República Argentina

NATIONAL NUCLEAR SAFETY REPORT

2004

CONVENTION ON NUCLEAR SAFETY

NATIONAL NUCLEAR SAFETY REPORT

CONTENTS

INTRODUCTION

The Second National Nuclear Safety Report was presented at the second review meeting of the Nuclear Safety Convention. At that time it was concluded that Argentina met the obligations of the Convention.

This third National Nuclear Safety Report is an updated report which includes all safety aspects of the Argentinian nuclear power plants and the measures taken to enhance the safety of the plants. The present report also takes into account the observations and discussions maintained during the second review meeting. The conclusion made in the first review meeting about the compliance by Argentina of the obligations of the Convention are included as Annex I and those belong to the second review meeting are included as Annex II. In general, the information contained in this Report has been updated since March 31, 2001 to April 30, 2004.

Those aspects that remain unchanged were not addressed in this third report with the objective of avoiding repetitions and in order to carry out a detailed analysis considering article by article.

As a result of the above mentioned detailed analysis of all the Articles, it can be stated that the country fulfils all the obligations imposed by the Nuclear Safety Convention.

The questions and answers originated at the Second review meeting are included as Annex III.

With the aim of facilitating the understanding of this Third National Nuclear Safety Report the main introductory aspects of the First Report are reproduced.

I.1 General Aspects

The Argentine Republic subscribed the Convention on Nuclear Safety, approved by a Diplomatic Conference in Vienna, Austria, in June 17, 1994. Besides, in February 4, 1997, the National Congress passed Act No 24,776, approving the Convention adopted in September 20, 1994. According to the provisions in Section 5th of the Convention, each Contracting Party shall submit for its examination a National Nuclear Safety Report about the measures adopted to comply with the corresponding obligations.

This third Report describes the actions carried out by Argentine Republic since the second nuclear safety report was issued (March, 2001) up to April, 2004 showing that it complies with the obligations derived from the Convention, in accordance with the provisions of its Article 4.

The analysis of the compliance with such obligations is based on the legislation in force, the applicable regulatory standards and procedures, the issued licenses, and other regulatory decisions. The corresponding information is described in the analysis of each of the Convention Articles constituting this Report.

The country has two nuclear power plants in operation, Atucha I and Embalse, which initiated their commercial operation in 1974 and 1984 respectively. Their corresponding net electric power are 335 MW and 600 MW, which represent about 7.3% of the installed electric power. Both nuclear power plants supply about 12% of the total electric power generated in the country. A third nuclear power plant, Atucha II, is in an advanced state of construction.

Atucha I nuclear power plant is located about 100 km to the Northwest of Buenos Aires City. The reactor is of the PHWR type with a pressure vessel. According to the original design Atucha I is fuelled with natural uranium, but fuel elements of new design were incorporated with slightly enriched uranium (0.85%). The reactor is moderated and cooled with heavy water (see Annex 8 NNSR 1998).

Embalse nuclear power plant is located at the Province of Córdoba, approximately 110 km to the south of Cordoba City (state capital) and 5 km to the Southwest of Embalse town. It is a CANDU type reactor, of the pressure tube type, loaded with natural uranium fuel and moderated and cooled with heavy water (see Annex 8 NNSR 1998).

Atucha II nuclear power plant is under construction, next to Atucha I. Its reactor will also be of the PHWR type with a pressure vessel, loaded with natural uranium fuel, moderated and cooled with heavy water, with a net electric power of 693 MW.

I.2 National Policy in the Nuclear Field

Due to its special characteristics, the activities related to the use of nuclear energy for peaceful purposes need to be subject to national (or federal) jurisdiction and regulated as an organic and indivisible system. For this reason the National Congress is empowered to establish the laws concerning the subject, through Section 75 paragraphs 18 and 32 of the National Constitution.

Within this context, Act No 24,804, 1997 or "National Law of the Nuclear Activity", is the legal framework for the peaceful uses of nuclear energy. Article 1st of the Act No 24,804, 1997, sets that concerning nuclear matters the State will establish the policy and perform the functions of research and development and of regulation and control, through the National Atomic Energy Commission and the Nuclear Regulatory Authority.

Moreover, the mentioned law sets that any nuclear activity either productive or concerning research and development, that could be commercially organized, can be carried out both by the State and the private sector.

In the case of nuclear power generation, Decree 1540, Article 4, 1994 sets that a State Company named Nucleoeléctrica Argentina S.A. is in charge of the operation of Atucha I and Embalse nuclear power plants and of the construction, commissioning and operation of Atucha II nuclear power plant.

I.3 Summary of the Main Subjects Contained in the Report

The present National Report has been performed in order to comply with Article 5 of the Convention on Nuclear Safety, and has been prepared as much as possible following the Guidelines Regarding National Reports Under the Convention on Nuclear Safety and the most significant conclusions introduced during the second review meeting in 2002. This means that the Report has been ordered according to the Articles of the Convention on Nuclear Safety and the contents indicated in the above mentioned Guidelines.

I.4 Annexes

Additional information to this Report is included in the following annexes:

Annex I presents the conclusions made in the first review meeting about the compliance by Argentina of the obligations of the Convention.

Annex II presents the conclusions made in the second review meeting about the compliance by Argentina of the obligations of the Convention.

Annex III includes the questions and answers discussed at the second review meeting .

ARTICLE 6
EXISTING NUCLEAR INSTALLATIONS

In the previous National Nuclear Safety Reports some major improvements to the nuclear power plants safety have been detailed. Particularly, the major significant requirements established by the Regulatory Body have been stated for both Atucha I and Embalse nuclear power plants.

In this Article the state of those requirements and the new safety aspects taken into account since the second review meeting up to the present report are presented (see Annex I). Special attention has been paid to the conclusion of the backfitting program for Atucha I nuclear power plant based on the results of the continuous safety assessments and the Regulatory Body requirements.

6.1 Atucha I Nuclear Power Plant - Plant Improvement Status

6.1.1 Coolant Channel Replacement

As it has been mentioned in the previous reports, reactor internals were originally designed considering the reactor lifetime. The coolant channels shown four important issues,

a) "Stellite-6" (a 60% cobalt alloy) located in two contact areas;

b) Coolant channels nozzle stuck in their guide bushing, due to effects such as crud and fuel channel thermal isolation (foils 0.1-0.2 mm of Zircalloy 4) particles deposition in the clearance

c) Coolant channels axial growth due to irradiation exceeding the design basis is another effect that contributes to the coolant channel sticking against the moderator tank bottom.

d) Coolant channel thermal isolation suffered an increasing degradation due to creep, deformation and embrittlement causing foil fractures. This process has generated a relevant quantity of particles which were disseminated into the moderator tank.

All coolant channels with "Stellite" were replaced with a new design finalizing the extended replacement program initiated some years ago as a part of the backfitting program. Still remain within the reactor core 54 new design channels with thermal isolation foils 0.2 mm of Zircalloy 4 that will be replaced during 2004/5.

6.1.2 Second Heat Sink

As it was stated in the first and the second reports, the second heat sink represents an additional heat sink using feed and bleed via the steam generators. This heat sink system has the main purpose of ensuring, as an additional emergency system, the heat transfer via the steam generators in cases where the normal heat sink or the high pressure residual heat removal system are either unavailable or ineffective. This system is one of the major design changes in terms of the plant safety and the project that involved design, construction, testing and commissioning stages was finalized.

As built, the second heat sink includes:

- A safe feeding system for steam generators
- A safe and controlled leave steam pressure relief station
- A safe electrical power supply system
- Instrumentation and control equipments

From the regulatory point of view, and “ah-hoc” committee was established -as a part of the licensing process of such significant design changes- evaluating each one of the stages such as design, construction and commissioning. The licensing of such new safety system involved an important effort to the Regulatory Body in terms of regulatory evaluations and inspections. The committee concluded that the second heat sink and other design plant modifications (see 6.1.3) met the regulatory requirements during all stages and recommended to the board of Directors for approval.

The main regulatory tasks on the evaluations area were concentrated on: actuation signals, design data, requirements on the safety variables and signal limit values, postulated accident classification and evolution and interfaces with the existing plant. The second heat sink fire analysis was reviewed by specialized consultants. Additionally, the Responsible Organization has updated the Atucha I PSA including this new system reviewed by the Regulatory Body. The main inspection areas were focused on mechanical systems, electrical systems and I&C digital systems.

Second heat sink system also included major I & C modifications and improvements such as the a new system logic using TELEPERM technology. The second heat sink and its independent emergency power supply is controlled by both a safety related system (TELEPERM XS) and the operational control system (TELEPERM XP).

6.1.3 Design Changes Important to Safety

Within the backfitting program additional design changes to improve the plant safety were implemented. Such improvements to the existing reactor protection system rise up as a consequence of safety analysis integrated with the second heat sink . The major improvements were:

- Improvements to High Pressure Injection System
- Improvements to the Boron Shutdown System
- Small and Large LOCA signal logic changes
- Secondary side leak signal changes

- Reactor trip initiation changes
- Steam generators tube rupture signal logic changes
- New signals of steam generators level

6.1.4 Plant Specific Probabilistic Safety Assessment

All plant design changes as a consequence of the backfitting program were included within the PSA model for Atucha I. The full scope PSA was updated and the total core damage frequency is below 1. 10^{-04} / year. Such value is considered acceptable by the Regulatory Organization, however considering the concept of continuous improvement established, once the regulatory review of the updated PSA is finalized and the findings clearly understood new issues would be rise to discuss with the Responsible Organization in order to get additional improvement to the core damage frequency.

Main core damage frequency contributors are 52% LOCAs and 48% Transients. In case of LOCAs the main contributor is the Small LOCA with medium depressurization of the primary circuit and the main transient contributor the loss of cooling water system.

6.1.5 Pressure Vessel Integrity

The Regulatory Body has been carried out an assessment of the available information related to the reactor pressure vessel since 1997. It was concluded that there are uncertainties regarding the reactor pressure vessel integrity under certain accidental operational situations. On the other hand, several requirements have been done in order to evaluate that the reactor pressure vessel integrity will continue preserving an appropriate safety margin at the end of the reactor lifetime.

During 2002 several analysis and material testing were carried out. In particular, non-irradiated samples were tested using the “Master Curve” methodology whose results allow to reduce uncertainties in ductile-brittle transition temperature. The main conclusion was ductile-brittle transition temperature had been used in the safety analysis carried out was conservative. Additionally, uncertainties corresponding to the irradiated material were reduced and those used in the safety analysis carried out was also conservative.

On the other hand, the Responsible Organization performed a pressurized thermal shock analysis, the analysis of the most severe transient and a full scope elastic-plastic analysis. After to evaluate such study some uncertainties regarding to the transition temperatures still remain that impact within the safety margin at the end of the pressure vessel lifetime. As the main conclusion from the Regulatory Body and the Responsible Organization, additional analyses are necessary such as thermo hydraulic analyses and in-depth pressurized thermal shock evaluations in order to get a better understanding about the mentioned uncertainties and review the representatives scenarios. However, two important conclusions can be mentioned:

a) Thermo hydraulic analysis shown the effect of heating up the high pressure injection water do not improve the thermal shock considering the most important accidental sequences. Such analysis considered the trigger time and the actuation time of the high pressure injection system. Therefore, the

Regulatory body decided to suspend the requirement related to heat up the high pressure injection water.

b) Additional measures were taken focused on reducing the impact of the thermal shock in particular reactor protection changes related to low pressure injection system.

c) The regulatory body required additional evaluations to be presented in 2006 in order to assure that an adequate reactor pressure vessel reliability at the end of the life time will be maintained.

6.1.6 Shutoff Control Rods

As stated in the previous national reports shutoff control rods and shutdown system were affected due to increased drop time and stuck in their guide bushing, by both effects, crud and fuel channel thermal isolation particles deposition in the clearance. Besides, the axial growth of tube guide control rods by irradiation caused it to stick against the moderator tank bottom as it was the case of the coolant channels

After to performed several tests, inspections and evaluations the Regulatory Body required to replace all of them as part of the backfitting program. This activity was completed satisfactorily.

6.1.7 Backfitting Program

As was stated in the previous reports, a backfitting program was established by the Regulatory Body priorizing the reactor internals issues. The program also considered relevant safety aspects such as the completion of the second heat sink system and the reactor pressure vessel analysis . Besides, an updated version of the relevant safety documentation was required. All the backfitting activities were fulfilled in accordance what the Regulatory Organization required. The main activities performed were:

- ✓ A control rod shutdown system test program with the objective of detecting early effects of potential failures in the new control rods.
- ✓ Replacement of all channels with “Stellite-6”.
- ✓ Replacement of all control rod guide tubes with a new nozzle design.
- ✓ Updating of the Safety Report, Probabilistic Safety Assessment, Operation Policies and Principles Manual, Maintenance Manual and Quality Assurance Manual.
- ✓ In-core neutron flux sensor guide tubes replacement.
- ✓ Moderator tank cleaning.
- ✓ Commissioning of the second heat sink system.
- ✓ Pressure vessel integrity analysis.
- ✓ Moderator water level measurements

6.2 Embalse Nuclear Power Plant

6.2.1 Pressure Tube Inspection

Following the program established for long-term assessment of hydride blister susceptibility by monitoring deuterium uptake in pressure tubes at Embalse a new scraping of pressure tubes was carried out during the last planned outage in May 2004. Still the results are no available however an assessment performed previously indicated a lower deuterium uptake rates in comparison with assessment performed using deuterium concentration data from other CANDU 6 reactors.

A new computer code SLARADE was used to define the repositioning strategy improving the previous one and incorporating all the operating experience of the Canadian plants reaching a better estimation about the time window for contact between pressure tubes and calandria tubes.

On the other hand, it was detected humidity within the annular gas system due to the ingress of H_2O from the lattice tube to one pressure tube. Therefore, during 2002 planned outage the design of annular gas system was modified in order to isolate the tube group involved with such H_2O ingress and identify the pressure tube that caused the H_2O ingress. Additionally, the Regulatory Body required to the Responsible Organization to take actions as preventive measures during the last planned outage in order to assure that the safety is not compromised taking into account the annular gas system modification. Such actions involved the garter springs repositioning of all tubes with highest susceptibility to blister formation until the year 2005 belonging to such tubes group and selecting one of them with the highest power rate to monitor the uptake of deuterium to carry out an additional scrapping.

6.2.2 Feeders

An important task about CANDU Reactors is the feeders inspection based on the operating experiences in other CANDU reactors. During each planned outage several feeders areas were inspected, with the objective of determining the evolution of the thickness wall decrease by erosion – corrosion mechanisms and cracking measurements. The inspection methods and qualified personnel used are in accordance with the standards and guides. The results in the evolution of the inspection that took place allow a life expectancy higher than 25 years for all sensitive areas.

6.2.3 Plant Specific Probabilistic Safety Assessment

As was stated in the Second National Report the Embalse CANDU 600 PSA was finalized. The quantification results can be resumed as follows: Core Damage Frequency (CDF) 2.67 10^{-05} / year. This includes both core damage with radioactive release confined inside containment and core damage with containment by-pass.

Major contributions to Core Damage Frequency are: Very Small LOCA (50%) leakage exceeding, total Loss of service water (17%), Primary coolant leakage - feeders break - (4%).

Recovery actions analysis was not performed within this quantification however the core damage frequency value is acceptable for the Regulatory Body . Taking into account that most of major contributors include human errors, it is expected that results will improve significantly when recovery actions are modeled and included. Nevertheless, some design changes are under review in order to reduce contributions to core damage.

The regulatury review scope, timing and deterministic re-analysis were defined. It is planned to conclude such review during 2005.

6.3 Atucha II Nuclear Power Plant

The plant construction activities are still almost discontinued, keeping the maintenance of the components meanwhile decisions are expected to be taken so as to continue with the construction of the plant (see 18.3).

6.4 Significant Events

6.4.1 Atucha I Nuclear Power Plant

6.4.1.1 Reactor scram due to steam generator low level

When a surveillance test of one reactor protection system signal was being performed to check the logic that commands the turbine fast trip actuation, a spurious activation of a partial reactor scram signal occurred initiating, among others automatic actions, the feedwater valve closure impeding to supply water to steam generator 1. This situation provoked a SG1 water level decrease that caused automatic reactor scram, turbine trip and the second heat sink system actuation.

The normal feedwater flow was reached about 7 minutes later than incident initiation, then the reactor was led to the cold shutdown state. The station was 45 hours out of service.

Reported as **INES LEVEL:1**

6.4.2 Embalse Nuclear Power Plant

6.4.2.1 Nuclear Power Plant, Involving Co-60 Slugs of a Sealed Source Withdrawn From an Adjuster Unit.

On July 1, 2003, a B(U) type transport package, loaded with Co-60 having a total activity of 11.47 PBq, was submerged in the Embalse NPP fuel transfer pool to withdraw its internal grid having 47 zircaloy pencils (with 16 slugs of Co-60 each one), and then take the empty package out of the pool in order to carry out inspection and maintenance operations on it.

When withdrawing the supposed empty package from the pool, a radiation protection officer measured the activity detecting a dose rate of 0.1 Sv/h while the package was still 1 meter under water. This activity rate was also detected by area monitors in the pool building and the high level alarm was activated.

After these indications, withdrawal was immediately interrupted and the package was returned to the pool bottom. Later on, it was detected that 3 slugs were still inside the package (radiation source detected) while another 6 slugs had fallen out of it and were laying at the pool bottom.

During the grid handling inside the pool, one of the pencils lost its seal so that 9 out of 16 slugs came out of it. Three slugs were found inside the package while the other 6 fell out, reaching the pool bottom.

Reported as **INES LEVEL:1**

(QUOTE RELEVANT USER MANUAL PARAGRAPHS) Broken barrier with potential radiological risk (loss of confinement of the source). INES User´s Manual 2001 Edition, part IV.

6.5 Opinion of the Regulatory Body Concerning the Operation Continuity of Nuclear Installations

CNA I and CNE met the regulatory standards related to design and operation. In the case of CNA I the backfitting program was concluded according the requirements issued by the Regulatory Body and its license was renewed for a period of 10 years.

ARTICLE 7
LEGISLATIVE AND REGULATORY FRAMEWORK

7.1 National Legislative Framework

There have not been major changes within the Legislative and Regulatory Framework described in the first and the second national nuclear safety reports.

7.2 Normative Framework

The Regulatory Body has continued updating the regulations in force, particularly during this period and no modifications have been made in the safety standards of nuclear power plants.

7.3 Periodic Safety Review and License Renewals

Until 2003, Periodic Safety Review as it is defined by IAEA has not been required in Argentina. Regulatory Standard “AR 3.9.1. – General Safety Operation Criteria” establish that the Safety Reports of nuclear installations must be updated each time that be performed a plant design modification and once every five (5) years. The operating licenses includes similar requirements. These Safety Reviews, which are part of the continuous improvement program, foresees a continuous following of the safety problems, the operative experience feedback and the aging management program.

Additionally, there is a permanent regulatory body activity, both the standards review and the standards updating, whose target is to maintain the Argentinean normative system updated. It is a regulatory requirement to perform and update the NPPs probabilistic safety analysis, which implies a safety review to be performed during the revision stage or during the improvements implementation or design changes.

However, in 2003 the Board of Directors of the Regulatory Body nominated a specific committee to analyze and update the nuclear power plant operating licenses considering national and international aspects. A number of considerations were taken into account such as: a) limited or unlimited renewal period of the operating license b) avoiding repetitions with the standards c) the benefits of applying a periodic safety review methodology d) the requirements issued that consider permanent fulfilment and e) the operating experience

The committee issued in August, 2003, a new draft of the operating license that includes two major changes:

- To include a valid period of the operating license by 10 years
- To require a formal periodic safety review to each operating plants

At the end of 2003 the Board of Directors of the Regulatory Body approved the draft document and the new license to be applied for Atucha I was put in practice on December, 2003. The same procedure was initiated in 2004 for Embalse nuclear power plant and it is expected to put in practice the new licence at the end of 2004.

ARTICLE 8
REGULATORY BODY

8.1 Functions and Competence of Regulatory Body

As it was stated in the first National Nuclear Safety Report Act No 24,804, 1997 or "National Law of Nuclear Activity", sets that the Nuclear Regulatory Authority (Regulatory Body) is in charge of the regulation and surveillance of nuclear activity concerning radiological and nuclear safety, physical protection and safeguards. On Sept. 1998 Act 25,018 -Radioactive Waste Management Regime- came into force.

The Regulatory Body, as an independent public sector agency ("de facto" and "de Jure") since many years ago, under the jurisdiction of the Office of the President of the Nation, is responsible, in accordance with section 7 of the Law, for the regulation and supervision of nuclear activities in all matters related to nuclear and radiological safety, physical protection and control of the use of nuclear materials, licensing and surveillance of nuclear facilities and international safeguards. The Law provides that the regulation and surveillance of the nuclear activity on such matters is "subject to national jurisdiction". The Regulatory Body is also responsible for advising the Executive on issues under its purview.

8.2 Regulatory Body Organizational Structure and Human Resources

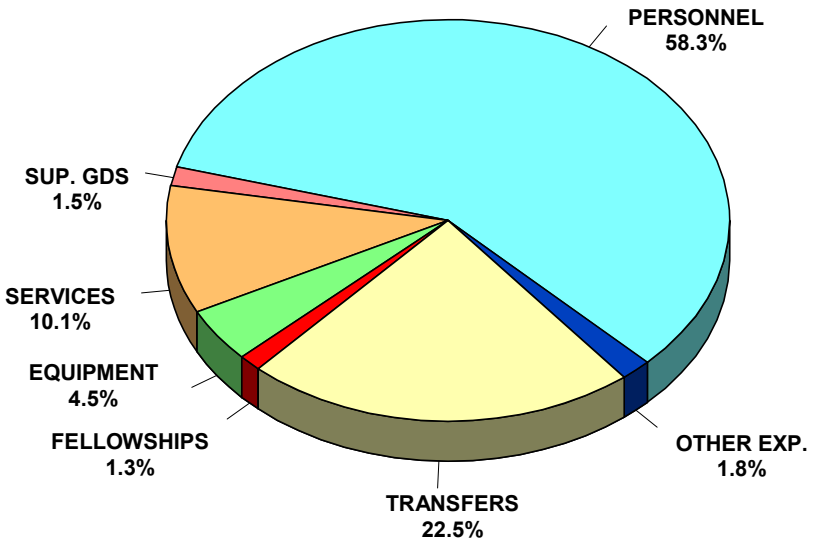
On 2002, after new national authorities had been elected, the Board of Directors of the Nuclear Regulatory Authority has been renewed. Nuclear Regulatory Authority reports directly to the Secretary of the National Presidency. The organizational structure and organization chart remained unchanged. The Regulatory Body is managed by a Board of Directors made up by three members instead of six, a Chairman, a 1st Vice-Chairman and a 2nd Vice-Chairman. The new Board renewal that took place did not alter politics or the actions taken by the Nuclear Regulatory Authority. The Institution keeps the entire support of the governmental authorities

During 2002, 21 technical employment agreements were made and by the end of the year there were 20 fellowships. On the other hand, the Regulatory Body has initiated important governmental negotiations in order to incorporate approximately 100 professionals within a period of 5 year covering different positions among the staff. ARN total personnel is distributed geographically as follows: 68% works at the Regulatory Body main office in the city of Buenos Aires, 26% at the Regulatory Body laboratories at Ezeiza Atomic Centre. Five resident inspectors at the nuclear power

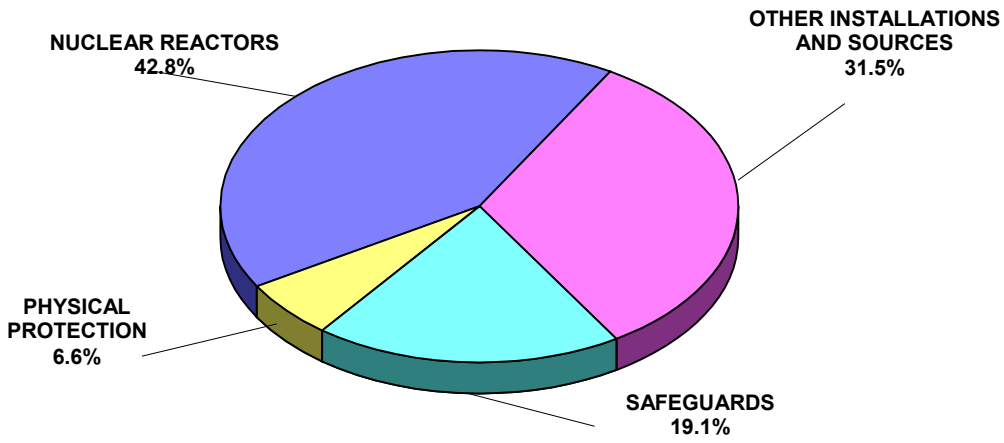
plants, two agents working in a south delegation and six working abroad make up the remaining 6%.

The total budget during 2003 was $21.789.333. Composed by 81% from National Treasury and 19% from annual regulatory fees and goods or resources assigned according to applicable laws and regulations.

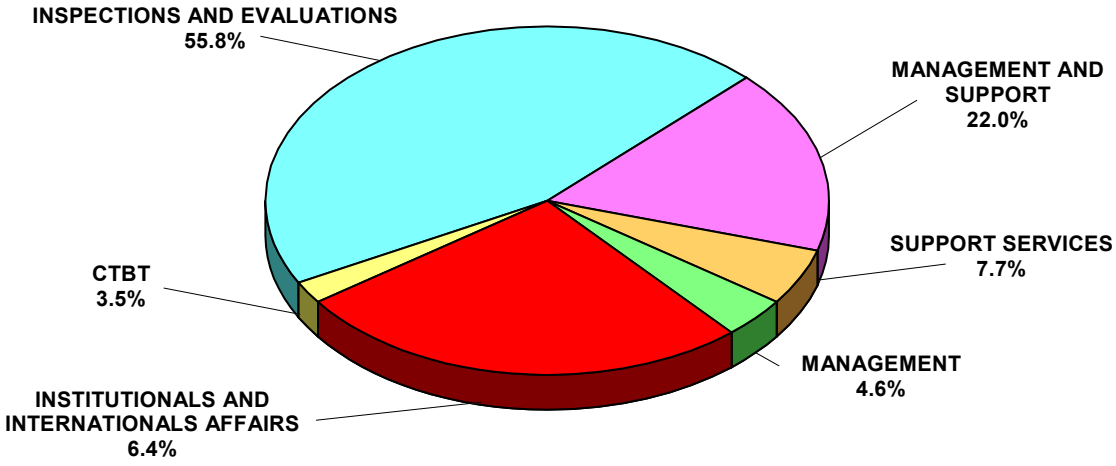
Item	$
1 – Personnel	10.415.301
2 – Support goods	392.208
3 – Services	3.551.661
4 - Equipment	1.307.360
5.1 - Fellowships	261.472
5.9 - Transfers	5.556.280
9. – Other expenses	305.051
TOTAL	**21.789.333**



Several charts showing budget distributions of the work plan for 2003 of expenses according to different criteria. Budget distribution of regulatory tasks in 2003 work plan by type of inspection:



Budget distribution in 2003 work plan by tasks:



8.3 Quality Management System in the Regulatory Body

In the past, some activities were performed in the area of quality management within the Regulatory Body. The Board of Directors decided to stress the development and the implementation plan of such activities during 2002 considering the entire institution. Quality activities were usually involved in the ARN, it was decided to work in this area in a systematic way with the support of external advisors involving the National Technological University of Buenos Aires (UTN-BA). In this direction, an agreement was signed between ARN and UTN-BA. The agreement goal is to obtain a well structured quality management within the ARN focusing external and internal customers and based on the “Continuous Improvement Concept”. ISO 9000, version 2000 and IAEA document PDRP-6 “Quality Management on the regulatory bodies” were the main support documents.

Such quality management implementation and control area will be and independent unit within the structure and will depend of the Board of Directors. This unit is composed by three branches: Internal Audits, Continuous Improvement and Documentation Control.

8.3.1 Major Activities Performed

Specific training to different staff positions based on: ISO standards, IAEA document PDRP-6, quality system tools, working groups, continuous improvement, customer services, group of facilitators, internal communication, workshop on performance indicators and documentation control and classification.

- ✓ High level staff
- ✓ Managers
- ✓ Department Heads
- ✓ Division Heads
- ✓ Technical experts
- ✓ Facilitators
- ✓ Support staff
- ✓ Administrative staff
- ✓ Customers services staff

A total amount of 120 training hours to all staff. Continuous Improvement area: several examples were considered as a pilot experience and quality management tools were involved to the improvement groups.

8.3.2 Main Documentation Elaborated

- Quality Policy of ARN, approved by the Board of Directors
- Mission, Goals, functions and Values
- Commitment with the society
- Quality Management Structure
- Quality Management Implementation Plan
- Primary training level
- Quality Manual Structure
- Procedures Manual: Regulatory Procedures: 27 regulatory procedures and instructions
- Administrative Procedures: 30 procedures

The ARN quality management program involves a strong effort of the staff and in particular of high level staff. During 2003 staff training, elaboration of system quality documents and documentation improvements is considered within the quality management system. All necessary resources to provide the implementation plan will be ready at the end of 2004. Until now the experience on implementation such program revealed significant institutional changes.

8.4 Maintaining Competence of the Regulatory Body

In the frame of the National Plan for the Modernization of the Public Sector adopted by the national government, in January, 2003 the ARN signed a special commitment with the Ministers' Chief Cabinet unit named “Program Agreement” with the following strategic goals:

- To maintain and improve the regulatory quality and efficiency; in particular to address the challenge of the gradual lost of specialized human resources with the scientific and technical knowledge required to guarantee the quality of the regulatory decisions and of the control activities.

- To strengthen the institutional view.

Under this agreement, the ARN undertakes to improve its work and the quality of its nuclear regulatory function through the strengthening of its management tools and the readiness to introduce required changes to that end. The Ministers’ Chief Cabinet unit undertakes to support ARN’s activities to facilitate the introduction of the required changes to achieve the above-mentioned goals. This supports includes – inter allia – the approval of administrative decisions oriented to obtain financial aid to improve the quality, integration and management of the regulatory function and the technical assistance to strengthen the ARN institutional image.

Note: The Program Agreement is a commitment undertaken between a governmental institution and the Ministers’ Chief Cabinet unit to modernize the public sector. This agreement comprises the establishment of quantifiable and verifiable results and a flexible system to achieve an improvement in the areas of efficiency, efficacy and quality management (Federal Law 25.512, Regulation of the Public Administration Sector, Art. 5, c).

8.5 Relationship with other Organizations

Relationship between the Nuclear Regulatory Body and other organizations remains the same as far as regulatory activities are concerned. It has continued to participate in the Forum of Ibero-American Nuclear Regulators and the Network of Regulators of Countries with Small Nuclear Programs. Its activity has been particularly intense in the Ibero-American Forum, in the frame of which steps have been taken towards the establishment, with the participation of the IAEA, of a nuclear safety network connecting its members.

The following chart shows the places and dates where the meetings took place:

Forum of Ibero-American Nuclear Regulators	
Mexico	July, 1997
Argentina	May, 1998
Spain	April, 1999
Brazil	November, 1999
Cuba	July, 2000
Argentina	May, 2001
Mexico	May, 2002
Argentina	May, 2003

Network of Regulators of Countries with Small Nuclear Programs	
IAEA	September, 1998
Argentina	October, 1999
Finland	September, 2000
South Africa	October, 2001
Slovak Republic	September, 2002
Hungary	September, 2003

On the other hand, new technical and scientific cooperation agreements between the Nuclear Regulatory Body and other national and international organizations (tables 8.5.1 and 8.5.2) have been subscribed.

Table 8.5.1 – National Organizations

Agreement Counterparts	Agreement Objectives
Cooperation and Training Agreement between the Nuclear Regulatory Body and the Faculty of Engineering, University of Buenos Aires.	Cooperation in the realization of post-graduate courses in radiation safety and the safe use of sources, and in nuclear safety.
Cooperation Agreement for Research and Development Activities between the Nuclear Regulatory Body and the National Counsel for Scientific and Technical Research (CONICET)	Cooperate on the subjects that are their responsability
Cooperation Agreement among the Nuclear Regulatory Body, the National Atomic Energy Commission, the Province of Mendoza's Ministry of the Environments, the San Rafael Municipality and the National University of Cuyo	(Renewal) Studies and assessments related to facilities existing in the San Rafael area.
Cooperation Agreement between the Nuclear Regulatory Body and the Custom General Direction	Cooperate in the education and training of Customs staff in relation to the control of the transfers of radioactive materials and nuclear equipment.
Cooperation Agreement between the Nuclear Regulatory Body and the Argentine Society of Radiation Protection	Cooperation and exchange of experience in their respective areas.

TABLE 8.5.2 – INTERNATIONAL ORGANIZATIONS

AGREEMENT COUNTERPARTS	AGREEMENT OBJECTIVES
Cooperation Agreement between the **Nuclear Regulatory Body** and the **Directorate General for Nuclear Safety and Radiation Protection (DGSNR) of FRANCE (March, 2004)**	Exchange of Technical Information and Co-operation in the Regulation of Nuclear Safety and Radiation Protection.
Cooperation Agreement between the Nuclear Regulatory Body and the National Department of Nuclear Technology (DINATEN) of URUGUAY (June, 2002)	Technical cooperation concerning regulatory aspects in the uses of nuclear energy
Joint Project with the University of Pisa, ITALY and the Universidad del Salvador, Argentina (October, 2001).	Research and development on safety analysis of nuclear installations.

Most of the agreements referred to in previous reports include clauses for its automatic renewal. On the other hand, during the period covered by this NNSR the Arrangement with the Nuclear Regulatory Commission (NRC) of the United States of America for the exchange of technical information and cooperation in regulatory and safety research matters, was extended for a further period of five years (on 08/1/02).

During 2002 an exchange of letters was concluded with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), relative to co-operation mainly addressed to the exchange of experience and information relevant to the regulation of the Australian Replacement Research Reactor being built by an Argentinian company.

Besides, specialists from the Nuclear Regulatory Body participate -as nominated experts- in the following programs and international committees:

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

ARTICLE 9
RESPONSABILITY OF THE LICENSEE

The responsibility of the Licensee was described in detail in the First National Nuclear Safety Report and there have not been any changes about this Article. In particular, it was established the licensee's responsibilities and the control actions applied by the Regulatory body to verify the licensee met its responsibilities. In the Second National Report it was explained the measures taken by the Responsible Organization and the Regulatory body in order to fulfill regulatory requirements issued in relation to the backfitting of Atucha I.

The remaining activities of the backfitting program required for Atucha I nuclear power plant during three planned shutdowns in 2001, 2002 and 2003 were met in timely manner. Additional non safety related activities such as the replacement of the main station transformer were carried out. The backfitting activities implemented within this period are described in Article 6. Such program already finished represents a significant improvement terms of nuclear and radiological safety.

All activities in both nuclear power plants were carried out for the safe operation and their met the requirements established by the mandatory documentation.

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ARTICLE 10
PRIORITY TO SAFETY

The principles and priorities regarding safety were explained in the first National Nuclear Safety Report. The principles and priorities established and described such as, general safety principles, safety policy, safety culture, management attitudes, personnel motivation, regulatory activities and voluntary actions of safety improvements and good practices, remain unchanged.

Safety culture promotion and attitudes evaluation were explained in the second National Report. Additional activities within safety culture were carried out to improve the promotion and the evaluation such as:

- Through its own performance

Evolution and growing up through the years provides evidence that one of the most valuable ways regulators can apply to promote operator's safety culture is the use of regulator's own proficiency, which includes, among others: professionalism, teamwork, organizational and individual commitment with safety culture.

- Relationship regulator – operator

The relationship has been improved using simple approaches such as: Polite and professional attitude in verbal communications, Honest dialogue particularly focused to accomplish safety objectives more than on strict compliance with rules and promoting good practices for high performance in plant activities.

- Evaluating Safety Culture

Direct evaluation: day to day operation follow up is a good approach we use through resident inspectors, some of whose activities to detect early sign of declining safety culture.

Evaluation through follow up of Operating Experience Feedback (O.E.F.) Program: Additionally, safety analysts from the Regulatory Body, applies a different perspective throughout assessments. The main goal to be reached by analysts is the evaluation of the influence of organization and management (organizational factors) in root and direct cause of events.

Some others activities are in progress such as development of a set of Indirect Safety Culture Indicators and improvement of regulators training to deal with "organizational factors" (which are imperative to safe performance in Nuclear Power Plants).

ARTICLE 11
HUMAN AND ECONOMIC RESOURCES OF THE LICENSEE

11.1 Introduction

Period 2001-2003 has been characterized by macroeconomic difficulties which resulted in a recessive process, that reached in 2002 a negative variation of the internal gross product, a strong devaluation of the Argentine peso (after maintaining a parity took place 1$=1 US$ for more than one decade with insignificant values of inflation). The currency devaluation additionally to the maintained recession, have had serious effects, among which we will mention those that affected the electrical market. The devaluation has been followed by a low but sustained inflation, affecting the social economy since the wages stayed practically unvarying.

Because of the risk of hyperinflation (with the consequent social conflicts), the National Government chose - among other measures - to freeze the fares of public services including the electrical generation, in spite of the increase of the costs of generation, as a result of the increase of cost of national provisions and services and, in larger extent, the stranger supplies.

The electrical market migrated then of a remuneration system based on marginal costs to another one of tariffs that only contemplate the minimum costs of generation: fuel, essential manual labor, consumable and maintenance. The freeze up of tariffs also reached the fossil fuel market that also was deregulated like the electrical market. It is important to keep in mind that solid propellants - particularly the natural gas - supplies to 45% of the electrical generation.

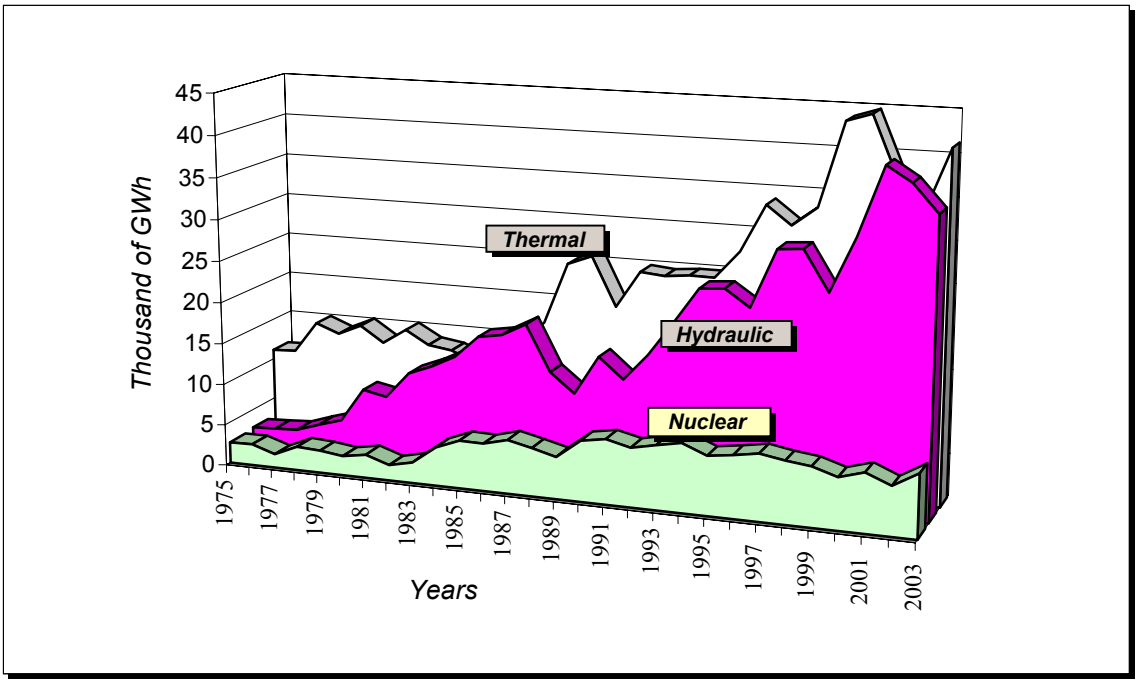
In 2003 a process of economic recovery began, taking the GIP to values of the order of the 6 to 8%, process that even continuous and derive to an increase of the electrical demand from approximately 8 to 10% as well. Despite this increase, wage adjustments did not take place, to avoid negative consequences in the economic growth.

With the purpose of avoid a continuous declining of purchasing power to the population, the increases of the tariffs of the services were below the increase of the generation costs. The difference between the real costs of generation and the applied tariffs have been assumed by the National Government using different methods of mitigation of its effects.

In spite of the lack of investment, the increase of the electrical demand was covered with the excess of reserve of the system, avoiding the shortage of the electrical supply.

However, by the end of the 2003 and beginnings of the 2004, some restrictions to the electrical demand have been applied because of fall of hydro energy, together with a sudden increase of natural gas in industrial uses.

In the attached graphs the electrical generation for years 2001, 2002 and 2003, discriminated in hydroelectric, thermal and nuclear one and the respective installed power.



11.2. Nucleoelectric Generation

In spite of the tariffs framework of recognition of minimum costs, the generation of nuclear origin was not affected. The production goals were fulfilled, taking place all the programmed maintenance, completed improvements and changes of design for update of the facilities (example Second Heat sink and reactor internal components, both in ATUCHA I, see Article 6).

Also it was continued with the qualification programs and retraining of the operation personnel and stayed the technical, administrative and professional staff of both power stations and administrative technical support as it is appraised in the attached table.

In summary, in spite of the economic difficulties that the State undergo, the nuclear electric generation maintained its quality level both in the security and availability of the power stations, giving fulfillment to all the regulatory requirements.

11.3. Electrical Generation and Economics

11.3.1 Total Electrical Generation. Period 2001 - 2003

In the following graphs the total electrical generation is appraised discriminated by type of source: thermal, hydro and nuclear

11.3.2 Nuclear generation 2001, 2002, 2003

PERFORMANCE

	2001	2002	2003
Gross Energy (MWh)	7.058.638	5.820.814	7.566.289
load factor (%)	80.18	66.12	85.94
Installed Nuclear Power (%)	4.65	4.43	4.40
Generated Nuclear Power (%)	8.33	7.49	9.02

ENERGY FEES (ANNUAL AVERAGE IN $/MWH)

Year	2001	2002	2003
Value	18.94	22.70	29.96

Human resources:

Personnel 2001, 2002, y 2003 by work area and specific knowledge

	Año	CNA I	CNA II	CNE	MAIN BRANCH	TOTAL
Professionals	2001	86	41	86	112	325
	2002	84	38	83	119	324
	2003	83	35	81	119	318
Technicians	2001	308	80	350	82	820
	2002	309	73	345	97	824
	2003	306	72	344	96	818
Administratives	2001	30	50	43	48	171
	2002	28	49	42	74	193
	2003	27	48	41	73	189
Total	2001	424	171	479	242	1316
	2002	421	160	470	290	1341
	2003	416	155	466	288	1325

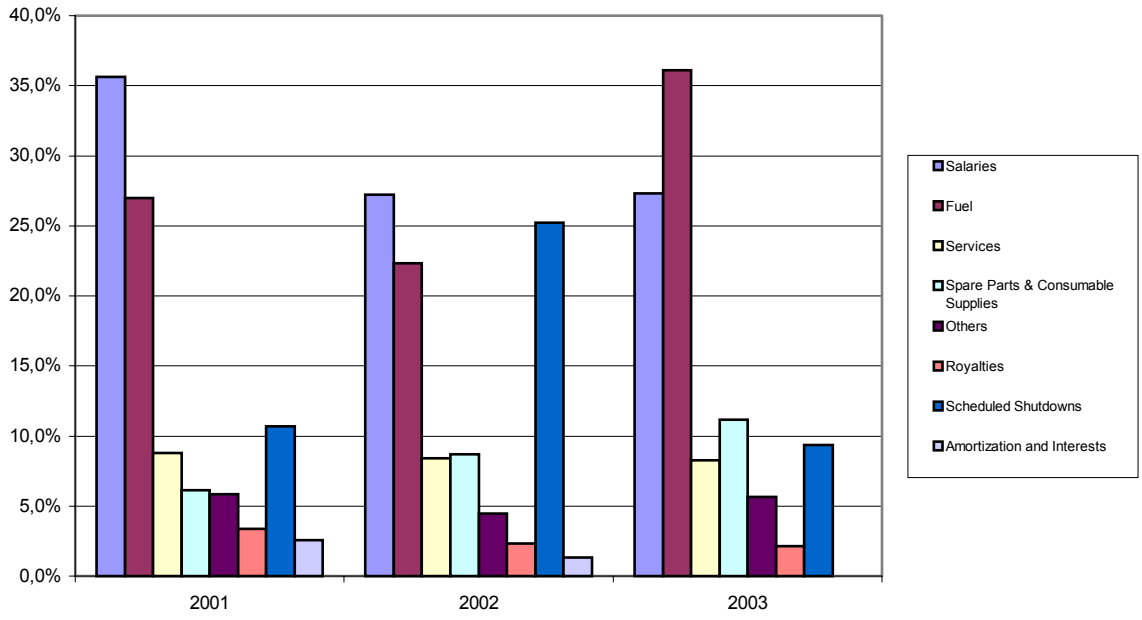
Current Expenses. 2001, 2002, 2003

Evolution of O&M costs ($ x 1000000) period 2001 – 2003

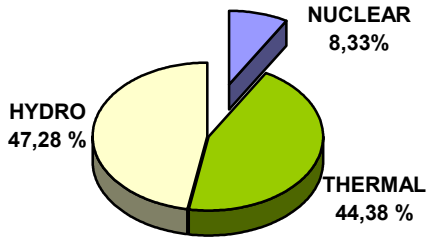
TITLE/YEAR	2001	2002	2003
SALARIES	39.0	41.3	45.9
FUEL	29.5	33.9	60.7
SERVICES	9.6	12.8	13.9
SPARE PARTS AND CONSUMABLE SUPPLIES	6.7	13.2	18.8
OTHERS	6.4	6.8	9.5
ROYALTIES	3.7	3.5	3.6
SCHEDULED SHUTDOWNS	11.7	38.3	15.7
AMORTIZATION AND INTERESTS	2.8	2.0	0.0
TOTAL	**109.4**	**151.8**	**168.1**

Note: taxes are not included

Evolution of O&M Costs (excluding taxes

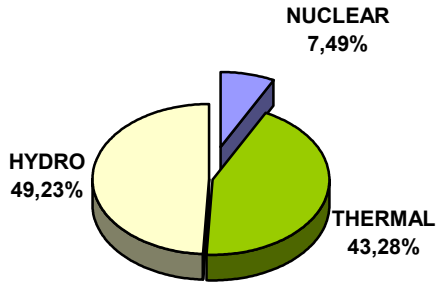


GROSS ENERGY GENERATED 2001



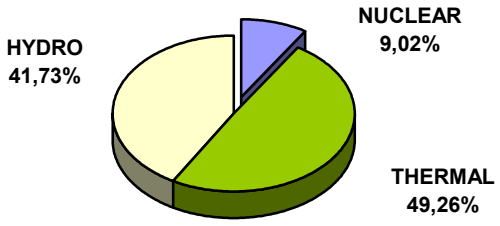
NUCLEAR	**7058,60**	**GWhe**
THERMAL	37.601,7	GWhe
HYDRO	40.057,5	GWhe
TOTAL	84.717,8	GWhe

GROSS ENERGY GENERATED 2002



NUCLEAR	**5.820,8**	**GWhe**
THERMAL	33.629,4	GWhe
HYDRO	38.259,8	GWhe
TOTAL	77.710,0	GWhe

GROSS ENERGY GENERATED 2003



NUCLEAR	**7.566,3**	**GWhe**
THERMAL	41.334,2	GWhe
HYDRO	35.014,1	GWhe
TOTAL	83.914,6	GWhe

ARTICLE 12
HUMAN FACTORS

The human factors were discussed in detail in the previous National Reports. Methods to prevent, detect and correct the occurrence of events related with human factors are being used in the Operating Organization. In this sense, different methodologies are used by both the Responsible Organization and the Regulatory Body to detect both human factors and organizational deficiencies as “root causes” and “contributing causes” of analyzed events as part of Operational Experience Feedback Program. Additionally, PSAs carried out for Atucha I and Embalse shown that human corrective actions were necessary to be considered in order to ensure that the capabilities and limitations of human performance were taken into account in the procedures for normal and abnormal operation.

ARTICLE 13
QUALITY ASSURANCE

As it was stated in the previous reports based in the regulations Argentine Nuclear Power Plants in operation or in construction have quality assurance programs that are documented, implemented, revised and evaluated by the Plant Management. The frame or these specific programs is the General Quality Assurance Program of the Responsible Organization.

The General Quality Assurance Manual was reviewed recently. The revision 1 incorporates a new Quality Police approved by the Responsible Organization Directory. Actually, the organization units are adapting its specific manuals in accordance with this revision.

The General Quality Assurance Manual revision 1 fulfills the requirements of Regulatory Standard AR 3.6.1, revision 2, 2002, and IAEA Practice Code 50-C-Q. Table 13.1 shows the state of the Quality Assurance General Program updated on July, 2004.

TABLE 13.1

ORGANIZATION UNIT	DOCUMENT	REVISION	PROCEDURE NUMBER
NASA	Quality Assurance General Manual	Revision 1 Updated	General Procedures 14
CNAI	Quality Assurance Manual for the Operation	Revision 2 Updated (in review)	200
CNE	Quality Assurance Manual for the Operation	Revision 4 Updated (in review)	460
CAN II	Quality Assurance Manual for the Construction	Revision 2 Updated (in review)	60
Engineering and Support Services	Services Dept. Quality Assurance Manual	Revision 4 Updated (in review)	150
Engineering and Support Services	Engineering Dept. Quality Assurance Manual	Revision 0 Updated (in review)	14

The evaluation of the Program implementation at the Plants is the Quality Assurance Divisions responsibility, reporting the results of both units to the Manager. On the other hand, the Quality Assurance Department is the responsible for the evaluation of the Installations General and Specific Programs implementation. Periodically, the mentioned Divisions write down reports including the results of the audits and surveillance, which are sent to the Installation Manager and the Responsible Organization General Manager. The audit results of the Atucha I Nuclear Plant are also informed to the Regulatory Body in accordance with a new requirement included in the Operation License.

Figures 13.1 y 13.2 show updated and approved organization charts of Atucha I and Embalse nuclear power plants. The organization chart of Atucha I unit was recently reviewed. Both organization charts have similar structures.

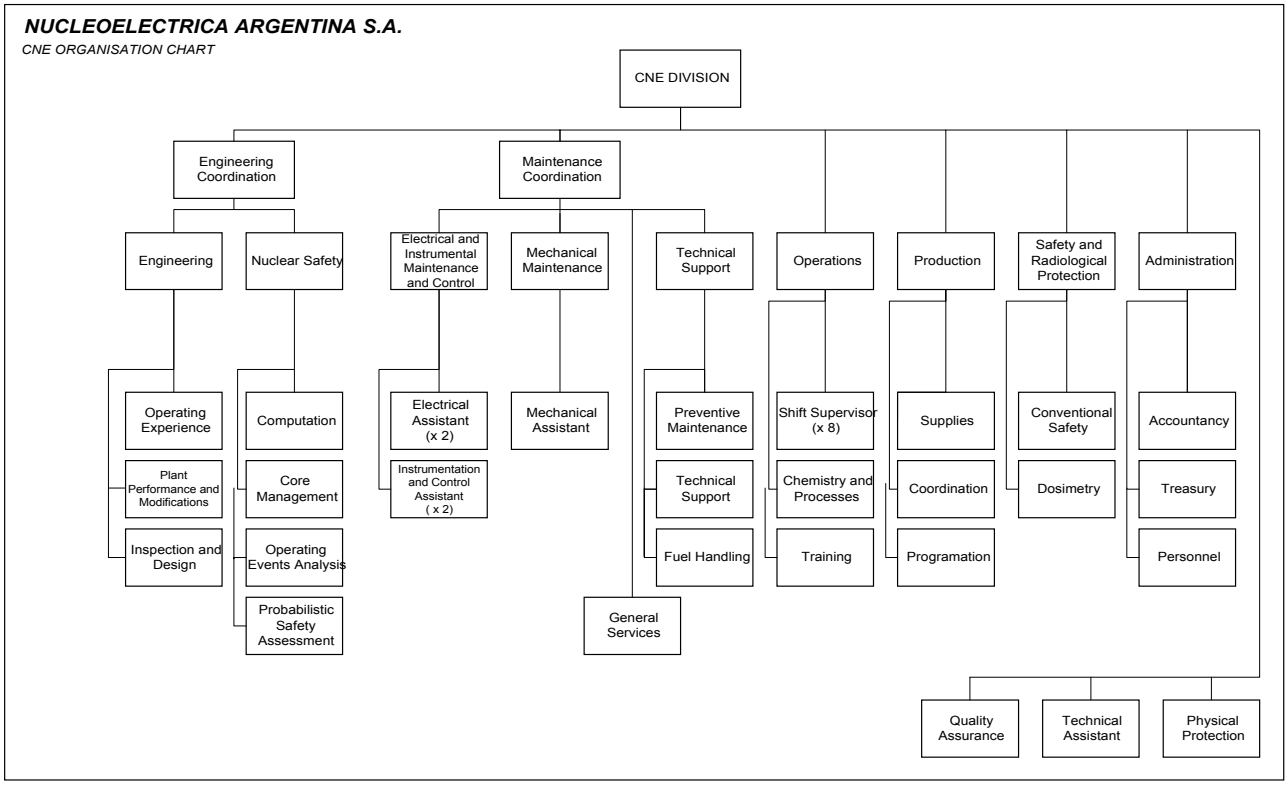


Figure 13.1

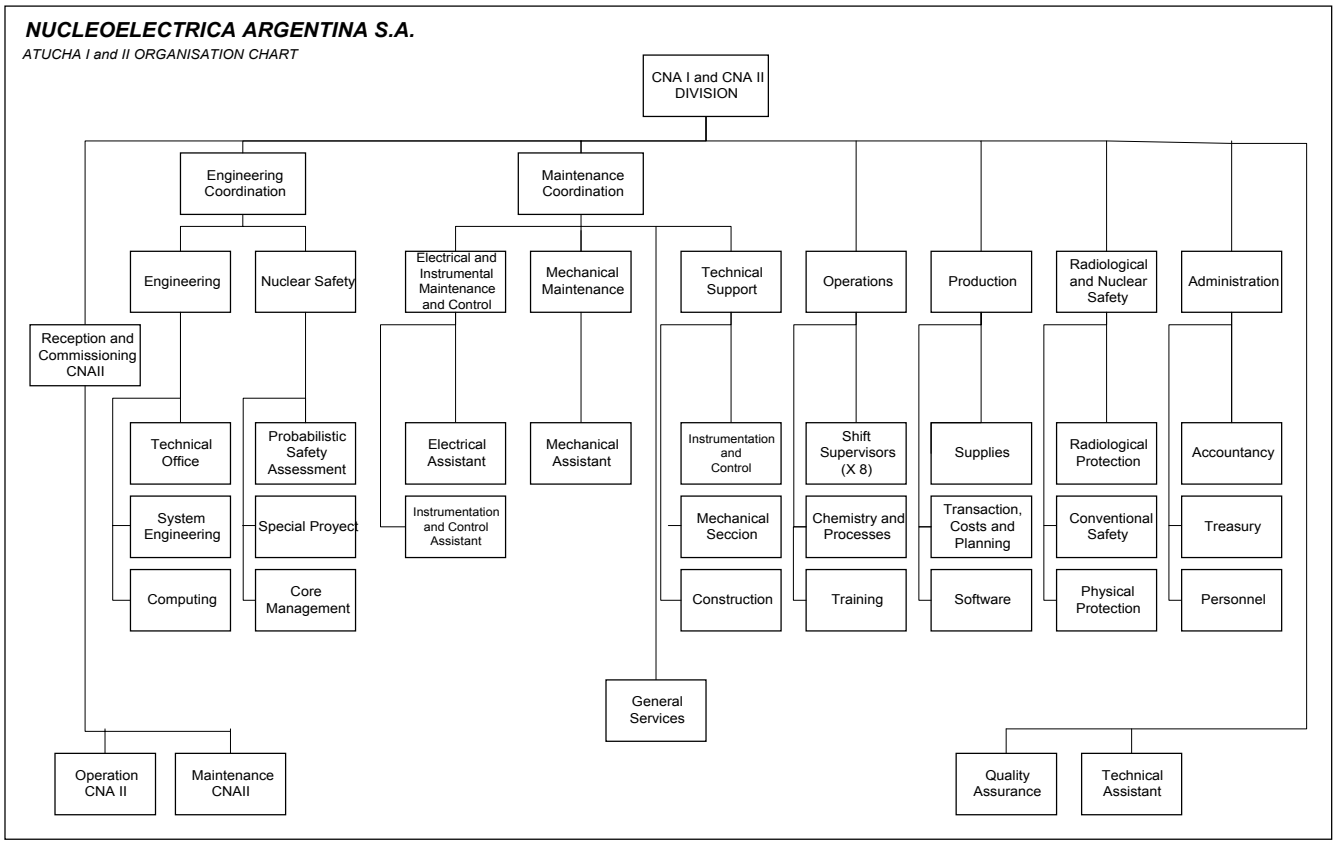

NUCLEOELECTRICA ARGENTINA S.A.
ATUCHA I and II ORGANISATION CHART
CNA I and CNA II DIVISION
Engineering Coordination
Maintenance Coordination
Engineering
Nuclear Safety
Electrical and Instrumental Maintenance and Control
Mechanical Maintenance
Technical Support
Operations
Production
Radiological and Nuclear Safety
Administration
Reception and Commissioning CNAII
Technical Office
Probabilistic Safety Assessment
Electrical Assistant
Mechanical Assistant
Instrumentation and Control
Shift Supervisors (X 8)
Supplies
Radiological Protection
Accountancy
System Engineering
Special Proyect
Instrumentation and Control Assistant
Mechanical Seccion
Chemistry and Processes
Transaction, Costs and Planning
Conventional Safety
Treasury
Computing
Core Management
Construction
Training
Software
Physical Protection
Personnel
General Services
Operation CNA II
Maintenance CNAII
Quality Assurance
Technical Assistant

FIGURE 13.2

ARTICLE 14
ASSESSMENT AND VERIFICATION OF SAFETY

The safety assessment of both nuclear power plants, inspections and audits were detailed in the previous National Nuclear Safety Reports by the Regulatory Body and the Responsible Organization. In this report the main safety assessment efforts were explained in detail within Article 6.

14.1 Ageing

The Ageing Management Program required by the Regulatory Body with the objective of maintaining the safety of the nuclear power plants lifetime by optimizing the inspection and maintenance programs, replacing parts and ageing monitoring, prevention and mitigation was described in detail in the previous national reports. There have been no major changes. However, the Responsible Organization proposed to the Regulatory Body to include the Ageing Management Program within a Life Management Program to analyze the extent current NPP operation for both Atucha I and Embalse NPP considering that the safety of the plant is an absolutely necessary but not sufficient condition of the life extension. Such program consists in an integration of ageing management and economic planning to maintain the safety level and maximize return of investment over the service life of the plants.

As a result of the Ageing Management Program application during the considered period, the following activities were performed:

14.1.1 Atucha I Nuclear Power Plant

The major ageing analysis for Atucha I was included within the backfitting program detailed (see Article 6). The main issues were fuel channels, control rods, reactor pressure vessel, control rods tube guides, I & C, high pressure injection system and residual heat removal system.

Additionally, during each planned outage 100% of the steam generators tubes are inspected. Since the beginning of the plant operation approximately 89 tubes (2.2%) of steam generator #1 and 117 tubes (2.97%) of steam generator #2 have been plugged.

14.1.2 Embalse Nuclear Power Plant

14.1.2.1 Pressure Tubes:

Up to now 253 pressure tubes (66% of the whole number) have been repositioned and 124 pressure tubes (34% of the whole number) remain to be inspected. Inspections were performed according to CAN/CSA - N 285.4 - 94 Canadian Standard. Additionally to the mentioned in Article 6, it was carried out a nozzle inspection to the shutdown system #2 to follow-up the existing gap among the 6 nozzles and the calandria tubes in order to verify any potential freeting by contact getting good results.

14.1.2.2 Feeders:

During the planned outage 2002, 107 feeders were inspected. From 235 feeders inspected since 1989, all of then would have a lifetime higher than 25 years. The main contributors to such performance is the chemical control to the primary heavy water.

14.1.2.3 Steam Generators:

During each planned outage 100% of the tubes that belong to one steam generator are inspected. Since the beginning of the plant operation approximately 22 tubes on each steam generator have been plugged. On the other hand, during last years it has been detected flow assisted corrosion on the tube plate in the U-bend zone as a consequence of the feed water flow. During 2004 planned outage three special supports were installed instead of the scallop bars to minimize vibrations and freeting.

14.1.2.4 Moderator Heat Exchangers

A special design modification was carry out in the moderators heat exchangers consisting on helicoidal tubes separators to avoiding vibrations reducing freeting and as a consequence the number of tubes to be plugged. During the last planned outage only seven tubes were plugging. Since the beginning of the plant operation approximately 100 tubes on each steam generator have been plugged.

14.2 Regulatory Plant Safety Indicators

From 1998 safety indicators data were collected and evaluated as was explained in the previous reports. Until 2002, the indicators evaluation was made throughout the analysis of changes on their behaviour, but there were not acceptability criteria.

In order to establish thresholds or acceptability values for performance indicators was necessary to analyze historical data, but getting historical data was not possible for most of the indicators at the beginning of the program. Statistics was made for those indicators that have been reported in the past (outages, power reductions, dose, training, wastes and effluents), but such method was not applicable for indicators in areas like maintenance or repetitive tests.

In 2002 frequency distributions of each indicator were made using the data collected since 1998. From these distributions an acceptability criteria were defined and a pilot implementation was initiated for validation. As a result of the pilot implementation experience, evaluation criteria were changed.

Thresholds for indicators of each plant were calculated separately because plants performance is not compared.

Validation or modification of the defined limits is a continuous task. Some indicators have an almost constant value along the time and good operational conditions are observed so this value could be considered as an acceptable reference value. However, it is difficult to define an optimum, acceptable or unacceptable value. Even for indicators for which regulatory limits are applicable, they can not be used as a threshold because the historical values of the indicators are below those limits.

ARTICLE 15
RADIOLOGICAL PROTECTION

There has not been any change in the general criteria and standards used in Radiological Protection in Argentina.

15.1 Atucha I Nuclear Power Plant

15.1.1 Radioactive releases into the environment

The limits of the environmental releases of Atucha I nuclear power plant have been modified in January, 2004, due to the update in dose assessment model and parameters

Table 15.1 - Authorised gaseous discharge limits for Atucha I

NUCLEID	K_i (TBQ)
Ar-41	1×10^{3}
Ba-140	4×10^{0}
Co-60	8×10^{-2}
Cs-134	1×10^{-1}
Cs-137	6×10^{-2}
H-3	1×10^{4}
I-131	5×10^{-2}
Kr-85m	1×10^{4}
Kr-87	1×10^{3}
Kr-88	1×10^{3}
Ru-103	1×10^{0}
Ru-106	7×10^{-2}
Sb-122	3×10^{1}
Sb-124	2×10^{0}
Sr-89	5×10^{-1}
Sr-90	6×10^{-3}
Xe-133	6×10^{4}
Xe-135	8×10^{3}

Table 15.2 - Authorised liquid discharge limits for Atucha I

NUCLEID	K_i (TBq)
Ag-110m	5×10^{1}
Ba-140	1×10^{2}
Ce-144	4×10^{1}
Co-58	2×10^{2}
Co-60	8×10^{0}
Cr-51	8×10^{3}
Cs-134	2×10^{0}
Cs-137	3×10^{0}
Fe-59	8×10^{1}
H-3	2×10^{4}
I-131	1×10^{1}
Mn-54	1×10^{2}
Ni-65	4×10^{3}
Ru-103	4×10^{2}
Ru-106	3×10^{1}
Sb-122	2×10^{2}
Sb-124	1×10^{2}
Sb-125	8×10^{1}
Sr-89	9×10^{1}
Sr-90	1×10^{1}
Transuránidos	4×10^{0}
Zn-65	2×10^{1}
Zr-95	1×10^{2}

The gaseous radioactive releases to the environment due to Atucha I nuclear power plant operation in the period 2001-2003 may be observed in Table 15.3, discriminating those corresponding to I-131, H-3, aerosols and noble gases; it also includes an estimation of C-14 discharge.

Table 15.3 - Activity released from Atucha I to the environment as gaseous discharges

Year	I-131 (TBq)	Tritium (TBq)	Aerosols (TBq)	Nobles Gases (TBq)	C-14 (TBq)
2001	$2{,}8 \times 10^{-5}$	$8{,}5 \times 10^{2}$	$9{,}2 \times 10^{-6}$	$4{,}9 \times 10^{1}$	$2{,}9 \times 10^{-1}$
2002	$1{,}2 \times 10^{-5}$	$9{,}7 \times 10^{2}$	$6{,}3 \times 10^{-6}$	$2{,}1 \times 10^{1}$	$2{,}1 \times 10^{-1}$
2003	$1{,}3 \times 10^{-4}$	$1{,}3 \times 10^{3}$	$5{,}6 \times 10^{-6}$	$2{,}3 \times 10^{2}$	$4{,}1 \times 10^{-1}$

The liquid radioactive releases to the environment by Atucha I nuclear power plant during the same period are presented in Table 15.4, discriminating between liquid discharges of H-3 and gamma emitters.

The 95% of the total average discharge from Atucha I nuclear power plant to the environment correspondeds to tritium. Comparing these average discharges with the respective annual authorised discharge limits, it is observed that they did not exceed 10% of such limits.

TABLE 15.4 - ACTIVITY RELEASED FROM ATUCHA I TO THE ENVIRONMENT AS LIQUID DISCHARGES

YEAR	TRITIUM (TBQ)	OTHER RADIONUCLEIDS (TBQ)
2001	$1,5 \times 10^{3}$	$5,3 \times 10^{-1}$
2002	$8,7 \times 10^{2}$	$3,9 \times 10^{-1}$
2003	$1,3 \times 10^{3}$	$4,8 \times 10^{-1}$

The activity released from Atucha I to the environment as liquid discharges were increased during 2003 due to heavy water leakages through the fuel channels during the massive channel replacement (see Article 6). Corrective actions were taken on December, 2003.

15.1.2 Public Exposure

The annual average dose to the critical group due to Atucha I nuclear power plant operation, during the period 2001-2003, was lower than 2% of the established individual dose constraint. Gaseous discharges were the main contributor (see 15.1.1)

The annual dose values to the critical group for the period 2001-2003 are shown in Table 15.5, discriminated according to the discharge type.

TABLE 15.5 - CRITICAL GROUP INDIVIDUAL DOSE FOR ATUCHA I

YEAR	GASEOUS DISCHARGES DOSES (MSV)	LIQUID DISCHARGES DOSES (MSV)	TOTAL DOSES (MSV)
2001	$3,2 \times 10^{-3}$	$7,2 \times 10^{-4}$	$3,9 \times 10^{-3}$
2002	$3,8 \times 10^{-3}$	$3,9 \times 10^{-4}$	$4,2 \times 10^{-3}$
2003	$6,1 \times 10^{-3}$	$7,1 \times 10^{-4}$	$6,8 \times 10^{-3}$

The collective effective dose normalised per unit of electric energy generated $(GW_{(e)}\ y)^{-1}$, is presented in Table 15.6, calculated with population data up to a radius of 2000 km from the nuclear power plant.

TABLE 15.6 - REGIONAL NORMALISED COLLECTIVE EFFECTIVE DOSE FOR ATUCHA I

YEAR	GASEOUS DISCHARGES DOSES (MAN SV/GWA)	LIQUID DISCHARGES DOSES (MANSV /GWA)	TOTAL DOSES (MANSV/GWA)
2001	$7,2 \times 10^{-1}$	$2,1 \times 10^{0}$	$2,8 \times 10^{0}$
2002	$1,1 \times 10^{0}$	$1,8 \times 10^{0}$	$2,9 \times 10^{0}$
2003	$8,1 \times 10^{-1}$	$1,2 \times 10^{0}$	$2,0 \times 10^{0}$

The average collective effective dose per unit of electric energy generated, calculated with population data up to a radius of 2000 km from the Atucha I nuclear power plant nuclear power plant, for the period 2001-2003, represented 17% of the collective effective dose constraint per unit of electric energy generated set by the Regulatory Body in 15 [man Sv $(GW_{(e)}\ y)^{-1}$].

Besides, the average collective effective dose per unit of electric energy generated due to radionuclides of global distribution, was 2,5 [man Sv (GW(e) y)-1] for tritium and 39 [man Sv (GW(e) y)-1] for C-14 for the period 2001-2003. The update of the global dosimetric factor for tritium releases contributed to the increase in the collective dose value. Those collective effective doses correspond to the incomplete effective dose commitment integrated over the expected duration of the practice (500 years).

The average normalised collective effective dose for the period 2001-2003, due to C-14 releases is higher than the collective effective dose constraint per unit of electric energy generated established in Standard 3.1.2. This is due to the fact that Atucha I nuclear power plant initiated its operation before the above mentioned standard was in force.

15.2 EMBALSE NUCLEAR POWER PLANT

15.2.1 Radioactive Releases into the Environment

The Regulatory Body authorised a set of gaseous and liquid discharge limits, contained in the plant operating license and shown in Tables 15.7 and 15.8 respectively. For critical group doses, these limits were set much lower than 0.3 mSv.

TABLE 15.7 - AUTHORISED GASEOUS DISCHARGE LIMITS FOR EMBALSE

NUCLEID	K_i (TBQ)
Ar-41	$7,4 \times 10^{3}$
Kr-85m	$3,7 \times 10^{4}$
Kr-87	$7,4 \times 10^{3}$
Kr-88	$3,7 \times 10^{3}$
Xe-133	$1,9 \times 10^{5}$
Xe-135	$3,7 \times 10^{4}$
H-3	$3,7 \times 10^{4}$
I-131	$2,2 \times 10^{1}$
Co-58	$3,7 \times 10^{1}$
Co-60	$3,7 \times 10^{-1}$
Sr-89	$1,1 \times 10^{2}$
Sr-90	$3,7 \times 10^{0}$
Ru-106	$1,5 \times 10^{0}$
Cs-134	$1,5 \times 10^{0}$
Cs-137	$3,7 \times 10^{-1}$
Ba-140	$1,5 \times 10^{2}$

Table 15.8 - Authorised liquid discharge limits for Embalse

NUCLEID	K_i (TBq)
H-3	$3,7 \times 10^{3}$
Cr-51	$3,7 \times 10^{2}$
Mn-54	$7,4 \times 10^{-1}$
Fe-59	$3,7 \times 10^{1}$
Co-60	$1,5 \times 10^{-1}$
Zn-65	$7,4 \times 10^{-2}$
Ni-65	$7,4 \times 10^{3}$
Sr-89	$3,7 \times 10^{0}$
Sr-90	$1,5 \times 10^{-1}$
Zr-95	$1,9 \times 10^{0}$
Ru-103	$3,7 \times 10^{0}$
Ru-106	$1,5 \times 10^{-1}$
Ag-110m	$1,1 \times 10^{0}$
Sb-125	$1,1 \times 10^{0}$
I-131	$1,9 \times 10^{-1}$
Cs-134	$3,7 \times 10^{-2}$
Cs-137	$3,7 \times 10^{-2}$
Ba-140	$1,1 \times 10^{1}$
Ce-144	$1,9 \times 10^{-1}$
Gd-153	$3,0 \times 10^{1}$

The gaseous radioactive releases by Embalse to the environment, for the period 2001-2003 may be seen in Table 15.9, discriminating those corresponding to I-131, H-3, aerosols and noble gases, and including an estimation of C-14 discharges.

Table 15.9 - Activity released from Embalse to the environment as gaseous discharges

Year	I –131 (TBq)	Tritium (TBq)	Aerosols (TBq)	Nobles Gases (TBq)	C –14 (TBq)
2001	$0,0 \times 10^{0}$	$2,4 \times 10^{2}$	$0,0 \times 10^{0}$	$4,6 \times 10^{1}$	$4,9 \times 10^{-1}$
2002	$0,0 \times 10^{0}$	$2,7 \times 10^{2}$	$0,0 \times 10^{0}$	$2,4 \times 10^{1}$	$4,2 \times 10^{-1}$
2003	$0,0 \times 10^{0}$	$2,6 \times 10^{2}$	$0,0 \times 10^{0}$	$7,2 \times 10^{1}$	$4,8 \times 10^{-1}$

Note: The value "0" means lower than the minimum detectable level

The liquid discharges released by Embalse to the environment for the same period are presented in Table 15.10, discriminating between liquid discharges of H-3 and gamma emitters.

Table 15.10 - Activity released from Embalse to the environment as liquid discharges

Year	Tritium (TBq)	Other radionuccleids (TBq)
2001	$8,0 \times 10^{1}$	$1,2 \times 10^{-3}$
2002	$6,9 \times 10^{1}$	$1,6 \times 10^{-3}$
2003	$1,1 \times 10^{2}$	$1,8 \times 10^{-3}$

The 88% of the total average discharge from Embalse to the environment corresponds to tritium. These average discharges were less than 3% of the annual authorised discharge limit. The activity released from Embalse to the environment as liquid discharges were increased during 2003 due to steam generators tube failures whose corrective actions were taken at the end 2003.

15.2.2 Public Exposure

The annual critical group doses due to Embalse operation during the period 2001-2003, are presented in Table 15.11, discriminated according to discharge type. The annual average critical group doses due to Embalse operation, for the period 2001-2003 resulted lower than 1% of the established individual dose constraint. The liquid discharges were the main contributor (see 15.2.1).

Table 15.11 - Critical group individual dose for Embalse

Year	Gaseous discharges Doses (mSv)	Liquid discharges Doses (mSv)	Total Doses (mSv)
2001	$1,3 \times 10^{-4}$	$1,9 \times 10^{-3}$	$2,0 \times 10^{-3}$
2002	$1,4 \times 10^{-4}$	$1,7 \times 10^{-3}$	$1,8 \times 10^{-3}$
2003	$1,9 \times 10^{-4}$	$2,3 \times 10^{-3}$	$2,5 \times 10^{-3}$

The collective effective dose normalised per unit of electric energy generated is presented in Table 15.12, calculated with population data up to a radius of 2000 km from the nuclear power plant.

Table 15.12 - Regional normalised collective effective dose for Embalse

Year	Gaseous Discharges Doses (manSv/GWa)	Liquid Discharges Doses (manSv/GWa)	Total Doses (manSv/GWa)
2001	$1,2 \times 10^{-2}$	$7,2 \times 10^{-2}$	$8,4 \times 10^{-2}$
2002	$1,5 \times 10^{-2}$	$7,4 \times 10^{-2}$	$8,9 \times 10^{-2}$
2003	$1,4 \times 10^{-2}$	$9,9 \times 10^{-2}$	$1,1 \times 10^{-1}$

The average collective effective dose per unit of electric energy generated, calculated with population data up to a radius of 2000 km from Embalse nuclear power plant, for the period 2001-2003, represented less than 1% of the collective effective dose constraint per unit of electric energy generated.

The average collective effective dose per unit of electric energy generated due to radionuclides of global distribution, was 0.1 [man Sv $(GW_{(e)}\ y)^{-1}$] for tritium in the period 2001-2003 and 18 [man Sv $(GW_{(e)}\ y)^{-1}$] for C-14 in the same period. Those collective effective doses correspond to the truncate effective dose commitment integrated over the expected duration of the practice (500 years).

The average normalised effective collective dose for the period 2001-2003, due to C-14 releases is a bit higher than the collective effective dose constraint per unit of electric energy generated established in Standard 3.1.2 due to the fact that Embalse´s design was finished before the above mentioned standard was in force.

15.3 Occupational Exposure

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

AR 3.1.1 standard sets different criteria to ensure that the occupational dose to workers is as low as reasonably achievable and lower than the established dose constraints, and that the protection is optimised.

The Regulatory Body requires that whenever possible, radiological protection shall be achieved using installation systems rather than operational procedures.

Each nuclear power plant operating license sets the following conditions for workers:

1. Personnel working in a controlled area must be submitted to individual monitoring and annual medical surveillance.
2. It must be monthly recorded occupational dose due to:
   - External exposure.
   - Intake of radioactive material in this period.

- These records must contain the following information:
  - Individual dose.
  - Collective effective dose resulting from the development of different maintenance, repairing and operation tasks.

- The Primary Responsible must keep the mentioned records for at least thirty years after the end of service of the involved personnel.

15.3.1 Dose Limits to Workers

According to what standard AR 10.1.1 establishes, it is considered that dose limits have not been exceeded when the following conditions are fulfilled:

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

and

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

where:

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

L_{DT} is the limit of equivalent dose in skin or the lens of the eye

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

I_j is the incorporation value of nuclide *j* durig a yea,

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

15.3.1.1 Occupational Dose in Atucha I Nuclear Power Plant

In Atucha I nuclear power plant, Co-60 deposits and activated corrosion products have been contributing with more than 60% to the occupational dose due to external exposure. For this reason, the Regulatory Body has forbidden the use of cobalt alloys in the primary circuit components, and consequently, a total replacement of fuel element channels has been carried out in Atucha I nuclear power plant (see Section 6.2.1.3) and in Atucha II nuclear power plant, now at the construction stage, there is no use of cobalt alloys in primary circuit components. This is a clear example of operational experience feedback.

The collective effective dose, the normalised collective effective dose and the average individual effective dose received by workers in Atucha I nuclear power plant during the period 2001-2003, are presented in Table 15.13.

Table 15.13 - Occupational Dose in Atucha I

Year	Collective Effective Doses (manSv)	Normailzed Collective Effective Doses (manSv/GWa)	Mean Effective doses (mSv)
2001	11,8	68	12
2002	11,3	92	10
2003	2,8	11	5

The finalization of the backfitting program (see Article 6), in particular the activities performed on the reactor internals, is reflected in the pronounced decrease of the collective dose in Atucha I nuclear power plant during 2003.

15.3.1.2 Occupational Dose in Embalse Nuclear Power Plant

The collective effective dose, the normalised collective effective dose and the average individual effective dose received by Embalse nuclear power plant workers during the period 2001-2003 are presented in Table 15.14.

Occupational doses in Embalse nuclear power plant are lower than those recorded in Atucha I nuclear power plant due to the before mentioned contribution of Co-60, to the technological differences between both nuclear power plants as well as to the longer operation period of Atucha I nuclear power plant compared to Embalse nuclear power plant.

Table 15.14 - Occupational Dose in Embalse

Year	Collective Effective Doses (manSv	Normailzed Collective Effective Doses (manSv/GWa)	Mean Effective Doses (mSv)
2001	0,5	1	1,0
2002	4,6	9	5,0
2003	1,3	2	1,9

ALARA Activities

ALARA activities has been stressed and reinforced during last years taking into account the amount of tasks involved in the backfitting program for Atucha I.

It has been introduced ALARA improvements such as reinforced mock-ups training, improving tools and a task planning carefully analyzed. Additional shielding to work within special areas and an improved and a strict personnel control have been carried out.

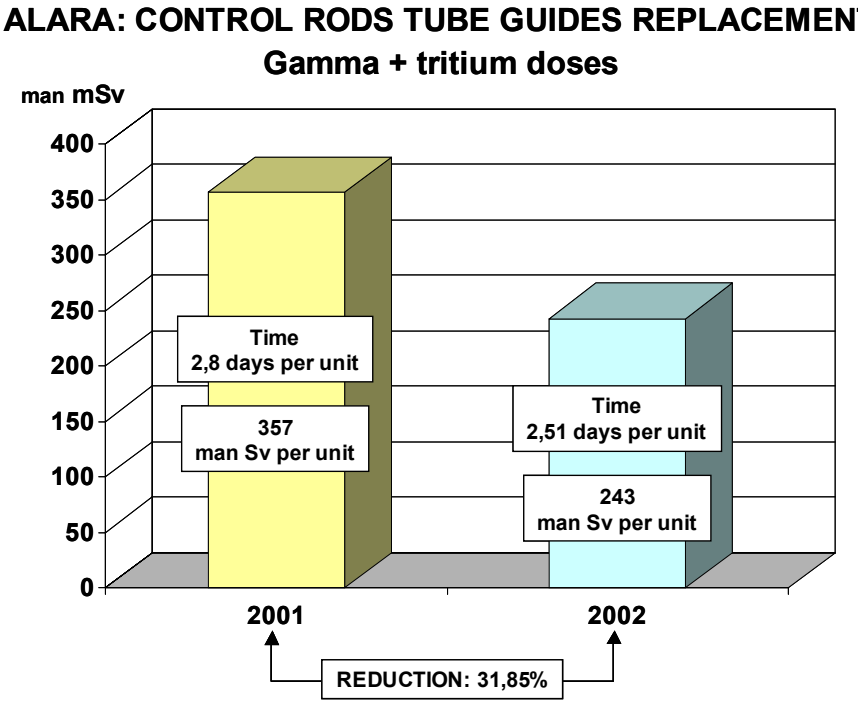
The following specific issues are examples:

Shielding: improved shielding within the control rods area and control rods coils area. Due to the radiological impact to replace the control rods additional planning efforts were carried out.

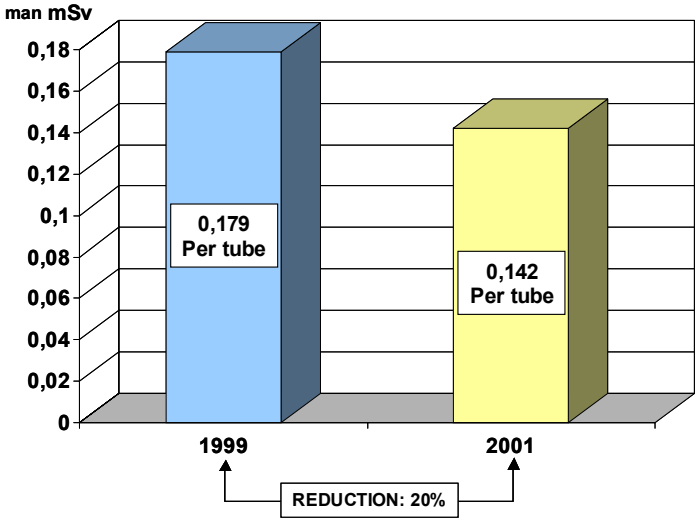
Training: specific training program was developed in particular regarding the personnel involve in tasks like shielding, control rods coils disassembly, mock-ups related to channel replacements, control rod tubes replacements and neutron flux detectors.

Tools: new extracting tools for fuel channels and control rods tubes, changing working methods for welding, improved methodology related to the removal and transport operations with channels and control rod tube guides.

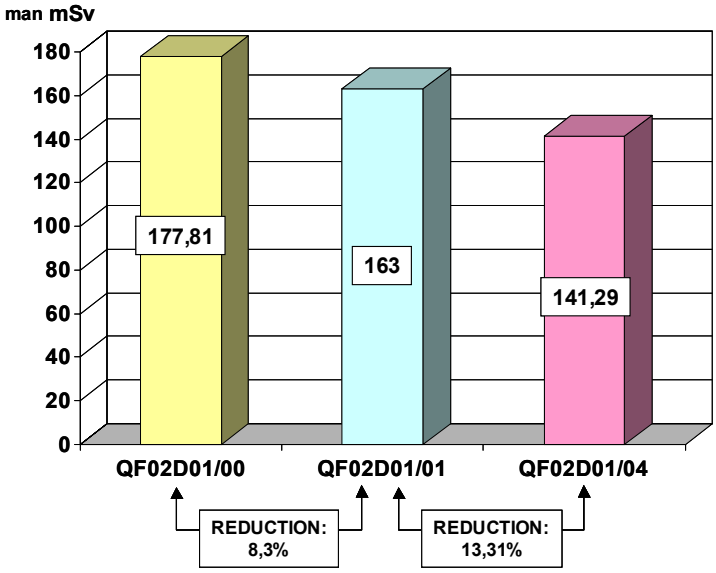
The following charts shown the improvements in many relevant areas.



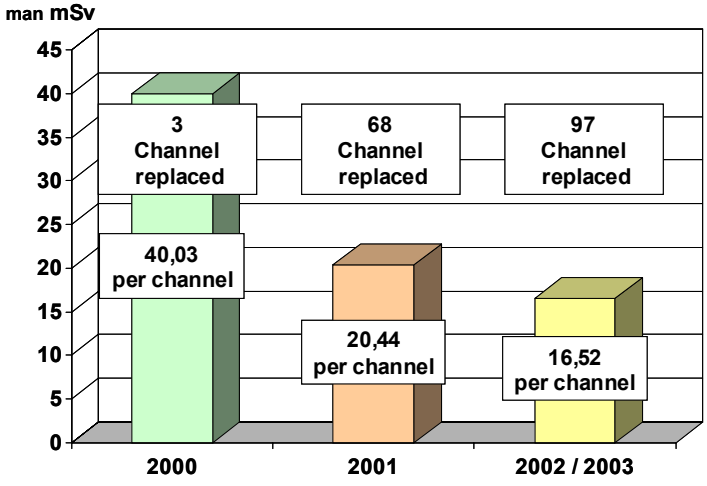
ALARA: STEAM GENERATORS
Inspection doses per tube



ALARA: MAIN COOLANT PUMPS - SEALS REPLACEMENT
Gamma + tritium doses



ALARA: CHANNEL REPLACEMENT



ARTICLE 16
EMERGENCY PREPAREDNESS

16.1 Introduction

During the period covered by the report many nuclear emergency exercises were performed. The format of these exercises were defined in order to prove the new functions of the Regulatory Body established in Act 24804/97, the Ordinance 1390/98 and the Resolution of ARN 25/99 as was stated in the previous report.

Special attention has been paid by the Regulatory Body, starting from the changes established in the mentioned Acts and Ordinances to conduct all the civil organizations and Security Forces in the area included in Nuclear Emergency's Plans.

In particular the operational capacity of the Regulatory Body in the management of the implementation of actions to protect the members of the public in the surroundings of the nuclear power plants from the radiological consequences is currently checked by carrying out emergency exercises. The Regulatory Body, in addition to its main role as head at the Emergency Control Centre for off-site consequences, performs the nuclear and radiological assessments, the radiological protection of intervening teams and the environmental monitoring. Representatives of all the intervening organisations (as established in the Emergency Plan) integrate such command and the Regulatory Body coordinates the response teams from civil organisations, (Fire fighter brigades, Civil Defence, etc) security forces (Police, Gendarmerie and Coast Guard) and military institutions (Army, Navy and Air Force). These organisations apply the countermeasures with their response teams. All this groups have procedures to deal with nuclear emergencies, under the coordination of the Regulatory Body.

16.2 Actions taken for the improvement of the emergency exercises

The main objectives of the emergency exercises were:

- to extend the diffusion of the current procedures among the intervening organizations
- to establish operational commands and,
- to verify the capacity of application of the automatic radiological countermeasures (residential sheltering, thyroid prophylaxis, control of accesses, notifications, messages to members of the public, etc).

During the preparation of the exercises it was considered necessary to qualify the emergency response groups from all organizations in radiological protection, likewise in the new legal aspects, in those their intervention was framed.

Not only the technical expertise but also the robust legal framework (Nuclear Law and Regulation ordinances) facilitate all involved institutions to recognize the leadership of the Regulatory Body for the application of the radiological protection measures. In such a sense, all levels of the organizations involved were encouraged to perform the different roles assigned.

The nuclear emergency exercises carried out during the period were the following:

- ✓ La Cruz, Embalse CNE 2001, June 28 2001
- ✓ Lima, CNA 2001, November 30 2001
- ✓ Embalse, CNE 2002, October 30 2002
- ✓ Lima, CNA 2002/2003, October 23 2003

The exercises of Embalse 2002 and Lima 2003 stand out because the participation of a great number of civil organizations and Security Forces and the scope of the countermeasures.

Besides both nuclear power plant's operators and the Regulatory Body, the following organizations participated actively and received the specific training according to that established in the legislation and in Nuclear Emergency Plans:

- National Army
- National Gendarmerie
- Prefecture Naval Argentina
- Police of Buenos Aires Province
- Police of Córdoba Province
- Federal Emergency System
- Civil Defense, Córdoba Province
- Civil Defense, Zárate
- Civil Defense, La Cruz
- Civil Defense, Embalse
- Firefighter Brigada de Embalse
- Firefighter Brigada de Lima
- Firefighter Brigada de Zárate
- FM El Sitio, Lima
- FM Libre, Lima
- FM Delta, Embalse
- FM Show, Embalse

The member of the public in the surroundings of both NPPs also participated (up to 10 kilometers, where actions are planned in detail and it is necessary to practice them). For it, previously to each exercise an important effort in diffusion activities and training were carried, with special emphasis in the primary and secondary schools of the area. In the exercises of La Cruz, Embalse NPP 2001, 2500 inhabitants participated, in that of Embalse, Embalse NPP 2002, 4500 and in Lima, Atucha I NPP 2002/2003, 6000 inhabitants.

During all nuclear emergency exercises carried out within the period, the ability of the regulatory Body to conduct the emergency response teams belonging to all civil organizations and security forces was achieved properly. All those involved recognized the leadership of the Regulatory Body by virtue of the obligation that emanates from the Law, and by virtue of the technical authority in radiation protection.

On the other hand, the personnel of the Regulatory Body have acquired the necessary skills to carry out the new role of conducting civil organizations and security forces, taking advantage of the operative experience of this forces and integrating them with representatives to the Emergency Control Center to address the emergency. Notwithstanding, the coordination function assigned to the Regulatory Body, each participating organization exercises its own role and competence

16.3 Status of national and international agreements

List of effective approved nuclear emergency plans, considering Law 24804/97, the ordinance 1390/98 and the Resolution of RNA 25/99:

- Municipal Plan for Nuclear Emergencies, La Cruz, Córdoba Province, approved on September, 2001.
- Municipal Plan for Nuclear Emergencies, Zárate, Buenos Aires Province, approved on January, 2002.
- National Plan for Nuclear Emergencies, Federal System of Emergencies, approved on December, 2002.
- Municipal Plan for Nuclear Emergencies, Embalse, Córdoba Province, approved on June, 2003.
- Provincial Plan of Nuclear Emergency, Ministry of Security, Córdoba Province, approved on November, 2003.
- Plan of Nuclear Emergencies, External Aspects, Embalse NPP (updated in November, 2003).
- Plan of Nuclear Emergencies, External Aspects, Atucha I NPP (updated in November, 2003).

On the other hand, within the quality management system of the Regulatory Body, improvements of internal procedures related to emergency are being performed (see Article 8). Formal and operative activities that have been arise from the Convention of Prompt Notification and Assistance in cases of radiological emergencies for accidents in central Nuclear were normally met and responded. Additionally, Argentina participates in emergency events and in CONVEX International exercises. Argentina

also participated in many training activities in the framework of the Project ARCAL/IAEA “Strengthens of national capacities to face emergencies".

In connection with the safety and security of NPPs, emergency preparedness activities have continued. The activities have been focused on disseminating information of the radiological risk and the nuclear emergency plans for the population surroundings the NPPs.

ARTICLE 17
SITING

1.7 Site Re-Evaluation

In the second National Nuclear Safety Report was indicated the activities carried out in the area of sismicity of Embalse NPP, the Regulatory Body issued requirements to review the design parameters corresponding to earthquakes, extreme meteorological phenomena and man-induced events that were determined according to the region and site specific conditions of each plant. Additionally, an updated program of plant response to the earthquake occurrence at Embalse Nuclear Power Plant and the digital seismic instrumentation that provide data directly to plant operators for decision making and for immediate actions to check the DBE excedence were implemented properly. The regulatory requirements were met. Besides, during this period specific personnel training regarding the instrumentation system and checking were carried out.

On the other hand during this period, new and more reliable data and information is available. In 2001, an official National Census was carried out and all data were available to be processed from 2002. The Responsible Organization is using all the information to update the sitting chapters of the Final Safety Analysis Reports of the nuclear power plants. The seismic PSA for Embalse NPP has been re scheduled and initial discussions are in place.

ARTICLE 18
DESIGN AND CONSTRUCTION

During this period, the following aspects regarding design and construction can be mentioned:

18.1 Embalse NPP

During 2003 the third step of the dry storage program was finalized. It includes forty new silos to extend the Dry Storage of Irradiated Fuel Elements System to cover the plant operation needs for the next four years. The capacity consists in nine canisters with 60 fuel elements per canister. The total storage capacity is 540 fuel elements. Additionally, a behavior analysis and field measurements were performed in order to compare the calculations values and a follow up program was established. Updated design changes were considered to take into account better safeguard controls.

18.2 Atucha I NPP

Additionally to the design activities applied to the backfitting (see Art. 6) can be mentioned a room for temporary storage of low activity wastes and a temporary room to expand the storage of filters to be used in cooling and moderator cleaning systems are under construction.

18.3 Atucha II NPP

During the last period the scarce construction activities of Atucha II were described in the second national report. It is important to mention the plant construction reached 85% of the total. Maintenance activities for installed components and preserving the storage were carried out according with the manufacturers specifications and guidelines.

During 2003, the Secretary of Energy required to the Responsible Organization an updated analysis considering technical, economics and financial aspects in order to provide adequate information to take the decision to resume or not the construction of the plant . In this sense, the Responsible Organization organized an ad-hoc group and such analysis was presented at the end of 2003. The Governmental Authorities that reviewed the analysis concluded that it is reasonable to finalize the construction of the plant.

During 2004, the Responsible Organization started to re-establish the negotiation with the main contractor –Siemens- to discuss the technical and financial conditions and establishing a program to resume the construction and finalize the plant.

On the other hand, the Regulatory Body prepared a project review considering the current standards and those that the plant was designed, concluding that there is no objections to finalize the plant construction from the safety point of view. The Construction license was also reviewed it is still in force and minor changes are necessary to finalize the plant. In addition, the Regulatory body is analyzing the convenience to request at IAEA a design review mission. Such mission would be useful considering that the design was performed 30 years ago and the long construction period.

ARTICLE 19
OPERATION

The aspects related to the operation of Atucha I and Embalse nuclear power plants were described in detail in the previous National Nuclear Safety Reports. However, some further progress has been made in the area of operating experience feedback both from our own and from foreign plants.

19.1 Operational Experience Feedback

As a consequence of a requirement issued by the Regulatory Body in 1998, the Responsible Organization started a formal and systematic process of evaluation of the operating experience in order to obtain a feedback to improve reliability and availability of the nuclear power plants. The major actions required by the Regulatory body include:

- ✓ Use of international and national databases
- ✓ Use of root cause analysis methodologies in case that an event is applicable in domestic plants.
- ✓ Taking immediate corrective actions to avoid events occurrence or recurrence.
- ✓ Corrective actions follow up.
- ✓ Lessons learned from analysis.

The Responsible Organization prepares a quarterly report including the results obtained by the application of the program. Besides, nuclear power plants expertise teams evaluate “low level events” and “near misses” obtaining their own database.

The program coordinator reviews about 200 reports per year from different international sources. However, due to design, procedures, systems and components or low safety significant actions approximately 10% of the events would be applicable. Several recommendations were implemented improving the plants safety and their availability.

During this period it was increased the training courses using the lessons learned from events, organizing training meetings and discussions. The participants became very enthusiastic with this activity, developing new ideas, solutions and new alternatives to the corrective actions taken by different plants.

19.2 Accident Management and Severe Accidents

Several activities carried out and initiated within the area of severe accidents that includes analysis, plant modifications and procedures were detailed in the previous national reports. On September, 2003 the Regulatory Body issued a requirement to set off the implementation and development a Severe Accident Management Program (SAMP) according to international practices. Such program must be developed within a period of five years, determining the strategies and development and implementation of procedures with the objective of preservation of confining barriers applicable to each nuclear power plant.

The SAMP takes into account the exiting systems and components and/or the implantation of the necessary plant modifications. Such activities are developed by the Responsible Organization, and other support organizations such as Cuyo National University, to develop the progression model of severe accidents using the MELCOR code and Atomic Energy Commission within specific areas such chemistry, physical processes, fuel and structures. As part of SAMP the scope extension of the Level 1 PSA is considered. The minimum scope to be achieved by the Responsible Organization was defined by the Regulatory Body.

In connection with Atucha I NPP the first performed activities within the SAMP developed by the Responsible Organization were the organizational procedures and documentation control. A specific methodology to characterize the plant damage states has been defined. Based on such methodology six representative scenarios were selected taken into account the international experience and the plan specific issues and design such as Station Blackout, Primary blow down, Pressurizer Safety Relief Valve Opening, Small LOCA and Steam Generator LOCA.

A model for Atucha I NPP is being development with MELCOR 1.8.5 code, some scenarios have been modeled with SCDAP/RELAP 5 with different assumptions until the complete accident progression can be analyzed.

Based on time at melt core, some of the scenarios considered at the beginning have been modified in conformity with the review of the characterization in plant damage states.In connection with Embalse NPP accident progression analysis carried out for “Generic CANDU Probabilistic Safety Assessment” and the “CANDU 6 Probabilistic Safety Study” developed by AECL is considered and a number of core damage accidental sequences were selected as results from the PSA level 1 developed. On the other hand, the Responsible Organization is maintaining close discussions with AECL to develop an international methodology for CANDU reactors.

19.3 Peer Reviews between the Responsible Organization and WANO from 2001 to 2004

PERIOD		TEMA
31/07/01 to 10/08/01	HUNTERSTON B NPP UK/FRANCE	Peer Review Team Leader Team and Seminar
12 to 20/11/01	VANDELLOS NPP SPAIN	Peer Review
01 to 19/09/01	NESCKARWESTHEIM NPP GERMANY	Peer Review
8 to 26/10/01	TRILLO NPP SPAIN	Peer Review
8 to 29/09/01	FLAMAVILLE NPP FRANCE	Peer Review
26/01 to 16/02/02	SIZEWELL A NPP UK	Peer Review
2/02 to 23/02/02	HEYSHAM I NPP UK	Per Review C.N. HEYSHAM I – INGLATERRA
14/01 to 31/01/02	CAIGA NPP INDIA	Peer Review
11 to 29/11/02	C.N. DOEL NPP BELGIUM	Peer Review
17/03 to 4/04/03	FESSENHEIM NPP GERMANY	Peer Review
15 to 22/06/03	LYON – FRANCE	WANO Seminar
5 to 23/06/03	ISAR NPP GERMANY	Peer Review
17/03 to 04/03	HINKLEY POINT B NPP UK	Peer Review
03/11 to 21/11/03	COFRENTES SPAIN	Peer Review
5/04 to 13/04/03	HUNTERSTON B NPP UK	Follow Up Mission

ANNEXES

ANNEX I
CONCLUSIONS ABOUT ARGENTINA DURING THE FIRST REVIEW MEETING ON THE CONVENTION ON NUCLEAR SAFETY

1. Legislation and Regulatory Framework.

   - ✓ Since 1994, Argentina has had an independent regulatory authority, in accordance with a national law. It is the single authority in charge of licensing and supervision of nuclear installations as well as personnel licensing. It is an independently financed from the national budget and regulatory fees.
   - ✓ The regulatory system relies on performance-based regulation and is reliant on continuous interaction between regulator and licensee.

2. Safety of Nuclear Installations

   - ✓ A systematic operating experience feedback program and an ageing management program are in place.
   - ✓ Accident management program is under development.
   - ✓ Part of the major backfitting measures of Atucha I is completed, and the remaining backfitting measures are planned to conclude in 2001.
   - ✓ The combined use of the PSA and deterministic approaches for regulatory decision making and to improve the operating conditions of the installations is considered a good practice.
   - ✓ A continuous risk management program to improve safety using PSA, reassessment and evaluation of various options for improvement is in place.
   - ✓ A periodic safety review is being performed every five years.
   - ✓ Regulatory predictive performance indicators are used as a complementary preventive tool to detect early signs of deterioration.

Concern:

Although a large portion of the safety backfitting has been completed on CNA I, there still remain some important measures to be implemented.

Recommendation:

Argentina should expedite the backfitting program of CNA I in a timely manner.

3. Safety Culture/Human Factors/ Quality Assurance (Management of Safety)

   - ✓ A corporate policy and principles manual have been issued which refers to safety culture and the basis in which safety culture is cultivated.

4. Radiation Protection

   - ✓ The legislative and regulatory framework in the area of radiation protection is in place.
   - ✓ ICRP-60 recommendations for public and workers were implemented in 1995.

5. Emergency Preparedness

   - ✓ Emergency planning covering the on-site and off-site responses is in place, and periodic exercises are carried out on a regular basis.

Argentina provided and presented a very informative and comprehensive report and answered the questions in the same manner.

The participating Contracting Parties compliment the Argentine delegation for their excellent and informative presentation utilizing the latest visualization technology.

The participating Contracting Parties recognize Argentina's dedications to further improve the high level of safety of its nuclear installations and encourage a continuation of assessment and improvement of nuclear safety.

ANNEX II
CONCLUSIONS ABOUT ARGENTINA DURING THE SECOND REVIEW MEETING ON THE CONVENTION ON NUCLEAR SAFETY

A. Introductory Comment

The presentation was well structured and addressed the improvements made since the 1st. Review Meeting.

Major Themes and Good Practices

There had been an aggressive backfitting program at Atucha I

- Requested by the regulator in 1998 with deadlines.
- Deadlines were not met and regulator refused to accept a revised schedule which had been proposed by the utility.
- The regulator took enforcement action in 2000.
- The plant was shutdown.
- Eventual restart was in 2001.
- All outstanding backfit tasks are to be completed during the 2002 outage.
- Since the original backfit program was established, additional tasks (reactor internals) have been identified and incorporated.

These demonstrate good regulatory practice in both requesting and enforcing safety requirements.

1. There is a strong inspection program at Embalse to demonstrate that the plant will be capable of operating for its full design lifetime.
2. A shutdown and low power PSA is being carried out at Embalse (completion 2003).
3. Changes to the licensee organization which may impact safety must be submitted to the regulator before implementation.
4. The regulator has established an oversight process for the systematic review of safety culture.
5. Re-evaluation of siting (i.e. external hazards) has been carried out. Specifically: seismic events, tornadoes and flooding.
6. There is a systematic OPEX program in place with a regulatory assessment of its effectiveness.
7. De-regulation has had no observed impact on safety to ate.

8. The regulator has full autonomy and adequate capability, but recently there has been a small reduction in staffing levels due to retirements.

B. Points from the Discussions.

1. A recent law requires that the regulator is responsible for decision-making and co-ordination of actions associated with emergency Planning and Preparedness. This is a new activity that is still being developed.
2. The Members of Group V noted that the radiation dose levels during the necessary backfits at Atucha I were relatively high. The Members of Group V encourages the regulator to monitor these trends closely during the residual work.
3. The regulator is developing Safety Performance Indicators. The Members of Group V recommended that thresholds be defined in these indicators which can be used as measures for acceptable safety performance and regulatory action.

C. Points from the 1st. Review Meeting not discussed above

The following information was provided during the presentations:

1. A non-prescriptive strategy is preferred.
2. There is currently no difficulty in providing financing for safety upgrades of the operating reactors.
3. PSA is widely used; continuous review processes are in place as a substitute for PSR; safety reports are updated as part of this process.
4. Emergency preparedness exercises are carried out once per year.

D. Items to be included in the National Report for the Third CNS Review Meeting

The Members of Group V suggested that updates on the item given in D above should be included in the next report.

ANNEX III
ANSWERS TO QUESTIONS OR COMMENTS - NATIONAL NUCLEAR SAFETY REPORT – 2001

N°1
CNS-Ref.-Art.: 6.1.1.5
Page of Report: 13
Chapter of Nat. Report: **6**

QUESTION:

When will the second heat sink installed at Atucha I be in operation?

ANSWER:

The regulatory body required that the second heat sink will be in operation at the end of the planned outage corresponding to the year 2002 according to the backfitting program. The Responsible Organization will commission the system in December, 2002.

N°2
CNS-Ref.-Art.: 6.1.1.6
Page of Report: 13
Chapter of Nat. Report: **6**

QUESTION:

Article 6.1.1.6 (page 13) refers to the Level 1 probabilistic safety analysis (PSA) that was performed for Atucha I in the first Argentine National Report in 1998. As an extension to the Level 1 PSA for Atucha I, the internal fire and shutdown risk analyses, as well as sources of a radioactive release other than the reactor core were concluded. PSA analysis of Embalse is being developed but is not completed (Article 6.2.4, page 19). The report infers that the licensee will use the PSA results to identify areas for improvement and modification. **How does the regulatory body use this risk data?**

ANSWER:

The PSA results from the Argentinean NPPs are used by regulatory body as follows:

- Regulatory requirements issue, as a part of the continuous improvement program of safety, related to modification and improvement of operating procedures, components, equipment and systems.
- Optimizing inspection efforts focusing it on the risk contributors items.
- To evaluate design improvement alternatives.
- Staff training and re-training.
- To analyze the allowed outage times of components and systems and plant configurations control.
- To analyze plant events.

N°3
CNS-Ref.-Art.: 6.1.1.6.1
Page of Report: 13
Chapter of Nat. Report: **6**

QUESTION:

Please provide information on the recommendations of the Fire Risk Analysis.

ANSWER:

The Fire Risk Analysis, finished in November, 2001, does not yet include realistic recovery actions analysis. Fire risk analysis recommendations to the plant will be elaborated after recovery actions analysis is concluded (planned to the end 2002).

Considering the recovery actions, it is expectable that the results of this analysis will show a more realistic core damage frequency and will modify relative contributors importance. Major contributor is fire in electronic and electrical cabinet room, in which the effects of fire are easily recoverable, taking into account that in many cases the effect is not unavailability of components or systems, but spurious signals that affects one or more components.

N°4
CNS-Ref.-Art.: 6
Page of Report: 11 to 20
Chapter of Nat. Report: **6**

QUESTION:

Is the concept of Periodic Safety Review implemented in Argentina?

ANSWER:

Regulatory Standard “AR 3.9.1. – General Safety Operation Criteria” establish that the Safety Reports of nuclear installations must be updated each time that be performed a plant design modification and once every five (5) years. The operating licenses includes similar requirements. These Safety Reviews, which are part of the continuous improvement program, foresees a continuous following of the safety problems, the operative experience feedback and the aging management program. Additionally, there is a permanent regulatory body activity, both the standards review and the standards

updating, whose target is to maintain the Argentinean normative system updated. It is a regulatory requirement to perform and update the NPPs probabilistic safety analysis, which implies a safety review to be performed during the revision stage or during the improvements implementation or design changes.

N°5
CNS-Ref.-Art.: 6
Page of Report: 11 to 20
Chapter of Nat. Report: 6

QUESTION:

a) Could Argentina indicates whether periodic safety reviews are required by the Regulatory Body?

In the report from Canada, generic safety issues for the Candu plants are identified such as hydrogen behavior in Candu nuclear generating stations, positive void reactivity treatment in large LOCA analysis.
b) Are these generic safety issues, if they apply to the Embalse plant, taken into account in the safety evaluation of the plant?

ANSWER:

a) The Regulatory Standard “AR 3.9.1 – Operating General Safety Criteria” establishes that the nuclear installation safety reports must be updated once each five years. Related with this issue the operating licenses establishes similar requirements. This safety reviews are a part of the continuous improvement program, which consider the continuous following of the safety issues, the operating experience feedback and the aging management program. The updating and performing of the probabilistic safety analysis –a regulatory requirement to Argentinean nuclear power plants – implies an installation safety review during the analysis stage or during the implementation of improvements and design changes.

b) These generic safety issues for the CANDU plants are also valid for Embalse NPP. Positive void reactivity in large LOCA analysis has been considered in the safety evaluation of the plant, up to now based on data provided by the designer (AECL). At present there is a revision of the Safety Report going on and the purpose of the Responsible Organization is to perform large LOCA analysis evolution with updated codes, in particular those which are capable to improve the assessment of the increase of power due to positive void reactivity feedback in large LOCA (with cross sections based on the WIMS-D5 code).
Related with the hydrogen behavior into the Embalse containment, analysis of the generic CANDU 600 studies have been initiated.

N°6
CNS-Ref.-Art.: 6
Page of Report: 11 to 20
Chapter of Nat. Report: 6

QUESTION:

Article 6 of the Report says that the plant improvement program is being implemented at "Atucha-I" NPP which is planned to be completed in 2002.

What major problems from the safety viewpoint will be resolved after the completion of "Atucha-I" improvement program?

ANSWER:

After the completion of Atucha-I backfitting foresee in the 2002 planned outage, the efforts to analyze severe accidents will be increased and the implementation of accident management program will be prioritized.

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N°7
CNS-Ref.-Art.: 6.1.1.10 – 9.1
Page of Report: 17 - 29
Chapter of Nat. Report: 6 - 9

QUESTION:

It is reported that the Regulatory Body has issued an updated backfitting program.

1. Please explain the policy and criteria to choose these items as backfitting programs.
2. Do you have any idea to implement Periodic Safety Review as enforced in several countries to identify backfitting items systematically?

ANSWER:

1) Atucha I updated backfitting program items were chosen by considering the safety analysis results, the probabilistic safety analysis, the regulatory inspections and the operating experience feedback as detailed below:

1.1) Replacement of all coolant channels with “stellite-6”:
The replacement of coolant channels with “stellite-6” was performed to optimize radiological protection through the decreasing of doses caused by Cobalt 60 gamma radiation. Cobalt 60 is generated as an activation result. Besides, the new channels (without “Stellite-6”) include other design improvements to avoid both the thermal isolation degradation and the channel nozzle stuck in their guide bushing.

1.2) Commissioning of the second heat sink system:
The convenience of installing an independent second heat sink was determined by the need of increasing safety in terms of the core damage probability obtained in the level 1 probabilistic safety analysis and, it has the main purpose of ensuring, as an additional emergency system, the heat transfer via the steam generators in cases where the normal heat sink or the high pressure residual heat removal system are either unavailable or ineffective .

1.3) Pressure vessel integrity analysis:
Pressure vessel integrity analysis is being performed because of some uncertainties about the material behavior as a consequence of differences between the neutron spectrum that exists in the specimens used in the surveillance program. Besides, uncertainties related with the RPV integrity under some accidental conditions exist. Therefore, as stated in the second report, the regulatory body required the Responsible Organization that in case that it could not demonstrate that the RPV integrity will continue keeping an adequate margin at the end of the reactor lifetime, it would have to perform the necessary actions to heat the water contained into the high pressure emergency core cooling accumulators.

1.4)Control rod shutdown system test program:
During the last years an increase in the shutoff rod drop time was observed. Because of that, the regulatory body required the responsible organization to follow the control rods performance.

1.5) Replacement of all control rod guide tubes:
During the 1999 planned outage, there were stuck control rod guide tubes detected as a consequence of crud and coolant channel thermal isolation particles deposition and tubes axial growth due to irradiation. The above mentioned stuck provoked tubes bending that caused that the affected rods increase their drop time. The regulatory body required to replace all control rod guide tubes for other guide tubes with a new nozzle design.

1.6) In-core neutron flux sensor guide tubes replacement:
A bending that affected some in-core neutron flux sensor guide tubes was observed. The cause of such guide tubes bend was the same cause as the one explained in item 1.5. To avoid both the contact between neutron flux sensor guide tubes / surrounding coolant channels and the neutron flux detectors degradation, the regulatory body required the in-core neutron flux sensor guide tubes replacement by other guide tubes with a new design.

1.7) Moderator tank cleaning:
The generation of particles coming from coolant channels thermal isolation degradation, as an irradiation consequence, contributed to stick the coolant channels, the control rod guide tubes and the in-core neutron flux sensor guide tubes. To take remedial actions, the regulatory body required both to replace the coolant channels for other channels with an improved design and to clean the moderator tank by removing such particles.

2) The continuous safety evaluation program implemented to update the safety report, the probabilistic safety analysis, the continuous follow-up of the safety issues, the continuous follow-up of operating experience feedback and the follow-up of the aging management program, allow a systematic identification of the items to be considered in the backfitting of nuclear installations.

N°8
CNS-Ref.-Art.: 6.2.2
Page of Report: **19**
Chapter of Nat. Report: 6

QUESTION:

Please provide information on the standards, guides and methods used to inspect the Embalse feeder pipes for erosion-corrosion.

ANSWER:

Inspection of feeders pipes was included in the service inspection program in all the Embalse planned outages since 1989 (wall thickness was controlled by using ultrasonic methodology according to designer recommendations).
During the next plant maintenance outage in order to improve the inspection, a semi automatic equipment from Canada will be used. There will be Canadian personnel for training of argentine personnel. Another equipment that will be used for the first time

also is specific for controlling the integrity of feeders (echo-pulse methodology). This device is also Canadian and it will be used by foreign personnel with its own procedures.
The programme PIP-ISI (In Service Inspection) is based on Canadian Standard CSA 285.4/78 adapted to CAN/CSA 285.4/94,supplementary article 13.

N°9
CNS-Ref.-Art.: 6.3
Page of Report: 20
Chapter of Nat. Report: 6

QUESTION:

Articles 6 and 18 of the Report mention that the construction of "Atucha-II" NPP has been indefinitely discontinued.
What are the causes of this prolonged suspension of "Atucha-II" construction?

ANSWER:

Atucha II NPP construction and assembly activities never were totally interrupted. However, such activities continued moving through in a much slower activities level than the originally planned. This activities delay were mainly due to that the privatization of argentine nuclear power plants (including Atucha II) was not implemented as considered in the National Law o Nuclear Activity (Act N° 24,804).

N°10
CNS-Ref.-Art.: 7.3
Page of Report: 22
Chapter of Nat. Report: 7

QESTION:

Article 7.3 (page 22) states that the regulatory body has introduced a new Standard (AR 0.11.3) that establishes specific requirements for plant staff training, and mechanisms to evaluate the training process. **Please provide a brief discussion of the new requirements and how the training process will be evaluated.**

ANSWER:

New Standard AR 0.11.3. about specific requirements for plant staff training, as well as formalizing some procedures that were being carried out at the plants, introduced new criteria mainly in the following aspects:

a) Minimum program of training courses that the licensed personnel must follow.
b) Requisites that must be followed in practices using a simulator, particularly those related to emergency operative procedures, and in testing loops and mock-ups.
c) Evaluation of trained personnel through examination boards with the eventual participation of the Regulatory Board.

The training evaluation of the power plants licensed personnel is carried out in the following way: after the training, the Responsible Organization constitutes an examination committee with the agreement of the Regulatory Body. This committee analyses the evaluations carried out by the instructors during the different courses and gives a final report indicating the people that passed the exams. The Regulatory Body integrates the examination committee and is able to perform an in-depth analysis of the different aspects of the evaluation and the Regulatory Body is able to make individual evaluations to ratify the conclusions reached.

N°11
CNS-Ref.-Art.: 8.2.1.1 – Table 8.1
Page of Report: 24 - 25
Chapter of Nat. Report: 8

QUESTION:

In terms of human resources, excluding one of projects mentioned in the report, has the level of resources committed to direct regulatory activities remained unchanged?

ANSWER:

The human resource have been redistributed according to the technical needs and work planning. The Regulatory Body has the level of human resources sufficient and adequate for each planned working plan.

N°12
CNS-Ref.-Art.: 8.3
Page of Report: 25
Chapter of Nat. Report: 8

QUESTION:

Are the necessary activities of the Argentinean Regulatory Authority effected by the current financial crisis?

ANSWER:

Up to the present, the Regulatory Body has not faced any effect coming from the crisis the country is going through. Even though some difficulties have arisen regarding the budget around the last quarter of 2001 it may be said that they did not affect any regulatory activity related to the nuclear power plants in operation.

N°13
CNS-Ref.-Art.: 8.3
Page of Report: 25
Chapter of Nat. Report: 8

QUESTION:

Financial analysis on real expenses versus estimated expenses of the NRA shows a reduction of approximately US$3M and asserts that this has not affected regulatory activities but does not provide statistic evidence.

ANSWER:

The difference between estimated expenses (U$S 19 020 154) and real expenses (U$S 16 132 828) corresponding to year 2000 are mainly due to:

1. Funds coming from USA Department of Energy (DOE) and Comprehensive Nuclear Test-Ban Treaty Organization (CTBT) of contributions assigned to radionuclide detection stations in Salta and Bariloche and infrasonic detection station in Neuquen - no implemented (U$S 1 800 000).
2. Salary reductions around 12% stipulated by National Government, as part of the economic emergency (U$S 757 000).

N°14
CNS-Ref.-Art.: 8.5
Page of Report: 26
Chapter of Nat. Report: 8

QUESTION:

What is the status of implementation of the plan to improve the quality within the Regulatory Organization? How many internal audits have been conducted? Who performed the audits and what were the findings?

ANSWER:

The implementation of quality improvement started, as it is explained within the National Safety Report 2001, in areas of general management to continue afterwards in more specific areas. A satisfactory level of personnel training and an adequate regulatory attitude in every leading group has been achieved.

Since 1999, a process of internal audits has been put into practice every four months by a group of independent auditors and which conclusions are directly reported to the Board of Directors of the Regulatory Body so as to take the corrective actions the Directors consider necessary to adopt. The process will have to be deepened during the next years, including external audits and improving the internal audits.

N°15
CNS-Ref.-Art.: 8 5
Page of Report: 26
Chapter of Nat. Report: 8

QUESTION:

The QA system of NRA has been strongly developed in recent years. Do you have plans to ask for an independent, external audit made by, e.g. IAEA IRRT, to evaluate your QA system?

ANSWER:

Yes, these activities are being planned as from 2003/4.

N°16
CNS-Ref.-Art.: 8 6 – Table 8.6.1
Page of Report: 26 - 27
Chapter of Nat. Report: 8

QUESTION:

Article 8.6 (Table 8.6.1, page 26) shows that the regulatory body has agreements with several other entities, including: the National Atomic Energy Commission to do studies on radio medicine and dosimetry methods, the National University of Buenos Aires School of Engineering to perform studies, research and technological developments in radiation protection and nuclear safety, and the Argentine Geological Services to do seismic evaluations. **Do these same organizations also perform work for the operating organization (NASA), and if so, how is a conflict of interest avoided?**

ANSWER:

The Regulatory Body has taken the decision of completely avoiding to make agreements of cooperation with any Institution that is performing any work for the Responsible Organization. Taking into account the country scale and with the purpose of avoiding a conflict of interest, the Regulatory Body hires the services of foreign organizations whenever the local institution that may offer those services has advised or is advising the Responsible Organization about those works.

N°17
CNS-Ref.-Art.: 10
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

In the current report some interesting initiatives are mentioned. This particularly concerns "*the review of trends for special set of regulatory indicators"*. Please explain how were the indicators developed and how were they validated in practice?

ANSWER:

Indicators were developed according to the following steps:

- -Gathering information from other nuclear organizations, in particular other regulatory bodies (CNSC and NRC) and information published by IAEA.
- -Definition of specific characteristics and scope.
- -Definition of a framework to define the parameters to be utilized as indicators, covering all important areas from the regulatory point of view.
- -Identification of relevant aspects to be evaluated.
- -Determination of a quantitative indicator for each one of the parameters selected.
- -Evaluation of feasibility to obtain information.
- -Definition of a set of performance safety indicators.
- -Pilot implementation.
- -Assessment of the results and improvements and modifications.
- -Final set of performance safety indicators.

They were validated through the process of selection, definition and pilot implementation. However, thresholds for performance indicators have not been established nor validated.

N°18
CNS-Ref.-Art.: 10
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

How does the regulator assess safety culture ?

ANSWER:

Evaluation is inherently drawn in every inspections, both routinely and specially programmed seeking weaknesses and early declining signs. Examples of safety culture monitoring aspects can be seen whenever management weaknesses are detected or operations procedures are ignored or operating limits are exceeded or maintenance weaknesses are shown, as inspection findings.

Specially programmed inspections (by evaluators) are focused on some others issues like verbal communication with operators. Besides, through evaluation of operation (routine surveillance tests, corrective maintenance) together with the evaluations of regulatory safety indicators trends it is also possible to determine signs of declining performance.

Resident Inspector Manual contains a dedicated chapter, which includes guides to detect weaknesses and early signs of declining in the Safety Culture within specific plant areas and within the Organization

N°19
CNS-Ref.-Art.: 10
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

a) Could Argentina indicate if internal or external reviews or audits have been carried out for assessing the safety culture?
b) What are the safety indicators used by Argentina?
c) Is there any change in the safety level identified by these indicators during the transition period of the privatization process or after? (many details are given concerning the financial aspect, but comments about the safety evolution would be appreciated).
d) Are these indicators thought to allow an early identification of a possibly declining safety in order to take the appropriate countermeasures?

ANSWER:

a) Safety culture evaluation is inherently drawn in every inspections, both routinely and specially programmed seeking weaknesses and early declining signs. Examples of safety culture monitoring aspects can be seen whenever management weaknesses are detected or operations procedures are ignored or operating limits are exceeded or maintenance weaknesses are shown, as inspection findings.

Specially programmed inspections (by evaluators) are focused on some others issues like verbal communication with operators. Besides, through evaluation of operation (routine surveillance tests, corrective maintenance) together with the evaluations of regulatory safety indicators trends it is also possible to determine signs of declining performance.

No internal or external audits has been made in Argentinean nuclear power plants on safety culture.

b) Set of Performance Indicators

Normal Operation

- **Plant Stability:**
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

  4. Individual maximum dose.
  5. Total equivalent dose.

Effluents:

  6. Liquid effluent discharges.
  7. Gaseous effluent discharges.

Waste Management:

  8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of actions of the Safety Systems.

Risk

24. Unavailability of Safety Systems.
25. Impact of reported events on core damage frequency.

c) The first set of performance indicators was reported at the end of 1998. The Responsible Organization (NASA) was not privatized and the Argentine State remains being the owner of the nuclear power plants. The safety standards are keeping their current levels and in same cases they were also improved.

d) The objective of the program was incorporate a set of safety performance indicators to be used as a new regulatory tool to provide an additional view of de operational performance of the nuclear power plants, improving the ability to detect degradation on safety related areas. Thus, as an example, indicators related to maintenance and surveillance activities or organizational aspects have been defined according to that objective.

N°20
CNS-Ref.-Art.: 10
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

The Report mentions that Nucleoelectrica Argentina S.A. started, few years ago, to compete in an open electricity market. What measures were taken in order to avoid the jeopardizing of safety due to increasing production interests ?

ANSWER:

The deregulation and privatization of the electrical market introduced, particularly in the area of generation, the concept of competitiveness.

Even when the nuclear power plants were not privatized and the cost of generation was considerably low, the Responsible Organization carried out a series of measures to improve its competitiveness capacity. The most outstanding results were obtained using uranium slightly enriched in CNA I (0,85% de U-235), instead of natural uranium. This improvement allowed the Responsible Organization to duplicate the discharge burnup of the fuel elements, with savings of about 30% in the kWh generation cost.

Another important saving was achieved improving the programmed outages planning, reducing the period time when the plant is out of service and therefore optimizing the technical assistance services both national and international.

Regarding the electrical market competence it should be pointed out that within the period corresponding to this report, the regulatory body has not observed any reduction in safety related investments

N°21
CNS-Ref.-Art.: 10.1
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:
It is reported that during the training and re-training the benefits of applying the safety culture principle are provided.

1. What are the Safety Culture Principles?
2. Were they developed by the Regulatory Body?

ANSWER:

1. Safety Culture principles (for organizations and individuals) have been taken from IAEA Safety Series No 75 - INSAG 4. Nuclear Regulatory Authority considers statements from the above mentioned guide should be also applied to monitor NPPs Managers attitude. For training, INSAG 4 point 3.2.3 has been applied as a reference to properly check managers commitment with safety culture.
2. The Regulatory Body did not develop the safety culture principles, however, some enhancements (or adjustments) were made to applied IAEA guides.

N°22

CNS-Ref.-Art.: 10.1
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

What are the regulatory safety indicators?

ANSWER:

Set of Performance Indicators

Normal Operation

- **Plant Stability:**

1. Number of plant shutdowns.
2. Number of power reductions.
3. Load Factor:

- **Radiological Protection**

Dose:

4. Individual maximum dose.
5. Total equivalent dose.

Effluents:

6. Liquid effluent discharges.
7. Gaseous effluent discharges.

Waste Management:

8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events. Number of actions of the Safety Systems.

Risk

23. Unavailability of Safety Systems
24. Impact of reported events on core damage frequency .

N°23
CNS-Ref.-Art.: 10.1
Page of Report: 31
Chapter of Nat. Report: 10

QUESTION:

It is reported that regulatory safety specialists review the safety culture attitudes during inspections.

1. How do they evaluate them?
2. Do they have any inspection manual of safety culture attitudes?

ANSWER:

1. Evaluation is inherently drawn in every inspections, both routinely and specially programmed seeking weaknesses and early declining signs. Examples of safety culture monitoring aspects can be seen whenever management weaknesses are detected or operations procedures are ignored or operating limits are exceeded or maintenance weaknesses are shown, as inspection findings. Specially programmed inspections (by evaluators) are focused on

some others issues like verbal communication with operators. Besides, through evaluation of operation (routine surveillance tests, corrective maintenance) together with the evaluations of regulatory safety indicators trends it is also possible to determine signs of declining performance.

2. Resident Inspector Manual contains a dedicated chapter, which includes guides to detect weaknesses and early signs of declining in the Safety Culture within specific plant areas and within the Organization.

N°24
CNS-Ref.-Art.: 11
Page of Report: 33 - 40
Chapter of Nat. Report: 11

QUESTION:

The nuclear programme in Argentina is of limited size. This situation can induce problems on the staff motivation and turnover and recruitment of competent engineers. Is Argentina investigating this potential problem?

ANSWER:

On the one hand, lack of motivation and recruitment difficulties of specialized staff in the nuclear field are internationally common. In particular, in Argentina, attitudes of lack of motivation has also been observed in the nuclear field compared it wit others country areas. Several studies and presentations have been made to the highest level in the national government to search for a solution to this problem.

On the other hand, Nuclear Engineering Course is maintained in the Bariloche Atomic Centre and the University of Buenos Aires, School of Engineering, dictates a post-graduate course on Nuclear Energy that could satisfy the needs for recruitment.

The Regulatory Body is watching this process with much attention and is ready to require the adoption of any necessary decision.

N°25
CNS-Ref.-Art.: 11
Page of Report: 33 - 40
Chapter of Nat. Report: 11

QUESTION:

Under the current market competition in private electricity generation, does enough margin in offered tariffs exists (for electricity produced in nuclear installations) to account for the future de-commissioning of the plants? Could this margin ensure collection of sufficient funding for decommissioning, during plants operation until the end of their design life?

ANSWER:

The National Law of the Nuclear Activity (Act No. 24, 804) and Decree 1390/98 established the constitution of a Fiduciary Fund for Argentine nuclear power plants decommissioning, made up as follows:

- CNAI decommissioning U$S 199 000 000
- CNAII decommissioning U$S 216 000 000
- CNE decommissioning U$S 238 000 000

Funds flow had to be made by the Responsible Organization yearly, in amounts that had to take into account the remainder lifetime of each plant.

On the other hand, the mentioned Act and its regulatory Decree 1390/98 established that the National Atomic Energy Commission should define a project of each plant decommissioning complying with the requirements that the Regulatory Body had made accordingly. To fulfill this responsibility National Atomic Energy Commission would be able to use the resources accumulated in the Fiduciary Fund.

As the plants privatization did not take place, this Fund has not been constituted and to face this responsibility, National Atomic Energy Commission has the resources from the National Budget assigned to the institution, unless present legislation is modified and a Fiduciary Fund independent from privatizations was constituted.

It should be highlighted that the domestic electrical market tariffs established for the payment of electrical generation from any origin does not contemplate the constitution of any fund for the decommissioning of the plants.

N°26
CNS-Ref.-Art.: 11.1
Page of Report: 33
Chapter of Nat. Report: 11

QUESTION:

Has the present economic crisis any impact on the operating organization NASA (Upgrading, Backfitting, Safe Operation)?

ANSWER:

Economic recession is not reached the nuclear power plants, they go on generating at full power and selling all energy generated. It should be highlighted that nuclear generation cost is among the lowest in the domestic electric generating market.

The unrestricted dispatch for operation of nuclear power plants guarantees funds flow that allows to maintain the necessary economic resources so as to keep the level of the salaries, comply with scheduled maintenance, personnel training plans and spare parts stocks. Summing up, the present crisis has had no impact on operation, availability and safety of Argentine nuclear power plants.

The Regulatory Body is on the alert towards any early sign of degradation of the installations that might affect safety and is ready to adopt the necessary corrective measures and eventually requiring to shut down the plants if necessary.

N°27
CNS-Ref.-Art.: 11.4
Page of Report: 35
Chapter of Nat. Report: 11

QUESTION:

Has the financing scheme for the radioactive waste including spent fuel disposal and the decommissioning of nuclear power plants been agreed upon and regulated?

ANSWER:

The strategic plan of waste management has been approved by the National Atomic Energy Commission -Board of Directors- on July, 2001 and sent to the National Executive Power. Once reviewed it should be sent to the consideration of the National Congress for its approval. At present, the strategic plan is being analyzed by different organizations within the National Executive Power and has not been sent for approval to the National Congress yet.

The acceptance criteria and transference conditions have been elaborated by CNEA and approved by the Regulatory Body. At present CNEA is adding some news procedures.

The National Law of the Nuclear Activity (Act No. 24, 804) and Decree 1390/98 established the constitution of a Fiduciary Fund for Argentine nuclear power plants decommissioning, made up as follows:

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As the plants privatization did not take place, this Fund has not been constituted and to face this responsibility, National Atomic Energy Commission has the resources from the National Budget assigned to the institution, unless present legislation is modified and a Fiduciary Fund independent from privatizations was constituted.

It should be highlighted that the domestic electrical market tariffs established for the payment of electrical generation from any origin does not contemplate the constitution of any fund for the decommissioning of the plants.

N°28
CNS-Ref.-Art.: 11.2
Page of Report: 34
Chapter of Nat. Report: 11

QUESTION:

Are there sufficient funds for the decommissioning of the NPPs?

ANSWER:

The National Law of the Nuclear Activity (Act No.24, 804) and Decree 1390/98 established the constitution of a Fiduciary Fund for Argentine nuclear power plants decommissioning, made up as follows:

- CNAI decommissioning U$S 199 000 000
- CNAII decommissioning U$S 216 000 000
- CNE decommissioning U$S 238 000 000

Funds flow had to be made by the Responsible Organization yearly, in amounts that had to take into account the remainder lifetime of each plant.

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As the plants privatization did not take place, this Fund has not been constituted and to face this responsibility, National Atomic Energy Commission has the resources from the National Budget assigned to the institution, unless present legislation is modified and a Fiduciary Fund independent from privatizations was constituted.

It should be highlighted that the domestic electrical market tariffs established for the payment of electrical generation from any origin does not contemplate the constitution of any fund for the decommissioning of the plants.

N°29
CNS-Ref.-Art.: 11.6
Page of Report: 38
Chapter of Nat. Report: 11

QUESTION:

What is the current situation of Atucha I operators regarding simulator training? Is there a plant specific simulator available? Is there an intention to build one?

ANSWER:

Personnel training in a simulator currently takes place in ANGRA II (Brazil). In Atucha I there is a specific reduced simulator, an interactive graphic simulator (IGS) that is used with training purposes of new staff only. It contains a model of the primary loops and its

control, with the objective of simulating system behavior in different operating situations, transients and accidents with loss of coolant, for training operators in the procedures of normal and accidental events. On the other hand, the construction of a specific full scope simulator is not foreseen.

N°30
CNS-Ref.-Art.: 11.7
Page of Report: 38
Chapter of Nat. Report: 11

QUESTION:

Article 11 of the Report (item 11.7) says that in the period of 1994-1998 "Nucleoeléctrica S.A." took a number of actions aimed at assuring competitiveness of NPPs in an open electricity market, and this resulted in the reduction of generation costs and kWh price by a factor of 1.3.
Could you please comment in this connection on the following: could safety be impaired because of utility striving to improve NPP competitiveness in the open electricity market?

ANSWER:

The deregulation and privatization of the electrical market introduced, particularly in the area of generation, the concept of competitiveness.

Even when the nuclear power plants were not privatized and the cost of generation was considerably low, the responsible organization carried out a series of measures to improve its competitiveness capacity. The most outstanding results were obtained using uranium slightly enriched in CNA I (0,85% de U^{235}), instead of natural uranium. This improvement allowed the Responsible Organization to duplicate the discharge burnup of the fuel elements, with savings of about 30% in the kWh generation cost.

Another important saving was achieved improving the programmed outages planning, reducing the period time when the plant is out of service, components outage times and therefore optimizing the technical assistance services both national and international.

Regarding the electrical market competence it should be pointed out that within the period corresponding to this report, the regulatory body has not observed any reduction in safety related investments.

N°31
CNS-Ref.-Art.: 11.7
Page of Report: 38
Chapter of Nat. Report: 11

QUESTION:

The Regulatory Body has improved its capability to supervise the nuclear power plants, reinforcing its departments of nuclear safety analysis and inspectorate.

How does the nuclear regulator monitor the processes of deregulation of electricity market and privatization of nuclear industry and assure that nuclear safety is not deteriorating in this competitive environment?

ANSWER:

The deregulation and privatization of the national electricity market introduced, in particular into the power generation area, the competition concept. In spite of the fact that Argentinean nuclear power plants were not privatized and its generation costs were allowable low, the Responsible Organization implemented a set of measures to improve its competitive capability. The more relevant results were achieved, in Atucha I NPP, by using fuel elements with slightly enriched uranium (0.85% of U^{235}) instead of natural uranium fuel element which allow to duplicate the fuel elements discharge burn-up saving about 30% in the kWh cost. Another important saving was achieved by improving scheduled revisions, reducing out of service times and optimizing national and foreign assistance services. Such measures allowed the responsible organization to keep the necessary economic resources needed for safe nuclear power plants operation.

On the other hand, the Regulatory Body, by means of continuous assessments such as evaluating some indicators trends that provide significant information regarding this subject and the application of the inspection program, verified that the economical resources for training, maintenance, and upgrading components and systems are continually taking place during operation and the plant planned outages.

N°32
CNS-Ref.-Art.: 12
Page of Report: 41
Chapter of Nat. Report: 12

QUESTION:

How are foreign events and experiences included in the human factor assessment?

ANSWER:

Defining Operating Experience as: “Operational history of NPPs examined with the purposed of improving the safety, reliability, and availability of plants by identifying causes and transferable lessons following events and singling out good practices which may be emulated by other plants or operators” . Human factors, when influence the behavior of an event; are common for most of the countries. Some examples are : training, environment, interaction between staff and systems.
Screening of foreign events can be use as “lessons learned” when experience has shown that NPPs operators (from different countries) are able to make the same mistakes in similar situations.
From the PSA point of view, foreign events and experiences helped to evaluate the possibility of certain recovery actions, not included in the procedures. Foreign experience is being used in certain actions to evaluate operator time response in some specific scenarios.

N°33
CNS-Ref.-Art.: 12
Page of Report: 41
Chapter of Nat. Report: 12

QUESTION:

a) Could Argentina provide some information on the measures taken by contractors in order to ensure a sufficient competence and safety culture?
b) Are the PSA results used for the definition of the operators training (identification of critical actions)?
c) What is the type of Emergency Operating Procedures used by Argentina (event oriented or symptom oriented)?

ANSWER:

a) The technical assistance services to the nuclear power stations are given by competent companies whose personnel has qualifications, knowledge and experience about domestic nuclear power plants. Also the new personnel is trained with the necessary knowledge before they enter to the nuclear area.

b) In the case of Atucha I NPP where PSA was finished, reviewed and modifications to the plant already implemented, it can say that:

1. PSA results conducted to the convenience of writing new abnormal operating procedures and updating of many of the existing ones, particularly with respect to the identification of critical human actions.

On the other hand, PSA results are important to evaluate potential recovery pathways in the significant accidental situations that were not included in the plant procedures. Additionally, specific information about the operators time and time windows have been compiled.
Examples of new procedures (already implemented):
Primary low pressure
Saturation in the Primary Heat transport System
Loss of condenser cooling water.
Loss of secured service water.

2. Modification of existing procedures including new or emphasizing critical human actions e.g. Using volume control system for Small LOCA mitigation.

In the case of Embalse NPP, there is already a quantification of the complete model. Anyway most critical actions have been already identified (those with higher contribution to the core damage). Such critical actions are being included in the operators training programs..

c) In general, event oriented procedures of emergency are used, but benefits from symptom oriented procedures have been included due of the following reasons:

1. All the procedures include the broad control of the plant critical parameters (power control, safety systems verification, etc.).
2. In the case of alarms sets corresponding to different events, the procedures include a series of steps in order to discriminate them avoiding misunderstandings . Also describe the specific processing of each one and, if it is necessary, to indicate the links to the procedures for the specific event.

3. If a wrong procedure is being used because of a mistake, the operator could quickly detect the fault throughout the successive questions and verifications.

N°34
CNS-Ref.-Art.: 12
Page of Report: 41
Chapter of Nat. Report: 12

QUESTION:

Paragraph 4 of section 12 refers to the identification of precursors to operational events, including low safety significant events and near-misses. What has been done to make the encouraging environments to collect those events and what are the processes to handle those events and near-misses?

ANSWER:

The process to encourage people to collect those events is, occasionally, the one recommended in other countries: the use of the "blame tolerance"**(1)** criteria.

At the moment, there is a specific procedure for the report and analysis of the Internal Events. Such events are examined by the operating experience coordinator that determines the level of the report, considering the importance of the event from one to three.

Regarding how the report of " smaller " events is handle; the procedure that governs the task contemplates a report scheme in which any worker of the Power station can by itself, to its own criterion and with no need of explicit authorization of its superior ones, to communicate an event

With respect to the process used to organize this type of events, these are classified from level 1 to 3 and they do not require analysis of root cause obligatorily, only direct or apparent cause is required. In addition to the remedial actions that could correspond, the analyzed event is spread in the corresponding sectors and is published in a base data internal available for all the personnel.

(1) BLAME TOLERANCE: Organizational ability to accept slips and lapses by workers without sanctions. In such a framework, individuals feel free to report near misses and events without fear of reprisals or recriminations.

N°35
CNS-Ref.-Art.: 12
Page of Report: 41
Chapter of Nat. Report: 12

QUESTION:

Having in mind that the PSA level. 1 is available for both NPPs, please explain how is PSA used for event and human performance analyses.
a) Are the corrective measures evaluated by PSA?

b) Have you developed and/or used specific performance/safety indicators in the area of human factors? If yes, what is your experience with them?

ANSWER:

a) PSA results conducted to the convenience of writing new abnormal operating procedures and updating of many of the existing ones, particularly with respect to the Identification of critical human actions. PSA team has been cooperated in the development and revision of procedures as well as in operators training. New procedures (already implemented):
Primary low pressure
Saturation in the Primary Heat transport System
Loss of condenser cooling water.
Loss of secured service water.
Modification of existing procedures including new or emphasising critical human actions e.g. Utilizing volume control system for Small LOCA mitigation.
Corrective actions were included in PSA model after the procedures were changed and operators training was completed, that is changing quantification in some cases from “recovery actions” to “type3“ actions.

b) Do not exist specific human performance indicators because of the difficulty to define them in this area. Nevertheless many of the regulatory indicators give indirect information which can be used for evaluation of human performance

N°36
CNS-Ref.-Art.: 13.2 – Fig. 13.1
Page of Report: 43 - 45
Chapter of Nat. Report: 13

QUESTION:

It is reported that Embalse organization has suffered significant modifications but has no affect to QA system. In the figurer it seems that the QA section is in parallel to “Engineering Coordination” and “Maintenance Coordination”. Is QA section in a position to direct QA activities to these organizations as a staff reporting to the Manager of “CNE Division”?

ANSWER:

QA section reports directly to the Manager of Embalse NPP Division. QA Section personnel operates directly as an independent section from the others. This section has sufficient authority and organizational freedom to carry out its responsibilities.

N°37
CNS-Ref.-Art.: 13.1
Page of Report: 43
Chapter of Nat. Report: 13

QUESTION:

Does the Regulatory Body also reviews the general Quality Assurance Program of the Responsible Organization and Nuclear Plant Quality Assurance Program, namely if the

programs are prepared in accordance with Argentinean legislation and IAEA applicable quality and Safety guides and other adequate documents referring to nuclear quality if the programs are mutual harmonized?

ANSWER:

The Regulatory Body is empowered to review the quality programs of both the Responsible Organization and the nuclear installations. Such regulation can be made by the Regulatory Body itself or contracting third parties. The quality system and programs must meet the regulatory standard 3.6.1 “Quality System”, the operating license requirements and any other requirement on such subject issued by the Regulatory Body. The regulatory standard AR 3.6.1 “Quality System” is consistent with Code 50-C-Q, NUSS program of IAEA.

On the other hand, the Quality Assurance General Manual of the Responsible Organization and the NPPs quality programs have been prepared considering the requirements issued by the Regulatory Body and the recommendations of IAEA codes and guides. The plants QA Programs are consistent with the Responsible Organization General Program.

N°38
CNS-Ref.-Art.: 14
Page of Report: 47 - 49
Chapter of Nat. Report: 14

QUESTION:

Is Argentina considering life extension of the Embalse and Atucha I reactors. If so, what are the regulatory requirements for plant life extension?

ANSWER:

At the moment was not considered life extension of argentinean nuclear power plants. However, the Responsible Organization is performing studies on critical components (e.g.. Atucha I reactor pressure vessel integrity and Embalse pressure tubes replacement) with the objective to establish the basis for an extension life program of both nuclear power plants.
Besides that, studies on the components ageing effects have been initiated aimed to collect the necessary information for evaluating, from the safety end economic point of view, the life extension of nuclear power plants.

N°39
CNS-Ref.-Art.: 14
Page of Report: 47 - 49
Chapter of Nat. Report: 14

QUESTION:

According to the Report, could be understood that the “Regulatory Plant Safety Indicators” tool is already being used, although this is not specifically said in the Report. What are the results?

ANSWER:

At the moment, some of the results were useful to detect and request for corrective actions, especially in surveillance – maintenance. From the evaluation of performance indicators trends, audits and especial inspections have been planned.

N°40
CNS-Ref.-Art.: 14
Page of Report: 47 - 49
Chapter of Nat. Report: 14

QUESTION:

Your work on developing safety indicators is very interesting. Please provide us with information about the actual indicators in the six main areas.
a) What are these indicators?
b) How these indicators are used in the regulatory decision making?

ANSWER:

a) Set of Performance Indicators

Normal Operation

- **Plant Stability:**
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

  4. Individual maximum dose.
  5. Total equivalent dose.

Effluents:

  6. Liquid effluent discharges.
  7. Gaseous effluent discharges.

Waste Management:

  8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

  9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
  10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
  11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.

12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition)
25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

b) The objective of the safety performance indicator system is to incorporate a set of safety performance indicators to be used as a regulatory tool to provide an additional view of de operational performance of the nuclear power plants, improving the ability to detect degradation on safety related areas. Audits and inspections are planned specifically based on the indicators trends.

N°41
CNS-Ref.-Art.: 14
Page of Report: 47 - 49
Chapter of Nat. Report: 14

QUESTION:

According to the Atucha NPP PSA studies during shutdown state, major contributors to core damage frequency were identified showing the important weight of the relatively

high maintenance unavailability of certain components and an important contribution of single failures that can cause the unavailability of components to be used as a redundancy for residual heat removal.
Did these results lead to induce some changes?

ANSWER:

PSA for low power and shutdown modes is not completed yet. Phase I, corresponding to cold depressurized shutdown states was finished last year, without including realistic recovery actions analysis. Taking into account the time available for operator, we expect that this analysis will reduce significantly many of the main contributors to core damage.

At present, phase II of low power and shutdown PSA is under development. As many corrective actions based on the PSA level 1 results were taken to improve the plan safety, as soon as the complete shutdown and low power PSA finished and reviewed by the Regulatory Body, it is expected to be in the conditions to propose or require the necessary design changes.

N°42
CNS-Ref.-Art.: 14
Page of Report: 47 - 49
Chapter of Nat. Report: 14

QUESTION:

It is mentioned that the Aging Management Program in Atucha Iand Embalse NPP includes valves, pipelines, pumps and heat exchangers.
What methods are used for monitoring the degradation of the components and what are the technical backgrounds for each method?

ANSWER:

The monitoring of components degradation is included within the ageing management program. It is based on evaluation of the operating conditions for each component under analysis, such as working temperature, irradiation field, component functional characteristics and human errors that can lead to worst normal degradation conditions. Well known methodologies are used to evaluate such degradations:

- Predictive and preventive maintenance
- In-service inspection program
- Additional testing
- Degradation evaluation
- Evaluation of acceptance criteria on each case

In-service inspection program includes the follow-up of critical components or safety related components. Redundant components revision, is performed by alternating for each component at different planned outages. Monitoring wall thinness in pipelines and valves are performed through ultrasound method. Heat exchanger tubes inspection is performed by using eddy current method.

Inspection of feeders was included in the Embalse NPP In Service Inspection Program in 1989, from that, the feeders wall thickness was inspected by ultrasound techniques.

In the 2002 planned outage it is foreseen to use a Canadian semi-automatic equipment. Besides, another equipment to be used is a device to control the feeders integrity (echo-pulse methodology).

N°43
CNS-Ref.-Art.: 14
Page of Report: 47
Chapter of Nat. Report: 14

QUESTION:

In 1998 the first set of indicators was defined and a pilot implementation program was initiate. As a result of pilot program several improvements have been carried out. Has the introduction of these indicators already shown some positive effects (better and more rapid safety insights, ability to focus attention of the inspection, perhaps even the reduction in number of necessary inspections…)?

ANSWER:

It has been detected some positive effects, particularly with the indicators related with maintenance. Good results were obtained from the indicator “Reworking maintenance”, which showed tendencies allowing to infer the associated causes.

The indicator “Corrective work orders issued for safety and safety related systems which are pending” was very useful, resulting in a complete revision of the work orders database. Some corrective measures were taken by the Responsible Organization to improve performance indicators results.

Regulatory inspections frequency has not been changed. Some audits to verify the reported indicators had been performed and, in the case of “Overdue preventive or predictive maintenance tasks”, it was performed a permanent verification by resident inspectors.

N°44
CNS-Ref.-Art.: 14
Page of Report: 47
Chapter of Nat. Report: 14

QUESTION:

Please provide some examples of the regulatory plant safety indicators used.

ANSWER:

Set of safety performance indicators:

Normal Operation

- Plant Stability:
  1. Number of plant shutdowns.
  2. Number of power reductions.

3. Load Factor:

- **Radiological Protection**

Dose:

4. Individual maximum dose.
5. Total equivalent dose.

Effluents:

6. Liquid effluent discharges.
7. Gaseous effluent discharges.

Waste Management:

8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition)
25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

N°45
CNS-Ref.-Art.: 14
Page of Report: 47
Chapter of Nat. Report: 14

QUESTION:

It is stated that Nuclear power plants in operation have implemented an aging management required by the regulatory body. Do you perform comprehensive periodic safety review relevant to aging management recommended by IAEA ?

ANSWER:

The aging management program was implemented three years ago required by regulatory body. To facilitate a continuous improvement process it has been performed a program effectiveness " self assessment" by monitoring the actions included in such program. On the other hand, the Regulatory Body is checking the results of this program as a regular basis in order to review whether it is being effectively managed considering its objectives.

N°46
CNS-Ref.-Art.: 14.2
Page of Report: 48 - 49
Chapter of Nat. Report: 14

QUESTION:

About Safety Indicators used by the Regulatory Body:
a) What is the set of numerical safety indicators been used?
b) Is there goals or thresholds establish for each indicators?
c) How are the indicators been used in the regulatory control process?

ANSWER:

a) Set of safety performance indicators:

Normal Operation

- **Plant Stability:**
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

4. Individual maximum dose.
5. Total equivalent dose.

Effluents:

6. Liquid effluent discharges.
7. Gaseous effluent discharges.

Waste Management:

8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition)
25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

b) There is not goals or thresholds establish for each indicator. To evaluate Nuclear Power Plants performance by using selected Safety Indicators, it is necessary to establish reference or acceptability values for them. In order to establish these values it is necessary to have sufficient historical data to validate a relation between the value of the indicator and its influence on the safety performance. This task is not possible for most of the indicators of the program. Although statistics covering the last eight years of operation have been made for some of them. The above is not applicable for indicators in areas like maintenance or repetitive tests. Nevertheless, experience showed that most of the indicators have values within of a limited range allowing to establish reference parameters. Therefore, until values of acceptability will be defined, the evaluation of information included in each indicator is being performed by following each indicator evolution corresponding to each nuclear power plant.

c) The set of safety performance indicators is used as a regulatory tool to provide an additional view of the nuclear power plants performance allowing to improve the ability to detect any eventual degradation on safety related areas.

N°47
CNS-Ref.-Art.: 14.2
Page of Report: 48 - 49
Chapter of Nat. Report: 14

QUESTION:

It is reported that the Regulatory Body is considering the use of numerical indicators as a tool to evaluate the safety performance and they are divided to six areas.
Could you explain followings,
1) What parameters are supposed to evaluate each area?
2) It is reported that indirect indicators are also to be evaluated. What parameters are to be evaluated?
3) What is your idea to reflect the evaluation results to the nuclear plant regulations?

ANSWER:
1) The following indicators are considered to evaluate each area:

Normal Operation

- **Plant Stability:**
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

4. Individual maximum dose.

5. Total equivalent dose.

Effluents:

6. Liquid effluent discharges.
7. Gaseous effluent discharges.

Waste Management:

8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition)
25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

2) Indirect indicators are used to evaluate programmatic and organizational aspects of the Responsible Organization. Such indicators have been included into the organization, maintenance and surveillance areas.

3) The set of safety performance indicators is used as a regulatory tool to provide an additional view of the nuclear power plants performance allowing to improve the ability to detect any eventual degradation on safety related areas.

N°48
CNS-Ref.-Art.: 14.2
Page of Report: 48 - 49
Chapter of Nat. Report: 14
QUESTION:

Article 14 (item 14.2) states that programs of NPP safety assessments using numerical safety indicators have been introduced at "Atucha-I" and "Embalse" NPPs.
Would you please advise us on the list of these numerical indicators for operating plants, using which you perform the routine (quarterly) safety assessments of the plants.

ANSWER:

The set of performance indicators that is being used are the following:

Normal Operation

- **Plant Stability:**
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

  4. Individual maximum dose.
  5. Total equivalent dose.

Effluents:

  6. Liquid effluent discharges.
  7. Gaseous effluent discharges.

Waste Management:

  8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

  9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
  10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.

11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

14. Number of overdue repetitive tests of safety or safety-related systems.
15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.
21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.
23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition).
25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

N°49
CNS-Ref.-Art.: 14.2
Page of Report: 48 - 49
Chapter of Nat. Report: 14

QUESTION:

Article 14.2 (pages 48-49) states that the regulatory body established a program to define and implement a system of Safety Performance Indicators in 1997. A pilot program was carried out in 1998. The regulator defined a framework with 6 main areas: operation stability, radiation protection, surveillance, organization, abnormal operation,

and risk. The indicators are reported quarterly. **How are performance indicators used by the regulatory body and the operating organization to assess the safety performance of a licensed reactor? What indicators are used?**

ANSWER:

The objective of the program is incorporate a set of safety performance indicators to be used as a new regulatory tool to provide an additional view of de operational performance of the nuclear power plants, improving the ability to detect degradation on safety related areas.

The set of performance indicators that is being used is the following:

Normal Operation

- Plant Stability:
  1. Number of plant shutdowns.
  2. Number of power reductions.
  3. Load Factor:

- **Radiological Protection**

Dose:

  4. Individual maximum dose.
  5. Total equivalent dose.

Effluents:

  6. Liquid effluent discharges.
  7. Gaseous effluent discharges.

Waste Management:

  8. Low activity solid wastes.

- **Surveillance:**

Maintenance:

  9. Number of reports on safety or safety-related system deficiencies of a corrective nature submitted during the period.
  10. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending, excluding those requiring the cooling down of the nuclear power plant.
  11. Number of reports on safety or safety-related system deficiencies of a corrective nature which are still pending due to lack of supplies.
  12. Number of reports on corrective-type deficiencies in the safety or safety-related system components subject to corrective or preventive maintenance in the previous six months.
  13. Number of overdue preventive or predictive routine inspections and maintenance tasks involving safety or safety-related system components, excluding those requiring the cooling down of the power plant.

Repetitive Tests:

  14. Number of overdue repetitive tests of safety or safety-related systems.
  15. Number of deficiency reports submitted on the basis of the repetitive tests performed on safety or safety-related systems.
  16. Number of test procedures whose revision or issuance is overdue.

- **Organization**

Training:

17. Number of hours devoted to training on safety-related issues.

Feedback from Operational Experience:

18. Number of documented event analyses, findings or design modifications in similar power plants.

Internal Control:

19. Number of internal technical audits.

Compliance with Regulatory Authority standards

20. Number of pending Regulatory Requirements.

21. Number of violations to the Mandatory Documents.

Abnormal Operation

22. Number of relevant events.

23. Number of activation of the Safety Systems.

Risk

24. Unavailability of Safety Systems (under revision due to it is considered necessary to clarify its definition)

25. Impact of reported events on core damage frequency (under revision due to it is considered necessary to clarify its definition).

N°50
CNS-Ref.-Art.: 15
Page of Report: 51 - 63
Chapter of Nat. Report: 15

QUESTION:

The report identifies the authorized gaseous and liquid discharge limits for Atucha I and Embalse NPP. Some differences in considered radioactive nuclides and the limit value present between two NPPs. What makes the differences for two NPPs?

ANSWER

The differences between radioactive nuclides and the limit values of both NPPs arise from consider specific characteristics for each installation and the use of specific radiological models. In case of limit values it is influenced by the critical group location for gaseous discharges and the river or lake characteristics for liquid discharges. Likewise must be taken into account the number of installations in a site (Atucha I and Atucha II) to avoid that the critical group total doses resulting from all nuclear power plants operating in that site, exceed the dose restriction imposed by the Regulatory Body (0,1 mSv).

N°51
CNS-Ref.-Art.: 15
Page of Report: 51 - 63
Chapter of Nat. Report: 15

QUESTION:

The workers' exposure in the Atucha I NPP was very high, especially in the last two years in comparison to other NPP's – average effective dose in 2000 was 80% of dose limit. Are plant specific ALARA programs in place and are they implemented? What are the specific measures taken to reduce exposure from Co-60?

ANSWER:

During the activities carried out due to the backfitting program for Atucha I NPP, it had not operated during both four months in 1999 and six months in 2000. In such planned outages a large amount of work was performed with significant radiological impact such as the replacement of coolant channels, control rod guide tubes, in-core neutron flux sensor, moderator tank cleaning, moderator level sensors and maintenance activities in the moderator system heat exchangers.
All the above mentioned works were performed in a high radiation field. Significant investments have been carried out in the ALARA program of the plant. The application of the ALARA program considering work planning, shield analysis and mock-up practices contributed to diminish the personnel doses significantly avoiding higher doses.

Cobalt 60 present in the Atucha I nuclear power plant is due to "stellite-6" from original coolant channels. The ALARA program is applied not only for reducing doses but also for reducing the radiation sources. With the objective to eliminate cobalt 60 sources, all original coolant channels are being replaced by other ones without "stellite-6" and different design. Such work imply significant working doses but, it is expected that relationship cost / benefit will be in future improved.

N°52
CNS-Ref.-Art.: 16
Page of Report: 65 – 68
Chapter of Nat. Report: 16

QUESTION:

It is not clear in the text if the State Company Nucleoeléctrica Argentina S.A. is part of the Nuclear Emergency Response System. What is the role of NASA during an emergency?

ANSWER:

The nuclear power plants operation licence requires an emergency plan that includes internal and external aspects of the radiological consequences. The Responsible Organization (Nucleoeléctrica Argentina S.A) elaborated, implemented and keeps updated that plan, which is approved by the Regulatory Body. The plant manager conducts the on-site emergency response and is also responsible, at the beginning of an emergency, of applying the off-site "automatic countermeasures" up to 10 km (stable iodine pills distribution, sheltering and road control).

After the initial period, a Regulatory Body Officer take the power from the plant manager for conducting the countermeasures appliance, once the external organization for nuclear emergency response is established according to regulations.

N°53
CNS-Ref.-Art.: 16
Page of Report: 65 – 68
Chapter of Nat. Report: 16

QUESTION:

Please provide information on measures for contacting and informing neighboring Contracting Parties (e.g. Chile and Brazil) in the event of a radiological emergency.

ANSWER:

In 1986, Brazil and Argentina signed the Argentinean-Brazilian Co-operation Agreement. This agreement includes the “Co-operation and Mutual Assistance in cases of nuclear accidents and radiological emergencies” Chapter. Brazil is the only neighboring country with nuclear power plants. Argentina has also agreements related to nuclear affairs with Paraguay, Bolivia, Uruguay and Chile.
This agreements facilitate bilateral communications when necessary and, furthermore, Argentina, Chile and Brazil are Contracting Parties of the Convention on Early Notification of a Nuclear Accident, framework to facilitate the exchange of information in the event of radiological emergency due to a nuclear accident.

N°54
CNS-Ref.-Art.: 16
Page of Report: 65 – 68
Chapter of Nat. Report: 16

QUESTION:

It is unclear whether Argentina has bilateral agreements with its neighboring countries. Please explain the official arrangements with all of your neighboring countries for information exchange and notification of emergencies (also less severe ones).

ANSWER:

In 1986, Brazil and Argentina signed the Argentinean-Brazilian Co-operation Agreement. This agreement includes the “Co-operation and Mutual Assistance in cases of nuclear accidents and radiological emergencies” Chapter. Brazil is the only neighboring country with nuclear power plants. Argentina has also agreements related to nuclear affairs with Paraguay, Bolivia, Uruguay y Chile.
This agreements facilitate bilateral communications when necessary and, furthermore, Argentina, Chile and Brazil are State Parties of the Convention on Early Notification of a Nuclear Accident, framework to facilitate the exchange of information in the event of radiological emergency due to a nuclear accident.

N°55
CNS-Ref.-Art.: 16
Page of Report: 65 – 68
Chapter of Nat. Report: 16

QUESTION:

How is the information and data-transfer between the different centers organized in case of an accident?

ANSWER:

Information and data transfer between emergency centers is performed using multiple and diverse means like: regular telephone lines (colloquial and Facsimile), mobile phones (including satellite ones), radio-transmissions (fixed and mobile VHF and USB stations and “beepers”) and internet.

Plant condition and its evolution, meteorological conditions, radiation measurements, protective actions, and forecasts, in particular dose projections, data are transmitted to the emergency centers since the first early alerts detected, by a superior technical officer specially designated for that purpose.

Emergency centers re-transmit this data and also reply with the result of assessments, questions and instructions when necessary. All telephone communications are based on commercial available systems and for the radio-transmissions there is a special system maintained by operator and emergency response organizations.

N°56
CNS-Ref.-Art.: 16
Page of Report: 65 – 68
Chapter of Nat. Report: 16

QUESTION:

The report states that the Federal Emergency System is a national structure responsible for coordinating amongst the federal agencies. In addition, it stated that the Regulatory Body is a specific national organization that acts in cases of nuclear emergencies. Which organization will be the lead organization if there is an nuclear emergency?.

ANSWER:

The Plant Manager conducts the on-site emergency response and is also responsible, at the beginning of an emergency, of applying the off-site “automatic countermeasures” at a local distance, up to 10 km (stable iodine pills distribution, sheltering and road control).

After the initial period, a Regulatory Body Officer receives, from the Plant Manager, the power for conducting the countermeasures appliance in the first 10 km, once the local external organization for nuclear emergency response is established, according to regulations.

In other instances (at state and national levels) emergency co-ordination centers are constituted for the necessary actions to be applied in spatial and time scales different from those related to the local ones. These co-ordination centers are conducted by national and state representatives from the Federal Emergency System and the States Civil Defense respectively.

N°57
CNS-Ref.-Art.: 16.1
Page of Report: 65
Chapter of Nat. Report: 16

QUESTION:

In general, the nuclear authorities do not have enough experience in dealing with the co-ordination and management of the several aspects concerned with civil defense (or civil protection). What kind of changes did the Regulatory Body perform in order to face the new responsibilities set by the Act No. 24,804 and Decree 1,390 ?

ANSWER:

The Regulatory Body has more than 20 years experience in nuclear accident exercises participating at a local level and being involved in all the aspects related to off-site radiological countermeasures. The Regulatory Body is the most experienced national agency concerning this matter.

Since Act No. 24,804 and Decree 1,390 the following changes have taken place:

- A national system and control center for nuclear emergencies, response and co-ordination was set.
- Senior teams from the Regulatory Body increased their skills by means of training on the new responsibilities. In particular co-ordination and management of the aspects concerning radiological countermeasures involving large number of people (from 2,000 to 8,000 inhabitants, according to the population distribution around the first 10 km from the NPPs).
- New emergency plans were developed together with Local Civil Defense, States Civil Defense and Federal Emergency System. These plans include radiological and non-radiological aspects and are tested periodically together with the population.

N°58
CNS-Ref.-Art.: 16.2.2
Page of Report: 66
Chapter of Nat. Report: 16

QUESTION:

It is reported that the nuclear power plants periodically perform drills and exercises and are evaluated by the Regulatory Body.

1. Is the offsite drills or exercise performed with the participation of the Regulatory Body?

2. Have you ever participated in the international emergency exercise such as JINEX coordinated by IAEA?

ANSWER:

1. Since 1980 to 1998, the Regulatory Body was the auditor of the off-site exercise and took part as advisor. Since 1999 by the new Decree the Regulatory Body changed its role to coordinator and auditor and took part leading the off-site countermeasures implementation to mitigate radiological consequences on the public, up to 10 km.
2. The Regulatory Body participated in JINEX and other international exercises.

N°59
CNS-Ref.-Art.: 16.2.3
Page of Report: 67
Chapter of Nat. Report: 16

QUESTION:

For further clarification please sketch the competencies and especially the tasks of your initial emergency response system including the tasks and competencies of the Nuclear Emergency Operative Chief.

ANSWER:

The Plant Manager is, at the beginning of an emergency, responsible of applying the off-site “automatic countermeasures” up to 10 km, acting as Nuclear Emergency Operative Chief

After the initial period, a Regulatory Body Officer receives from the Plant Manager the power for conducting the countermeasures appliance, once the external organization for nuclear emergency response is established according to regulations.

Civil organizations and security forces report to the Nuclear Emergency Operative Chief.

The tasks of the Nuclear Emergency Operative Chief are:

- Lead the stable iodine pills distribution, sheltering and road control.
- Assess the radiological consequences at local level and inform the Regulatory Body headquarters and other organizations.
- Apply late complementary protective actions established by the Regulatory Body headquarters and other state or national competent organizations.

N°60
CNS-Ref.-Art.: 16.2.3
Page of Report: 67
Chapter of Nat. Report: 16

QUESTION:

1. Does the “precautionary action zone” of 10 km correspond to the “precautionary action zone” recommended by the IAEA (3 km distance). Could you give more detailed explanation?
2. What actions will be taken in the “precautionary zone”?
3. Who is the decision-maker for protective actions ?
4. Who provides expert advice to local or state authorities?

ANSWER:

1) Yes, it does. The precautionary action zone corresponds to IAEA´s recommendation. In Argentina a “key hole” shaped region of 3 km in all directions and up to 10 km in the direction of the wind (60º circular sector) is defined for this purpose.
2) In this region the following early primary protective actions are applied: stable iodine pills distribution, sheltering and road control. In some particular cases (public identified as living very close to the nuclear power plant or people within the boundaries) early evacuations are applied. These actions are applied on the basis of plant and meteorological conditions.
   Late protective actions are: general evacuation, food consumption restriction and decontamination. These measures are taken on the basis of environmental measurements and radiological assessment.

3)The Plant Manager conducts the on-site emergency response. The Plant Manager is also responsible, at the beginning of an emergency, of applying the off-site “automatic countermeasures” at a local instance, up to 10 km (stable iodine pills distribution, sheltering and road control). After the initial period, a Regulatory Body Officer receives from the Plant Manager the power for conducting the countermeasures appliance in the first 10 km, once the local external organization for nuclear emergency response is established, according to regulations.

4) The Regulatory Body provides advice and is also the leader in the implementation of radiological protective actions at local level. In other instances (at state and national levels) emergency coordination centers are constituted. These coordination centers are conducted by national and state representatives from the Federal Emergency System and the States Civil Defense respectively and the regulatory body act as technical advisors.

N°61
CNS-Ref.-Art.: 17
Page of Report: 69 - 71
Chapter of Nat. Report: 17

QUESTION:

a) Could Argentina provide more information on the re-evaluation plan concerning the man-made events?
b) In the 1999 report, it was indicated that the flooding level of the Atucha site had been changed, inducing modifications of cooling water inlet structures of CNA 2. Is this new flooding level acceptable for CNA 1?
c) Concerning the seismic re-evaluation of the Embalse NPP, the safety improvements are related to the implementation of a new digital seismic instrumentation and operating procedures. Is it not necessary to reinforce structures and verify the seismic qualification of components?

ANSWER:

a) The regulatory body is analyzing together with responsible organization which kind of external man induced events re-evaluation study would be performed. On the other hand, a solid substances explosion effects training which includes the consequences of its mitigation was performed.

b) In the last years different alternatives have been studied regarding flooding in Atucha I. Actually not only water level but also other events resulting in intake channel blockage have been studied. Operating instructions have been developed by listing the actions that has to be taken depending on the level measured in the intake channel. That instructions take into account the configurations needed to keep the plant in a safe situation, considering also the cooling of the storage spent fuel pool. The second heat sink which is now under construction, will improve safety for these scenarios providing an independent system from the actual residual heat removal system which uses the river as final heat sink.

c) The digital instrumentation proposal to seismic detection installed in Embalse NPP is give information to operator to decide the reactor scram in case that an earthquake occurs while the plant is operating. Besides, as were explained in 1998 report, improvement to installation systems due to seismic re-evaluation performed at that moment, were implemented before the beginning of plant operation. Therefore, considering that the design basis earthquake was not modified since that time, it was not considered necessary reinforce structures or check seismic components calibration. On the other hand, considering the new seismic monitoring system, operating procedures were updated. The objective is to evaluate the real plant state concerning eventual damages and its operational situation to decide whether to continue operating and to evaluate it in the long term. Such procedures includes a number of inspections to be performed to determine the safety related systems state and them to decide about the operation state that will be the plant conducted.

N°63
CNS-Ref.-Art.: 18
Page of Report: 73
Chapter of Nat. Report: 18

QUESTION:

a) Are there design evolutions performed since the plant construction (for example due to experience feedback or to PSA results)?
b) Does the design of plants in Argentina include some specific features relating to severe accident management in order to reduce, as indicated in INSAG 12, the probability of large releases requiring short term off-site response?

ANSWER:

a) Since the Argentinean nuclear power plants commissioning, diverse design modifications were performed. Such modifications were based on different reasons as follows:

1. Some plant designer developments were applied to Argentinean nuclear power plants. (i.e.: the dry storage of irradiated fuel elements system in Embalse NPP).
2. Safety improvements arisen from probabilistic safety assessment results. (i.e. isolation valves in the Atucha I presurizer auxiliary pipelines were installed. Besides, it was improved the emergency power supply system).
3. Some original design weaknesses were corrected related with reactor internals (i.e.: Replacement of all coolant channels with “stellite-6” and coolant channel nozzle modification in Atucha I and II NPPs).
4. Conceptual design changes (i.e.: introduction of slightly enriched fuel elements and second heat sink in Atucha I NPP)

b) The Argentinean nuclear power plants had been designed in the sixties. Nevertheless, such designs includes intrinsic safety aspects related to severe accidents . These safety aspects are being evaluated according was indicated in the National Safety Report.

N°64
CNS-Ref.-Art.: 18
Page of Report: 73
Chapter of Nat. Report: 18

QUESTION:

There were further developments of technical rules and regulations and also of new regulatory requirements in Germany during the last two decades. Have these developments been considered to some extent necessary for Atucha I (e.g. upgrading or backfitting measures in the plant)?

ANSWER

The Argentinean nuclear power plants must to fulfil the standards and requirements applied in the country. Such standards are permanently updated taken into account the

nuclear activity state-of-the –art. Besides, Regulatory Authority personnel participates in international technical committees where information is exchanged and it is monitored regulatory issues advance. On the other hand, Atucha I nuclear power plant receives advisory, recommendations and technical support from the designer / supplier.

N°65
CNS-Ref.-Art.: 18
Page of Report: 73
Chapter of Nat. Report: 18

QUESTION:

Are still valid construction licenses for Atucha II NPP ? If not, when did they expire?

ANSWER:

The Argentinean regulatory system foresee that nuclear power plants construction process finishes when the operating license is granted, so that the Atucha II construction license is in force. It is important to clarify that, according is established in the Argentinean standards, the construction license, like any other of the licenses issued, may be modified in case of it was required.

N°66
CNS-Ref.-Art.: 18
Page of Report: 73
Chapter of Nat. Report: 18

QUESTION:

Where there material deficiencies observed due to construction being halted or even stopped for a significant period of time ? Was a mothballing concept adopted ?

ANSWER:

Until now have not been observed component and equipment deficiencies due to prolonged storage as a Atucha II construction delay consequence. Concerning it, is important to mention that the works had never been totally stopped, the construction was continued tough at a very reduced rhythm. However, some original design modifications related with Atucha I operating experience feedback were performed, as an example reactor internals could be mentioned. Besides, measures to maintain adequately conditioned components and equipment till it be assembled had been taken.
The “mothballing concept” was not adopted because, as was explained, the construction and assembling works had never been totally stopped.

N°67
CNS-Ref.-Art.: 19
Page of Report: 75 - 82
Chapter of Nat. Report: 19

QUESTION:

a) Design improvements in strainers have been approved and implemented in Candu type reactors in Canada: could Argentina clarify the situation for its NPP?
b) Could Argentina give some information on the schedule of the studies of severe accident in the Atucha and Embalse plant?
c) Is Argentina planning to implement some mitigation devices such as hydrogen recombiners?

ANSWER:

a) Considering the emergency core cooling system (ECCS) strainer blockage incident at Barseback NPP, Sweden, and the experience exchange in the CANDU Owners Group design improvement in CANDU plants ECC strainers was introduced recommended by the designer. Justification of the design change and supporting studies and tests were provided by AECL to Embalse NPP. The new design was approved after completion of NASA appropriate procedure and they will be installed in the next 2002 scheduled outage. The new design filters have larger surface and they consider a reduced load and a solid construction against high pumps suction pressures.

b and c) In connection with severe accidents evaluation in Atucha I and Embalse NPPs, the Regulatory Body is analyzing different issues such as containment failure modes of Atucha I, hydrogen behavior and associated mitigation systems and venting filter system with the objective to establish the basis for potential requirements. After completion Atucha I backfitting, the Responsible Organization will focus the analysis toward severe accident issues.

N°68
CNS-Ref.-Art.: 19
Page of Report: 75 - 82
Chapter of Nat. Report: 19

QUESTION:

Are there concerns about the necessary technical support in the future from the former plant designer and the manufacturers and suppliers, because of restructuring processes and mergers in the German industry ?

ANSWER:

At present, there is no concerns about the future technical support, because of, if well KWU was substituted by FRAMMATOME, the latter one maintains the quality and assistance of both the service and the supply.

N°69
CNS-Ref.-Art.: 19.1
Page of Report: 75 - 76
Chapter of Nat. Report: 19

QUESTION:

To implement Operating Feed Back Experience (OEFB) system, several working steps have to be performed, for example, collecting and management of operational experience information from domestic and foreign NPPs, analysis of collected information, feedback of the analysis result, etc. Please explain briefly the organization handling the OEFB system.

ANSWER:

The OEFB system is composed by three dependent teams: Headquarter and Embalse and Atucha I teams. Each group is functioning according to it was established in the corresponding procedure.
The Headquarter OEFB group involved in the programme of management of operating experience performed a screening using international databases looking for documented events. The criteria used for initial screening is different for information coming from outside of the plant (external information) than for information from the own plant (internal information). For external information it must be first determined whether it is applicable for the plant under consideration or not. The determination of applicability involves aspects such as: generic implications which apply to the plant, similar equipment at the plant, similar practices that challenge the plant to similar events occurrences and actions that may be required to avoid the occurrence of an event similar to it that has already happened. If the information is found to be applicable, a further evaluation for significance is made.

From the information screened, those events which could happen in Atucha I or Embalse nuclear power plants are analyzed. Such events information are also submitted to both the Regulatory Body and to the involved plant analysts. The results of the analysis includes recommendations and suggestions to modify the design or changes in procedures.

Atucha I and Embalse nuclear power plant teams dedicated to the analysis of operational experience also check over the resulting improvements and report the results. Besides, also are evaluated “low level events” and “near misses” obtaining their own database.

The follow up of events occurred in the field, improves the quality of the analysis, allowing “first hand information” and fast communication with the personnel involved. Besides, the operational incidents, significant, low level and minor events, their corrective actions and follow up of corrective actions are recorded.

N°70
CNS-Ref.-Art.: 19.1
Page of Report: 78
Chapter of Nat. Report: 19

QUESTION:

The preliminary studies with respect to containment performance during severe accidents aimed to identify the phenomena during such accidents (hydrogen generation, static and dynamic loads on the containment). As the containment is not designed against severe accident loads, are there additional studies to install passive hydrogen recombiners and to implement filtered containment venting?

ANSWER:

Concerning severe accidents evaluation in Atucha I and Embalse NPPs, the Regulatory Body is analyzing different issues such as containment failure modes, hydrogen behavior and mitigation systems and venting filter system with the objective of establish the basis for potential requirements. After completion of the Atucha I backfitting , the Responsible Organization will focus the analysis toward severe accident issues.

The design of Atucha II NPP considers a hydrogen recombinators system for severe accidents. The basic plant engineering includes a recombination and mixed system to the atmosphere connected with different plant locals, a fan system and heat exchangers. Besides, SIEMENS offered a new system composed by a set of catalytic recombiners and ignitors with the objective to update the original design. Containment venting filter system is not considered in the original design.

N°71
CNS-Ref.-Art.: 19.1
Page of Report: 78
Chapter of Nat. Report: 19

QUESTION:

Has the Regulatory Body required the development of accident management procedures with the aim to use alternative measures to prevent core damage in case of safety system failures ?

ANSWER:

The regulatory body required to Responsible Organization to analyze systematically the more adequate actions to mitigate a potential radioactive release when the accidental plant situation exceed the situations foreseen in the operating emergency procedures. The goal is to develop a strategy for the above mentioned cases to re-establish the core cooling, to control reactivity and to maintain integrity of both primary system and containment system.

The probabilistic safety analysis dominant sequences, the operating experience analysis and the severe accident phenomenology research are the basis to evaluate plant vulnerabilities.

At the moment are being studied some measures to face severe accidents. However, such measures had not yet been implemented (I.E.: hydrogen generation due to loss of coolant accidents occurrence). The severe accident management will be intensified when Atucha I backfitting be implemented (2002 planned outage).

N°72
CNS-Ref.-Art.: 19.2
Page of Report: 78
Chapter of Nat. Report: 19

QUESTION:

Do you have Severe Accident Management Guidelines (SAMG)? Could you provide a short description of your Accident Management Program?

ANSWER:

The Regulatory Body required to Responsible Organization to analyze systematically the more adequate actions to mitigate a potential radioactive release when the accidental plant situation exceed the situations foreseen in the operating emergency procedures. The goal is to develop a strategy for the above mentioned cases to re-establish the core cooling, to control reactivity and to maintain integrity of both primary system and containment system.

The probabilistic safety analysis dominant sequences, the operating experience analysis and the severe accident phenomenology research are the start to evaluate plant vulnerabilities.

At the moment are being studied some measures to face severe accidents. However, such measures had not yet been implemented (I.E.: hydrogen generation due to loss of coolant accidents occurrence). The severe accident management will be intensified when Atucha I backfitting be implemented (2002 planned outage).

N°73
CNS-Ref.-Art.: 19.2
Page of Report: 78
Chapter of Nat. Report: 6 - 19

QUESTION:

Which are the regulatory requirements to take into account severe accidents? Which measures have been implemented at the plants for severe accidents?

ANSWER:

The Regulatory Body required to Responsible Organization to analyze systematically the more adequate actions to mitigate a potential radioactive release when the accidental plant situation exceed the conditions foreseen in the operating emergency procedures.

The goal is to develop a strategy for the above mentioned cases to control reactivity, to re-establish the core cooling, and to maintain integrity of both primary system and containment system.

The probabilistic safety analysis dominant sequences, the operating experience analysis and the severe accident phenomenology research are the starting point to evaluate plant vulnerabilities.

At the moment are being studied some measures to face severe accidents. However, such measures had not yet been implemented (i.e.: hydrogen generation due to loss of coolant accidents occurrence). The severe accident management will be intensified when Atucha I backfitting be implemented (2002 planned outage).

N°74
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QUESTION:

What measures are in place or proposed to ensure the Nuclear Regulatory Authority (particularly NRA's Board of Directors) remains an independent regulatory agency?

ANSWER:

The Nuclear Regulatory Authority is, as the "National Law of the Nuclear Activity" (Act No. 24804) has established, an independent entity on National Presidency jurisdiction. Therefore, according to the above mentioned, all Directors Board decisions are mainly based on preserving the independence of the Regulatory Body.

N°75
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QUESTION:

a) Have recent events in the Argentine economy affected the ability of plant operators, plant suppliers and the NRA to monitor/maintain and extend safety culture (including safe operations - adequate qualified staff, equipment and finances)? If so, how?
b) Have recent events in national government affected the ability of plant operators, plant suppliers and the NRA to monitor/maintain and extend safety culture (including safe operations – adequate qualified staff, equipment and finances)? If so, how?

ANSWER (a and b):

Economical recession did not reach to nuclear power plants activities which continuing generating to full power and selling all power generated. It should be highlighted that nuclear generation cost is among the lowest in the domestic electric generating market.

The unrestricted dispatch for operation of nuclear power plants warrantees funds flow that allows to maintain the necessary economic resources so as to keep the level of the salaries, comply with scheduled maintenance, personnel training plans and spare parts stocks. Summing up, the present crisis has had no impact on operation, availability and safety of Argentine nuclear power plants.

The Regulatory Body is on the alert towards any early sign of degradation of the installations that might affect safety and is ready to adopt the necessary corrective measures and eventually requiring to shut down the plants if necessary.

Concerning the country crisis effects on the regulatory activities, some budgetary difficulties appeared during 2001 last three months, but it do not affected the primary regulatory activities related with the regulatory body control activities effectiveness on the nuclear power plants.

N°76
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QUESTION:

How will proposed deregulation and privatization of the national electricity market affect the ability of plant operators, plant suppliers and the NRA to monitor/maintain and extend safety culture (including safe operations – adequate qualified staff, equipment and finances)?

ANSWER:

The deregulation and privatization of the national electricity market introduced, in particular into the power generation area, the competition concept. In spite of the fact that Argentinean nuclear power plants were not privatized and its generation costs were allowable low, the responsible organization faced a set of measures to improve its competitive capability. The more relevant results were achieved, in Atucha I NPP, by using fuel elements with slightly enriched uranium (0.85% of U-235) instead of natural uranium fuel element which allow to duplicate the fuel elements discharge burn-up saving about 30% in the kWh cost. Another important saving was achieved by improving scheduled revisions, reducing out of service times and optimizing national and foreign assistance services. Such measures allowed the responsible organization to keep the necessary economic resources needed for safe nuclear power plants operation.

On the other hand, the Regulatory Body by means of continuous assessments such as evaluating some indicators trends that provide significant information regarding this subject and the application of the inspection program verify that the economic resources for training, maintenance, and upgrading components and systems are continually performed during both the operation and the plant planned outages.

N°77
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QUESTION:

What measures, capable of disclosure, has the NRA taken or required operators to take in terms of security since the terrorist attacks in the USA on September 11, 2001?

ANSWER:

Among the different measures adopted, in addition to that incapable of disclosure due to physical protection system (PPS) confidentiality reasons, can be mentioned:

a) To alert and improve security about the matter, different meetings among armed forces, security forces and intelligence organisms were performed.
b) To increase awareness about the matter, some meetings with the operators were performed.
c) Installations internal guard was strengthened.
d) A permanent alert state to evaluate the "design basis threat" among the involved organisms to know any change that obligates to modify some aspect of the PPS was established.
e) As was being performed prior to September 11, 2001, interaction with Responsible Organization and Regulatory Authority for PPS improvements, has been continued.

N°78
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QUESTION:

What progress has been made in the Radioactive Waste Management Strategic Plan since 1998 [i.e.: has waste been accepted, if so what and where]

ANSWER:

The Radioactive Waste Management Strategic Plan was approved by Atomic Energy National Commission on July, 2001 and it was sent to National Executive Power to be revised and submitted to National Congress consideration for it approval by law. At present, such Strategic Plan is being analyzed by different National Executive Power organisms and was not sent for approval to National Congress yet.

The acceptation criteria and the conclusions on radioactive waste transference had been elaborated by the Atomic Energy National Commission and approved by the Regulatory Body. Nowadays, the Atomic Energy National Commission is elaborating some additional procedures.

In the National Report of the Joint Convention on Safety in Spent Fuel Management and Safety in Radioactive Waste management will be included more details about radioactive waste management.

N°79
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

COMMENT: The report is not self-contained. It is necessary to have the previous report in order to have a complete understanding of the present one.

ANSWER:

The Argentinean National Safety Report was elaborated according to Guidelines Regarding National Reports under the Convention on Nuclear Safety lineaments.

N°80
CNS-Ref.-Art.: General
Page of Report: -
Chapter of Nat. Report: -

QESTION:

Has the current economic crisis affected operations at Atucha I and Embalse? In what way?

ANSWER:

The economical recession did not reach to nuclear power plants activities which continuing generating to full power and selling all power generated. It is important to remark that the nuclear generation cost is among the lowest of the power generating facilities.

The unrestricted dispatch for operation of nuclear power plants guarantees funds flow that allows to maintain the necessary economic resources so as to keep the level of the salaries, comply with scheduled maintenance, personnel training plans and spare parts stocks. Summing up, the present crisis has had no impact on operation, availability and safety of Argentine nuclear power plants.

However, the Regulatory Body is on the alert towards any early sign of degradation of the installations that might affect safety and is ready to adopt the necessary corrective measures and eventually requiring to shut down the plants if necessary.

N°81
CNS-Ref.-Art.: General
Page of Report: -
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QESTION:

Has there been any study done on the effect of possible seismic events on Atucha I and/or Embalse? What about the Atucha II site?

ANSWER:

An Embalse nuclear power plant seismic re-evaluation which results are showed in the National Safety Report 1998 (items 14.1.2.2. - Design and construction; 17.5.2. - Site studies for Embalse nuclear power plant and 17.6. - Site re-evaluation) was performed.

The zone where Atucha I is located is considered a low risk seismic one. Construction of the plant was done according to DIN1045 standard. Another plant structures, built afterwards, a second spent fuel storage pool, and lately the Second Heat Sink system are based on Argentinean regulations and recommendations issued by CIRSOC (National Research Centre for the Safety of Public Constructions).

However, for Atucha I and Atucha II nuclear power plants common site, a seismic aspects evaluation that was mentioned in the first National Safety Report (item 17.5.3. Site studies for Atucha II nuclear power plant) was performed.

N°82
CNS-Ref.-Art.: 8.4
Page of Report: 25
Chapter of Nat. Report: 8

QUESTION:

What is an “autarchic entity”?

ANSWER:

The National Law of Nuclear Activities (Act No 24,804) establishes the autarchic (independence) of the regulatory body. The above mentioned implies that regulatory body has complete juridical capacity to act in both the public right and the private right ambits having faculties to self administrates according to standards created by such regulatory body.

The functions of an autarchic organism are National State functions but, there not exists hierarchical relationship between autarchic organism and central organism; hierarchy is replaced by administrative control. Besides, an autarchic organism have patrimony and its own resources which are assigned to fulfil its purposes.