CONVENTION ON NUCLEAR SAFETY

NATIONAL NUCLEAR SAFETY REPORT

ANSWERS TO QUESTIONS OR COMMENTS - **ARGENTINA - 2021**

Autoridad Regulatoria Nuclear
PRESIDENCIA DE LA NACIÓN

EIGHTH REPORT

ARGENTINEAN NATIONAL REPORT FOR THE CONVENTION ON NUCLEAR SAFETY

ANSWERS TO QUESTIONS OR COMMENTS - 2021

Autoridad Regulatoria Nuclear
PRESIDENCIA DE LA NACIÓN

This report demonstrates how Argentina has implemented its obligations under the Convention on Nuclear Safety. The report follows closely the guidelines, regarding form and structure, that were established by the contracting parties under Article 22 of the Convention.
This Report is produced by the Autoridad Regulatoria Nuclear (Nuclear Regulatory Authority) on behalf of Argentina. Contributions to the report were made by representatives from Nucleoeléctrica Argentina S.A. (NA-SA) and Comisión Nacional de Energía Atómica (CNEA)

ARGENTINEAN NATIONAL REPORT
FOR THE CONVENTION ON NUCLEAR SAFETY
Eighth Report - **ANSWERS TO QUESTIONS OR COMMENTS**

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ANSWERS TO QUESTIONS OR COMMENTS
NATIONAL NUCLEAR SAFETY REPORT – 2019

No. 1
COUNTRY: UNITED KINGDOM
CNS-REF.-ART.: Article 6
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.6.5.2

The Eighth report lists amongst the activities to be carried out in preparation for the long term operation of CNA I that demonstration of "Leak before Break behaviour" will be undertaken.

Please describe what this demonstration will entail, and how the design would be demonstrably resilient to the consequences of gross failure (double-ended guillotine break).

The CNA I LTO programme involves the demonstration of LBB on the main piping of the reactor. This demonstration is based on the analysis previously performed for the CNA II commissioning. It entails the following tasks:

- Scope and screening of the piping to be analysed. Identified systems: main cooling and moderator circuits, pressurizer surgeline and sprayline.
- Collecting and verification of the documents related to materials for the LBB.
- LBB Fractomecanic assessment for each identified system.
- Additional measurements for leak detecting. Tritium detectors.

Drawing from the analysis conclusions, CNA I foresees that additional analyses and/or actions could be needed (i.e., increase the ISI frequency on some welds, reduce conservatisms on the stress calculations, etc.).

No. 2
COUNTRY: UNITED KINGDOM
CNS-REF.-ART.: Article 10
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.10.2.2

The Eighth report outlines activities of the Licensee on safety culture (SC) such as the Programme of Consolidation of Safety Culture (PRACS) and the role played by ARN in evaluating safety culture during inspections. The report, however, does not appear to include the outcomes, trends, any challenges or specific actions arising from safety culture evaluation by either the Licensee's or ARN activities.

Please outline the key findings and actions arising from the safety culture evaluations.

As a result of the last safety culture self-assessment carried out for the Licensee at corporate level, three areas for improvement were identified and certain global actions were proposed as follows:

AFI 1: Identification of problems and troubleshooting

"[…] the effectiveness of corrective actions is not always measured and in some cases there are expired corrective actions. On the other hand, not all indicators have defined objectives or reflect the process they monitor."

Proposed actions:

1) Set up methodology for the Effectiveness Analysis of Corrective Actions.
2) Define corporate expectation for rescheduling of due dates.
3) Identify, analyse and reformulate indicators that do not contain clear objectives or do not provide the necessary information for decision making.

AFI 2: Work practices

"… In the execution of field work, a questioning attitude is not always prioritized, the procedures are not always strictly followed, nor are the standards of good work practices maintained in some activities."

Proposed actions:

1) Create a campaign to disseminate the benefits of good practices in the field with the goal of identifying risks.
2) Define a methodology to include either in the Work Packages or in Work Instructions, the Error Prevention Techniques as well as the good practices of the industry.

AFI 3: Coordination of work teams

"[…] the work management process has weaknesses in its programming and in the coordination of the teams. Additionally, differences are found in certain modes of management processes between CNE, CNA I-II and SPC, which hampers its efficiency".

Proposed actions:

1) Proposal to carry out a benchmarking (i.e. to know strengths and weaknesses) with the objective of unifying the planning and programming process among the people in charge of CNE, CNA and SPC.
2) Analyse the possibility of adding Work Management (planning and programming) in the PRACS.

No. 3
COUNTRY: UNITED KINGDOM
CNS-REF.-ART.: Article 14
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 14.2.1.2.1 CNA

The Eighth report outlines in section 3.14.3.1.3.1 a series of additional analysis, improvements and modifications to be performed on CNA I from the stress tests undertaken. These include, amongst others, the evaluation of the need for a filtered containment system, for the cooling of the exterior of the Reactor Pressure Vessel (RPV), or the installation of the in-core instrumentation for Severe Accident Management. These activities are noted as expected to take place during the Life Extension Project.

Please confirm the expected status of analyses and measures by the time ARN's permissioning decisions are to be made.

The RPV external side cooling is considered as a means for retaining the corium in scenarios with extensive core damage. The strategy and its effectiveness were analysed and extra efforts had to be made to adjust codes to the Atucha reactors. NA-SA along with ISS, the current developer of RELAP5 / SCDAP, have developed a version of the code that is representative of the expected phenomenology in Atucha reactors (RELAP5 / SCDAP Mod 3.6). In the past years, preliminary results had been obtained with RELAP5 / SCDAP. These calculations were followed by more complex analysis with ANSYS / CFD code, performed for CNA II NPP. The results of these analyses showed that the countermeasure is not successful in a scenario of LOCA in the moderator circuit with failure of safety injection system or in a SBO scenario. Based on these results, it was decided to rule out this countermeasure for Unit II and Unit I. It should be noted that the results for Unit II are extrapolable to Unit I in this case. As it was mentioned, a parallel course of analysis has been started, to assess possible stabilization of molten material inside sump; avoid an early containment breach; and to decrease consequences in public as far as reasonably achievable. This task is being performed as part of phase B of CNA I LTO. This project is part of the Conceptual Improvement Plan that will be presented for consideration to ARN in March 2020 (see section 3.6.5.2).

Regarding the venting filtered containment system it is also planned to be implemented as part of phase B of CNA I LTO.

No. 4
COUNTRY: UNITED KINGDOM
CNS-REF.-ART.: Article 17
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.2

The Eighth report states in section 3.17.2.3.2.1.2 that the minimum and maximum water levels at the Atucha I and II have been reassessed and that the extreme river level rise of Río de la Plata considered was a 1 in 1,000 year event. For natural external hazards characterised by frequency of exceedance hazard curves, it is generally expected that a design basis event should be derived conservatively to take account of data and model uncertainties. An event with an annual probability of exceedance of 10^{-4} is frequently used for non-discrete hazards.

Given the above, please justify the approach taken including the frequencies selected. How has the impact of climate change been factored in?

NA-SA requested INA (National Water Institute) to develop a re-assessment of Paraná River Extreme Levels. The study took into account historical records and previous studies to simulate different scenes adding catastrophes (e.g. Itaipú and Yaciretá dams burst) and extreme meteorological events (storms and others).

One of the main references was “Analysis of Extreme Hydrometric Dimensions at the Nuclear Power Plant Site - Atucha II Nuclear Power Plant”, which applied the Gumbel distribution (Generalized Extreme Value distribution Type-I) to model the maximum level distribution of Paraná River. It was found that Log-Pearson Type III distribution had a better fit for minimum value. For these reasons it was the selected distribution for downspout.

On the other hand, the report from INA took into account the study “Risk analysis of flood duration in the coastal areas of the Río de la Plata considering climate change”. This study models the influence of the Meteorological event called sudestada (strong winds from southeast) over the La Plata River levels and Paraná River regime.The implicantions of this model can be extrapolated to recurrence periods of 1.000 years.

The impact of climate change was also considered in the aforementionted study, where possible scenarios for 2030 and 2070 are modelled, predicting a major influence of south-east winds (higher levels and longer duration). INA suggests that CNA should make a follow-up of the Río de La Plata basin evolution. It merits noting that CNA already makes a continuous tracing and record of Paraná River levels. These data can be checked out with the data released by governmental services, like National Naval Prefecture.

No. 5
COUNTRY: ICELAND
CNS-REF.-ART.: Article 16
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: Article16

Does Argentina intend to complete a self-assessment on its emergency preparedness and response arrangements with regard to nuclear and radiological emergencies based on the EPRIMS tool and to share information on the results?

Argentina has already made its self-assessment with EPRIMS tool. The last update was at the end of 2019.

No. 6
COUNTRY: LUXEMBOURG
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 128
CHAPTER OF NAT. REPORT: 3.16.8

On page 66 the report highlights the interaction with the Uruguayan and Brazilian Regulatory Bodies in their character of neighboring country, with regard to their participation in the practical emergency plan exercises at CNA as a possible good practice. On page 128, it is stated that

representatives from those two states took part as observers in some of the exercises. In relation to those statements, we would like to ask two questions:

1) **What is the main goal to invite those representatives as observers?**
2) **Given that the Atucha NPP is in a relative proximity to Uruguay, are there any other bilateral mechanisms in place to exchange information or to collaborate bilaterally in case of a nuclear emergency?**

1) The invitation to external observers is done with the purpose to offer them an opportunity to provide feddback which can inform future exercises or in real situations. By the same token, those feedback comments can be useful in exercises carried out in their respective countries as well, putting into practice tasks developed in our scenarios.
2) Yes. Regarding the EPR, there are mechanisms to share information with Uruguay. Moreover, cooperation is also possible through the IAEA exchange mechanisms in compliance with the Prompt Notification and Assistance Conventions.

No. 7
COUNTRY: PAKISTAN
CNS-REF.-ART.: General
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 2.4

Reference section 2.4 of the report, the licensing of CAREM 25 small modular prototype reactor was highlighted as challenge for Argentina. Argentina may like to elaborate this challenge with specific examples.

Regarding the licensing of CAREM 25 prototype reactor, the most relevant/salient challenges and issues faced by ARN are described as follows:

- The methodology for the Safety Classification of Structures, Systems and Components has a systematic methodology and clear involvement in Defense in Depth. It allows to establish engineering requirements to ensure an adequate functional capacity, robustness and reliability of the relevant SSCs.
- Safety demonstration through modeling and computer simulation for SSC within a consolidated experience. V&V of TH and neutronics codes.
- Safety demonstration through tests in an installation with adequate similarity, used for parametric studies of the dynamic response to perturbations, changing steam dome volume, hydraulic resistance, P and T.
- Construction inspections and regulatory audits.

No. 8
COUNTRY: PAKISTAN
CNS-REF.-ART.: General
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 2.4

Reference section 2.4 of the report, it is mentioned that special attention is given to the licensing of passive safety systems based on the knowledge of the physical phenomenon and the use of validated codes and standards for design and manufacturing. Argentina may like to share detail of areas that need special attention during licensing of passive safety systems.

As mentioned in section 2.4, one of the areas with special focus is the validation and verification of computer codes used for the Responsible Entity for the demonstration of Safety.

ARN does not have specific standards for the system codes used for safety analysis/ demonstration (TH, neutronics, fuel behavior, etc.).

Most commonly used codes have been already validated and verified within the respective correlations range (RELAP5, TRACE5, CATHENA, CATHARE, MARS, ATHLET, and others).

However, due to special design features of CAREM reactor (e.g. the Passive Safety Systems), ARN required a comprehensive analysis of each condition and physical phenomena that could occur during PIEs transients/accidents and checking codes capability for capturing and representing them.

This procedure holds mainly for thermal-hydraulics and neutronics codes (cell and core level). Some specifics codes have been developed for engineering/design, e.g. steady-state conditions, DNB, instabilities maps.

ARN will provide/provides guidance on how to develop models/codes, its documentations and the quality assurance process required (based on CNSC RG G-149).

No. 9
COUNTRY: CHINA
CNS-REF.-ART.: General
PAGE OF REPORT: 13
CHAPTER OF NAT. REPORT: 2.5

How to decide the site selection and construction standard of CNE External Emergency Control Centre, including the safety assessment of distance from the Embalse NPP and the seismic level?

For the External Emergency Center, a construction report was requested from the Nuclear Power Plant, ARN analyzed this report. Regarding its location, building will take place outside the UPZ (10 km). The design and construction characteristics have been evaluated as well as specific safety conditions have been considered.

No. 10
COUNTRY: CHINA
CNS-REF.-ART.: General
PAGE OF REPORT: 15
CHAPTER OF NAT. REPORT: 2.7

CNA 1 was reached the end of design life in April 2018 and maintain the current licensing basis as defined by the FSAR and PSR performed in 2014, how long does this stage last?

The current Operating Licence was amended in April 2018 with the purpose to authorize the operation beyond the design lifetime. The validity period of this Licence is five full power years (5 FPY) or until September 29th 2024, whatever occurs first. This last date corresponds to the expiration date of the PSR performed in 2014 (10 years cycle).

No. 11
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 32-33
CHAPTER OF NAT. REPORT: 3.7.2

What process is used to prepare AR Standards? Are proposals for new AR Standards submitted to relevant licensees and expert organizations before they are adopted?

ARN follows an established process for the elaboration, review and revision of standards and guides in the framework of ARN management system.

Regulatory Standards Division, which reports directly to ARN Board of Directors, coordinates the activities of the process for elaboration, review and revision of standards and guides.

The process for any standards includes the following steps:

- The evaluation of the need to develop / revise standards and guides, that is performed by technical or management areas based on the regulatory experience; operator experience, international recommendations and the requirements of the conventions signed by Argentina,
- The participation of ARN senior staff of technical areas to elaborate the initial drafts and revisions process,
- The call for the interested parties involvement (not only licensees but any human or legal persons who felt affect by the standard) before standard approval and
- The access to published Standards and Guides on the ARN website.

When ARN plans to issue or modify a standard applicable to relevant licensed facilities, in addition to the previous steps, a Prior Consultation Procedure has to be applied. According to this procedure, the main licensees of said facilities are invited to join a committee to evaluate the proposed standard, and then all licensees are able to give their opinion on the project of standard before its approval.

No. 12
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 32-33
CHAPTER OF NAT. REPORT: 3.7.2

Does your national framework address questions about safety-security interface in nuclear facilities? If so, how is this done?

National Framework includes requirements related to nuclear and radiological safety, safeguards and security.

All the standards of the ARN establish that its compliance does not relieve from compliance with other norms and requirements established by both the ARN and other competent authorities.

The standard AR 10.13.1. “Basic standard for the physical protection of nuclear materials and installations” establishes that no physical protection measure must be at expense of radiological and nuclear safety. Also, it is required that technical procedures and activities related to plant operation must be taken into account in the design of the physical protection system.

The standard AR 10.13.2. “Security of radioactive sources” establishes that no any security measure must be at the expense of radiological and nuclear safety.

It is foreseen that new revisions of the standards related to radiological and nuclear safety applicable to all life stages of nuclear reactors will explicitly establish requirements regarding interfaces between all regulatory areas, when applicable.

No. 13
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 36
CHAPTER OF NAT. REPORT: 3.7.2.3.1

How do ARN handle the difficulties in a performance-based regulatory approach with identification of good outcome measures?

There are several names for the regulatory approach alternative to the Prescriptive Approach: Performance-Based Regulatory Approach; (Safety) Goals Oriented Approach; or simply non-prescriptive. ARN has a sound understanding of both approaches and may be flexible with the names.

There are no particular difficulties in identifying good outcomes in a performance-based regulatory approach. A non-prescriptive approach does not imply relaxing acceptability or success criteria, nor having ad-hoc rules for each assessment (that would produce difficulties the identification of good outcome measures). A non-prescriptive approach implies judging some cases by the safety goals behind the pre-written (pre-scribed) regulatory requirements. Perhaps a definite answer to the question requires ensuring a common understanding of the different regulatory approaches.

ARN understands that a good approach to “good outcome measures” is based on the identification and prioritization of outcomes, being safety the parameter of the prioritization. In this sense, good “outcome measurements” are essentially safety goals oriented. If the outcomes were to be measured against the strict compliance against the wording of an undifferentiated list of requirements (prescriptive), it would be possible to perceive acceptance by a numerical value (let’s say 95% of compliance) even having one or two essential safety requirements not-complied.

No. 14
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 37
CHAPTER OF NAT. REPORT: 3.7.3.2.1

How is the Environmental Impact Assessment (EIA) addressed as part of the licensing process? Which authority is responsible for this being done and what assessments is being done of the EIA in parallel with the nuclear safety assessments?

The Environmental Impact Assessment (EIA) is a requirement included in Argentina provincial legal frames. The Law 11459 (Radicación Industrial) applies in Buenos Aires province, whose regulatory authority is OPDS (Provincial Agency for Sustainable Development), and the Law 10208 (Provincial Environmental Policy) applies in Córdoba province, whose regulatory authority is the Ministry of Water, Environment and Public Services.

These laws determine the mandatory contents of an Environmental Impact Assessment from a non-radiological point of view. Several points of EIA concur with those described in the Final Safety Report, Chapter 2 relative to Site Characteristics e.g.: physiographic characteristics, climate descriptions, socioeconomic condition, connectivity etc. The EIA of any project is sent to the corresponding authority previous to the start of the project, to get the environmental approval.

According to the activity’s particular features, the radiological aspects and impacts control is within the scope of ARN (National Nuclear Regulator) in the frame of Law 24804 (Nuclear Activity Law and its Regulatory Decree 1390/98), and CNEA (National Atomic Energy Commission) as the responsible entity of Law 25018 (Radioactive Waste Management Regime).

No. 15
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 37
CHAPTER OF NAT. REPORT: 3.7.3.2.1

Is it part of the applied licensing process to have public (nearby residents, environmental organizations) insight, e.g. through hearings? At what stages?

The licensing process in Argentina doesn’t contemplate a formal participation of the public through public hearings. However, there is a communication procedure through which ARN responds to interested parties' concerns and communicates their actions for example, with regard to licensing of a new NPP. This can be done in any stage of the licensing process upon public’s demand.

No. 16
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 39-40
CHAPTER OF NAT. REPORT: 3.7.3.3

Is it included in ANR's planned or special inspections to also follow up the license holders' work with safety culture?

Yes, follow up the license holder's work with safety culture is part of the inspected topics in a NPP for all type of inspections.

No. 17
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 9
PAGE OF REPORT: 59
CHAPTER OF NAT. REPORT: 3.9.2

"The Regulatory Body requires that each NPP is sustained by an organization capable of providing its personnel with the necessary support for the fulfilment of those tasks related to radiological and nuclear safety, such as the revision of operation procedures, maintenance of safety systems, technical modifications of the plant, etc. in order to increase safety. The Regulatory Standards AR 0.0.1. and AR 10.1.1. establish the Licensees responsibilities, being the follows the significant ones....."

What measures have been implemented by the licencees to abide by the regulatory standards above?

The Licensee has an integral management system in place which includes all the processes and associated procedures in order to fulfil the mentioned regulatory standards and any other regulatory requirements.

No. 18
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 9
PAGE OF REPORT: 61
CHAPTER OF NAT. REPORT: 3.9.3.5

"A program of visits to NPPs related to the people is being carried out since many years ago. In 2018 more than 7,000 visitors were received. The general public as well as different institutions like national and international agencies representatives, schools and universities continue participating of this program."

Is not 7000 visitors in one year a quite high number? Has the increased security requirements, put in place after 9/11, affected how plant tours are conducted?

Of the total visits received at the Atucha Nuclear Complex and Embalse NPP, about 90% of them (89% in the CNE and 97% in the CNA) correspond to educational institutions, mainly secondary schools.

Only 1% of visitors in Atucha and 8% Embalse are individuals who come to visit the plants as part of our tour program, which implies a previous registration that involves entering a waiting list for the tour.

All of our visitors, students, individuals, authorities and officials, must go through the physical security instances of the plants before entering, in addition to having a rigorous control of data prior to the visit.

Before taking the tour through the plants, a presentation is held where the public interacts and, if necessary, any type of attitude that does not fit the normal parameters of a visitor are observed and reported.

We consider it a great pillar of our approach to society opening the doors of the plants and showing the community our work and it is in our interest to strengthen this program to continue strengthening our links with the population near the plants.

No. 19
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 9
PAGE OF REPORT: 60
CHAPTER OF NAT. REPORT: 3.9.3.1

It is written that the intention of communication with the public is to install a positive perception of the nuclear power generation.

Is this really the main and only goal of the communication? What are the other main goals with communication to the public?

"Installing a positive perception about the generation of nuclear energy in favor of the operation and continuity of nuclear power plants operated by Nucleoeléctrica Argentina is one of the objectives of communicating with the public but not the only one.

Nucleoeléctrica Argentina also aims to strengthen its image as a utility that produces baseload, safe and clean energy; promote the development of nuclear technology as a solution to the effects of climate change; carry out the communication of the projects that the company develops; inform and familiarize the various stakeholders about the safe and responsible operation of nuclear power plants; maintain an open and transparent communication with interested parties; and provide communication support in crisis and emergency situations, among other objectives."

No. 20
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 10
PAGE OF REPORT: 66
CHAPTER OF NAT. REPORT: 3.10.2.2

"Regulator–operator relationship. The relationship has been improved using simple approaches such as:

- **Polite and professional attitude in verbal communications.**
- **Honest dialogue particularly focused on accomplishing safety objectives more than on strict compliance with rules and promoting good practices for high performance in the plant activities."**

In practice, what activities are performed to achieve the communication and dialogue described above?

In practice, the communication and dialogue as described in section 3.10.2.2. are reached by on the job coaching of personnel. Coaching is considered one of the most powerful attributes for effecting change. Coaching helps influence “the people variable” in the change process towards a professional regulator-operator relationship.

No. 21
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 10
PAGE OF REPORT: 66
CHAPTER OF NAT. REPORT: 3.10.2.2

The Licensee has been developed a Programme of Consolidation of Safety Culture (PRACS in Spanish initials) to reinforce nuclear safety culture. The goal of the PRACS is to create a bridge between the concepts of Nuclear Safety Culture and actual performance in the stations.

What kind of improvements have you found by using PRACS?

"Among the improvements found using PRACS, it can be mentioned: process and procedures unification between both NA-SA power plants sites (eg, error prevention techniques, corrective actions, operational decision making, company emergency plan, self-assessments, indicators); development of plans for joint communication between the 2 NA-SA power plants sites (eg industrial

safety topics), cross-sectional application of WANO guides throughout the organization (eg Human Performance Program Assessment Model).

All the above-mentioned improvements produce tangible products, but in turn the PRACS, through regular meetings between the different experts on different topics, generates an intangible but very important added value, linked to the promotion of integration and communication between the different company areas, thus avoiding isolated areas of knowledge."

No. 22
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 74
CHAPTER OF NAT. REPORT: 3.12.1

The observation of tasks by area leaders, the rigorous reading of the weekly reinforcement of human performance, the field training on the use of different error prevention techniques by the Human Factors area, make up a proactive process aimed at reinforcement of expectations and improvement of performance in the field.

Which requirements regulate 'the field training'?

The reinforcement of expectations and practices of field work complements the requirements regulated by the initial and continuous training programs. In this way, they are transformed into brief spaces of exchange between the leader and their team, in which the necessary alertness is maintained and increased so that the behaviours are a solid barrier in the different activities. Additionally, the findings that arise in the field and can be improved with training are notified to the training department so that it has field information when developing its continuous training programs.

No. 23
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 74
CHAPTER OF NAT. REPORT: 3.12.1

Furthermore, Regulatory Standards AR 3.2.1 and AR 3.4.1 establish the information the operator should count with in order to take safety related decisions, the prohibition of interventions during the period immediately after the occurrence of accident initiating events and the characteristics of the man – machine interaction related to the design of the reactor instrumentation and protection systems.

How is intervention prohibited "during the period immediately after" (grace time) practically regulated?

The regulatory authority requires that the protection system be automatically initiated in the case of a postulated event. The design of the protection system shall automate various safety actions to actuate safety systems so that operator action is not necessary within a justified period of time from the onset of anticipated operational occurrences or accident conditions. This means that operator intervention is not required, because the system is capable of executing all safety measures needed. On the other hand, the prohibition of operator intervention is regarding any action that would result in an inhibition or interruption of any safety measure executing during the grace period. This is a requirement demanded by the regulatory body to the system’s design, and is assessed and approved at the design phase of the project. In this way, the regulatory body ensures that there is no human intervention aiming to stop or prevent any safety measure taken by the system as a result of the system not allowing it by design.

No. 24
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 75
CHAPTER OF NAT. REPORT: 3.12.1.1

After the back-fitting implementation, the evaluation of the new main contributors to the core damage frequency permitted to consider the most safety related human actions. In this sense, the reliability of such actions was carried out modifying procedures and increasing training efforts. Additionally, new systems were included and consequently new procedures were carried out improving the overall plant safety.

How was the improved, over-all plant safety measured?

The improvement in human behavior is monitored by the presence of leaders in the field and by the analysis of trends in internal events on CNA, with special emphasis on those internal events with causes associated with behavior. Monitoring these trends and the general actions for common findings of different internal events is the way to monitor and improve safety in work practices.

No. 25
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 75
CHAPTER OF NAT. REPORT: 3.12.1.1

The Licensee has established a program to evaluate the incidence of human factors in the safety performance of the NPPs.

COMMENT: Good examples of programme points to evaluate incidence of human factors, especially points 1 and 3.

Argentina appreciates the comment from Sweden.

No. 26
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 76
CHAPTER OF NAT. REPORT: 3.12.1.1

Training and retraining of all personnel in the different techniques and methods of application in the field of action in order to minimize the presence of human error.

How often does training and retraining of all personnel occur?

Training and retraining in human performance is defined in the initial and continuous training programs for each position. Additionally, there are 52 weekly human performance reinforcements which are disseminated by each group leader. There, different topics are refreshed, previously communicated expectations are reinforced, results of previous performance are spread and expectations that are pursued in current performance are reiterated.

No. 27
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 78
CHAPTER OF NAT. REPORT: 3.12.1.3.1

In 2015-2016, the Training Department gave a retraining called "Back to Basics". It was addressed to CNE staff in order to strengthen the use of Error Prevention Techniques (Pre-job briefing and Post-job debriefing, Self-checking, Peer-checking and Independent Checking, Use

and Adherence to the Procedures, Use Three-way Communication, Questioning Attitude, Making Conservative Decision) to generate a tangible link between staff and daily activities, as well as also to impart a healthy concern towards the human fallibility and vulnerability. The program included 12 hours of retraining divided into a theoretical block and a practical one.

The 12 hour retraining - is it a "one time action" or is it periodically repeated?

The “Back to Basics" Workshop was a one time Human Performance program for all plant personnel.

No. 28
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 79
CHAPTER OF NAT. REPORT: 3.12.2

Once such events have happened, the NPP´s Primary Responsible determines the responsibility degree, if any, of persons who may have incurred in errors and applies the corrective measures and, if it corresponds, the pertinent sanctions. On the other hand, having analysed the event, the ARN issues requirements and, if it is deemed necessary, applies the corresponding sanctions to the involved personnel, the Primary Responsible and the Licensee.

The NPP’s Primary Responsible determines the responsibility of persons for errors and, if applicable, applies pertinent sanctions. Please explain how applying this policy leads to prevention of undesirable events? Could such application of sanctions not lead to that errors are not being reported (hiding of the facts)?

Argentina considers that prevention of undesirable events is not achieved through a sanctions regime. Instead, it relies on the activities mentioned in the whole Article 12.

Please understand those paragraphs in the framework of the specific actions at each nuclear power plant that are described in sections 3.12.1.1.3.12.1.2 and 3.12.1.3.

The application of sanctions is the last resort used and has to be graduated with the severity of the infraction.

No. 29
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 13
PAGE OF REPORT: 82
CHAPTER OF NAT. REPORT: 3.13.2

Periodically, the QA Management issues reports showing the audits’ results. It is also stated: "In addition to the dissemination of the general principles of quality and safety culture, the involved staff is trained every time a new procedure is approved or a new revision performed".

Are there requirements on the periodicity of QA activities?
Is it really possible to train the staff every time a new revision is performed?

1) The audits are annually planned on the basis of a series of factors, such as: related issues found in previous audits, problems performing tasks, importance of the processes with respect to safety, new projects, result of process indicators, new requirements, etc.
2) Following a graded approach to safety, the training requirements after a revision of a certain procedure is performed are met. According to the established procedures, the sector responsible for the modification or generation of a procedure determines, together with the training sector, which participants need to receive training as well as the modality to be used, that is, in a classroom or through the intranet. When the latter is performed, the participants included in the training receive an e-mail communication with a link to access the online e-learning platform.

No. 30
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 94-95
CHAPTER OF NAT. REPORT: 3.14.3.1.3

To our understanding, plant damage state characterization is still underway, i.e. the SAMG are still based on five specific scenarios (small LOCA etc.). Is this correct?

One of the main principles in IAEA Safety Guide NS-G-2.15 say that "Accident management guidance should be set out in such a way that it is not necessary for the responsible staff to identify the accident sequence or to follow some pre-analysed accident in order to be able to execute the accident management guidance correctly". When are the guidelines based on plant damage state planned to be implemented?

1) The “five specific scenarios” mentioned were just an initial constraint within the regulatory requirement of developing a Severe Accident Management Program. That philosophy is superseded these days.

   In the present, SAMG are based primarily on both deterministic and probabilistic assessments, and where a lack of them is unveiled, engineering judgment is applied. By these means, challenges to safety functions or barriers are identified and plant vulnerabilities are determined. Viable SAMG are then developed taking into consideration those insights.

   CNA II

   An accident progression model is developed, and continuously upgraded, with MELCOR 1.8.6 code. Also, a RELAP5/SCDAP Mod 3.6 model is used for assessing the in-vessel stage phenomenology and for SAMG verification.

   A full PSA (L1, L2 & L3) is developed and constitute the basis for determining sequences for which feasible SAMG might be considered.

   CNA I

   CNAI counts with a preliminary accident progression model coded in MELCOR. It is complemented with a RELAP5/SCDAP Mod 3.6 to provide a better representation of the thermal-hydraulic behavior of the plant and to address in-vessel phenomenology. Also, evaluation of SAM strategies is performed.

   PSA L2 for CNA I was not developed yet, but it is expected to be elaborated within the life extension project. In the meantime, experience from CNA II PSA L2 was transferred to CNA I in order to develop SAMG. Also, a multi-compartment model of CNA I containment with GOTHIC 8.1 is being tested to assess SAM strategies.

   CNE

   SAMG for CNE are adapted from the generic guidance provided by COG, which are based on accident progression assessments performed with the MAAP4-CANDU code.

2) In effect, Severe Accident Management Guidelines based on symptom diagnosis are being implemented at the moment in all of our operating NPP.

No. 31
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 97
CHAPTER OF NAT. REPORT: 3.14.3.1.3.1: CNA I - Filtered Containment Venting system

"Presently, all the efforts are concentrated in verifying the stabilization of molten material and the project advancement is tied to results of such analysis, which are not yet conclusive, given the difficulty of the task".

The stabilisation of corium, both in-vessel or ex-vessel, are phenomenon associated with large uncertainties. For the ex-vessel scenario large amount of noncondensible gases can be produced due to corium interaction with basemat concrete, together with intensive steam production. Hence, a containment overpressurisation protection system, as FCVS, is to be considered a reasonably practicable safety improvement of defence in depth level 4. An accident management strategy for DID level 4 typically requires the installation of dedicated

safety systems for the protection of the last barrier and cannot solely be based on analytical efforts due to the complexity and uncertainty of the involved phenomena.

How and when will Argentina act regarding filtered containment venting system, especially in the light of the Vienna Declaration that states that "Reasonably practicable or achievable safety improvements are to be implemented in a timely manner"?

As it was mentioned in the 8th report, CNA I operation is currently under phase ""A"" of long term operation, LTO (see section 3.6.5.2). The filtered containment venting system for CNA I is planned to be implemented as part of the improvements for phase B of CNA I LTO.

No. 32
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 94
CHAPTER OF NAT. REPORT: 3.14.3.1.1

According to Argentinean Regulatory Standard AR 3.9.1 –"General Criteria for Operational Safety in NPP" the SAR of a nuclear installation must be updated each time that a plant design modification is performed, and once every five years.

What kind of updates, apart from plant modifications, are requested in the five year-update?

What kind of evalutations are required for those analyses that are not updated?

1) For ARN, safety is a dynamic concept and because of that licences are granted for a validity period of 10 years and continued operation is based on the licensee's submission and regulatory approval of a Periodic Safety Review (PSR). Following this approach SAR update has to be performed in order to reflect the upgrade of the licensing basis derived from the improvement measures identified after comparison of the plant against modern standards.

   Currently, ARN is performing an updating of its regulations including AR 3.9.1 and the requirement of updating of the SAR every five years will be modified to ten years in accordance to PSR concept. Regardless the frequency for SAR update, the regulatory expectation is to update the licensing basis aiming at reducing the gap (as far as practicable) of the existing plants in comparison to modern plants.

2) For those analysis that are not updated it is required the evaluation of operational aspects which are relevant to safety. The main aspects are maintenance, surveillance and testing, management of ageing and analysis of operating experience.

No. 33
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 99
CHAPTER OF NAT. REPORT: 3.14.3.1.3.2: CNA II - Filtered Containment Venting system

Some filtering system common to both units is being considered.

The Fukushima accident shows that we can have severe accidents affecting all plants at a site. What is the reasoning behind the consideration to have a common system for both plants? Have all the risks connected to such a common system been assessed?

The common containment filtered system for CNA unit I and II was ruled out. Independent filtered systems for unit I and II are planned to be implemented at the same time in order to take the advantages of carrying out similar projects together. Its implementations are foreseen for phase B of CNA I LTO.

No. 34
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 107
CHAPTER OF NAT. REPORT: 3.14.3.2.2

For commissioning of CNA II it was required to develop PSA Levels 1 to 3.
Does the PSA study for CNA II cover all plant states?

Currently, the plant states covered in PSA study for CNA II are full power and internal events.

No. 35
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 104
CHAPTER OF NAT. REPORT: 3.14.3.1.3.5

In December 2012, CANDU Energy performed a Severe Accident Management Guidance (SAMG) Training and Validation Exercise for the Severe Accident Management Program.
Was the validation for some specific cases or for all plant damage states?
What was the outcome of the exercise? Will the revised guides go through the same validation?

Validation Exercise for the Severe Accident Management Program was done for two selected scenarios because it was impractical to hold a Validation Exercise for every severe accident scenario, or even in order to exercise every SAG, SCG and CA.

The main goals of validation plan were:

- Effectively integrate the SAM function of the TSG into the emergency response organization;
- Provide confirmation that SAM guidelines are viable to implement;
- Provide necessary and sufficient training to all staff involved in response to a severe accident;
- Ensure effective communications between involved participants during a severe accident response.

The selected two specific severe accident scenarios satisfy the following requirements:

- Be among the most likely severe accident scenarios, based on PSA insights;
- Include a transition from EOPs to SAMG;
- Identify the relevant equipment failures and human errors throughout the scenario;
- Involve the use of updated plant status sheets, provided by the controllers when required by any significant event;
- Involve use of EOPs, SACRG-1, SACRG-2, the DFC and SCST, entry into at least one SAG and one SCG, use of one or more related CAs, and SAEG-1 and SAEG-2;
- Require the use of communication methods and plant data management tools that are designed for use during a severe accident response.

To be as realistic as possible, the final validation scenarios has taken into consideration the location of the CICE and TSG, the different groups that are settled in these locations, and the information available in each area. The duties and roles of the different actors of the emergency response organization were detailed (i.e., the control room, field operators, the TSG, the radiation protection group, the site security group, the public information group, the logistic group, etc.).

The outcome of the exercise was satisfactory because the main goals of the validation were verified. As a result of this exercise, a set of minor modifications on the SAM guidelines were generated. The most important modification was changes in the format of some information and tables in order to do it more friendly and easy to use.

The guides were revised after the validation exercise and the mentioned minor changes were included in the revision.

Note:
TSG: Technical Support Group
EOP: Emergency Operating Procedure
SACRG: Severe Accident Control Room Guideline
DFC: Diagnostic Flow Chart
SCST: Severe Challenge Status Tree
SAG: Severe Accident Guideline
SCG: Severe Challenge Guideline
CA: Computational Aids
SAEG: Severe Accident Exit Guideline
CICE: Internal Centre of Emergency Control

No. 36
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 114
CHAPTER OF NAT. REPORT: 3.15.2.1 - Table 3.15.1

Activity released from CNA I to the environment as gaseous discharges "CNA I" seems to have a decreasing the I-131 release to the environment from 3.4 x 10^{-3} in 2016 to 8.7 x 10^{-6} TBq in 2018, while "CNA II" release is around 2.7 x 10^{-3} to 7.0 x 10^{-4} Tbq.

Is there a fuel damage policy which affects release of I-131 at the plant? Eg. is there a restriction on allowed tramp uranium on the core or the I-131 release to the environment during operation with damaged fuel? Is there a source term reduction program at the plants and is it connected to fuel failure management?"

1) Within the Plant Policies and Principles Manual there is an operational criterion for activity concentrations when failed fuels are detected in the core.
2) They are defined in the operating specifications of the plant with failed fuel elements.
3) ALARA Program.

No. 37
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 117
CHAPTER OF NAT. REPORT: 3.15.5

ARN requires that whenever possible, radiological protection be achieved using plant's systems rather than operational procedures.

Could you please inform about which measures have been taken to achieve this and which modifications have been made to the plant systems.

The statement is in the frame of Requirement 81: "Design for radiation protection" of IAEA SSR 2/1, Rev.1 by which "Provision shall be made for ensuring that doses to operating personnel at the nuclear power plant will be maintained below the dose limits and will be kept as low as reasonably achievable, and that the relevant dose constraints will be taken into consideration."

Despite that this requirement is applicable for the design of new NPPs, one example for the existing NPPs that shows ARN's commitment in this regard, is the requirement for replacement "stellite-6" in the core material to minimize activation of materials, as far as is reasonably practicable (see 3.18.3.2).

No. 38
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 121
CHAPTER OF NAT. REPORT: 3.15.6.3

ON-LINE Dosimetry System Management, avoiding unplanned exposures.

Is the system used mostly as a tool in protection against overexposures or it also used in the optimization of radiation protection?

It is both. The system basically works as real time (on-line) dosimetry tool which, as stated, avoids unplanned exposures. However, other solutions (hardware & software) can be included to expand the RP service provided, such as, on-line air contamination measurement and real time IP video streaming (both used as RP optimization tool). At Embalse NPP, we have used the system as a real time dosimetry along with the video streaming, and we are currently in the process of testing the air contamination additions.

No. 39
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 121
CHAPTER OF NAT. REPORT: 3.15.6.2

Dose reduction is reported for scheduled outages due to e.g. better control and monitoring of the personnel individual dose and use of tele-dosimetry.

Was there any individual dose planning carried out before the work was performed? Are there requirements for individual dose targets, linked to the practical execution? Was a specific dose rate survey program carried out before the work?

1) The dosimetric planning of the task was carried out taking into account the dose rates in workplace, the time and the amount required, and based on that the collective dose was estimated.
2) There are individual annual ALARA restrictions of 15 mSv for plant personnel and 18 mSv for hired staff.
3) Yes, it was done.

No. 40
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 118
CHAPTER OF NAT. REPORT: Table 3.15.10 and Table 3.15.11

The average effective dose at "CNA I" and "CNE" plants is roughly 2 mSv/year; while at "CNA II" its below 1 mSv/year.

What is the reason for the difference between the plants? Please, could you inform about the maximum individual doses at the plants?

The main reason for the difference in the average effective dose between the plants is the operating life time of every plant. As known all Argentinian NPP has a D_2O as coolant and moderator, which in course of time is being more activated. Also with the pass of time are being more contaminated different systems and components in plants. In case of CNA I this time is more than 40 years, in CNE more than 30 years. Of course, despite of the radiological measures, these activation and contamination are reflected in the effective dose of maintenance and operation personal. In case of CNA II the operation time is approximately 5 years and there aren't the same levels of D_2O activation or components contamination as in other plants.

Anyway, there were other tasks done in CNA I and CNE that could contribute to increase the average effective dose. For example, in CNA I, the intervention of the guide tube of the control bar (reactor enclosure), in CNE, the feeders repairmen of channel S07 (calandria enclosure).

The maximum individual doses in 2019 were:

Atucha Site (CNA I + CNA II): 17.673 mSv

CNE: 6.316 mSv

No. 41
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 123
CHAPTER OF NAT. REPORT: 3.16.2

The COEM, placed at the surroundings of NPP, is where the automatic countermeasures are implemented, nuclear and radiological assessment is performed, intervention group´s radiological protection and environmental surveillance are managed, among others.

Here automatic countermeasures are mentioned. Could you please explain what does the automatic countermeasures mean and consist of?

Automatic countermeasures are protective measures for the population which has to be implemented rapidly in order to reduce the risk of severe effects on the population's health. The established criterion is, except in extreme situations, that automatic countermeasures are applied before the release of radioactive material starts.

No. 42
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 139
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1: Earthquakes - CNA I

"The possible seismically induced internal flooding was analysed during the systems walk downs" at CNA I.

Can anything be said about the results of these analyses and why they were limited to internal flooding compared to the ones for the CNA II and CNE sites which also included external flooding?

Liquid levels released per site and potential flood levels were calculated. The affected safety components were identified and actions were taken, such as:

- design, construction and installation of non-return mechanisms in different enclosures
- replacement of normal doors with watertight doors
- clapper placement in different enclosures
- placement of qualified seals (flame retardant, fireproof, waterproof and radiation resistant) in certain slab and wall passages
- placement of level sensors
- reconditioning and / or replacement of emergency door (to provide watertight sealing) that connects Level -6.50 m of Auxiliary Building with Manoeuvre Building, to isolate the controlled zone from floods that come from outside.

In addition, an abnormal event instruction is available to diagnose an internal flood event and take measures to mitigate its impact.

CNA I and CNA II are in the same site and external flooding was analysed for the site. (Please see paragraph 3.17.2.3.2.1.2 of the report).

No. 43
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 139
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1: Earthquakes - CNA II

Some easy fixes have already been solved and others will be implemented in the next scheduled outage in 2017.

Were the planned improvements implemented in 2017 and which were they?

The remaining improvements were made between 2017 and 2018 during outages. Furthermore, some of them were solved during Normal Operation. They were:

JFC44AA201: Solenoid operated valve. Solved during scheduled outage 2017. Enlarge the upper rack strike where a tube passes from the top of the valve.

KAA20AA006: Motor operated valve. Solved during scheduled outage 2018. Thinning of the Wall with which it is in contact.

KAA20AA007: Motor operated valve. Solved during scheduled outage 2018. Turn the valve away from the Wall, to give it a minimum of 1" of separation, as the top can interact with the wall.

BTF/BTD Batteries bank: Solved during Normal Operation in 2016. Mobile cranes were accommodated to avoid a possible fall in the batteries racks in case of earthquakes.

No. 44
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 139
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1: Earthquakes - CNA II

Internal and external flooding caused by earthquakes have been analysed and it is considered that the Licensee is carrying out the appropriate actions to successfully meet these scenarios.

Can anything be said about the actions needed?

Liquid levels released per site and potential flood levels were calculated. The affected safety components were identified and actions were taken, such as:

- design, construction and installation of non-return mechanisms in different enclosures
- replacement of normal doors with watertight doors
- clapper placement in different enclosures
- placement of qualified seals (flame retardant, fireproof, waterproof and radiation resistant) in certain slab and wall passages
- placement of level sensors
- reconditioning and / or replacement of emergency door (to provide watertight sealing) that connects Level -6.50 m of Auxiliary Building with Manoeuvre Building, to isolate the controlled zone from floods that come from outside.

An abnormal event instruction is available to diagnose an internal flood event and take measures to mitigate its impact.

In addition, there are actions in the Operations Manual that address external flooding, regardless of the event that originates it. (Instruction T17 for CNAUI, 3.3.3 for CNAUII).

No. 45
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 139
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1: Earthquakes - CNA II

For the purpose of increasing the capacity to respond against extreme external conditions, the Licensee proposes to implement a set of improvements that are acceptable.

Can any examples of improvements be given?

Examples of improvements:

JFC44AA201: Solenoid operated valve. Solved during scheduled outage 2017. Enlargement of the upper rack strike where a tube passes from the top of the valve.

KAA20AA006: Motor operated valve. Solved during scheduled outage 2018. Thinning of the Wall with which it is in contact.

KAA20AA007: Motor operated valve. Solved during scheduled outage 2018. Turn the valve away from the Wall, to give it a minimum of 1" of separation, as the top can interact with the wall.

BTF/BTD Batteries bank: Solved during Normal Operation in 2016. Mobile cranes were accommodated to avoid a possible fall in the batteries racks in case of earthquakes.

No. 46
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 144
CHAPTER OF NAT. REPORT: 3.17.2.3.2.2.1.

A 24-inch rupture disc (RD) assembly shall be installed on the top of the existing calandria vault inspection port […]. It is foreseen to be implemented by the end of 2017.

Has the rupture disc been installed by now or has this been postponed for any reason?

In order to preserve the structural integrity of the Calandria vault, an additional rupture disk (RD) was installed during the CNE Life Extension. This new disk was added to the existing ones that belong to the Extreme Shielding Cooling System.

With this design modification, the pressure relief capacity of the Calandria vault is ensured during a severe accident. The existing disks are 6-inch and the new is 24-inch.

No. 47
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 137-139
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1

For CNA I, CNA II and CNE it is pointed out that seismically induced flooding has been analysed. Have analyses on seismically induced fire been performed as well?

For CNA UI the revision 1 of the Internal Fire Analysis (Phase 2 PSA Level 1) was developed and submitted to the regulatory body by incorporating the Second Heat Sink, the Emergency Power Supply System and the fourth UK pump, and based on PSA Revision 5.

CNA UII is developing the Internal Fire PSA, which will be finished by midst 2021.

For CNE, analysis of seismically induced fire was performed as part of the PSA based Seismic Margin Assessment. The Embalse SSEL was reviewed to identify the sources of seismically induced fire. Fire scenarios were developed for each source by identifying the sources' location, paths of propagation, targets and damaged components. The Embalse seismically induced fire sources were identified to be only NSQ fuel tanks. In general, the seismic fire interaction sources may lead to leak of oil due to

rupture of the tanks as a result of the earthquake event. In all cases, an electric spark was assumed to be the ignition source.

The result of the assessment was that all seismic induced fire scenarios could be screened out and no further assessment was required in the level 1 and 2 PSA based SMA.

No. 48
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 150-155
CHAPTER OF NAT. REPORT: 3.18.3.1/ 3.18.3.3

The Regulatory Standard AR 3.4.1., concerning man-machine interface taking into account the state-of-the art at the time the NPP was designed, regarding information processing and report systems is fulfilled (p. 150). Taking into account the state-of-the art regarding the information processing and report systems at the time the NPP was designed; Regulatory Standard AR 3.4.1 related to man-machine interface is fulfilled (p.155).

Are the requirements related to man-machine interface in Regulatory Standard AR 3.4.1 different depending on when a reactor was designed? How does CNA II comply with the Regulatory Standard AR 3.4.1?

Although the standard AR 3.4.1 does not take into account for the establishment of different requirements the moment at which the reactor was designed, it is a fact that Argentina regulations are frequently updated (or supplemented) in order to maintain the requirements according to the state of art and aligned with international standards. This may result in the consideration of additional regulatory requirements that are required for the design of new reactors and in some cases may generate specific requirements that imply design modifications for the existing nuclear reactors.

The AR 3.4.1 standard basically establishes the following requirements related to the man-machine interface:

- The reactor protection system must initiate its actions automatically.
- Operator action is not necessary for a required period of time after activation.
- The operator can initiate protection actions but cannot activate the operation of the reactor protection system.
- The operator must have the indication of the status of all protection actions.

In CNA II, these criteria are fulfilled and all protection actions performed by the reactor protection system are carried out automatically by monitoring the safety variables representative of the different design basis accidents and without the operator intervention. Similarly, the concept of priority control is used to identify that reactor protection commands have priority over operational commands (both from operating systems and manuals performed by the operator) and thus, avoiding the operator interruption of protective actions. Finally, the status of all protection actions can be displayed on the reactor protection system panel located in the main control room and in the emergency control room.

No. 49
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 150
CHAPTER OF NAT. REPORT: 3.18.3.1.1

The following design measures / changes are still under assessment:

- **Cooling of the RPV external side.**
- **Venting filtered containment system.**
- **I&C improvements to provide the information for severe accidents management (beyond design basis accidents). New level measurement was installed to manage water replenishment to the spent fuel pools.**

In light of VDNS (principle 2), should this be understood as no decision has yet been made whether these changes will be implemented or not?

The RPV external side cooling is considered as a means for retaining the corium in scenarios with extensive core damage. The strategy and its effectiveness were analysed and extra efforts had to be made to adapt codes to the Atucha reactors. NA-SA together with ISS, the current developer of RELAP5 / SCDAP, have developed a version of the code that can represent the expected phenomenology in Atucha reactors (RELAP5 / SCDAP Mod 3.6). In the past years, preliminary results were obtained with RELAP5 / SCDAP. These calculations were followed by more complex analysis with ANSYS / CFD code, performed for CNA II NPP. The results of these analyses showed that the countermeasure is not successful in a scenario of LOCA in the moderator circuit with failure of safety injection system or in a SBO scenario. Based on these results, it was decided to rule out this countermeasure for Unit II and Unit I. It should be noted that the results for Unit II are extrapolable to Unit I in this case. As it was mentioned a parallel course of analysis has been started, to assess possible stabilization of molten material inside sump, to avoid an early containment breach, so as to decrease consequences in public as far as reasonable achievable. This task is being performed as part of phase B of CNA I LTO. This project is part of the Conceptual Improvement Plan that will be presented for consideration to ARN in March 2020 (see section 3.6.5.2).

Regarding the venting filtered containment system it is also planned to be implemented as part of phase B of CNA I LTO.

No. 50
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 154
CHAPTER OF NAT. REPORT: 3.18.3.2.2

As stress test results the following design measures / changes are in progress:

- **Alternative power sources (MDGs).**
- **Cooling of the RPV external side.**
- **Venting filtered containment system.**

The cooling of the RPV external side is still under development […].

What is the status of implementing the alternative power sources and the venting filtered containment system?

The RPV external side cooling is considered as a means for retaining the corium in scenarios with extensive core damage. The strategy and its effectiveness were analysed and NA-SA together with ISS, the current developer of RELAP5 / SCDAP, have developed a version of the code that can represent the expected phenomenology in Atucha reactors (RELAP5 / SCDAP Mod 3.6). In the past years, preliminary results obtained with RELAP5 / SCDAP were performed. These simple calculations were followed by more complex analysis with ANSYS / CFD code, performed for CNA II NPP. The results of these analyses showed that the countermeasure is not successful in a scenario of LOCA in the moderator circuit with failure of safety injection system or in a SBO scenario. Based on these results, it was decided to rule out this countermeasure for Unit II and Unit I. As it was mentioned a parallel course of analysis has been started, to assess possible stabilization of molten material inside sump, to avoid an early containment breach, so as to decrease consequences in public as far as reasonable achievable.

The filtered venting containment system for CNA II is planned to be implemented at the same time with CNA I in order to take the advantages of carrying out similar projects together. It implementation is foreseen for phase B of CNA I LTO.

Regarding alternative power sources, an electrical interconnection between normal busbars of Unit I and Unit II is available. It should be noted that Unit 1 is connected to 220 kV line and Unit 2 is connected to 500 kV line and both units have 132 kV line as a back up line. A new mobile diesel generator will be available on site in May 2020.

No. 51
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 11
PAGE OF REPORT: 71
CHAPTER OF NAT. REPORT: 3.11.2.3

The total personnel has decreased from 3435 to 2996 from 2017-2018.
Will this continue? If so what kind of proactive measures are taken?

Currently there are 200 people at NA-SA who will be retired in the next two years. The company is working proactively to have different scenarios for a medium-term staffing plan, which is related to the annual budget according to the current budget of the company (with a 3-year horizon).

No. 52
COUNTRY: SWEDEN
CNS-REF.-ART.: General
PAGE OF REPORT: 4
CHAPTER OF NAT. REPORT: 1.4.1

On page 4 it is written: "In order to achieve this goal, a consensus was reached among the FORO member countries regarding the stress tests content and scope, so that each Regulatory Body required the mentioned stress tests to the Licensees.
Since FORO consists of 10 countries but only four countries have nuclear reactors, on what basis was this consensus reached? Were the technical issues of the stress tests agreement different from the European (of which Spain also took part)?

As it is stated in section 1.4.1, member states having NPPs of the FORO decided to conduct a stress test in each one of their NPPs. The consensus refers to the agreement reached by these member states in relation of performing a stress test with similar scope and content to the one implemented by the Western European Nuclear Regulators Association (WENRA). The technical issues of the stress test agreement didn't have any difference with respect to the European one.

No. 53
COUNTRY: SWEDEN
CNS-REF.-ART.: General
PAGE OF REPORT: 6
CHAPTER OF NAT. REPORT: 1.4.1.1

Bullet 9 (on page 6) reads; Installation of an additional (fourth) pump to the river Water Cooling Ensured System (UK) (CNA I). What does UK refer to in this context?

In CNA I and based on German rules, it was used an identification system for the plant systems-structures-components called KKS. In the frame of this KKS, the letter U refers to mechanical group of conventional secondary installations and UK refers to secondary secured cooling system.

No. 54
COUNTRY: SWEDEN
CNS-REF.-ART.: GENERAL
PAGE OF REPORT: 9
CHAPTER OF NAT. REPORT: 1.4.2.1

On page 9 it is written; "The main objective of the MOU was the establishment, since an early stage of the project, of the regulatory requirements and expectations in terms of licensing process and safety level that must be fulfilled by the design of the proposed plant and demonstrated through the Safety Analysis to be further submitted by to ARN".

What is the legal status of such an MOU in Argentina? What would the implications be if ARN or NA-SA would not honour the MOU? In what way can the safety level be "fixed" or "outlined" at this early stage of the project?

The current licensing process of NPPs in Argentina starts with the construction stage and there is no formal arrangement in the regulation for any earlier regulatory involvement.

Currently, ARN is updating their standards including the one corresponding to licensing process for nuclear installations. As part of this activity, it is foreseen the adoption of “pre-licensing” process by which the design of the proposed NPP is reviewed against the AR’s standards as well as IAEA SSR 2/1 Rev. 1 and IAEA SSG-30.

In the meantime, ARN developed the MOU as a formal arrangement to frame the “pre-licensing” activities and the regulatory expectations. Because MOU was signed by the Board of Director of ARN, it became a formal regulatory requirement of mandatory fulfilment by the applicant.

In the case that NA-SA (the applicant) doesn´t honour the MOU, ARN has the right to decide different actions ranking from the issuance of additional regulatory requirements up to decline the licensibility of such NPP, depending of the safety implication of the deviation from the MOU.

During this early stage of the project, a high level approach is used for reviewing the safety level of the proposed plant through the fulfilment of requirements as stated in IAEA SSR 2/1 Rev. 1 and the so called “integrality concept”. By this concept, the connection between the engineering requirements for SSCs (as derived from the Safety Analysis) are verified to be consistent with those identified during the safety classification process.

No. 55
COUNTRY: SWEDEN
CNS-REF.-ART.: General
PAGE OF REPORT: 9
CHAPTER OF NAT. REPORT: 1.4.2.2.1

It is stated on page 9 that; "PSR is used in Argentina for justification and development of the analysis of the minimum modifications to be done for safe continued operation". How does ARN enhance safety and optimise radiation protection if only minimum modifications are required? How does this objective compare with the VDNS, objective 2, of implementation of reasonably practicable safety improvements are to be implemented in a timely manner?

Please, understand the wording “minimum” in this context as following: PSR is not the only source driving the identification of improvement/enhancement activities for safe continued operation.

See section 3.6.3, where it is stated that safety improvements are driven by different approaches.

No. 56
COUNTRY: SWEDEN
CNS-REF.-ART.: General
PAGE OF REPORT: 12
CHAPTER OF NAT. REPORT: 2.2

On page 12 it is stated: "Regarding the recommendations, the most relevant are related to the methodology for scope setting for assessments of SSCs for LTO and implementation of a comprehensive equipment qualification programme.” Thank you for sharing the information about recommendations and suggestions. Should "most relevant" not read "most important" in this section? Were not all the recommendations relevant?

The recommendations were all relevant and both parties: NA-SA and ARN, appreciate them.

Correct, “most relevant” not read “most important”.

No. 57
COUNTRY: SWEDEN
CNS-REF.-ART.: General
PAGE OF REPORT: 15
CHAPTER OF NAT. REPORT: 2.9

It is stated on page 15 that: "The goal of the PRACS is to create a bridge between the concepts of Nuclear Safety Culture and actual performance in the installation". Due to the very definition of nuclear safety culture, the actual performance in the installation is influenced by the prevailing safety culture. Please explain what is meant by performing a bridge in this context?

Safety culture in the first instance may seem in its definition as an abstract term. What is intended with the PRACS is to provide a practical implementation framework to reinforce the safety culture, by strengthening specific issues (Fire Protection, Emergency Preparedness, Equipment Reliability, Human Performance, Operational Decision Making, Indicator Management, among others), through the definition of persons responsible (coordinators), in the different NA-SA sites, who lead these issues, which must implement a specific methodology to carry out transversal objectives to the organization, through the fulfilment of specific actions. The term “bridge” refers to how a definition of safety culture that speaks of "values" makes a concrete transduction to specific actions.

No. 58
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 19
CHAPTER OF NAT. REPORT: 3.6.3.1.2

It is reported (page 19); "In the case of CNA I, ARN used the opportunity of endorsing the long term operation to formally require the performance of a comprehensive ageing management review for all safety related SSCs in scope…the results of these 47 reports were 374 recommendations categorized as non-critical for safe long term operation". In the next section it is written: "In addition, CNA I, CNA II and CNE are improving their current Ageing Management Program using the latest table of International Ageing Lessons Learned (IGALL - AMPs)...it can be pointed out the need of CNA I to include AMP110 "PWR Boric Acid Corrosion" in order to address the recrystallization of boric acid problems, as it happened during the first cycle of operation".

Was the original LTO review performed against "obsolete standards" and if so, does this explain why no critical recommendations for safe long term operation of the reactor constructed between 1968 and 1974 was found?

LTO in Argentina is justified using the Periodic Safety Review. Thus, review of the safety factors is performed against modern standards, including the particular ones for ageing.

Recommendations were categorized as non- critical for safe LTO as all of them are feasible to be managed assuring a continued safe operation.

No. 59
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 20
CHAPTER OF NAT. REPORT: 3.6.4.1.1

It is mentioned (page 20) that; "During the interim storage the spent fuel must maintain the same structure and integrity as those one that have never been deposited dry". Is not the general view that dry storage of spent fuel (in an inert environment in order to counteract corrosion) is less problematic than wet storage? What is your view on this issue?

Yes, we agree that dry storage of spent fuel is less problematic than wet storage.

But, in order to understand the situation and context in CNA I (Nuclear Power Plant Atucha I) in relation with the storage of spent fuel, we will describe some design details of the Plant:

a) There are originally 2 (two) spent fuel bay buildings in CNA I (CP1 y CP2).
b) Their capacities are: CP1 – 3,240 positions for spent fuels; CP2 – 8,304 positions for spent fuels. At 31/12/2019, there were occupied 10,701 of these positions (approx. 93%).
c) The normal operation in CNA I is supported by a regularly refill of fuel. The average is 0.7 spent fuel/Day.

In order to support the normal operation of CNA I in the future, it was decided to construct a dry storage facility of Spent Fuel Elements with a 2,754 spent fuel capacity. By design, this facility will be integrated to the existing building of the spent fuel bay building with a possible reversible moving process of fuel elements. It will permit the spent fuel elements store dry, but in case of necessity, they can go again through the wet storage, for example in case they will go to the final disposal.

No. 60
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 40
CHAPTER OF NAT. REPORT: 3.7.3.3

It is stated (page 40) that; "Act No. 24,804, entitles the ARN to carry out with such inspections and regulatory review and assessments, performed by its personnel, such as:..." and then it is listed "routine planned inspections", "special inspections, including reactive inspections", "safety assessments" and "regulatory audits". Does the Act detail which type of inspections and assessment the ARN can perform (e.g. unannounced inspections?) or is this decided by the authority within a more general mandate? What is a meant by "special circumstance" besides the abnormal events?

The Act states that ARN has to carry out inspections and the frequency of them has to be determined by ARN. It is also said in the Act that ARN has the power to define the access regime for their inspectors.

There is no additional detail in the Act regarding the inspections.

Special circumstances is referring to, besides the abnormal events, those situations arisen from the non-compliance of the terms and conditions of the corresponding Licence. It is a broader approach compared with the only consideration of abnormal events.

No. 61
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 40
CHAPTER OF NAT. REPORT: 3.7.3.4

The text on page 40 describes that "ARN, in certain cases, can issue a recommendation to the licensee. A recommendation is a demand that differs from a requirement in that the licensee has certain flexibility to accomplish it by means of alternative ways which ensure at least the same result required by the recommendation". Since on page 33-34 it is argued that the regulatory standards are non-prescriptive, the licensee's responsibility goes beyond the mere compliance with requirements, and that ARN mostly work with a performance based approach, what would such a recommendation consist of? Does it recommend a certain outcome or means to achieve this outcome? Could you please give examples of such recommendations?

According to ARN's management system the definition of recommendation is the following:

"Recommendation: It is a regulatory requirement for whose compliance the Responsible Entity has some flexibility, being able to adopt alternative solutions (for example different engineering solutions) to ensure, at a minimum, the same result required by the recommendation. These alternative solutions must be proposed to ARN for evaluation".

No. 62
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 43
CHAPTER OF NAT. REPORT: 3.8.1

On page 43 it is written that the "Law No. 25,018/98 sets provisions that involve the ARN in the management of Radioactive Wastes and that it states that ARN must approve the acceptance criteria, the transfer conditions and the radioactive waste (irradiated fuel) transference procedures." What does it mean that ARN approves these criteria, conditions and procedures (CCPs)? Is any safety responsibility taken over by the authority? May other CCPs be used if they fulfill the requirements of the laws and standards?

ARN, as Regulatory Body, has the competence to authorize, among other things, the transfer and storage of radioactive waste and irradiated fuel, for which it evaluates the specific conditions (criteria and procedures) if any, proposed by CNEA for such purpose, and approves if applicable. The responsibility of the tasks belongs to the operator.

No. 63
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 44
CHAPTER OF NAT. REPORT: 3.8.2

UCE responsibility listed at page 44: Institutional knowledge management. Could you please tell us more about how ARN works with institutional management knowledge?

The Education and Training Unit, in partnership with some relevant sectors, is developing a general training plan. Knowledge management activities are included in this general strategy. Regarding the institutional knowledge management, among other activities, it is expected to build an active database (particularly, it will contain the data linked to the E&T activities carried out by the staff), a systematic appraisal the material produced by the institution and implement the application of SARCON tool provided by the IAEA.

No. 64
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 46
CHAPTER OF NAT. REPORT: 3.8.3

It is reported on page 46 that activities are on-going in order to define ARN job profiles. Furthermore, the HRD division will develop a training plan for long and medium term. Could you please share your experiences in this important task? Have you also mapped the available staff competences?

Now there is a document that describes the basic profiles and training requirements for staff. This document lays the basis for developing the training plan but, in order to develop this planning, it is necessary to know the real skills of the staff and the existing gaps. Therefore, the ongoing activities are the analysis of the skills gaps defined to map them and develop the training plan.

No. 65
COUNTRY: SWEDEN
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 48
CHAPTER OF NAT. REPORT: 3.8.3.1.2

It is reported on page 48 that one of the main changes affecting NPPs control was in 2015 when inspections and evaluations related to radiological safety were transferred to the Radiological Protection in Facilities and Practices Division, in coordination but independent from LCRND. Could you please tell us more about the reasons behind this transfer?

Historically, the regulatory activities in radiation safety field were performed by professional belonging to the former division of "Radiological Protection in Facilities and Practices" in response to a request of activity identified by "Licensing and Control of Nuclear Reactors". In 2015, instead of working on a request basis, the Board of Directors decided to allocate the responsibility for radiation safety and radiation protection to the "Radiological Protection in Facilities and Practices". So, the main reason is the direct allocation of responsibility to the division where the professionals belong to.

No. 66
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 31
CHAPTER OF NAT. REPORT: 3.7

Please specify were the requirements for LTO are laid down and elaborate them.

There is no indication were the legal requirements for LTO are elaborated. It is unclear if they are part of a law, decree, or regulatory guides.

Up to date there is no AR standard defining the regulatory requirements and expectations for LTO. However, by regulatory practice all the requirements for a safe LTO are developed in formal letters which became as mandatory fulfilment. See for more detail the section 3.6.5.2 of the National Report.

In the case of Atucha I these requirements included but were not limited to:

- Implementation of improvements arising from the 2014 Periodic Safety Review (PSR),
- Comparison of Atucha I current design against the latest / modern German KTA design standards,
- Development of condition assessment of systems, structures and components (SSC) related to safety in accordance with the methodology defined by ARN,
- Completion of equipment qualification programme,
- Development of Time Limited Ageing Analysis (TLAAs) for structures and components belonging to systems safety classes 1, 2 and 3.

No. 67
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 35
CHAPTER OF NAT. REPORT: 3.7.2.3.1

On page 35 it is stated that the "ARN adopted, more than three decades ago, a probabilistic criterion for defining reference levels of acceptable risk". Do you plan to include the VDNS Principle 1 in your NORMA AR 3.1.3 "Criterios radiológicos relativos a accidentes en reactores nucleares de potencia (Rev. 2)" document? Please define the "Grupo Crítico" in NORMA AR 3.1.3.

The Argentinian legislation is based on probabilistic criteria for defining reference levels of acceptable risk. Those reference levels are elaborated in AR 3.1.3. "Criterios radiológicos relativos a accidentes en reactores nucleares de potencia (Rev. 2)". Within this document the levels of acceptability and non-

acceptability based on the probability and the dose for the public are elaborated. The curve does not reflect the VDNS Principle 1 regarding L&ERFs to be practically eliminated.

Currently there is a project for the review of all the Argentine standards, and the Vienna Declaration on Nuclear Safety (VDNS) will be included. The critical group stated in the Standard AR 3.1.3 is nowadays interpreted as a hypothetical person who lives in the surroundings of the Nuclear Power Plant and that has the highest risk (mainly due to his location taking into account the dominant wind direction and the distance to the NPP). The risk is measured as the probability of a fatality (or having a severe consequence) due to an irradiation following a nuclear accident.

No. 68
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 35
CHAPTER OF NAT. REPORT: 3.7.2.3.1

According the information provided on page 35 "Regulatory Standards are not prescriptive but of compliance with safety objectives (performance)". From the safety objectives the acceptance criteria are derived for each NPP. Please provide a comparison of the acceptance criteria for your three NPPs.

It is not easy to provide a comparison of the acceptance criteria for the different NPPs. For example, some deterministic acceptance criteria are identified from functional capacity, reliability and robustness derived from the safety classification of systems, structures and components, which in turn is based on the Safety Analysis demonstrating the functional safety of a design.

No. 69
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 117
CHAPTER OF NAT. REPORT: 3.15.5.1

Chapter 15.5.1 provides an overview on manSv and average dose at the Argentinian NPPs. Can you provide information on the maximum dose a person received in the respective years?

An average dose of >2mSv is rather high in comparison for pressurized water reactors and with regard to other countries.

Maximum individual annual dose for CNAUI

	NA-SA	Contractor
2016	14.89 mSv	17.37 mSv
2017	14.85 mSv	18.90 mSv
2018	15.28 mSv	16.47 mSv

Maximum individual annual dose for CNAUII

	NA-SA	Contractor
2016	2.55 mSv	1.52 mSv
2017	9.66 mSv	9.94 mSv
2018	7.13 mSv	5.85 mSv

Maximum individual annual dose for CNE

2016	20.44 mSv
2017	19.68 mSv
2018	19.33 mSv

No. 70
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 133
CHAPTER OF NAT. REPORT: 3.17.2.1

"Besides, the Regulatory Standard AR 10.10.1. "Site Evaluation for Nuclear Power Plants" had recently been developed and put into force, taking into account the lessons learned from the Fukushima accident and the corresponding IAEA standards"

What are the standards included in AR 10.10.1? Is IAEA SSR-1 Site Evaluation for Nuclear Installations considered? To what extent are possible effects of climate change considered?

The standard on which the AR 10.10.1 was based is the IAEA NS-R-3, Rev.1 - Site Evaluation for Nuclear Installations.

AR 10.10.1, as well as the revised NS-R-3, contains requirements related to:

- The potential occurrence of events in combination;
- Establishing levels of hazard for the design basis for the installation and their associated uncertainties;
- Multiple facilities at a single site;
- Monitoring of hazards and periodic review of site specific hazards.

There are no specific requirements related to the consideration of climate change.

No. 71
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 137
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.1

The report states that "The CNA I NPP was not originally designed or qualified considering severe earthquakes. However, due to the conservative design applied as well as the SSCs robustness, it was considered that there is an inherent capability to withstand earthquakes of a certain level which will be determined by means of a SMA to assess the SSCs' status in relation to their ability to perform its safety function after a specific earthquake occurrence".

What was the initial Design Basis Earthquake for CNA I? Is the seismic safety assessment completed for CNA I? If so, what are the final findings and resulting improvements? What were the results regarding possible seismically induced internal flooding?

The design of CNA I, consistent with the criteria and requirements established in the 1960s for nuclear power plants located at sites of low seismicity, did not contemplate seismic loads.

In the context of Fukushima, following WANO recommendations and ARN requirements the evaluation of the safety against earthquakes and associated induced hazards, for CNA I was formulated by NA-SA.

The seismic evaluation program consisted of the following phases:

- Phase 1: Scoping Study and Preliminary Plant Walkdown
- Phase 2: Development of the Safe Shutdown Equipment List (SSEL) and System Walkdown
- Phase 3: Structures Seismic Dynamic Response and In-structure Response Spectra Calculations
- Phase 4: Seismic Capability Walkdown – Screening Process
- Phase 5: Detailed Analysis and Evaluation for Seismic Qualification.

Those equipment and / or structures whose seismic capacity was judged below acceptable were classified as outliers, and the solutions were categorized as follows:

- items for which easy fixes were implemented
- items that depended on chatting of relays or contactors, for which studies and tests were performed, in order to qualify them
- items for which HCLPF calculations were performed, and, if necessary, plant modifications were implemented

Regarding internal flooding:

Liquid levels released per site and potential flood levels were calculated. The affected safety components were identified and actions were taken, such as:

- design, construction and installation of non-return mechanisms in different enclosures
- replacement of normal doors with watertight doors
- clapper placement in different enclosures
- placement of qualified seals (flame retardant, fireproof, waterproof and radiation resistant) in certain slab and wall passages
- placement of level sensors
- reconditioning and / or replacement of emergency door (to provide watertight sealing) that connects Level -6.50 m of Auxiliary Building with Manoeuvre Building, to isolate the controlled zone from floods that come from outside.

In addition, an abnormal event instruction is available to diagnose an internal flood event and take measures to mitigate its impact.

No. 72
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 141
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.3

The report states that some conceivable weaknesses were identified concerning other external hazards and the "licensee decided to implement additional studies to confirm them". Can you elaborate on the weaknesses? Have the studies been completed? Have any hard ware measures been implemented?

Aircraft traffic: According to IAEA Standard NS-G-3.1 ""External Human Induced Events in Site Evaluation for Nuclear Power Plants"" (2002), and the information provided by the Argentine Air Force, both airways located over CNA as the proximity of airports can be ruled out as sources of risk since they are beyond the Screening Distance Value (SDV) recommended for airways and proximity to airports (4 km). In addition, the CNA zone is a prohibited flight zone because the restriction is 3000 feet (914.4 m) and the airways are above that height. The annual probabilities of a plane and helicopter accident in the CNA linear airway are less than 10^{-7}/ year, so according to the Argentine Regulatory Guide ARN 3.1.3 these scenarios are discarded.

Potentially hazardous industrial plants: According to the information provided by the Municipality of Zárate, within this area there are chemical factories, and few of them are dangerous for human health and with the possibility of forming a toxic cloud. All of them are beyond the SDV suggested by the IAEA for explosions and toxic clouds.

No. 73
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 145
CHAPTER OF NAT. REPORT: 3.17.2.3.2.2.3

In chapter 3.17.2.3.2.2.3 a re-evaluation of the risk of tornadoes for CNE is mentioned, but no results / findings are presented. Are there any actions resulting from the evaluation?

As the result of the assessment of risk of tornado for the CNE site, the actions proposed are:

1. Cleanup from outdoor areas, all loose/stored components that could lead to be potential missiles
2. In order to guarantee the 5 key safety functions under the occurrence of a tornado, an assessment was performed and the conclusion was to take reinforcement measures in civil structures in EPS and EWS buildings and the housing where some isolation valves are located.

No. 74
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 148
CHAPTER OF NAT. REPORT: 3.18.2

The report states that for the "LTO period, ARN requires that SSCs fulfil the engineering requirements (robustness, functional capacity and reliability) needed for having a robust Defence in Depth concept". What are the related measures to achieve a robust DiD concept? Which are the main components addressed by these measures? To what extent are DECs considered? What are the related expected probabilities of occurrence and acceptance criteria?

The methodology for assessing the Defence in Depth (DinD) concept in Atucha I was developed based on the IAEA SRS-46, "Assessment of Defence in Depth for Nuclear Power Plants".

According to this document, there a series of safety principles (affecting different levels of DinD) that has to be assessed in order to identify the improvement/corrective measures for achievement a robust DinD concept.

Examples of these safety principles are SP 182: Equipment Qualification, SP 177: dependent failures, SP 221: Containment structure protection, etc.

As per this methodology all systems, structures and components important to safety need to be assessed as a first step.

In the case of Atucha I after doing this, corrective measures like replacement of non-qualified for qualified equipment, protective measures as installation of additional piping supports or re-routing/re-location of some systems, among others activities were and are being performed.

Design extension conditions without significant fuel degradation as well as design extension conditions with core melt, are considered in the above mentioned methodology.

No. 75
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 148
CHAPTER OF NAT. REPORT: 3.18.2

It is stated that the "CAREM reactor, a project prototype of a small power NPP has an enhanced Defence in Depth concept with some distinctive and characteristic features that greatly simplify the design". A greatly simplified design might contradict an enhanced Defence in Depth concept. This should be elaborated.

Can you elaborate on the enhanced Defence in Depth concept of the CAREM? How is the VDNS Principle 1 reflected in the license requirements?

According to the international trend and the recommendations of the IAEA, the design of CAREM-25 incorporates innovative concepts. Special emphasis has been placed on the adequate internalization of the Defense in Depth principle with the objective of fulfilling the Fundamental Safety Functions.

As mentioned in section 2.4, the regulatory activities observed an enlargement in its scope for the purpose of analyzing the inclusion of the design aspects destined to comply the safety functions for events occurring in sub-level 3B of DiD. As it is mentioned in Section 1.4.2.1., the objective of sublevel 3B is the control of multiple failure events (Design Extension Conditions), with a very low probability of occurrence, which defines a series of SSCs with particular engineering requirements designed to deal with these events.

Regarding to the currently construction license, the requirements derived from the regulatory standards are maintained, adding the requirements established in the AUSC (section 3.18.3.4.3.) related to some systems (of regulatory interest) that operate at level 3B of DiD. Those requirements applies to design, construction, assembly and testing stages of 2nd Protection System, 2nd (Diverse) Shutdown System, depressurization valves of RPV and Containment.

No. 76
COUNTRY: AUSTRIA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 149
CHAPTER OF NAT. REPORT: 3.18.3

On page 149 it is stated that some regulatory standards were not immediately applied at CNE and CNA I. When and to what extent where the ARs applied to the older NPPSs?

Since 2003, in Argentina, the Operating Licence is granted for a time period of ten calendar years. The regulatory requisite in order to renew the licence, is the submission and approval of a Periodic Safety Review (PSR). As part of this PSR, the safety factor 1 - Design, includes the comparison of the plant against modern standards from the country, as well as from the technology's country.

So, the AR are not exactly "applied" to older plants but the plant is compared against the ARs and if there are some gaps, corrective measures have to be identified and implemented, as far as practicable and suitable.

No. 77
COUNTRY: FRANCE
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 44
CHAPTER OF NAT. REPORT: 3.8.2

Could Argentina give information about the Nuclear Regulatory Authority ARN's resources to inform the public?

ARN has a Division of Communication responsible for promoting the ARN's institutional image among the stakeholders through strengthening internal and external communications. The Division reports to Board of Directors (see Figure 3.8.1 – ARN Organization Chart), with a team of 10 mixed-skill professionals. The functions of media relations and monitoring, online communications, including social media, and visual design are performed by the ARN's Communication staff.

No. 78
COUNTRY: FRANCE
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 43
CHAPTER OF NAT. REPORT: 3.8.2

Could Argentina precise if the three members of the Nuclear Regulatory Authority ARN's Board of Directors are nominated by the President of the Nation or if their nominations are approved through public hearings?

Article 18 of the "National Law of Nuclear Activity", Law Nº 24,804, establishes that the Board of Directors of ARN is nominated by the President of the Nation.

No. 79
COUNTRY: FRANCE
CNS-REF.-ART.: Article 10
PAGE OF REPORT: 15
CHAPTER OF NAT. REPORT: 2.9

Could Argentina describe activities and practices (related to organization, self-assessment, training, etc.) implemented by the nuclear regulatory authority ARN for developing and maintaining the safety culture within the regulatory body and ensuring a "common understanding of the safety culture" between the regulator and the licensee? In addition, does the regulator evaluate their effect on oversight of the licensee's safety culture?

The creation of CNEA in 1950s with the aim to coordinate and promote research in nuclear activities and to control them led to an early awareness of radiological safety issues related to such activities. There was a relevant participation of argentine experts in the development of the concept of “Safety Culture”, since the first INSAG meetings working in the analysis of the Chernobyl accident. Since then, the Safety Culture concept was consolidated in the area of nuclear safety, and in the oversight of reactors.

An assessment by the Senior Management on ARN’s Safety Culture has found that the following are elements providing strength:

- ARN personnel features a sound radiological safety-awareness based on a well settled common understanding of the fundamentals of radiological protection. Regarding Nuclear Safety, the personnel related to the regulation of Nuclear Facilities has developed an effective competence, based on the theoretical understanding of the conceptual structure and on the practice of relevant regulatory processes successfully performed.
- The concepts of safety culture are generally known throughout ARN organizational structure, and many of its elements are consolidated.
- Within each management department there is an organizational working culture that supports and encourages trust, collaboration and communication.
- Every agent is ensured to be entitled to report of problems relating to technical, human and organizational factors. There is a practice on the acknowledgement of problems, and on the reporting of the actions taken.
- ARN working culture is strong on a questioning and learning attitudes at all levels.
- ARN regulatory control has historically included a systemic approach to enhancing safety in all the facilities and practices under regulation. The trend to the explanation of requisites and teaching attitude on radiological protection towards the responsible of regulated facilities has been a feature of ARN for decades.

Nowadays the concept of Safety Culture is fostered in ARN through several means:

- The Induction Course implemented for all ARN personnel included modules on Radiological Safety (concepts on radiation, biological effects and radioprotection) and Nuclear Safety (concepts of safety by design, demonstration of safety and licensing basis). This allowed to overcome the lack of a systematic induction, and to extend the safety awareness providing a basis to develop Safety Culture as an organizational working culture.
- As part of the documentation relevant for safety and the re-training of personnel at nuclear reactors, Nuclear Fuel Cycle Facilities, and radiative applications.
- Departmental managers are proactive in this regard and foster meetings with inspectors and technical personnel to enhance their safety culture.
- Workshops with users of radiation sources, to enhance their knowledge on safety and their Safety Culture.

No. 80
COUNTRY: FRANCE
CNS-REF.-ART.: Article 11
PAGE OF REPORT: 71
CHAPTER OF NAT. REPORT: 3.11.2.3

Argentina has identified the risks of knowledge and competence loss related to the departures of staff for the licensee NA-SA. Could Argentina indicate if it has taken provisions to maintain the level of knowledge through hiring and knowledge transfer provisions or methods for identifying critical knowledge gaps?

Yes, the licensee continues to work hard to reduce the gaps in critical knowledge. NA-SA has been working on a position-by-position survey to determine the status of these positions during 2018. The study allowed making an effective projection of the potential retirements of personnel that the organization would have in the next 3 years. For each position, an evaluation was made of the impact of the loss of knowledge and experience that comes with potential resignations and potential successors were identified that would replace the vacancies originated by the retirements.

With respect to actions to retain critical knowledge in the organisation, the Training Departments began working on the development of training plans based on the SAT methodology to establish guidelines for the training process of each of the critical positions in the organisation. Together with the fieldwork and the preparation of plans, the training and knowledge module was developed in the Peoplenet management system to load the training plans and closely monitor the training process of the people who hold these positions. It should be noted that the degree of development of the training plans is not the same at the sites. It is expected that by the end of 2020 all sites will have developed plans and uploaded them into the system for subsequent monitoring.

The above mentioned action aims at ordering, retaining and enabling the transfer of knowledge in those critical positions of the organisation. Further more the succession plan is continuously updated. This plan includes the filling of critical positions, the identification of potential successors, planning for potential retirements, in addition to the systematic review of training plans.

No. 81
COUNTRY: FRANCE
CNS-REF.-ART.: Article 13
PAGE OF REPORT: 82-87
CHAPTER OF NAT. REPORT: 3.13

Could Argentina precise procedures and guidance to manage detection of non-conforming, counterfeit, suspect or fraudulent items received from suppliers before they are installed in the plant? Could Argentina precise the inspection program focusing on preventing and detecting the incorporation of non-conforming, counterfeit, suspicious and fraudulent items?

On the basis of a graded approach to safety, a reception committee in each plant is responsible for verifying that the technical specifications of the received items comply with those stated in the purchase order. Also, the items are stocked in controlled conditions according to the specifications. Before installation in the plant, items which do not comply with defined standards are clearly identified and segregated to prevent inadvertent use.

No. 82
COUNTRY: FRANCE
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 11-12
CHAPTER OF NAT. REPORT: 2.2

Could Argentina give more information about the recommendation of the SALTO mission at Atucha I regarding the implementation of a comprehensive equipment qualification program? Is only new equipment concerned or does it also concern old equipment subject to ageing?

1. The equipment qualification program is in its establishment phase, performing the following five main tasks:
   a) Basic and detail engineering of the equipment that will be replaced by qualified equipment and preparation of the technical specifications of purchase.
   b) Purchase of the new qualified equipment and components.
   c) Technical specifications for the qualification of the remaining equipment and components that are planned to qualify for any of the other methods provided (modification, analysis, testing, dedication). Task hired to CNEA.
   d) Performing of the tasks specified in point B. (modification, tests, analysis, dedication).
   e) Mounting and commissioning for all the equipment qualified in points B and D.
2. Most of the I&C equipment will be replaced by new qualified equipment, as well as some electric equipment (e.g. cables and actuators). Old equipment already aged will be also qualified as follows: cables by type testing; actuators by analysis and type testing; and penetrations and junction boxes by modification and subsequent testing. Mechanical equipment will be qualified by analysis, operating experience or replaced (in a very few cases).

No. 83
COUNTRY: FRANCE
CNS-REF.-ART.: General
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: Summary

In his report, the President of the 7th review meeting had recommended that Contracting Parties consider the implementation of the good practices that where identified during the meeting. Could your country provide information on the actions carried out with regards to the implementation of those good practices in your country?

From the four good practices identified at the 7th Review Meeting, Hungary's good practice was the driven force for improving the communication process to stakeholders.

Communication to stakeholders by ARN was improved relaunching an updated ARN website at www.argentina.gob.ar/arn with an enhanced a content, tailored to 3 different users' profile –general public, regulated and students, in a more modern and accessible website for people with different abilities, and with responsive design.

No. 84
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 17
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.17

As part of evaluating the radiological impact of NPP operation on the public and environment, does Argentina monitor the prevalence of cancer among population groups living around NPP sites (for example, by conducting relevant research studies)?

Argentina as part of the requirements do not have Ecology, and fresh water supply. Is there any particular reason as to why?

1. There are no specific studies on the prevalence of cancer in the population around the NPPs. To evaluate the environmental radiological impact, monitoring and follow-up of authorized discharges to the environment are carried out, sampling and measurements of radionuclides are carried out in the different environmental matrices. Likewise, the dose to the representative person of each site is calculated for the emitted discharges.
2. Standard AR 10.10.1 "Site evaluation for NPP" establishes specific requirements and criteria for this purpose:
    - The environmental radiological impact must be evaluated considering all the operating states and accident conditions, including those cases that may lead to emergency measures.
    - The surrounding geographical area should be evaluated considering the foreseeable present and future characteristics and the distribution of the population, including the present and future uses of land and water, and any other characteristic that may affect the possible consequences of radioactive emissions to the public and the environment.
    - Land and water uses of the site area: land and water uses should be characterized to assess the effects of the nuclear power reactor on the site area and to prepare emergency plans. The evaluation should include land and water bodies that can be used by the public or can serve as a habitat for organisms present in the food chain.
    - Possible effects on the public should be evaluated due to the dispersion of radioactive materials, both in surface waters and groundwater, using the data and information collected.
    - Environmental radioactivity: before commissioning a nuclear power reactor, the environmental radioactivity of the atmosphere, hydrosphere, lithosphere and biota in the site area must be determined, in order to assess the effects of the operation of the nuclear power reactor. The data obtained will constitute the environmental radiological baseline and should be collected periodically for a period of at least one year, before commissioning.

No. 85
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 6
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.6

Was the concept of extended shutdown considered prior to issuing approval for LTO phase A?

CNA I reached its end of life in 2018, current operation is stated as under LTO Phase A up until the first of 5 equivalent full power years or ten calendar years. Prior to entering LTO phase B the Global Assessment and Conceptual Implementation plan would be submitted to the Regulator in 2020. Is it expected that the projects that is in this plan be completed prior to entering or receiving approval for phase B, i.e. within 4 years if 2024 is the end date for phase A?

The concept of extended shutdown wasn´t considered.

The submission that ARN has to receive in 2020 contains the implementation plan, where a schedule for the corrective and improvement measures has to be proposed to ARN. The regulatory expectation is that the basis for the schedule be the safety significance of such measures, so a "timely implementation" can be assured. ARN expects that the plan be completed prior to entering in phase B.

No. 86
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 6
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.6

Does ARN play an active role in accumulating and dissemination of OE and is there an internal process for this within ARN?

ARN receives immediate and 24-hour communications of all the relevant events that occurred in the three nuclear power plants of the country, such as a 60-day evaluation report. Both communications and reports are archived on a platform for storage of information and documents. Also the reports made by this ARN on these events are archived in it. Meetings are held with the group of operational experience of the plants. The dissemination of events with their staff and safety culture is required and this is measured by a performance indicator.

The way of exchange information with other countries is through the IRS. First, an analysis is made of the events that may be useful to help prevent events in other nuclear power plants around the world. Then they are sent and loaded into the IRS database, which includes events from all the member countries of the group.

No. 87
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 6
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.6

Has Argentina adopted the revised dose limits to the lens of the eye and the extremities? If so, is it implemented or by when will it be implemented?

Does Argentina have any regulations regarding protection of the biota? If so, what is the status of implementation? If not, is it planned to be developed and implemented?

Standard AR 10.1.1. Basic Radiological Safety Standard establishes the following dose limits for workers:

- an equivalent dose to the lens of 20 mSv per year. This value should be considered as the average in 5 consecutive years (100 mSv in 5 years), not exceeding 50 mSv in any of the individual years.
- an equivalent dose to skin or extremities of 500 mSv per year.

While the dose limits for the public are:

- an equivalent dose in the lens of 15 mSv per year
- an equivalent dose in skin or extremities of 50 mSv per year.

For students 16 to 18 years of age, who in their studies require the use of radiation sources, the equivalent dose limit to the lens is 20 mSv per year and the limit of equivalent dose in skin or limbs is 150 mSv per year.

Standard AR 10.1.1. Basic Radiological Safety Standard establishes the requirements for the protection of people and the environment against the harmful effects of ionizing radiation and for the safety of radiation sources.

Standard AR 10.10.1 "Site evaluation for nuclear power plants" establishes the following requirements related to environmental protection:

D1. General requirements

21. The environmental radiological impact must be evaluated considering all the operating states and accident conditions, including those cases that may lead to emergency measures.

D2. Requirements Associated to the effects of the nuclear power reactor on the site area

27. The site assessment should identify and analyze the direct and indirect routes through which radioactive material can reach the public and the environment, to determine the potential radiological impact of nuclear installations in the site area.

28. The location and design of the nuclear power reactor should be assessed together to ensure that the radiological risk to the public and the environment is as low as reasonable to achieve.

D5.5 Environmental radioactivity

70. Before commissioning a nuclear power reactor, the environmental radioactivity of the atmosphere, hydrosphere, lithosphere and biota in the site area must be determined, in order to assess the effects of the operation of the nuclear power reactor. The data obtained will constitute the environmental radiological baseline and should be collected periodically for a period of at least one year, before commissioning.

ARN has the CROM V8 model as a tool to perform specific estimations in biota.

No. 88
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 13
PAGE OF REPORT: 84
CHAPTER OF NAT. REPORT: 3.13.2.1

CNE-LTO Project: It is mentioned in this section that in certain cases third part inspectors are delegated to audit suppliers. In which cases are the third party inspectors delegated?

Inspections of all national suppliers were performed by the LTO staff.

For the fabrication of reactor internals, pressure tubes, calandria tubes, closure sealsand feeders, and steam generators, resident inspectors were assigned in the factory during the whole fabrication process, and periodic audits and surveillances were performed by the LTO QA group.

In the case of international suppliers third party controls were performed.

No. 89
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 14
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 14

What were the major issues experienced during start-up of the CNE plant under the new power uprated conditions?

What has been the impact of the power uprate on in-service inspection programme?

The major issues experienced during CNE Start-up Process were:

- Shutdown system #1 trip when a High Pressure of the Primary Heat Transport test procedure was being carried out.
- Turbine trip after Reactor setback test.
- Turbine manual trip after grid operator required reactive power decrease.
- Shutdown System #2 trip by High Neutronic Power.
- Shutdown System #1 trip due to Steam Generators Low Level during the performance test instruments installation and enabling.
- Loss of power in Metal Clad #3O bus bar Class III.
- Turbine trip due to Steam Generator #3 High Level.
- Complete loss of offsite power after argentine interconnection system breakdown.
- Shutdown system #1 actuation due to low level on Steam generator #2.
- Unnoticed discontinuity of ""Online Gas Chromatography"" measurement data display.

Impact of the power uprate on in-service inspection programme

The CNE's In-Service Inspection (ISI) Programme incorporated design changes performed in the BOP (Balance Of Plant), in which Feed Water pre-heating systems were modified. Regarding the design changes in the NSP and BOP, equipment were replaced with the same characteristics as the ones being replaced. These replacements were considered in the Embalse ISI Programme so they fit within the CSA 285.4 Standard regarding inspection periods and baseline inspections.

No. 90
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 148
CHAPTER OF NAT. REPORT: 3.18.1

Given that CAREM is an innovative design are there any design specific requirements applicable to it, in addition to those in SSR-2/1 Rev. 1, and what are they.

The design of the CAREM 25 Reactor is prior to the issuance of the SSR-2/1 Rev. 1, however, it is harmonized with the requirements of this guide and the safety requirements of coming from the post Fukushima accident lessons were included in the design even before the accident.

In the framework of the Licensing scheme, considering CAREM 25 as a prototype of NPP, ARN granted the authorization for construction with "license conditions" which was a set of regulatory conditions that reinforcing authorization, as a result of the assessment of a safety demonstration based on comprehensive deterministic and probabilistic safety analysis.

No. 91
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 148
CHAPTER OF NAT. REPORT: 3.18.2

Did ARN develop any special regulatory requirements for a NPP that uses passive safety systems?

No regulatory standard has been developed that contains requirements for a NPP that uses passive safety systems. Regarding to Licensing of CAREM 25, as mentioned in section 2.4, one of the areas with special attention was the validation and verification of computer codes used for the RE for the demonstration of Safety.

ARN does not have specific standards for the system codes used for safety analysis / demonstration (TH, neutronics, fuel behavior, etc.) but the most commonly used codes have been already validated and verified within respective correlations range (RELAP5, TRACE5, CATHENA, CATHARE, MARS, ATHLET, and others).

However, due to special design features of CAREM reactor, ARN required a comprehensive analysis of each conditions and physical phenomena that could occur during PIEs transients/accidents and checking codes capability for capturing and representing them. This procedure holds mainly for thermal-hydraulics and neutronics codes (cell and core level) and some specifics codes have been developed for engineering / design, e.g. steady-state conditions, DNB, instabilities maps.

To develop this task, ARN provided guidance (based on CNSC RG G-149) on how to develop models / codes, its documentations and the quality assurance process required.

No. 92
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 125
CHAPTER OF NAT. REPORT: 3.16.4

The report says that in case of Green Alert, Argentina intends to distribute stable iodine tablets to the population living in the area of UPZ. As it is likely, that such distribution could take some time, are there any future plans to distribute iodine tablets in advance before the accident?

Currently, stable iodine tablets are stored in the NPP and at strategic points in the cities involved. Argentina doesn´t rule out the possibility of implementing a distribution strategy differently in the future.

No. 93
COUNTRY: SLOVAKIA
CNS-REF.-ART.: General
PAGE OF REPORT: 12
CHAPTER OF NAT. REPORT: 2.3 CNA II

ANSYS/CFD code probably does not cover secondary contamination of airflow called radioactive aerosol evaporation. How the contingency for active radionuclide evaporation is calculated (i.e. OMEGA Software recommended by IAEA)?

Exactly as you mention, the ANSYS/CFD code does not cover the contamination assessment.

The ANSYS/CFD calculations are used to assess whether or not the early containment bypass (corium melting the safety injection suction lines) can be avoided. In case it could, then an early large release from the containment to the environment can be precluded. Our goal is to avoid the containment bypass.

In the past for Atucha II PSA-L2 we employed MELCOR code for calculating radionuclide behavior inside the containment.

No. 94
COUNTRY: SLOVAKIA
CNS-REF.-ART.: General
PAGE OF REPORT: 13
CHAPTER OF NAT. REPORT: 2.5

...an agreement between NA-SA and Almafuerte Firefighters Station located more than 15 km from the Embalse NPP....

The description does not provide an information about the reaction time to cover emergency, we recommend to use reaction time rather, i.e. 15 minutes.

In case of internal emergency, CNE immediately calls Embalse firefighters, which take between 14 and 18 minutes to arrive, according to drills and previous experience. It is also established that, if convened, the emergency response organization must meet at the Internal Emergency Control Centre within 60 minutes of the calling.

In case of requiring external assistance for an event within the site, CNE immediately calls the firefighters of the city of Embalse (they are 7 km from the NPP), which take between 14 and 18 minutes to arrive, according to the drills and previous experience.

On the other hand, if a general emergency is declared in the NPP, the external response organizations are notified immediately to assist the COEM that it would be temporarily located in the fire department of the city of Almafuerte (approximately 18 km from NPP).

No. 95
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 23
CHAPTER OF NAT. REPORT: 3.6.5.1

Therefore, NA-SA developed a Plant Life Management (PLIM) and a Plant Life Extension (PLEX) program in order to maintain a high level of safety and plant performance during its life extension (extended period of 25-30 year). ...

The extension for CNE I from 1974 up to the year 2049 or 2054 seems to be very long. So long extension may lead to significant material degradation, which could be not executed by mitigation measures. What are the main arguments for such a long term operation?

Section 3.6.5.1 refers to CNE Life Extension and the related activities in order to safe operate the plant for 25-30 additional years depending on the load factor of the plant.

We understand that the question was posted for CNA I. In this case, the basis for definition of intended continued operation time was the demonstration (with safety margin) of the structural integrity of the reactor pressure vessel up to the end of the long term operation. It was also demonstrated for such period of time, the structural integrity of the metallic containment. So, the critical components were demonstrated to be fit for that additional period of service.

No. 96
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 9
PAGE OF REPORT: 61
CHAPTER OF NAT. REPORT: 3.9.3.5

Does the operator intend to construct an "information centre" near by the NPP?

An "information centre" is a useful tool that has proven successful in other projects with similar characteristics. The company has considered the implementation of an information centre, however due to the embryonic state of the new builds, we have not yet advanced in the discussion of an "information centre" for what could be Atucha III.

No. 97
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 11
PAGE OF REPORT: 68
CHAPTER OF NAT. REPORT: 3.11.1

These resources cover the acquisition of the necessary supplies and services for the normal development, the planned special revisions as well as the improvements of the NPPs.

The financial resources cover also the costs for decommissioning of NPP´s? There is no information about covering these costs from the electricity fees.

Decommissioning: In accordance with the provisions of Article 2, subsection e) of Law No. 24.804, it is the responsibility of the National Atomic Energy Commission to determine the manner of decommissioning of nuclear power plants; the scheme presented has not yet been approved.

In accordance with the provisions of PEN Decree No. 1.390/98 regulating Law No. 24.804 on nuclear activity, the fund with the necessary resources to face the decommissioning from each nuclear power plant would be created with the contributions of the company that became an operator of nuclear power plants to be privatized. Law No. 26.784, in its article 61, repeals article 34 of Law No. 24.804, so NA-SA is no longer subject to privatization. For this reason and in accordance with the provisions of article 37 of Law No. 24.065, which states that "the generation and transportation companies of total or majority ownership of the national State will have the right to recover only their total operating and maintenance costs that allow to maintain the quality, continuity and safety of the service…" the responsibility of financing the decommissioning of nuclear power plants is not assumed to date by NA-SA.

Similarly, it is noted that to date the sixth National Report 2017 of the "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management" has been issued. In its point F.6.5 it states that, the financing for the constitution of said fund must be assumed by the national State with own funds.

No. 98
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 19
PAGE OF REPORT: 177
CHAPTER OF NAT. REPORT: 3.19.9.2

Wet interim storage. Afterwards, treatment and conditioning for final disposal.
A dry interim storage is not considered due to lower operational costs, as it is stated in the Chapter 3.19.9.3.1?

The statement "Wet interim storage. Afterwards, treatment and conditioning for final disposal" is for research reactors. The strategy was a decision not connected with the spent fuel treatment and storage at CNA I NPP, as described in section 3.19.9.3.1.

No. 99
COUNTRY: SLOVAKIA
CNS-REF.-ART.: Article 19
PAGE OF REPORT: 178
CHAPTER OF NAT. REPORT: 3.19.9.3.1

Is there in the Wet interim storage an emergency wet pool, for example in case of maintenance?

There is no emergency wet pool in the Wet interim storage. But we can isolate the different spent fuel pools to perform maintenance on the working pool.

No. 100
COUNTRY: GERMANY
CNS-REF.-ART.: General
PAGE OF REPORT: 7
CHAPTER OF NAT. REPORT:

According to the National Report the assessment of the habitability of the MCR and SCR is an on-going activity. Does this activity comprise all three NPPs in operation (CNA I/CNA II/ CNE)? What are the main aspects to be assessed?

The activities comprise CNA I and CNA II NPPs.

The main activities that were performed are the following:

- A verification of the design of the main and auxiliary control rooms was carried out during 2016.
- A qualitative risk analysis of potential internal and external events at CNA site, which could affect the habitability of the control rooms, was also carried out.

The current status of the tasks required to test the tightness of the envelope of the main and auxiliary control rooms is shown below:

- Definition of control room envelope: finished.
- Evaluation of operating modes of the ventilation system: finished.
- Analysis of interference with adjacent areas: finished.
- Definition of acceptance criteria: in progress.
- Evaluation of improvements related to increase the main control room habitability: in progress.

No. 101
COUNTRY: GERMANY
CNS-REF.-ART.: General
PAGE OF REPORT: 14
CHAPTER OF NAT. REPORT: 2.6

In the National Report it is stated that CNE is currently operated under the commissioning licence and that the mandatory documents to apply for the operating licence are under preparation. Could Argentina please share the status of the commissioning program of CNE? Has Phase C "increasing the power of the reactor until reaching 100% FP, executing all the tests defined" successfully finished? Is commercial production of electric energy permitted under the commissioning licence? What are the regulatory limitations to avoid a long period of full power operation without a valid operating licence?

The licensee had already executed all the tests corresponding to phase C of the commissioning.

During the commissioning phase, the licensee conducted tests of various types to verify the operation of the plant according to the design, taking into account all the design changes that were implemented. In addition, ARN requested the licensee to incorporate additional tests to the program. For example:

- Power ramp at 30%FP, 50%FP and 75%FP to verify the control capacity of the plant to reach the new set power.
- Manual Set-back from 50%FP to 20%FP, 80%FP to 50%FP and 100%FP to 80%FP to verify the control capacity of the plant to reduce the power.
- Manual turbine trip at 50%FP, 80%FP and 100%FP to verify the automatic power reduction functions (step-back) and the capacity of the bypass valves.
- Main Steam Safety Valves Capacity test at 50%FP.
- Partial loss of feedwater to a simple steam generator.
- Shut Down System Nº1 manual trip to verify the dynamic response of the plant and power recovery.
- Load rejection from 500 kV line at 50%FP.

All tests were successfully carried out by licensee and were oversee by the inspectors of the ARN. All the tests at 100% FP and phase C of the commissioning was successfully completed.

In order to authorize the licensee to perform all commissioning tests up to 2064 MW (100% FP) of nominal thermal power corresponding to phases B and C of the commissioning program, the ARN issued an amendment to the Operation License of the Embalse Nuclear Power Plant. The validity of this license would be as long as phases B and C tests were carried out. It was expressly established in this license that, once the last phase C test has been executed and approved by ARN, the licensee must request, within a maximum period of 30 days, the issuance of the new operating license so that the installation can continue operating.

Thus, the regulatory limitation to avoid long periods of operation at full power without a valid Operating License was precisely established in the amendment to the license that allowed the licensee to perform phase B and C tests of commissioning.

No. 102
COUNTRY: GERMANY
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 21
CHAPTER OF NAT. REPORT: 3.6.4.1.2

According to the National Report at CNA I a temporary emergency control room was installed. Could Argentina please explain why this emergency control room is only temporary? In our understanding SSR 2/1 requires a permanent supplementary control room (see Req. 66).

The actual emergency control room in CNA I is defined as temporary because it is not the definitive one which will be constructed, commissioned and put into operation for entering into the phase B of the LTO project.

The original design of CNA I didn't contemplate the existence of an emergency control room. After Fukushima accident and later, as a result from the Periodic Safety Review done in 2014, became clear the necessity to solve this non-compliance in the light of modern safety requirements.

Due to a feasibility study done by the plant, ARN decided to require the installation of an emergency control room divided in a two-step process.

By the first step and in order to enter into the phase A of the LTO project, ARN required to install this temporary emergency control room in the Secondary Heat Sink building from where the plant can be shut it down and keep it in safe state. Also, instruction for operation and monitoring the plant from this temporary emergency control room were developed.

By the second step and in order to enter into the phase B of the LTO, a "definitive" emergency control room has to be installed. The design basis of this emergency control room has to be equivalent to the corresponding at CNA II. ARN is waiting for the implementation plan which will be submitted for approval next march 2020.

No. 103
COUNTRY: GERMANY
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 21
CHAPTER OF NAT. REPORT:

It remains unclear, if the temporary emergency control room serves CNA I as well as CNA II. Are there two emergency control rooms (one for CNA I and one for CNA II) or can both reactors be controlled from a single emergency control room?

CNA II has operative its own emergency control room. Instead, CNA I has operative its temporary emergency control room and has the plan to construct- commission and put in normal operation the permanent emergency control room, in the frame of the LTO project.

So, each plant can be controlled from the corresponding emergency control room.

No. 104
COUNTRY: GERMANY
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 23
CHAPTER OF NAT. REPORT: 3.6.4.3.3

Could Argentina please describe the principle of the level measurement of the spent fuel pool utilizing a compressed air bubbler?

The principle of operation is quite simple. In the Bubbler level gauge, a bubbler tube is used to measure and indicate pool level. Air is forced through the bubbler tube and the bubbles come out on the bottom of the liquid level. The greater the height of the liquid in the pool, the more pressure it needs to push the air out.

In this way, the back pressure from the bubbles is measured and converted into level value.

No. 105
COUNTRY: GERMANY
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 29
CHAPTER OF NAT. REPORT: 3.6.5.2

In the National Report the main activities of CNA I LTO stage "B" are listed. Based on the National Report it seems that some of the activities have already been completed and some are ongoing. Could Argentina please clarify, which activities have already been implemented, and comment on the time schedule for completion of the remaining activities?

The activities that were already implemented in order to enter into phase A, are:

- Condition assessment of all in scope systems, structures and components (SSCs);
- Revalidation of Time Limited Ageing Analysis (TLAAs) related to the RPV structural integrity, SSCs for coping with the confinement function. Identification of TLAAs for structures and components to cope with the fundamental safety functions other than confinement. Updating the P-T curve;
- Development of equipment qualification master list (environmental, seismic and electromagnetic immunity) and the program for further qualification;
- Completion of implementation of corrective measures (as far as practicable) from the review of safety factors belonging to the last PSR (2014) according to the IAEA SSG-25;
- Plant implementation of relevant recommendations which resulted from the condition assessments, in order to assure fitness for service of SSCs under the scope of Phase A;
- Implementation of new Fire – fighting's automatic systems;
- Implementation of temporary emergency control room.

Conceptual Implementation plan for the remaining activities will be submitted to ARN in 2020. It is expected that the projects that are in this plan be completed prior to entering into phase B, which will be in 2023 or within 4 years (as per the operating licence), depending when is the end date for phase A (2023 or 2024).

No. 106
COUNTRY: GERMANY
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 37
CHAPTER OF NAT. REPORT: 3.7.3.2.1

It is stated in the National Report that in 2010 ARN introduced the "ad hoc" licensing scheme for the innovative CAREM reactor. Later ARN revised the licensing scheme. Could Argentina please share its experience why the "ad hoc" licensing scheme will not be followed?

The evolution of the project and the experience gained in other projects (OL of CNA II, LTO license of CNE, pre-licensing of an updated CANDU and of the HPR 1000) leads to an up-date of the licensing scheme of CAREM 25.

The revised licensing scheme fits completely in the licensing procedures foreseen for new NPPs in terms of mandatory documents (table of contents and scope) and overall approach.

No. 107
COUNTRY: GERMANY
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 37
CHAPTER OF NAT. REPORT: 3.7.3.2.1

As stated in the National Report Argentina issues commissioning licences. Do these licences include hold points in the commissioning activities? In case of, could Argentina please share the defined hold points for Embalse as well as the foreseen hold point for commissioning of the CAREM reactor?

The commissioning license authorized the licensee to perform all commissioning tests up to 2064 MW (100%) of nominal thermal power to execute phases B and C as described in the Licensing Bases Document (LBD) for Embalse Life Extension Project. In this LBD, which was part of the mandatory documentation established in this commissioning license, all tasks of regulatory interest, including commissioning, were established with licensing milestones and hold points.

In summary, the following milestones and their corresponding prerequisites were established.

Milestone 1: Hydrostatic Test of Primary Heat Transport System (PHTS).

Prerequisite 1: Containment system available and verification of proper conservation of systems.

Milestone 2: Start fueling the reactor.

Prerequisite 2: Successful Hydrostatic Test of PHTS and notice ARN 60 days before.

Milestone 3: Guaranteed Shutdown State removal and power increase up 5%FP.

Prerequisite 3: Containment leak test, conformation of the ad hoc Committee for commissioning and mandatory documentation defined in the LBD approved (Phase B).

Milestone 4: Authorization of tests at different power levels (5%FP, 50%FP, 80%FP and 100%FP) (Phase C).

Prerequisite 4: Successful tests of the previous power level and evaluation of the corresponding report issued by the ad hoc Committee.

Milestone 5: Application for the Operation License.

Prerequisite 5: All mandatory documentation analyzed and approved by ARN including the final report of the ad hoc Committee.

Regarding CAREM:

The Commissioning Program (CP - included in the IS as chapter 14) defines a set of tests that will be carried out in the installation in order to demonstrate that the safety objectives of the SSC design are met and that the installation will work with safety conditions in both normal and abnormal operation. Therefore, all aspects of the planned operation for the Installation Operation stage must be consolidated to include them in the CP and test them during the Commissioning stage. Due to the design characteristics of the CAREM 25 prototype, the CP will require special treatment by the Responsible Entity (RE) to deal with states or situations outside the nominal parameters or with functional conditions not yet characterized. This includes, for example, tests at low and intermediate powers with a natural circulation greater than expected by calculation. This requires an early definition of possible values for the Operating Limits and Conditions (OLC, chapter 16 of the Safety Report) and a proposal of the detention points during the tests. These RE proposals must be approved and authorized by the ARN.

No. 108
COUNTRY: GERMANY
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 38
CHAPTER OF NAT. REPORT: 3.7.3.2.2

It is stated in the National Report that for CNA II the operating licence (issued in May 2016) is only valid for 5 years. In response to question No. 30 from CNS 2017 Argentina answered that the validity of the operating licence will be increased after the planned outages in years 2017 and 2018. Has the validity of the operating licence for CNA II increased to an interval of 10 years? Does it require a PSR for a license renewal? When will the first PSR for CNA II be performed?

No, the validity of the operating licence for CNA II has not increased to an interval of 10 years. According to an Act, signed by Boards of Directors of both Operator and Regulatory Body, considering the need of capitalizing the experience of having completed a “delayed project” and applying the principle of continuous improvement of nuclear and radiological safety, was decided to stablish a 5 years period for the first operating licence for CNA II.

In this Act were stablished the requirements for renewal the operating licence, including among others, the results of tasks done during the planned outages in years 2017 and 2018. Also there were requirements in relations with: evaluation programme of safety systems, extension of probabilistic

safety analysis and technical specifications. The compliance of all these items will be the base for renewal the operating licence for another 5 years period.

However, if Operator presents the PSR by this time, the operating licence could be renewed for 10 years. If not, the Regulatory Body will require the Operator to present the first PSR at least for petition of licence renewal after 10 years operation.

No. 109
COUNTRY: GERMANY
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 39
CHAPTER OF NAT. REPORT: 3.7.3.3

It is stated in the National Report that ARN performs regulatory audits to analyse organization, operation and process aspects related to radiological and nuclear safety in order to examine the degree of compliance with the provisions in the mandatory documentation.

Does ARN also assess the safety culture at a specific NPP during such audits?

How are observations regarding safety culture obtained and taken into consideration from planned inspections and special/reactive inspections?

Does ARN apply performance indicators for its assessment?

1) Currently ARN does not assess organizational safety culture (SC) as whole during regulatory audits to NPPs.
   - "ARN elaborates and execute an annual Regulatory Audits Plan that involves areas of regulatory interest of CNA I, CNA II, CNE and CAREM to verify compliance with regulatory standards, especially the regulatory standard AR 3.6.1." (NR, 3.8.3.1.2). This standard does not have regulatory requirements on safety culture, as stated by standards coherent with IAEA GSR Part 2.
   - "Currently NA-SA is assessing to adapt CNA U I-II and CNE Quality Assurance Manuals, according to ISO 9001:2015 and to IAEA GSR part 2 (2016). ARN is preparing a new revision from AR 3.6.1 "Nuclear power plant quality system", coherent with GSR part 2 and with other standards from the regulatory framework." (NR, Question No. 43, Annex II).

   However, ARN assess some SC topics during regulatory audits to NPPs.
   - "The Licensee of CNA I, CNA II and CNE, has been developed a Programme of Consolidation of Safety Culture (PRACS in Spanish initials) to reinforce nuclear safety culture… Currently, the programme covers topics such as operating experience, corrective actions follow up, self-assessment programme, fire protection, emergency preparedness, human error prevention tools, risk management, ALARA, management indicators, equipment reliability, etc.. " (NR, 2.9)
   - Previous regulatory audits covered some PRACS topics (i.e. regulatory audit to CNA I operating experience programme).
2) See 3.10.2.2 Safety culture and its developments (i.e. evaluation of the SC for renewal of personnel specific authorizations, evaluation of the SC attitudes during inspections, etc.).
3) Currently:
   - ARN does not apply safety performance indicators (SPI) to assess NPP safety culture;
   - ARN is developing a methodology to assess SPI related to NPP organization (safety attitude, internal control and compliance).

No. 110
COUNTRY: GERMANY
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 54
CHAPTER OF NAT. REPORT:

According to the National Report ARN staff was reduced by approximately 15%. Could ARN please explain in more detail the reasons for this reduction? How does this reduction affect ARNs performance reflecting the assessment of one reactor in commissioning, one reactor

under construction and an expected review of the design assessment for a construction licence? How will ARN manage the workload with reduced human resources and at the same time adequately ensure its regulatory functions?

Nowadays, ARN is subject to the restrictions in force for institutions of the National Public Administration to hire or contract personnel. Since 2017 there has been a policy of disengaging personnel with age over the retirement limit, and offering of voluntary retirements to personnel under that age. ARN coped with the situation transferring personnel with competences to critical activities from sectors that carry out activities of lower priorities.

No. 111
COUNTRY: GERMANY
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 105
CHAPTER OF NAT. REPORT: 3.14.3.1.4

It is stated in the National Report that more than 40 sequences were analysed by deterministic safety assessments for the CAREM reactor. SSR 2/1 requires that the design is capable of coping with accidents more severe than design basis accidents. Despite ATWS, what kind of accident sequences have been analysed as DEC without core melt? How are such accident sequences derived?

The phenomenology involved in accidents with core fusion (severe accidents) differs radically from those where there is no core fusion. Therefore accidents with core fusion must be treated at a specific Defense in Depth (DiD) level. Design elements that aim to prevent core fusion conditions and that are taken into account in the demonstration of safety, do not belong to the same level of DiD as the design elements whose objective is to control severe accidents that were not prevented. That is why the objective of Level 4 Defense in Depth is the control of accidents with core fusion -postulated- to limit off-site release, as far as reasonably practicable.

No. 112
COUNTRY: GERMANY
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 148 + 151
CHAPTER OF NAT. REPORT: 3.18.3.1.1

It is stated in the National Report that in preparation of LTO for CNA I, a benchmark against the most recent revision of KTA standards (KTA 3206, KTA 3501 and KTA 3904) was performed. Could Argentina please share the identified safety improvements related to KTA 3501 "Reactor Protection System and Monitoring Equipment of the Safety System" and KTA 3904 "Control Room, Remote Shutdown Station and Local Control Stations in Nuclear Power Plants"?

As part of the LTO project it is planned to replace the Reactor Protection System (RPS). The design and construction of the new RPS will be based on current normative (IEEE-1E or/and KTA 3501).

Regarding KTA 3904, the main discrepancy is the lack of an emergency control room (ECR), which is planned to be constructed as part of the LTO Project. The ECR will be constructed according to the regulatory requirements and following the current international normative. Another aspect is the need to improve the ventilation system of the MCR to ensure its habitability in the presence of smoke or harmful gases outside. The "Habitability of the MCR" Project is currently in course.

The gap involving automatic fire extinction system was resolved last year.

No. 113
COUNTRY: GERMANY
CNS-REF.-ART.: Article 19
PAGE OF REPORT: 160-182
CHAPTER OF NAT. REPORT: 3.19

On 16 June 2019 Argentina was faced with power failures in large parts of the country, having also an impact on all three Argentinian NPPs in operation. How long were CNA I, CNA II and CNE facing a loss of offsite power? Does Argentina classify this loss of offsite power as an AOO or DBA? What counter measures are in place to cope with such a situation (house load operation or emergency power supply)?

The loss of offsite power is treated as an AOO. A plant facing this event can go to a safe shutdown condition or to a reduction of power to self-consumption disconnected from the grid. Emergency Power Supply is available using diesel generators.

- Atucha I was already in shutdown condition and Emergency Power started successfully.
- Atucha II was at 40% of full power and continued operating in self-consumption.
- Embalse shutdown when the offsite power was lost and diesel generators started successfully. The loss of offsite power for Embalse lasted more than 9 h and the plant was in shutdown condition for 40 h.

This event in 2019 was extraordinary because it persisted for about 13 h within almost all the country, but no consequences were reported in any NPP.

It is worth mentioning that one of the items of the stress test performed in all NPPs after Fukushima was the extended Loss of Offsite Power including Station Black Out.

This event has not been included in the main report because it happened on 16 June 2019, after the closing date of March 2019.

No. 114
COUNTRY: INDIA
CNS-REF.-ART.: General
PAGE OF REPORT: 3
CHAPTER OF NAT. REPORT: 1.3

It is mentioned that CNNC is the supplier for HPR 1000 PWR and NA-SA holds the Design Authority role. ARN and NA-SA have signed a MoU on regulatory requirement.

Does ARN plan to undertake a detailed review and assessment of the overseas HPR 1000 design for its licensing in Argentina?

Yes, according to the licensing process of a NPP in Argentina a detailed review and assessment of the HPR 1000 design has to be performed for granting the operating licence.

MOU must be understood as a pre-licensing activity and doesn't diminish the regulatory involvement during the licensing process. According to Argentinean standard, it is necessary to review and further approve the Preliminary Safety Analysis Report and all the topical related documentation as a condition for granting the operating licence.

It is important to stress that ARN is member of Multinational Design Evaluation Program HPR1000 working group (MDEP-HPR1000).

No. 115
COUNTRY: INDIA
CNS-REF.-ART.: Article 10
PAGE OF REPORT: 65
CHAPTER OF NAT. REPORT: 3.10.2.2

It is mentioned that the Licensee has developed PRACS to reinforce nuclear safety culture and PRACS performance is measured through Surveys.

Could Argentina share:

1) The process of PRACS?

2) Some examples of recommendations of PRACS committee.

1) The PRACS process consists of selecting specific topics in the organization (fire protection, emergency preparedness, equipment reliability, human performance, operational decision making, indicator management, among others), through the definition of persons responsible (coordinators), in the different NA-SA sites, who lead these issues, which must implement a specific methodology (meetings and deliverables) to carry out transversal objectives to the organization, through the fulfilment of specific actions. The status of the issues is monitored in the framework of a PRACS committee (at a plant site and headquarters level) which is led by the corresponding site manager (in the case of headquarters, the committee leader is the General Manager).

2) Some examples of recommendations arising from the PRACS committees are: process and procedures unification between the 2 NA-SA power plants sites (eg, error prevention techniques, corrective actions, operational decision making, emergency plan, self-assessments, indicators); development of plans for joint communication between the 2 NA-SA power plants sites (eg industrial safety topics).

No. 116
COUNTRY: INDIA
CNS-REF.-ART.: Article 13
PAGE OF REPORT: 83
CHAPTER OF NAT. REPORT: 3.13.2

It is mentioned in the report that NA-SA has a Quality Assurance program to ensure that SSCs meet the necessary standards. ARN also audits the Quality Programs of the NPPs.

Can Argentina clarify whether ARN also have any plans to monitor in future at Suppliers' premises as part of Supply Chain Management? (for example: in the case of HPR 1000).

As part of the regulatory involvement during the licensing process ARN performs audits at manufacturer shops with the purpose to assess the application of the Quality Assurance program in their activities. ARN gives special attention to the fulfilment of the SSC´s engineering requirements (robustness, functional capacity and reliability, all supporting the safety demonstration) during the whole life including the manufacturer stage.

At certain cases when the licensee decides to nominate a certified third party in the project, ARN adapt its involvement during product realization by oversighting the results of the third party inspections.

No. 117
COUNTRY: INDIA
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 92
CHAPTER OF NAT. REPORT: 3.14.2.2

It is mentioned that during the retubing campaign (2016 to 2018) all the pressure tubes and calandria tubes were replaced by new ones with improved design features.

Can Argentina share information on these improved design features?

The design changes were proposed by CANDU Energy, depending on the operational experience, to comply with the design requirements of the fuel channels.

- Pressure tubes: The new design of this component includes changes in geometry, material chemistry and the tests required during manufacturing.

  The geometric change proposed by the designer was to increase the thickness of the tube from 0.165 "to 0.169", maintaining the internal diameter and with a slight increase in the external diameter. As is known, one of the effects of irradiation-induced creep is the dimensional change of the pressure tubes without a change in volume, which leads to a decrease in the thickness. The modification proposed by the designer aims to ensure thickness at the end of life, which implies an increase in tensions, to be sufficient to withstand the tensions imposed by the different states of load including accidental ones.

  Based on the operational experience of CANDU 6 reactors, the designer proposed changes in the chemical composition of the pressure tube aimed at decreasing its probability of failure. These changes correspond to reducing the initial hydrogen content from 20 ppm to only 5 ppm and limiting the chlorine content to 0.5 ppm as a residue of the process used to refine Zr. These changes allow:

  - Decrease the amount of initial hydrogen, which influences the phenomenon of DHC and blistering.
  - Improve the strength of the material.
  - Improve corrosion performance.
  - Improve fracture toughness.

- Calandria tubes: The most important modification to the calandria tubes corresponds to the implementation of a surface treatment for the central outer surface of the tube called "Glass peening". This treatment generates a rougher surface of the material, resulting in a better heat transfer to the moderator in the event of an accident, mainly because the vapor bubbles that form on the surface would be smaller and more easily released.

  In relation to geometric changes, the modifications were:

  - Increase of eccentricity tolerance in the flared section from 0.015 "to 0.020".
  - Extension of the perpendicularity tolerance at the ends of 0.02 "to 0.03".
  - Maximum ovality decrease from 0.04 ”to 0.02” in the central part of the tube.

These modifications would favor non-interaction between the calandria tube and the pressure tube.

No. 118
COUNTRY: INDIA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 139-141
CHAPTER OF NAT. REPORT: 3.17.2.3.2.1.2

1) It is mentioned in the report that in 2016 CNA estimates for extreme rise of Río de La Plata River a 1,000 years recurrence was taken. For minimum water level, a minimum Paraná River flow with a 100 years recurrence was considered.
Can Argentina clarify whether these recurrence periods are in line with Argentine codes?

2) It is mentioned in the report the PMH level is 8.45 m and the plant main buildings are on 23m high plateau.
Can Argentina clarify whether during PMH Level flooding incidence, will access to plant by personnel be hampered?

1) There is no specific argentine regulation establishing recurrence periods that should be used for risk evaluation. The rule “AR 10.10.1. “EVALUATION OF NUCLEAR POWER PLANTS SITING - Revision 0”, released by ARN (National Nuclear Regulator) establishes some general criteria in D4.2 Meteorological Phenomena:

   41. The extreme values of meteorological variables and phenomena must be evaluated, as well as meteorological and climatological features of the reactor siting. Accordingly, wind, rainfalls, snow, temperature, watercourse and tide levels parameters shall be documented for a certain period of time in order to evaluate possible extreme values.

44. The siting zone must be assessed to establish the possibility of floods or downspouts (…). If such possibility exists the relevant data must be collected and evaluated, including historical, meteorological and hydrological data.

2) The pump house is only located at river level, all the other main buildings are located on the top of the Paraná river cliff. The access to plant by personnel cannot be hampered because the entries to the plant's main buildings are located on the opposite side of Paraná River, on a 23 m high plateau.

No. 119
COUNTRY: INDIA
CNS-REF.-ART.: Article 19
PAGE OF REPORT: 163
CHAPTER OF NAT. REPORT: Section 3.19.4

It is mentioned that the NPPs have in force surveillance program for long lived components, as the reactor pressure vessel and its internals.

Can Argentina elaborate its regulatory requirements with respect to residual life assessment of the long lived components (such Calandria, Endshield etc.)?

Regulatory requirements for life assessment of long lived SSCs are oriented to demonstrate the capability to perform the intended functions during the entire period of life extension. In order to reach this safety objective ARN identified a set of regulatory expectations, which were requested to the plant. These are the following:

- In LA all components are important, so no screening was required.
- LA must include a review of applicable codes, standards and a thorough evaluation of:
  - Design margins,
  - Stress and seismic analysis reports,
  - Manufacturing processes, quality control, material/manufacturing defects.
- Maintenance, surveillance and inspection history, must comprehensively considered.
- Review of chemistry including chemistry specifications, and an analysis of chemistry excursions and their impact on materials.
- Operating/event history. Data gathering and review should include, but is not limited to:
  - failure rate history of components/subcomponents
  - component/subcomponent replacement history (including any actions arising from EQ requirements)
  - failure mechanisms observed to date
  - degradation sites
  - age related failure modes
  - service conditions (environmental, loading and power conditions resulting from normal operating requirements)
  - vibration data
  - operational transients
  - engineer's/operator's logs
  - conditions that prevail during testing, shutdowns and storage
  - unplanned events
  - thinning rates (where applicable -in order to evaluate design margins and estimate the remaining life by comparing thickness measurements against minimum thickness required)
- A qualitative fatigue assessment may be done as part of a LA such that a much more in depth analysis of operational transients may be required.
- Ageing evaluation (Ageing Management Review).
- Health prognosis.

Each piece of information presented in the aging evaluation has to be used to provide a prognosis for continued operation of the component and to provide the technical basis for recommendations.

The assigned health prognosis may be excellent/good/fair/poor for continued operation of the SSC to reach design life (life attainment) and for life extension beyond refurbishment.

The definitions of these categories are the following:

Excellent: The SCC is likely to operate beyond life attainment. No aging degradation was detected. Maintenance, health monitoring and other aging management activities are generally considered to be adequate.

Good: The SCC is likely to operate satisfactorily over life attainment with no significant aging degradation evident. That is, the SCC is generally being well maintained and does not require significant investment to reach life attainment provided that current aging management practices are continued.

Fair: The SCC is currently operating satisfactorily, but is obsolete or showing signs of aging, and may require additional remedial action for life attainment.
Improvements in aging management methods are identified to mitigate further aging degradation.

Poor: It is unlikely that the SCC will operate satisfactorily for life attainment without taking remedial action (e.g., replacement/refurbishment) within a short timeframe. Generally the SCC is exhibiting obvious signs of significant aging and/or is not in compliance with current codes/standards.

No. 120
COUNTRY: UNITED STATES OF AMERICA
CNS-REF.-ART.: General
PAGE OF REPORT: 12
CHAPTER OF NAT. REPORT: 2.4

Challenge #4 relates to licensing activities on CAREM 25, a small modular reactor prototype. Is the ARN planning to join the SMR Regulator's Forum to gather insights and best practices from the international community?

The ARN recognizes that participation in the SMR-RF sharing information regarding the licensing of the CAREM reactor would be beneficial in several aspects, but given the appropriate timing evaluation and the limitations of resources, ARN decided to postpone this participation to another stage of the licensing process. It is expected to open CAREM licensing experience when assembly and construction activities have been completed, preliminary tests are underway, and the ARN is analyzing the documentation to issue the Commissioning License. This opening will be considered considering the appropriate areas and mechanisms to integrate potential users and providers of SMRs.

No. 121
COUNTRY: UNITED STATES OF AMERICA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 158-159 and 184
CHAPTER OF NAT. REPORT: 3.18.3.5 and 4.4

Argentina has expressed interest in constructing a 4th NPP. The design selected is a HPR-100 of Chinese design. The contract between NA-SA and CNNC (China National Nuclear Corporation) has not been signed yet.

1) **What is the timeline for signing this contract?**
2) **Clarify, when is the new plan expected to become operational?**
3) **Does the cooperation arrangement between ARN and NNSA-China include cooperation for new reactors and construction activities?**
4) **Is ARN expanding its regulatory oversight program to include construction activities? If yes, please clarify to what extent.**

1) Although the negotiation of the construction contract for an HPR-1000 in Argentina is well advanced, there remain a number of substantive issues that still have to be agree among the parties before the contract can be approved and signed. The timeline for signing the contract is not yet clearly established due to the unresolved substantive issues.

2) The earliest time this plant could enter commercial operation is 2029.

3) Yes, the cooperation agreement includes the cooperation for licensing activities of new reactors.

4) Due to the recent licensing activities for Atucha II, the current regulatory oversight includes construction activities. So far, there is no need to expand it.

No. 122
COUNTRY: UNITED STATES OF AMERICA
CNS-REF.-ART.: General
PAGE OF REPORT: 11 - 13 - 15
CHAPTER OF NAT. REPORT: 2.2 – 2.6 – 2.7

Numerous activities associated to long term operation, life extension, and refurbishments are discussed. Did ARN evaluate the findings of the recent European Topical Peer Review on aging management to leverage lessons and gather good practices? If yes, were any gaps identified that needed regulatory action in Argentina?

ARN didn't evaluate the European Topical Peer Review on aging management.

No. 123
COUNTRY: CANADA
CNS-REF.-ART.: General
PAGE OF REPORT: 6
CHAPTER OF NAT. REPORT: 1.4.1

"The regulatory conclusion resulting from the stress tests performed by the licensee and ARN is that there is a need for some regulatory actions". What regulatory actions is ARN planning to take in regards to these findings?

The main regulatory action is the updating of the AR standards embedding the lessons learnt from Fukushima Daiichi accident and the harmonization of all standards with the latest IAEA safety requirements and guides. For more information see section 3.7.2.2.

No. 124
COUNTRY: CANADA
CNS-REF.-ART.: General
PAGE OF REPORT: 16
CHAPTER OF NAT. REPORT: 2.11

"The IRRS mission was reprogrammed due to operative reasons. Does this mean the mission was rescheduled to a different date, or that the scope of the mission was changed (or something else entirely)?

The mission was rescheduled to next 4th May, 2020.

No. 125
COUNTRY: CANADA
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 30
CHAPTER OF NAT. REPORT: 3.6.6

"The concept of defence in depth of the existing NPP's remains acceptable, like the one in CNA II or was/is being upgraded like in CNE and CNA I." Is there a timeline for the upgrades at CNE and CNA I?

In the case of CNE, the timeline for upgrade the defence in depth concept was connected to the LTO project. All the measures for the safety upgrade were mostly implemented during the refurbishment outage, as one of the pre-conditions to reach the first criticality (January 2019).

In the case of CNA I the timeline was derived from an integral assessment of all measures identified for upgrading and/or making more robust the defence in depth concept. The integral assessment took due consideration of the safety significance of each proposed measure and was based on deterministic analysis, probabilistic safety assessment and engineering judgment.
As similar as CNE, the timeline had also connection with the LTO project. In this case three milestones can be identified:

1. For facing Phase A (already done),
2. During Phase A where a long outage is planned for next 2023.
3. For facing Phase B in next 2025.

It is important to stress that for both cases the timeline was developed in accordance with the safety significance of the upgrading measure and a prioritization of them was also done considering at which level of the defence in depth concept is aimed to.

No. 126
COUNTRY: CANADA
CNS-REF.-ART.: Article 7
PAGE OF REPORT: 41
CHAPTER OF NAT. REPORT: 3.7.4

"fines to be applied proportionately to the severity of the fault and as a function of the potential damage involved". How are the fines calculated? Is there a minimum/maximum monetary value?

The infractions are typified in different articles of the Sanctions Regime for Nuclear Power Plants; approved by Resolution Nº 63 (5/5/99) of ARN Board of Directors. Each type of infraction has associated a minimum and a maximum of monetary fine.

At the time of the issuance of the sanctions regime, different parameters such as the regulatory fee and the value of wages were taken into account to determine the values of fines. However, these values were fixed without updating so far.

On the other hand, a technical evaluation is performed at the time of imposing the amount of the fine. The technical evaluation involves analyzing the regulatory offences taking into account two parameters; 1) severity of the infraction and 2) potential of the damage. Likewise, these extremes are graduated in mild, moderate and severe. So if the infraction to the regulatory standard is considered to entail a severity of the serious infraction and the potentiality of the damage is also severe, then the amount of fine to be applied will be the maximum that is typified.

No. 127
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 47
CHAPTER OF NAT. REPORT: 3.8.3.1.1

"The country's economic situation during the reported period doesn't provide a good environment for hiring new personnel or for giving to the existent staff more attractive work conditions". Understanding that there is no control over the economic situation of the country, does the licensee or regulator have any plans in place to address this difficulty?

ARN had a severe loss of qualified personnel in the last years and has faced the situation of transferring personnel with competencies developed in sectors that carry out less priority activities, to sectors with higher priority activities. To address this issue in the near future, work is being done on the mapping of skills to develop an appropriate training plan that suits current staff and a knowledge management plan.

No. 128
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 47
CHAPTER OF NAT. REPORT: 3.8.3.1.1

Good Performance: Providing technicians with in-depth radiation protection training (8 weeks, 7 hours a day) in addition to on-the-job training.

Argentina appreciates to Canada the identification of a good performance.

No. 129
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 48
CHAPTER OF NAT. REPORT: 3.8.3.1.2

Radiological safety inspections and evaluations are conducted by Radiological Protection in Facilities and Practices division independent from licensing and control division. Does the Radiological Protection division share their results with LCNRD?

Yes, Radiological Protection division shares their results with LCNRD. As the division of responsibilities imposed by ARN´s structural organization states, Radiological Protection performs its activities in response of work packages asked for LCNRD. The results of their activities are internally submitted to LCNRD for their further management.

No. 130
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 50
CHAPTER OF NAT. REPORT: 3.8.3.1.5

The UCE is working to formalize OJT. Is there an expected date for completion of this formalization?

As we stated in the reference document, the Education and Training Unit (UCE) is working on the formalization of the activities considered as OJT. As the UCE understands that this task is a constant updating process, this work is always "in progress". However, regarding to the establishment of procedures for the registration of these activities and their particular features, a pilot mechanism is currently running.

No. 131
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 54
CHAPTER OF NAT. REPORT: 3.8.6

"The mentioned Law sets the amount of the annual regulatory fees, as a function of the nominal power installed for each NPP". Does this amount change with time to cover increased costs due to inflation over the years?

Art. 26 of the National Law of Nuclear Activity No. 24.804 states the following: "…In the case of nuclear power plants this annual regulatory fee may not exceed the value equivalent to the average annual price of one hundred megawatt hour (100 MW / h) in the Electricity Market determined based on the prices in said market corresponding to the previous year. Said fee must be paid per nominal installed megawatt during the lifecycle of the plant until the activities of removal the spent fuel from the reactor are completed…"

TRAP = PMAeE [$/MWH] x SPEB [MWH]

Where:

TRAP: Annual regulatory fee.

PMAeE: Estimated annual average price of the energy.

SPEB: Total gross power installed of the NPPs in operation.

That is, there are two variables that are involved in determining the value of the regulatory fee for year:

- The average annual price of 100 MWh in the Electricity Market.
- The nominal installed nuclear power.

The use of them results in the variation of costs over the years.

No. 132
COUNTRY: CANADA
CNS-REF.-ART.: Article 12
PAGE OF REPORT: 79
CHAPTER OF NAT. REPORT: 3.12.1.3.3

"Self-assessments program is carried out annually". Is there a schedule for which divisions/ programs are checked? If not, how is this decided upon?

A program of self-assessments with different objectives is designed annually, according to the need of each department.

No. 133
COUNTRY: CANADA
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 98
CHAPTER OF NAT. REPORT: 3.14.3.1.3.1

The measurements for cooling the outer side of the pressure vessel and venting the containment will be evaluated in due course. Are there dates planned for the initiation of these measurements?

The RPV external side cooling is considered as a means for retaining the corium in scenarios with extensive core damage. The strategy and its effectiveness were analysed and extra efforts had to be made to adapt codes to the Atucha reactors. NA-SA together with ISS, the current developer of RELAP5 / SCDAP, have developed a version of the code that can represent the expected phenomenology in Atucha reactors (RELAP5 / SCDAP Mod 3.6). In the past years, preliminary results were obtained with RELAP5 / SCDAP. These calculations were followed by more complex analysis with ANSYS / CFD code, performed for CNA II NPP. The results of these analyses showed that the countermeasure is not successful in a scenario of LOCA in the moderator circuit with failure of safety injection system or in a SBO scenario. Based on these results, it was decided to rule out this countermeasure for Unit II and Unit I. It should be noted that the results for Unit II are extrapolable to Unit I in this case. As it was mentioned a parallel course of analysis has been started, to assess possible stabilization of molten material inside sump, to avoid an early containment breach, so as to decrease consequences in public as far as reasonable achievable. This task is being performed as part of phase B of CNA I LTO. This project is part of the Conceptual Improvement Plan that will be presented for consideration to ARN in March 2020.
Regarding the venting filtered containment system it is also planned to be implemented as part of phase B of CNA I LTO. (see section 3.6.5.2).

No. 134
COUNTRY: CANADA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 142
CHAPTER OF NAT. REPORT: 3.17.2.3.2.2

A seismic re-evaluation is planned as part of the CNE life extension project. Has this re-evaluation been conducted now that CNE has re-started?

Seismic re-evaluation was carried out in the initial stages of the life extension project and allowed the realization of several design improvements as described in the National Nuclear Safety Report 2019, 3.17.2.3.2.2.1. Earthquakes.

No. 135
COUNTRY: CANADA
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 144
CHAPTER OF NAT. REPORT: 3.17.2.3.2.2.1

A 24 inch rupture disc assembly shall be installed on the top of the existing calandria vault inspection port. It is foreseen to be implemented by the end of 2017. Was this addition completed as scheduled?

This design modification was implemented during the life extension project as scheduled and assured the pressure relief capability of the calandria vault during a severe accident. This rupture disk breaks when the internal pressure reaches 69 kPa and was sized to evacuate the mass of steam arising from a severe accident.

No. 136
COUNTRY: CANADA
CNS-REF.-ART.: General
PAGE OF REPORT: 2-3
CHAPTER OF NAT. REPORT: 1.3

The fourth NPP will be of a different design than the first 3 NPPs. Why was this SMR design chosen? When will the new reactor be commissioned?

As it is stated in the Section 1.3 of the National Report, the National Government promotes nuclear activities in the country.

Within this framework, the National Congress, through Law No. 26,566 declared of national interest the design, implementation and commissioning of the CAREM prototype reactor being built in Argentina, committing CNEA for that purpose.

No. 137
COUNTRY: CANADA
CNS-REF.-ART.: General
PAGE OF REPORT: 8
CHAPTER OF NAT. REPORT: 1.4.2.1

How are these events (large LOCAs, LOFA, control rod ejection) eliminated via this CAREM 25 prototype design? Please explain how risk reduction systems operate to accomplish this.

The CAREM design reduces the number of sensitive components and potentially risky interactions with the environment.

CAREM is a natural circulation based indirect-cycle reactor with features that simplify the design and improve safety performance. Its primary circuit is fully contained in the reactor vessel and it does not need any primary recirculation pumps. The self-pressurization is achieved by balancing steam production and condensation in the vessel, without a separate pressurizer vessel.

Regarding to Large LOCA events, the limitation of the diameter of the connection to the Reactor Pressure Vessel (RPV) to 38.1 mm and the penetrations of the pressure vessel at the highest possible level, above the active area of the GV, which reduces the impact of events due to loss of refrigerant in the reactor and in the requirements of safety systems.

Regarding the Control Rod Ejection event, is a typical initiating event of pressurized water-cooled reactors that were excluded in the safety analysis because the Control Rod mechanisms are hydraulic and in-vessel (internal of RPV) without being subjected to pressure differences.

Risk reduction systems perform functions at level 2 of DiD. These systems will be considered important for safety and will be assigned a degree of safety classification to provide a level of protection before level 3A, trying to avoid the thresholds of activation of the first protection system in relation to the demand for Safety Systems .

No. 138
COUNTRY: CANADA
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 24
CHAPTER OF NAT. REPORT: 3.6.5.1

Aging Assessment - Argentina should consider a benchmarking of the Aging Management plans for example, those developed in other CANDU countries.

Argentina appreciates the suggestion and will consider performing a benchmarking of the Ageing Management plans. However it is worthwhile to mention that Argentina is an active member of IAEA-IGALL group which provides a good platform for sharing experiences, included CANDU experience in that regard.

No. 139
COUNTRY: CANADA
CNS-REF.-ART.: Article 6
PAGE OF REPORT: 27
CHAPTER OF NAT. REPORT: 3.6.5.1

Has the management of SG component replacement considered operating experience from other CANDU installations?

All design changes implemented for the new Steam Generators (SG) were due to 3 fundamental factors:

- Plant repowering
- Seismic requalification
- Operational experience

Due to repowering, the thermal transfer area was increased through the implementation of longer tubes.

To comply with the new seismic requirement, design of the Quinshan steam generators was adopted as reference, which implied changes in the internal support of the pipe harness and certain modifications in the anchors of the external support on the SG shell.

In relation to the design changes associated with the operating experience, the new design and type of material for the tube support plates and the U-bend supports can be mentioned. The new support design is of the "Flat bar" type and the adopted material is 410 S stainless steel.

In addition, an inspection port in the U-bend region, 3 support plate inspection ports, 2 new inspection ports in the pre-heater region and 1 additional waterlancing port were added.

Carbon steel alloy subcomponents that are part of the pressure envelope, with wet surfaces in service, have 0.2% minimum Cr in their chemical composition.

No. 140
COUNTRY: CANADA
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 49
CHAPTER OF NAT. REPORT: 3.8.3.1.5

What is the curriculum based on for the ARN postgraduate courses that the ARN dictates in academic partnership with the School of Engineering of the University of Buenos Aires (FIUBA)?

The curriculum of the Specialization Degree in Radiation Protection and Security of Radiation Sources and the Specialization Degree in Nuclear Safety, are based on the elements developed by the standard syllabus developed by the IAEA for PGEC and on the document developed by the IAEA for BPTC, but also adds some particularities and deepens in some specific topics.

No. 141
COUNTRY: CANADA
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 126
CHAPTER OF NAT. REPORT: 3.16.6

"ARN is currently working with the National System for Comprehensive Risk Management and Civil Protection (SINAGIR) in the development of a plan that covers all areas for the postulated nuclear accident scenario" - Could you please elaborate on the status of this work?

During 2019, ARN and the Secretariat of Civil Protection of the Nation signed a notification agreement for the SINAGIR Public Alert Platform, whereby emergency situations are disseminated and notified to the public. In addition, ARN has access, through the Secretariat, to integrated computer communication and information exchange systems where the characteristics of the emergency and the available resources of all the response organizations involved are communicated. On the other hand, the efforts to develop an updated national plan for nuclear emergencies began.

No. 142
COUNTRY: CANADA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 159
CHAPTER OF NAT. REPORT: 3.18.3.5

"Despite the contract between NA-SA and CNNC has not been signed yet, it is important to stress that a management system of the entire design process will be in place in order to assure that the design organization has the capability to provide design products and services complying with the requisites set by NA-SA and applicable laws, regulations, standards, specifications and any other requirements established by ARN" - Could you please elaborate on the status of this? What managed process will be used and how does it differ from those used on the first 3 NPPs?

According to the agreed draft version of the Contract for the Fourth NPP, the Contractor shall be responsible for the design of the plant, which shall be reviewed and accepted by NA-SA. The Management System shall be established by the Contractor and approved by NA-SA and it shall fulfill the requirements set out by ARN's regulations, IAEA Guidelines, NA-SA´s requirements as well as ISO and other applicable standards.

The Management System for the Fourth NPP Project is a logical evolution from the Quality Management System used for Argentina´s previous three NPP Projects that have been carried out during the 70´s and 80´s. In particular it takes advantage on the lessons learned during the application of the one recently used for the completion of the Atucha II NPP. It has been improved and updated according to the last versions of the applicable documents, codes and standards.

No. 143
COUNTRY: RUSSIAN FEDERATION
CNS-REF.-ART.: General
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: General

What is Argentina's response to the "Major Common Issues Arising from Country Groups Discussions" (paragraphs 25 to 34 of the Summary Report of the 7th Review Meeting of the Contracting Parties to The Convention on Nuclear Safety)?

The Argentina´s response to the "Major Common Issues Arising from Country Group Discussions" is embedded into the different sections of the National Report.

As example, it can be mentioned that concerning safety culture, section 3.10.2.2 "SAFETY CULTURE AND ITS DEVELOPMENT" provides a description of the activities performed in that regard. Also, it is important to mention that Argentina is actively participating in a Regional Latin America (RLA) project from the IAEA with the purpose of supporting NPP life management and safety culture practices. This project contemplates the participation of the regulatory body as well as the operator and its biennial plan is developed according to the needs of each participant organization.

Under this project several activities were performed, as for example:

- Preparation for peer review mission like SALTO (Safety Aspects of Long Term Operation).
- Preparation of OSART (Operational Safety Review Team) mission.
- Supporting assessments and development of continuous improvement programs on operational safety, leadership and culture for safety.
- Practical support to ensure strong leadership and culture for safety during changes.
- To strengthen the implementation of nuclear oversight in the regulatory body.

Regarding the issue "International Peer Reviews", the National Report describes the activities performed in the frame of Ibero-American Forum of Radiological and Nuclear Regulatory Agencies (FORO) which illustrates the Argentina's commitment on the participation in international peer reviews and exchange of information.

Communication to stakeholders by ARN was improved relaunching an updated ARN website at www.argentina.gob.ar/arn with an enhanced a content, tailored to 3 different users' profile –general public, regulated and students, in a more modern and accessible website for people with different abilities, and with responsive design.

In summary, it can be concluded that "Major Common Issues Arising from Country Group Discussions" were considered, to the applicable extent, as an opportunity for improving activities of the regulatory body or operators.

No. 144
COUNTRY: RUSSIAN FEDERATION
CNS-REF.-ART.: Article 11
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: Section 3.11

What actions is Argentina taking to ensure the availability of financial resources in the case of a radiological emergency?

ARN has a permanent financial fund to meet the first needs in case of a radiological emergency.

No. 145
COUNTRY: RUSSIAN FEDERATION
CNS-REF.-ART.: Article 16
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.16

Are there unannounced emergency drills and exercises in Argentina? If yes, then what are the lessons learned from such exercises compared to planned exercises and exercises?

In the case of NPPs, exercises involving the population and response organizations are planned and announced activities.

No. 146
COUNTRY: ITALY
CNS-REF.-ART.:
PAGE OF REPORT: Annex II - page 2
CHAPTER OF NAT. REPORT: Annex II

With reference to the meeting held in Argentina in 2017 on supply chain and contractors qualification, could Argentina provide information about the current national situation? Have operator's difficulties for the supply of components having relevance for safety? Is the aging management affected from any in the supply capabilities?

The company owner the NPPs has not had relevant difficulties to meet the requirements of the plants in terms of important safety supplies.

On the other hand, it has not been observed that aging management was affected by lack of supplies.

No. 147
COUNTRY: ITALY
CNS-REF.-ART.: Article 6
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.6.3.1.3

Could Argentina explain the countermeasures put in place to avoid components CFSI (Counterfeit, Fraudulent and Suspect Items)? Were there in the past any finding? If yes, what were the consequences on NPPs operation?

On the basis of a graded approach to safety, a reception committee in each plant is responsible for verifying that the technical specifications of the received items comply with those stated in the purchase order. Also, the items are stocked in controlled conditions according to the specifications. Before installation in the plant, items which do not comply with defined standards are clearly identified and segregated to prevent inadvertent use.

No. 148
COUNTRY: ITALY
CNS-REF.-ART.: Article 8
PAGE OF REPORT: 45
CHAPTER OF NAT. REPORT: 3.8.3

With reference to human resources at the ARN, could Argentina provide information on the staff age and, if needed, on the expected recruitment to assure staff turnover?

The staff age is distributed in the following segments:

Ages over 60 years: 15%

Ages between 50 and 60 years: 18%

Ages between 40 and 50 years: 22%

Ages between 30 and 40 years: 39%

Ages under 30 years: 6%

ARN had in the last years a severe loss of qualified personnel because of the retirement age. To address this difficulty in the future, work is being done on the mapping of skills to develop an appropriate training plan that suits current staff and a knowledge management plan.

No. 149
COUNTRY: ITALY
CNS-REF.-ART.: Article 11
PAGE OF REPORT: 68
CHAPTER OF NAT. REPORT: 3.11

Could Argentina provide information about financial resources with regard to remediation following possible nuclear accidents and to ensure decommissioning activities?

Nuclear accidents: Argentina contemplates this issue in Law 25313 (Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and Convention on Supplementary Compensation for Nuclear Damage).

Article 9 - Every natural or legal person to develop a nuclear activity must:

(…)

c) Assume the civil responsibility that for the operator of a nuclear installation determines the Vienna Convention on Civil Liability for Nuclear Damage, ratified by law 17,048, for the sum of eighty million US dollars (US $ 80,000,000) per accident nuclear in each nuclear installation. It must be covered by insurance or financial guarantee to the satisfaction of the National Executive Power or its designee, assuming the National State the remaining responsibility.

Decommissioning: In accordance with the provisions of Article 2, subsection e) of Law No. 24,804, it is the responsibility of the National Atomic Energy Commission to determine the manner of decommissioning of nuclear power plants; the scheme presented has not yet been approved.

In accordance with the provisions of PEN Decree No. 1,390/98 regulating Law No. 24,804 on nuclear activity, the fund with the necessary resources to face the decommissioning from each nuclear power plant would be created with the contributions of the company that became an operator of nuclear power plants to be privatized. Law No. 26,784, in its article 61, repeals article 34 of Law No. 24,804, so NA-SA is no longer subject to privatization. For this reason and in accordance with the provisions of article 37 of Law No. 24,065, which states that “the generation and transportation companies of total or majority ownership of the national State will have the right to recover only their total operating and maintenance costs that allow to maintain the quality, continuity and safety of the service…” the responsibility of financing the decommissioning of nuclear power plants is not assumed to date by NA-SA.

Similarly, it is noted that to date the sixth National Report 2017 of the “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” has been issued. In its point F.6.5 it states that, the financing for the constitution of said fund must be assumed by the national State with own funds.

No. 150
COUNTRY: ITALY
CNS-REF.-ART.: Article 11
PAGE OF REPORT: 71
CHAPTER OF NAT. REPORT: 3.11.2.3

With reference to human resources at the NA-SA, could Argentina provide more information on the sufficiency of the number of qualified staff and on recruitment plans, if needed?

Yes, more information can be given if needed. We understand that we have the qualified staff as expressed in other answers. As also stated in other answers, recruitment plans are included within the Staffing Plan that is discussed and agreed upon with the Plant Managers.

No. 151
COUNTRY: ITALY
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 113
CHAPTER OF NAT. REPORT: 3.15.1

Could Argentina clarify how and by which organization all the information concerning the levels of radioactivity in the environment around the plant are made available to the public?

The information concerning the levels of radioactivity in the environment is made available to the public by ARN.

Each year, ARN publishes the Annual Activity Report that compiles the main tasks carried out in the areas of radiological and nuclear safety, safeguards and physical protection including the levels of radioactivity in the environment.

The Annual Activity Report is prepared in accordance with the provisions of article 16 of the National Law of Nuclear Activity - Law No. 24804 and fulfills the function of informing stakeholders.

No. 152
COUNTRY: ITALY
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 113
CHAPTER OF NAT. REPORT: 3.15.1

Could Argentina explain how and by which organization independent environmental monitoring is performed around the plant?

ARN carries out an Environmental Plan for Radiological Monitoring (in Spanish, PMRA) in the surroundings of the nuclear power plants involving sampling and subsequent measurement of radionuclide concentration in various environmental matrices: water, air, soil, sediments and food.

This monitoring is independent of those carried out by the Primary Responsible of the plant.

Samples are processed and evaluated in ARN's laboratories, located in the Ezeiza Atomic Center (CAE). These laboratories are dedicated to sample pretreatment, gamma spectrometry, tritium measurement, determination of uranium by fluorimetry and kinetic phosphorescence, determination of strontium, measurement of alpha emitters and beta, radon measurements, among others. The techniques used in these laboratories are accredited under the standard IRAM 301:2005 (ISO / IEC 17025: 2005).

No. 153
COUNTRY: ITALY
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 122
CHAPTER OF NAT. REPORT: 3.15.7

Could Argentina provide information on what are, according to the radiation protection laws, the dose limits for members of the public during normal and accident conditions? Do, in normal conditions, the calculated doses take into account the exposure coming from direct external irradiation and doses from gaseous and liquid effluents?

Standard AR 10.1.1 establishes.

The dose limits for the public are:

a. an effective dose of 1 mSv per year; and in special circumstances, a highest effective dose value in a single year, provided the average dose effective for five consecutive years does not exceed 1 mSv
b. an equivalent dose in lens of the eyes of 15 mSv per year
c. an equivalent dose in skin, hands or feet of 50 mSv per year.

For these cases, Standard AR 3.1.3 “Criterion Curve”, establishes a limit to the risk from any accident situation through a probabilistic quantification.

Moreover, Standard AR 10.1.1 establishes:

In the design of an installation Class I, the Responsible Entity shall ensure that the annual probability of occurrence of a postulated accidental sequence is verified (or category of release), estimated according to requirement 47, with potential radiological implications on the public, and the effective dose estimate resulting from that sequence on the representative person do not define a point in the unacceptable area of Figure 2.

Figure 2 is the “Criterion Curve for the public”.

In addition, Standard 10.1.1 establishes:

EMERGENCY EXPOSITION SITUATION

Public exposure

The protection strategies should be such that for the residual dose reference levels, expressed in effective dose, are applied in the range of 20 to 100 mSv.

In normal situations, the doses calculated for public include those due to gaseous and liquid discharges as well as direct doses by external irradiation, if applicable.

No. 154
COUNTRY: ITALY
CNS-REF.-ART.: Article 15
PAGE OF REPORT: 117
CHAPTER OF NAT. REPORT: 3.15.5

Could Argentina provide information if Radiation Protection Laws establish specific provision for external workers liable to be exposed to ionizing radiation?

ARN implements radiation protection through regulatory standards.

The Radiological Protection criteria adopted by the Regulatory Body to control the dose received by workers is consistent with ICRP’s recommendations. Regulatory Standards AR 3.1.1, AR 4.1.1 and AR 6.1.1 applied to nuclear power reactors, research reactors and radioactive facilities Type I set different criteria to ensure that the occupational dose to workers stays as low as reasonably achievable and lower than the established dose constraints and there is not a distinction about permanent or external workers.

Occupational Dose Limits

Dose limits for workers are as follows: The effective annual dose limit is 20 mSv. This value shall be considered as the average in 5 consecutive years (100 mSv in 5 years), not exceeding 50 mSv in any single year.

Regulatory standard AR 10.1.1 sets that employees are responsible for their compliance with the procedures established to ensure their own protection as well as the protection of other employees and of the public. This condition is consistent with the recommendations of the International Atomic Energy Agency (IAEA).

No. 155
COUNTRY: ITALY
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 125
CHAPTER OF NAT. REPORT: 3.16.4

Could Argentina clarify which organisation(s) is (are) responsible for providing information to the public both prior and in case of a nuclear emergency?

Through the recently signed agreement between ARN and the Secretary of Civil Protection of the Nation, there is an alert platform in which basic information is disseminated in case of emergencies about risks and recommended measures, so that the public is also protected. In addition, the population remains informed during it.

On the other hand, the populations surrounding nuclear power plants have a public early warning system.

No. 156
COUNTRY: ITALY
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 128
CHAPTER OF NAT. REPORT: 3.16.8

How are information to neighboring Countries provided in emergency preparedness and emergency situation?

Argentina has ratified Early Notification and Assistance Conventions in case of Nuclear Emergencies through National Law 23731. Notification to the IAEA and the member countries is through the USIE platform.

No. 157
COUNTRY: ITALY
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 150
CHAPTER OF NAT. REPORT: 3.18.3.1.1

During past 7th review process, Argentina specified that containment venting filtration system was under assessment at CNA I & II NPPs. Could Argentina clarify the reasons for which the assessment of the filtered containment venting system has not been completed yet, and when is its implementation foreseen?

Independent filtered containment venting systems for CNA I & II are planned to be implemented at the same time in order to take the advantages of carrying out similar projects together. Its implementations are foreseen for phase B of CNA I LTO. (see section 3.6.5.2)

No. 158
COUNTRY: ITALY
CNS-REF.-ART.: Article 16
PAGE OF REPORT: 129
CHAPTER OF NAT. REPORT: 3.16.9

Among different computational tools that operate at the Emergency Control Center of ARN is there a system able to acquire plant parameters in order to evaluate the source term?

Currently, ARN in its facilities does not have a computer system with required safety conditions to access the NPP plant information.

No. 159
COUNTRY: ITALY
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 93
CHAPTER OF NAT. REPORT: 3.14.3

For existing installations could Argentina provide a list of adopted safety improvements to meet the VDNs objective of avoiding early radioactive releases or radioactive releases large enough to require long term protective measures?

As it is stated in Article 6 of the National Report, comprehensive and systematic assessments of the existing NPPs have been carried out and will continue to be carried out periodically in Argentina, resulting in numerous safety improvements that helped meet the objective in principle (2) of the VDNS.

Detail of the activities performed during the reported period can be found in section 3.6.3, “Actions leading to safety improvements” and in section 3.6.4, “Improvement activities”, of the National Report.

No. 160
COUNTRY: ITALY
CNS-REF.-ART.: Article 17
PAGE OF REPORT: 134
CHAPTER OF NAT. REPORT: 3.17.2.3

How frequently and according to which procedure site related factors are re-evaluated with particular reference to natural hazards?

In Argentina it is required for all NPP the development of a Periodic Safety Review (PSR) every ten calendar years, according to the IAEA SSG-25, "Periodic Safety Review for Nuclear Power Plants". As part of this PSR, Safety Factor 1: "Plant Design" and Safety Factor 7: "Hazard Analysis", requires a site re-assessment in light with the latest regulations/practices and modern standards. In addition, Argentina is reactive from events like Fukushima.

No. 161
COUNTRY: ROMANIA
CNS-REF.-ART.: Article 14
PAGE OF REPORT: 13
CHAPTER OF NAT. REPORT: 2.6

Please provide more information on the new events for which it is mentioned that the trip coverage has been improved.

The new events for which the trip coverage has been improved are:

- Loss of Moderator Heat Sink
- Loss of Moderator Circulation

For those events, there were no effective trip parameters installed on shutdown systems at Embalse. Coverage was provided by regulating system actions only.

After refurbishment, the effective trip parameter for both shutdown systems is "High Moderator Level". Anyway, the fuel channel integrity is not compromised for these events. The only potential dose comes from tritium released from the moderator inventory spilled out of the Calandria. The quantity of tritium released is expected to be small. The release would be well within regulatory limits. This is not a limiting acceptance criterion for shutdown system effectiveness, which is primarily determined by prevention of fuel failures.

The main trip coverage´s improvements of the reactor´s shutdown systems can be summarized as follow:

1) Events that were not covered by at least one trip parameter of each shutdown system and are now covered by at least one trip parameter of each shutdown system:
   - Single main HTS pump trip
   - Single main HTS pump seizure
   - Feedwater line breaks
   - Steam line breaks outside containment
   - Loss of feedwater flow to one boiler
   - Loss of moderator inventory
2) Events that were not covered by at least one trip parameter of each shutdown system and are now covered by two or more trip parameter of each shutdown system:
   - In-Core LOCA
   - Loss of Class IV power (external power)
3) Events that were covered by only one trip parameter of each shutdown system and are now covered by two or more trip parameter of each shutdown system:
   - Large LOCA
   - Small LOCA
   - Loss of primary circuit pressure an inventory control: depressurization
   - Loss of service water

No. 162
COUNTRY: ROMANIA
CNS-REF.-ART.: Article 18
PAGE OF REPORT: 14
CHAPTER OF NAT. REPORT: 2.6

Please provide more information on the modifications implemented to improve the reliability ECC, referring to the extra lines for injection, relocation of sump level sensors to improve measurement and the reduced frequency for the interface LOCA event through the ECCS line. What is the basis for these modifications (new safety analyses, operational experience, etc.)?

The design changes to the ECC were mainly to meet the new objectives of the PSA in terms of probability of severe damage to the core. Thus, it was proposed to increase the reliability and availability of the system.

The main ECC modifications were the following:

- Increase the size of valves and associated pipes corresponding to the recirculation of the emergency cooling system (PV23 / PV24). This modification was made to provide an alternative path for medium pressure injection from the Dousing tank to the aspiration of the ECC pumps.
- Replacement of the manual valve V7 for manual check valve. This eliminates the need for manual operator action in case of Design Bases Earthquake. In this case, the long-term replenishment of water to PHTS (Primary Heat Transport System) from the Dousing tank or from the Emergency Water Supply is done through MV75 and the V7 valve is required to be closed.
- Installation of redundant valves to the Dousing tank isolation valves to ensure the isolation of the Dousing tank at the end of the medium pressure stage avoiding the entry of air into the suction of the ECC pumps.
- Automatic transfer of medium pressure stage to the low pressure stage, avoiding the need for operator intervention.
- New level measurements of the Dousing tank were provided to ensure accurate measurement.
- Seismically qualified electric power supply for ECC pumps. This design change was to ensure the operation of the ECC pumps in the case of LOCA and 24 hours after a site earthquake (SDE) (by not considering Class III Diesel available).
- Provision of cooling water to the ECC heat exchanger from the Emergency Water Supply (EWS) in case of loss of Service Water System.
- Additional alarms to keep the operator informed. For example, low pressure alarm in the ECC water tanks and the relocation of the sump level sensors because they were close to the suction of the ECC pumps and could cause wrong measurement.

No. 163
COUNTRY: SOUTH AFRICA
CNS-REF.-ART.: Article 17
PAGE OF REPORT:
CHAPTER OF NAT. REPORT: 3.17

As part of evaluating the radiological impact of NPP operation on the public and environment, does Argentina monitor the prevalence of cancer among population groups living around NPP sites (for example, by conducting relevant research studies)?
Argentina as part of the requirements does not have Ecology, and fresh water supply. Is there any particular reason as to why?

1) There are no specific studies on the prevalence of cancer in the population around the NPPs. To evaluate the environmental radiological impact, monitoring and follow-up of authorized discharges to the environment are carried out, sampling and measurements of radionuclides are carried out in the different environmental matrices. Likewise, the dose to the representative person of each site is calculated for the emitted discharges.
2) Standard AR 10.10.1 “Site evaluation for NPP” establishes specific requirements and criteria for this purpose:

The environmental radiological impact must be evaluated considering all the operating states and accident conditions, including those cases that may lead to emergency measures.

The surrounding geographical area should be evaluated considering the foreseeable present and future characteristics and the distribution of the population, including the present and future uses of land and water, and any other characteristic that may affect the possible consequences of radioactive emissions to the public and the environment.

Land and water uses of the site area

Land and water uses should be characterized to assess the effects of the nuclear power reactor on the site area and to prepare emergency plans. The evaluation should include land and water bodies that can be used by the public or can serve as a habitat for organisms present in the food chain.

Possible effects on the public should be evaluated due to the dispersion of radioactive materials, both in surface waters and groundwater, using the data and information collected.

Environmental radioactivity

Before commissioning a nuclear power reactor, the environmental radioactivity of the atmosphere, hydrosphere, lithosphere and biota in the site area must be determined, in order to assess the effects of the operation of the nuclear power reactor. The data obtained will constitute the environmental radiological baseline and should be collected periodically for a period of at least one year, before commissioning.

CONVENTION ON NUCLEAR SAFETY

ANSWERS TO QUESTIONS OR COMMENTS

Autoridad Regulatoria Nuclear
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