CONVENTION ON NUCLEAR SAFETY

NATIONAL NUCLEAR SAFETY REPORT

ANSWERS TO QUESTIONS OR COMMENTS - **ARGENTINA - 2017**

Autoridad Regulatoria Nuclear
PRESIDENCIA DE LA NACIÓN

SEVENTH REPORT

ARGENTINEAN NATIONAL REPORT FOR THE CONVENTION ON NUCLEAR SAFETY

ANSWERS TO QUESTIONS OR COMMENTS - February 2017

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
Seventh Report - **ANSWERS TO QUESTIONS OR COMMENTS**

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Convention on Nuclear Safety
Questions Posted To Argentina in 2017

No.: 1

Country: Austria

Article: General

Ref. in National Report: 2.8 Internatical support missions, p15

Question

The process of Internal Technical Support Missions (MISTI), implemented by NA-SA, can be seen as area of good performance for Argentina. The process has been applied mainly between NA-SA plants, including support organisations. Since 2011, when the first MISTI was initiated, a number of 23 MISTI missions were performed.

Answer

Argentina appreciates the comment from Austria.

No.: 2

Country: Canada

Article: General

Ref. in National Report: Section 2.5 (p.14)

Question

The report states, "as a condition for licensing the CNE life extension, to carry out a periodic safety review…". (CNE, Central Nuclear Embalse)

Can the Contracting Party clarify if the PSR is required to inform the regulatory decision on licence renewal, or as a condition following licence renewal?

Answer

In Argentina, license renewal is based on successful completion of PSR. Therefore, for CNE life extension, it is required to inform the regulatory decision.

No.: 3

Country: Canada

Article: General

Ref. in National Report: Annexe II, p.16, No. 28

Question

The report states that "An interconnection between CNA I /CNA II normal electric bars will be maintained manually activated. Among the improvements that are being analyzed after Fukushima, it is considered that CNA I´s EPS can be a backup for CNA II through this interconnection. These measures are still under study, and up to now no calculations on their impact on global core damage frequency have been done."
Can you elaborate on the progress and implementation of this interconnection?

Answer

The current status is the following:

- The electrical interconnection between CNA I and CNA II is now manual and it has been incorporated into the operational instructions following a blackout. This interconnection can be in both directions in order to supply power to the normal bars. For other purpose, such as for closing the switches, previous actions are needed, according to the load flow.
- A conceptual engineering assessment has been performed in order to supply power to a CNA II secured bar using diesel generators from CNA I. This action is foreseen in an Emergency Power Case of both plants, plus unavailability of the 4 diesel generators of CNA II and having the 3 CNA I diesel generators available.

No.: 4

Country: Canada

Article: General

Ref. in National Report: Annex IV.12 (p.6)

Question

Can you please clarify for the design of the CAREM 25 what is meant by "Emphasis has been given since the design genesis to prevention of core degradation accidents by means of passive safety features, guarantying no need of active systems or operator actions for a period of at least 36 hours." Are batteries considered part of the passive safety features? If so, are there any additional strategies being considered to extend the life of the batteries (i.e., load shedding)?

Answer

Batteries are considered part of the passive safety features. Moreover, the valves needed to control the main line of the passive safety features go to a safe position in case of loss of electrical power. This means that these passive safety features are triggered in case of loss of the batteries.

No.: 5

Country: Finland

Article: General

Ref. in National Report: page 5

Question

The report describes the process for stress tests and its peer review within FORO. Could it be clarified if the stress test national report and its peer review results were made publicly available?

Answer

National Reports from Argentine, Mexican, Brazilian and Spanish NPP stress tests were published at FORO web page in Spanish:
http://www.foroiberam.org/web/guest/publicaciones/evaluacion

The FORO presentation during the VI Meeting to Review Safety Convention, in English, is available at this web page too.

No.: 6

Country: Finland

Article: General

Ref. in National Report: page 11

Question

The report indicates that several WANO peer review missions have been conducted in Argentina during the review period. However, no OSART missions have been conducted. Is there a plan to invite also OSART missions to Argentina?

Answer

In order to request an OSART mission to Argentina in the future, in 2016 two regional workshops on operational safety have been conducted in Argentina focused on Supply Chain (procurement) and Nuclear Safety Oversight. The following meetings are scheduled to take place during 2017 in Argentina:

- Knowledge management for CNEA and NASA
- Supply chain from engineering and maintenance aspects
- Participation of experts from Regulators, Utilities or TSOs in OSART missions or workshops as Observers

In addition, the participation of Argentina in three meetings to be conducted in Brazil and Mexico during 2017 is planned.

No.: 7

Country: Finland

Article: General

Ref. in National Report: page 21

Question

The report indicates that a process has been initiated to invite an IRRS mission to Argentina. When is the IRRS mission planned to take place?

Answer

The IRRS mission in Argentina is planned to take place in the 4th Quarter of 2018 (4Q2018), according to the IAEA Schedule for missions for 2018:
https://gnssn.iaea.org/regnet/irrs/Pages/Events.aspx

No.: 8

Country: Luxembourg

Article: General

Ref. in National Report: VDNS

Question

Please elaborate on the following aspects related to the VDNS:
1) How do you define 'a new nuclear power plant'?
2) How does your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of preventing accidents in the commissioning and operation of new nuclear power plants?
3) How do your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of mitigating against possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions?
4) How do your national requirements and regulations address the application of the principles and safety objectives of the Vienna Declaration to existing NPPs?
5) Do your national requirements and regulatory framework require the performance of periodic comprehensive and systematic safety assessments of existing NPPs – if so, against what risk/engineering objective or limit are these judged and can you give practical examples?
6) How do your national requirements and regulations take into account the relevant IAEA Safety Standards throughout the life-time of a Nuclear Power Plant?
7) What issues have you faced or expect to face in applying the Vienna Declaration principles and objectives to your existing fleet or new build of Nuclear Power Plants?

Answer

1) How do you define 'a new nuclear power plant'?

ARN will consider as a New NPP to every nuclear power plant that has initiated the licensing process after 2010. This includes the CAREM reactor and the 4th NPP that is expected to initiate the licensing process in 2017.

2) How does your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of preventing accidents in the commissioning and operation of new nuclear power plants?

Argentine Regulatory Framework is not prescriptive.

The objectives stated in the set of standards are fully compatible with the safety concepts and objectives included in the Vienna Declaration. The compliance with technical criteria is verified through the consolidated practice of review of the licensing basis documents and regulatory requirements.

In particular, Argentine standards includes among others AR 3.1.3 “Criterion Curve” and AR 3.2.1 which deals with technical criteria to achieve an acceptable safety level necessary to enter into commissioning phase.

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

In AR 3.2.1 standard “Safety Criteria in the design of NPPs”, the implementation and compliance with the Defence in Depth concept is explicitly required.

In order to maintain a safety level during operation, AR 3.9.1 “General safety criteria for the operation of NPPs” standard establishes a set of organizational, procedural, maintenance and surveillance requirements to be fulfilled by the utility during the whole plant life.

3) How do your national requirements and regulations incorporate appropriate technical criteria and standards to address the objective of mitigating against possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions?

For new NPPs, a full study of PSA of levels 1, 2 and 3, is required in order to fulfill AR 3.1.3 standard and then any findings that lead to possible releases are identified and appropriate measures are analyzed. Besides, severe accident management is developed.

4) How do your national requirements and regulations address the application of the principles and safety objectives of the Vienna Declaration to existing NPPs?

The Safety Review of existing Nuclear Power Plants in Argentina is an activity that has been behind the periodical renewal of operating licenses. These reviews were historically conducted in “case by case” terms and with the aim of improving, as much as achievable, the safety level of the plant. The terms of the Safety Review were revisited under the light of SSG-25 “Periodic Safety Review for Nuclear Power Plants” since its issuance a few years ago.

In the frame of IAEA’s action plan, within the Iberoamerican Forum of Radiological and Nuclear Regulatory Agencies (FORO), an application of Fukushima lessons learned was implemented. Argentina has carried out comprehensive stress tests aimed to determine the existing safety margins to cope with extreme events, analyzing their behavior and the consequences for design extension conditions scenarios, such as station black-out and the loss of ultimate heat sink for a long term, as well as the capacity to manage such accidents.

Argentina has also carried out special safety reviews and upgrades of the NPPs taking into account the operating experience.

Argentina does not have any specific regulation dealing with periodic safety review. As stated before, these reviews were conducted using case by case methodology, and in all cases the identified improvements have been enforced via requirements issued by ARN with time constraints.

5) Do your national requirements and regulatory framework require the performance of periodic comprehensive and systematic safety assessments of existing NPPs – if so, against what risk/engineering objective or limit are these judged and can you give practical examples?

Answer in the above question.

6) How do your national requirements and regulations take into account the relevant IAEA Safety Standards throughout the life-time of a Nuclear Power Plant?

Our national regulation is compatible and in line with the relevant IAEA safety standards. Any identified gap in our national regulation is foreseen to be covered taking into account the IAEA standards and recommendations.

7) What issues have you faced or expect to face in applying the Vienna Declaration principles and objectives to your existing fleet or new build of Nuclear Power Plants?

We have not faced any major issue in applying the Vienna Declaration principles and objectives.

No.: 9

Country: Poland

Article: General

Ref. in National Report: Page 12, 2.2.

Question

Why the physical protection system was not completed (lack of perimeter sensors, temporary measures in access control system) before commissioning of CNA II?

Answer

The original design of CNAII did not consider the Physical Protection System.
It was added in the commissioning stage. Priority was given to the construction of the double perimeter fence and to the access control system. The rest is currently under implementation.

No.: 10

Country: Portugal

Article: General

Ref. in National Report: 31

Question

What percentage of your NPP's already have a containment venting-filtration system installed.

Answer

There are 3 reactors in operations in Argentina. Embalse NPP is currently in long shutdown for refurbishment and a filtered containment venting system is planned to be installed during the shutdown. The installation of this system for Atucha Unit I and II is under evaluation.

No.: 11

Country: Portugal

Article: General

Ref. in National Report: 31

Question

What percentage of your NPP's already have autocatalytic hydrogen recobiners installed in the containment.

Answer

All the NPP's, CNA I, CNA II and CNE have Auto-catalytic Recombiners. In the case of Embalse, it is being installed and will be ready for the extension life.

No.: 12

Country: Slovakia

Article: General

Ref. in National Report: p. 11

Question

Argentina invited an IRRS mission in 2016. Please provide information on outcomes of the IRRS mission and on the planned measures to implement its findings during the national presentation.

Answer

The IRRS mission in Argentina is planned to take place in the 4th Quarter of 2018 (4Q2018), as it was mentioned in the National Report, it was requested in 2016. The outcomes of the mission and the planned measures to implement its findings will be presented at the 8th Review Meeting.

No.: 13

Country: United Kingdom

Article: General

Ref. in National Report: Pages 8,154,158 - 159

Question

Paras 1.4.2.1, 3.18.3.1.1, 3.18.3.2.2 & 3.18.3.3.1
Section 1.4.2.1 of the National Report describes a 4-level scheme of Defence in Depth (DiD) arrangements. Could Argentina expand on the text in Section 3.18.2 and under 'design improvements implementation' to explain in more detail to what extent the existing NPPs meet those levels now?

Answer

Argentinean NPP's have met the requirements of the Defense in Depth levels, long before the Fukushima Daiichi accident. Since design inception of the facilities, systems were put in place which cope with the objectives of the four DiD levels relevant to design, even though the design of CNA I precedes those concepts.

The design improvements implemented after the Fukushima Daiichi accident have strengthen the safety of the units, having a main impact in level fourth and also level three of Defense in Depth. As examples it can be cited that level 1 of DiD has been reinforced by improvements of the availability of external power supply devises, etc., thus preventing initiating events; level 2 has been strengthen by the upgrading of safety related systems such as compressed air; level 3 is benefited by new or improved Emergency Power Supply systems, increased diesel generators autonomy, improved Emergency Water Supply, improved trip coverage, the addition of another Secured River Water Cooling pump, or improvements of the seismic capacity of the plants, etc.; and level 4 is further improved by the addition of several alternative water sources for both the reactor and the spent fuel pools, addition of Passive Auto-catalytic Recombiners, addition of Containment Filtered Venting systems, etc.

No.: 14

Country: United Kingdom

Article: General

Ref. in National Report: Page 8

Question

Section 1.4.2.1
SSR-2/1 Rev 1 (Paragraph 2.13) and the Fundamental Safety Principles in SF-1 (Paragraph 3.31) describes defence-in-depth and notes that the "independent effectiveness of the different levels of defence is a necessary element".
Can Argentina please provide more information on how it maintains the independence of the levels of defence-in-depth?

Answer

It is important to preserve the independence of the different levels of the Defence in Depth principle to assure the effectiveness of the measures within each level in the following terms:

- No measure can be avoided just by considering that another measure in a previous level was successful
- No measure can affect the application of another measure in a following level.
- As far as practicable, the systems intended for actuation at a certain level of DiD are not credited to play a role in another level. Whenever it is applicable, independence is reinforced by diversity and physical separation.
- It is recommended that different procedures are written for the operations in each level: normal operation, anticipated operational occurrences, accident condition, severe accident management and emergency plans.

Those criteria are applied at each safety review performed to the NPP.

No.: 15

Country: Bulgaria

Article: Article 6

Ref. in National Report: page 31, Section 3.6.4.1;

Question

The final report of PSA level 1 (high power) was submitted for approval to ARN in 2015 and it is being analyzed by ARN. The results of PSA L2 were also submitted for approval to ARN. Do ARN use the services of any technical support organizations for independent evaluation of licensees' safety assessments? According to the regulatory framework is there a time period for review and approval of documents submitted by the licensee?

Answer

ARN has a permanent technical staff for reviewing and evaluating of PSA levels 1, 2 and 3. The evaluation depth depends on the report, whether it is an updated or a new one.

In order to improve and complete some evaluations, ARN contracts TSOs (technical support organizations) for performing reviews. These TSOs have been GRS (Germany), INVAP (Argentina), independent experts in PSA, Sandia National Labs, among others.

The TSO reports are checked by the ARN technical staff, re-written if needed and addressed to the operator.

Regarding to the regulatory framework, ARN has a rule that state the schedule for submitting mandatory documentation to the regulator in the licensing process (AR 3.7.1). On the other side, the schedule links the regulatory review with a license or authorization milestone.

No.: 16

Country: Canada

Article: Article 6

Ref. in National Report: p.42, Section 3.6.3.2.1.2

Question

It is not clear if the new emergency power supply system has already been installed? If yes, can you elaborate if the diesel generators are portable (on trailer) that can be transported in the event of a complete loss of onsite power – station blackout (SBO) or fixed on site?

Answer

The section referred in the question describes the design modification of the original Emergency Power Supply system of CNA I, replaced with a new, greatly improved system. The system is comprised of three stand-by diesel generators, which are not portable but fixed. This new Emergency Power Supply system is already installed.
On a side note, in case of a complete loss of on-site power, there is a Mobile Diesel Generator as additional power source.

No.: 17

Country: Canada

Article: Article 6

Ref. in National Report: p.34, Section 3.6.4.1

Question

Under the heading "SGs replacement", the final paragraph states: "The design of the new SGs includes the following aspects: the re-powering of the plant…".
Please clarify what is meant by "re-powering of the plant".

Answer

The SGs (Steam Generators) originally installed at CNE were manufactured with tubes of shorter length than those of other CANDU plants, making the total transfer surface 2800 m^2 and the thermal power transferred to the Secondary Steam System was 2015 MWth. Thus, during CNE refurbishment, SGs will be replaced considering a new design with longer tubes to achieve a larger transfer surface making the thermal power transferred to the Secondary Vapor System to reach 2064 MWth. With this and additional works in thermal cycle, turbine and alternator, CNE will increase output power from 648 MWe to 683 MWe.

No.: 18

Country: Germany

Article: Article 6

Ref. in National Report: p. 26

Question

A new emergency power supply system was implemented at CNA I . It is stated, that the two redundant trains are diverse. Could Argentina explain in more detail how diversity was achieved to avoid a common cause / common mode failure of the emergency power supply system?

Answer

The referenced description mentions that the two EPS trains are diverse from other power sources, not diverse from each other. Nonetheless, actions have been taken to avoid common failures, as it is described in the referenced section of the report.

No.: 19

Country: Germany

Article: Article 6

Ref. in National Report: p. 28

Question

It is described, that by a manual accident measure CNA II could be supplied via the 220 kV line from CNA I. Besides the benefits of such an accident measure, analyses of detrimental effects on safety are worthwhile to be performed. Can Argentina comment, if such analyses have been performed, before the decision was made to keep the connection between both Units?

Answer

As it was stated in the report, the interconnection referenced is neither automatic nor permanent, but has to be manually initiated by the operator in the event of an emergency power case with loos of diesel generators of one plant.

If such an event should occur, an assessment was performed in order to determine the load capacity that the interconnection could handle not jeopardizing the safety of the other unit. The interconnection would be seen from the CNA II electric systems as an external power source.

No.: 20

Country: Germany

Article: Article 6

Ref. in National Report: p. 28

Question

Could Argentina discuss in more detail the measures foreseen in the new SAMGs SC 04-5 and SC 04-6 to increase the operating time of the diesel generators and the batteries, respectively?

Answer

Due to the loss of external power supply (500 kV and 132 kV connections) and the impossibility of operating in island mode, the CNA II has 4 diesel generators of 6 MW each one (with 2oo4 redundancy), with an individual fuel consumption at 100% power of 1.47 m^3/h, the fuel availability gives a range of 72 hours to the 4 generators. Taking out of service 2 of the 4 redundancies, the number of operating hours will be doubled.

The auxiliary boiler system has a tank of fuel with a volume of 200 m^3, adding 68 hours of autonomy for two of the generators. Fuel will be transferred from the auxiliary boiler system tank to the diesel tanks.

As a third measure, and if the interconnection between the auxiliary boiler system tank and diesel tanks is not available, fuel is supplied by a tanker.

These strategies will be used in case of any of the following plant conditions:

- Emergency diesel generators are the only source of electrical power.
- For external causes, the tanks of the diesel generators system can't be supplied with fuel.
- The external power supply to the site is expected to be interrupted for more than 72 hours.

SAMGs SC 04-6

The batteries are designed to maintain power supply to DC loads without interruption in the following cases:

- When the Auxiliary Power System fails and an additional single failure is assumed, for the power requirements supply of its associated train, and the power requirements of its loads feed through the decoupled diodes of its neighbor train, until the emergency diesel units take charge of the loads and the battery chargers are activated again (approximately 15 s) .
- When rectifiers are not available to supply the normal power of the 24 V and 220 V DC systems taking into account the power requirements of its associated train for 120 min.

The above design meets the minimum permissible load voltage, taking account of voltage drops (eg. cables, fuses, protectors and decoupling diodes).

The strategy to increase the maximum time of electrical supply of the batteries is the removal of consumption loads components are disconnected from different groups of the power supply system. These are detailed below:

1- Disconnection of consumers from 24/48 V power supply bars

The main components of the 24/48 V DC Emergency Power Supply System that are disconnected:

• Four 48/24 V DC buses, identified as [BVN/P/Q/R] Consumers disconnected.

2- Disconnection of rotary converters

The main components that are disconnected:

• Five rotary 220 V DC / 380 V AC converters,

• Four uninterruptible power supply 380/220 V AC

3- Disconnection of consumers in 220/380 V power supply bars

The 220 V DC Emergency Power main components that are disconnected:

• Four 220V DC bars, identified as [BVA/B/C/D] disconnected

No.: 21

Country: Germany

Article: Article 6

Ref. in National Report: p. 31

Question

For CNE a clause-by-clause comparison of the actual licensing and design basis with the most recent national and international safety standards was performed between 2013 and 2015. Can Argentina provide examples, which improvements have been identified by NA-SA and when the identified improvements will be implemented at CNE?

Answer

Many design changes were proposed by the designer taking into account the experience of other CANDU plants, and also by comparison with CNSC and CSA standards. As examples of the improvements we can mention:

Changes in EPS in order to support ECC.

Changes in EWS

Changes in ECC design in order to accomplish single failure criterium

Changes in SDS #1 (new shutdown parameters).

No.: 22

Country: India

Article: Article 6

Ref. in National Report: Section 3.6.4.1 Page 32

Question

It is stated "Addition of a line to add water in the calandria vault from outside of the reactor building. NA-SA submitted this design change to ARN for approval in 2014; it is still under ARN's analysis."

Does Argentina have plans for providing connection for addition of water in to calandria also from outside the reactor building to arrest the progression of the accident?

Answer

CNE is evaluating the details to implement a water line that allows adding water into the calandria, from a pump or from the network fire. This connection would be made in the pipeline of entry to the Moderator's Purification System.

Thus, during the CNE refurbishment, this design change will not be executed, but the connections necessary to be implemented after that will be provided.

No.: 23

Country: Poland

Article: Article 6

Ref. in National Report: Page 24, 3.6.3.1.1.

Question

What is the definition of plant design modification? Is every change in any part of the plant regarded as modification?

Answer

Not every change done to the Nuclear Power Plant is regarded as a design modification, but only those that could alter the licensing basis. Nonetheless, not all design changes are treated equally from a regulatory stand point, but their treatment is graduated depending on the safety relevance of the modification.

The SAR describes the design features under which the facility is licensed, and hence any design change that alters such description, and consequently alters the licensing basis of the facility, ought to trigger the update of the SAR to reflect the design as built.

No.: 24

Country: Poland

Article: Article 6

Ref. in National Report: Page 31, 3.6.4.1.

Question

Regarding Review and update of Hazard Assessments - is there a guide or other document explaining the classification of SSC into different change categories?

Answer

Yes, there is a document developed by the designer which defines the so called three categories: “like for like”, “Minor Modifications” and “Major Modification or New Design”. It also establishes the seismic hazard in terms of peak ground acceleration for each one of the categories.

No.: 25

Country: Russian Federation

Article: Article 6

Ref. in National Report: Section 3, para 3.6.4.1

Question

From the report it is not clear the operating organisation did not take part in the qualification tests of digital control computers?
Could you give additional information about operator and regulator participation in development of specifications (technical requirements) for Digital Control Computers; in design, engineering and factory testing of such computers.

Answer

It is not expected that qualification tests will be repeated at site. However NASA personnel witnessed these tests.

NA-SA participated as reviewer of the technical specifications and of the D&E phases and had active participation in the factory tests. These processes were also monitored by ARN.

No.: 26

Country: Canada

Article: Article 7

Ref. in National Report: p.44, Section 3.7.3.3

Question

In the first paragraph, the report states "The Regulatory Body has performed assessments as well as… regulatory inspections and audits as frequently as considered necessary." How is the scope of, and schedule for ARN inspections and assessments established? For example, is it defined on an annual basis?

Answer

The scope of the inspections and assessments is set by the Regulatory Body based on the following concepts.

It is considered that all objectives, requirements, conditions, provisions, pre-requisites, etc. that a nuclear operator must comply with to safely operate a facility, in the broadest sense of the concept, are adequately stated in the nuclear standards; in the Mandatory Documentation, such as Operating License, Handbook of Operating Policies and Principles, maintenance manuals, etc.; and in Regulatory Requirements issued by the Regulatory Body. Nuclear Standards might be reviewed over the course of years, in order to accommodate evolving world trends and new paradigms in the industry, safety developments, etc. Mandatory Documentation is often subject to review to reflect the evolving operating life and condition of facilities; and Regulatory Requirements are issued by the Regulatory Body every time that it is considered that action is required on the part of the Operator on a specific subject.

Based on the safety framework thusly described, the Regulatory Body develops a set of criteria, extracted from the instruments described above, for which fulfillment can effectively be verified by regulatory inspections and assessments.

On the base of those criteria, and in order to properly verify their fulfillment, the Regulatory Body develops a series of inspection tools, which are the activities effectively carried out by the regulatory inspectors and evaluators, and which yield a concrete result leading to the fulfillment, or lack of thereof, of the criteria. Such inspection tools are, for example, the review of the management of operative experience; oversight of the execution of periodic testing procedures; oversight of completion of maintenance programs; quality assurance audits; oversight of radiological protection programs results; oversight of ALARA program, etc.

Currently, the schedule of inspections is set taking into consideration the needed periodicity of each of those inspection tools in order to yield representative results of the areas assessed, and are scheduled on an annual inspection plan.

ARN is planning to elaborate a systematic inspection program (in terms of scope and frequency) for all NPP´s.

No.: 27

Country: Austria

Article: Article 7.1

Ref. in National Report: Section 3.7.2.2, p40, Section 4.6, p187

Question

What is the envisaged timeline of the normative framework review that will incorporate the principles of the Vienna Declaration?
How does this activity and its timeline relate to Argentina's intention to invite an IRRS mission and the timeline for that?

Answer

ARN has already started the review of their normative framework to incorporate the principles of the Vienna Declaration. The planned timeline to fulfill this objective is the end of 2019.

The visit of the IRRS mission to Argentina is planned to take place during the 4th Quarter of 2018. At that time, the review of the regulatory framework will still be in process and the progress achieved will be shared with the reviewers.

No.: 28

Country: France

Article: Article 7.1

Ref. in National Report: Section 3.7.3.3, 44

Question

Could Argentina describe with more details the daily tasks performed by resident inspectors at NPPs? What provisions are taken to ensure their independence from the operator (article 8.2 of the Convention)? For instance, do they work in a specific NPP for a limited period of time?

Answer

Question No 26 refers to the scope and schedule of regulatory inspections in nuclear power plants. Please refer to the answer to that question for details on how the regulatory inspection plan is developed.

The daily tasks performed by the resident inspectors at NPPs consist on the execution of the inspection activities defined by the inspection plan, according to an annual schedule. This plan includes, among others, activities such as monitoring and control of plant parameters; regulatory oversight of maintenance programs, repetitive tests of safety systems, etc.; review of ALARA plan, doses; etc.

Other activities include the oversight of events, planned or unplanned power maneuvers, outages oversight, evaluation of emergency drills, etc.

In order to foster resident inspectors' independence from the operator, they receive a complete technical and material support from Regulatory Body headquarters. There are not regulations or limitations for the period of time to work in a specific NPP for inspectors, but at the present time, the average residence period in a specific NPP is 7 years.

No.: 29

Country: Germany

Article: Article 7.2.1

Ref. in National Report: p. 39

Question

Does the new Regulatory Standard AR10.10.1 define an exceedance frequency for hazards to be considered in the design basis? If yes, could Argentina share this value?

Answer

AR 10.10.1 does not define any exceedance frequency for external hazards to be considered in the design basis.

No.: 30

Country: Germany

Article: Article 7.2.2

Ref. in National Report: p. 43

Question

In contrast to Atucha I and Embalse the licence for Atucha II is only valid for five instead of 10 years. Will ARN increase the validity period from five to ten years in the subsequent licences of Atucha II?

Answer

ARN will increase the validity period to ten years after successful completion of activities already requested to the utility and scheduled to be developed during the planned outages corresponding to years 2017 and 2018.

No.: 31

Country: Mexico

Article: Article 8

Ref. in National Report: p.50

Question

Currently, the ARN regulates three nuclear power plants in operation and the construction of a modular nuclear power plant among other safety-related activities. What provisions has the ARN (human and financial resources, and technical support organizations) to deal with the regulation of these nuclear power plants in the long term?

Answer

The regulatory system and practices are based on a graded approach following the safety classification of systems, structures and components. In performing the regulatory activities according with this approach, ARN has the practice to contract several TSOs (technical support organizations) for some topical areas. For the core regulatory activities, ARN has hired

professionals increasing the plant about 15% during the last year for dealing with NPPs. The plan is to hire professionals in order to preserve the knowledge of those that are going to retire during the following years.

No.: 32

Country: United Kingdom

Article: Article 8

Ref. in National Report: Page 55 - 57

Question

The regulatory body in Argentina, Autoridad Regulatoria Nuclear (ARN), has established, documented and implemented a Quality Management System (QMS) according to the requirements established in the 2015 version of the ISO 9001 Standard.

• In 2015 the Board of Directors decided to continue the implementation, development and improvement of the QMS based on ISO 9001 Standard and its adaptation to the new version 2015 of that standard.
• The decision by the Board of Directors demonstrates continued commitment to an integrated management system that supports a strong safety culture within the regulatory body.

Answer

Argentina appreciates the comment from United Kingdom.

No.: 33

Country: United States of America

Article: Article 8

Ref. in National Report: 3.8.6

Question

ARN has continued to experience significant growth over the last three years in both its staffing and budget. Given that a significant portion of its budget comes from the National Treasury, what national motivation has driven this growth?

Answer

The national motivation was the National Nuclear Program that requires to increase necessary resources including ARN Budget to support fulfilment of regulatory activities, and enlarge ARN staff.

Accordingly, the main growth in budget from 2013 to 2015 is in the personnel item: from 115,781 to 170,811 (in thousands of Argentine pesos). In that period, ARN increased his staff from 396 to 449 people. Besides, inflation in the period must be considered.

No.: 34

Country: Austria

Article: Article 8.1

Ref. in National Report: Section 3.8.4.5, p58

Question

How many employees does the ARN Quality Management Unit have?
The National Report states on page 58 that 117 internal and external audits were carried out in the period 2013-2016 (August). That means more than one audit every second week. How does ARN Quality Management Unit cope with the (pre-, audit and) post-audit work: definition of action plans, monitoring actual implementation of recommendations, dissemination of the changes to the staff, monitoring of the effectiveness of these changes, and of the management system, etc.?
How does the rest of the ARN staff cope with the process, in terms of additional work load, adjustment to change and benefits from these improvements?

Answer

1) The ARN Quality management unit has 7 employees. All of them are Quality Internal Auditors and only 5 of them are quality leader auditor.

2) The Internal quality audits in the period 2013-2016 were 74 and the External Audits carried out by the IRAM (Argentine Institute for Standardization and Certification) were 43.

   The quality management unit carries out an audit program that includes all the audits to be carried out during the year. Starting in 2016, this program is carried out every six months. This program is approved by the Boards of Directors and communicated to all ARN staff in their publication on the intranet.

   The head of the quality management unit appoints a lead auditor and an audit team for each audit. The lead auditor interacts with those responsible for the processes involved and sends the audit plan by mail. The audit team prepares the audit: reviewing applicable regulations, procedures, ISO 9001, etc.

   Each Process is assigned a person responsible for implementing the quality management system. That person is a member of the quality management unit, who interacts with the process and carries out a control of the state of the implementations of the corrections and recommendations. Subsequently, the effectiveness of the implementation criteria is reviewed in the corresponding audit.

   The processes that are certified with ISO 9001 carry indicators and quality objectives; they are reviewed and shown in the Boards of Directors; every suggestion of the Boards of Directors is made by mail to the corresponding Process.

3) The Board of Directors is informed of the audit findings states, proposals for future changes and the optimization of changes is analyzed to maximize benefits and reduce the increase of the work. ARN staff is notified by email and the person designated as implementer along with process owner decides the best way to implement the improvements.

No.: 35

Country: China

Article: Article 9

Ref. in National Report: 2.13/P19

Question

It is mentioned that "For the Second Hot Functional Plant Test (HFT II), the fuel assemblies were loaded in the Reactor, which is included in Phase B." However, Phase C was developed as a comprehensive unique Program for the whole Plant and is defined as Commissioning (meaning Nuclear Commissioning of the NPP).
Question: How to clearly divide the responsibilities of nuclear safety works between contractor and license holder in Phase B and Phase C? How to control the contractors effectively for license holder?

Answer

From the regulatory perspective, the responsibility is always under the organization that is the license holder. The activities performed in Phase B are covered by Construction License, instead of those under Phase C, for which Argentinean practice is to grant a Commissioning License. Regarding the so called “preliminary tests” performed under phase B and those corresponding to commissioning, AR 3.8.1 regulation establishes that the license holder is responsible for coordinating and controlling the development of all preliminary and commissioning tests, and they are allowed to delegate partial or totally the execution of them but retaining the whole responsibility.

No.: 36

Country: United States of America

Article: Article 9

Ref. in National Report: 3.9.3

Question

In describing its fulfillment of Article 9, Responsibility of the Licensee Holder, ARN identifies that NA-SA carries out a Communications Annual Plan which has a stated goal “…to install a positive perception of the nuclear power generation.” This gives the impression that NA-SA’s efforts to promote nuclear power are a responsibility of the licensee imposed by ARN.
(1) Is this true?
(2) If yes, how does ARN maintain appropriate independence between promotion and regulation?

Answer

It is not true.

The comments regarding NA-SA´s activities in connection with public communication and stakeholders were indicated as a good practice in order to keep the public and governmental organizations informed about the facilities and activities. It illustrates a commitment regarding its obligations as an industry which offers a public service for the community in the provision of nuclear energy. However, this issue is not imposed by ARN. ARN is not in charge of the promotion of Nuclear Activities.

It is important to note here that the legislative framework from Argentina ensure real independence of the regulatory body from the industry. The National Law on Nuclear Activities Act N° 24.804 and its Decree N° 1390/98 establish those provisions which are described in the following sections from the national report, such as;

1.2. NATIONAL POLICY IN THE NUCLEAR FIELD
3.7.1. NATIONAL LEGISLATIVE FRAMEWORK
3.7.3. LICENSING SYSTEM
3.8. ARTICLE 8: REGULATORY BODY
3.8.1. FUNCTIONS AND COMPETENCE OF THE REGULATORY BODY

No.: 37

Country: Canada

Article: Article 10

Ref. in National Report: p.70

Question

In the report, it is stated that Safety Culture is promoted based on diffusion, training, and re-training providing all personnel with the benefits of applying the safety culture principles to all activities carried out at NPPs.

How often and to what degree does the re-training take place for each employee?

Answer

The Safety Culture has a preponderant role in the training of all the staff.

All staff is annually trained. In 2014 the training was delivered to all the staff on Safety Culture features. In 2015, the results of a safety culture survey conducted at the plant were presented to all the staff.

In 2016, management expectations regarding Safety Culture were presented to all staff.

In 2017, it is planned to deliver a five-module training programme "Safety Start".

No.: 38

Country: Canada

Article: Article 10

Ref. in National Report: p.71

Question

It is stated in the report that "The programme defines management issues and implementation issues that require improvements. An eight step strategy for each topic is in place."

Can the Contracting Party elaborate more as to what the eight step strategy is?

Answer

As described in INPO 05-005, "Guidelines for Performance Improvement at Nuclear Power Station", 2006, the Eight Steps for Improving Nuclear Plant Performance are:
1. Establish Sense of Urgency
2. Align the Leadership Team
3. Develop or Revise Vision, Goals and Plans, Management Controls, and Performance Monitoring
4. Communicate the New Vision and Goals
5. Engage the Workforce for Broad Based Action
6. Create Short-Term Wins
7. Consolidate Gains and Produce More Change
8. Ingrain New Approaches in the Culture.

The framework for the steps and the sequence of implementation was derived from industry experience. The steps and the sequence have been reviewed in their final form by several of these executives and other leaders in the industry. The template general structure (process for change) is described by John P. Kotter of the Harvard Business School in his book Leading Change.

No.: 39

Country: China

Article: Article 11.2

Ref. in National Report: 2.9/P16

Question

CNA I and CNA II were initiated their commercial operation in 1974 and 2016. Their corresponding net electric powers are 335 MW and 693 MW. However, both plants use the same simulator for training, the differences between plant and full scope simulator of CNA II is probably to lead operators of CNA I to make wrong decisions .
Question: 1) How to evaluate the effectiveness of training on scope windows basis graphic simulator for CNA I? Is there any report about that? 2) Is the life extension for CNA I required by NA-SA and approved by ARN? If so, is the full scope simulator required?

Answer

1) The Interactive Graphical Simulator is used in the annual trainings for certain pre-established scenarios (it is a simulator of partial scope). The evaluation of the training is carried out by observing the performance of the operators shift. There are no reports on the effectiveness of training.

   From 1987 to 2015, CNA I Control Room staff was trained in the simulator of Angra II nuclear plant (PWR).

   Atucha II Total Scope Simulator was installed on site in 2015.

   Since 2015, CNA I Control Room staff has been trained in Atucha II (CNA II) simulator. Unit I and II designs are very similar so this has resulted in a great improvement in the simulator - plant similarity and in the applicability of emergency procedures.

2) The life extension of CNA I is under technical-economic evaluation by NASA authorities and a licensing framework agreement is under discussion with the Regulator. Up to now, the Full Scope Simulator is not required by the Regulator.

No.: 40

Country: Canada

Article: Article 12

Ref. in National Report: p.78, section 3.12

Question

The report describes “the measures taken by the Licensee regarding the contractors in order to ensure their adequate competence and safety culture.” Please describe the process used to vet contractor companies to ensure that their training and qualifications are adequate and contribute to the reduction of human error.

Answer

Before entering the plant, the contractor personnel receive training in human error prevention techniques. This initial training aims to present the human error prevention techniques, describes them, explains the importance of its use and gives examples comparable to the most common roles of contractors. In addition, those permanently hired participate in the "CAS"

(Annual Safety Course), where topics such as human error prevention techniques and Safety Culture are presented.

The “Managers on the Field” program is based on task observation involving contractors and company staff. Managers observe the behaviour of contractors, as well as company supervisors and workers behaviours. Special focus is on supervisors setting expectations and correcting workers.

No.: 41

Country: Canada

Article: Article 12

Ref. in National Report: p.79 section 3.12.1.1.1 Human Error Redu

Question

Do you use observation and coaching techniques to reinforce desirable behaviors in the organization? If so, how would those techniques be incorporated into the other techniques that you use e.g., human error reduction tools?

Answer

There are two closely related programs focused on improving human performance and reinforcing desirable behaviours. These are: "Human Error Reduction Techniques" and "Managers on the Field". The “manager on the field” programme is based on task observation. Different activities are carried out to communicate and reinforce management expectations, such as:

- Annual re-training of task observers, to communicate expectations and show strengths and weaknesses of the processes.
- Weekly Reinforcement Messages. This is a weekly message focused on strengths and weaknesses of the organization on the application of Human Error Reduction Techniques
- Analysis of the Task Observation. Communications addressed to leaders taking into account actions to improve the task observation programme.
  - Periodic reports by each sector to identify adverse trends and taking action to reverse such trend.
  -Compliance with the "Manager on the Field" and "Human Error Reduction Techniques” programs, are part of the General Behaviour Expectations of the Site Manager.

No.: 42

Country: Romania

Article: Article 12

Ref. in National Report: pages 78-84

Question

What regulatory reviews and inspections are performed with a focus on human factors engineering and human performance? How does the ARN perform regulatory oversight of human factors?

Answer

Regulatory Oversight starts with Nuclear power plant personnel licensing (3.7.3.2.3.).

Besides, Operating Experience feedback follow up program is focused mainly on human factors engineering and human performance Operating Experience Feedback (1.4.2.2.3.).

No.: 43

Country: Austria

Article: Article 13

Ref. in National Report: Section 3.13.2, p85-86

Question

According to section 3.8.4 the ARN is transitioning from ISO 9001:2008 to ISO 9001:2015, but section 3.13.2 states that the Quality Assurance programs of the organisation units of the operating organisation comply with ISO 9001:2000 and IAEA 50-C-Q (1996).
Is the ARN requiring the licensee to comply with more recent standards, especially with the view of refurbishment and life extension programmes?
If no, why not, and if yes, what is the timeline for the implementation of such requirement?

Answer

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. The planned timeline to fulfill this objective is the end of 2019 (see question 27).

No.: 44

Country: Bulgaria

Article: Article 13

Ref. in National Report: page 86, Section 3.13.2.1.;

Question

In para 3 is stated that: "These procedures foresee inspections at the supplier's facility and review of their quality system before awarding the contract". Are these procedures applicable to all suppliers in the country and abroad?

Answer

In order to qualify suppliers, a classification by safety classes is determined.

When the SSCs are Class I and the manufacturing is done in the country, inspections and audits are performed to the supplier.

When deemed appropriate, a permanent resident inspector remains at the factory.

When components are manufactured abroad, widely experienced suppliers are selected, recognized as suppliers of such components for the nuclear industry having international qualifications. In certain cases a third party can be delegated to audit or monitor on behalf of NA-SA during manufacture stage.

No.: 45

Country: Canada

Article: Article 13

Ref. in National Report: General

Question

Can the Contracting Party explain if the quality program applies the graded approach or risk-based approach? Does the scope and frequency of an audit for a certain program use the graded approach in order to focus more on the higher risk areas?

Answer

Currently the quality assurance system is designed with the graded approach, but the organization is planning to address a risk based approach.

In the audit program, the graded approach is used and when the need for improvement is detected in an area, a surveillance program is implemented.

No.: 46

Country: France

Article: Article 13

Ref. in National Report: 3.13.3, 87 and 88

Question

Has ARN developed and implemented a construction inspection program to provide regulatory oversight of the construction of CAREM reactor? Does ARN carry out inspections at the construction site and/or conduct vendors inspections to ensure that products and services furnished to CAREM reactor meet established regulatory requirements for quality and other safety factors?

Answer

At present, ARN lead an inspection program at the site of the reactor CAREM 25 related with construction of civil structures (currently underway). This program is developed by ARN inspectors supported by experts belonging to some of the TSOs mentioned in National Report.

ARN reviews the mandatory documentation presented, in order to define and plan the inspection tasks (as were mentioned in National Report Section 3.7.3.3).

In order to meet established regulatory requirements, ARN only conduct inspections and audits to Responsible Entity, not to vendors. The Responsible Entity is in charge of assuring that the supplier quality program is implemented and the defined design criteria are accomplished.

No.: 47

Country: Germany

Article: Article 13

Ref. in National Report: p. 88

Question

Section 3.13.3.1 deals with the quality assurance of subcontractors of the CAREM project. It is stated, that not only documents are verified, but also where responsible staff from the CAREM project will witness the tests. Could ARN share the involvement of the regulator in inspections on the vendors / subcontractors site in case of fabrication of items important to safety to ensure, that only qualified equipment will be installed at the site?

Answer

In order to meet established regulatory requirements, ARN only conduct inspections and audits to Responsible Entity, not to vendors. The Responsible Entity is in charge of assuring that the supplier quality program is implemented and the defined design criteria are accomplished.

No.: 48

Country: Russian Federation

Article: Article 13

Ref. in National Report: Section 3, para 3.13.2

Question

According to the Report, hundreds of quality assurance procedures have been developed for each Argentina NPP in the framework of quality assurance programmes for these plants. Could you please give additional information about the subjects of these procedures and types of activities they address.
Do NPP quality assurance programmes include procedures for design / engineering companies, as well as companies testing systems and components supplied to nuclear power plants, in particular, in the framework of life extension projects (replacement /refurbishment of equipment)?

Answer

The quality assurance system is made of quality assurance programs.
There is one for each nuclear power plant, in which the works are described in documents that are categorized in:
Management: such as organization, policies, objectives, training of human resources, control of nonconformities, corrective and preventive actions, control of documents and records.
Operational: operation, maintenance, safety, engineering, production, human performance, training and development of personnel, technical assistance, site management, design, purchasing, inspection and acceptance tests.
Evaluation: self-evaluation and independent evaluation.
Quality programs audits are performed to selected suppliers in order to confirm that the supplier quality program is implemented and meets the established requirements. The main processes during manufacturing are also audited. When components are manufactured abroad, widely experienced suppliers are selected, recognized as suppliers of such components for the nuclear industry having international qualifications. In certain cases a third party can be delegated to audit or monitor on behalf of NA-SA during manufacture stage.

No.: 49

Country: Canada

Article: Article 14

Ref. in National Report: pp.94-100, Section 3.14.2.2

Question

Has the management of Central Nuclear Embalse pressure tubes and fuel channel components considered Operating Experience from other CANDU installations?

Answer

Within the framework of the CNE's Life Extension Project, fuel channels will be replaced as part of the task called "Retubing". Based on the experience of other CANDU-type reactors, the new

components have design changes to improve aspects related to: plant availability, response to accidents, reduction of stresses in components, solution of operational experience events.

In the case of Pressure Tubes, changes in the chemical composition of the tube were implemented with the aim of decreasing its probability of failure. These changes consist of decreasing 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 in order to Improve material strength, performance against corrosion, reduce the amount of initial hydrogen which influences the phenomenon of DHC and blistering and Improve fracture toughness.

For Feeder tubes, changes in the chemical composition were implemented as well, in order to reduce the rate of thinning of material.

In the case of garter spring, it was implemented a change to a "tight fit" design, with greater capacity of adherence to the pressure tube and to use a material with greater elastic property and resistant to high temperatures.

No.: 50

Country: Canada

Article: Article 14

Ref. in National Report: p.95, Section 3.14.2.2.1

Question

In the second paragraph (page 94), the report stresses the importance of repositioning garter springs "To verify… that the PT does not reach the content of equivalent hydrogen for the blister formation threshold (BFT)…". BFT is the threshold for a contact blister to begin growing.
However, on page 95, the report states: "The general approach used… was to determine the probability of blister cracking…".
Please clarify the operational limit NA-SA intends to apply when assessing its new fuel channels for contact: the pressure tube achieving BFT, or cracking of a contact blister?

Answer

On page 95, section 3.14.2.2.1 the report states: The general approach used in this evaluation was to determine the probability of blister cracking resulting from the failure process of the PT / CT contact causing blisters. Due to the fact that the blister cracking probability is depending of the time, it was considered 232,000 equivalent full power hours (EFPH) as the evaluation period, which exceeds the EOL and provides a margin for accounting the uncertainties in the repositioning activities.

The Annulus Spacer Position Study shows that no pressure tube to calandria tube contact is expected within the design lifetime (210,000 EFPH), with 87% margin. As such, from a design perspective, there is no operational limit to apply when assessing the new fuel channels, before the design life of 210,000 EFPH is reached.

Therefore, the operational limit that NASA applies is "the pressure tube achieving BFT".

No.: 51

Country: China

Article: Article 14.1

Ref. in National Report: 3.6.3.1.1/P24

Question

Description in section 3.6.3.1.1: "the SAR of nuclear installations must be updated each time that a plant design modification is performed".
Question: What are the requirements and principles on the update of the SAR for ARN?

Answer

The regulatory goal is to maintain the licensing bases documentation according to the actual and current plant configuration. This is required by AR 3.9.1 and the corresponding license.

As it was mentioned in the National Report, the mandatory documentation updating is carried out in NPPs based on the abnormal event evaluation, operating experience feedback, plant modelling with probabilistic techniques, identification of abnormal situations not specifically considered in the operation procedures, plant design modifications already implemented, etc. From this arises the need for the implementation of modifications or improvements.

No.: 52

Country: China

Article: Article 14.1

Ref. in National Report: 3.6.4.1/P30

Question

Regarding CNE life extension activities, new systems have been added to provide redundancy during maintenance or upgrading of safety related systems.
Question: Could you please explain what kind of systems have been added, and what kind of features do those newly added systems have?

Answer

The systems that have been added and the kind of features that those newly added systems have, are described in pages 31, 32 and 33 of the section 3.6.4.1. Please, refer to them.

No.: 53

Country: China

Article: Article 14.1

Ref. in National Report: 3.14.3.3/P114

Question

According to the IAEA Safety Standard Series No. SSG-25 "Periodic Safety Review of Nuclear Power Plants" document, 14 safety factors need to be reviewed in safety review activities. However the safety factor "Hazard analysis" wasn't included in the list of safety factors for CNA I PSR.
Question: Could you please explain the consideration for lack of the safety factor "Hazard analysis"?

Answer

IAEA Safety Standard Series SSG-25 “Periodic Safety Review of Nuclear Power Plants” in its item 2.12 states that: A PSR should provide a comprehensive assessment of the safety of the nuclear power plant. Since the complex process of conducting a PSR can be aided by appropriate subdivision of tasks, this Safety Guide sets out these tasks in accordance with 14 safety factors. These safety factors have been selected on the basis of international experience and are intended to cover all aspects important to the safety of an operating nuclear power plant. This subdivision is, however, not unique. In cases where the number of safety factors used and/or their grouping is different (for example, to meet the specific needs of the operating organization or regulatory body or owing to particular aspects of the nuclear power plant under review), the comprehensiveness of the PSR should be ensured by other means.

In the case of CNA I it was decided not to develop a Safety Factor “Hazard Analysis”; instead, the purposes of it were split and included in another safety factors as for example “Probabilistic Safety Analysis”. In this, all internal and external hazards are considered as contributions to Level 1 PSA.

Besides, regarding protection against external events like earthquakes, a seismic margin assessment was developed dealing with earthquakes of 10^{-4} frequency of exceedance per year.

In summary, a clause by clause comparison was performed covering the issues related with “Hazard Analysis”.

No.: 54

Country: China

Article: Article 14.1

Ref. in National Report: 3.17.2.3.1/P138

Question

Question: CNA I and CNA II are comparatively old PHWR type. As to these two units, have them been implemented any significant design modifications according to the results of periodic safety review? What's the principle for determining these design modifications?

Answer

PSR was developed only for Unit 1. As a result of comparison with national and international standards, several improvements were decided. Some of them, as improvements in fire protective features, are being implemented. Also other design changes derived of Severe Accident Management Program, as PARs, were implemented in 2014.

Other major design changes, whose implementation demand a long outage of the plant, will be implemented as part of the plant life extension project.

No.: 55

Country: Germany

Article: Article 14.1

Ref. in National Report: p. 103

Question

Could Argentina inform about the scheduled date for the installation of the filtered containment venting system at Atucha I? Are there similar plans for Atuacha II?

Answer

Starting from the simulation of the Plant behaviour in case of Design Extended Condition scenarios without countermeasures (base cases) using the programs: MELCOR (Atucha II) and RELAP5/SCDAP (Atucha I and Atucha II), insights have been gained into the PHWR severe accident issue.

Diverse Severe Accident Management countermeasures are presently being assessed for Atucha I and Atucha II.

They shall take into account the design particularities of those Plants, both inside and outside of the reactor pressure vessel.

Some features, like the moderator tank and the lower plenum filling bodies, have a significant role in the in-vessel accident progression.

On the other hand, the reactor pressure vessel cavity has also some unique characteristics that require a specific approach to evaluate countermeasures like external reactor vessel cooling (ERVC).

The ERVC efficacy to stabilize the corium inside the vessel is currently being analysed.

Preliminary analysis considering a Filtered Containment Venting System (FCVS) for Atucha I and Atucha II were performed last year (for instance simulations with the GOTHIC code).

It was concluded that more knowledge about the Plant behaviour is needed.

Depending on the ERVC evaluation results and other considerations, the analysis of FCVS for both Plants is planned to carry on.

No.: 56

Country: Germany

Article: Article 14.1

Ref. in National Report: p. 110-114

Question

External events could also contribute to the core damage frequency. Does Argentina have plans to expand the scope of probabilistic safety analyses in such a way, that also external events will be taken into account?

Answer

As were mentioned in the National Report, the most significant external hazards affecting the Argentine NPPs are earthquakes; flooding and low level water.

“For Argentinian NNPs, a PSA based Seismic Margin assessment (SMA) was performed to determine potential vulnerabilities of the current design to face seismic event that could jeopardize the fundamental safety functions. To perform the seismic safety assessment (SSA), the Licensee of CNA I; CNA II and CNE updated the seismic hazard of each site using methodologies and databases according to the state of the art.”

In the case of Flooding and low level water for Atucha site:

“The maximum and minimum water levels in Atucha I-II site are being reassessed. The following scenarios are being considered:

1) For maximum level rise: a chain breaks of Itaipú and Yacyretá, in simultaneous with a maximum Paraguay river flow, maximum rainfall on Paraná river basin and extreme rise of Río de La Plata river. In all cases historical records were taken as reference.

2) For minimum water level: a minimum Paraná flow river with a 100 years recurrence in simultaneous with the minimum historical level in Paraná de Las Palmas discharge point.

The following studies have been completed so far:

- General description of the area of study.
- Weather and meteorological events in the area where Atucha site is located.

- Hydrodynamic Model".

Besides, "there was a reassessment of the risk of tornadoes on Atucha site, which also evaluated the impact of missiles in CNA I buildings.

The report elaborated gathers and evaluates national and international standards applicable to missile impact generated by tornadoes. A study was conducted of the physical characteristics of tornadoes, storms and missiles that could impact on the facilities; a probabilistic model on tornado risk was developed and applied in order to determine exceedance curves and the return period of wind speeds caused by tornadoes and other severe storms in the site area. For this reassessment, a record of tornadoes spanning until 2013 was used. Finally, the general condition of each building of CNA I regarding safety against missile impact was detailed.

Regarding intense rains, lightning and tornadoes, the conclusion of the assessments was that a suitable margin exists and some conceivable weaknesses were identified as well as some improvements and modifications were proposed. The licensee decided to implement additional studies to confirm them".

Flooding / low water level for CNE:

"The consideration of flooding/low-water-level for Argentine NPPs is consistent with both domestic regulations and international criteria established at the design time. However, further studies were considered necessary to be required for the Embalse site. For CNE, it is foreseen to carry out a re-evaluation of the consequences of the occurrence of earthquakes on the existing dam located downstream from the plant.

- Internal and external flooding situations have been analyzed. Regarding this issue, it is considered that the Licensee is carrying out appropriate actions to successfully cope with these scenarios".

"Tornadoes, wind loads, lightning and intense rains have been analyzed and it is considered that the licensee is carrying out the appropriate actions to successfully cope with these scenarios".

"A re-evaluation of the risk of tornadoes for the Embalse site is foreseen to be completed by the end of 2017. This re-evaluation will include the response analysis and the existing margin for the safety related buildings and SSCs facing Beyond Design Basis (BDB) tornadoes. The effect of missiles caused by tornadoes will also be included".

In the future, ARN will promote the realization of PSA including external events.

No.: 57

Country: Romania

Article: Article 14.1

Ref. in National Report: Annex II, page 4

Question

The use of PSA in the CNE´s Life Extension (PLEX) program is mentioned as a good practice. Please provide information on how was the PSA used in the PLEX program.

Answer

The PSA was a tool to verify adequacy and appropriateness of the modifications. The two main issues which relate PLEX program to PSA are:

1) The use of PSA results as a tool to contribute in the verification of the design changes to be carried out during the Refurbishment Project.
2) Updating of the PSA model, including all the design changes carried out during the Refurbishment Project.

Regarding 1), the main Minimal Cut Sets contributing to the Core Damage Frequency were evaluated. Some design changes developed during the Refurbishment Project were taken from this analysis in order to improve systems capabilities or redundancies and eliminating human actions through the automation of actions, etc. Some examples of them are the following:

- Generation of a LOCA signal on sustained PHTS header low pressure, in order to automate the injection of the ECCS for Very Small LOCA scenarios. This injection was manual before the Refurbishment activities.
- Automatic stop of the four PHTS main pumps on low PHTS header pressure (LOCA Scenario) to avoid PHTS additional damages, not depending on operator actions.
- For the same reason that the aforementioned, automatic stop of the four PHTS main pumps on high pump bearing temperature (loss of pumps cooling because of a loss of service water).
- Automatic alignment and actuation of the Low Pressure ECCS stage in order to avoid human actions.
- Addition of redundancy for the ECCS valves that isolate dousing tank at the end of the ECCS Medium Pressure actuation in order to improve the reliability of the safety function “avoiding air intake to PHTS” to assure the circulation.
- Addition of redundancy for EWS main valves 3461-PV7 and PV41 to diminish the probability of failure to open for the injection from dousing or from the lake.

Regarding 2), regardless of the design changes that are more relevant from PSA point of view, other design changes are being carried out. All design changes affecting to the PSA model were included in such model in order to keep PSA results updated.

No.: 58

Country: Russian Federation

Article: Article 14.2

Ref. in National Report: Section 4.4

Question

According to the Report, the Licensee has developed a Programme of Consolidation of Safety Culture, the performance of which is measured through indicators.
Could you please give examples of such indicators, and tell whether you use quantitative characteristics to evaluate safety culture?

Answer

Establishing a quantitative measure using indicators on Safety Culture is not straightforward to do. However, it is very useful and necessary to have indicators that show some trend in issues concerning to Safety Culture. For this reason, some indicators have been defined in relation with some attributes of the traits of a Healthy Nuclear Safety Culture. For example:

- PRACS-002 Indicator: Questioning attitude. Number of Level 4 events reported in a quarter vs. the total number of events reported in the period.
- PRACS-004 Indicator: Leadership Accountability. Total number of tasks observations performed by quarter and by Deputy Manager, Department Head and Division Head vs. the number of observations expected.
- PRACS-007 Indicator: Continuous Learning. Number of people performing Benchmarking, WANO Missions, Workshops, Internal Technical Support Missions (MISTI)

No.: 59

Country: Russian Federation

Article: Article 14.2

Ref. in National Report: Section 3.14.3.1.3

Question

The Report mentions some technical tools that have been introduced (or are planned to be introduced) at Argentenian plants to manage beyond-design-basis accidents.
Could you please tell whether these tools (in particular, hydrogen recombiners) will undergo periodic checks, including testing, throughout the plant lifetime?

Answer

Autocatalytic hydrogen recombiners are installed on site and are periodically tested during scheduled outages.

According to AREVA recommendations, at least 25% of recombiners must be tested at each scheduled outage.

No.: 60

Country: Canada

Article: Article 15

Ref. in National Report: p.119, Section 3.15.4.1

Question

In Table 3.15.7, it seems that the I-131 release for 2015 is many orders of magnitude better than 2013/2014 and significantly better than the other nuclear stations. This seems to be not proportional with the trend / magnitude of the other emissions. Can the Contracting Party comment on this value and confirm that it is correct?

Answer

Embalse NPP has operated during 2015 only in July and some days in December. The releases of gaseous I-131, noble gases and aerosols were not detectable or barely over the detection limit during those periods. The values for aerosols and Xe-133 in the Table 3.15.7 are due to the emissions registered in July but the I-131 was hardly detected.

No.: 61

Country: Canada

Article: Article 15

Ref. in National Report: Section 3.15.4.2

Question

This section documents a loss of heavy water from the steam generator of Central Nuclear Embalse. Can the Contracting Party explain how the event happened, and discuss any corrective actions put in place to prevent reoccurrence?

Answer

The contribution described in section 3.15.4.2 from tritium release from Embalse NPP was not produced by the occurrence of an event, but from a small leak from a tube of one of the steam generators, whether from surface pitting or from the welded connection to the tube plate. Embalse NPP has in place a procedure for detection and repair of leaks from steam generators tubes, but the successful application of the procedure requires the leak rate to reach a certain minimum value in order to provide relevant possibilities of detecting the offending tube. In the referenced case, the leak rate remained minutely low during an extended period of time, which is contrary to what common operative experience shows, thus preventing the possibility of successful discovery of the leaking point. During plant outages, inspections were carried out over the steam generator, and tubes were sealed on the smallest of indications, but the leak remained.

Nonetheless, it is to be noted that the dose to the representative person, even in this situation, remained orders of magnitude below regulatory limits.

Corrective actions put in place to prevent reoccurrence consist of the replacement of all four steam generators of Embalse NPP.

No.: 62

Country: Canada

Article: Article 15

Ref. in National Report: General

Question

The report details some interesting dose savings achieved for the Reactor Inspection Program tasks. The notable improvements in collective dose per related tasks should be shared through operational experience processes to ensure others can learn from these successes.

Does Argentina have mechanisms in place and regulatory obligations to communicate lessons learned? Is Argentina an active member of the NEA's ISOE program?

Answer

Convention report is a mechanism to communicate lessons learned (Annex V)

Periodically, incidents significant to safety are reported by both CNA (CNA I-II) and CNE to the WANO.
In addition, CNE usually participates in CANDU Owners Group (COG) Weekly Screening Meeting teleconferences, where it provides to COG a periodic report of its significant events.

Currently Argentina does not belong to OECD / NEA

No.: 63

Country: China

Article: Article 15

Ref. in National Report: 3.15.6.3/P125

Question

One application of ALARA practices presents the Digital RWP implementation.
Question: What's the difference between former RWP and present digital RWP, and how the new method benefits ALARA practice of onsite radiological work?

Answer

The difference between the current RWP (Radiological Working Permission) and former one is based on a digital system developed to easily manage all permits (previously were all written in paper). The benefit is not only for all CNE personnel as they are now able to track the RWP status, but for ALARA officers also to have more flexibility and facility in providing the service.

No.: 64

Country: Canada

Article: Article 16

Ref. in National Report: p.131, 3.16.6

Question

It is stated that the "municipal plans are tested at least once per year, involving response organizations and the public." How do you get the public involved in the exercises? Are there a minimum number of public participants for each exercise?

Answer

Public located in the surroundings of NPPs is encouraged to participate voluntarily in exercises by training in a realistic nuclear emergency situation, where several protective actions are to be implemented promptly. Among response actions to be trained, evacuation (within an area of 3 km from the NPP), sheltering, iodine thyroid blocking and restrictions for accessing to the affected zone are included. A few weeks prior, public meetings and presentations on educational institutions are organized to provide information about the exercise, but also to retrieve feedback from the public.

During the exercise, the public is notified about a nuclear emergency situation through the Public Alert System, which consists of a set of sirens distributed across the settlements close to the NPP. As further indications are delivered through local FM stations, people are encouraged to stay tuned at every stage of the exercise. Also, a candy (emulating the stable iodine) is provided to each member of every home by Gendarmería Nacional Argentina.
At some point, local FM stations will indicate that it´s time to implement sheltering and to take the stable iodine and people are expected to do so. The experience showed that communication through local FM stations is an effective channel for giving indications to the public, and has also proven to be a useful way to obtain feedback as people are animated to leave messages and inquiries to be answered by a designated officer. Implementation of almost every protective action has been improved by taking into account people´s outlooks.

No.: 65

Country: United States of America

Article: Article 16

Ref. in National Report: 3.16.2

Question

The National Report indicates that the regulatory body will take charge of emergency management in the event of a nuclear accident. In other countries, the regulatory body serves in an advisory role to the licensee and national and local governments to maintain its independence.
(1) Please elaborate on what lessons learned prompted the Argentinian regulatory body to assume this role.
(2) What are the benefits and challenges with such an approach?

Answer

The main strength of this approach is that the regulatory body as the party in charge of emergency management has the sufficient knowledge on nuclear safety, due to its regulatory functions, to implement effective and on-time protective actions, but also to modify these response actions, in case it was necessary. The regulatory body has also adequate monitoring capabilities and a great experience in radiological protection issues.

Particularly, the regulatory body in Argentina has also the responsibility to manage radiological emergencies. Therefore, the regulatory body should have enough resources and infrastructure to face this duty.

One of the challenges of this scheme is that coordination with other response organizations may result complicated, but it was overcome over time.

Ultimately, it was settled that for our country the regulatory body being in charge of the emergency management has more benefits than challenges.

No.: 66

Country: India

Article: Article 16.1

Ref. in National Report: Section 3.16.10.2.1, Page 135

Question

It is stated "A new Internal Centre for Emergency Control was built. The Centre was designed and built taking into account the recommendations and suggestions provided by WANO in the 2012 Peer Review and in the Emergency Preparedness Technical Support Mission that took place in 2013, as well as the proposals that came from performed benchmarking."

What is the design basis of the Internal Emergency Control Centre located at site with regard to seismic, flood and radiation protection considerations and what are the main plant parameters monitoring and power supply provisions available in the Internal Emergency Control Centre?

Answer

The original design criteria of the “Internal Emergency Control Centre" was not based on seismic conditions or flooding because it is located in a "non-seismic" area and at a height of 23 m above the level of the river. Nevertheless, NA-SA is currently working on a new design based on these external events.

In the current building a ventilation system with external air filtration (HEPA absolute filter and activated carbon) is being implemented to reduce radioactive material from the outside.

The Centre has 3 redundant and diverse electrical feeds.

Regarding "main plant parameters monitoring", the building has optical fiber connector to access documentation servers and plant parameters of both NPPs. Also the building has a back-up digital data server. In this way, NA-SA has access to all the information concerning reactors.

The Internal Emergency Control Centre has redundant communications: land line phones, mobile phones and satellite phones and VHF radio.

In the Internal Emergency Control Centre, on-line information is received from the perimeter dose rate measurement system within a 10 km radius around CNA site. It has its own meteorological tower that provides information such as wind speed and direction, solar incidence, rain gauge, etc.

In case of emergency there is a loudspeaker system installed within a 10 km radius around CNA site to alert the population.

There are potable water and packaged food for the emergency organisation and exclusive dosimeters to be distributed among the Emergency Response personnel (Police, Firefighters, Civil Defence, etc.).

No.: 67

Country: United Kingdom

Article: Article 16.1

Ref. in National Report: page 130

Question

The report states that during an emergency, relevant automatic protective actions are taken within the Protection Action Zone (PAZ) and Urgent Protective Zone (UPZ) and that "Environmental monitoring starts once the release of radioactive material has finished." Given the new real-time information environmental monitoring network of fixed and mobile radiological and meteorological stations around each plant.

Please describe any plans the Nuclear Regulatory Authority (Autoridad Regulatoria Nuclear (ARN)) has to integrate this and other field monitoring data into decision making processes for off-site protective actions prior to termination of the release.

Answer

To this day, there is no integration of monitoring data obtained from fixed stations or mobile instruments with the decision making process for off-site protective actions prior to termination of release. Urgent protective actions within the PAZ are implemented automatically once the emergency has been declared.

For the moment, information from fixed and mobile monitoring is part of the data taken into account to implement and to adjust protective actions once the release has finished, for example, adjusting the extent of the PAZ and as data entries for atmospheric dispersion models.

No.: 68

Country: Canada

Article: Article 17

Ref. in National Report: p.141, Section 3.17.2.3.2.1, and p.144,

Question

Intake channel blockage has been studied as a result of flooding (page 141). However, it is not clear if these studies have addressed the extreme scenario of the rupture of the upstream Yacyretá Dam and consequence of extremely large amounts of debris, including whole trees, on the potential blockage of the intake channel.

Answer

For the case of Atucha site (CNA I and CNA II), the cooling water is extracted from the Paraná River through the water intake. Water is filtered through thick, thin grids and rotating filters.

The rupture of the upstream Yacyretá Dam has been considered and the specific information is included In the Seventh National Report, item 3.17.2.3.3.1.2 (Flooding/low water level). In that item it is mentioned that "the estimated maximum water height that would be reached on the Atucha site after the rupture of the Yacyretá dam located 1,200 kilometers upstream is similar to the one calculated for the simultaneous confluence of the two main river tributaries in case of a maximum precipitation (intense rains). For the dam rupture above mentioned, it was estimated that the probable maximum high water level (PMH) for the Atucha site is 8.45 meters…"

Besides, it is explained that "the CNA I and CNA II main buildings were built on a 23 meters height plateau. Therefore, high water levels are not expected to affect these buildings since those are all placed at a level that provides a substantial margin from the PMH.

However, in the CNA I case, the water intake for the normal river water cooling system pumps and the secured river water cooling system pumps are located at a level of 6 meters and may be vulnerable to river level rise for it is less than the PMH of 8.45 meters. Besides, the minimum water level height for which the plant can operate is –1 meter given by the pumps water intake level.

To overcome these CNA I extreme high and low water levels design weaknesses, a fourth pump of the secured river water cooling system (UK) was installed in the CNA II pumps house. This pump keeps running even with a river level rise of 8.45 meters or low river levels of -2.00 meters. This allows this pump operation even in case the water level exceeds the CNA I pump house height or the water level is below the pump intake level".

On the other side, "the Second Heat Sink (SHS) system belonging to CNA I NPP is capable of removing heat in situations where the pump house is unavailable.

Also the availability of the structures, systems and components (SSCs) that must be functional in case of external flooding scenarios has been studied. The SSCs that are necessary to stop, bring and maintain the reactor into a safe shutdown condition after a loss of the river water assured cooling system (UK), were identified from the plant's PSA as well as their availability was verified through the plant walk-downs".

As well, in the same item it is mentioned that "CNA I and CNA II have three specific flood and low water level management instructions. In case of an extreme scenario like the one described before, the NPP will be kept in a safe shutdown state".

No.: 69

Country: Canada

Article: Article 17

Ref. in National Report: General

Question

The discussion of site re-evaluation post-Fukushima is comprehensive and indicates that a thorough review was performed.

Has the capability of the facilities to manage radioactive liquid waste (i.e., contaminated cooling water) following a core damage event been assessed and/or evaluated?

Answer

The radioactive liquid waste generated as a result of a severe accident shall be kept inside the containment. This is possible due to the big containment volume that is similar to PWR. The indicative chart of the different contributions is attached.

Acronyms:

RB: Reactor Building

HTS: Heat Transport System

HP ECC: High Pressure Emergency Core Cooling

MP ECC: Medium Pressure Emergency Core Cooling

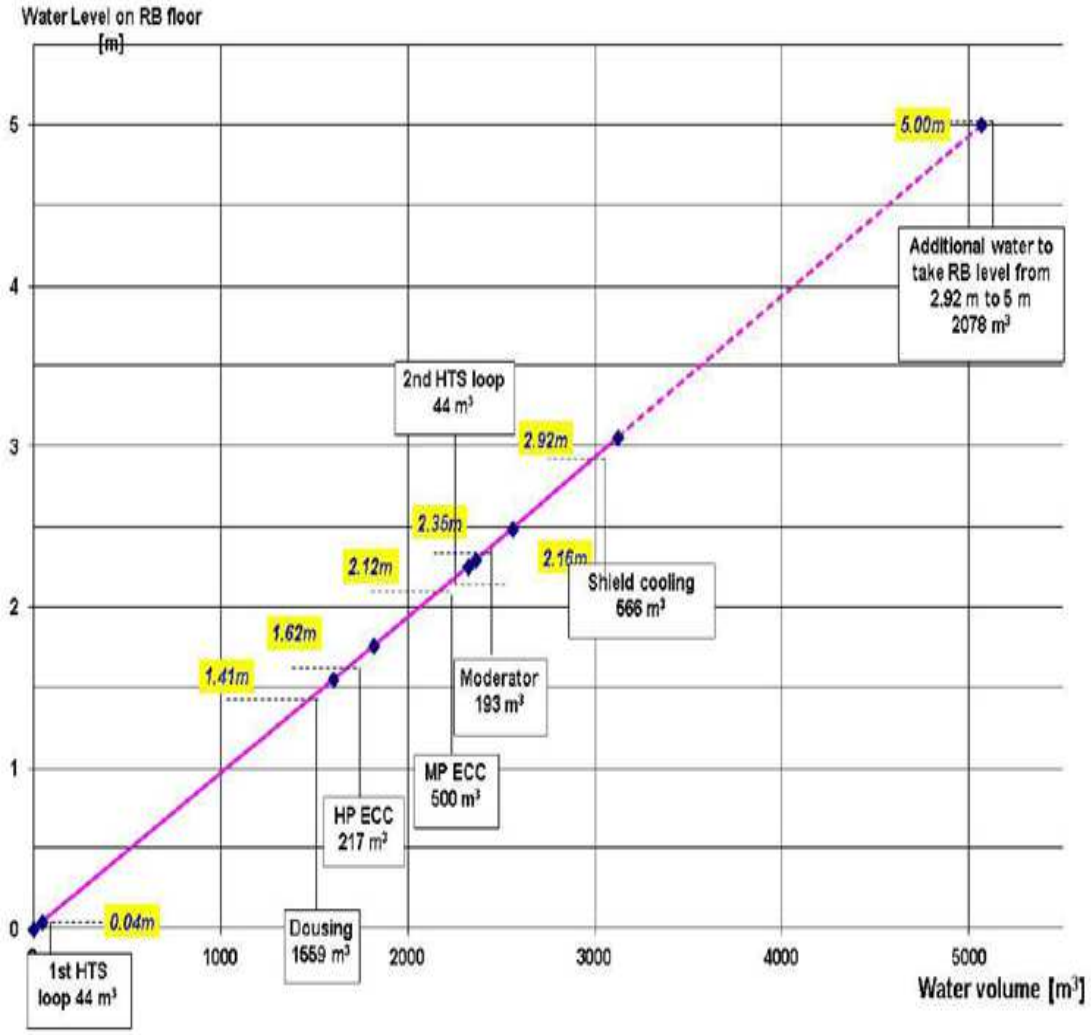

Figure 1 – Embalse Containment Water Level vs Water Volume [Up to 5 m]

No.: 70

Country: Canada

Article: Article 17

Ref. in National Report: p.156, Section 3.17.2.3.2

Question

The site re-evaluation summary highlights ends with the following statement: "as a result of the stress tests performed by the Licensee and the corresponding assessment carried out by the Regulatory Body, it was issued a regulatory requirement asking additional assessments or the implementation of improvements and modifications referred to seismicity, flooding and other extreme external hazards, many of which have already been implemented".
It is commendable for Argentina to take the necessary steps to implement these improvements.
What is the timeframe for licensees to complete these implementations?

Answer

In sections 3.14.3.1.2. Post Fukushima Analysis and 3.18.3.2.1/2, 3.18.3.3.1 Design improvements implementation, the improvements and modifications referred to extreme external hazards among other plants changes are stated. Several changes have been already implemented; however, there are few improvements still under analysis.

In order to define a time frame it is necessary to finalize those analyses and verify the feasibility of such remaining improvements.

No.: 71

Country: Germany

Article: Article 17

Ref. in National Report: p. 138

Question

In the report it is said, that the seismic risk at the Atucha site is very low. And the NPP shall withstand horizontal loads typically for regions with low seismicity. Which PGA value is used for the design basis earthquake for Atucha I and Atucha II? Does Argentina apply the minimum PGA value of 0.1g as recommended by the IAEA Safety Standard No. NS-G-1.6?

Answer

As stated in section 3.17.2.3.2.1.1. "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. The CNA II original design criteria were based on a 0.05 g PGA DBE (Design Basis Earthquake). Additionally, design principles and construction measures for low seismicity regions were applied".

A hazard analysis for Atucha site was performed, demonstrating that a 0.1g PGA value must be considered as design basis earthquake for new NPPs and as review level earthquake for existing NPPs. This is in line with IAEA Safety Standard No. NS-G-1.6.

No.: 72

Country: United Kingdom

Article: Article 17

Ref. in National Report: Page 137

Question

The report states that the information provided by siting studies enable the identification of actions required to protect the public from accident situations, which can then be taken into account within the corresponding Emergency Plans. An increase in population around nuclear sites has the potential to affect the safety of both individuals (by potentially decreasing the protection that is provided by the provisions within the off-site plan) and society (by increasing the collective effective dose that the public would receive in the event of an off-site release of radioactive material).
Please clarify what regulatory or other administrative controls are in place to limit the population distribution or growth around a site that may be considered as suitable for the location of a nuclear power plant?

Answer

The regulatory body or the licensee does not have authority to control or to limit the population distribution, the population growth or the long term land-use policies and plans in the regions surrounding a nuclear facility.

Nevertheless, AR 10.10.1 standard “Sitting assessment for Nuclear Power Plants” may be considered as a tool that influences indirectly in this subject. One of the requirements stands that “Population growth and distribution must be kept under surveillance […] in order to keep associated risks as low as reasonably achievable”, but also that “Sitting assessment must consider expected variations on land usage in the surroundings of a NPP”.

In the section related to the public and emergency preparedness and response, the standard states that “The geographic area surrounding a NPP shall be considered taking into account present and future population characteristics and distribution, including present and future land and water usage, but also any other characteristic that can be affected or can affect the consequences on the public or the environment of radioactive releases.”

No.: 73

Country: Canada

Article: Article 18

Ref. in National Report: p.157, Section 3.18.3.2.1

Question

In the "Review of Safety Issues", the positive void coefficient is mentioned as an issue for Central Nuclear Atucha II, but not for Central Nuclear Atucha I or for Central Nuclear Embalse.

Can the Contracting Party explain the rationale for this?

Answer

The "Review of safety issues" was included as an explanation of the additional evaluations of the SAR required by ARN for the re-licensing of CNA II after several years of delay, with the objective of reevaluating and reinforcing the design basis of the plant and safety systems. This imply that the positive void coefficient is not a safety issue for any CANDU reactor type nuclear power plant or for CNA I (both PHWR reactors).

No.: 74

Country: China

Article: Article 18.1

Ref. in National Report: 3.17.2.3.1/P139

Question

Description in section 3.17.2.3.1: "Man induced external events are also considered in the plant design basis. In this regard, an explosion pressure wave corresponding to deflagration of a gas cloud is defined, which is duly taken into account through appropriate layout and structural aspects. Also, measures to avoid the entering of explosive gases into buildings and structures are taken into account in the design of the plant".
Question: How to take into account the possibility and corresponding measures for hydrogen explosion/deflagration inside the reactor building?

Answer

As were mentioned in the previous report related to the potential hydrogen explosions, in CNA I and CNA II Passive Auto-catalytic Recombiners (PARs) have been installed and in the case of CNE, PARs installation required for the hydrogen management inside the containment is foreseen to be implemented during the life extension refurbishment.

No.: 75

Country: Germany

Article: Article 18.1

Ref. in National Report: p. 162

Question

A high quality of the reactor pressure vessel is a mandatory requirement for nuclear safety. One issue is, that the reactor pressure vessel counts to the so called long lead items. Regulatory inspection of the fabrication may be challenging from a legal point of view. Could ARN describe in more details the planned inspections of the reactor pressure vessel during fabrication to ensure a high quality of this component?

Answer

The CAREM RPV is designed and constructed under ASME III stamp, in accordance with the relevant requirements of Section III of the ASME Boiler and Pressure Vessel Code, 2010 Edition with 2011 Addenda.

ARN reviews the mandatory documentation presented, in order to define and plan the inspection tasks (as were mentioned in National Report Section 3.7.3.3).

In order to meet established regulatory requirements, ARN only conduct inspections and audits to Responsible Entity, not to vendors. The Responsible Entity is in charge of assuring that the supplier quality program is implemented and the defined design criteria are accomplished.

Related to MIP (Manufacturing Inspection Program and Testing), the Responsible Entity establish, by the Design Specification of CAREM RPV, all the examinations, dimensional controls and tests that manufacturer shall be responsible of performing (under ASME NB-5000 and NB-6000). All the examinations shall meet the written procedures which have been previously accepted by the Responsible Entity. The examinations and tests shall be subject to Responsible Entity acceptance.

No.: 76

Country: Canada

Article: Article 19

Ref. in National Report: General

Question

In response to the Fukushima accident a significant safety analysis appears to have been completed to determine the required mitigating actions, subdividing actions between short-, medium- and long-term plans.

However, much of the corrective actions are to be implemented as part of the long-term plan. Can the Contracting Party provide the plan timelines showing when facilities are to have their long-term actions completed?

Answer

See answer to question 70.

No.: 77

Country: Canada

Article: Article 19

Ref. in National Report: Page 166, Section 3.19.3.2

Question

In the third paragraph, the report states: "Such operational limits and conditions mainly arise from the Canadian experience on CANDU type reactor operation, transferred to CNE." While the operational limits and condition (OLC) documents developed by Canadian utilities represent a logical starting point for developing OLCs for CNE, it is important to note that design differences across Canada's CANDU fleet have necessitated slight differences in the OLCs used at each station. To what extent did Autoridad Regulatoria Nuclear (ARN) and/or Nucleoeléctrica Argentina S.A. (NA-SA) staff review the Canadian OLCs for applicability to CNE?

Answer

CNE together with Embalse Plant Designer (Candu Energy) have recently completed the analysis to determine the LOE (Limits of Operating Envelope) and SOE (Safe Operating Envelope).

The LOE determines the type of safety analysis applied to different plant parameters that intend to define the SOE. The SOE are the conservative values of a set of plant parameters that guarantee to accomplish the acceptance criteria in the safety analysis for the design basis events.

With the SOE, the Plant will set the OLC (Operating Limit Conditions). The Plant Operating Policies and Principles (OPP) Manual will be reviewed and will include in one annex the OLC; this will be finished and approved by ARN prior to the plant start up for second operation cycle.

No.: 78

Country: Mexico

Article: Article 19

Ref. in National Report: p.178

Question

What is the total amount of financial resources (U.S.Dlls.) for the final disposal of radioactive waste according with the provisions described at Act No. 25.018?

Answer

In order to secure the availability of sufficient resources, the current regulations set forth the creation of funds for financing the PNGRR (National Program for Radioactive Waste Management) and the decommissioning of each NPP. These funds shall come from the main radioactive waste generators, which are currently within the sphere of the State.
In accordance with the principle of unity of action and patrimony of the State, and while the nuclear power plants remain within the sphere of the State, the funding for PNGRR activities will depend on the National Budget granted to CNEA. Regarding long-term projects, such as

the installation of future repositories, as long as the funds anticipated by the current regulation are not integrated, the national State shall secure the availability of sufficient resources for CNEA to deal, when necessary, with the expenditure and investments to finance the management of waste originated from nuclear power plants.

No.: 79

Country: China

Article: Article 19.1

Ref. in National Report: 2.13/P18

Question

It is mentioned that "Commissioning was planned to demonstrate that all components, systems and structures are functioning in accordance to previously calculated data and design documentation."
Question: According to the experience of commissioning, some components, such as explosion valve, are not demonstrated by commissioning activities. Could you please list items that are not demonstrated in commissioning, and try to analysis the usability of these items?

Answer

It is not really viable to list the items whose performance is not “demonstrated” during commissioning.

Perhaps the original wording is misleading: the components classified as “Class 1”, including all the components of Safety Systems, are already qualified in terms of functional capability and robustness. In general this qualification is based on the use of standards, and only for components with innovative features the qualification is made by tests. Commissioning tests include the functional tests of safety systems, meant to verify that the systems performance is coherent with the “previously calculated data and design documentation”. In other words, commissioning functional tests will cover thoroughly all the DBA scenarios, which are dealt by the operation of safety systems. DEC scenarios are dealt by systems that are functionally tested in a systematic way in all the cases that the system operating conditions are achievable. In general severe accidents scenarios are not tested during commissioning.

No.: 80

Country: China

Article: Article 19.3

Ref. in National Report: 3.19.5/P166-P167

Question

The content of the CNA II's Operating Manual is more specific than the CNA I's .
Question: Why is not CAN I implemented the good practice?

Answer

CNA I and CNA II are facilities commissioned within a span of many years, hence the Operating Manuals of both facilities are not equally structured. Nonetheless, all the information covered by the Operating Manual of CNA II is also covered with the same amount of depth and detail in the Operating Manual of CNA I. The organization of the chapters and volumes is however different for both units, so for CNA I, the information is arranged in three parts, whereas for CNA II, the information is arranged in six parts. It is foreseen that the documentation of CNA I will be updated in the frame of the long term operation.

No.: 81

Country: Romania

Article: Article 19.4

Ref. in National Report: pages 166-167

Question

How does the regulator review and inspect the verification and validation of emergency operating procedures and severe accident management guidelines?

Answer

The emergency operative procedures (EOP) as well as the SAMGs are mandatory documentation that the operator has to submit to the regulator. The EOPs are based on engineering judgment, experiences in other similar plants and validated against simulations in a full-scope simulator on site. As it is mentioned on page 33 of the national report "To develop and implement Severe Accident Management Guidelines (SAMG) specific for CNE, based on the Generic Guidelines developed by the CANDU Owner's Group (COG), with the designer support. These SAMG will fulfill the Regulatory Body requirements related with the stress test that includes the consideration of the mitigation actions foreseen in order to prevent large radioactive releases as a consequence of damages to the core and the spent fuel pool". The SAMG strategies are based on computer simulation with a validated system code for these purposes.

No.: 82

Country: China

Article: Article 19.7

Ref. in National Report: 3.19.8/P168

Question

It is mentioned in section 3.19 that "use of root cause analysis methodologies in the cases where an event is applicable in domestic plants". Normally, RCA method is applied to event investigation and analysis, especially in the internal event.
Question: How to apply the RCA method into analysis and assessment of the external event?

Answer

External events are events received as operating experience feedback and there is not root cause analysis for those events. They are used for lessons learned and possible corrective actions (Annex V).

No.: 83

Country: China

Article: Article 19.7

Ref. in National Report: 3.19.8/P163

Question

Description in section 3.19.8 "Incidents significant to safety are reported in a timely manner by the holder of the relevant license to the ARN.". "An event report is submitted to IRS when the event is considered by the national coordinator to be of international interest. During the period 2013-2015, three relevant events were reported to IRS."
Question: Are there any criteria to identify the Incidents significant to safety? Could you provide the criteria? How to make sure all the Incidents significant to safety are reported to the ARN correctly and completely. What are the criteria for the events reported to the IRS?

Answer

There are criteria to identify incidents significant to safety and they are contained in the Operation License from each NPP.

The criteria applied to identify the Incidents significant to safety are the ones expressed in the Argentine Regulation. These criteria are:

a. Safety Related System degradation: reactivity control, Heat Transport System pressure, flow or temperature; moderator system parameters; BOP parameters.
b. Safety System unavailability, safety system instrumentation and essential supplies.
c. Significant degradation of one of the radioactive safety barriers (fuel cladding, heat transport system and containment system).
d. Occupational exposure or radioactive effluents discharge to the environment, in excess of the corresponding authorized limits.
e. Internal or external events, both natural and resulting from human action, which could affect directly or indirectly the installation safety.
f. Any event considered by the facility Internal Safety Advisory Committee.

Each plant has an operating procedure where those criteria were expressed. Besides, station manager or shift supervisor could report to the regulator other events that at their own criteria are Incidents significant to safety.

For example:

a. Unplanned shutdown.
b. Damage to the equipment that could affect the safety, which were caused by inadequate operation, design flaws, quality material, maintenance and/or repair.
c. Heavy water spill greater than 100 kg.
d. Isotopic degradation is equal or greater than to 0.1% in the heat transport systems or moderator.

ARN makes sure that all the events are reported through regular inspections of NPP events data bases.

According with IRS rules, events reported to IRS must be useful as operating experience feedback to the nuclear community.

CONVENTION ON NUCLEAR SAFETY

ANSWERS TO QUESTIONS OR COMMENTS

Autoridad Regulatoria Nuclear
PRESIDENCIA DE LA NACIÓN