

Questions Posted to Argentina and Answers in relation to the Argentine National Report for the Second Convention on Nuclear Safety Extraordinary Meeting 2012

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| Question 01 | The report states that ARN performed inspections and evaluations to assess the readiness of mitigating systems; however, no further information is provided on the results and if there are any recommendations to improve nuclear safety. Including results of inspections and evaluations performed by ARN would greatly strengthen the report. | Introduction |
| Answer 01 | The actions arising from evaluations and inspections made by ARN on the topics of interest of this Convention are detailed in the chapters of the National Report. In the summary table of Annex IV the activities carried out by the Operator and ARN are given, as well as the corresponding improvements/modifications resulting from the stress test, which are foreseen to be implemented in each NPP as a result of the lesson learned from the Fukushima accident. | |
| Question 02 | Question for ARN and NA-SA: Were potential changes to intensity of external events examined with climate change in mind for the remaining service lives of the three facilities? | General |
| Answer 02 | Whether potential changes to intensity of external events examined with climate change in mind for the remaining service lives of the three facilities could be foreseen, their analyses and the eventual needed for improvements will be requested by ARN to NA-SA by specific requirements, and the corresponding changes must be implemented, as well as the modifications needed in the mandatory documentation. As an example, in the Atucha site case, NA-SA has a contract with the Instituto Nacional del Agua (INA, National Water Institute). INA has the responsibility of evaluating the influence of the climate change in the River Plate Basin. NA-SA requested INA an update of the forecast of high and low water levels and to revise the maximum and minimum levels in the Atucha site, to be used for safety studies. INA is studying possible scenarios in 20, 50 and 100 years periods. | |
| Question03 | Question for ARN and NA-SA: For all three facilities: Has the possibility of a simultaneous in-plant fire (for example triggered by a seismic event) been assessed and factored into mitigation strategies? | General 2 |
| Answer 03 | For the three NPPs, ARN requested NA-SA, as part of the stress test, the deterministic analysis of simultaneous in-plant fire triggered by a common cause event. The analyses have still been performed and the results will be taken into account for the mitigation strategies improvements. In that sense, at both Atucha and Embalse sites, programs for | |

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| | <p>updating site seismic data were underway before the Fukushima accident happened.</p> <p>After Fukushima, to meet ARN requirements as well as WANO recommendations, the evaluation of the safety against earthquakes and associated external induced hazards (e.g. fires and floods generated by earthquakes) for CNA I was initiated in 2011. This program covers identification of concomitant events in the nuclear installation, e.g., seismic-fire and seismic-flood interactions, including the effects of the earthquake on fire prevention and protection systems, seismic-induced explosions and other seismic-induced chemical reactions, etc.</p> <p>Apart from the equipment identified from both safe shutdown paths, within the additional systems to be seismically evaluated, the Fire Protection System has been included.</p> <p>As a result of plant walkdowns performed in CNA I, some observations were made regarding potential consequential fires, fire equipment separation and firefighting equipment.</p> <p>CNA II is also updating its seismic program in order to cover these tasks.</p> <p>A similar scope has CNE seismic reevaluation program which is ongoing.</p> | |
| Question04 | <p>Use of a Containment Emergency Filtered Venting system has not been considered as a design issue. Has Argentina undertaken studies to rule out over-pressurization of the containment building?</p> | General 2 |
| Answer 04 | <p>The following resumes several aspects related to the prevention of overpressure inside the containment:</p> <ul style="list-style-type: none"> • The filtered venting system was not considered in the original design of Argentinean NPPs. • As part of the PSR, the Regulator required the Operator, to reevaluate the accident management measures and the plant design features to protect the containment integrity after the fuel damage occurrence, as a prevention of the containment over-pressurization. • In the case of Embalse NPP the original design features that protect the integrity of the containment against over-pressurization are the large volume of the containment (~48000 m³) and passive condensation in building structures of the containment, local air coolers and dousing spraying. <p>A specific Severe Accident Management Guideline (SAMG) is being developed to address this phenomenology, <u>and a filtered vent system from containment atmosphere will be installed during the refurbishment for the plant life extension.</u></p> | |

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| | <p>In addition to the filtered vent installation, the current design allows for two venting possibilities. One is the venting of the containment from the dousing and through the SGs, so that the scrubbing of what is vented is by passage through the water of the SGs. Another way to vent, which the current design allows, is by opening the valves of the spent fuel port from the maintenance room of the fueling machine to the fueling machine room (R 001) and from it down by the transfer channel to the reception pool and the atmosphere of the building making the scrubbing in the water of R 001/pool. Both venting possibilities will be included in the SAMGs.</p> <ul style="list-style-type: none"> • Concerning CNA I and CNA II, the studies performed to evaluate the evolution of different accidental sequences for the level 2 PSA, showed an increase of the containment pressure that in no case exceeds the design pressure. This is mainly due to the very low power/free volume relation in the containments. This leads to the preliminary conclusion that venting of the containment could be not needed. <p>Moreover, The PSA level 2 studies are being updated and it is expected to be completed in 2013. According to the results, the filtered venting system will be implemented in CNA I and CNA II, if needed.</p> <p>Additionally, the following strategies to be implemented to diminish the containment pressure during severe accidents are available:</p> <ul style="list-style-type: none"> – From the outside by means of the annular space ventilation. – From the inside through air recirculation using the existing ventilation system. | |
| Question05 | Regarding “Assured power supply to CNE”, what formal arrangements or formal agreements are in place to ensure that the connection to the Reolin hydraulic generator would be made in the timeframe needed (23 hours according to other information presented in section 2.2.3 and it’s sub-sections, e.g., 2nd paragraph in section 2.2.3.3 and in 3rd paragraph in section 2.2.3.4)? | 2.2.3 Pag 84 |
| Answer 05 | <p>CAMMESA is the company that regulates the wholesale electricity market in Argentina. There is an agreement (CAMMESA Procedure PT-7 "Recovery of the SADI after total collapse) between CAMMESA and NA-SA (CNE Operator), to be used in case of a collapse of the electric grid.</p> <p>With the aim of securing the support services of the CNE against the failure of emergency diesel generators, there is a bus bar in the Transform Station (TS) 132 kV Almafuerte, near Embalse site, for</p> | |

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| | <p>use as a passage between Reolín (1 or 2) and the Embalse NPP (132 kV).</p> <p>The request the TS to make the planned configuration at Almafuerte transform station is performed directly by CNE, according which is established in the mentioned agreement.</p> | |
| Question06 | <p>Although it is stated that “The system has earthquake qualification ...”, it is not clear if this includes the dousing tank. It would be appreciated if more details could be provided on what systems have earthquake qualification, in regards to the discussion in this section.</p> | 2.2.3.2 Pag 87 |
| Answer 06 | <p>The dousing tank is part of the reactor building structure, it was constructed with the same seismic qualification, and during the seismic reevaluation, was considered in the same way that the whole structure.</p> | |
| Question07 | <p>Has the analysis of water availability for water replenishment taken into account the need for water to be available for fire response?</p> | 2.2.3.3. Pag 88/89 |
| Answer 07 | <p>Yes, in the analysis of water availability for water replenishment, the needed for water to be available for fire response was taken into account.</p> | |
| Question08 | <p>With regards to “Due to depletion or total loss of battery system after 8 hours, it must be supply the necessary systems to extend the availability of batteries providing recharge by the additional emergency power supply system.” How long will be batteries be available after these improvements are made?. It is assumed that the improvements would support necessary instrumentation to support SAM guidelines.</p> | 2.2.3.3. Pag 90 |
| Answer 08 | <p>The emergency portable diesel generator may supply electricity to the battery chargers. The diesel generator will be able to operate for more than seven days with the fuel reserves available at the plant. After this time, it is possible to obtain fuel from external supplies.</p> | |
| Question09 | <p>Question for ARN and NA-SA: For all three sites, has there been discussions to consider installing post-severe accident reactor power instrumentation to confirm the reactor and corium pile remains sub-critical?</p> | 3.1.1.3.2 |
| Answer 09 | <p>The risk of re-criticality in the Argentine reactors in case of a severe accident is considered negligible. The Embalse and Atucha II reactors use natural uranium dioxide fuel and heavy water as moderator and coolant. The Atucha-I reactor uses similar moderator and coolant and slightly enriched uranium (SEU) fuel with 0.85 w% of U-235.</p> <p>In severe accident conditions, with partial core meltdown, there will be significant melting of pressure and calandria tubes in the case of Embalse and coolant channels in the case of Atucha-I or II.</p> | |

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| | <p>For that reason, the moderator and the main heat transport systems will be communicated and the injection of light water coolant from the emergency core coolant system will produce a significant degradation of the heavy water from both the coolant and moderator systems.</p> <p>For Atucha I, which, as mentioned before, uses SEU 0.85 w% fuel, criticality calculations have been done assuming fresh fuel, and light water coolant and moderator at room temperature. The calculations showed that to approach the situation of criticality with less than the 50 mk safety margin required by ARN standard, is necessary to postulate a regular infinite lattice of individual fuel rods, spaced with spacing near the optimal to have maximum reactivity (about 1.65 cm distance between rod centers in a square lattice).</p> <p>More generally, in the three reactors, if the fraction of the core melt is large and the corium moves to the bottom of the calandria in the case of Embalse, or to the bottom of the reactor pressure vessel (RPV) in the case of Atucha-I or Atucha-II, the natural or low enrichment fuel will be very far from these favorable fuel moderator geometrical conditions need for re-criticality.</p> <p>Finally, in all plants also must be taken into account the very low reactivity excess in normal operation that lead to the need of a continuous fuel elements replacement, and the absence of a poison dissolved in the moderator, that could lead to a reactivity increase in some severe accident scenarios.</p> <p>For all that reasons, no special neutron instrumentation is planned to be added for severe accidents.</p> | | | | |
| Question 10 | <p>When discussing containment filtered venting capabilities, the report mentions the option of venting using scrubbing water of the spent fuel pool toward another closed room in the plant where the spent fuel is discharged (Room R-001). Scrubbing would help retaining fission products, but not the Hydrogen. Could you provide more details on the measures to mitigate potential hydrogen accumulation in this room?</p> | 3.1.1.3.2 Pag 131 Parrafo 3 | | | |
| Answer 10 | <p>For the Embalse Life Extension Project NA-SA signed contracts with the plant designer, CANDU Energy, for the installation of PARS and for the development of Severe Accident Management Guidelines (SAMGs). The SAMGs specific for Embalse have already been received by the plant, and before the end of 2012 CANDU ENERGY will provide training and a severe accident exercise for the validation of the SAMGs. One of the strategies is, shown below:</p> <p style="text-align: center;">“SCG-3 - SEVERE CHALLENGE GUIDELINE 3: CONTROL CONTAINMENT ATMOSPHERE FLAMMABILITY”</p> <p style="text-align: center;">Strategy #5 - Vent containment using water scrubbing venting</p> <table border="1" data-bbox="397 1834 1217 1872"> <tr> <td data-bbox="397 1834 638 1872">LINEUP</td> <td data-bbox="638 1834 879 1872">5a</td> <td data-bbox="879 1834 1217 1872">5b</td> </tr> </table> | LINEUP | 5a | 5b | |
| LINEUP | 5a | 5b | | | |

| | DESCRIPTION | Depressurize Containment using Spent Fuel Port | Depressurize Containment using steam generator water scrubbing vent path via dousing tank and MSSVs | |
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| | Regarding the contract with Candu Energy related to PARS the design where they will be installed has not yet been delivered to NA-SA. At the present time the severe accident analysis is being carried out and will indicate the location of PARS is taking place including R001 and the spent fuel reception pool. | | | |
| Question 11 | The report describes in detail the regulatory actions to implement lessons learned from the Fukushima event, requiring the licensees to identify weaknesses and propose and implement improvements to the existing severe accident management programs. These new regulatory actions and evaluations were needed mainly because the nuclear power plants have developed SAM programs in response to the regulatory requirements issued prior to the Fukushima accident. Could you clarify whether the regulator intends to update the regulatory framework to incorporate, from regulatory standpoint, the lessons learned from Fukushima accident? | | | 3.1.2.4. Pag 143 |
| Answer 11 | <p>The Argentine regulatory framework has no suffer any important change as a result of the Fukushima accident. ARN, within the existing framework required the Operator specific assessments after the accident (stress test) and also has conducted independent evaluations deemed necessary. As a result of both tasks emerged a set of regulatory requirements in order to further improve the safety of the installations; all of them are deeply described in the National Report.</p> <p>In the summary table of Annex IV the activities carried out by the Operator and ARN are given, as well as the corresponding improvements/modifications resulting from the stress test, which are foreseen to be implemented in each NPP as a result of the lesson learned from the Fukushima accident.</p> | | | |
| Question 12 | As part of its response to Fukushima Daiichi, has the operator or the regulator made any particular improvements to help communicate information to the general public? | | | 5.2.9.1 Comentario 1 |
| Answer 12 | <p>The communication with the public and its training for the implementation of automatic protection measures were always considered extremely important, both for the Regulator and the Operator, in order to implement the strategy adopted for a nuclear emergency response.</p> <p>For this reason the Regulator and the Operator keep a fluid relationship with the public members and the authorities of the areas that could be affected by a nuclear emergency. In particular, in the months before the drills, trainings to the public members</p> | | | |

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| | <p>in the area are carried out, including students of the schools.</p> <p>During the drills with involvement of the public - which are held every two years for each NPP- information and training is provided to the public and the quality of that information is verified, considering the understanding of the message by the receiver.</p> <p>For these reasons, it is considered that the communication system with the public in case of nuclear emergency is appropriate. However the evaluation of the communication strategy is ongoing, and any improvement needed will be implemented.</p> <p>The attempts to improve the quantity and quality of the information conveyed to the public, both by the operator and the regulator, are long-lasting and of a permanent nature. A specific effort has been made for example to address and respond rapidly to requests from the press: providing timely official information to it, with its immediate reflection on the general public, is a very important tool in terms of conveying the message that the authorities are on top of the issue and adequately dealing with it. In addition, it can be said that the Fukushima event highlighted a very important and well-known element: information going to the public must be precise, clearly expressed and validated.</p> <p>Besides, following the occurrence of the event Fukushima, ARN has requested, to the Argentinean NPPs in operation (CNA I and CNE) and the one in construction (CNA II), to conduct a Comprehensive Safety Assessment (EIS) within which stand out as an important aspect to be evaluated during a nuclear emergency management, the resource availability affected the communications and the procedures applicable to them.</p> <p>This EIS, subsequent to the preparation of the document under treatment, keeps explicit conclusions in the Section 5.2.9.2 of the report on the strengths of the communications system used. Nevertheless, the following equipment improvements have been proposed:</p> <ul style="list-style-type: none"> • Set of fixed and mobile satellite telephones for internal and external communication during the emergency, to be used as a backup to the collapse of public communications (CNA I and CNE), • Audible alarm system installed in the nearest town to the facility (CNA I). | |
| Question13 | The country report indicates that Argentina wishes to “duly contribute” to improving the IAEA peer review process. It also refers to increasing transparency with respect to nuclear safety. Can Argentina elaborate on how it would like to increase transparency and improve peer reviews? | Pag 179 Párrafos 2 y 3 |

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| Answer 13 | <p>With respect to the “peer reviews” element of the question, paras 04 to 06 in page 179 of the National Report describes the notes which the effort to “strengthen” such reviews must have, as directed by the Action Plan. Argentine “due contribution” to that effort will consist in participating as actively as possible in the various instances in which such process is and will be taking place (technical and policy-making related meetings in the IAEA, and at national and regional levels). Such participation will be always aimed, as foreseen in the Action Plan, to the adequate incorporation to the peer reviews of the lessons learned, and to maximizing the benefits to the country involved.</p> <p>The NR does not speak of “increasing transparency”. Transparency in the nuclear field is a value of the utmost importance, and Argentine nuclear actors try their best to continuously reflect it in their work.</p> <p>We did note that Fukushima has clearly raised the awareness of a number of actors in the safety of the nuclear activities of all States.</p> | |
| Comment14 | <p>Both the regulator and the licensee are to be commended for the excellent level of detail provided in the report to show how lessons learned are being applied to ongoing analysis of the existing facilities in Argentina. The details provided appear to indicate that Argentina has fulfilled it’s obligations in the preparation of its national report.</p> | All |
| Answer 14 | <p>Thank you very much for the comment.</p> | |
| Question15 | <p>How often are your agreements and protocols with external organizations, including the evacuation plans, reviewed to ensure the arrangements initially established between the “Parties” are properly maintained over time and are adequate in order to effectively respond to the event? Are these agreements and protocols legally binding on the “Parties” involved?</p> | Pag 149 |
| Answer 15 | <p>According to the agreements and protocols signed with external organizations, there is a formal obligation to carry out its periodic review only when it is specified in the agreement. The mentioned periodic review is established in many agreements signed by external organizations and the Operator or ARN. In these cases, periods of review between two and ten years are generally specified.</p> <p>The experience has shown that the frequent review of those most general agreements (framework agreement) is not necessary, but the agreements that involve operative commitments and protocols do require a frequent review and updating.</p> <p>The general agreements are reviewed approximately every ten years, and the operative agreements are reviewed every few years. The review period is established between the parties depending on the effectiveness of the benefits in practice.</p> | |

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| | <p>In particular aspects of these agreements relate exclusively to effective roles during emergencies, and are reviewed considering the findings and results arising from the exercise of implementing the Emergency Plan for each facility.</p> <p>Of course, these agreements and protocols are legally binding.</p> | |
| Question16 | <p>Observation: This section outlines the training and exercise program at various jurisdictions. Question: What is the scope and frequency of full-scale exercises held for nuclear emergency management involving operator and various levels of government and other organizations to test interoperability and compatibility of plans, procedures and arrangements at all levels?</p> | Pag 156 |
| Answer 16 | <p>Every year, the NPPs in Argentina must carry out a nuclear emergency exercise. Every two years the drills must include the participation of the public in the planning area.</p> <p>The general objective is to verify:</p> <ul style="list-style-type: none"> • The operational capacity of the organizations involved in order to implement the protection actions to the public members in the “precautionary action zone” (10 km around the Plant). <p>The particular objectives are to verify:</p> <ul style="list-style-type: none"> • The appropriate implementation of automatic protection action in “precautionary action zone” (sheltering, distribution of stable iodine tables and access control), • Communications between the organizations involved in the nuclear response, • Communication between the response organization and the public, • Interaction between Regulator, Operator and local and national government boards, • Decision making process in the Local Emergency Operative Centre, • Performance of the Regulator Emergency Control Center. | |
| Question17 | <p>On page 72, the interconnection possibility between CNA I and CNA II is presented. Is the equipment for the permanent hook up seismically qualified?</p> | Pag 72 |
| Answer 17 | <p>In case of CNA I loss of external power supply, the plant has an electric interconnection with emergency DGs of CNA II that was specially built fifteen years ago. These DGs are used as backup system of CNA I original emergency electric system, being capable</p> | |

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| | <p>of providing energy to the plant to achieve and maintain it in a safe shutdown condition.</p> <p>At present it is one of the systems that are considered in one of the two success paths considered within the seismic margin methodology which is been employed in order to evaluate the seismic safety of CNA I. All components involved in the interconnection between the two normal busses are included in the safe shutdown equipment list and have been evaluated and considered in the walkdowns performed.</p> <p>Nowadays a new I I emergency power supply system is being licensed. Only the part which involves the electrical interconnection between normal bars of I I – I II will be kept in the future after I II begins its operation.</p> <p>There are several proposals on how to take advantage of this interconnection in the future, which have been mentioned in some sections of the National Report. The more direct one is that both NPPs will have another alternative external power supply, for instance I I would count on the 500 kV lines with two redundancies.</p> | |
| Question18 | <p>Could we get some more details concerning the seismic hazard probabilistic calculations conducted in the past?</p> <p>Have you performed paleoseismological studies (also in the case of Embalse NPP)? What were the results?</p> | 1.1.1.1.2 |
| Answer 18 | <p>a) More details concerning the seismic hazard probabilistic calculations conducted in the past.</p> <p>We understand that the request to provide more information concerning PSHA calculations is focused on the topic 1.1.1.1.2 “Study by JJJ and Associates”. In this sense, the information provided in the National Report could be complemented as follows:</p> <p>(i) Performance of a probabilistic seismic hazard assessment (PSHA).</p> <p>The goal of the PSHA was to determine the mean seismic hazard (seismic hazard curves, uniform hazard response spectra, and deaggregated scenarios of significant contributions to the hazard). Two probability of exceedance levels were of particular interest; the mean 10^{-4} and mean 10^{-6}. The mean 10^{-4} seismic hazard was associated with the SSE (horizontal PGA level of 0.1g). The mean 10^{-6} seismic hazard was the “beyond design basis earthquake” to be considered (horizontal PGA level of 0.32g). The procedures of IAEA Safety Standards SSG-9 and its predecessor NS-G-3.3 were used, and analyses were also in compliance with USNRC RG 1.208.</p> <p>(ii) Seismotectonic Modeling.</p> | |

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| | <p>The JJJ Study included the distant source (the subduction zone west of the Andes), the foreland of the Andes and the stable continental crust. The study also considered the possibility that the Parana fault could be active by including it in the logic tree.</p> <p>(iii) Regarding ground motion prediction equation (GMPEs) the JJJ Study used three GMPEs, namely, Youngs et al. (1997), Atkinson and Boore (2003) and Zhao et al. (2006), for the far source, i.e. the subduction zone, which has produced the largest earthquakes ever recorded. These GMPEs were developed using the data that came from subduction zones from different parts of the world and, therefore, are appropriate for this particular source.</p> <p>JJJ Study used four other GMPEs, namely, Atkinson and Boore (2006), Campbell (2003), Silva et al. (2002) and Campbell (2007) for the near seismogenic sources (Pre-Andes, the suspect Parana fault and Foreland). These GMPEs were derived using data from crustal faults (the GMPE by Campbell, 2007) in interplate seismotectonic regions. The three GMPEs (Campbell, 2003, Atkinson and Boore, 2006, and Silva, et.al, 2002) were derived using data from intraplate seismotectonic regions (such as the central and eastern North America). The reason for using these together was to adequately represent the attenuation of ground motion propagation in stable continental crust while the initial onset of motion may have been produced by interplate crustal faulting.</p> <p>JJJ Study used three of the GMPEs in PSHA due to the unsuitability of incorporating Vs30 representation in the others in the PSHA software. These were:</p> <ol style="list-style-type: none"> 1) Youngs et al. (1997) for soil (for the Andes source) 2) Campbell (2003) with Vs30= 300 m/s (0.5) (for Pre-Andes, the suspect Parana fault and Foreland). 3) Silva et al. (2002) (0.5) (for Pre-Andes, the suspect Parana fault and Foreland). <p>Four GMPEs were used in Scenario earthquake 1 (representing near source):</p> <ol style="list-style-type: none"> 1) Atkinson and Boore (2006) 2) Campbell (2003) 3) Silva et al. (2002) 4) Campbell (2007) | |
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| | <p>The JJJ Study also used three GMPEs in Scenario earthquake 2 (representing far source):</p> <ol style="list-style-type: none"> 1) Youngs et al. (1997) for soil 2) Atkinson and Boore (2003) 3) Zhao et al. (2006) <p>In this way the epistemic uncertainties in the GMPEs were taken into account in a satisfactory manner. When different GMPEs were used in the JJJ Study at different branches of the logic tree in order to represent the epistemic uncertainty, equal weights were assigned to them as there was no basis to prefer one GMPE over the other.</p> <p>(iv) PSHA Methodology.</p> <p>The basic PSHA methodology that was used in the JJJ Study is the ‘Scenario Earthquake’ approach. The scenario earthquake method can also use deaggregation in order to identify the magnitude-distance pairs that contribute most significantly to hazard at various levels of annual frequency of exceedance. However, if there are tectonic features which are most likely to generate these pairs, then one approach is to identify the magnitude and distance pairs that would be associated with the particular seismogenic source having a given annual frequency of exceedance. This approach has the advantage that it avoids issues due to averaging over distance and magnitude (when using the deaggregation method), sources are postulated where there are no actual sources of earthquakes and sources which are known to be active are not identified as significant magnitude-distance pair.</p> <p>(v) Site Response</p> <p>Due to the general nature of the available soil profile data, JJJ Study used GMPEs that provided soil response directly using the Vs30 reference. When this was not available to be directly input to the PSHA program, a post processing was performed in order to obtain the ‘amplified’ values.</p> <p>b) Paleoseismological studies and the results.</p> <p>No further field studies have been performed by NA-SA in the Atucha site to confirm or not the presence of an active fault along the axis of the Paraná river. The reassessment of the seismic hazard was based on research conducted since the GNZ report. Regarding CNE, as stated in the page 25 of the NR: The geological investigations performed in order to fully characterize the seismotectonic setting of the CNE region, and quantify local fault activity, included the following:</p> | |
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- Flyover under low-sun-angle conditions, to identify active faults.
- Geophysical profiling, to identify where there are breaks in the bedrock surface that could be buried fault scarps.
- Geomorphic mapping and soils survey, to characterize landform surfaces and identify their relationship with soil types, mapping soils to the group and subgroup level.
- Trenching, at locations determined by the results of the previous three tasks. Soil samples were gathered at the trenches, to be used in the next task.
- Age dating of fault movement, to determine the age of the last fault movements, as well as the frequency that the faults have moved in the past.

The above tasks were conducted by D'Appolonia, with the participation of experts from both local and international universities. The seismotectonic framework model, or seismic source model, constitutes the first step in the development of the probabilistic seismic hazard analysis.

The field study has focused on three geologic structures with the potential to be active faults: the Comechingones Fault as exposed near the town of Merlo about 55 km west of the plant, the Sierra Chica Fault passing within a kilometer of the Embalse NPP, and the Despeñaderos lineament, located about 25 km east from the plant site.

The basic results are as follows:

- Comechingones Fault – active in an engineering sense. What is meant by “active in an engineering sense” is that the fault would be considered active under any engineering classification such that its potential effects should be accounted for in assessing seismic hazard. The Comechingones Fault exhibits multiple ruptures within the past ~7,000 years, and it can be assumed that the ruptures were associated with large earthquakes.
- Sierra Chica Fault – active in a geologic sense. What is meant by “active in a geologic sense” is that the fault appears to exhibit movement, but so slowly that the probability that it will affect a man-made structure during an expected service life is low. It is certainly much less active than the Comechingones Fault, but it is not practical to show that it is actually inactive, as there are three of nine OSL (optically stimulated luminescence) tests of

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| | <p>faulted sediment that indicate activity within the past ~60,000 years. The fault appears to be segmented, but the field observations do not suggest that the most recent movements are different from one part of the fault to another.</p> <p>The best estimate for the segment of the Sierra Chica fault passing the site is what is observed at Villa General Belgrano: the return period for a large earthquake sufficient to rupture the fault is estimated to be about 10,000 to 20,000 years. D'Appolonia does not see compelling arguments to suggest that this event would be small, so assumes that the characteristic magnitude should be about $M_w = 6.8-7.2$.</p> <ul style="list-style-type: none"> • Despeñaderos Lineament – D'Appolonia does not consider this feature to represent a seismic hazard to the Embalse NPP, based on the results of the field observations and trenching, but recognizes that the University of Córdoba considers that this feature could be active. | |
| Question19 | <p>Could you explain in more detail why for the value of RLE only 0.1 g PGA was chosen, although the mechanical and electrical components (in the case of CNA II) had been already designed for a maximum horizontal acceleration of 0.15 g?</p> | 1.1.1.2.2 |
| Answer 19 | <p>The design basis for the CNA II mechanical and electrical components which are installed at any level within a protected building considers a static load based on a horizontal acceleration of 0,15g and a vertical acceleration of 0,075g.</p> <p>The adopted RLE considers a ground motion of 0,1g PGA with a spectral response as shown in Figure 1-7 of the National Report. So, for the review of the components seismic margin (SMA), the value of the 0,1g will not be used; instead the value coming from the floor response spectra at the different level will be the input of the seismic demand.</p> <p>Regarding the SMA, structures and equipment are screened out by verifying during the plant walkdown that these rugged elements comply with the caveats in Tables 2-3 and 2-4 of the EPRI Report NP-6041.</p> <p>The SMA screening tables are purposely conservative since they are applied to many situations. In order to make the screening tables practical it was necessary to cover all potential situations without making the caveats and restrictions difficult to use. In most cases the components that are screened out have HCLPF capacities that are significantly higher than the screening table capacity levels.</p> <p>Tables 2-3 and 2-4 are primarily geared to earthquakes with Richter magnitudes between 6.0 and 6.5 producing ground motion with broad frequency content input spectra and total durations of 10 to 15 seconds (from the determinist seismic hazard assessment</p> | |

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| | of GNZ, the postulated earthquake was 5.5M). | |
| Question 20 | Could you please illustrate the seismic capacity of the added components with HCLPF values? | 1.1.1.1.2.1.2 Phase 2 Pag 9 |
| Answer 20 | <p>The seismic capacity verification of the added components is being conducted using same approach and methodology as the components of the SSEL corresponding to the selected success paths. Thus, the US EPRI SMA methodology is being followed in this regards.</p> <p>Therefore, the seismic capacity will be evaluated by:</p> <ul style="list-style-type: none"> • The seismic capability walk down in which many of those added components were screened out due to their high seismic capacity, using the above mentioned approach (i.e. greater than 0,3g for ground motion acceleration). • The seismic capacity of the added components which were not screened out during the walk down phase is being evaluated using the Conservative Deterministic Failure Margin Method. <p>Phase 2 of this seismic evaluation study is still undergoing. As it is mentioned in point 1.1.1.1.5.2 of the National Report the integrity of the containment structure and isolation valves of the CNA I will be checked for an earthquake more demanding than the RLE.</p> | |
| Question21 | Was there any special reason not to consider the effect of temperature in the study? | 1.1.1.2.5.2 |
| Answer 21 | <p>According to the design concept for CNA II external impacts are combined neither with other external impacts, nor with fault sequences occurring independently inside the plant.</p> <p>Loads resulting from external impact are to be combined with those from normal operation conditions. Constraint forces (e.g. due to temperature) are not taken into account in combination with external impacts (based on the document KWU VRS/8/81c "S.L.B. 2.1.9 - Load assumptions and load combinations for civil structures").</p> <p>The same criteria are also included in the present American Society of Civil Engineers (ASCE) Standard "Seismic design Criteria for Structures, Systems and Components in Nuclear Facilities, ASCE/SEI 43/05. SEI: Structural Engineering Institute of the American Society of Civil Engineers.</p> | |
| Question22 | What additional activities are planned or being considered following the seminars held in 2011 to gain a better understanding of the roles and responsibilities in responding to an event based on lessons learned from the Fukushima event? | General 4 |
| Answer 22 | These types of activities are held on a regular basis as part of | |

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| | <p>ARN's systematic actions aimed at further engaging relevant stakeholders. In the case of "seminars", the content of the presentations will be updated as necessary in the light of the latest findings and lessons learned from the Fukushima accident.</p> <p>In the specific case of the institutions involved in the response to an event, ARN has a longstanding and fluent relation with them, holding annual coordination meetings, prior to practical emergency exercises at NPPs. As indicated in the National Report, the issue of co-ordination among a number of entities of different government levels in a very critical situation is being given a particular attention. As shown by Fukushima, a clear awareness of the necessity for a smooth common working of policy levels and technical levels within such entities, and among these, is of utmost importance.</p> | |
| Question23 | <p>In case of a nuclear emergency, the plant manager has responsibilities for implementing urgent and immediate offsite protective actions.</p> <p>(1) What does this mean in the context of evacuating the public?</p> <p>(2) Does the plant manager have the authority to declare an evacuation of the public?</p> | General 5.1 |
| Answer 23 | <p>Under national legislation, ARN conducts the management of off-site response. ARN assigns to the NPP Manager the responsibility of carrying out the urgent and immediate actions of protection off site, contemplated in the Emergency Plan, only until the ARN Operative Chief of Nuclear Emergencies (JOEN) arrives.</p> <p>The strategy for the immediate response in a nuclear emergency includes the application of urgent and immediate actions of protection, such as sheltering, distribution of stable iodine tablets and access control, but they do not include the early evacuation of the population. Therefore it is not expected that the NPP Manager must implement the evacuation. Nevertheless, before JOEN arrives, the NPP Manager in his role as Chief of Emergency has the power and legal authority to declare and conduct a public evacuation.</p> | |
| Question 24 | <p>(1) Regarding the Ibero-American Forum countries' "stress tests," do the Forum countries intend to share the results with other regulators outside of the Forum countries?</p> <p>(2) How will the countries work together to draw common conclusions?</p> | Pag 178 Último párrafo |
| Answer 24 | <p>1.- Sharing the results</p> <p>This Final Report of the FORO stress test was approved by the FORO plenary and, as a way to share the results with the international community, will be presented at the Extraordinary Meeting of the Nuclear Safety Convention dedicated to the lessons learned from Fukushima, which will be held in August 2012 at the</p> | |

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| | <p>IAEA headquarter. Besides, the Final Report is available in the FORO web page: www.foroiberam.org</p> <p>2.- Drawing common conclusions</p> <p>The reports of the cross peer review made to each country identifying good practices as well as recommendations and suggestions to be considered in future actions, were accepted by all the FORO country representatives. The review process was completed with the preparation of a Final Report, which is available in the FORO web page.</p> <p>The FORO has decided to implement follow-up technical meetings in 2014 and 2016 to verify the fulfillment of the improvement implementations according with the agreed schedule and to analyze the convenience of consider new lesson learned that may arise as a result of the ongoing evaluations.</p> | |
| Question 25 | The report states that “Argentina is advancing on its reflection on how to best make use of the IAEA peer reviews.” Will Argentina consider inviting an IRRS mission? | Pág 179 Párrafo 7 |
| Answer 25 | <p>Argentina is aware of the full array of peer reviews (including those under the aegis of the IAEA), of their usefulness and the experience accumulated through a number of years and many missions. In the case of the Agency’s, we are confident that the main action “IAEA peer reviews” in the Action Plan will prove to be valuable and result in an enhancement of their technical soundness and of their relevance to national situations, and certainly we expect that to be the case for IRRS missions.</p> <p>While Argentina places special attention to the issue of regulatory effectiveness (as extensively demonstrated in the successive National Reports), requesting a peer review related to the activities of the RB is not a current priority. This said, it should be noted that the "reflection" mentioned in the NR does refer to all of the peer review missions.</p> <p>In several parts of this NR we have indicated that the Regulatory Body (ARN) is undergoing a complex process of restructuring parts of its functioning, including the implementation of a management system, and of renewal of its personnel. All of this takes place in the frame of the re-launching of the nuclear energy- and fuel cycle-activities in the country, fact which possesses challenges of its own. The ARN efforts are at present devoted to adequately attend these processes. The eventual consideration of peer review missions (the value of which is not under dispute for our country) will occur in due course.</p> | |