	0
LLW	Storage	Yes	Yes	3016.79	100	0	0	0	0	0	0
HLW	Storage	Yes	Yes	152.44	100	0	0	0	0	0	0

Est. = distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations.
FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications, DF= Defense.
DC/RE=Decommissioning/Remediation, ND=Not Determined.

D.4.4 PILCANIYEU TECHNOLOGICAL COMPLEX

PILCANIYEU TECHNOLOGICAL COMPLEX INVENTORY AT 12-31-2023	
Stored Waste (#)	Volume (m^3)
Process Waste	29.48
Miscellaneous Waste	5.21

(#) Contaminated material with natural Uranium

D.4.5 URANIUM DIOXIDE PRODUCTION PLANT

UO_2 Production Plant INVENTORY AT 12-31-2023	
Stored Waste (#)	**Volume (m^3)**
Operational Waste *	**139.8**

(#) Contaminated material with natural Uranium

* The disassembly of the filters and pre-filters continues in order to reduce the volume of the contaminated material and therefore the inventory of filters and pre-filters is nil, having become part of the inventory of operating waste

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D.4.6 EZEIZA RADIOACTIVE WASTE MANAGEMENT AREA FROM CAE (AGE)

EZEIZA RADIOACTIVE WASTE MANAGEMENT AREA from AGE – 12/31/2023											
Type of Waste	Place of Facility	Processed	Est.	Volume (m^3)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	No	Yes	359.35	10	47	0	46	0	0	0
LLW	Storage	Yes	Yes	806.9	50	25	0	25	0	0	0
LLW	Disposal	Yes	Yes	2397.3	66	1	0	33	0	0	0
ILW	Storage	No	Yes	4.3	0	28	0	72	0	0	0
ILW	Storage	Yes	Yes	23.0	0	43	0	57	0	0	0
ILW	Disposal	Yes	Yes	169.6	2	46	13	39	0	0	0

Est. = distribution is an estimate, Proc. = Is the waste processed (Yes/No)? RO=Reactor Operations.
FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications, DF=Defense.
DC/RE=Decommissioning/Remediation, ND=Not Determined.

SECTION E LEGISLATIVE AND REGULATORY SYSTEM

E.1 Implementing measures

Argentina has a legal framework that regulates all nuclear activity, including spent fuel and radioactive waste management. Argentina is a contracting party to the Joint Convention, adopted through the promulgation of Law No. 25675. In addition, the legal framework is complemented by the National Law of Nuclear Activity No. 24804 and its Regulatory Decree NO. 1390/98, and the Radioactive Waste Management Regime, approved by Law No. 25018.

The administrative and regulatory structure determined by the legislation and that was implemented to address the management of spent fuel and radioactive waste is comprised in the following manner:

- The Nuclear Regulatory Authority, created through the National Law of Nuclear Activity, Law No. 24804, created as an independent regulatory body and whose functions regarding the implementation of the management of spent fuel and radioactive waste are determined in the aforementioned legislation.

- The National Atomic Energy Commission is the enforcement authority of the Radioactive Waste Regime, approved by Law No. 25018. Likewise, in all radioactive waste management activities, CNEA must comply with the regulatory standards related to radiological and nuclear safety, physical and environmental protection and international safeguards established by ARN, and with all corresponding regulations: national, provincial, municipal and from the Autonomous City of Buenos Aires.

- 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 assignment of responsibilities.

E.2 Legislative and regulatory framework

E.2.1 Legal framework

The present report will take as a reference all the relevant legal precedents regarding safety in the management of spent fuel and radioactive waste until the closing of this report.

E.2.1.1 Background

CNEA (Argentine Atomic Energy Commission) was created in 1950 by Decree No. 10936/50 as an autonomous government agency in charge of coordinating and promoting nuclear activities in Argentina. Its creation marked an important milestone in the consolidation of a structured approach towards nuclear energy and scientific research in the country.

In 1957, Decree Act No. 22498/56, ratified by Law No. 14467 and Decree No. 842/58, determined the CNEA's competence as the regulatory body for nuclear and radiation safety matters regarding the safety of nuclear facilities and the controlled use of nuclear material, with the specific purpose of the protection of individuals and the environment against exposure to the harmful effects of ionising radiation.

In 1994, in response to a state reform, nuclear activity was reorganized, and Decree No. 1540/94 created the National Nuclear Regulatory Body (ENREN) to perform the regulation and surveillance of the nuclear activity independently from CNEA.

In 1997, Nuclear Activity Law No. 24804 established the Nuclear Regulatory Authority (ARN) as an independent body and the successor of ENREN. Additionally, the aforementioned Law and Decree No. 1390/98 reorganized the competences and functions of CNEA and ARN.

In 1998 the Radioactive Waste Management Regime was regulated by Law No. 25018.

E.2.1.2 Current situation

The present legal framework comprises 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**, reformed in 1994, introduces Art. 41 that, concerning radioactive waste, establishes:

  Art. 41: All inhabitants are entitled to the right to 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 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 waste and of radioactive waste 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 of the State in the nuclear field. These are strong commitments and obligations regarding the control of: **(a)** non-proliferation of nuclear weapons; **(b)** nuclear security; **(c)** spent fuel and radioactive waste safe management; **(d)** security of nuclear materials; **(e)** cooperation in case of nuclear accidents and radiological emergencies; **(f)** liability in case of nuclear damage; and **(g)** import, export and handling of spent radioactive sources.

- **Law No. 24804: E**nacted in 1997. This Act determines that the National State will establish the nuclear policy and perform research and development activities through CNEA, and regulatory and surveillance actions through ARN. CNEA is the national organization which, among other duties, advises the National Executive Power 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 to Decree No. 1390/98 that regulates Law No. 24804**: Enacted on November 27, 1998. According to this Decree, every individual person or legal entity that, as a result of a licensed or authorised activity, produces spent nuclear fuel or radioactive waste shall provide resources to the Argentine Atomic Energy Commission so that the latest can perform its duty of waste management. The entity or person generating waste shall be responsible for the safe storage of such material, within the scope of the facility it owns, having to comply with the dispositions which, to that effect, are established by the Nuclear Regulatory Authority. In the case of a nuclear power plant, the entity generating waste shall take the necessary measures in order to assure the safe operation of the plant and to have sufficient storage capacity to keep all the fuel assemblies included in that facility.

- **Law No. 25018:** Enacted on September 23, 1998. The Argentine State, by means of the Argentine Atomic Energy Commission, assumes responsibility for all radioactive waste management generated in the country. In turn, waste producers are responsible for the conditioning and safe storage of the waste generated in the facilities operated by them, until that waste is transferred to CNEA. The latter is in charge of elaborating a Radioactive Waste Management Strategic Plan as part of the Radioactive Waste Management National Program.

- **Law No. 26566:** Enacted in 2009, declared of national interest the activities for the construction of a fourth nuclear power plant, as well as all the necessary acts to enable the life extension of Embalse (CNE) and Atucha Unit I (CNA I) NPPs, and the activities involved in the construction, commissioning and operation of Atucha Unit II (CNA II) Nuclear Power Plant. In addition, it declared of national interest the design, implementation and commissioning of the CAREM [Central Argentina de Elementos Modulares] prototype reactor currently being built in Argentina.

- **Law No. 26784**: Enacted in 2012, Article 61 revokes Article 34 of Law No. 24804, which stated that the nuclear energy generation activity developed by NA-SA was subject to privatization.

E.2.2 Regulatory framework

E.2.2.1 National requirements and provisions on radiological safety

The ARN 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 the Act and regulations resulting therefrom, as well as by international agreements and the non-proliferation policies adopted by the Argentine Republic.

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

In this sense, Law No. 24804, Art. 7 determines that ARN is in charge of the regulation and control of the nuclear activity in all aspects regarding radiological and nuclear safety, security and control of the use of nuclear material, licensing and control of nuclear facilities and international safeguards, as well as the advisory role to the National Executive Power in the corresponding matters. In addition, Law No. 24804 in its Art. 10 sets forth that the regulation and control of the nuclear activity in those aspects is subject to national jurisdiction, and Art. 14 provides that ARN shall act as an independent agency under the jurisdiction of the Presidency of the Nation. Besides Law No. 24804, Art. 16 grants 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 individuals, to conduct regulatory inspections and assessments, and to impose sanctions in the corresponding cases (for further details see SECTION E.3 of this report).

The regulatory system of ARN[1] at the closing date of this National Report is composed of 64 mandatory standards and 10 regulatory guidelines, acting as recommendations. ARN regulations comprise licensing of radioactive and nuclear facilities and their staff, and may be complemented, if necessary, by requirements related with radiation and nuclear safety, use of radioactive sources, radioactive waste management, safeguards, security and radioactive waste transport. Regulatory standards and guidelines are available and can be downloaded as a PDF document from ARN´s website: https://www.argentina.gob.ar/arn/marco-regulatorio/normas-regulatorias/. Since 2019, ARN has added to its site information alerts to warn about revisions and publication of new standards and guidelines. These alerts are published along with public news in the press and social networks.

The approach of the regulatory standards is for the most part focused on performance. That is to say, they establish the compliance of safety objectives, complementing with prescriptive requirements. In this sense, the manner to achieve these objectives is mainly based on the appropriate decisions taken by the Responsible Entity and with ARN surveillance in the different stages of licensing a nuclear or radioactive facility. IAEA Standards are used as reference and permanent consultation during the process of elaboration, revision or change of regulatory standards associated to radioactive waste management. Other International documents are also taken into consideration.

Regulatory Standard AR 10.1.1, Basic Safety Standard, Rev. 4, determines the requirements and provisions on the matter, which are consistent with the recommendations of the International Commission on Radiation Protection, specifically with its publication N. 103.

Although the regulatory system has not undergone major changes with respect to previous Reports, the Regulatory Body has continued updating current regulations, especially modifying the following standard and guidelines:

[1] These are known as Normas Regulatorias AR (Standards AR).

Table N° 1: Standards and Guidelines Updates 2020-2023

CODE	DESIGNATION	REVISION
Standard AR 10.6.1	Management system for safety in facilities and practices	Rev. 0
Standard AR 7.11.1	Individual permits for operators of industrial gammagraphy equipment	Rev. 4
Guideline AR 1	Dosimetric factors for external exposure and internal exposure, guideline levels of radionuclides in food and water, and recommendations for controlling radon gas exposure.	Rev. 2

Standard AR 10.6.1 has been elaborated according to IAEA General Safety Requirements No. GSR Part 2 “Leadership and Management for Safety”, together with other international documents.

Guideline AR1, Rev. 2, was updated according to IAEA General Safety Requirements No. GSR Part 3 “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards”, together with international documents such as: *“Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources”, Safety Series No.115* (1996), and the document from *International Commission on Radiological Protection, “Age-dependent Doses to Members of the Public from Intake of Radionuclides - Part 4 - Inhalation Dose Coefficients”, ICRP Publication 71, Pergamon Press, Oxford and New York* (1995).

E.2.2.2 Licensing System

Hereinafter the fundamental concepts of the system are summarized:

In Argentina, the licensing system for radiation safety is determined in the Basic Standard AR 10.1.1 Rev 4. Facilities for radioactive waste and spent fuel management, from nuclear power plants ad research reactors, are categorized by this standard as Type I or Relevant facilities. 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, commissioning, operation and decommissioning of Type I facilities cannot be started without the corresponding licenses requested by the license holder and granted by the Regulatory Body. The licenses are granted after ARN has performed an independent evaluation of the safety conditions foreseen and presented in the corresponding “Safety Report”.

The validity of such licenses is contingent upon compliance with the conditions stipulated therein and with the standards and requirements issued by the Regulatory Body. Non-

compliance with one or more of these standards, conditions or requirements may constitute grounds for ARN to suspend or revoke the corresponding license, in accordance with the current sanction system regime.

The staff of a nuclear or radioactive facility must be properly trained and qualified in accordance with their duties at the facility. ARN requires that all personnel assigned to significant safety-related tasks be properly licensed and hold specific authorizations for their assigned duties. Standards AR 0.11.1 and AR 0.11.2 determine the criteria and procedures to grant individual licenses and specific authorizations to the personnel performing tasks that require licenses in nuclear and radioactive facilities. Furthermore, those standards set out the terms and conditions according to which 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 International Atomic Energy Agency (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 made explicit in the Operation License itself.

E.2.2.3 Prohibition to operate without a license

Law No. 24804, Art. No. 9, provides that in order to develop a nuclear activity any natural or legal person shall, among other requirements, comply with ARN regulations in its scope of competence and request a license, permit or authorization that will enable them to perform the activities and comply with the obligations in safeguards or non-proliferation matters that Argentina has subscribed to or will subscribe to 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, ARN will require the implementation of corrective measures, and in the case they are not complied with, thismay lead to the imposition of sanctions provided in the regulatory system.

E.2.2.4.1 Documentation and reports

During the licensing process, the License Holder must submit to ARN the documentation related to radiological and nuclear safety produced by the requesting entity. The main components of the documentation in the case of an Operation License for a nuclear power plant, which includes the radioactive waste management and the spent fuel generated by the facility, are the following:

- Safety Report
- Manual of Policies and Operating Principles
- Quality Manual
- Operational, Missions Tasks and Duties of the Personnel Organization Chart
- Operation Manual
- Code of Practice including the Emergency Plan, Environmental Monitoring and Waste Management
- Maintenance Manual
- Probabilistic Safety Assessment
- Management of Operational Experience Program
- Staff Training Manual and Staff Training Program
- 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 security

The details of the documentation submitted to ARN, as well as the schedule for its submission, are established in Standard AR 3.7.1, "Schedule of documentation to be submitted prior to the commercial operation of a nuclear power reactor". This documentation has to be kept permanently updated, and the modification proposals must be forwarded to the Regulatory Authority.

On the one hand, the license and the abovementioned documentation constitute the Mandatory Documentation. On the other hand, any other standard or requirement issued by the Nuclear Regulatory Authority in connection with radiological and nuclear safety, safeguards and security is also mandatory.

In addition, the License granted by ARN determines the periodical reports that the Organization which 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 for each relevant radionuclide discharged to the environment and results of environmental monitoring sample tests.
- Inventory of processed and stored solid radioactive waste.
- Values of the doses received by the personnel occupationally exposed.
- Report on the annual Emergency Plan application drill: development, results and lessons learned.
- All evidence or information which, in the criteria of the License holder, 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 rest of 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

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

- **Planned inspections:** Programmed inspections offer the opportunity to examine the operator’s activities to corroborate its proper performance and discover possible problems at an early stage. These inspections consist of observation and evaluation of routine activities in terms of safety to assess the effectiveness of the license holder performance.
- **Reactive inspections:** Reactive inspections are usually fostered by the regulatory body in response to an unexpected, unplanned or unusual situation or incident, in order to assess its significance and implications, as well as the adequacy of corrective actions. A reactive inspection may be caused by an isolated incident, by

a series of minor events taking place in a particular facility, or by a complaint from a third party.

- **Non-routine inspections:** These are regulatory inspections related to a safety assessment in the stage of licensing or to particular situations of licensed facilities.

- **Special inspections:** They are performed by experts in matters as dosimetry, instrumentation and control, and others, in coordination with the inspectors. They have different objectives as, for example, the supervision of preventive maintenance tasks during planned outages.

- **Technical evaluations:** They involve the analysis of data collected during inspections or from other sources. For example, evaluations of the radiation safety of specific practices at nuclear or radioactive facilities to detect their potential weaknesses and identify possible measures to reduce workers or public doses or to improve the safety level.

- **Regulatory audits:** They are performed in accordance with written procedures and are scheduled to review organizational, operational and procedural aspects related with nuclear and radiation safety.

E.2.2.5 Specific regulatory actions

The regulatory actions that may be taken by 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, ARN sends a regulatory document to the License holder in the form of a requirement, recommendation or request for additional information, as the case may be. In this document ARN urges the License holder to take the required corrective measures within a determined term. These documents have the following scopes:

- **Requirement:** It is a regulatory order that the License holder must comply with as requested by the Regulatory Body.

- **Recommendation:** It is an action that ARN regards as advisable to be implemented by the License holder, who has certain flexibility to comply with it, by means of alternative solutions which ensure, at least, the same result required by

the recommendation. These alternative solutions must be proposed by the License holder to ARN for their evaluation.

- **Request for additional information:** It is a regulatory demand whereby more details of the documentation provided are required. For example, the justification of an assertion, and the demonstration of the result of calculations or additional documentation.

E.2.2.6 Sanction system

All deviations from the requirements established in the Regulatory Standards, Regulatory Requirements, Operating Licenses, and conditions and terms of Individual Authorizations detected by ARN involve follow-up actions, including formal communications between different levels of responsibility, to urge the holder to take the necessary corrective actions as soon as possible, provided that the safety of the public, workers, and the facility itself is not affected. Only in case of resistance or non-compliance with the corrective actions by the Responsible Entity is the respective sanction regime applied.

Law No. 24804 in its Article 16 section g) authorizes ARN authorizes ARN to impose the appropriate Sanction System in case of non-compliance with the Nuclear Law, the AR Standards, and the Requirements established in the respective Licenses or Permits.

Likewise, section h) of the mentioned Article 16, authorizes ARN to establish the procedures for the implementation of sanctions in relation to the non-compliance of the regulation as its attribution, guaranteeing the principle of due process. It is also important to highlight that Annex I of Decree No. 1.390/98, which regulates the Nuclear Law, stipulates that, for better fulfilment of its duties, ARN is authorized to establish a system of penalties.

The authority granted by the government to ARN in the Nuclear Law has been regulated through the approval by ARN Board of Directors of the following Sanction Regimes:

a) Sanction Regime for Nuclear Power Plants, approved by ARN Board Resolution No. 63/99.
b) Sanction Regime for Nuclear Non-compliance of Regulations for Radiation and Nuclear Safety, Security, Safeguards and Non-Proliferation in Relevant Facilities, approved by protection ARN Board Resolution 24/99000
c) Sanction Regime for Type II and III Facilities, Non-Routine Practices, and Transport of radioactive materials, approved by ARN Board Resolution 32/02 and modified by Resolution 622/22.

Since 1999, ARN has implemented a Procedure for non-compliance with regulatory standards regarding radiation, security, and nuclear safeguards. A new revision was approved by ARN Board Resolution No. 159/22. This procedure ensures due process and is complemented by the internal management procedure, which establishes the methodology for the application of sanctions when an act, action, or omission known to the

Nuclear Regulatory Authority, either through inspections by its personnel or through a third-party report, may signify non-compliance or violation of regulatory standards, regulatory requirements, or the conditions established in the Licenses, Authorizations, or Permits granted by ARN. It also establishes the responsibilities of ARN personnel involved. This procedure applies to all sanction regimes approved by Board Resolutions No. 24/99, 63/99, and 32/02.

The sanction system represents the last link of the safety chain. ARN considers that if the regulatory system is really effective and the License holder fully exercise their responsibilities, the application of sanctions and fines should occur only in exceptional cases. In this sense, an informal ARN function is to make License holder and Primary Responsible parties 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 Assignment of responsibilities

The Argentine Atomic Energy Commission is an autarchic body which depends on the Energy Secretary. Its powers and functions are set mainly in the National Law of Nuclear Activity, Law No. 24804, which in its Article 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 that responsibility or from making all that is reasonable or compatible with its possibilities in pursuit of radiological and nuclear safety, safeguards and security. The License holder, with a permit or authorization may delegate, in a 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 transfer of that waste to the managing organization, Law No. 25018 in its Art. 6 sets out that the National State, through the authority in charge of the application of this Act, 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 Regulatory Body, until they are transferred to CNEA, with the obligation to give immediate notice to ARN on any event which could result in an incident, accident or operation failure.

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

Article 8 sets out that the transfer of radioactive waste and spent fuel elements to CNEA shall be made at the time and in accordance with the procedures established by CNEA, with the ARN’s previous approval. In no event, shall the operator of the generating facility be exempted from the responsibility for contingent civil and/or environmental damages

until the transfer of the radioactive waste is completed. Therefore, and in agreement with Decree No. 1390/98, which regulates the provisions of Law No. 24804, that transference defines the limit of responsibility of the operator of the generating facility, with reference to radioactive waste and spent fuel elements.

E.3 Regulatory body

E.3.1 Duties and competence of the regulatory body

All nuclear activities performed in the country from 1950 until 1994 were controlled by CNEA through its regulatory branch: The Regulatory Affairs Management. The applied regulatory system was defined by Law No. 14467 and its Regulatory Decree No. 842/58.

Currently, the Nuclear Regulatory Authority operates as an autonomous and decentralized entity within the jurisdiction of the Presidency of the Nation and is subject to the regime of external systems of public control established for the entire National Public Administration through Law No. 24.156, the Financial Administration Law. As stipulated in Article 7 of the Law, it is responsible for the regulation and oversight of nuclear activities concerning radiological and nuclear safety, security, control of nuclear material use, licensing and oversight 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. ARN also acts as an advisory body to the National Executive Power in matters of its competence.

Law No. 24804 assigns a wide set of faculties and responsibilities to ARN (https://servicios.infoleg.gob.ar/infolegInternet/anexos/40000-44999/42924/norma.htm).

It should be noted that Annex I to Decree No. 1390/98, which regulates the above-mentioned Act, provides that for a better compliance of its duties, the Nuclear Regulatory Authority shall approve contingency plans in 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 those purposes. 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.

Law No. 24804 and Annex I of regulatory Decree No. 1390/98 grant ARN the necessary legal competence to determine, develop and apply a regulation and supervision system for all nuclear activities performed in the country as well as radiation activities with exception

to X Ray and NORM activities. In order to ensure an appropriate level of control, that legal competence is complemented by an adequate technical competence.

For this reason, from the beginning of the regulatory activities in the country it is considered imperative to have qualified staff, so that with their level of knowledge and experience endow the Regulatory Body its own independent criteria in all aspects of nuclear and radiation safety, safety in the transport of radioactive materials and in radioactive waste management, as well as safeguards and security.

For the same reason and as mentioned above, when the independent Regulatory Body was created, all human resources and materials were transferred to it from CNEA regulatory branch.

It is worth highlighting that 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 summarised the following basic aspects:

- Training of staff involved in radiological and nuclear safety, transport and waste safety; safeguards and security, either belonging to 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 assessments related to the licensing of regulated facilities.
- Development of scientific and technical aspects related to radiological and nuclear safety, transport and radioactive waste.

E.3.2 ARN organizational structure and human resources

The ARN is managed by a Board of Directors composed of a President, a First Vice President, and a Second Vice President, all with full-time dedication. The President, in turn, exercises the executive functions of ARN. The current organizational structure is shown in Figure 1.

In the technical area related with spent fuel and radioactive waste management, three of those Departments possess a crucial role, their activities are:

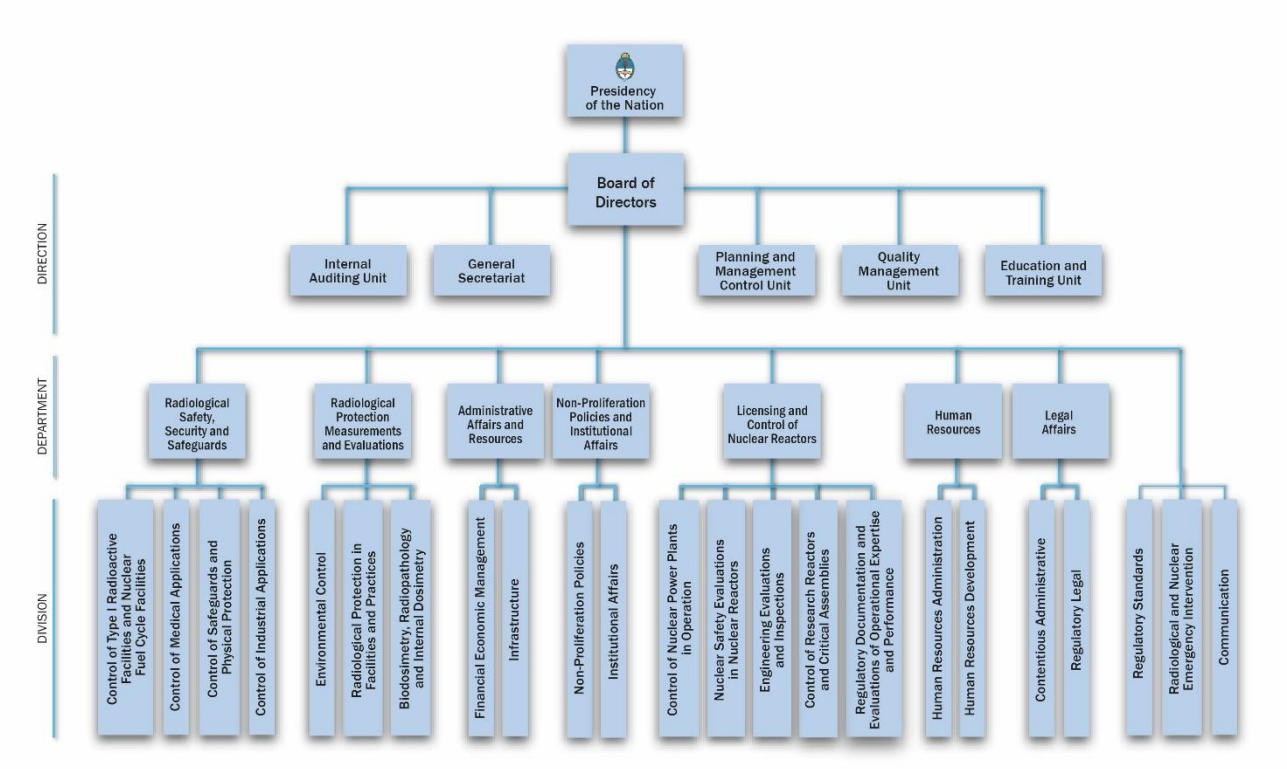
The main tasks performed by the Radiation Safety, Security and Safeguard Department are to license and control all facilities and practices which involve radioactive material, as established in the Basic Safety Standard, with the exception of nuclear reactors. With this purpose, regulatory inspections and evaluations are undertaken, concerning the radiation safety of radioactive facilities, the transport, and nuclear safety of fuel cycle facilities, with the exception of Nuclear Reactors. Furthermore, the department is responsible for the safeguards control of all nuclear facilities in the country and the regulation of security in all

nuclear facilities and of those which possess radioactive sources, in line with a graded approach related with associated risk.

The Measurements and Radiation Protection Evaluations Department participates in the regulatory control of the compliance to the adequate levels of protection of people and the environment related to those facilities supervised by ARN. It is responsible for conducting radiation safety assessments, modelling and measurements and its respective evaluations under the scope of spent fuel and radioactive waste management. It is also in charge of the verification of the environmental discharges and associated systems, and of the shielding of radioactive facilities and the assessment of criticality accident risks. Furthermore, it oversees the activities of control of fulfilment of safety during the scheduled stops of the Nuclear Power Plants and it evaluates the environmental radiological impact on nuclear and radioactive facilities. Develops research and development activities associated with the radiological safety, with the purpose of justifying and improving the knowledge and technics required for regulatory purposes.

The Licensing and Control of Nuclear Power Plants Department is in charge of guaranteeing the control of radiological and nuclear safety of nuclear power plants, research reactors and critical assemblies during operation, after closure and during decommissioning. Establishes and perform the licensing process of new nuclear power plants, research reactors and critical assemblies as well as the workers at these facilities who hold positions requiring a license issued by ARN. It also verifies licenses, regulations, requirements, agreements and international conventions in force, and undertakes the corresponding regulatory actions.

Figure 1– Organizational Chart ARN 2023



Regarding ARN personnel, until December 2023, the organization had 354 workers. Out of them, 60% are professional. Out of the 354 employees of ARN, 60% are professionals, of which 49% hold postgraduate degrees, 4% have completed a master's degree, and another 3% hold doctoral degrees. Within the professional staff, 39% have engineering degrees, and 32% have degrees in Natural Sciences, Exact Sciences, and related fields. Regarding engineering disciplines, main specialties include chemical engineering, comprising 29%, electronics at 27%, and industrial and mechanical engineering with 8% and 9% of graduates, respectively.

The structure of the Body is composed of 7 Departments, 3 Divisions which depend directly on the Board of Directors and 5 other Divisions. Under this umbrella, 3 Departments and 2 Divisions are fully committed to technical activities related with the regulatory activities, comprising 59% of the staff.

Geographically, staff is distributed along the different offices as follows:

- 76% work at Headquarters,
- 20% work at the Ezeiza Atomic Centre,
- 3.5% at Atucha Nuclear Power Plant and Embalse Nuclear Power Plant, and
- 0.5% is distributed in the remaining offices.
- The complete geographical distribution of ARN staff is shown in Table N° 3.

Table N° 2: Geographical Distribution of ARN employees

LOCATION	PERCENT
HEADQUARTERS	76 %
EZEIZA ATOMIC CENTER	20 %
CNA & CNE NUCLEAR POWER PLANTS	3.5 %
OTHERS	0.5 %

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

Distribution of activities and resources required to implement the control activities on the regulated facilities through inspections, assessments, and regulatory audits, throughout all stages, during operation and licensing are comprised in ARN Annual Work Plan.

Control is implemented on four regulatory areas: nuclear safety, radiological safety and protection, safeguards and non-proliferation, and security.

Regulatory activities require a comprehensive endeavour encompassing inspections and assessments.

Herein follows the total number of evaluations and inspections conducted throughout the period 2020-2023.

Table N° 3: Total number of evaluations and inspections

ACTIVITY	YEAR			
	2020	2021	2022	2023
Inspections	569	784	1.041	1.086
Evaluations	3.433	4.553	6.555	5.842

E.3.3.1 Training of ARN staff

Fundamental tools for the training of professionals with technical backgrounds entering ARN include post-graduate programs offered annually by the University of Buenos Aires in collaboration with ARN. These programs award degrees in Specialist in Radiological Protection and the Safety of Radiation Sources, and Specialist in Nuclear Safety. Training is further complemented by on-the-job experience and participation in specific courses, congresses, seminars, and research projects, both nationally and internationally.

Additionally, every year, ARN conducts a ten-week Basic Radiological Protection Course aimed at training other technical personnel within the institution. This course provides an excellent alternative to university postgraduate programs and is attractive to technicians and professionals starting out or working in any area of the nuclear sector.

The educational programs and courses of the Nuclear Regulatory Authority extend throughout the Latin America and the Caribbean region via the Regional Training Centre under its supervision. These educational initiatives not only aim to provide specialized knowledge in radiological and nuclear safety but also strive to promote a culture of safety throughout the region

E.3.3.2 Maintenance of the regulatory body’s competence

ARN signed an Agreement-Program with the Undersecretary of Public Administration, in which a matrix of commitments for management results was determined so as to approach the development of a comprehensive quality management system, the staff performance evaluation and a demand plan for personnel recruitment.

E.3.3.3 Training activities

ARN maintains a consistent policy aimed at continuous efforts in training. Particularly, this is achieved through the organization and provision of university postgraduate courses and programs aimed at educating and training workers, as well as training trainers to create a cascading effect in educational activities.

Argentina’s experience in education and training in radiological and nuclear safety is based on its postgraduate courses in Radiation Protection and Safety of Radiation Sources, and in Nuclear Safety, which, during the last 35 years provided education to 1324 professionals, 1305 of whom are from Latin America, and 19 from other regions of the world.

In 2006, the first IAEA mission of EduTA in a Latin American country took place in Argentina. This peer international evaluation of the national education structure on nuclear and radiation safety concluded with very positive results for our country. In 2008, as a direct consequence of this mission, the Argentine Government signed a Long-Term Agreement with IAEA, by which Argentina agreed to become a Regional Training Centre in Latin America and the Caribbean in terms of Nuclear, Radiological, Transport and Waste Safety. Currently, the Education and Training Unit of ARN oversees this Centre.

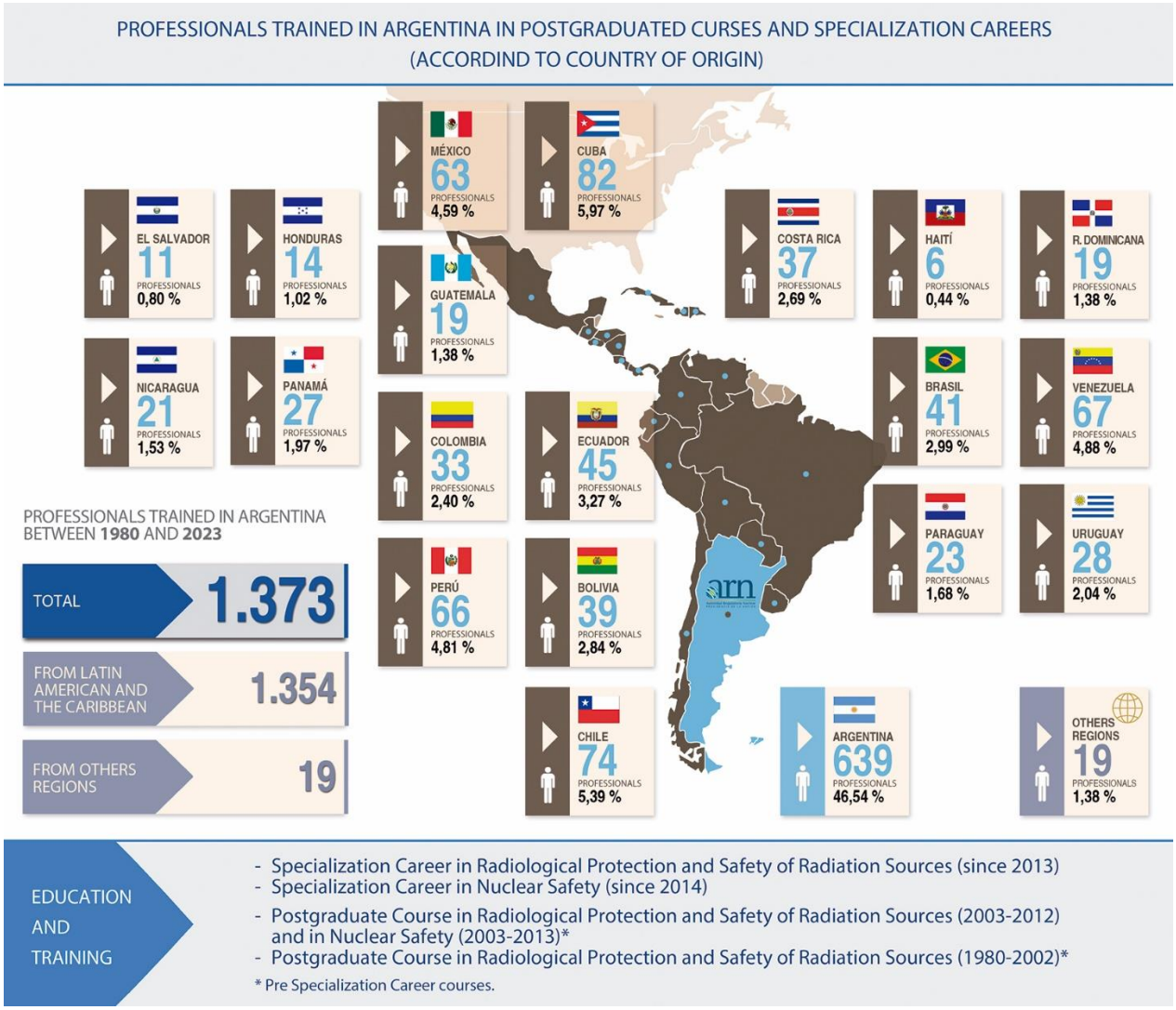
As a milestone in the pursue of the highest education standards, in 2013 and 2014, the above-mentioned courses have been recognized as Specialization Careers, granting its graduates a postgraduate degree which in turn has been officially recognized by the Secretariat of Education.

In November 2017, a follow-up mission of EduTA took place in Argentina. The team that conducted the mission underscored the fact that ARN has taken a key role in the development of capacities in radiological protection in the region. Also, the continuous development of postgraduate courses along with the Engineering Faculty of the University of Buenos Aires under the sponsor of IAEA for the past 40 years represents a unique case of association between IAEA and a regional centre which provide assistance to Member States in order to build their capacities.

Furthermore, ARN also offers training courses in Radiological Protection to its own technical personnel, CNEA´s and other local institutions, public or private related to the nuclear sector.

As a member of the Latin American Network for Education and Training in Nuclear Technology (LANENT), ARN Unit for Education and Training has made available a system for learning management for all Programs and Careers offered.

Figure N° 2: Professionals trained in Argentina according to the country of origin



E.3.3.4 Quality Management System (QMS)

The Nuclear Regulatory Authority implements its QMS to continuously improve the effectiveness and efficiency of its regulatory actions, focused on increasing stakeholder satisfaction, considering that environmental, health, quality, occupational safety, information security, physical protection, and economic requirements are integrated with radiological and nuclear and safety requirements.

To achieve compliance with these requirements and consequently stakeholder satisfaction, ARN:

- ❖ Identifies processes.
- ❖ Determines their sequence and interaction.
- ❖ Establishes criteria and methods necessary to ensure effective management of each process.

- ❖ Ensures the availability of resources and information needed to support the operation and monitoring of these processes.
- ❖ Monitors, measures, and analyzes these processes.
- ❖ Implements necessary actions to achieve planned results and continuously improve these processes.

The requirements of the system are described in the “ARN Quality Manual”, which was last updated on May 18th, 2023.

The Board states and communicate the Quality Policy.

QUALITY POLICY

The Nuclear Regulatory Authority assumes the responsibility of guaranteeing the protection of the society and its habitat, in the present and in the future, against the harmful consequences of ionizing radiations and to control that the regulated activities are only performed with peaceful purposes.

We promote a safety culture based on an enquiring attitude, a rigorous approach and careful regulatory behaviour and in the transparency towards access to information in relation to radiological safety and nuclear matters for involved stakeholders.

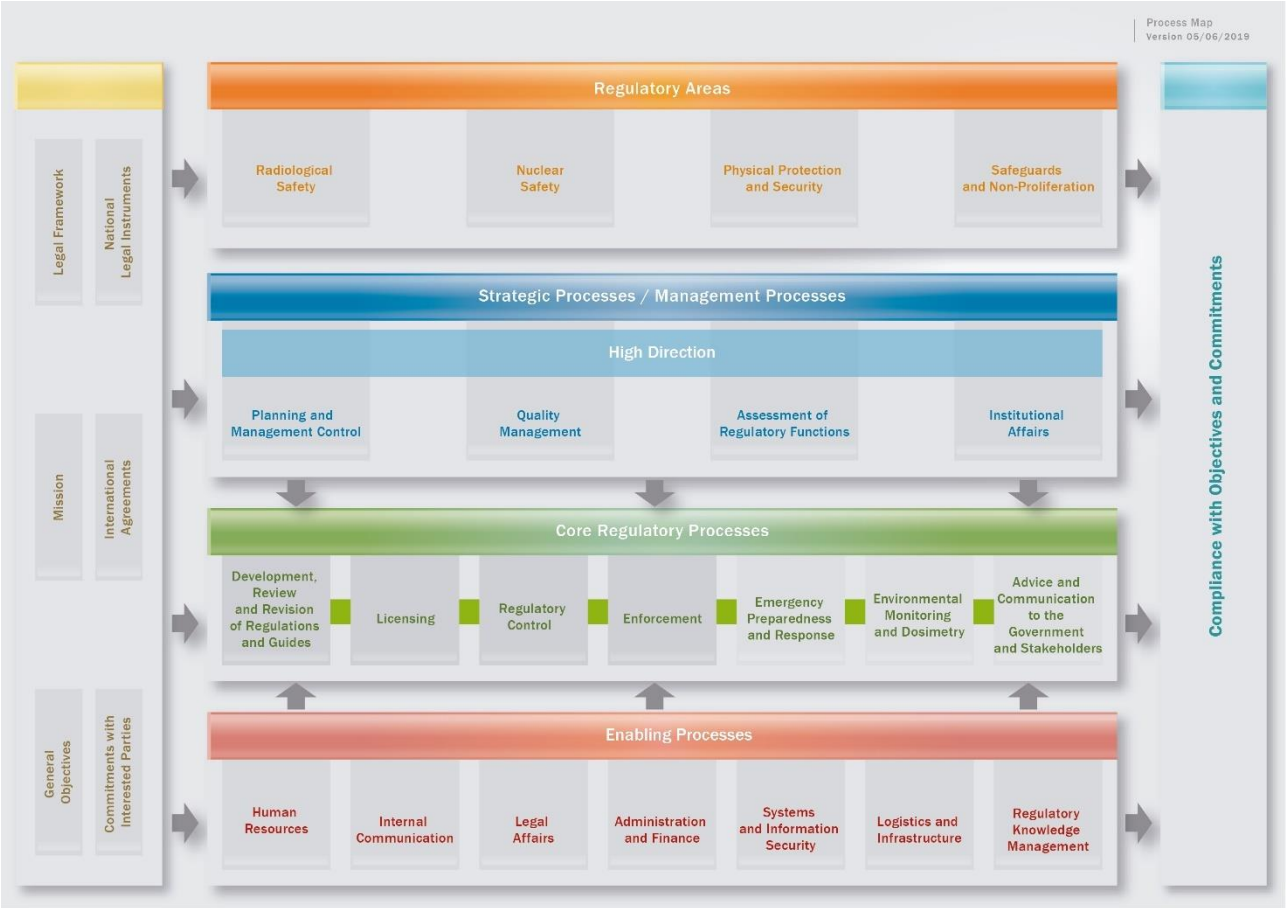
In view of its strategic objectives, the Nuclear Regulatory Authority plans, performs, verifies, and acts in order to continuously improve its Quality Management System, based on the requirements of Standard IRAM:ISO-9001:2015 ins its current version and considering international recommendations to implement a Comprehensive Management System.

Processes Approach

ARN has a Process Map that reflects the necessary processes and their interactions to fulfill its regulatory functions. Process management is described in the mandatory document called the “Process Sheet”.

ARN maintains the corresponding records to support the operation of its processes and to ensure that they are carried out as planned in pursuit of safety.

Figure N° 3: Processes map



Follow-up, measurement, analysis, and evaluation

With the aim of evaluating the performance and effectiveness of its quality management, ARN conducts monitoring, measurement, analysis, and evaluation of safety through various methods:

- Follow up of processes.
- Evaluation of indicators for objective compliance in the processes.
- Analysis of surveys.
- Internal audits and quality verifications.
- Management review.
- Oversight control.

Through internal quality audits, implementation and effectiveness of the quality management are verified. They are performed by certified staff and are independent of the reviewed area.

The Quality Management Unit proposes an annual internal quality audit program to Senior Management for evaluation, review, and approval.

ARN conducts internal quality audits to:

- Prove the products and processes compliance in relation with the requirements of the implemented documentation.
- Guarantee the fulfilment of the Quality Management System.
- Continuously improve the efficiency of the Quality Management System
- Identify improvement opportunities, in order to continuously enhance the efficiency of the quality management system, via the implementation of quality objectives.
- Verify the compliance with corrective measures and evaluate its effectiveness.

During the period comprised by the present report 33 internal audits have been performed under the Standard IRAM-ISO 9001:2015.

In accordance with IRAM-ISO/IEC 17025:2017, 10 internal audits and 3 external audits conducted by the Argentine Accreditation Body were carried out.

The follow-up of the processes is performed through work meetings with the involved responsible and other members, with the purpose of verifying that the adequate management tools are being implemented and for the treatment of the audit's findings.

The Board reviews the QMC in scheduled dates and due adjustments are performed, if needed, to make sure of their convenience, adaptation and efficiency.

End-certification and credentials

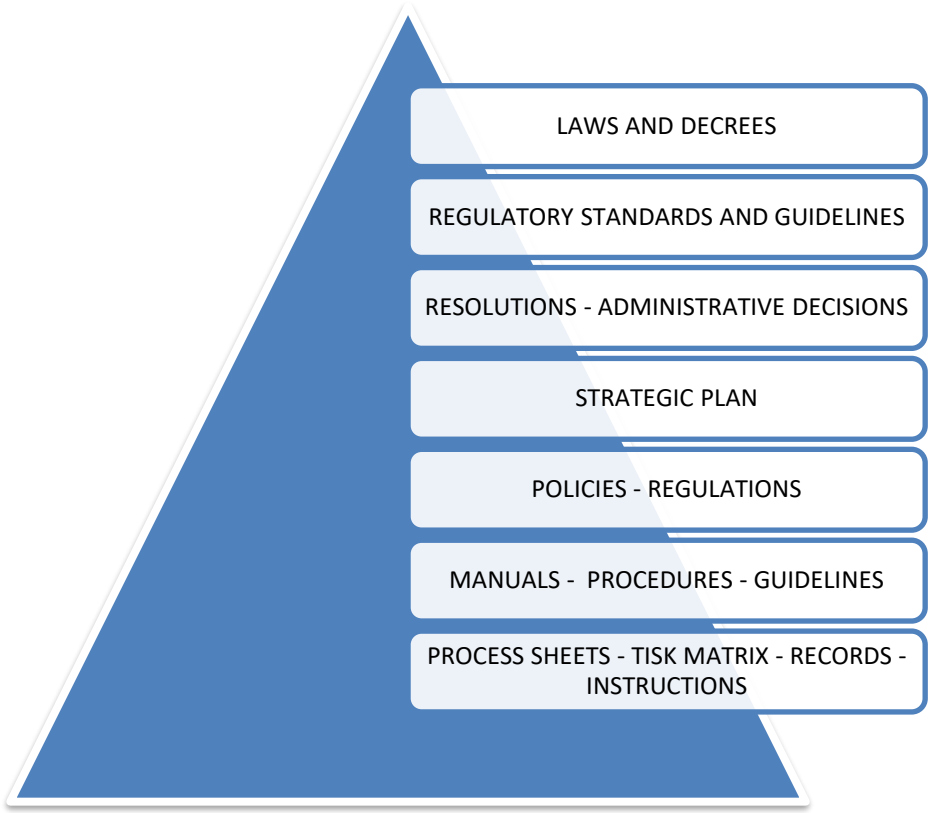
Up to date, the certified laboratories are: the multi-site laboratory, belonging to the Biological Dosimetry Laboratories, the Dosimetry Laboratory by Thermal Luminescence and the Environment Laboratory. All of them have successfully completed the re-evaluations required to Full Standard corresponding to 2023.

Furthermore, the Calibrations Laboratory successfully passed the 3rd maintenance evaluation to Full Standard corresponding to 2023.

Documentation management

The documentation structure of the QMS is comprised by external and internal documentation which offers a legal framework for the development of different activities of ARN.

Figure N° 4: The documentation structure of the QMS



The organization maintains all required documented information as per the current version of IRAM-ISO 9001:2015 and as determined by the organization in its respective documents such as manuals, procedures, process sheets, instructions, regulations, among others.

The documentation is controlled, usable, legible, clearly identified, and easily accessible at the point of use.

Additionally, ARN has a defined Information Security policy, and in 2022, an Information Security Committee was formed with the aim of ensuring the effectiveness of the management system processes and standardizing criteria for the strategic inclusion of information security in all institutional projects.

During the reference period of this report, 259 documents were developed and/or updated: manuals, regulations, procedures, and work instructions.

Stakeholders' satisfaction

ARN keeps in mind the expectations and needs of the interested parties in the activities and participation during the QMC processes, with the purpose of increasing the satisfaction level and at the same time guaranteeing the fulfilment of safety.

ARN ensures that the requirements of stakeholders are known and met by the Body, prioritizing compliance with the National Nuclear Activity Law, public safety, worker safety,

and habitat protection. Moreover, appropriate strategies are defined for interacting with stakeholders:

- Adequate means to regularly and effectively communicate with stakeholders and inform them about radiological risks associated with facility operations and activities.
- Suitable means to promptly and effectively communicate with stakeholders in circumstances that have changed or were unforeseen.
- Appropriate means to disseminate necessary safety-related information to stakeholders.
- Appropriate means to consider stakeholders' concerns and expectations regarding safety in decision-making processes.

Continuous improvement

To improve efficiency and effectiveness of QSM and fulfil stakeholders' requirements, ARN analyses the data produced by the quality internal audits, the fulfilment indicators, board reviews, surveys analysis, suggestions, and improvement opportunities presented by the stakeholders, implementing the following measures:

- It is determined whether there are needs or opportunities that should be considered for continuous improvement. Additionally, processes can correct, prevent, or reduce undesired effects in order to contribute to the improvement of the QMS.
- Appropriate corrective actions are taken without undue delay for non-conformities and observations detected during an internal quality audit or self-detected.

E.3.3.5 Financial resources

Nuclear Activity Law No. 24804, Article 25, establishes that the financial resources for the proper functioning of ARN shall originate mainly from:

- The regulatory fee created according with Article 26 of the above-mentioned Law.
- Subsidies, heritage, legacies, donations from private organizations, from non-licensed facilities, or transfers acquired under any title.
- Interests and benefits deriving from the management of its own funds.
- Contributions from the National Treasury determined according to the budget of each financial year.
- Other funds, assets or resources that may be assigned according to applicable laws and regulations.

In this sense, the first paragraph of Article 26 of the Law No. 24804 establishes that the Designated License holders of an authorization or permit, or Corporate Body whose

activities are under the purview of the Authority, will pay a yearly and in advance Regulatory Fee which will be approved through the National Budget.

For nuclear power plants, this annual Regulatory Fee shall not exceed the value equivalent to the average annual price of one hundred megawatt-hours (100 MW/h) in the Wholesale Electricity Market, determined based on the prevailing prices in that market in the immediate previous year. During the decommissioning stage and until the completion of tasks related to the removal of irradiated fuel from the reactor, the Plant Operator must pay the Regulatory Fee per megawatt of installed nominal power.

Likewise, Article 26 of the Annex I of Decree 1390/98 establishes that ARN will set the Audit Fee and shall remit through the National Presidency its Budget in order to be approved by the Honourable Congress of the Argentine Republic.

In order to fulfil this, the Board of ARN through Article 1 of the Executive Decision 76/08 approved the System of Fees by Licensing and Inspection which is applied to Natural Persons or Body Corporations which request the granting or are Owners of Licenses, Operation Authorizations, Specific Authorizations and Individual Permits, but also to Natural Persons or Body Corporations which request the granting or are Owners of Certifications of Approval of Radioactive Material Transport granted by ARN.

Annex to Executive Decision of the Board of ARN 76/08, Chapter I, Article 6 establishes:

- The value of Regulatory Hour (VHreg), in Argentine pesos, is the average between the result of the Regulatory Hour of the previous year times the wage increase in the regulatory activity and the result of the Regulatory Hour of the previous year times the Internal Wholesale Price Index published by INDEC (National Institute of Statistics and Census) in the past year, according to Executive Decision 142/21.

Finally, in the Annex of the above-mentioned Executive Decision, the Regulatory Hours shall be applied according to the following*:*

- ❖ In Chapter 4 to relevant facilities, grant of the individual license and for the release or renewal of the specific authorization.
- ❖ In Chapter 5 to non-relevant and other facilities and authorized activities, to the supervision of transfers, to the release or renewal of the individual permit.
- ❖ In Chapter 6 to the transport of radioactive material.

In this sense, ARN approved a “Licensing and Inspection System of Fees”. This system establishes a rate for the granting of licenses and permits according to the type of facility or activity, in addition to the corresponding yearly fee for the operation of those facilities or practices.

The system establishes a yearly fee for the operation of certain facility or activity. This fee is determined by a simple formula which takes into account two factors: “the Regulatory Effort”, expressed as the number of hours of inspection or evaluation that ARN determines

for the regulatory control of such facility or practice; and the rate of that effort, which is calculated according to the monetary value of the inspection or evaluation, which is set yearly. The fee for NPP operation is excepted from this System.

Every year, ARN prepares a draft budget where all expenses and resources needed for the next year are detailed. The Budget granted to ARN for the year 2023 was of **$3,451,820,664** (Argentine Pesos), as detailed in Table N° 4. Following in Figures N°5 and 6 it is possible to visualize the budget distribution for regulatory areas and sections.

Table N° 4: ARN Budget for the year 2023

	DA N° 4-23			
Section	**Financing Source**			**Total**
	11	**12**	**21**	
1- Staff	$ 2,023,832,000	$ 213,367,000	$ 1,947,000	$ 2,239,146,000
2- Goods	$ 0	$ 44,577,306	$ 6,153,510	$ 50,730,816
3- Non– staff Services	$ 15,330,000	$ 472,247,521	$ 30,826,503	$ 518,404,024
4- Capital Expenditure	$ 25,062,000	$ 38,050,000	$ 15,793,824	$ 78,905,824
5.1.3- Scholarships	$ 0	$ 1,740,000	$ 0	$ 1,740,000
5.9- Overseas Transfers	$ 207,953,000	$ 286,441,000	$ 0	$ 494,394,000
SUBTOTAL	**$ 0**	**$ 1,056,422,827**	**$ 54,720,837**	**$ 3,383,320,664**
9.1.2 Figurative Expenditure	$ 0	$ 68,500,000	$ 0	$ 68,500,000
TOTAL	**$ 32,272,177,000**	**$ 1,124,9222,827**	**$ 14101327**	**$ 3,451,820,664**

Figure N° 5: Budget distribution by Regulatory Department

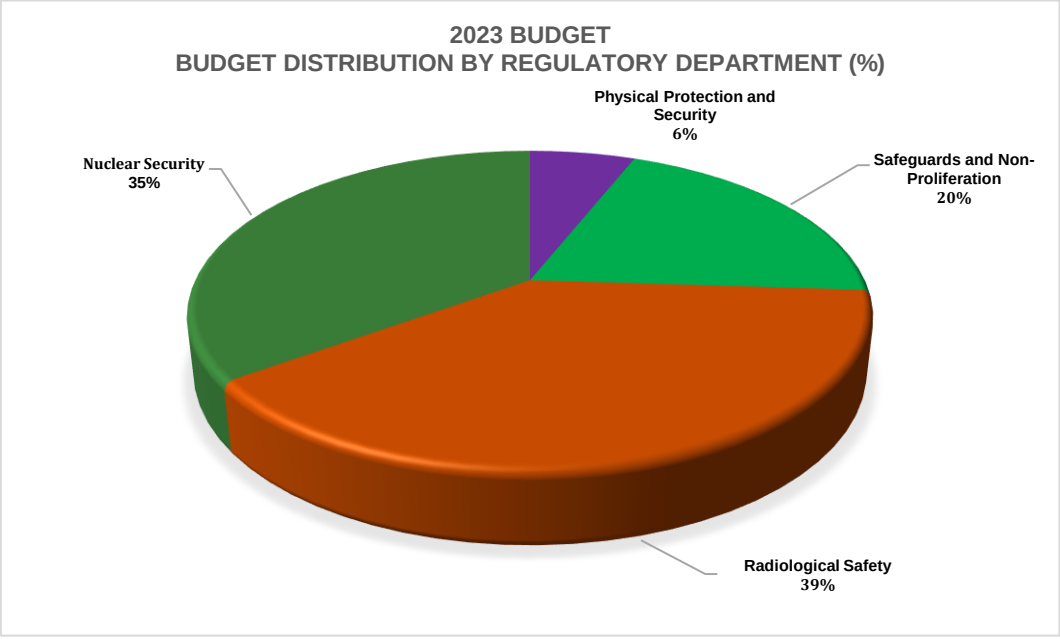
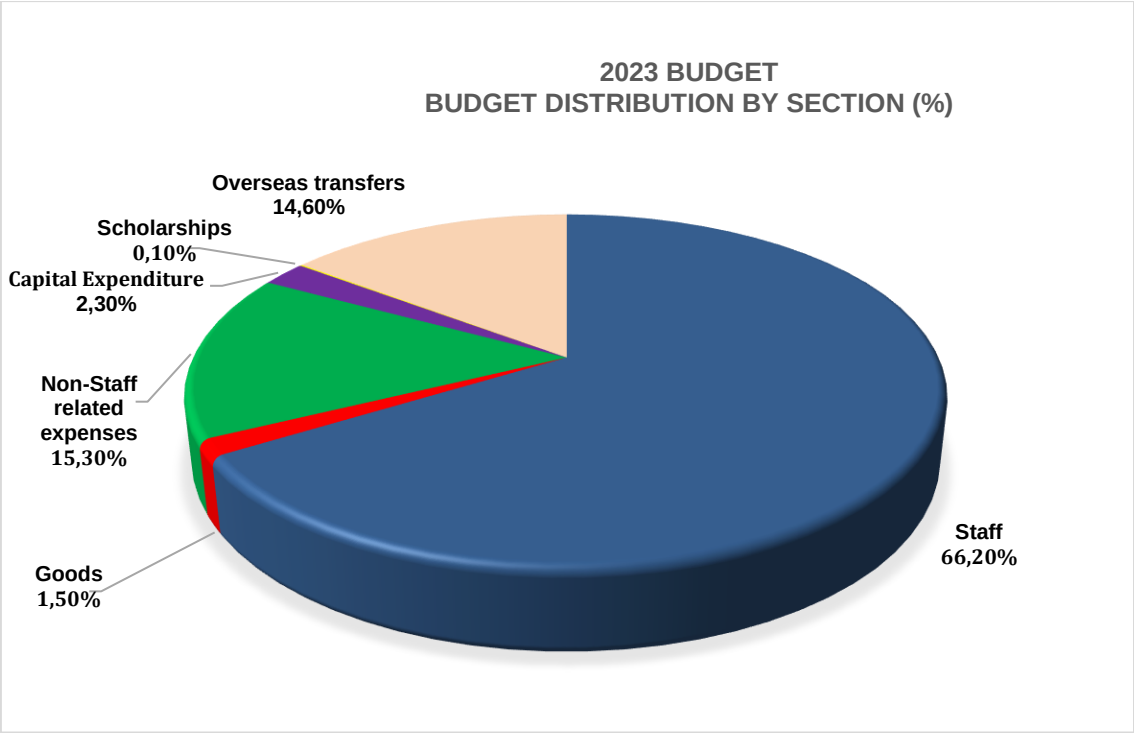


Figure N° 6: Budget distribution by section



E.3.4 Relationship with other organizations

The Department of Non-proliferation Policies and Institutional Affairs participates in the definition and implementation of the country policies in regulatory matters in national and international corresponding fora.

During the period 2020-2023 ARN continued the cooperation activities with other organizations. In this framework, the participation and contribution of ARN in the projects and activities of the Forum of Radiological Regulators Organisms of Ibero- America (FORO) were maintained. The mentioned Forum is constituted by the radiological and nuclear regulatory organisms of Argentina, Brazil, Chile, Colombia, Cuba, Spain, México, Paraguay, Perú, Portugal and Uruguay and has the objective of sustaining high levels of nuclear and radiological safety and security in the Ibero-American region.

ARN actively participates in its technical program and supports the Secretariat, based in Buenos Aires, in managing the nuclear and radiological safety and security knowledge network. The technical program is made jointly and continuously in coordination with the action plans of the International Atomic Energy Agency (IAEA) and sustained by a knowledge network on nuclear and radiation safety and security which enables information exchange among regulatory agencies from the region. In this framework, leading and interesting projects in the international sphere have been conducted in areas of Occupational Radiation Protection, Radiation Protection in Medical Applications, Radiation Protection for the Public and the Environment, Emergency Preparedness and Response, Follow up of Accidents and Incidents, Control of Radioactive Sources, Decommissioning of Facilities, Waste Management, Nuclear Safety, Radioactive Material Transport, Legal Affairs, Human and Organizational Factors and Security.

ARN has kept strong links with other national and international agencies, which sometimes translate into cooperation agreements. During the period of this report, ARN subscribed six (6) national agreements and two (2) international agreements. Moreover, different actions were undertaken to implement binding commitments, mainly through bilateral meetings, technical visits and specific trainings. However, in-person meetings were severely affected by the restriction measures imposed in response to the pandemic.

Currently, ARN high level specialists and experts participate, as nominated experts, in the following international committees and IAEA advisory groups:

- Commission on Safety Standards, “CSS”
- Radiation Safety Standards Committee, “RASSC”
- Nuclear Safety Standards Committee, “NUSSC”
- Waste Safety Standards, Committee “WASSC”
- Transport Safety Standards Committee, “TRANSSC”
- Emergency Preparedness and Response Standards Committee “EPReSC”
- Permanent Advisory Group on Safeguards Implementation, “SAGSI”
- International Expert Group on Nuclear Liability (INLEX).

Furthermore, ARN representatives participate in:

- United Nations Scientific Committee on the Effects of Atomic Radiations, “UNSCEAR” (UN)
- International Commission on Radiological Protection (ICRP)

During the period 2020-2023, 17 Safety Standards Drafts were received from IAEA in order to appraised by the State Members: 6 of those during 2020, 5 during 2021, 3 during 2022 and 3 until August 18th, 2023.

E.3.5 Transparency of activities and communication with the public

The Communication Division promotes the spread of ARN´s institutional image among the different sectors and interested social stakeholders through the strengthening of internal and external communication of the institution.

ARN's Institutional Strategic Plan 2021-2025 recognizes efficiency and transparency in regulatory management as one of its core values. The Strategic Plan is built upon five Strategic Lines, each with General and Specific Objectives. One of these Strategic Lines aims at consolidating a distinctive institutional image through institutional communication

that strengthens ARN's relationship with stakeholders, ensuring the dissemination and understanding of regulatory actions, and improving access to information

Reports and Publications

ARN publishes an Annual Report of Activities, which is prepared according with the specifications set in Article 16 of the National Nuclear Activity Law, about the regulatory tasks and the main activities performed in order to fulfil the regulatory mission and the tasks assigned in the field of radiological and nuclear safety, safeguards and non-proliferation and security. ARN send this document to the executive authorities, legislative and those belonging to the Argentine nuclear sector. to keep informed the involved stakeholders in regards with regulatory activity. ARN keeps an updated archive of Annual Reports published since 1994.

An integral part of regulatory activities includes the results of the Environmental Radiological Monitoring Plan conducted annually by ARN in the vicinity of relevant regulated facilities, completely independent of the monitoring conducted within the facilities themselves. This monitoring involves collecting samples from air, water, soil, and other environmental matrices, which are processed and analysed in ARN's own laboratories. The results are published annually and made publicly accessible on ARN's website.

Additionally, ARN publishes an annual Technical Report compiling scientific and technical work presented at congresses, symposiums, conferences, and seminars, as well as publications in scientific and technical journals. These works are publicly accessible.

Regarding International Treaties, ARN maintains an updated publication on its website of National Reports on Nuclear Safety, as Argentina is a contracting party to the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

ARN has a specific section on its website dedicated to information about the Joint Convention, which includes public access to all Argentine National Reports published since 2003, as well as supplementary dissemination materials related to the Joint Convention and the IAEA

Communication of radiological and nuclear events

ARN provides information to the public and stakeholders about radiological and nuclear events in an open and transparent manner, whether they involve radiological or nuclear risks or are of public sensitivity and interest. Through a specific section on its website, ARN publishes and keeps this information updated, organized in a table that allows selection by category and keyword to facilitate the search for relevant information.

Public Information Access

In accordance with the National Law on Access to Public Information No. 27275, in effect since 2017, public agencies are required to provide information and access to data for

consultation by the general public. ARN has a process for responding to information requests and public inquiries, which can be channelled via telephone or email

Complaints Channel

In 2022, ARN implemented a complaints channel accessible from its website. The complaints channel is a transparency tool that allows any natural or legal person to inform the regulatory agency of alleged non-compliance with regulatory standards in a secure manner, through various means, and if desired by the complainant, anonymously or with identity protection

Public Participation

According to Decree No. 1,172/03, Article 3, ARN must comply with a participatory process for the development of its regulatory standards. To achieve this, ARN makes available to the public the draft or modified projects of regulatory standards on its website for the submission of opinions and proposals. It also conducts extensive dissemination through all its institutional channels and the press.

Other communication channels

ARN continuously keeps regulated entities, stakeholders, the press, and the general public informed about regulatory activities and current regulations. As part of a more interactive communication approach, ARN has strengthened its presence on social media in recent years, including YouTube (2020) and LinkedIn (2021), in addition to the official ARN channel on Facebook (2015).

SECTION F OTHER GENERAL SAFETY PROVISIONS

F.1 Responsibility of the license holder

F.1.1 Background

At the beginning of the nuclear activity in Argentina, the facilities did not have the magnitude and complexity they have nowadays. The responsibility for radiological and nuclear safety of these facilities fell on to one person, generally the head of the facility, who by themselves assisted by their personnel or by contracting third party services, performed all safety-related tasks. When the facilities had the appropriate means and equipment and the personnel had been trained, the sector responsible for assessing the safety conditions gave their approval for the Operating Permit to be granted.

While these concepts are still essentially valid, significant improvements have been made to the regulatory system over the years. Thus, depending on the magnitude of the facility, the Regulatory Body demands that the persons who are to fill certain positions on the operation personnel receive specialized training and hold an Individual License. Furthermore, the requirements for the training of operating staff have been increased.

Likewise, for larger and more complex facilities, the Regulatory Body considered that, in order to guarantee its operation with a similar degree of safety to that for which the facility was conceived, it was not enough to have an operating staff of sufficient number and their training adequate. Therefore, it was required that the design and operational aspects of major facilities also be periodically reviewed and that, when appropriate, the modifications advised by the state-of-the-art in terms of safety be introduced. These considerations gave rise to the figure of License Holder.

F.1.2 License holder and primary responsible

The ARN requires that every nuclear facility be backed by an organization able to provide the necessary support to the plant staff in tasks inherent to radiological safety, nuclear safety, security, safeguards and safety in radioactive waste management, such as the review of Operating Procedures, maintenance of safety systems, technical modifications to the plant, among others.

This role lies on the so-called License Holder, which, in the case of nuclear power plants, it is the company Nucleoeléctrica Argentina S.A. (NA-SA), responsible for the operation of CNA, I, CNA II and CNE, including the SF storage systems and the RW management generated at these facilities. The CNEA is the License Holder for RW management through the PNGRR at the facilities corresponding to the Ezeiza Waste Management Area (AGE). In this place is where RW is managed, whether it is generated by the CNEA or other facilities outside it.

The Regulatory Standards AR 0.0.1, AR 10.1.1 and AR 10.6.1 establish the responsibilities of the License Holder. The most relevant are the following:

- The License Holder must make every reasonable and compatible effort in accordance with its possibilities in favor of safety, complying at least with standards and requirements issued by the ARN. Such responsibility extends to the design, construction, commissioning, operation and closure (decommissioning) stages of the facility.
- Compliance with the standards and procedures is a necessary but not sufficient condition concerning the responsibilities of the License Holder, which must make every reasonable and compatible effort within its possibilities to enhance safety. It is also responsible for complying with the standards and requirements imposed by other non-nuclear competent authorities, such as the conditions concerning the release of chemical effluents (see SECTION H.1).
- The License Holder may be in charge of the operation of more than one nuclear facility and delegate totally or partially the execution of safety-related tasks but retains full responsibility for them.
- At each facility, the License Holder must appoint a Primary Responsible comprised of one person from its staff, to whom it will assign direct responsibility for the radiological and nuclear safety of the facility, as well as for the compliance with the applicable licenses, standards and requirements. In the case of operating nuclear power plants, their respective managers fulfil the function of Primary Responsible.
- The License Holder must provide the necessary assistance to the Primary Responsible so that it can exercise its functions and supervise it to verify that it satisfactory fulfils its safety-related responsibilities.
- The License Holder must carry out the nuclear facility’s safety assessment and submit the respective technical documentation to the ARN for the granting of the required license.
- No modification that alters the design, operating characteristics or the mandatory documentation included in the Operating License of a nuclear or radioactive facility and that is related to radiological or nuclear safety may be initiated without prior authorization of the ARN.
- The License Holder and the Primary Responsible must facilitate the inspections and audits required by the ARN.
- Any change in the organization of the License Holder that may affect its capacity to meet its responsibilities requires the prior approval of the ARN.

Besides the responsibilities of the License Holder and of the Primary Responsible, the ARN has defined the responsibilities of the employees working at the facility. In this regard, the Regulatory Standard AR 10.1.1, "Basic radiation safety standard", Rev.4, establishes that workers are responsible for their compliance with the procedures established to ensure their own protection, that of other employees, of the public and of the environment. This condition is consistent with the IAEA recommendations.

F.1.3 Regulatory control of compliance with the responsibilities of the license holder

In order to verify that license holders comply with their respective responsibilities, the ARN exercises different types of controls as detailed below:

- The ARN has updated information on the operational organization structure. In the event of any changes to this structure, the License Holder must submit to the ARN a document describing the new operational organization structure, missions, functions and staff requirements. It is emphasized that any proposed change must be duly justified. The ARN evaluates the documents and justifications and, if no observations are found, the document becomes effective when the facility has the capacity to cover all licensable positions.
- The Regulatory Standard AR 0.11.1, "Licensing of Type I Facility Personnel", Rev. 3, determines the requirements that Type I facility personnel must meet in order to obtain an Individual License or Specific Authorization.
- The procedure for granting Individual Licenses and Specific Authorizations enables the ARN to verify the suitability of those persons who are to assume responsibilities related to the facility's safety. This aptitude is re-evaluated each time Specific Authorization is renewed, a process that goes hand in hand with the validity of the psychophysical aptitude certificate, the annual retraining and the correct task performance.
- The Individual License may be suspended or revoked by the ARN if during the performance of the duties it is found out that any of the conditions required for its granting are no longer fulfilled. Likewise, the Specific Authorization may also be modified, suspended or revoked. In addition, the ARN verifies the compliance with its obligations of the Primary Responsible regarding the safety of the facility, in particular its compliance with the applicable standards, the conditions of the Operating License and all other requirements related to radiological safety. This is done through evaluations, inspections and regulatory audits carried out by the ARN inspectors and analysts, with the assistance of external experts when necessary.
- The ARN undertakes specific inspections to verify the compliance with radioprotection aspects during the scheduled shutdowns of the NPPs.
- The Regulatory Standards AR 10.14.1, AR 10.13.1 and AR 10.13.2 establish the requirements to be met by facilities in terms of safeguards and of protection and security.
- The ARN has established a sanctions regime to be applied in all cases of non-compliance with any regulatory requirement.

F.2 Human and financial resources

Introduction

The CNEA, since mid-2020, depends on the Secretariat of Energy of the Ministry of Economy of the Nation. The functions of this Secretariat include the definition of the nuclear policy, all matters related to the peaceful uses of nuclear energy or radioactive sources, the nuclear fuel cycle, the radioactive waste management, the development and research of nuclear activity and, in particular, the nuclear power generation, in accordance with Decree No. 804/20.

Both human and financial resources are essential elements to guarantee the safety conditions of nuclear facilities. Consequently, the Regulatory Body requires due qualification and training of all the personnel of the SF and RW management facilities according to the functions they perform, requiring that the personnel covering safety-related functions have their enabling License and Specific Authorization.

In the case of SF and RW produced by nuclear power generation, the License Holder for the operation of the NPPs, NA-SA, is responsible for having qualified and trained personnel in accordance with the regulatory and legal framework in force, providing the necessary economic resources for the development of operating activities, including the storage of SF and RW, until the transfer to the CNEA is carried out.

Financing of the National Program for Radioactive Waste Management

The CNEA has financed the tasks carried out by the PNGRR together with the Technical Department of Uranium Mining Remediation, with contributions from the National Treasury, included in its budget and approved by the National Executive Power.

CNEA’s organizational structure and resources

Annex I of the Administrative Decision N° 793/23 updated the first level of the CNEA structure.

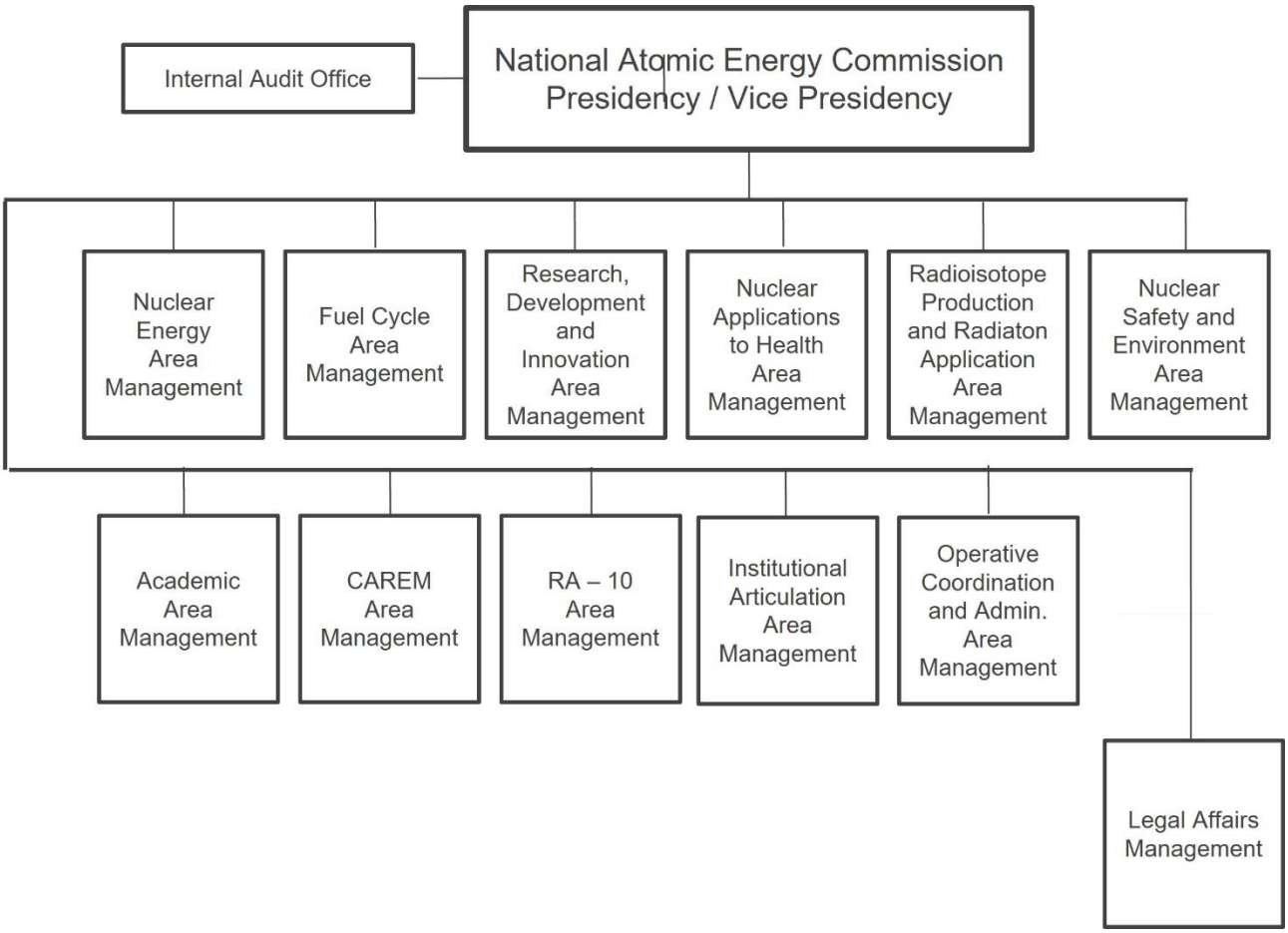
The PNGRR together with its TECHNICAL DEPARTMENT OF URANIUM MINING REMEDIATION, report directly to the Nuclear and Environment Safety Area Management.

The Nuclear and Environment Safety Area Management, among other duties, carries out the following activities:

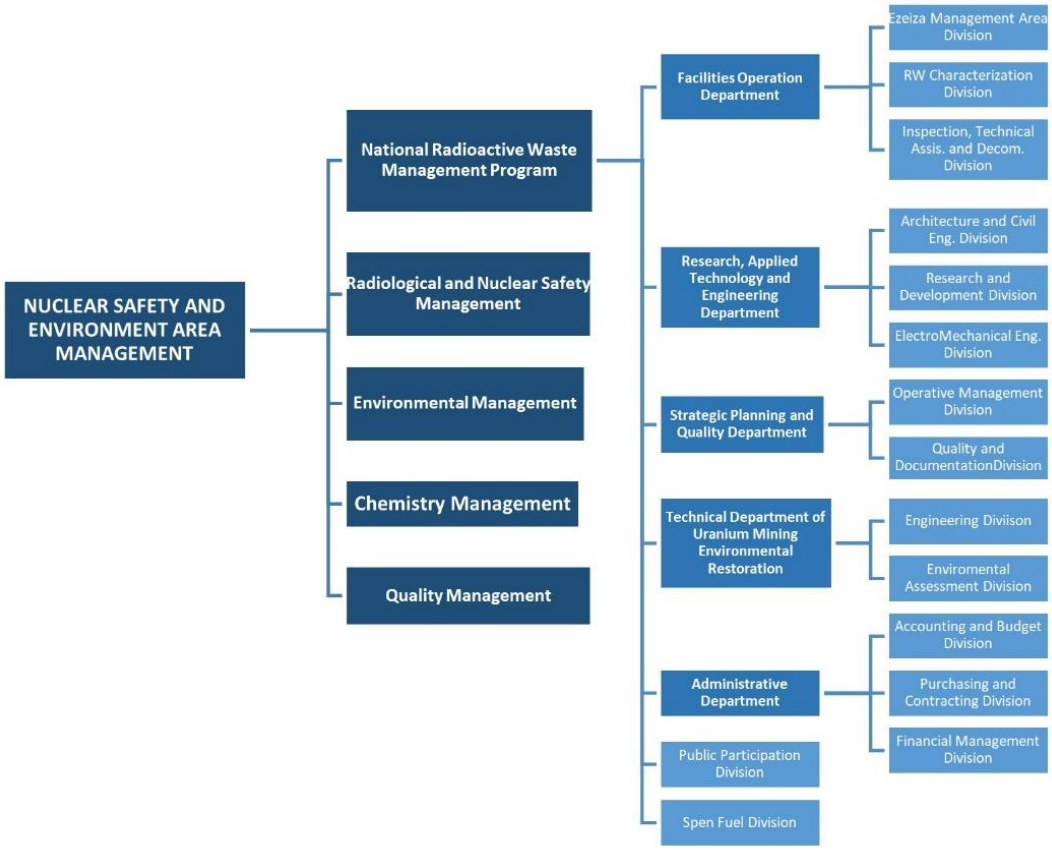
- To establish methodologies of management and criteria for safety, environment and quality.
- To monitor the performance on safety, environment and quality.
- To coordinate, advise and provide technical assistance to other Managements and Sites on these topics.

In order to achieve this, it has specialized Managements for radiation safety, security, nuclear safety, conventional security, quality management and environmental management.

Fig. N° 7: CNEA's organizational structure



Nuclear Safety and Environment Area Management



The CNEA has made progress in the implementation of a Quality, Safety and Environment Management System, applying the most widespread standards in the field. This System, based on continuous improvement, is the most effective methodology for compliance with the CNEA policies, through the planning of objectives and processes necessary to obtain results in accordance with the policy; the implementation of the processes established to achieve the objectives; the monitoring of these processes with respect to the established policy, objectives and requirements; and the review and decision making for performance improvement.

The main elements of this System are the identification of potential hazards, risk assessment and determination of controls; identification and control of environmental aspects; identification and compliance with legal requirements; establishment of improvement programs and objectives; determination of roles and responsibilities; allocation of resources; assurance of personnel competence through training; awareness raising; application of communication and participation methodologies; continuous strengthening of the safety culture; control of documentation and records; determination and monitoring of processes; operational control; emergency preparedness and response; continuous strengthening of the safety culture; control of documentation and records; determination and monitoring of processes; operational control; emergency preparedness and response; the application of communication and participation methodologies; the continuous strengthening of the safety culture; the control of documentation and records; the determination and monitoring of processes; operational control; emergency

preparedness and response; the integrated management of non-conformities, incidental events, corrections and corrective actions; the conduct of internal audits; and the systematic review of performance by Managements in their area of responsibility.

The PNGRR is responsible for the management activities of SF and RW, generated in the research and radioisotope production reactors, their facilities and the facilities of the external generators to the CNEA, such as NPPs and small generators.

The following tables show the financial resources allocated and the distribution of personnel by objectives.

Table N° 5: CNEA's Financial resources dedicated to RW and SF management 2023

ITEM	RESOURCES ($ ARS)
Research and Development	13,369,948,00.-
RW and SF management	6,318,000,00.-
Projected improvements	395,408,552,00.-
Personnel	810,239,159,00.-
TOTAL	**1,225,335,659,00.-**

Table N° 6: CNEA's Human resources dedicated to RW and SF management to December 2023

CALIFICATION	Full time	Partial time
Professionals	67	4
Assistants and technicians	41	7
Fellows	0	2
TOTAL	108	13

Training of human resources

Most of the personnel dedicated to SF and RW Management have completed the Specialization Course in Radiation Protection and Safety of Radiation Sources, and the Specialization Course in Nuclear Safety, or the Radiation Protection Course for technicians, given by the ARN. These courses are offered by the University of Buenos Aires and the ARN.

Likewise, the attendance, participation and training of personnel in courses and seminars given at universities and other science and technology organizations is encouraged. In particular, for some specific topics in the nuclear area, training in foreign organizations has been arranged through scientific and training visits, as well as attendance at specialization courses and seminars.

On the other hand, the personnel dedicated to the management of SF and RW participate every year in dictating training courses on the subject of Radioactive Waste Management in the Master's Degree in Radiochemistry and in the Specialization in Nuclear Reactors at the Dan Beninson Institute of the CNEA, jointly with the National University of San Martín, and in the Specialization Course in Technological Applications of Nuclear Energy at the Balseiro Institute of the CNEA, together with the University of Buenos Aires.

NA-SA staff members with specific functions at the NPPs, as well as the AGE personnel, receive retraining in accordance with the requirements established in Regulatory Standard AR 0.11.3, "Retraining of personnel at Type I facilities", Rev.1. At the beginning of each year, NA-SA and the CNEA submit to the ARN the retraining program to be developed during that year. For each specified function, the Program includes the list of courses, the timetables, the syllabus and the lecturers designated to teach and evaluate them.

Training of fellows

The PNGRR has a staff of fellows dedicated to the main lines of research and development being carried out at the three Atomic Centers and at the CNEA Headquarters, all of them under the direction of professionals specialized in the specific disciplines.

In some cases, the fellows are graduates of postgraduate courses at the CNEA's teaching institutes, so that they have already acquired complementary training prior to their dedication to the assigned line of research and development.

The fellowships for professionals may be for further training or for the completion of doctoral or master's theses. In the case of technical fellows, they perform support tasks for the principal investigators. Grants have also been awarded to advanced students in different disciplines.

F.3 Quality assurance

F.3.1 Introduction

In April 2021, a new ARN standard, Standard AR 10.6.1, "Management System for Safety at Facilities and Practices", Rev. 0, came into force. The objective of this Standard is to establish the requirements for the development and implementation of a management system to help ensure radiological and nuclear safety, security and physical protection and safeguards. Its scope reaches all facilities and practices regulated by the Regulatory Authority and all stages of the life of a facility or practice.

Table N° 7: Main changes between AR 3.6.1 and AR 10.6.1 Standards

Main conceptual and terminology changes	
Previous Standard (AR 3.6.1)	**With AR 10.6.1**
Efficiency	→ Performance and efficiency
Quality Control (QC), Quality Guarantee o Quality Assurance (QA), Quality Management (QM)	→ Management (M)
Quality Program, Quality System	→ Management System
Quality Policy	→ Security Policy
Conduction, Guidance	→Leadership

New terms and concepts that were not previously standardized by the Regulatory Authority also appear: supply chain, competence, safety culture, graded approach, knowledge management, indicator, management manual, objective and stakeholder.

With this standard, the management system encompasses quality elements, and it is added that the management system must integrate the elements of radiological and nuclear safety, security and physical protection, safeguards, quality, conventional hygiene and safety, environmental safety, economic, social, organizational and human factors, in such a way that safety is not compromised.

AR 10.6.1 establishes, among others, two documents:

- The License holder's security policy.
- The management manual applicable to the facility or practice.

Each License Holder conducts its own independent inspections, audits and assessments. In turn, as part of the assessments, each License Holder carries out self-assessments of its Management Manual and Management System.

In licensing processes, when a License holder applies for an authorization for a facility or practice, among other mandatory documentation, it must submit to the ARN a Management Manual in accordance with Standard AR 10.6.1.

In regulatory control processes, the License Holder must submit to the ARN modifications to the mandatory documentation, including revisions to its Management Manual.

Whether for licensing or for regulatory control, all facilities that already had a Quality Manual according to the previous Standard AR 3.6.1 must submit to the ARN a new Management Manual, according to this Standard AR 10.6.1, which replaces the previous one as mandatory documentation.

With reference to Standard AR 10.6.1 and the applicable Management Manual, the ARN may carry out inspections or audits of the facility's management systems and/or processes.

Some of the regulatory procedures used by the ARN to assess the Management Manuals of facilities or practices regarding the Standard AR 10.6.1 are:

- Radiological and nuclear safety assessments of Type I radioactive facilities and the nuclear fuel cycle.
- Verification of Application Standards in Safety Management Systems for Medical Practices with Ionizing Radiation.
- Regulatory assessments for Licensing/Authorization of NPP site construction/commissioning/operation.
- Non-routine assessments at NPPs.

F.3.2 Nucleoeléctrica Argentina Sociedad Anónima (NA-SA)

Since its creation in 1994 by Decree No. 1540/94, NA-SA has been carrying out its nuclear power generation activity, currently operating CNA I and II, and the CNE.

Through Law No. 26,566, NA-SA was entrusted with the construction, commissioning and operation of a fourth power plant, the life extension of the Embalse Nuclear Power Plant, completed in January 2019, as well as the completion of the construction and commissioning of the Atucha Nuclear Power Plant Unit II, in operation since May 2016.

NA-SA, as the License Holder, has a Quality Management System that serves as a reference framework for the specific quality assurance programs of each unit of the organization. This System, initially described in the General Quality Assurance Manual, was approved in November 1997. Since then, the General Quality Assurance Manual has been revised several times.

Currently, it is called the Quality Management Manual and is currently in Revision 5, which incorporates the requirements of the IRAM-ISO 9001:2015 standard at corporate level. The Quality Management Manual also complies with the requirements of Standard AR 10.6.1, "Management system for safety in facilities and practices".

The Quality Policy was also adapted to meet the requirements of IRAM-ISO 9001:2015 standard and unified with the Environmental Policy. Revision 3 was put into effect in November 2021.

Table N° 8: State of NA-SA Quality System Management

ORGANIZATION UNIT	DOCUMENT	REVISION N°	NUMBER OF PROGRAMMATIC PROCEDURES
NA-SA	Quality Management Manual	5	41
CNA I - II	Management System for CNA Security, Unit I and II	0	196
CNE	Quality Guarantee Manual for the CNE (*) Operation	7	162
UGPN	UG Integrated Management System Manual	1	61
Central Services Management	Management System Manual	9	20

(*) Currently being finalized by NA-SA.

F.3.3 National Atomic Energy Commission

CNEA Quality Management System

One of the responsibilities of the Quality Management is to coordinate the Quality Management activities carried out at the CNEA and to centralize information on the subject. Periodically, the authorities are informed of the state of development of the Quality Management Systems of the Institution's sectors.

The Institution's mandatory documents must be integrated into its Management System and complied with by the different sectors.

The documentation of the CNEA's Quality Management System is completed with the documentation issued by the different sectors, such as Management System Manuals, Quality Plans, General Procedures, Operating Procedures and Work Instructions, all prepared in accordance with the CNEA's Regulatory Procedures; applicable external documents such as specific standards or codes and the applicable regulatory standards, in particular the Standards and Requirements of the ARN.

The documents are monitored in two ways:

- **Internal:** Based on the Regulatory Standard AR 10.6.1 "Management System for Safety in Facilities and Practices", Rev. 0, the managers of each sector are responsible for carrying out a "Managerial Self-Assessment"; additionally, they must receive annually the results of an "Independent Evaluation" of the efficiency in the application of the Quality System in order to improve it.
- **External:** The areas in the CNEA generating and managing SF or RW are subject to audits and inspections of different types, characteristics and origins, including technical aspects and management systems:

- Inspections by the Nuclear Regulatory Authority.
- Audits by the National General Audit Office (AGN).
- Audits by the National General Syndicate (SIGEN).
- There are some sectors whose management systems are certified, as well as laboratories whose management systems and activities are accredited. In these cases, these sectors are additionally evaluated by the corresponding external body, such as the Certification Entity or the Argentine Accreditation Body.
- The CNEA has a computerized document management system called ADMINDOC.
- The Quality Management and Nuclear Certification Department was incorporated into the Quality Management
- An agreement was signed between NA-SA, ADIMRA, INTI and the CNEA to develop certification schemes for nuclear products within the framework of the National Certification System.

Radioactive Waste Management National Program

The PNGRR, an organization implemented by the CNEA in order to comply with the RW management responsibilities assigned by Law No. 25018, has designed a Quality Management System applicable to all stages of the management of SF and RW and materials derived from uranium mining, with the aim of ensuring that the conditioned radioactive material complies with acceptance requirements, both for transport and for storage and confinement.

The Quality Management System is framed within the general policy for Quality Management of the CNEA. The responsibility for the development of the Quality Management System procedures and their compatibility with the CNEA's Quality Management Program is carried out by the Quality Management and Documentation Division, which reports to the Strategic Planning and Quality Department of the PNGRR. To date, and since the incorporation of the documentation of the former PRAMU and the CAB Uranium Laboratory, the PNGRR Quality Management System includes 104 Operating Procedures and 7 Working Instructions in force, corresponding to the different activities carried out.

The sector has a staff of 3 people directly involved in Quality Management and Documentation, without considering the Project and Operations inspectors. Likewise, in order to allow an efficient access to documentation, the sector has a database in which, in addition to the aforementioned procedures, the specifications and plans of the installations, memories, reports and other technical documents are recorded. The Standards and legislation issued by the regulatory authorities and public authorities that provide a framework for the RW management make up another database.

At present, the first database has 2,238 records (not including plans), of which 546 are current documents. In the second database there are 57 records.

According to the regulations issued by the Regulatory Body, in order to obtain the respective Operating Licenses, the sectors that manage RW must submit Safety Reports that include the description of their Management Systems.

F.4 Operational radiation protection

The basic radiation protection criteria applied in the country state the following:

- Practices using radiation must be justified.
- Radiation safety must be optimized.
- Established dose limits and restrictions must be respected.
- Accidents must be adequately prevented, and emergency procedures must be implemented in case they occur in order to mitigate their consequences.

These criteria, in relation to radiation safety at SF and RW management facilities, have been defined by the Regulatory Body in the following standards:

- AR 10.1.1 Basic Radiation Safety Standard.
- AR 10.12.1 Radioactive Waste Management.
- AR 3.1.1.1 Occupational Exposure in Nuclear Power Reactors.
- AR 3.1.2 Limitation of Radioactive Effluents in Nuclear Power Reactors.
- 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 Exposure in Type I Radioactive Installations.
- AR 6.1.2 Limitation of Radioactive Effluents from Type I Radioactive Facilities.

Dose limits for the public

The effective dose limit for members of the public is 1 mSv in a year and applies to the total effective dose to the representative person generated by all facilities and practices. In special circumstances a higher value may be applied in a single year, provided that the average over five consecutive years does not exceed the value of 1 mSv. The annual dose equivalent limits are 15 mSv for the lens and 50 mSv for the skin.

Dose constraints for the public

The Regulatory Body has established for the design of each facility an annual effective dose constraint on the representative individual of 0.3 mSv due to the release of gaseous and liquid radioactive effluents, in accordance with Standards AR 3.1.2, AR 4.1.2 and AR 6.1.2.

As mentioned in the previous Report, as of June 2013, the ARN has established that, for the design of a nuclear power reactor, a nuclear research reactor or a Type I radioactive

facility at a site with multiple facilities, sufficient retention for the release of radioactive effluents must be foreseen as not to exceed the annual dose value in the representative person of 0.5 mSv, considering the radioactive effluent discharges from all the facilities located at the site, in accordance with the ARN Resolution No. 191/13. This is expressed, particularly for nuclear power reactors, in Standard AR 10.10.1, "Assessment of Nuclear Power Reactor Siting", Rev. 0.

When the design of radiation protection systems ensures that under normal operating conditions no worker will receive an effective dose in excess of 5 mSv in a year and no member of the public will receive an effective dose in excess of 100 µSv in a year, the Standard AR 10.1.1, "Basic Radiation Safety Standard", Rev. 4, states that it is not necessary to demonstrate that the systems are optimized, unless the Regulatory Authority expressly requests it. Even in cases where such demonstration is not required, facilities must implement systems and actions to keep doses as low as reasonably achievable, although these implementations do not necessarily arise from an optimization analysis.

Occupational dose limits

The dose limits for workers are as follows:

- Annual effective dose: 20 mSv in a year, taking this value as the average over 5 consecutive years (100 mSv in 5 years), not exceeding 50 mSv in a single year.
- Crystalline equivalent dose: 20 mSv in a year, taking this value as the average over 5 consecutive years (100 mSv in 5 years) and not to exceed 50 mSv in a single year.
- Equivalent dose for skin or extremities: 500 mSv in one year.

The dose limit applies to the sum of the dose due to external irradiation in the period considered plus the committed dose due to intakes in the same period.

F.4.1 Conditions for radioactive material release

F.4.1.1 Discharges

In relation to effluents, and in accordance with regulatory standards, retention systems must be optimized.

The Regulatory Body establishes that the discharge of radioactive effluents to the environment must be as low as reasonably achievable and the annual activity of each significant radionuclide present in the effluent must not exceed the authorized discharge value established in due course by the ARN.

The authorized discharge values are understood as an operational constraint and are derived from the calculated doses to the representative person due to gaseous and liquid discharges, optimized with an appropriate margin of flexibility to ensure the protection of the public without interfering with the operation of the facility. Specific mathematical models are used for this purpose.

In order to maintain continuous discharge conditions, daily and quarterly restrictions are stipulated for the application of the respective models.

Emissions of gaseous and liquid effluents that occur during normal operation of the facilities are monitored by the operator on a continuous basis and are periodically reported to the ARN.

The Regulatory Body carries out a verification program of the operator's control of discharges, which includes the review of sampling procedures, measurements and calculations of uncertainties, as well as surveys of measuring equipment (calibration, standard sources, and other equipment). In some cases, the review includes independent sampling of discharges, determination of activity concentration of the radionuclides of interest and an environmental monitoring plan independent of the operator´s one, which includes sampling and measurement of water, air, sediments, soil and food such as vegetables, milk and fish.

The following table shows the average annual activity discharged to the environment by the nuclear reactors for the period 2020-2023, broken down by discharge route and radionuclide group.

Table N° 9: Annual average of discharges

Annual average of discharges to the environment for the 2020-2023 period								
INSTALATION	LIQUIDS			GASEOUS				
	Total Activity [Bq]			Total Activity [Bq]				
	H-3	Emitters β/γ	Emitters α	Noble gases	H-3	Iodine	C-14	Others
CNAI	1.4E+15	3.6E+11	1.5E+09	3.7E+13	6.5E+14	1.2E+08	4.9E+11	2.1E+07
CNAII	5.8E+14	6.8E+10	7.8E+07	6.8E+13	8.5E+14	1.4E+09	1.3E+11	3.8E+07
CNE	1.4E+14	6.1E+08	---	2.9E+13	1.9E+14	2.2E+07	1.3E+12	5.8E+03
RA-3	---	1.6E+07	---	2.4E+13	---	1.1E+06	---	1.7E+07
RA-6	---	7.4E+05	---	1.3E+09	---	---	---	---

References:
---: Not applicable

F.4.1.2 Clearance of solid materials

In Regulatory Standard AR 10.1.1, “Basic Radiation Safety Standard”, Rev. 4, the ARN refers to the clearance of solid materials and the applicable dose criteria. Namely:

‘Radioactive material or any object with radioactive content may be exempted if, in all reasonably foreseeable circumstances, the effective dose to any person from such material is not expected to exceed 10 μSv in any one year and provided that the Regulatory Authority does not understand otherwise. For scenarios with a low probability of occurrence, the exemption applies if the effective dose expected to be received by any individual does not exceed 1 mSv in any one year’.

The ARN has the Regulatory Guideline AR 8, “Generic Clearance Levels”, Rev. 1, which establishes the values of activity concentration per radionuclide, the general conditions for clearance, the explanation of terms, the recommendations for the clearance of materials based on their activity concentration, as in the case of materials with a mixture of radionuclides of artificial and natural origin. In addition, it presents clearance values in terms of surface contamination for alpha, beta and gamma radionuclides, and considerations for the application of these values.

The Regulatory Authority may consider it necessary to grant clearance of materials with levels higher than those recommended in the Guidance through a conditional clearance.

During the period 2020-2023, numerous requests for clearance have been received from Type I and II facilities, promoting the minimization of radioactive waste and optimizing financial resources.

F.4.1.3 Exemption of practices

In Regulatory Standard AR 10.1.1, Rev. 0, the ARN refers to the practice exemption and applicable dose criteria. Namely:

‘Any practice or radiation source assigned to it may be exempted if, in all reasonably foreseeable circumstances, the effective dose expected to be received by any individual, from that practice or radiation source, does not exceed 10 μSv in any one year, and provided that the Regulatory Authority does not understand otherwise. For low probability of occurrence scenarios, the exemption applies if the effective dose expected to be received by any individual does not exceed 1 mSv in any one year’.

The ARN has Regulatory Guidance AR 6, “Generic Exemption Levels”, Rev. 1, which establishes the total activity and activity concentration values for more than 300 radionuclides, the general conditions for granting exemption, the explanation of terms and references, and recommendations for mixing if more than one radionuclide is used in a practice or radiation source within a practice.

F.4.2 Occupational exposure

The radiological protection criteria used by the Regulatory Body to control the dose received by workers are consistent with the recommendations of the ICRP.

The Regulatory Standards AR 3.1.1, AR 4.1.1 and AR 6.1.1, applicable to nuclear power reactors, research reactors and Type I radioactive facilities, respectively, establish criteria to ensure that occupational doses are kept as low as reasonably achievable and below the established dose limits.

The Standard AR 10.1.1, Rev. 4, establishes the conditions to be met to verify compliance with the dose limits. These have been detailed in previous National Reports to this Joint Convention.

In most of the facilities the occupational doses are global values that include the doses received in operation and maintenance and are applied to all the workers at the facility subject to personal monitoring; consequently, the contribution received in radioactive waste and spent fuel storage tasks is not discriminated against.

Only in the case of the AGE personnel do the reported doses correspond exclusively to radioactive waste management activities. For this facility, in the periods 2020, 2021, 2022 and 2023 the collective effective doses were 0.00 Sv.p, 0.20 Sv.p, 0.95 Sv.p and 0.00 Sv.p, respectively. With respect to the personnel effective doses for the same period and averaged annually, these were as follows: 0.00 mSv, 0.014 mSv, 0.063 mSv and 0.00 mSv.

F.4.3 Radiological and nuclear safety at the CNEA

As mentioned in previous National Reports, the CNEA is the License Holder for the operation of nuclear and radioactive facilities at the different Atomic Centers.

The main activities of the GSRYN are the following:

Strengthening:

- The existing capacity of the CNEA on safety issues.
- The control and support systems for the facilities.

Optimize:

- The environmental radiological monitoring programs of the CNEA sites and carry out public dissemination of their results.
- The radiological monitoring programs for personnel at radioactive facilities and surrounding areas.
- The occupational medicine system

Consolidate:

- A proprietary radio-health medicine system.
- A support network for the licensing of facilities.
- A patient radiation protection program at national level.

F.5 Emergency preparedness

F.5.1 Introduction

As stated in previous National Reports, the Nuclear Regulatory Authority requires the License Holder to devise a Radiological or Nuclear Emergency Response Plan. This Emergency Plan includes the implementation of protective actions to prevent and/or mitigate eventual radiological consequences in accidental situations. The magnitude and

scope of the Plan are consistent with the type of facility in question. All Type I facilities must submit an Emergency Plan for approval by the ARN. In the case of Type II facilities and some non-routine practices, they must have at least one Emergency Procedure. For NPPs, an external Emergency Plan is also required to address the possibility of radiological consequences for neighboring residents.

The Regulatory Standards AR 10.1.1, AR 3.7.1 and AR 4.7.1, the Operating Licenses and the Requirements formulated for the facilities License Holder and the Primary Responsible regulate the planning and preparation of the response to emergency situations.

F.5.2 Structure of the emergency plan in the national scope

The National Nuclear Activity Law and its Regulatory Decree provide the ARN with the legal framework to approve and intervene in contingency plans in the event of nuclear accidents.

The municipal, provincial, Autonomous City of Buenos Aires and national authorities that may be involved in the preparation of such plans must comply with the guidelines and criteria defined by the ARN, the body that exercises the powers established in the Convention on Nuclear Safety.

In December 2002, the interim version of the National Nuclear Emergency Plan was approved by the Federal Emergency System (SIFEM) and the National Directorate for Civil Defense, updated in accordance with the requirements of the Nuclear Activity Law. One year later, the Provincial Nuclear Emergency Plan for the Province of Cordoba, where the CNE is located, was approved. The approval of the Provincial Nuclear Emergency Plan for the Province of Buenos Aires, where the CNA I and II are located, is still pending.

In August 2019, a Framework Agreement was signed between the ARN and the Secretariat of Civil Protection under the Ministry of Security of the Nation as a basic integrating member of the National System for Integrated Risk Management (SINAGIR).

For the municipalities that could be directly affected by a nuclear accident within a 10 kilometers radius, the NPPs have a Municipal Plan for Nuclear Emergencies. Such is the case of the town of Lima, close to CNA I and II, and of the municipalities of La Cruz, Embalse, Villa del Dique and Villa Rumipal, close to the CNE.

In the case of the Atomic Centers, the possible accidents at each facility are evaluated and characterized in the Safety Reports, where most of the facilities operate with a relatively low radioactive inventory, the probable radiological consequences of which would only affect the facilities themselves and, in extreme cases, the Atomic Center where they are located.

As has been pointed out above, agreements have been established with the public authorities for the implementation of protection measures, defining the responsibilities and functional relationships of the organizations in charge of putting them into practice.

In addition, the facilities under the regulatory control of the ARN conduct periodically emergency drills. The frequency and characteristics of the drills will depend on the risk associated with the activities carried out at these facilities. In the particular case of the NPPs operating in Argentina, internal drills are conducted on an annual basis, while those involving members of the public and response organizations (external) are conducted every two years.

The purpose of the drills at the NPPs is to train the population and the response organizations' staff, to evaluate the performance of the application of the NPP's Emergency Plan and of the municipalities involved, and to test new concepts, ideas and equipment. It also seeks to identify opportunities for improvement in the performance during the response and in the coordination of the participating organizations.

F.5.3 International Agreements associated with emergency preparedness

The Argentine Republic has been a signatory to a multiplicity of multilateral and bilateral international instruments. Among them, the following can be highlighted:

- Argentine Brazilian Cooperation Agreement, towards the end of 1986, signed between the Federative Republic of Brazil and the Argentine Republic. In particular, Annex II to Protocol 11 of the Agreement includes the Program of Cooperation and Reciprocal Assistance in the Event of Nuclear Accidents and Radiological Emergencies.
- Agreement between the Argentine Republic and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement), approved by Law No. 24046. In force since 12 December 1991.
- Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco), approved by Law No. 24272. In force since 18 January 1994.
- 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), approved by Law No. 24113. In force since 4 March 1994.
- Treaty on the Non-Proliferation of Nuclear Weapons (TNP), approved by Law No. 24448. In force since 10 February 1995. Convention on Nuclear Safety (CSN), approved by Law No. 24776. In force since 16 July 1997.
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, approved by Law No. 25279. In force since 18 June 2001.
- Convention on the Physical Protection of Nuclear Material, approved by Law No. 23620. In force since 6 May 1989.
- Amendment to the Convention on the Physical Protection of Nuclear Material, approved by Law No. 26640. In force since 8 May 2016.

- Convention on Early Notification of Nuclear Accidents, approved by Law No. 23731. In force since 17 February 1990.
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, approved by Law No. 23731. In force since 17 February 1990.
- Vienna Convention on Civil Liability for Nuclear Damage, approved by Law No. 17048. In force since 12 November 1977.
- Comprehensive Nuclear-Test-Ban Treaty (CTBT), approved by Law No. 25022. Not yet in force.

Argentina is also a member and focal point in the 'The Radiation Emergency Medical Preparedness and Assistance Network (REMPAN)' of the World Health Organization.

Besides, in case of accidents involving potential losses of nuclear material in the SFs, Argentina has undertaken to report to international safeguards agencies the characteristics, causes and consequences of the accident in a special report.

F.5.4 Nuclear Power Plants emergency plans

In the case of SF and RW management facilities located at nuclear power plants, the corresponding Emergency Plans contemplate actions to prevent and/or mitigate possible radiological consequences in accidental situations occurring at such facilities. The Emergency Plans of the NPP's have been described in the First National Report for the Joint Convention and have been developed in detail in the reports for the Convention on Nuclear Safety.

F.5.5 Atomic Centers emergency plans

As stated in previous National Reports, the CNEA, as the License Holder for the operation of nuclear and radioactive facilities, established a General Procedure for the development of Emergency Plans, such as the Emergency and Evacuation Plan for the CNEA Facilities. This document establishes the general guidelines to be followed and complied with by all the Atomic Centers and facilities under its jurisdiction.

F.6 Decommissioning

F.6.1 Introduction

As mentioned in the Seventh National Report, the CNEA informed the ARN of its decision to carry out the decommissioning of the RA-8 reactor and the Decommissioning and Dismantling Plan together with the Radiological Code of Practice was submitted to the ARN. A final report and discharge request was submitted in 2019.

The report was evaluated during the period 2020-2023 by the various relevant sectors of the ARN, including: the Safety, Security and Safeguards Management, the Radiation Protection Measurements and Assessments Management, the Nuclear Reactor Licensing

and Control Management, the Administrative Affairs Management and the Legal Affairs Management.

Following evidence that the CNEA had complied with the safeguards requirements by removing the RA-8 reactor from the list of facilities subject to the international safeguards agreements in force, and that from the point of view of radiological safety and security it had met the regulatory requirements, in August 2023, by Resolution of the Board of Directors, the RA-8 reactor decommission was determined and the regulatory supervision of its site by the ARN was terminated.

F.6.2 Regulatory aspects

The legal and regulatory framework for nuclear activities, described in SECTION E of this National Report, includes the decommissioning activities of nuclear facilities. Consequently, radiation safety criteria and standards, RW management and Quality Management, and safety culture concepts applied during the operation of nuclear facilities are all applicable.

One of the main requirements of the Regulatory Body is that the construction, start-up, operation and decommissioning of a relevant nuclear facility should not be initiated without the corresponding license requested by the License Holder and issued by the Regulatory Authority.

Article 16, paragraph b) of Law 24804 establishes that the Nuclear Regulatory Authority is empowered to grant licenses for the decommissioning of nuclear facilities.

This same Law and its Regulatory Decree establish, among other issues, the competences of the CNEA as the body responsible for determining the criteria for the decommissioning of NPPs.

The Regulatory Norm AR 0.0.1, “Licensing of Type I Facilities”, Rev. 2, indicates that the decommissioning of nuclear facilities requires a license issued by the ARN.

In addition, Regulatory Standard AR 3.17.1, “Decommissioning of Nuclear Power Reactors”, Rev. 2, establishes the minimum requirements for the decommissioning of these facilities. The main conditions are as follows:

- The License Holder, which holds the Decommissioning License, is responsible for the planning and provision of the resources required for the safe decommissioning of the nuclear power plant.
- The Decommissioning Program shall consider the necessary institutional arrangements and anticipate adequate radiation protection at each stage. Prior approval from the Regulatory Authority is required to implement the program.
- The Decommissioning Program shall include all necessary steps to ensure adequate radiation protection with minimum post-decommissioning surveillance.
- The License Holder may delegate the decommissioning in whole or in part to third parties, while retaining full responsibility. During the decommissioning process, the

License Holder shall consider and submit the following to the Regulatory Authority for consideration:

- Project management
- Site management
- Roles and responsibilities of involved organizations
- Radiation protection
- Quality assurance
- Radioactive Waste segregation, conditioning, transport and final disposal
- Monitoring after completion of partial stages of decommissioning
- Physical protection
- Safeguards and non-proliferation commitments

During 2019, a document detailing the content for a Preliminary Decommissioning Plan has been posted on the ARN's external website. It is based on the General Safety Requirements, Part 6, “Decommissioning of Facilities” - No. GSR - Part 6 and on the IAEA Safety Guide - No. WS-G-2.1 – “Decommissioning of Nuclear Power Plants and Research Reactors”.

F.6.3 Background

As a precedent in relation to decommissioning in Argentina, mention may be made of the decommissioning of the RA-2 Critical Facility, located at the CNEA's Constituyentes Atomic Center, which took place between 1984 and 1989. The reactor site is open to unrestricted use.

As pointed out in the previous National Reports, the responsibility for the manner of execution and activities of the decommissioning of the relevant nuclear facilities lies with the CNEA, in accordance with the provisions of the Nuclear Activity Law.

F.6.4 Planning for decommissioning of relevant nuclear facilities

The RA-8 reactor has been out of operation since the 1990s and has now completed its decommissioning process.

F.6.5 Financing

The CNEA has financed the tasks carried out by the PNGRR and the ex-PRAMU with contributions from the National Treasury included in its budget and approved by the National Executive Power.

With respect to the funds for the management and final disposal of RW, a fund is required to be generated jointly with the radioactive waste generator, administered by the National Radioactive Waste Management Program, as stipulated in Law No. 24804 and its

Regulatory Decree No.1390/98, and both later reconfigured in Article 13 of Law No. 25018.

Resolution No. 615/98 of the Secretariat of Energy approves the five trust contracts to be subscribed by the National State and the Argentina National Bank in order to comply with the provisions of the aforementioned Regulatory Decree No. 1390/98. Currently, the CNEA is initiating the internal procedures to carry out the negotiations with the involved parties in order to put them into practice.

Likewise, Law No. 25018 stipulates that the National Congress shall pass a law regulating the administration and control of the fund.

SECTION G SAFETY OF SPENT FUEL MANAGEMENT

G.1 General safety requirements

It is worth mentioning that, in general, the contents of SECTION G are valid for SECTION H homologous requirements, except in cases in which these requirements are specific for radioactive waste.

The general safety requirements associated with spent fuel management have not been modified with respect to the requirements described in the previous National Reports.

As a consequence of the accident at the Fukushima Daiichi Nuclear Power Plant and in order to apply lessons learned, the ARN requested a stress test for each Argentine NPP in operation. It consisted in a new safety margins assessment, assuming there was a sequence loss of defense lines in depth caused by the heat sinks, lines of external electricity provision, and, finally, the simultaneous loss of both resources, which could eventually lead to severe core accidents.

G.2 Existing facilities

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

To date, the existing SF storage facilities are the following:

SITE	FACILITY
Atucha Nuclear Power Plant- Unit I (CNA I)	I & II Pool Building
	Dry Storage for Spent Fuel Elements I (ASECQ I)
Atucha Nuclear Power Plant- Unit II (CNA II)	Pool Building (UFA)
Embalse Nuclear Power Plant (CNE)	Storage Pool
	Storage Silos (ASECQ)
Ezeiza Atomic Centre (CAE)	RA-1 Spent Fuel Storage (DECRA-1) *
	Research Reactors Irradiated Fuel Storage Facility FACIRI

*Located within the Ezeiza Radioactive Waste Management Area.

G.2.1 CNA I spent fuel storage pools

The SF described in this section come from the CNA Unit I, PHWR type NPP, with an installed capacity of 362 MWe that started operating in 1974.

The CNA I spent fuel is initially stored underwater until their transfer to dry storage. In

December 2023, 603 spent fuel elements were transferred from pools to dry storage. The Nuclear Power Plant has two fuel storage areas known as Pool Buildings:

- Pool Building I: Constituted by two decay pools. Storage capacity of 3240 positions.
- Pool Building II: Constituted by four decay pools. Storage capacity of 8304 positions.

Both pool buildings include a maneuvering pool or working area.

SF storage takes place in pools, which have a stainless-steel lining of several millimeters thick, in a double tier arrangement. SFE hang from stainless steel racks.

In order to collect and direct 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 SFs within the pools is performed using an overhead travelling crane with a telescopic mast fitted with the SFE handling tools. By maneuvering the crane and/or the telescopic mast it is possible to reach all points inside the pool.

With respect to the frequency at which the safety revisions are conducted, as was previously mentioned, the ARN has adopted the Periodic Safety Review methodology as well as the limitation of the period of validity for the Operating Licenses for Type I Facilities.

Currently, the plant has a Dry Storage for Spent Fuel Assemblies (ASECQ I) with a capacity to store 2844 spent fuel assemblies. The assemblies are stored vertically and transported in groups of 9 from Pool Building I, using a transfer cask (See Section G.4.1).

G.2.2 CNA II spent fuel storage pools

SFEs are transported through the fuel transfer canal from the reactor building of the CNA Unit II to the pools. The pools are reinforced concrete structures with a stainless-steel liner. The design ensures that no damage occurs to the concrete at a pool water temperature of 60°C.

SFEs are hung in a beam and stored in cooled demineralized water.

The number of positions in the four (4) pools is 6048. Storage maximum capacity of SFEs during normal operation is 4536 in three (3) pools and, in one of the pools, that capacity is of 1061 SFEs. In this pool, there is space left in case the whole reactor core needs to be removed. Such space shall be occupied in accordance with the strategy for removal and the composition of the fuel column.

Within the pools, there is enough space to use a SF transport container and fill it, so that afterwards it can be taken out of the site with the irradiated fuel assemblies.

G.2.3 CNE spent fuel storage pools

CANDU type spent fuels are originated in the CNE Nuclear Power Plant (CANDU 600) that started operating 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. After installing the underwater workstation table for the dry storage system at one end of the pool, the storage capacity was reduced to 45144 positions, corresponding to 8 years of operation. During the planned outage of the CNE, all the epoxy resin of the walls and the floor of the concrete pool was renovated, not causing any change to its storage capacity.

Failed SFEs are encapsulated and stored under water in the failed spent fuel storage pool. Unloading and transfer of SF 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. SFEs are stored under water in stainless steel trays.

During the planned outage, a third heat exchanger was added to the spent fuel pools system and an alternative cooling system (Alternative Cooling System for Spent Fuel Elements - SARPECQ) was also installed. The heat exchanger can be cooled with water from the Process Water System (SAP) or from the SARPECQ; this system was designed to keep water temperature stable in the pools once all the fuel of the core has been stored. This change enabled to retire the Process Water System (SAP) during the CNE life extension for maintenance and reconditioning without affecting SFEs cooling, considering that at that moment they were the only decay heat source.

G.2.4 Storage silos for spent fuel (ASECQ I) of the CNA I

The ASECQ I began operating in mid-2022 and allow the transfer of spent fuel elements with longer decay time from Pool Building I to the Dry Storage Building.

It consists of a structure of vertical dry silos with a capacity for 2844 SFE. As an extension of the controlled area, it has the same services as the pool area. The silo units are made of stainless steel, and each can accommodate a basket containing 9 spent fuel elements.

For handling the baskets with the SFE, a device (lifting and transport shielding) is used. This device serves to hold the baskets during transport and provides adequate shielding for workers during the transfer.

Some silo units are equipped with instrumentation to monitor the temperature of the fuel rod cladding. Additionally, the silo has a temperature and radiation monitoring system independent from those in the silo units.

G.2.5 Storage silos for spent fuel (ASECQ) of the CNE

The Spent Fuel Dry Storage System (ASECQ), integrated to the CNE facilities, comprises a pool worktable, SF handling tools, a pool shield with its transport cart, cranes, a transfer building (including the operation cell), the tractor vehicle for the transport to the silos field, the transport cart, spent fuel baskets, a flask, a shield lifting system for silos transference shielding, and the silos themselves.

SFEs are stored in these silos after 6 years of being cooled in the pool. The capacity of each silo is 540 SFEs housed in 9 baskets, with 60 SFEs per basket.

This system is in operation since 1993. There were plans to build the necessary silos to store the SF generated during the whole lifetime of the power plant. At present, 280 silos have been built, and towards the end of 2023, 250 silos were full already.

Upon request of the ARN, the ASECQ has been included in the “Ageing Management Program for Power Plant Components and Systems Related to Nuclear Safety”. 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. During the planned outage, the “Ageing Management Manual” was issued as part of the mandatory documents required by the ARN for the Operating License of the second cycle of operation.

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

G.2.6 Centralized storage of spent fuel from Research Reactors

G.2.6.1 Central storage of Special Irradiated Fissionable Material (DCMFEI)

Since 1972, the CNEA has the “Central Storage of Special Irradiated Fissionable Material” DCMFEI, which is located at the Ezeiza Radioactive Waste Management Area (AGE). This facility was designed and built to store MTR type SFEs from research reactors.

It comprises underground storage of 2.10 meters long and 0.141 meters diameter stainless steel tubes, with capacity to hold two (2) MTR type spent fuel elements or one (1) control element in each tube. The tubes are closed with lead filled steel plugs.

Since March 21, 2019, this facility does not store any SFEs from research reactors. They have all been transferred to the FACIRI (see SECTION G.2.5.3). At present, it stores 120 filters from the PPMo-99.

G.2.6.2 Spent fuel storage from RA-1 (DECRA-1)

As it was mentioned in previous National Reports, within the AGE, there is a storing area for SFEs from research reactors where 232 LEU spent fuel rods are stored, corresponding to the permanently discharged first core from the RA-1 research reactor.

G.2.6.3 Research Reactors Irradiated Fuel Storage Facility (FACIRI)

This facility came to replace the DCMFEI, and it has been conceived as a facility for centralized wet storage of spent fuel permanently discharged from the research reactors, enabling a better control of the maintenance of research reactors spent fuel and an adequate monitoring of the quality of the water, as well as incorporating major safety improvements.

SFEs showing failures are encapsulated before being stored. Before unloading SFEs to the FACIRI pool, they are visually inspected, and the report previously prepared in the DCMFEI is assessed as part of the documentation to transfer the SFEs to the FACIRI. That DCMFEI report is based on a visual inspection and a test conducted in a device that removes external contamination by means of a water flow of 5 m^3/h to evaluate the integrity of the SFE based on the gamma radiation increase measured in the water flowing through the device. If the SFE is considered to be encapsulated due to its possible lack of integrity, it is covered by an aluminum cylindrical cladding before being transferred to one of the positions for encapsulated SFEs.

The FACIRI storage capacity is based on the 16 meters depth of the pool and on the design of the grids pilled one upon the other, forming a column of grids. Up to 608 SFEs can be stored, distributed in 2 columns: one of 9 and the other one of 10 basket. Each basket can store 32 SFEs.

The positions for normal fuel elements are 416, those for control rods are 96, and those for encapsulated spent fuel elements are also 96.

The pools have a double stainless-steel lining and a treatment system that keeps the quality of deionized water at adequate levels in order to preserve the integrity of SFE during storage. Furthermore, there is a monitoring station that, by means of an underwater camera, enables visual inspection of the stored SFEs.

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

On March 21, 2019, the last SFE was transferred from the DCMFEI to the FACIRI, and up to October 6, 2023, this facility stores 265 SFEs: 26 of them were encapsulated due to their possible lack of integrity, and they occupied 26 of the 96 positions available for encapsulated SFEs. Spent fuel elements that have been stored for 9 years have been inspected, corroborating minimal progress in corrosion

G.3 Siting of Proposed facilities

The CAREM is one of the projected facilities. For the new reactor siting, a comprehensive assessment has been conducted. Even though this new facility is located within the same area of the CNA Unit I & II, independent analyses have been carried out for the CAREM, including assessments of external events that could affect the plant security, and the plant environment impact and potential effects on the population.

The RA-10 is another of the projected facilities. For its siting, a specific research study was conducted, and it is part of the design documents required by the ARN for the licensing of every new facility.

The evaluation was conducted in accordance with the IAEA Guidelines (Safety Requirements No. NS-R-3 (Rev. 1) "Site Evaluation for Nuclear Installations", Safety Guide No. NS-G-3.1 "*"External Human Induced Events in Site Evaluation for Nuclear Power Plants"*, Specific Safety Guide No. SSG-9 (Rev. 1) "*Seismic Hazards in Site Evaluation for Nuclear Installations", Specific Safety Guide No. SSG-18 "Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations"*, among others, ending in the respective design basis for the verification of the facilities.

In accordance with previous National Reports, the safety requirements for the remaining facilities for SF management have not been modified.

G.4 Design and construction of facilities

G.4.1 ASECG II within Atucha Nuclear Power Plant Units I and II Site

Currently, Nucleoeléctrica Argentina S.A. is in the design phase of a new dry storage site for spent fuel elements, named ASECG II.

This design features modularity, with the total project planned to consist of 34 blocks, each containing 40 silos. Each silo will accommodate 37 spent fuel elements, resulting in a capacity of 1,480 SFE per block. The silos will be underground and cooled by natural convection. The facility will allow underground access for personnel to inspect the condition of the silos.

Spent fuel elements will be transported using a transfer container, which will house a cylindrical canister capable of holding 37 SFEs. Subsequently, this canister will be deposited into the silo.

G.4.2 CAREM Nuclear Power Plant

The CAREM NPP is an innovative design prototype reactor of small power (100 MWt) thought to offer new design solutions based on the worldwide expertise in the safe operation of light water reactors. The CAREM design is based on an integrated light water reactor,

using enriched uranium as fuel. It is an indirect cycle reactor conceptually simple, which offers a high safety level.

The CAREM reactor prototype is located in Lima, Zárate, Buenos Aires Province, next to the CNA Unit I and II NPPs.

The CAREM's fuel elements have a hexagonal section with 127 rods: 108 are fuel rods; 18 are guide tubes for absorbing elements; and one is an instrumentation tube.

The reactor core has 61 fuel elements, and the refueling is annual. Qualification of enriched uranium fuel pellets fabrication process began towards the end of 2018.

Within the containment building, there will be the spent fuel storage pool designed to store the SFEs originated during 10 years of full power operation, residual heat removal and a proper level of sub-criticality.

The SF storage pool will include a cooling and clean-up system whose functions are:

- Removing decay heat dissipated by SFEs stored in the SF pool as a safety measure.
- If required, it will enable decay heat removal of a whole core once the reactor has been extinguished for 60 hours.
- Keeping the radiological, physical and chemical parameters of the water of the fuel elements pool within an appropriate range.

Furthermore, there is a plan to develop a replenish water system to compensate loss by evaporation at the maximum temperature according to the operation design.

In case of emergency by loss of normal supply water line, it is planned to include a support facility that may be temporal.

In December 2023, the construction of the containment structure for the CAREM project is at an advanced stage, with completion at 63%. The overall physical progress stands at 62%, while the reactor building construction is at 85%. The containment liner is nearly complete at 98%, and the reinforced concrete for the containment has been finished.

G.4.3 RA-10 Reactor

The RA-10 reactor is a multipurpose reactor for radioisotopes production, fuel irradiation, beams use, and neutron and thermal-hydraulic experiments. Its main purpose is to extend and consolidate radioisotopes production, provide materials and fuel irradiation, and offer new applications in the scientific and technological fields.

The RA-10 reactor is located at the Ezeiza Atomic Center (CAE). Its maximum power will be of 30 MW, and it will include a core made up of MTR type fuel reflected by heavy water.

The SFEs will be stored in pools inside the facility. Its capacity will be enough to cover 10 years of operation until they are transferred to a proper storage facility. The pools cooling

system is designed so that decay heat can be safely removed from the core, from the experimental devices and from the spent fuel elements during normal and abnormal conditions.

G.5 Assessment of safety of facilities

The requirements for the safety assessment of SF management facilities have not been changed since the presentation of the previous National Reports. They are described in SECTION H.5 and SECTION K.3.1 of the present National Report.

G.6 Operation of facilities

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

G.7 Disposal of spent fuel

At present, what was stated in the First National Report continue in force so long as spent fuels are stored in facilities specially designed and operated for that purpose.

Currently, there are several projects under execution to increase storage capacity in order to meet the lifetime of reactors and provide a period of several decades until SF have been transferred to a reprocessing plant or to a deep geological repository.

Up to date, R&D activities related to the design and project management, to site selection and research processes, and to the generic safety case of deep geological repository, have been performed.

SECTION H SAFETY OF RADIOACTIVE WASTE MANAGEMENT

H.1 General safety requirements

The following paragraphs summarize the scope of the general safety requirements for the management of radioactive waste 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 because it is classified as low or intermediate level on account of their radiological characteristics (half-life periods, types of radionuclides, energies and activity concentrations).

H.1.2 Minimization of radioactive waste generation

Minimization in the generation of radioactive waste in Argentina in order to minimize radiation dose, minimize environmental impact and economize costs is maintained as mentioned in the Seventh National Report to the Joint Convention.

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 final disposal).

In the planning of the management stages of different types of radioactive waste are set acceptance criteria for each of them based on their interdependence and the medium- and long-term strategies.

H.1.4 Efficient protection for individuals, society and environment

The ARN Standard AR 10.1.1, Rev. 4, Criterion 32, determines that “The Licensee must justify practices, optimize safety and observe dose limits and dose restrictions”.

The ARN Standard AR 10.12.1, Rev. 3, determines that the RW generator shall be responsible for:

- Safe handling of the RW generated until they are transferred to the RW Manager.
- Obtaining a RW management system and any necessary ARN previous authorization in any stage.
- Conducting all necessary operations before RW treatment, characterization and conditioning stages.
- Ensuring proper maintenance of any documentation and records of interest.

Furthermore, that Standard determines that the RW generator could delegate, in full or in part, the execution of RW management activities, but shall assume total responsibility for radiological safety.

The RW Manager is responsible for:

- Segregation, characterization, treatment, conditioning, recording, transport and storage of RW whenever applicable.
- Determining waste acceptance criteria for RW Repositories.
- Conducting safety assessments of the Repository during the licensing stages, satisfying the requirements of the ARN. The safety assessment of the Repository shall considerate a scenario of normal migration of radioactive material along with the situation resulting from disruptive events occurring during the planned isolation period. In the safety assessment of the normal migration scenario, estimated doses for future generations shall not exceed the dose restrictions set in the design of the Repository. Such safety assessment must fulfill the requirements of the ARN in terms of doses, risk or other safety indicators adequate for the required isolation periods.
- Keeping inventories of the RW transferred by the RW Generators, RW stored and finally disposed, permanently updating them during the operating stage of the Repository.
- Bearing responsibility during the activities related to the Repository closure and, whenever applicable afterwards, during the institutional control stage authorized by the ARN.
- Delegating, in full or in part, when applicable, the execution of RW management activities, but shall assume total responsibility for radiological safety.

H.1.5 Biological, chemical and other risks related to 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 passed the Act No. 7343 on Guiding Principles for Preservation, Defense and Improvement of the Environment which has jurisdiction over the Embalse Nuclear Power Plant located in this province.

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

Article 1 of Law No. 25018 determines the rights to safety of future generations (see SECTION L.1.3.2).

The ARN Standard AR 10.12.1 determines that in the safety assessment related to the normal migration scenario, the estimated doses received by future generations shall not exceed the dose restrictions set in the design of the Repository.

Moreover, by foreseeing that the present technologies used for radioactive waste management do not imply a potential risk for future generations, diverse studies and assessments 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 Avoiding imposing undue burdens on future generations

The aim of the ARN Standard AR 10.12.1, Rev. 3, “Radioactive Waste Management” is to determine requirements for the management activities to be performed with an appropriate level of radiological protection for individuals and for the environment, and of radiation sources safety for current and future generations.

Criterion 62 (related to safety assessment of RW final disposal facilities) of that Standard determines that in the safety assessment related to the normal migration scenario, the estimated doses received by future generations shall not exceed the dose restrictions set in the design of the Repository. Such safety assessment must fulfil the requirements of the ARN in terms of doses, risk or other safety indicators adequate for the required isolation periods.

The internationally accepted ethical principle whereby the beneficiaries of a practice should bear the total cost of the management and final disposal of generated waste has been contemplated in Law No. 25018. This Law provides the legal foundations for the existence of a fund for the management and final disposal of spent fuel and radioactive waste based on the contribution of the generators, either they are private or state-owned entities.

In this sense, Article 11 of the same Law considers the recovery of sites affected by industrial mining activities of uranium ores.

The elaboration of the PEGRR, within the framework of the PNGRR, determined by Law No. 25018 establishes the legal, technical and financial requirements to avoid imposing undue burdens on future generations.

In accordance with Law No. 25018, and with regard to long-term projects, such as the installation of future repositories, the National State must ensure the availability of sufficient resources for the CNEA, through the PNGRR, to meet the expenses and investments to finance the management of the SF and RW from nuclear power plants.

H.2 Existing facilities and past practices

H 2.1 Introduction

Radioactive waste management facilities are located in the following sites:

- Atucha Nuclear Power Plant-Unit I
- Atucha Nuclear Power Plant-Unit II
- Embalse Nuclear Power Plant
- Ezeiza Radioactive Waste Management Area (Ezeiza Atomic Centre)
- Bariloche Atomic Centre
- Constituyentes Atomic Centre
- Ezeiza Atomic Centre
- Pilcaniyeu Technological Complex
- Uranium Production Plant

H.2.*2* Facilities of Atucha Nuclear Power Plant Unit I

As was explained in previous National Reports, the frequency of performance of security reviews for Type I facilities responds to the Periodic Safety Review methodology. Likewise, the ARN has determined the limitation of the period of validity of the operating licenses, as was explained in SECTION E.2.2.2. of this National Report. The probabilistic safety analysis has already been mentioned in previous reports.

During the period 2020-2023, the regular management of solid and low-level liquid RW, the treatment and storage of spent mechanical filters and the bulk storage of spent ion exchange resins continued. There was no wet waste cementation during this period. Activity levels in the effluent discharges continue to be low enough to be below the established limits, without the need of concentrate treatment.

Using the analyzed samples of spent ion exchange resins, primary circuit CRUD, contaminated oils, and silica gel filters, radionuclide ratios were developed to determine the characterization of the RW.

As stated in the Seventh Report to the Joint Convention, the radiological inventory of radioactive waste from the CNA Unit I was officially submitted to the NRA during 2019, considering direct measurements, own and bibliographic Scaling Factors, and activities to complete and update the Scaling Factors for NAC Unit I continued during the period 2020-2023.

The Laboratory continues with the development of techniques for the determination of volatile radionuclides in samples.

H.2.3 Facilities of Atucha Nuclear Power Plant Unit II

During the period 2020-2023, the periodic management of low-level solid and liquid RW, the storage of spent mechanical filters, and the bulk storage of spent ion exchange resins continued.

So far, no waste liquids were processed by evaporation in the liquid RW treatment system, and no liquid or resin cementing campaigns were carried out with the radioactive concentrate processing system. This is because, as at NPP Unit I, the activity levels in the effluent discharges were low enough to be within the emission limits, without the need for concentrate treatment.

The radiological inventory of the RWs from the CNA Unit II was officially submitted during 2019 based on the characterization obtained at the Unit I. During the period 2020-2023, activities continued to complete and update the Scale Factors for NPP Unit II.

H.2.4 Facilities of Embalse Nuclear Power Plant

During the period 2020-2023, the storage facilities described in the Seventh National Report were used as foreseen and were adapted to the needs and observations of audits and requirements arising during this period, which led to their restructuring and organization.

In the Controlled Area, in the room set up as a Transitory Radioactive Waste Deposit, equipment was put into operation for shredding used and clean yellow bags. This process is carried out to avoid further use of these bags outside the NPP, in compliance with the RW management procedure.

The Radioisotope Analysis Laboratory is analyzing samples taken during the life extension to complete the NPP's own scale factors. During the period 2020-2023 some of the scale factors were updated with respect to those obtained in 2019 for the CNE.

H.2.5 Ezeiza Radioactive Waste Management Area (AGE)

The Ezeiza Radioactive Waste Management Area is located within the Ezeiza Atomic Centre, Province of Buenos Aires, and occupies a site of approximately 8 hectares to the northeast of the CAE. It is currently used for the treatment, conditioning and storage of solid and liquid radioactive waste and disused medical and industrial sources. Previously, radioactive sources and radioactive waste were disposed of there.

The radioactive waste and disused sources come from medical centers and industrial facilities in different provinces of the country, laboratories of the CNEA and other research and development facilities, as well as nuclear fuel cycle facilities,

Intermediate and low level RW are securely stored at the AGE pending the provision of the appropriate repository, as foreseen in the PEGRR.

Safety re-evaluation of the AGE

This topic was covered in previous National Reports.

The current status of the AGE facilities at the end of 2023 is described here in relation to the previous National Report.

AGE facilities for spent fuel and radioactive waste management

Maneuvering yard and storage of radioactive packages (PMEB)

This is an area designed to receive RW packages. It consists of a concrete base on compacted soil, semi-covered by a parabolic shelter with lateral protection. This shed has a lattice-type iron structure, one of the sides has a brick partition and structural reinforcements. The rest of the sides are enclosed with metal sheets. The front and back of the building have sliding gates and concrete block masonry walls. It currently has improved lighting and the installation of single-phase and three-phase lines.

With the repair of the upper deck, the PMEB is currently storing stored bulks such as structural solids, spent resins from the RA-3 and low and intermediate level liquids for subsequent treatment at the PPCC and the PTARR.

Treatment and conditioning plant (PPCC)

During the year 2020, some of the licensed staff left the Facility, resulting in a decrease in the number of licensed staff.

However, during the year 2023, there was an intake of personnel to cover the needs of licensable positions. These personnel are currently undergoing training.

During the aforementioned period, although no processes were performed at the facility, the corresponding preventive and corrective maintenance and radiological parameter measurements continued.

Treatment and conditioning plant of radioactive waste (PTARR)

Since 2018, the processes to be carried out at the facility were evaluated and a prototype resin mixing system was designed and built to improve homogeneity during conditioning and the structural RW cutting system together with the dynamic confinement system for future implementation.

In addition, a small-scale collection system for spent resins from the RA-3 was designed and built, and after confirming the feasibility of its implementation, the full-scale design was carried out.

Different processes for different streams are currently being evaluated and will need to be improved and adapted to the scale required and to the existing facility.

Interim storage deposit for spent sources and radioactive waste (DAIFRR)

As a result of the routine operation of this deposit, the stored inventories of RW and disused sources have also been increased. In order to improve the operational doses and optimize storage areas, the package stowage yards have been divided into sectors.

Rearrangement of packages was carried out in order to reduce the radiation fields at the sites with the highest occupancy factor, and maintenance work continued on the upper deck, rainwater drains, external wall surfaces and lighting, both inside the enclosure and the external lighting system. Repairs were also carried out on the upper deck.

Long-Term storage deposit (DAP)

This Deposit, located in the Ezeiza Atomic Centre, with administrative dependence on the AGE, became operational in 2010 in order to store waste from old practices (drums containing radioactive waste removed from Trench No. 2 of the Semi-containment System for Solid Radioactive Waste).

Due to the fact that this facility created to store historic waste in transoceanic containers does not operate continuously, neither new radioactive packages have been deposited nor have any movements been produced. Monitoring to evaluate radiological condition and maintenance activities has also been carried out.

Facilities for spent fuel and radioactive waste management next to the AGE

Radioactive waste characterization Lab (LABCAR)

During this period progress has been made with the development of a technique for the microwave digestion of cementitious matrices and inactive ion exchange resins, with the objective of extrapolating these techniques to real wastes coming from the generators.

Qualitative and quantitative determinations of the radionuclide content of samples from the RA-3, FACIRI and AGE have continued. Tritium determinations have also been performed on environmental samples.

In addition, a technique for the determination of total alpha and total beta content in a solid scintillation counter in liquid samples from different generators has been developed. In parallel, other techniques have been developed such as the cold digestion of cementitious matrices, the determination of the total alpha/beta content of aqueous samples, the chromatographic separation of Tritium (^{3}H), the determination by liquid scintillation of radionuclides such as ^{3}H and ^{90}Sr in liquid samples, the determination of the moisture content of ion exchange resins and the direction of a specialization thesis in radiochemistry of an agent of the PNGRR.

In addition to the above, the personnel of the Characterization Division have also been involved in the radiological characterization of the 114 drums sampled during the removal and repackaging of the drums deposited without cover in Trench 2 (T2) of the AGE. It should be noted that of the 114 drums, 53 contained cemented waste and the remaining 61 contained

compacted waste. As for the drums with compacted waste measurements have been already performed for most of them.

At this moment, the development of techniques for the digestion of ion exchange resins from the RA-3, the determination of alpha activity in oils from CONUAR and the preparation of techniques and equipment for the participation of the LABCAR in an intercomparison for the measurement of tritium in water, among other activities currently underway, continue.

Final disposal facilities of the AGE

System of semi containment for solid radioactive waste (SSRRSS)

In previous National Reports it was reported that all disposal and semi-containment systems were no longer operational. Radiological monitoring of these systems continued.

Measurement of the batch of 114 drums from the S and T sectors (not covered) of Trench No. 2 extracted during the removal and encapsulation of the drums, an operation carried out in 2000, was completed in April 2024.

Semi containment system for Very Low Level and Very Short Lived radioactive liquid waste

In previous National Reports it was informed that all disposal and semi-containment systems were no longer operational. Radiological surveillance of these systems continued.

System for the disposal of structural solid radioactive waste and disused sealed sources

In previous National Reports it was informed that all disposal and semi-containment systems were no longer operational. Radiological surveillance of these systems continued.

H.2.6 Facilities at Ezeiza Atomic Center

Decay, pre-Treatment and discharge plant for active liquids from the Radioisotope Production Plant (PPR)

For more information on the PPR, please refer to SECTION H.2.6 of the previous National Reports.

H.2.7 Pilcaniyeu Technological Complex (CTP)

The information provided in the Seventh Report to the Joint Convention is maintained.

In 2023, the renewal of the Individual Permits for the personnel of the Complex was carried out in order to give continuity to the process of licensing the operation of the Complex.

H.2.8 Uranium Dioxide Production Plant

During the 2020-2023 period, RW management has been one of the critical areas of the operation and strict procedures have been followed to ensure compliance with the standards imposed by the Nuclear Regulatory Authority. RW generated in operation defined as those arising from various areas of the plant with activity levels above the limit values established by the ARN, are managed with special care and diligence.

The RW generated include a variety of materials such as gloves, rags, plastics, disposable laboratory materials, hoses, waste from the cleaning of chutes, and discarded components from the dismantling of filters and pre-filters. These elements, once identified with levels above the permitted activity limit, are subjected to a compaction process to reduce their effective volume. This practice not only optimizes the use of storage space, but also reduces the environmental impact and facilitates the safe handling of RW.

The compacted RW are then confined in 200 dm^3 drums, designed for the safe storage of radioactive materials. These drums are temporarily stored in the raw material repository under the supervision of the Uranium Control Division of the National Atomic Energy Commission.

This storage facility has been structured to provide optimal conditions for the storage of these materials. It was built with brick walls and equipped with a lightweight slab roof, providing the structural integrity necessary for this purpose.

H.3 Siting of proposed facilities

Considerations related to this point are the same developed in SECTION G3.

H.4 Design and construction of facilities

H.4.1 Facilities at Atucha Nuclear Power Plant - Unit I site

During the period 2022-2026, a new 1,500 m^2 temporary Radioactive Waste Storage Facility, called DATRR IV, will be designed and built on the CNA Unit I site, which will include the same semi-automatic stowage system as DATRR III. Construction of the building is expected to be completed by the last quarter of 2026 or early 2027.

The benefits of the semi-automated stowage system technology are optimization of storage space, resulting in cost savings, and optimization of dosage during stowage, improved worker safety due to the containment provided by the structure, and improved ability to periodically inspect the stowage.

H.4.2 Facilities at Embalse Nuclear Power Plant site

During the 2020-2023 period, work continued on the project to build new radioactive waste storage tanks to increase capacity by at least an additional 3,000 m^3. Adjustments were also made to the existing repositories to optimize the storage of RW for the new operating cycle.

Given the scope of the storage construction project, the waste generated until the storages are ready for use is contemplated, so that a short-term solution was taken as the conditioning of a repository for the temporary storage of contaminated material and tools to be processed.

In addition to the tanks described in the Seventh National Report, with a total capacity of approximately 3,000 m^3, one of the four planned storages was built. The new building has a capacity of 800 m^3 and, once it has its Authorization to Commence Operation, will temporarily store low and intermediate level waste. The site where the new storage is located, as well as the planned ones, has the required means of control.

H.4.3 Facilities at Constituyentes Atomic Centre

H.4.3.1 Nuclear Materials Chemistry Lab (LQMN)

The Constituyentes Atomic Centre houses the Nuclear Materials Chemistry Laboratory, where research and development work is carried out, as well as the training of young professionals in new processes for the management of spent fuel and radioactive waste.

Progress was made with the repair and start-up of the controlled ventilation system for the entire facility, and with the fine-tuning of the equipment by means of tests without radioactive material.

Work continues on the preparation of the Mandatory Documentation to be submitted to the Regulatory Authority with a view to obtaining the Operating License.

H.4.4 Facilities at CAREM NPP site

SECTION G includes the detailed features of this new facility. The main aspects associated with the safety measures of the RW management systems design of the CAREM are described in the following paragraphs.

The design of the solid radioactive waste management system complies with the ALARA principle. It includes collection, segregation, characterization, conditioning and interim storage processes of the RW arising from the operation and maintenance of the CAREM.

RW will be managed to ensure an acceptable level of radiological protection of workers and public, and the preservation of the environment.

RW to be generated in normal conditions in the CAREM will be low or intermediate level RW. The Solid Waste Management System will include equipment to perform tasks such as pressing, drying and immobilization.

The CAREM design provides long interim storage for RW within the NPP CAREM site.

RW shall be characterized when generated in accordance with the PNGRR guidelines. During radiological characterization, radionuclides will be determined by direct methods (Gamma Scanner), semi empirical methods (representative sampling, scale factors, step factors) or analytical methods (calculation software).

RW shall be kept isolated, far from humans, during the necessary period of decay, using adequate multiple barriers.

H.4.5 Facilities at Ezeiza Atomic Center

H.4.5.1 RA-10 Reactor

This facility has been described in SECTION G 4.3, and in the Seventh National Report.

The RW generated by the RA-10 will be characterized and transferred to the AGE in compliance with the acceptance criteria established by the PNGRR, and with prior acceptance by the ARN.

H.5 Assessment of safety of facilities

As mentioned above, Criterion No. 40 of AR 10.12.1, "Radioactive Waste Management", Rev. 3, establishes that RW storage facilities must have a Safety Assessment involving the design, construction and operation stages, as appropriate, as well as Safety Analysis in normal operation and in abnormal and accidental situations.

The scope of the Safety Assessment includes all temporary storage facilities for RW, as well as the RW management activities performed at these facilities, which are located on the site of the CNA Units I and II and the CNE.

RW repositories located within the radiologically controlled zone of the plants are outside the scope. These storages were already covered in the PSA for radioactive sources other than the reactor core at the CNA Unit I and the CNE.

During 2019, activities began for the performance of the safety assessments of the temporary storage tanks classified as low, intermediate and high level RW, which are located within the nuclear power plant site, which were requested by the Nuclear Regulatory Authority.

The Safety Assessment of the temporary storage tanks of the Atucha Nuclear Power Plant Rev. 1, dated 30 September 2021, was approved by the ARN in March 2022.

The construction of a new temporary storage facility for RW called DATRR IV, with similar characteristics to DATRR III, is currently being planned. The corresponding Safety Assessment will be carried out prior to obtaining its Operating License.

With respect to the Safety Assessment of the CNE's temporary storage facilities for RW, it should be pointed out that, due to the modifications made to these installations, Revision 2 of the Safety Assessment was submitted on 30 October 2023 for evaluation by the ARN.

On the same date the Safety Assessment of the new transitional storage facility for low and intermediate level waste storage was submitted.

H.6 Operation of facilities

The considerations on this point are the same as those developed in previous National Reports. What is new compared to previous National Reports is reported below.

H.6.1 Uranium Mining Environmental Restoration Project (PRAMU)

The National Atomic Energy Commission, as part of its environmental protection program, carries out the Uranium Mining Environmental Restitution Project within the TECHNICAL DEPARTMENT OF URANIUM MINING REMEDIATION, under the PNGRR. The aim of the project is the environmental restitution of sites where uranium mining activities were formerly carried out.

The implementation of the project foresees several stages. The first stage contemplated the completion of the works at the Malargüe site, and the detailed engineering for the management of the Los Gigantes site, which was presented to the enforcement authorities of the Province of Córdoba in November 2018. It is also planned to continue with the necessary studies for the environmental restitution engineering in the sites of Córdoba, Tonco (Salta), Pichiñan (Chubut), La Estela (San Luis), Los Colorados (La Rioja) and Huemul (Mendoza).

In 2017, the project's actions were mainly aimed to the fulfilment of the restitution works at the former Malargüe Mill Complex and continuing with the engineering for the management projects for the former Los Gigantes and El Chichón Mill Complex, environmental liabilities deposited at the Córdoba site. As stated, the detailed engineering for the management of the Los Gigantes site was submitted in November 2018 to the Enforcement Authorities of the province of Córdoba and is awaiting approval. In addition, environmental characterization studies continue to be carried out for the management of environmental liabilities from uranium mining at the other six sites, and the implementation of the monitoring plan and the dissemination of the PRAMU in different areas continues.

During 2023, biodiversity studies were conducted at the Tonco (Salta) and Los Colorados (La Rioja) sites, to be used as complementary information in the definition of the baseline for these sites. In addition, the re-impermeabilization of Dam 3 of the Los Gigantes Site (Córdoba) was carried out.

H.6.2 San Rafael Mining and Milling Complex (CMFSR)

As reported in previous National Reports, on 12 February, 2021, work began on the neutralization of acid effluents contained in the DN3B dam. A total of 3,200 m^3 were neutralized, and this non-routine practice was completed on 20 February.

The Operating Procedures for quarry water and solid RW treatment processes are currently being drawn up for submission to the provincial authorities and the Nuclear Regulatory Authority.

Based on the provisions of the national and international regulatory framework applicable under these conditions, on 29 September 2022, the ARN granted an "Extended Shutdown" License. The Facility has also been classified at this stage as a Type II Nuclear Fuel Cycle Facility, based on a graded approach to the radiological risks it presents.

Between August 2022 and September 2023, two Type II Individual Permits have been obtained Function: Facility Operator: San Rafael Mining and Milling Complex Sierra Pintada.

In August 2023, the ARN was again asked for a Non-Routine Practice authorization for the neutralization of the liquids contained in the DN3B dam vessels, removal of the sludge deposited in both vessels, neutralization of the liquids contained in tanks of the former uranium ore treatment plant and subsequent disposal in the DN8-9 dam.

In October 2023, 90% of all the documentation requested in the framework of the Extended Shutdown License was submitted to the ARN.

Geoelectric test DN3B

To complete what is requested in Article 3 of the Environmental Impact Statement (Resolution No. 259/19), the state of integrity of the dam must be studied. To this end, a geoelectric test will be carried out to determine the state of conservation of the geosynthetic membrane.

The Plant's facilities are in the process of being reconditioned. In order to manage the quarry water and solid RW liabilities, the uranium concentration plant must first be conditioned and prepared for treatment. A survey of the state of the installations such as pipes, valves, pumps and ion exchange columns were carried out.

In June 2021, the construction and waterproofing of two reservoirs of the DN5 Dam system began and is currently in the final stage of construction.

Construction of the Radium and Arsenic Precipitation Plant

The list and sizing of the equipment necessary for the installation of the precipitation plant was drawn up, as well as the preliminary calculation of the energy needs of the plant and its sizing. The possibility of reusing some of the equipment located at the former Los Gigantes Mining Complex is currently being studied. The technical documentation for the construction of the civil works, which is planned for 2024, is currently at an advanced stage.

Similarly, the design of a quarry closure procedure is being developed to be applied, in the first instance, to the El Gaucho I and II quarry.

Reconditioning and waterproofing of cisterns

Since 2015, the first four cells of the complex's main cisterns have been completed. These four cells are sufficient for the treatment of quarry water, so the refurbishment and waterproofing of the remaining four cells has been rescheduled to be carried out in future periods.

Characterization and preparation of the Area of Special Restricted Crops (ACRE) for irrigation with treated quarry water.

In order to proceed in the execution of wells in the area, the following information was coordinated with the Division of Water Police of the Diamante River Sub delegation of the General Department of Irrigation

- Zoning of the ACRE: definition of boundaries, total surface and georeferencing of the area
- Irrigation system project: irrigation method, definition of sectors, sub-sectors, irrigation scheduling.
- Background information on existing operational and non-operational piezometers in the zoned area: location, operational status, construction characteristics, historical measurements of water levels and chemical quality. Available description of the well. Synthesis of studies carried out on them and results, subsequent to those presented in the General Environmental Impact Manifest.
- Updates regarding the work of “Mesa 2003” referenced in the Environmental Impact Statement on lithology, mineralogy and structure of the area destined for the ACRE.
- Alteration profile of the cover to know the condition of the rock surface with respect to the possibility of water infiltration due to the friability of the rock (weathering and fracturing).
- Infiltration data to characterize the capacity of the terrain to receive the treated water to be discharged, indicating maximum values, which must be spatially distributed in such a way that the entire effective area to be irrigated is covered.
- Update of the state of knowledge of the existing flora in the area to be irrigated, detailing if there are temporary studies of it. This helps with the understanding of seasonal variation (wet and dry season) and the effects of irrigation.

Based on what has been explained in previous paragraphs regarding the works carried out in the construction phase of the Project, and taking into account the works that remain to be completed for the treatment of quarry water and solid waste, the following is an estimate of the time required to complete this phase.

Table N° 11: Schedule of works to be carried out for the remediation project

Works	2023	2024	2025
Reconditioning and waterproofing of the resins			
Reconditioning of the treatment plant			
Construction and waterproofing of dam DN 5			
Construction of the Radium and Arsenic Precipitation Plant			
Characterization and preparation of the ACRE			
Geo-electric test DN3B			

H.7 Institutional measures after closure

The post-closure institutional measures foreseen for disposal systems of low level radioactive waste were described in previous National Reports. Regulatory Standard AR 10.12.1, "Radioactive Waste Management", Rev. 3, describes the safety criteria to be met by disposal facilities during all phases of disposal, including post-closure.

SECTION I TRANSBOUNDARY MOVEMENT

As it was discussed in previous National Reports, Revision 3 of Standard AR 10.16.1 “Transport of Radioactive Materials” is in force in Argentina, its content matches with the Spanish version of IAEA Specific Safety Requirements No. SSR-6 - “Regulations for the Safe Transport of Radioactive Material”. It establishes the regulations regarding transboundary movements of radioactive wastes and spent fuel.

National and international standards that regulate the transport of hazardous materials by land, air and water also remain in force.

For road and rail transport, the following legal instruments remain operational:

- National Transport and Transit Regulations, enacted by Decree No. 692/92.
- Law on Transport No. 24449, regulated by Decree No. 779/95.
- Resolution No. 195/97 on Technical Standards for the Transport of Dangerous Goods by Road, issued by the National Public Works and Transport Secretariat.
- 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) and the International Civil Aviation Organization (ICAO) both of them have incorporated the IAEA above mentioned Regulation for the Safe Transport of Radioactive Materials of the IAEA.

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 Waste in Packages on Board of Vessels (INF Code), under the International Maritime Organization (IMO).
- The “Facilitation Agreement on Hazardous Goods Transport” approved by MERCOSUR Board Decision No.15 on 4 December 2019 (MERCOSUR/CMC/DEC. No. 15/19)
- Convention on the Physical Protection of Nuclear Materials, in the framework of International Atomic Energy Agency (IAEA) and its amendment approved by law No. 26640, enacted on 13 October 2010.
- 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 Applications of Safeguards (Four Parties Agreement).

In the near future, spent fuel transboundary movement is not planned.

In addition, at the IAEA working group: “Denial of Shipment Working Group” Argentina is leading a proposal in order to give a solution, through a Behavior Code, on the delays and denials for the radioactive materials expeditions. This Code is currently under a revision process by the Member States, and it will be probably presented at the IAEA Board of Governors.

For the case of the transport of radioactive sealed sources, see further details on SECTION J.

SECTION J DISUSED SEALED SOURCES

J.1 Introduction

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

The ARN 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. This standard classifies the facilities in three levels. Such classification determines the regulatory control models based on a gradual approach related to the radiological hazards associated with the practices involved in such facilities.

The Standard determines that the license holder is responsible for complying with regulations, requirements, licenses, authorizations and permits issued by the ARN. The operation license/authorizations issued by the ARN expressly include responsibilities and conditions of operation.

When the license holder applies for an authorization or even at the moment of submitting Mandatory Documentation it accepts the responsibility over the management of those sources once they have reached the end of their operating and specific life. At the same time the ARN performs regulatory inspections and audits to verify that license holders comply with their responsibilities, in order to detect failures to comply with the Standard and avoid situations that might derive in radiological accidents.

Furthermore, 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 making use of them have the necessary qualifications and work in accordance with the responsibilities related to radiological safety. These qualifications are re-evaluated with regulatory inspections and audits every time the corresponding either specific authorization or individual permit is renewed.

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

It may be underlined that since the Argentine Republic has voluntarily and non-bindingly adhered to the “Code of Conduct on Safety and Security of Radioactive Sources” in the 2003-2004 period, the country complies with the recommendations formulated in it, a fact that reinforces the determination of exercising an effective control of radioactive 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:

- Any human or legal person shall, among other actions, adopt, introduce, carry out, interrupt or cease a practice extract, treat, design, manufacture, build, assemble, install, acquire, import, export, supply, provide, distribute, lend, rent, receive, place, locate, put into service, possess, use, exploit, maintain, repair, transfer, remove from service, dismantle, transport, store or sent radioactive sources to final disposal, if and only if it does so in accordance with the standards and requirements established by the Regulatory Authority. Handling of radioactive sources can only be done at facilities having appropriate resources and trained staff with adequate knowledge.
- Any human or legal person may operate or perform a practice if and only if the Regulatory Authority has granted him the license, registration or the corresponding authorisation for non-routine practice.
- License holders shall keep a detail and updated inventory of radioactive sources and their movements, taking the necessary security measures to prevent human intrusion in storage sites and/or the loss of radioactive sources.

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

J.3 Actions to maintain an adequate control of disused radioactive sources

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

- The storage of disused radioactive sources is allowed only in the facility as long as the holder of the license is able to demonstrate that has a specific program for its reuse or to use it in replacement of another source existing at the site.
- In this case, the holder of the license must provide a temporary storage area qualified as deposit, over which he has an adequate control to prevent non-authorized access, and appropriate security measures to avoid the robbery. Besides, the holder must keep auditable records of the regular controls done at the temporary storage.
- In case the license holder 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 safe storage site. The ARN requires the source to be sent to the CNEA in custody for a safe storage at the DAIFRR, a facility specially prepared for this purpose, located in the AGE. In extreme cases, in order to have the source under control, it can also be transferred to other facility nearby, licensed for this purpose with adequate deposit and able to accept the responsibility.

J.4 Special actions for appropriate control of the radioactive sources

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

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

- All imports or exports of radioactive materials should be performed with the ARN's authorization.
- Industrial plants, measurements instruments and laboratory equipment that could include radioactive sources to be imported shall previously submit a declaration to the ARN stating the content of such type of sources.
- In the case that radioactive sources deposited in custom offices exceeded for more than 30 days the time allowed by its internal procedures, the ARN must take action in order to arrange for the storage at the CNEA's authorized facilities.

The Regulator remains alert to the occurrence of situations in which radioactive source control cannot be ensured. In such cases, the ARN and the Justice act together in order to confiscate involved radioactive sources and sent them to a safe storage just to prevent accidental situations. This safe storage may imply the definitively custody of the sealed disused radioactive source at the DAIFRR, with the consequent transfer of ownership of it to the CNEA.

The license holder for the use of radioactive sources keep its responsibility regarding to radiological and physical security along the whole lifetime cycle until an authorized and express transference by the ARN or other Responsible Entity occur.

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 Type I and II sources, the procedures recommended by the IAEA's Guidelines on Imports and Exports of Radioactive Sources, are applied. In other sources categories, are considered the authorization procedures used by the Regulatory Authorities of the importing countries.

J.5 Security of sealed sources in use or in disuse

The security systems for radioactive sealed sources involve security measures. These measures are aimed at preventing intentional acts resulting in the loss of control of these radiation sources.

In October 2003, the CNEA issued the Directive PF-02 Physical Security of Radioactive Sources, in accordance with the Standard AR-10.13.1, Physical Protection of Nuclear Materials and Facilities Revision 1 and the IAEA technical documents (IAEA TEC DOC -

1344 and IAEA TEC DOC – 1355). This Directive was established as mandatory for all facilities developing activities that involved use and/or storage of radioactive sources in use or in disuse, under their responsibility.

As it was mentioned in previous national reports, in 2007 the ARN issued the Standard AR-10.13.2 Security Standard for Sealed Sources Rev. 0, in which the following measures are contemplated:

- In the case of a facility with high radioactive inventory (above the threshold mentioned for Type I, in accordance with the IAEA Safety Guide, No. RS-G-1.9 “Categorization of radioactive sources”), it is required to create a Security System similar to the physical protection system implemented in facilities with nuclear material.
- Compatible with the physical security measures referred in the IAEA TECDOC -1355 “Security of Radioactive Sources”. In the case of radioactive sources not contemplated in the IAEA Type I Security Guide No.RS-G-1.9 but implying a radiological risk, the ARN requires the implementation of a Security System to ensure the early detection of any event that could involve the theft of those sources.

For the transport of sealed radioactive sources are applied extra security measures, equivalent to those required for transportation of nuclear materials under the Standard of Physical Protection AR-10.13.1 considering a graded approach in relation its material transport category. These measures, in addition to the radiological safety measures, were specifically created to prevent fraudulent acts, and include corrective actions in case of events involving Type 1 sources or sources implying a radiological risk.

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 fraudulent acts in facilities with radioactive inventories entailing radiological risks.

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 materials but also security aspects of radioactive sources.

Among the most effective additional measures for early prevention or detection of nuclear and/or radioactive material illicit traffic are the permanent contact and exchange of essential information between the ARN, border control organizations, intelligence services and security forces, which implies full knowledge and the assumption of responsibilities by all organizations that constitute the “Control System”. Equally important is the coordination of inspection activities, which are planned according to the associated radiological risks.

J.6 Sanctions 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

Argentine regulations determine that people 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, explosion or any other event that could affect the safety of the radiation source. The ARN is in contact with all organizations that could intervene in case of radiological emergency and provides training activities related to such interventions.

ARN's Intervention System in Radiological Emergencies (SIER) is a passive guard system for those cases of radiological emergencies in facilities or on the street where radioactive material is involved coming from regulated companies or from orphan sources. This system operates 24 hours, 365 days a year. If the PNGRR is called by the SIER because of radiological emergencies in facilities or on the street, is in charge of the transport of the radioactive source to a safe storage under custody at the DAIFFR, deposit licensed to such purpose, located in the CAE.

The ARN has cooperation agreements with organizations that intervene in case of an emergency, such as the Argentine Army, the National Gendarmerie and the Argentine Navy, the Argentine Federal Police, the Argentine Naval Prefecture and the National System for Comprehensive Risk Management (SINAGIR)

J.8 Readmissions of decayed sealed sources to the country

The import of decayed sealed radioactive sources, as well as the import of any other radioactive source, is authorized by the ARN when all the requirements related to radiological safety and security determined by the regulations are fulfilled, the practice is justified, and the importer complies with the legal provisions in force and the obligations determined by its import license.

SECTION K GENERAL EFFORTS TO IMPROVE SAFETY

K.1 Introduction

This section describes the safety improvement actions in matters related to SF and RW management, in regular activities as well as for those in execution stage or for those that have been completed in the period between the presentation of the Seventh 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:

- Documentation updating
- Organization updating
- 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 the regular activities mentioned above, other projects and modifications have been developed and put into practice, which contribute to improve safety. Some of them are listed below:

K.3.1 Follow-up for the actions taken in the light of the Fukushima Daiichi accident, focused on the period 2020-2023

The following are the improvements required as a result of the stress tests performed:

- Loss of safety functions analysis.
- Loss of Offsite Power (LOOP): As a result of the LOOP evaluation, the improvements mentioned in the previous national reports for the CNA I, CNA II and CNE, remain.
- Station Blackout (SBO): as a result of the SBO studies, the Entity responsible for Nuclear Power Plant Operation hold the improvements mentioned in the previous National Reports for the CNA I, CNA II and CNE.

Improvements implemented during the period 2020-2023 in each NPP are detailed below:

CNA Unit II

Alternative energy sources

Given that in a case of BLACKOUT the Plant does not have electrical power to supply certain key components to keep the cooling of the core, changes were implemented in the facility in order to give electrical power to those components and, thus, bring the Plant to a safe and stable condition.

Power supply to key components is possible through a mobile auxiliary generation system, which has a single auxiliary diesel generator connected to one or more 6.6 kV bars of the emergency system (supply bars called BDA, BDB, BDC and BDD) and which stand-by power is 2,750 kVA to 2,200 kW. The objective of this modification is to supply water to the steam generators and vent the steam to the atmosphere. The power delivered by the mobile diesel generator is also sufficient to power components of the KBA volume control system and inject water into the primary-moderator system.

In addition, these are used as a strategy: the electrical manual interconnection CNA UI-II and the electrical manual interconnection CNA UI-II from UI Emergency Diesel Generators.

Severe Accident Management Guidelines (SAMG)

The following are the revisions made to the guidelines mentioned in the previous National Reports:

- Guideline 2-GAS-CE-01 “Evaluation of Plant Status”, Rev. 7.
- Guideline 2-GAS-SC-01 “Main Guidelines for Control Room”, Rev. 4.
- Guideline 2-GFAS-CE-01 “Long-term Monitoring”, Rev. 3.
- Guideline 2-GFAS-CE-02 “Completion of Severe accident management guidelines”, Rev. 1.
- Guideline 2-GAS-CE-04 “Power Supply”, Rev. 8.
- Guideline 2-GAS-SC-04-2 “Plant Cooling with 1 Active Electrical Train”, Rev.1.
- Guideline 2-GAS-SC-04-4 “Electrical interconnection – Power supply from Unit I to Unit II”, Rev. 3.
- Guideline 2-GAS-SC-04-8 “Power Supply from Emergency Diesel Generator of Unit 1 to Unit 2“, Rev. 2.
- Guideline 2-GAS-SC-04-9 “Power Supply of an Emergency Bus of CNA-II with a Mobile Diesel Generator”, Rev. 0.
- Guideline 2-GAS-CE-05 “Power supply and vent of Steam Generators”, Rev. 6.
- Guideline 2-GAS-SC-05-1 “Water Injection to the Steam Generators – System LAB/ LAH”, Rev. 3.
- Guideline 2-GAS-CE-06 “Depressurization of the primary system”, Rev. 2.

- Guideline 2-GAS-CE-07 “Reduction in the Release of Fission Products”, Rev. 3.
- Guideline 2-GAS-SC-07-1 ““Insulation of Containment vent”, Rev. 1.
- Guideline 2-GAS-CE-09 “Water injection to the primary system”, Rev. 4.
- Guideline 2-GAS-SC-09-1 “Water injection to the primary system – System KBA”, Rev. 5.
- Guideline 2-GAS-CE-11 “Water Injection to the Spent Fuel Elements Pools”, Rev. 11.
- Guideline 2-GAS-SC-11-1 “Water Injection to the Spent Fuel Elements Pools – System GHC”, Rev. 3.
- Guideline 2-GAS-SC-11-2 “Water Injection to the Spent Fuel Elements Pools – System SG”, Rev. 1.
- Guideline 2-GAS-CE-13 “Water injection to the Containment Sumps”, Rev. 2.
- Guideline 2-GAS-CE-14 “Control of containment conditions”, Rev. 4.
- Guideline 2-GAS-SC-14-1 “Cooling of the containment from the inside by air recirculation”, Rev. 0.
- Guideline 2-GAS-SC-14-2 “Relief of the UJA Containment to the Stack”, Rev. 0.
- Guideline 2-GDC-CE-01 “Evaluation of Containment Challenges”, Rev. 0.
- Guideline 2-GDC-CE-02 “Reduction of the Release of Fission Products”, Rev. 0.
- Guideline 2-GDC-CE-03 “Reduce the Pressure within the Containment”, Rev 0.
- Guideline 2-GDC-CE-05 “Containment Vacuum Control”, Rev. 0.

CNE

Regarding the Plant shutdown for refurbishment activities developed during 2016 to 2018 in order to extend the life of the Plant, the improvements mentioned in the previous National Reports for the CNE are currently maintained. The most noteworthy are mentioned below:

Alternative energy sources

There is a 668 kVA/380 V Mobile Diesel Generator that will be used to meet a specific power demand in case of accidental situations caused by a SBO. It is an additional supply source to the existing sources to supply unspecific charges.

A procedure was developed so that one possible function of the Mobile Diesel Generator is to start up a pump of the firefighting system.

Besides that, it was agreed with the grid operator that, in case of total or partial collapse of the grid, there will be a commitment to black start four machines of the Argentine Interconnection System to deliver electric power to the plant through the 132 KV line.

Batteries availability extension

A 1,500 kVA / 380 V diesel equipment was installed to extend the life of the class I battery banks.

In addition, in case of SBO and in the event of battery depletion, a system was installed that allows the possibility of opening the steam discharge safety valves.

Loss of heat sinks

As a result of the evaluation, the Entity Responsible for the Operation implemented the improvements mentioned in previous national reports.

Accident Management and Severe Accidents Management Program (SAMG)

Most of the improvements made were mentioned in previous National Reports.

It is only noteworthy that during the year 2023 the most important modification was the added of the PGAS in the SF storage pool, which is an addition to the already existing severe accident management in the core.

CNA Unit I

In relation to the period of this National Report, the following is highlighted:

Guidelines for Severe Accidents Management (SAMG)

The severe accident management program includes the following Guidelines approved to prevent or mitigate accidents beyond the design basis. The revisions performed are the following:

- Guideline 1-GAS-CE-01 (Rev. 3) “Evaluation of Plant Status”, Rev. 7.
- Guideline 1-GAS-SC-01 “Main Guidelines for Control Room”, Rev. 4.
- Guideline 1-GFAS-CE-01 “Long-term Monitoring”, Rev. 3.
- Guideline 1-GFAS-CE-02 “Completion of Severe accident management guidelines”, Rev. 2.
- Guideline 1-GAS-CE-04 “Power Supply”, Rev. 5.
- Guideline 1-GAS-SC-04-1 “Electrical interconnection from Unit II to Unit I”, Rev. 3.
- Guideline 1-GAS-SC-04-2 “Mobile Diesel Generator power supply” Rev. 2.
- Guideline 1-GAS-CE-05 “Feed and vent of Steam Generators”, Rev. 7.
- Guideline 1-GAS-SC-05-1 “Water Injection to the Steam Generators - High Pressure Way”, Rev. 7.
- Guideline 1-GAS-SC-05-2 “Water Injection to the Steam Generators - Low Pressure Way”, Rev. 8.

- Guideline 1-GAS-SC-05-3 “Water Injection to the Steam Generators by Pressurizing the feedwater Tank”, Rev. 2.
- Guideline 1-GAS-CE-06 “Depressurization of Primary”, Rev. 2.
- Guideline 1-GAS-CE-07 “Water Injection to the Primary”, Rev. 4.
- Guideline 1-GAS-SC-07-1 “Water Injection to the Primary (TA)”, Rev. 4.
- Guideline 1-GAS-SC-07-2 “Water Injection to the Primary (TA/TN)”, Rev. 4.
- Guideline 1-GAS-CE-08 “Water Injection to Containment Sinks”, Rev. 2.
- Guideline 1-GAS-CE-09 “Reduction in the Release of Fission Products”, Rev. 3.
- Guideline 1-GAS-SC-09-1 “Insulation of Containment vent” Rev. 1.
- Guideline 1-GAS-CE-10 “Control of Containment Conditions”, Rev. 4.
- Guideline 1-GAS-SC-10-1 “Containment Relief (TL7 system)”, Rev. 4.
- Guideline 1-GAS-SC-10-2 “Containment Relief (TL8 system)”, Rev. 3.
- Guideline 1-GAS-CE-12 “Water Injection to the Spent Fuel Elements Pools”, Rev. 10.
- Guideline 1-GAS-SC-12-1 “Water Injection to the Spent Fuel Elements Pools (UJ04)”, Rev. 3.
- Guideline 1-GAS-CE-13 “Refrigeration of Loading Machine”, Rev. 2.
- Guideline 1-GAS-SC-13-1 “Refrigeration of Loading Machine (SBO)”, Rev. 1.
- Guideline 1-GDC-CE-01 “Evaluation of Containment Challenge”, Rev. 0.
- Guideline 1-GDC-CE-02 “Reduction of the Release of Fission Products”, Rev. 0.
- Guideline 1-GDC-CE-03 “Reducing the Pressure within the Containment”, Rev. 0.
- Guideline 1-GDC-CE-05 “Containment Vacuum Control”, Rev. 0.

K.3.2 Research, Development and Innovation activity plan (R&D&I)

The PNGRR carries out Research, Development and Innovation (R&D&I) activities, in compliance with the strategic objectives of the PEGRR in force, which are necessary to achieve the objectives of safety, efficiency and continuous improvement. SECTION L includes a list of ongoing activities and those carried out jointly with the IAEA.

K.3.3 Public communication program

CNEA's communication policy established in its Strategic Plan and carried out by the areas of specific competence, foresees the establishment of communication and liaison channels, both with the institution's staff and with the rest of the community. Within this

context, during the period 2020-2023, the PNGRR, with the previous PRAMU incorporated into its structure, has implemented several communication and public participation actions.

These actions are relevant since the fulfilment of the objectives foreseen in terms of radioactive waste management and environmental remediation of uranium mining depends on technical and political decisions, as well as on the perception and participation of society.

These actions were carried out in accordance with the provisions of Law No. 25018 regarding the responsibility of CNEA, through the PNGRR, to keep the public informed on the different aspects related to radioactive waste management, including uranium mining remediation.

The period covered by this National Report includes the pandemic years in which working practices and routines were modified, including those actions related to communication and public intervention. The measures of Social, Preventive and Mandatory Isolation established by Decree N° 297/20 of the National Executive Power forced each sector to reorient its tasks by adapting to virtual mode and generating new mechanisms in the context of the health emergency.

In this regard, given the need to implement a remote work scheme, the PNGRR developed the "ConRRad" portal for knowledge management on radioactive waste. ConRRad is a tool designed to facilitate communication, liaison and the performance of tasks between PNGRR members and key collaborators, either at their workplaces or working remotely.

The pandemic situation prompted the launch of virtual training through CNEA's educational learning platform. Through this portal, the course "Nuclear Concepts" was launched, based on the need for more information and updated knowledge on issues related to nuclear activity. Among other topics, the course addresses aspects related to radiowaste management, sustainability and safety in all processes, and nuclear techniques used in environmental protection. On the same platform, the first self-managed course dedicated to radioactive waste management, entitled "What do we talk about when we talk about radioactive waste?" was fully implemented. Both courses were aimed at internal CNEA staff.

Also in virtual format, the PNGRR took part in the "Expo Becari@s" exhibition, which intended to share information on the topics addressed by the Institution and the training and research guidelines.

In any case, even after the pandemic, some of the training, information and internal debate activities remained virtual. The PNGRR initiated a cycle of CNEA virtual lectures during 2022 through the webinar entitled "The management of radioactive waste and spent fuels in Argentina", designed for CNEA staff and available to the public on the official institutional YouTube channel.

Throughout the year 2022, audiovisual products were produced for CNEA's official channels in social networks on the tasks carried out by the PNGRR. Material was

produced on the following topics: environmental monitoring and data collection campaigns for soil and water monitoring at the CAE, analysis of the corrosion of fuel assemblies in research reactors, the work carried out at the AGE, new lines of research for the treatment of radioactive waste, institutional responsibility in the management of radioactive waste and spent fuel, and the classification of radioactive waste according to their activity.

Also, the institutional website was updated with information on CNEA's current procedures, especially those related to the disused source removal service. The institutional contact channel was used to answer queries from individuals and companies interested in the management or removal of disused sources.

Likewise, during the period covered by this National Report, responses continued to be answered to requests from the public about the management of radioactive waste.

In continuity with the actions undertaken in previous years, once the period of sanitary isolation was over, the "CAC Puertas Abiertas" (CAC Open Doors) as resumed. The activity consists in a day for visiting facilities of Constituyentes Atomic Centre. These visits, aimed at CNEA personnel and the public in general, include the topics of RW management and environmental remediation.

The PNGRR also continued to participate in the talks and exhibition materials presented by CNEA at different fairs and exhibitions held throughout the country. Examples include the 47th International Book Fair of Buenos Aires, the permanent science and technology exhibition at the "Tecnópolis" site, and regional fairs in the Province of Buenos Aires and Mendoza, among others.

At the end of 2022, in the framework of the Technical Cooperation Project TC-ARG9016: "Building Capacities for Selecting and Characterizing Potentially Suitable Sites for Geological Disposal of Radioactive Waste and Spent Nuclear Fuel", and the ConfinAR Geo pre-project, the first edition of the workshop "First dialogues on radioactive waste and spent fuel disposal in Argentina" was held. This event included expert lecturers from other countries, such as Canada, Sweden and France, with the aim of establishing a dialogue with the community on the objectives, guidelines, perspectives and state of progress of the ConfinAR Geo Project. To this end, graphic materials associated with the disposal of RW were produced. This event was attended by members of CNEA, members of the Nuclear Regulatory Authority, NA-SA, and people from outside the nuclear environment, linked to the media, science and technology institutions, social and trade union organizations, among others.

As part of the RW disposal projects in the country, public participation and interaction with interested parties must be taken into account. With this objective in mind, the second edition of the workshop "Dialogues on final disposal of radioactive waste and spent fuels in Argentina" was held at CNEA Headquarters in 2023. Priority was given to members of science and technology institutions, and it was attended mainly by teachers, students and researchers from different disciplines.

During the period covered by this National Report, the PNGRR established relations and joint activities with the Faculty of Architecture, Design and Urbanism of the University of Buenos Aires, and with the Secretaries of Technology and Environment of the National University of La Plata.

In 2022, the Faculty of Architecture, Design and Urbanism established a link with the PNGRR with the aim of designing innovative proposals for this Program in terms of service design. To this end, a first stage of diagnosis and ethnography was carried out during which visits were made to the Ezeiza Atomic Centre, the PNGRR facilities at the AGE and FACIRI, and interviews were conducted with workers from different areas of the PNGRR. After this stage, the students presented to CNEA the proposals for knowledge management and innovation from the perspective of service design. The possibility of implementing these proposals is currently under evaluation.

In October 2023, in the framework of the Technical Meeting EVT2204961 "Technical Meeting on Local Stakeholder Engagement in Radioactive Waste Management", representatives of the university and students of the subject "Service Design" shared at the IAEA the characteristics and results of the previous years' experience.

In mid-2023, an agreement was initiated with the National University of La Plata (UNLP) for regular training and communication activities related to the management and disposal of radioactive waste and spent fuel. Among these activities, the PNGRR carried out the first talk open to the educational community. In order to guarantee the continuity and diversity of joint activities, a Specific Agreement was established between CNEA and the UNLP, approved by CNEA Presidential Resolution N° 829/23.

In order to broaden the exchange with the educational environment, interviews were held with the Institute of Public Administration, which resulted in a product especially dedicated to dissemination in the field of higher education: "Nuclear energy and the environment. CNEA's environmental restitution and radioactive waste management program".

Since the First National Report to the Joint Convention, CNEA has adopted the practice of publishing on its websites the contents of the National Reports and the questions and answers that have arisen from them.

Within the framework of the actions carried out for the Environmental Remediation Project of the San Rafael Mining and Manufacturing Complex, the Social Communication Management carried out the Communication Plan with the objective of establishing a systematic, documented and coherent environmental communication of the Complex.

As mentioned in SECTION B.3, during the management of the Malargüe environmental liabilities, an extensive communication program was carried out before, during and after the work was completed. Besides that, Los Gigantes site has a Communication Plan for when the remediation work is done. For the other sites to be remediated, the current DTRAMU is developing communication plans for the management of environmental liabilities.

The DTRAMU carried out training in the institutional framework and dissemination activities to the scientific-technical community. In this sense, the "National Training Course on Mining Safety and Uranium Processing, including Remediation and Waste Management" was held, with the participation of irrigation, environmental protection, mining, water resources and other agencies from the provinces of Cordoba and Mendoza, among others. In the same way, a course open to the public on "Environmental Management of Uranium Mining at the Malargüe Site in Mendoza, Argentina" was held at the Faculty of Sciences Applied to Industry (FACAI) of the National University of Cuyo.

The "Joint Technical Meeting of the Uranium Mining and Remediation Exchange Group and the International Working Forum on Regulatory Supervision of Legacy Sites" was also held in San Rafael, Mendoza, with the aim of exchanging experiences between different countries around the world.

Finally, it is worth mentioning that, in compliance with national legislation, the PNGRR reports annually to the Honorable Congress of the Nation on its main management activities. These reports are available to the public, who can request them through CNEA website.

K.4 Commitments of previous revision meetings

The commitments made by Argentina in previous meetings and their state of progress are the following:

1) Complete in time the dry storage facility for SF from the CNA Unit I to comply with the plant operational requirements.

Construction was completed and the facility started operating in 2022. In December 2023, 603 SFs were transferred.

2) Continue developing and implementing public commitment to influence positive and give support of the candidate sites for future near surface repositories and deep geological repositories.

As national and international experience shows, communication and stakeholder participation are decisive factors for the siting and realization of any RW disposal system.

Therefore, the ConfinAR Geo project for the disposal of intermediate and high-level radioactive waste and spent nuclear fuels foresees from its initial phase an approach based on stakeholder dialogue.

In this context, during the first years of the period covered by this National Report, and within the initial outlines of the ConfinAR Geo project, a central place was given to the mapping and characterization of stakeholders, both internal and external to the Institution and to the nuclear environment, and to the establishment of a Communication Plan and active participation of these actors, even before the identification of geologically suitable sites had begun.

As mentioned in SECTION K.3.3, the first communication and public participation activities specifically framed in the strategy, purposes and narratives of the ConfinAR Geo Project have been initiated.

3) Remaining Mining Sites Remediation

As mentioned in the previous national report Malargüe site remediation finished in June 2017, and the post-closure monitoring program of the Site continues. Remediation of the remaining sites is an ongoing activity at CNEA through the DTRAMU of the PNGRR (see details in SECTION H.6.1 and SECTION H.6.2).

4) Update of the Strategic Plan for Radioactive Waste Management

Following the recent merge of the PNGRR Management with the former PRAMU Management by Presidential Resolution N° 337/23 into a new functional structure that complies with the requirements of Law No. 25018, and within the framework of a new organic structure of CNEA approved in the Official Gazette of the Argentine Republic, by Administrative Decision N° 793/23; CNEA elaborated the Strategic Plan for Radioactive Waste Management to define the objectives for the management of radioactive waste, disused sources, spent fuels and environmental remediation of uranium mining, and to determine the actions to be achieved during the period 2025-2050.

5) Development of a new spent fuel dry storage facility for Unit II of the Atucha Nuclear Power Plant.

A new dry storage facility for spent fuel assemblies, known as ASECG II, is currently being designed by Nucleoeléctrica Argentina S.A. (see SECTION G.4.1).

6) Begin defining the site selection process for a deep geological repository in consensus with the public and interested parties.

The site selection process for the DGR, as established in the ConfinAR Geo Preliminary Project, will be divided into three clearly defined stages. The first of these aims to identify geologically suitable areas for the repository site at national level. In order to do so, the compilation, updating and analysis of the geological information available in the country is being carried out. At the same time, work is being done to develop quantitative and qualitative criteria for site selection, taking into account the characteristics of the natural system as well as technical, socio-economic, cultural and strategic factors. The information obtained will be used in the generic security study of the repository. From this study, it is expected to plan site selection activities, evaluate various geological repository options, outline the overall R&D&I program, and develop stakeholder engagement strategies to promote stakeholder participation in the process.

The second stage will then be proceeded with to the identification and discrimination of geologically favorable sites for both the isolation of radioactive waste and spent fuel, and for the construction of the required underground and surface facilities. At this stage, the

links with stakeholders would be established and their participation in the process would be integrated. At the end of this phase, it is estimated that between 3 and 10 sites will have been pre-selected, which will be evaluated on the basis of the technical and socio-economic criteria in the next stage. The latter would conclude with the public acceptance and selection of the suitable site for the deep geological repository.

K.5 IAEA review missions

K.5.1 IRRS mission

The period 2020-2023 was affected by the COVID-19 pandemic in the preparatory stage for the IRRS Mission, which could be received in the second half of 2022, and the related activities continued with the definition of the action plan derived from it.

The Nuclear Regulatory Authority had already taken the initiative to have in its structure an Activity (organizational unit) dedicated to coordinating the activities of preparation and conduct of the IRRS Mission, under the responsibility of senior staff with experience in the international arena.

The preparatory phase was marked during 2020 by mostly virtual activities, followed by remote working which became dominant during 2021, with full face-to-face activity resuming in 2022. Throughout this period, work was carried out in internal coordination with various sectors of ARN to prepare for the reception of the Mission, define and train interlocutors, collect updated evidence, translate into English documents of interest to the Mission (legal framework, regulatory framework, resolutions, management system documents, among others), coordinate technical visits and develop the pre-mission self-assessment.

Continuing with internal coordination it was held a workshop for immersion in IRRS missions and its self-assessment methodology (SARIS), for managers, deputy managers, unit heads, department heads, analysts, counterparts and support staff during the IRRS mission. This workshop was conducted in hybrid mode during the months of September and October in 2021.

With regard to external coordination, virtual preparatory meetings for the IRRS Mission were held with the coordinators of the Mission at the IAEA in 2021 and 2022, in order to agree on the logistical and technical arrangements associated with the IRRS Mission.

The self-assessment process was conducted mostly offline, while in 2022 the uploading of data into the SARIS system was completed, the assessment and validation of the information was carried out and the corresponding action plan was developed.

Logistical and budgetary aspects were exceptionally demanding on resources in 2022.

The Argentine Republic hosted the IAEA IRRS Mission from 22 August to 2 September 2022, which reviewed the entire regulatory infrastructure for nuclear and radiological safety

of the Nuclear Regulatory Authority with respect to the degree of implementation of IAEA safety standards. The Mission included technical meetings for the review of each module achieved by the Mission, and the peer review of the activities performed by the Nuclear Regulatory Authority in 6 radioactive and nuclear facilities and in its own laboratories, with more than 30 technical agents of ARN dedicated to the direct attention of the Mission, in addition to support staff.

During 2022 it was reviewed the preliminary report of the IRRS Mission and the outlining of internal actions for the definition of an integrated action plan.

In 2023, internal coordination activities were carried out to integrate the results of the self-assessment developed by ARN with the results of the IRRS Mission and to define the corresponding implementation actions. This process required more than 25 meetings with various sectors of ARN to reach a consensus on the Integrated Action Plan, the prioritization of the actions involved and their implementation in order to facilitate its final approval by means of a Board Resolution, incorporating the actions into ARN Work Plan.

At the same time, actions were developed to comply with some of the recommendations and suggestions made by the IRRS Mission.

K.6 Synoptic summary

In agreement with the determinations of the document Guidelines relative to the Form and Structure of the National Reports (INFCIRC 604/Rev. 3), the following synopsis of the present conditions in Argentina is included.

ARGENTINE EIGHTH NATIONAL REPORT – OVERVIEW

Type of Liability	Long Term Management Policy	Funding of Liabilities	Current Practices/ Facilities	Planned Facilities
Spent Fuel	Reprocessing decision deferred. Final Disposal: A project for a deep geological repository is being developed.	Argentine State[1].	CNA I: NPP Wet Storage. CNA II: NPP Wet Storage. CNE: NPP 6 years Wet Storage. CNA I: NPP Dry Storage CNE: NPP Dry Storage. Research reactors: Wet Storage facility or site (RA-6, FACIRI).	CNA II: Dry Storage Facility or Site - ASECG II CAREM: Wet Storage Facility and Wet or Dry Storage on Site. RA-10: Wet Storage Facility and Site. Deep Geological Repository (feasibility).
Nuclear Fuel Cycle Waste	Final Disposal	Argentine State[1].	LLW: Storage + Final Disposal. LLW: Treatment and Conditioning Facility. ILW: Treatment, Conditioning and Storage.	LLW: Near-surface Centralized. Repository (date under review). ILW: (waste from conditioning or reprocessing of SF of research and production reactors are included) and HLW (waste generated if the SF of power reactors is reprocessed): Deep Geological Repository. LLW: Treatment and Conditioning Facility (PTARR).
Non - Nuclear Fuel Cycle Waste	Final Disposal	Waste Generator when it is a private owner. Argentine State when the generator is the State.	LLW: Storage + Final Disposal. LLW: Treatment and Conditioning Facility. ILW: Storage	LLW: Near-surface Centralized Repository. ILW: Deep Geological Repository. LLW: Treatment and Conditioning Facility (PTARR).
Decommissioning	Decommissioning Plan (Regulatory Requirement).	Argentine State when the facility is state-owned Facility operator when it is a private owner	RA-8: Decommissioning Process accomplished	LLW: Near-surface Centralized Repository. VLLW: Near-surface Centralized Repository.
Disused Sealed Sources	Reuse or Recycling Clearance Final Disposal	Source User	Re-encapsulation: Co-60 sealed sources facility. Storage + Clearance (short-lived) Storage (long-lived)	LLW Near-surface Centralized Repository. ILW and HLW: Deep Geological Repository (feasibility).

(1) At present, all nuclear reactors and other nuclear fuel cycle facilities are operated by Argentine State Organizations, being the Argentine State responsible for their funding.

SECTION L ANNEXES

L.1 National Laws

L.1.1 Law No. 24.804/97 - National Law of Nuclear Activity

In the Seventh Report to the Joint Convention, the Articles of the National Law of Nuclear Activity are developed. The link to access the Seventh National Report is the following:

https://www.argentina.gob.ar/sites/default/files/7_informe_nacional_a_convencion_conjunta-2020.pdf

L.1.2 Law No. 25.018/98 - National Law on Radioactive Waste Management Regime

The articles of the National Radioactive Waste Management Regime Law are developed in the Seventh Report to the Joint Convention.

L.1.3 Legal norms governing the nuclear activity of the Argentine Republic: Organizational structure (1950-2023)

- Creation of the Argentine Atomic Energy Commission.
  Decree No. 10.936/50, May 31, 1950.
  Published: Official Gazette of the Argentine Republic, June 7, 1950.
  (Repealed by Decree-Law No. 22.498/56)

- Organization of the Argentine Atomic Energy Commission.
  Decree-Law No. 22.498/56, December 19, 1956.
  Published: Official Gazette of the Argentine Republic, December 28, 1956. Ratified by Law No. 14.467.
  Partially repealed by Law No. 24.804. In accordance with Article No. 33, Articles 2, 5, 9, 11, 16 and 17 are repealed.

- Ratification of decree-laws of the provisional Government.
  Dictated between September 23, 1955, and April 30, 1958.
  Law No. 14.467.
  Sanctioned: September 5, 1958.
  Promulgated: September 23, 1958.
  Published: Official Gazette of the Argentine Republic, September 29, 1958.

- Reorganization of activities and modification of the powers of the Argentine Atomic Energy Commission.
  Creation of the Argentine Nuclear Regulatory Entity.
  Constitution of Nucleoeléctrica Argentina S.A.
  Decree No. 1.540/94, August 30, 1994.

Published: Official Gazette of the Argentine Republic, September 2, 1994.

- National Law of Nuclear Activity.
  Law No. 24.804.
  Sanctioned: April 2, 1997.
  Partially enacted: April 23, 1997.
  Published: Official Gazette of the Argentine Republic, April 25, 1997.

- Regulation of the National Law of Nuclear Activity No. 24.804.
  Decree No. 1.390/98, November 27, 1998.
  Published: Official Gazette of the Argentine Republic, December 4, 1998.

- Radioactive Waste Management Regime.
  Law No. 25.018.
  Sanctioned: September 23, 1998.
  Promulgated: October 19, 1998.
  Published: Official Gazette of the Argentine Republic, October 23, 1998.

- The amendments to Nucleoeléctrica Argentina Sociedad Anónima by laws are ratified. Nucleoeléctrica S.A. is required to conduct the activities necessary to establish Atucha Nuclear Power Plant Unit II Management Unit. The corporation's purpose is to undertake the acts required to startup Atucha Nuclear Power Plant Unit II and to make the Argentine National Atomic Energy Commission participate in it.
  Decree No. 981/05, August 18, 2005.
  Published: Official Gazette of the Argentine Republic, August 22, 2005.

- The regime to conduct works for Atucha Nuclear Power Plant CNA Unit II is fully binding. It has been granted to the Argentine Atomic Energy Commission and it engulfs to the CNA Unit II Nuclear Management Unit of the corporation Nucleoeléctrica Argentina Sociedad Anónima.
  Decree No. 1.085/06, August 23, 2006.
  Published: Official Gazette of the Argentine Republic, August 25, 2006.

- The assignment of Stock Agreement subscribed by Nucleoeléctrica Argentina Sociedad Anónima and the Argentine Atomic Energy Commission was ratified on 22 June 2006
  Decree No. 1.760/09, November 16, 2009.
  Published: Official Gazette of the Argentine Republic, November 19, 2009.

- Activities that allow the completion of a fourth plant, the extension of the useful life of the Embalse Nuclear Power Plant and the CAREM Reactor Prototype are to be declared of national interest.
  Law No. 26.566.
  Sanctioned: November 25, 2009.

De facto promulgated: December 17, 2009.
Published: Official Gazette of the Argentine Republic, December 24, 2009.

L.1.4 Main international treaties on nuclear energy signed by the Argentine Republic (1966-2023)

- Vienna Convention on Civil Liability for Nuclear Damage. Approved by the International Conference on Civil Liability for Nuclear Damage, held in Vienna, Republic of Austria in 1963. (This Convention was modified and complemented by a Protocol and a Supplementary Convention approved by Law No. 25.313).
  Law No. 17.048.
  Sanctioned and promulgated: December 2, 1966.
  Published: Official Gazette of the Argentine Republic, December 16, 1966.

- Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter, opened for signature on December 29, 1972, in London, Mexico, Moscow and Washington.
  Law No. 21.947.
  Sanctioned and promulgated: March 6, 1979.
  Published: Official Gazette of the Argentine Republic, March 9, 1979.

- Convention Relating to Civil Liability in the Field of Maritime Transport of Nuclear Materials, signed in Brussels, Belgium, on December 17, 1971.
  Law No. 22.455.
  Sanctioned and promulgated: March 27, 1981.
  Published: Official Gazette of the Argentine Republic, April 6, 1981.

- Treaty on the Prohibition of the Placement of Nuclear Weapons and other Weapons of Mass Destruction on the Seabed and Ocean Floor and its Subsoil, signed in London, Moscow and Washington on February 11, 1971.
  Law No. 22.507.
  Sanctioned and promulgated: October 7, 1981.
  Published: Official Gazette of the Argentine Republic, October 13, 1981.

- Treaty on the Prohibition of Testing of Nuclear Weapons in the Atmosphere, in Outer Space and in Underwater Waters, concluded in the city of Moscow on August 5, 1963.
  Law No. 23.340.
  Sanctioned: July 30, 1986.
  Promulgated: August 19, 1986.
  Published: Official Gazette of the Argentine Republic, February 25, 1987.

- Convention on the Physical Protection of Nuclear Materials, signed in Vienna, Republic of Austria, on March 3, 1980.
  Law No. 23.620.

Sanctioned: September 28, 1988.
Promulgated: October 20, 1988.
Published: Official Gazette of the Argentine Republic, November 2, 1988.

- Convention on Early Notification of Nuclear Accidents and Convention on Assistance in the Event of a Nuclear Accident or Radiological Emergency, approved by the General Conference of the International Atomic Energy Agency, in Vienna, Republic of Austria, on September 26, 1986.
  Law No. 23.731.
  Sanctioned: September 13, 1989.
  Promulgated: October 6, 1989.
  Published: Official Gazette of the Argentine Republic, October 13, 1989.

- Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, adopted in Mexico, on February 14, 1967, with the amendments introduced on July 3, 1990, May 10, 1991 and August 26 of 1992 (Treaty of Tlatelolco).
  Law No. 24.272.
  Sanctioned: November 10, 1993.
  Promulgated: December 7, 1993 (Application of Article No. 70 of the National Constitution).
  Published: Official Gazette of the Argentine Republic, December 14, 1993.

- Treaty on the Non-Proliferation of Nuclear Weapons (NPT), opened for signature in London, Washington and Moscow on July 1, 1968.
  Law No. 24.448.
  Sanctioned: December 23, 1994.
  Promulgated: January 13, 1995.
  Published: Official Gazette of the Argentine Republic, January 20, 1995.

- Convention on Nuclear Safety adopted in Vienna, Republic of Austria, September 20, 1994.
  Law No. 24.776.
  Sanctioned: February 19, 1997.
  Promulgated: April 4, 1997 (Application of Article No. 80 of the National Constitution).
  Published: Official Gazette of the Argentine Republic, April 11, 1997.

- Comprehensive Nuclear Test Ban Treaty accepted by the United Nations General Assembly in New York, United States of America, on September 10, 1996.
  Law No. 25.022
  Sanctioned: September 23, 1998.
  Promulgated: October 20, 1998.
  Published: Official Gazette of the Argentine Republic, October 28, 1998.

- Joint Convention on Safety in the Management of Spent Fuel and on Safety in the Management of Radioactive Waste, adopted in Vienna, Republic of Austria, on September 5, 1997.
  Law No. 25.279.
  Sanctioned: July 6, 2000.
  Promulgated: July 31, 2000 (Application of Article No. 80 of the National Constitution).
  Published: Official Gazette of the Argentine Republic, August 4, 2000.

- Protocol of Amendment to the Vienna Convention on Civil Liability for Nuclear Damage and the Convention on Supplementary Compensation for Nuclear Damage, adopted in Vienna, Republic of Austria, on September 12, 1997 (Amendment and Supplementary to the Vienna Convention approved by Law No. 17.048).
  Law No. 25.313.
  Sanctioned: September 7, 2000.
  Promulgated: October 6, 2000 (Application of Article No. 80 of the National Constitution)
  Published: Official Gazette of the Argentine Republic, October 18, 2000.

- Agreement on the implementation of activities related to international surveillance facilities at the service of the Comprehensive Nuclear Test Ban Treaty, signed with the Provisional Technical Secretariat of the Preparatory Commission of the Comprehensive Nuclear Test Ban Treaty Organization, the December 9, 1999, in Vienna, Republic of Austria.
  Law No. 25.837.
  Sanctioned: November 26, 2003.
  Promulgated: February 19, 2004.
  Published: Official Gazette of the Argentine Republic, February 20, 2004.

- Cooperation agreement for the promotion of nuclear science and technology in Latin America and the Caribbean adopted by the Board of Governors of the International Atomic Energy Agency in Vienna, on September 25, 1998.
  Law No. 25.842.
  Sanctioned: November 26, 2003.
  Promulgated: January 9, 2004.
  Published: Official Gazette of the Argentine Republic, January 15, 2004.

- Amendment to the Convention on the Physical Protection of Nuclear Materials.
  Law No. 26.640.
  Sanctioned: October 13, 2010.
  Promulgated: November 13, 2010.
  Published: Official Gazette of the Argentine Republic, November 17, 2010.

- International Convention for the Suppression of Acts of Nuclear Terrorism.

Law No. 26.976.
Sanctioned: August 27, 2014.
Promulgated: September 17, 2014.
Published: Official Gazette of the Argentine Republic, September 24, 2014.

- Convention on Privileges and Immunities of the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean.
  Law No. 27.186.
  Sanctioned: September 23, 2015.
  Promulgated: October 13, 2015.
  Published: Official Gazette of the Argentine Republic, October 28, 2015.
  Date of entry into force: June 24, 2016, Official Gazette of the Argentine Republic, August 24, 2016.

L.2 PNGRR R&D&I Plan

L.2.1 Research, Development and Innovation activities

The Research, Development and Innovation Plan planned to meet the objectives of the PNGRR includes activities and lines of work related to the pre-disposition and final disposition of the SF and the RR. The research, development and innovation activities underway during the period 2020-2023 are listed below:

- Hydrogeological studies aimed at the disposal of low and very low level waste.

- Time domain electromagnetic studies (TDEM) applied to geological and hydrogeological investigations for the development of a Deep Geological Repository for final disposal of medium and high activity waste and spent fuels.

- Compilation, updating and analysis of natural resources data and review of exclusion criteria for the development of a DGR for final disposal of medium and high activity waste and spent fuels.

- Study of formulations for cementing liquid radioactive waste and spent ion exchange resins from research reactors.

- Laboratory tests with the objective of modifying the properties of the different liquid radioactive waste stored in the AGE and generated during the production of Mo-99 to improve its immobilization in cement.

- Study of plasma pyrolysis treatment processes of spent resins with the aim of optimizing their immobilization and disposal.

- Development and optimization studies of the Sol-Gel synthesis of nanoparticulate $(U,Gd)O_2$ for the optimization of nuclear fuel for modular reactors.

- Studies of aqueous corrosion mechanisms of aluminum alloy 6061 in medium and high purity waters.

- Microbiological monitoring of water, analysis of biocidal treatments and studies of bio-fouling and microbiological corrosion at FACIRI and RA-6.

L.2.2 Joint activities with the International Atomic Energy Agency

Within the framework of the Technical Cooperation and research programs with the IAEA, we participated and continue to participate in the following projects and activities in the period 2020-2023:

- National Technical Cooperation Project ARG/9/016: “Building Capacities for Selecting and Characterizing Potentially Suitable Sites for the Geological Disposal of Radioactive Waste and Spent Nuclear Fuel”.

- Interregional Technical Cooperation Project INT/9/187: “Sustaining Cradle-to-Grave Control of Radioactive Sources - Phase III”.

- Interregional Technical Cooperation Project INT/9/182: “International Project on Decommission in Small Medical, Industrial and Research Facilities” (MIRDEC Project).

- Relevant events on the subject organized by the IAEA, among which it is worth highlighting: “Interregional Meeting on Disposal in Deep Wells” (May 2023, Egypt); Final Coordination and Launch Meeting of phase III of the INT9187 Project (November 2023, Austria). “IAEA-CNEA TC ARG9016 Workshop: Development of safety cases at the beginning of a program for a Deep Geological Repository” (November 2022, Argentina); “IAEA-CNEA TC ARG9016 Workshop: “First dialogues on the disposal of radioactive waste and spent fuels in Argentina” (November 2022, Argentina); “Technical Meeting to support R&D plans in Geological Disposition” (September 2023, Austria); “Technical Meeting on the development of strategies for termination of safeguards in nuclear waste” (October 2023, Austria); “Training on site selection for deep geological repositories at Grimsel Site Formation Center” (September 2022, Switzerland); “Technical Meeting of the Underground Facilities Network (URF) for deep geological disposal (part I and II)” (2022, virtual); “Interregional Meeting on Management, Recordkeeping, Records and Traceability of Documents Related to Sealed Radioactive Sources and Disused Sealed Radioactive Sources” (July 2022, Philippines); “Interregional course in safety analysis and safety cases for radioactive waste management” (June 2021, virtual). Interregional meeting on borehole disposal, INT9186 (May 2023, Egypt). Interregional Training Course on hand-on training for category 3 to 5 sources INT 9186, (July 2023, Moroco).

- Networks promoted by the IAEA on the subject: “Network on Environmental Management and Remediation (ENVIRONET)” and “International Low Level Waste Disposal Network (DISPONET)”.

- “IAEA International Radioactive Waste Technical Committee (WATEC)” - International Technical Committee on Radioactive Waste.

- Coordinated Research Project (CRP): “Options and Technologies for Managing the Back End of the Research Reactor Nuclear Fuel Cycle (T33001)”, Research contract titled: “Storage and conditioning options for the Argentine based-research reactor spent fuel”.

- Coordinated Research Project (CRP): “Aging Management Programs for Spent Fuel Dry Storage Systems (T21028)”, Research contract titled: “Durability of Structural Components of Dry Storage Systems”.

- National Technical Cooperation Project ARG/7/008: “Improving Management and Evaluation of Quality and Availability of Water Resources in Certain Regions through the Use of Isotopic Techniques”.

- National Technical Cooperation Project ARG/9016: “Building Capacities for Selecting and Characterizing Potentially Suitable Sites for the Geological Disposal of Radioactive Waste and Spent Nuclear Fuel”.

- Interregional Technical Cooperation Project INT/9/186: “Sustaining Cradle-to-Grave Control of Radioactive Sources - Phase II”

- Relevant events on the subject organized by the IAEA, among which it is worth highlighting: “Virtual Consultative Meeting - Radioactive Waste Management, Decommissioning and Environmental Remediation” (May 2020, virtual); “Technical Meeting on the Management of Irradiated Uranium Waste Derived from the Production of Molybdenum-99 using Low Enriched Uranium Targets” (December 2020, virtual); “Fourth Plenary Meeting of the International Project for the Demonstration of the Operational and Long-Term Safety of Geological Final Disposal Facilities for Radioactive Waste (GEOSAF Part III)” (September 2020, virtual); “Consultancy Meeting to Prepare the Third Research Coordination Meeting on Aging Management Programs for Spent Fuel Dry Storage Systems” (October 2020, virtual); “Meeting of the Preparatory Committee of the 2021 Conference of the Parties to the Amendment to the Convention on the Physical Protection of Nuclear Material: Session 2” (February 2021, virtual); “Open meeting of legal and technical experts on the implementation of the Guide for the Management of Disused Radioactive Sources” (July 2021, virtual); “Technical Meeting on Global Advances in the Development of Geological Final Disposal Solutions within the Network of Underground Research Facilities” (February 2021, virtual); “School to prepare regulations for the physical and technological security of Radiation Sources” (July

2021, virtual); ”Technical Meeting on Study Tests of the Behavior of Waste Bodies for the Final Disposal of Low Activity Waste (International Network on Management Prior to Final Disposal, IPN)” (April 2021, virtual); “Virtual meeting to prepare updated terms of reference for the Steering Committee on Education and Training in Radiation, Transport and Waste Safety and to develop the relevant performance indicators” (April 2021, virtual); “Consultancy Meeting on the Nuclear Energy Series document ‘International Safeguards in the Design of Facilities for Radioactive Waste Management’ (June 2021, virtual); “Training Course on Project Planning, Management and Stakeholder Engagement for Decommissioning and Environmental Remediation Projects” (June 2021, virtual); “Technical Meeting on Lessons Learned on Final Disposal of Low Level Waste within the framework of the International Network on Final Disposal of Low Level Waste (DISPONET)” (July 2021, virtual); “Workshop on the Preparation and Response Phases for the Search and Recovery of Radioactive Sources” (July 2021, virtual); “Fourth Technical Meeting of the International Project on the Completion of Decommissioning (COMDEC)” (July 2021, virtual); “Prerequisites Workshop for the implementation of a National Deep Geological Disposal Program” (July 2021, virtual); “Technical Meeting on the Development of a Model Roadmap for the Storage of Radioactive Waste in Countries with Small Inventories” (July 2021, virtual); “Technical Meeting on the Establishment of Specific Dispensation Levels for Materials that are Suitable for Recycling, Reuse or Final Disposal in Landfills” (August 2021, virtual); “A generic Roadmap towards implementing the National Deep Geologic Repository Program in Argentina” (September 2021, virtual); “Technical Meeting on the Management of Hazardous Waste Generated during the Operation and Decommissioning of Research Reactors and other Nuclear Facilities (International Network on Management Prior to Final Disposal - IPN)” (October 2021, virtual); “Fourth Plenary Meeting of the International Project for the Demonstration of the Operational and Long-Term Safety of Radioactive Waste Geological Disposal Facilities (GEOSAF Part III)” (November 2021, virtual); “Consultancy Meeting on Aging Management Programs for Spent Fuel Dry Storage Systems” (November 2021, virtual); “International Conference on Radioactive Waste Management: Solutions for a Sustainable Future” (November 2021, virtual); “Workshop on Dry Storage of Research Reactor Spent Fuel” (November 2021, virtual); “Annual Meeting of the Technical Working Group on Decommissioning and Environmental Remediation” (November 2021, Austria); “Consultancy Meeting to prepare course material on Communication and Stakeholder Involvement with Radioactive Waste Disposal” (December 2021, virtual), “Technical Meeting on Status and Trends in Spent Fuel and Radioactive Waste Management” (February 2022, virtual), “Meeting Technical on Guidance on the Preparation and Conduct of Regulatory Examinations and Evaluations of Geological Final Disposal Programs” (April 2022, Austria); “Meeting of the International Technical Committee on Radioactive Waste (WATEC)” (May 2022, Austria); “International Conference on the Technological and Physical Safety of Radioactive Sources: Achievements and Future Projects” (June 2022, Austria); "Sixth International Project Technical Meeting on Decommissioning Completion” (June 2022, United Kingdom); “Interregional Meeting on Establishing and

Maintaining a National Register of Sealed Radioactive Sources" (June 2022, Brazil); "Technical Meeting on Human Resources Development in relation to Closing" (July 2022, Austria); "Technical Meeting on Good Practices in Establishing Radioactive Waste Inventories" (August 2022, Austria); "Technical Meeting on the Storage of Radioactive Waste" (August 2022, Austria), "Technical Meeting on the Coordination of Activities and Projects related to the Safety of Geological Final Disposal" (September 2022, Austria); "Interregional Training Course on Safety and Impact Assessment for Decommissioning Projects" (September 2022, Brazil); "Technical Meeting on Considerations Relating to the Back End of the Fuel Cycle for Small Modular Reactors" (September 2022, Austria); "Technical Meeting on the Guidelines Entitled "Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation" (October 2022, virtual); "Technical Meeting of the International Network on Final Disposal of Low Level Waste (DISPONET) on Lessons Learned from the Final Disposal of Low Level Waste" (October 2022, Bulgaria); "Interregional Meeting on Reuse and Recycling of Disused Sealed Radioactive Sources (DSRS)" (November 2022, Bosnia); "Regional course on the calibration of radiation protection equipment using neutron sources in Secondary Standard Dosimetry Laboratories (SSDL); (November 2022, Brazil), "Technical Meeting on Global Advances in the Development of Geological Disposal Solutions within the Network of Underground Research Facilities" (November 2022, Austria); "Training Workshop on Communication and Participation of Interested Parties in the Final Disposal of Radioactive Waste" (December 2022, Austria); "Training Course to Identify and Train Experts for Future Missions of the Integrated Examination Service for the Management of Radioactive Waste and Spent Fuel, Decommissioning and Rehabilitation" (January 2023, Austria); "Consultancy Meeting of the Underground Research Facilities (URF) Steering Committee" (January 2023, virtual); "Technical Meeting on the Status and Trends in Spent Fuel and Radioactive Waste Management" (February 2023, virtual); "Technical Meeting of the Network of Underground Research Facilities on Geological Final Disposal on Global Advances in the Development of Geological Final Disposal Solutions" (April 2023, virtual); "International Conference on Nuclear Decommissioning: Addressing the Past and Ensuring the Future" (May 2023, Austria); "Annual Meeting of the Technical Working Group on Decommissioning and Environmental Remediation (TWG-D&ER)" (May 2023, Austria); "Technical Meeting on the Decommissioning of Fuel Cycle Facilities" (June 2023, France); "Interregional Training Course on Design and Implementation of Decommissioning and Environmental Remediation" (August 2023, USA).

- Support was received from the IAEA through the implementation of the following missions of international experts in the country: "Expert mission on early stage site investigation and sitting for a deep geological repository in Argentina Field: Rad Waste Management, Decommissioning and Environmental Remediation", September 2022, "Expert Mission on the Safety Case, Safety Assessment and links to Site Characterization for Geological Disposal Field: Rad Waste Management, Decommissioning and Environmental Remediation", November 2022, "Advisory

mission on stakeholder engagement to support the national Deep Geological Repository program in Argentina", December 2022.

End of the Eighth National Report

of the Argentine Republic in furtherance of the

Joint Convention on the Spent Fuel Safety

and on the Radioactive Waste Management Safety