CSN CONSEJO DE SEGURIDAD NUCLEAR

EUROPEAN POST-FUKUSHIMA ACTION PLAN

SPAIN

NATIONAL ACTION PLAN

Revision 2

21st December 2017

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OBJECTIVE OF THE REVISION 2 OF THE NAcP

In keeping with the agreements reached by ENSREG during its meeting of June 27th 2017, the Spanish Nuclear Safety Council (CSN) hereby issues this revision 2 of the National Action Plan (NAcP) on post-Fukushima measures, with a view to reflecting the implementation status of the said plan. Moreover, this document provides an update since the Peer Review Workshop held in Brussels between 20 and 24 April 2015.

The contents of this revision aim to respond faithfully to the terms of reference set out within the framework of ENSREG, adapted to the current situation of the Spanish Nuclear Power Plants (NPPs).

It is important to point out that the development of a new format for this document has not been considered appropriate, but rather than a revised NAcP it is an update of the existing plan, with the emphasis placed on highlighting changes made to it; for this reason, the previously existing index and contents have been maintained to the extent possible. The main changes included are those related to the update of chapter 4 ("Relevant aspects of the revised NAcP") and the tables in the appendices addressing the "current status" of each of the points dealt with therein.

Finally it is also relevant to remark that CSN's Board of Commissioners has been continuously overseeing the licensees compliance with the measures required in the different Complementary Technical Instructions issued after the Fukushima accident.

1.- INTRODUCTION

1.1 European Stress Tests

In response to the accident that occurred on March 11th 2011 at the Fukushima Daiichi nuclear power plant in Japan, all the European countries initiated actions aimed at verifying the safety measures in place at their plants. However, it very soon became apparent that it would be advisable to develop a coordinated response in the European Union (EU) in order to ensure that all the plants in these countries were sufficiently robust as to withstand situations similar to those that occurred at the aforementioned Japanese facility.

During its meeting of June 10th 2011, the European Council set up a plan to submit all the European nuclear power plants to a homogeneous set of "stress tests", clearly defined in a document previously drafted by WENRA and ENSREG. The objective of these tests was to make it possible to assess the capacity of the NPPs to withstand situations beyond their respective design bases and to identify the safety margins existing with respect to these bases and the potential measures that might be implemented to improve their safety. As agreed, the plan was fully completed in all the countries by December 31st 2011.

As soon as this task was completed, an associated process of technical review at EU level, or Peer Review, was initiated, this being made up of four successive phases: desk-top review, topical review (held in Luxemburg in February 2011), country reviews (fulfilled in March and April) and, finally, an additional "country fact-finding review", carried out in a selected group of countries in September 2011 in order to check the consistency of the actions already initiated by the different counties. In the last two phases together, the review teams visited all the participating countries and a total 24 plants, including all the different designs currently existing in Europe.

1.2 European Action Plan

The ENSREG Action Plan [1], issued in July 2012 on completion of the Stress Tests, considered that it was necessary to take a step forward in order to verify the overall consistency of the implementation of the recommendations drawn from the Stress Tests process. In this respect, the member countries agreed to draw up a National Action Plan (NAcP) by December 31st 2012, in which each regulatory body would:

- Consider the results of the national Stress Tests
- Take into account the suggestions and recommendations of the ENSREG Peer Reviews
- Include the recommendations compiled by the Peer Review Board
- Take into account the relevant outcomes of the extraordinary meeting of the Convention on Nuclear Safety (hereinafter the CNS-EM)
- Incorporate actions arising from other national reviews
- Make public the contents of the NAcP

In accordance with the aforementioned ENSREG plan, a Peer Review process was carried out, including issues relating to the conclusions of the Stress Tests performed in each country. Finally, the outcomes of this process were widely reported.

2.- GENERAL DESCRIPTION OF THE SPANISH NATIONAL ACTION PLAN

Like the two previous versions, this revision of the National Action Plan contains an updated compilation of the actions currently under way in Spain in relation to the post-Fukushima safety enhancement programmes. The CSN has revised the contents of the document and approved it during its Board of Commissioners meeting of December 21th 2017.

2.1 Initial version of the NAcP

In accordance with the ENSREG recommendation, the initial Plan included the following:

- The conclusions drawn from the Stress Tests process implemented between June and December 2011; these conclusions were detailed in the National Report issued by the CSN on December 21st of that year [3]. Furthermore, on March 15th 2012 the CSN issued to all the licensees a set of binding Complementary Technical Instructions (hereinafter ITC-ST) requesting the implementation of all the conclusions drawn throughout the process in accordance with a predefined schedule.

- The suggestions and recommendations arising from the ENSREG Peer Reviews performed in March and September 2012. These recommendations have been described in the corresponding review team reports.

- The general recommendations compiled at European level by the Peer Review Board in the report "Compilation of recommendations and suggestions from the peer review of stress tests performed on European nuclear power plants" [2] dated 26th July 2012.

- The relevant results of the Second Extraordinary Meeting of the CNS-EM [4], [5]

- Other actions already initiated at national level in Spain.

The Plan also included the 6 subjects ("topics") discussed at the CNS-EM in August 2012, their text being organised in the following four sections:

- Part I, Stress Tests topics 1 to 3. This section addresses national conclusions and generic activities related to each item of the ENSREG document of reference 2.
  - Topic 1: external events
  - Topic 2: design issues (mainly related to the loss of electrical power or heat sinks)
  - Topic 3: severe accident management and recovery (on-site),

- Part II, topics 4 to 6. This addresses national conclusions and generic activities relating to each additional issue identified by the CNS-EM, including the following:
  - Topic 4: national organisations
  - Topic 5: emergency preparedness, off-site emergency response and post-accident management.
  - Topic 6: international cooperation.

- Part III, additional topics. This addresses conclusions and generic activities derived from national reviews and related decisions.

- Part IV, implementation of Activities. This part identifies the timelines and key milestones of each improvement activity at both generic and plant (site) specific level.

2.2 Updated versions of the NAcP

In accordance with the Terms of Reference (ToR) approved by ENSREG adapted to the current situation, it has not been considered appropriate to develop a new "format" for the revision of this Plan; rather, the revised NAcP is an update of the original plan with emphasis on highlighting the changes made and incorporating the following modifications:

Modifications included in NAcP revision 1:

- ✓ Response/clarification on any issues identified in the rapporteur's report from the 2013 workshop.
- ✓ Progress on implementation and update of the NAcP.
- ✓ Main changes in the NAcP since the 2013 workshop with justification, including:
  - additional measures
  - measures removed or modified
  - changes in the schedule
- ✓ Technical basis leading to the main changes identified in the NAcPs.
- ✓ Relevant outcomes of studies and analyses identified in the NAcPs, and completed since the 2013 workshop.
- ✓ Nationally identified good practices and challenges during implementation so far.

Content of NAcP revision 2:

- ✓ This version of the NAcP summarizes all the actions adopted in Spain after the European Stress Tests and provides an update of the progress on implementation of the NAcP revision 1.
- ✓ Revision 2 also updates the following issues since the 2015 workshop:
  - Response/clarification on any issues identified in the rapporteur's report from the 2015 workshop.
  - Main changes in the NAcP since the 2015 workshop, with the due justification.
  - Relevant outcomes of studies and analyses identified in the NAcP that have been completed since the 2015 workshop.
- ✓ Finally, Revision 2 has incorporated a specific section 5 for Conclusions.

3.- CONTENTS OF THE SPANISH NATIONAL ACTION PLAN

This section contains detailed information on the on-going and the already implemented actions in Spain as part of the Action Plan committed at European level, and the corresponding implementation process. The following sections contain the actions contemplated, ordered in accordance with what was established during the Second Extraordinary Meeting of the Convention on Nuclear Safety (CNS-EM), held in August 2012:

3.1 Part I, topics 1 to 3 (Stress Tests and CNS-EM)

The planned actions related to this topic are detailed as follows:

a) Requirements already issued by the CSN (conclusions of the Stress Tests in Spain)

With the objective of incorporating all the conclusions of the Stress Test process performed at the Spanish plants, on March 15th 2012 the CSN issued a Complementary Technical Instruction, or *Instrucción Técnica Complementaria* in Spanish, (ITC-ST) to each of the licensees. These ITCs include all the relevant conclusions stemming from the Stress Test process carried out in Spain from June to December 2011, and must be implemented in a timeframe extending up to December 2016. The ITCs included all the licensees' proposals and also some additional improvements deemed appropriate by the CSN. Additionally, some "requests for information" have been included in the instructions in order to require the licensees to carry out more complete analyses or additional studies; on completion of these analyses the CSN will decide on the appropriateness of establishing further requirements.

Attachment 1 summarises the content of these CSN instructions in two tables, one for generic actions and the other for additional plant-specific actions. This attachment also includes the updated status of the subjects covered by the ITC-ST since NAcP revision 1.

b) Recommendations and suggestions from the ENSREG Peer Reviews carried out in Spain

The ENSREG Review Team visited Spain twice: first in March 2012, when the complete Team attended the mission, which included a visit to Almaraz NPP (2-group Westinghouse 3-loop plant), and subsequently in September, when a reduced Team completed the anticipated "fact finding review"; on this occasion the Team visited Trillo NPP (single unit KWU 3-loop plant).

Attachment 2 contains a table with the recommendations emanating from both visits and the actions foreseen by the CSN to respond to them. The state of these actions have been updated since NAcP revision 1.

c) Relevant ENSREG recommendations and suggestions

Attachment 3 contains a table with cross-referenced information on the consideration given in Spain to the aspects included in the ENSREG document [2], which lists the generic recommendations and suggestions arising from the April 2013 workshop.

d) CNS-EM recommendations and suggestions

Attachment 4 contains a table with detailed information on the consideration given in Spain to the aspects included in the two reports issued following the Second Extraordinary Review Meeting of CNS-EM:

- The commitments contained in the Annex to the meeting's Final Summary Report [4]
- The different issues presented by the rapporteurs of topics 1 to 3 during the meeting, subsequently collected in the Report [5] of the President (PR) of the CNS-EM.

Further review meetings have been performed within the CNS. Noteworthy is the Sixth Review Meeting of the CNS, held from 24 March to 4 April 2014 in Vienna, where the Contracting Parties decided to hold a Diplomatic Conference regarding the amendment of article 18 of the Convention, INFCIRC/449.

The Diplomatic Conference was finally held on February 9th 2015 in Vienna and, as a result, the Vienna Declaration on Nuclear Safety (VDNS) was issued. This aspect is reflected in the next paragraph.

e) Implementation of the Vienna Declaration on Nuclear Safety (VDNS)

A Diplomatic Conference took place on February 9th 2015 at the IAEA headquarters in Vienna. As a result of this Conference, the Contracting Parties approved the INFCIRC 872 "Vienna Declaration on Nuclear Safety" [6], which is a commitment to certain principles to guide them in the implementation of the CNS' objective to prevent accidents and mitigate their radiological consequences, should they occur. The European Contracting Parties agreed to discuss the principles of the Vienna Declaration on Nuclear Safety in their National Reports and in the subsequent Review Meetings.

During the CNS 7th Review Meeting of the Contracting Parties, held in Vienna from 27 March to 7 April 2017, the three principles adopted during the VDNS were discussed:

1. *New nuclear power plants are to be designed, sited, and constructed, consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.*

   In Spain there are no plans to build new nuclear power plants, but the principle is understood to be applicable to existing plants as regards design modifications and operation. Indeed, many of the actions undertaken as a result of the Fukushima accident aligned with this principle.

2. *"Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner."*

   To meet this principle, the CSN requirements and regulations include the following aspects:

   - The requirements to be met on the DBA and DEC-A[1] analysis at NPPs are included in a CSN Instruction (IS-37) which is mandatory for the all the licensees.

[1] Design Extension: set of measures that are part of the installation's defense in depth and that have as objective the improvement of the plant's safety by reinforcing its capacities to withstand more demanding situations than those considered in the design bases, as well as the reduction of radioactive emissions to the environment. Two categories of Design Extension Conditions (DEC) are considered:

- DEC-A: when it is possible to prevent severe fuel damage, both in the core and spent fuel storage systems,
- DEC-B: when severe fuel damage is assumed.

- The requirements to be met for DEC-B[1] at NPPs are included in a CSN Instruction (IS-36) which is mandatory for the all the licensees.
- Improvements have been applied to the plants because of the PSRs (CSN Instruction IS-26) and the performance of the stress tests and associated analyses.
- The Royal Decree 1836/1999, approving the nuclear and radioactive installations regulation, establishes that the licensee shall continuously strive to improve the conditions of nuclear safety and radiological protection of the facility, analyse the best existing techniques and practices in accordance with the requirements established by CSN and implement those considered by this body to be appropriate. The CSN may at any time require the licensee to perform analyses for the implementation of improvements in nuclear safety and radiological protection, pursuant to the provisions of Law 15/1980 creating the CSN.
- The performance of periodic comprehensive and systematic safety assessments of existing NPPs is required.
- The future Royal Decree approving the nuclear safety regulation (RSN) will transpose the revised Directive on Nuclear Safety (Council Directive 2014/87 Euratom) and will establish the safety objective for the Spanish nuclear installations, that have to be designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents and, should an accident occur, mitigating its consequences and avoiding:
    a. Early radioactive releases that would require off-site emergency measures but with insufficient time to implement them;
    b. Large radioactive releases that would require protective measures that could not be limited in area or time.

  This requirement applies to nuclear installations for which a construction license is granted for the first time after 14 August 2014 and it is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including the framework of periodic safety reviews.
  The RSN is under final stage for approval.

3. *"National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA Safety Standards and, as appropriate, other good practices as identified inter alia in the Review Meetings of the CNS."*

   National requirements and regulations take into account the relevant IAEA Safety Standards throughout the lifetime of a nuclear power plant by the establishment of two CSN Instructions (IS-26 and IS-27) on basic nuclear safety requirements applicable to nuclear facilities and on general NPP design criteria. These ISs include the Spanish practices previously applied, the IAEA standards, and the country of origin standards (USA and Germany), as well as the WENRA reference levels.

3.2 Part II, topics 4 to 6 (CSN-EM)

3.2.1 Topic 4: national organisations

a) Current situation in Spain

In Spain, regulatory functions relating to nuclear safety and radiological protection are carried out by different authorities: the Government, which is in charge of energy policy and of issuing binding regulatory standards, the Ministry of Industry, Energy and Tourism and Digital Agenda, and the Nuclear Safety Council, the body solely responsible for nuclear safety and radiological protection

✓ Ministry of Energy, Tourism and Digital Agenda (Minetad)

The Minetad has assigned by the nuclear law and specific regulations the following functions in relation to nuclear and radioactive activities:

- Issuing of permits for nuclear and radioactive facilities (except for second and third category radioactive facilities located in Autonomous Communities to which administrative functions have been transferred in this area), following a mandatory and binding report by the CSN.
- Drawing up of standards proposals and enforcement of the system of sanctions.
- Contribution to definition of the research, technological and development policy in this area, in collaboration with the Ministry of Economy and Competitiveness.
- Monitoring of compliance with the international commitments subscribed to by Spain in the field of nuclear energy, in particular in relation to non-proliferation, the physical protection of nuclear materials and facilities and civil liability for nuclear damage.
- Relations with International Organisations specialising in this field.
- Relations between the Government and the CSN.

✓ Nuclear Safety Council (CSN)

Functions: the main functions assigned to the CSN in the Spanish legal system are as follows:

- To make proposals to the Government regarding necessary regulations in its realm of competence, and to draw up and approve technical instructions, guidelines and circulars.
- To issue the corresponding reports to the Minetad for the latter to take decisions regarding the granting of the legally established authorisations. These reports are binding when negative and denying such authorisation, and also as regards the conditions established when positive.
- To undertake the control and inspection of all the facilities and during all phases, especially during design, construction, start-up and operation and in the transport, manufacturing and homologation of equipment incorporating radioactive sources or generating ionising radiations. The CSN is authorised to suspend the operations of these facilities for safety reasons.
- To collaborate with the competent authorities in the setting out of the criteria to be fulfilled by the off-site emergency plans, and coordinate the support and emergency response measures.
- To collaborate with the competent authorities in setting out the criteria to be fulfilled by the physical protection plans of nuclear and radioactive facilities.
- To propose the initiation of sanctions proceedings in the event of infringements relating to nuclear safety and radiological protection.
- To control measures for the radiological protection of professionally exposed workers, the public and the environment.
- To collaborate with the competent authorities in relation to programs for the radiological protection of persons subjected to medical diagnosis or treatment using ionising radiations.
- To issue favourable reports on new designs, methodologies, simulation models or verification protocols relating to nuclear safety and radiological protection.
- To grant and renew nuclear and radioactive facility operator and supervisor licenses, head of radiological protection service diplomas and accreditations in the field of radio-diagnosis.
- To carry out studies, assessments and inspections of plans, programmes and projects for all phases of radioactive waste management.

Independence: Law 15/1980 establishes mechanisms to guarantee the independence of the CSN, one of them being the procedure whereby the members of the Board (President and Commissioners) are appointed; these are required to be persons of recognised solvency in the areas commissioned to the CSN and special value is attached to their independence and the objectiveness of their criteria. They are appointed by the Government in response to proposals by the Minetad and following the

appearance of the candidates before the corresponding Congressional Commission. Their term of office is six years and they may be re-elected once only for a second term. The posts of President and Commissioner and other high-ranking positions are incompatible with any other post or function; the persons occupying such posts shall not carry out professional activities relating to nuclear safety and radiological protection during the two years subsequent to their leaving the position.

The CSN does not systematically make use of external technical support from other organisations. Only for some very specific tasks, the CSN's technical know-how is complemented by public organisations, engineering firms or private consultants.

Funding: the CSN's budget is integrated into the General State Budget, as a result of which its approval corresponds to Parliament. The revenues are obtained fundamentally through the collection of fees and public prices for the services it renders in fulfilling its functions, the conditions for this being regulated in Law 14/1999, of May 4th, on Fees and Public Prices for services rendered by the CSN.

Assessments: in addition to internal assessment, the CSN has been subjected to external evaluations by national and international organisations. As regards the latter, in early 2008 the CSN hosted an IAEA IRRS mission that identified good practices and issued suggestions and recommendations, this requiring important preparatory self-assessment, systematisation and review efforts by the CSN. Furthermore, in January 2011 a follow-up IRRS mission was carried out in order to check the degree of implementation of the recommendations made by the 2008 mission, this being in response to a request by the Spanish Government. This mission concluded that the CSN had significantly improved its regulatory activities overall and pointed out a series of good practices. The final reports resulting from these two missions are public and available on the CSN website.

Spain will be hosting a new IRRS mission that will be carried out together with an ARTEMIS mission (Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation). These missions, which are designed to reinforce and improve the regulatory effectiveness, are scheduled to be held in October 2018.

Transparency: the transparency policy of the CSN is defined by the law by which the body was created, Law 15/1980, of April 22nd, reformed by Law 33/2007, of November 7th. This legislative reform incorporated guaranteed access to information on the environment, the participation of the public in decision-making and access to justice regarding environmental matters, as contemplated in the Aarhus Convention, which was ratified by Spain in 2004 and materialised in the national legislation by way of Law 27/2006, of July 18th, regulating rights to access to information, public participation and access to justice in relation to environmental matters. The amendment of the Law Creating the CSN was particularly ambitious regarding public information, aiming clearly to increase the transparency of the organisation and promote public trust in its activities.

The obligations as regards information and communication are channelled along three paths:

- Policy regarding information to the State Institutions: every year the CSN submits a detailed report to the National and Regional Parliaments on the activities carried out during the year.
- Policy regarding information in the vicinity of nuclear facilities: the CSN actively participates on the information committees set up at each of these installations.
- Policy regarding information for the general public: Law 15/1980 establishes the need to provide access to information and facilitate the participation of the members of the public and civil society. The CSN provides web-based information on the minutes of Board of Commissioners' meetings, the technical reports supporting the agreements reached by the CSN, the inspection reports, information on the integrated nuclear power plants supervision system (SISC) and all relevant events relating to the operation of the nuclear and radioactive facilities. As regards information for the media and stakeholder groups, the CSN responds to direct requests applying

criteria of transparency and agility as dictated by technical rigor. Furthermore, the CSN is obliged to subject its instructions and safety guides to public feedback during the preparation phase, and makes a form available to the workers of nuclear and radioactive facilities in order for them to report on any event affecting the safety of these installations, with guaranteed confidentiality.

Advisory Committee: the CSN Advisory Committee for Information and Public Participation in relation to nuclear safety and radiological protection was set up in compliance with article 15 of Law 15/1980, specifically in accordance with the wording of reform Law 33/2007, with the mission of issuing recommendations to the CSN to promote and improve transparency, access to information and public participation in areas included with the CSN's realm of competence. This legal provision was enacted in 2010 through the approval of the new CSN Statute, by Royal Decree 1440/2010, with establishment of the rules applicable to its working. The legal basis having been established, the appointment of the members representing the entities and organisations contemplated by law took place at the end of 2010.

b) Aspects considered in the President's Report (PR) of the CNS-EM [5]

- Section 4.1.2 of the PR: Review and revision of nuclear Laws, Regulations and Guides

  According to the information included in the previous paragraph (3.2.1.a), no deficiencies have been identified in the Spanish Nuclear Laws with respect to the accident that occurred at Fukushima. Nevertheless, the CSN has been carrying out an extensive programme for the last four years to adapt the regulation to the WENRA Reference Levels (development of new "Council Instructions", which are legally binding): both the WENRA harmonisation process and the CSN adaptation programme are carefully taking into account the lessons learnt from the accident. For example, it is worth mentioning that the CSN Instruction on Accident Management (IS-36), previously scheduled to be issued by the first semester of 2011, was intentionally delayed to 2015 in order to reflect the most important actions associated with the Fukushima event.

- Section 4.1.3 of the PR: Changes to the functions and responsibilities of the regulatory body – strengthened independence.

  According to the information included in the previous paragraph 3.2.1.a), no changes are deemed necessary in Spain in relation to the issue of the independence of the regulatory body.

- Section 4.1.4 of the PR: Post-Fukushima safety reassessment and action plans

  The Stress Tests carried out in Europe constitute a comprehensive post-Fukushima safety reassessment of the Spanish plants.

- Section 4.1.5 of the PR: Human and organizational aspects

  In accordance with article 5.3 of the EURATOM Directive on Nuclear Safety, the CSN is provided with the appropriate authority and financial resources to properly fulfil its duties.

3.2.2 Topic 5: emergency preparedness & response and post-accident management (off-site)

Very soon after the occurrence of the Fukushima accident, the need to review the provisions to cope with major nuclear accidents became clear for most of the agencies involved in the Spanish Emergency System. An action plan was drafted in close cooperation between the two main actors in this system, the Directorate General for Civil Defence and Emergencies and the Nuclear Safety Council.

The main aspects of this plan were summarised in the Spanish National Report to the second extraordinary meeting of the Convention on Nuclear Safety. The plan included the in-depth, open review of the provisions set forth in the document, which establishes the main provisions and criteria for Preparedness, Planning and Response to nuclear emergencies, the so-called PLABEN (Basic Plan for Nuclear Emergencies). Eleven general issues were identified to be the main points, on which the review work is being focused. These issues will be included in the new revision of the PLABEN, which is currently under elaboration and is being coordinated by the General Direction for Civil Protection and Emergencies (DGPCE, Ministry of the Interior) and is foreseen to be released throughout 2018.

1. Adequacy and provision of adequate resources to cope with major nuclear emergencies and other organisational issues:

   In this area, the inclusion in the emergency organisation of all the resources provided by the Military Emergency Response Unit (a military unit created in 2005 and especially trained to cope with major disasters) is one of the main aspects to be considered.

2. Reference levels for protective actions, for both the urgent and intermediate phases:

   The reference levels included in the PLABEN currently in force will be reviewed and updated to the most recent international criteria (i.e. IAEA BSS) and other lessons learnt from the Fukushima accident, especially the ones relating to management of the intermediate phase.

3. Reference levels for emergency response personnel:

   The reference levels for off-site and on-site intervening personnel will be harmonised (in the current PLABEN the approach is not consistent with this principle). Moreover, the reference levels to be adopted should allow sufficient margin to allow the assigned personnel to carry out on-site activities that are deemed to be crucial to prevent or mitigate major releases.

4. Accident scenarios and their time scale:

   Suitable changes should be considered in the allocation of resources and provisions to cope with long-lasting emergencies, considering the possibility of the need for urgent response actions planning and preparedness level. Also, the coordination of off-site provisions with some relevant on-site actions involving the possibility of important releases (especially the opening of the containment venting) will be addressed.

5. Emergency Planning Zone (EPZ) size:

   The current provisions for the EPZ considered in the PLABEN include an Urgent Protective actions Zone (Zone 1) measuring 10 km. in radius and a Long-Term Protective actions Zone (Zone 2) with a radius of 30 km. It is necessary to reassess the size of such zones, considering the experience of Fukushima, to determine the suitability of possible modifications, to allow for more realistic planning and preparedness. The size of the Preferred Actuation Zone (currently 5 km) will also be included in the reassessment.

6. Decision making and implementation criteria for urgent and intermediate phase protective actions:

The implementation criteria for some urgent phase actions will be reviewed, taking into consideration some insights from the Fukushima experience and new trends in emergency management:

- In the case of evacuation, the suitability of implementing a staggered evacuation criterion should be considered. This would involve a departure from the current PLABEN criterion (which establishes evacuation in the direction of the wind, the so called preferred attention sector) to an evacuation zone based on distance, and staging the evacuation according to prioritising criteria.

- To limit the duration of on-site sheltering to a few days

- To analyse several options (i.e. centralised distribution vs. distribution in advance) to improve the effectiveness of radiological prophylaxis.

In the case of relevant long-term protective actions (relocation, foodstuffs and water control), it is considered that the applicable criteria must be reviewed and developed in further detail, considering the lessons learned from Fukushima and the most recent developments in these areas.

7. Warning and communication systems:

   The existing warning system in Zone 1 should be reviewed to provide a balanced set of diverse and effective means to alert the population, considered certain limiting scenarios. Also, the provisions available for communication to the public and the media during the emergency will be revisited in order to ensure the ability to provide both reliable and timely information.

8. Public radiological screening facilities:

   The current PLABEN establishes the provision of facilities (the so called Screening and Decontamination Facilities, ECD) to which the evacuated people would be directed after evacuation and, once this screening and decontamination is completed, then the public would be directed to the Sheltering and Lodging Centres. The site of these ECD's is not very far from the NPP, as a result of which they might be contaminated during a major accident; furthermore, the size of the facilities is relatively small, so the ability to screen a large number of people is limited. Consequently, in the light of the experience of Fukushima this issue is going to be reassessed and the suitability of modifying the screening process determined, so that it may be carried out directly in the Sheltering and Lodging Centres.

9. Strengthening the role of the municipalities during planning and response:

   In order to reinforce this role, which has been shown to be essential, suitable changes in the organisational provisions of the PLABEN will be defined.

10. Cooperation of the licensees with the off-site emergency plans:

    To date, the cooperation of the licensees with the off-site emergency plans has taken place in an unstructured manner and only on a voluntary basis. This situation must be changed to allow for the binding and clearly structured cooperation of the licensees with the off-site emergency plans, both in preparedness, planning and response.

11. Transition from urgent to intermediate phase and from intermediate emergency phase to the existing exposure situation:

The current PLABEN is mainly focused on the urgent phase. Very few provisions are included for the intermediate phase. Moreover, the concept of the existing exposure situation is not included, due to the issuance date of the document. More detailed and clear provisions (both from the technical and organisational standpoint) will be included for the intermediate phase. Also, the concept and provisions for transition to the existing exposure situation, as set forth in the IAEA BSS (Basic Safety Standards), will be established.

Additionally the CSN, the regulatory authority, which is responsible during nuclear emergencies for the coordination of support and response activities relating to nuclear safety and radiological protection, has promoted the improvement of the following additional aspects:

12. Improvements in environmental radiological surveillance during an emergency: new mobile monitoring units have been acquired and the fixed surveillance network has been reinforced with portable equipment for power supply.

13. Improvements in the communications between the different emergency response centres (off-site, on-site, CSN). In case the Virtual Private Network (VPN), which supports these communications, becomes unavailable during an emergency, alternate means for communication have been provided:
    - Implementation of satellite technology and by feeding the communication equipment with diesel groups.
    - Readiness of the means provided by the Spanish Military Emergency Response Unit (UME), which among other supplies can provide alternative support for voice and data communications.

The aforementioned plan covers the entire scope, as regards the off-site emergency topic, referred to in the Report [5] of the President (PR) of the 2nd Extraordinary Meeting of the Convention on Nuclear Safety. Taking these points into consideration, the correspondence between the thirteen points set out above and the issues highlighted in the said report is as follows:

- Update to emergency plans: see items 1 to 11 above

- Planning and off-site exercises: see items 1 to 11 above and also chapter 3.1 of this report which addresses on-site emergency management aspects

- Enhancements in radiation monitoring and communication capabilities: see items 7, 12 and 13 above, and also chapter 3.1 of this report.

- Recovery Phase Aspects: see items 1, 6 and 11 above

- Adequacy of Emergency Response "Headquarters" and Sheltering Centres: See items 8 and 12 above

Section 4.2.4 covers the current status of this plan.

3.2.3 Topic 6: international cooperation

Although nuclear safety is a national responsibility, the Fukushima accident revealed the international dimension of any accident affecting a nuclear facility.

International cooperation was one of the relevant topics discussed during the second extraordinary review meeting of the Convention on Nuclear Safety. The main International activities carried out by the CSN were identified in the Spanish national report for this meeting.

a) Aspects considered in the President's Report (PR) of the CNS-EM

– Section 4.1.6 of the PR: Use of Peer Reviews (IRRS)

As has already been mentioned in point 3.2.1.a), Spain hosted a full-scope Integrated Regulatory Review Service (IRRS) mission between January 28th and February 8th 2008.

The results of the mission produced a total 7 recommendations and 26 suggestions and identified 19 good practices. The recommendations and suggestions made by the IRRS mission led the CSN to review its preliminary Action Plan in order to adopt the mission's results. Subsequently, from January 24th to February 1st 2011, the CSN hosted an IRRS follow-up mission.

The results of the IRRS mission and IRRS follow up mission were published by the CSN on its website and are available to the public and "stakeholder groups". Furthermore, the Spanish national reports for the CNS have described the way in which these peer reviews and mission findings have been addressed.

As commented before, Spain will be hosting a new IRRS mission that will be carried out together with an ARTEMIS mission (Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation). These missions, which are designed to reinforce and improve the regulatory effectiveness, are foreseen to be held in October 2018.

The CSN provides support for IRRS missions to other countries through the participation of experts on the review teams, when requested by the IAEA. The level of the experts provided by Spain shows the strong commitment to these review activities.

The CSN approach regarding peer reviews covers the remarks included in point 19 of the Report of the President of the Second Extraordinary Review Meeting of the CNS, which fosters the use of the peer review process. All the processes and action plans carried out by the CSN to ensure the implementation of the findings of the peer reviews and missions, and also the results of Spanish IRRS missions, have been reported at CNS review meetings.

Within the framework of the European Union, Spain also hosted two peer review missions relating to the European Stress Tests, which are described in paragraph 3.1.b. Also within the EU framework, the EURATOM Directive 2014/87 requires the performance each six years of a so-called Topical Peer Review. Nowadays, Spain is participating in the first exercise of this type focussed on aging management at the NPPS.

The outcomes of any future peer reviews performed in Spain will be reported to the Member States and to the European Commission, and will be included in future national reports to the CNS.

In addition, the CSN promotes and supports international review activities performed by the NPP licensees, which are carried out within the framework of organisations such as WANO ("Peer Reviews") or the IAEA (OSART missions).

Complementarily to the specific aspects relating to the Peer Reviews, the CSN also carries out other "benchmarking" type exercises with the regulatory bodies of other countries; for example,

two exercises of this type have been carried out recently with the US-NRC, focusing on NPP inspection and evaluation processes. Finally, and in a quite different field, Spain assumes the fulfilment of article 9 of the Euratom 2009/71 Directive, which establishes that the Member States must carry out a periodic self-assessment of their national regulatory frameworks and competent regulatory authorities at least once every ten years.

- Section 4.1.7 of the PR: Optimisation of the global safety regime

  As was set out in the Spanish national report for the second extraordinary meeting of the CNS, the CSN collaborates with other Spanish authorities (Maex and Minetad) in international relations within its realm of competence, i.e., nuclear safety, radiological protection and the security of nuclear facilities.

  In the multinational area, the CSN participates in the nuclear safety activities of the IAEA, the NEA-OECD and the European Union and it is an active member of WENRA and HERCA. This includes representatives on committees and working groups to develop international safety standards and guidelines, and participation in international peer review missions. This topic was dealt with during the last extraordinary meeting of the CNS, which focused on the need for efforts to reduce the duplication of the initiatives and actions undertaken by the international organizations.

b) <u>International action at European Level:</u>

Following the Fukushima accident, working groups were set up within the framework of ENSREG, HERCA and WENRA to address the issue of international coordination in emergency management, this including the participation of representatives of the CSN. The specific tasks performed in this respect by WENRA, HERCA and ENSREG have now been completed.

Two documents have been issued as a result of the efforts of these working groups: the first on the general mechanisms for cross-border coordination in the adoption of measures aimed at protecting the population during the early stages of nuclear emergencies (the *HERCA approach* document), and the second on the management of nuclear emergencies arising as a result of severe accidents, where little information is available on the accident that has occurred and its radiological consequences but where rapid decision-making is required for the protection of the population (final document of the AtHLET initiative). These two documents were finally merged into one that defines mechanisms for monitoring the practical application of the recommendations included in the HERCA approach and the AtHLET initiative.

The joint HERCA and WENRA meeting held on October 22nd 2014 approved this document (HERCA-WENRA Approach), along with their publication on their respective websites, and agreed to propose to ENSREG that HERCA and WENRA be invited to present them during the meeting scheduled for January 15th 2015.

The CSN has also participated in other working groups implementing the lessons learned from the Fukushima accident within the framework of WENRA: natural hazards, containment response in severe accidents, accident management and the impact of post-Fukushima studies on other analyses.

Finally, the CSN has collaborated actively within the framework of ENSREG in the drafting of the new proposal amending the Directive 2009/71/EURATOM. The CSN has also participated actively in the discussions and ad hoc working groups set up within the framework of the atomic issues group of the Council of the European Union during the process of negotiating this directive. The

fundamental building blocks of the new European directive consist of enhancing safety criteria, increasing transparency, strengthening the independence of the regulatory bodies and reinforcing the framework of peer reviews. The new Directive was approved in July 2014.

c) International action at multilateral level (outside the European Union):

The CSN is participating within the framework of the Ibero-American Forum of Radiological and Nuclear Regulators (FORO) in a project aimed at reviewing the safety of NPPs in Ibero-America, similar to the European Stress Tests. The countries involved in analysing the stress tests program are Argentina, Brazil, Mexico and Spain, and the evaluation of the results obtained is being carried out by all the FORO member countries. A meeting was held in Mexico City in June 2014 to address a process of "cross-comparison" of the actions carried out in these countries for the implementation of the measures deriving from their stress tests. The final meeting is scheduled to be held in Spain during the first half of 2018. The main objectives of this last meeting is to guarantee the consistency with the anticipated scope of the Stress Tests and the practical implementation of the solutions and improvements adopted in each country.

The CSN took part in the Ministerial-level Conference that took place in June 2011, one of the most important initiatives launched by the IAEA in the wake of the Fukushima event. This conference served to develop the bases of the IAEA action plan, which was approved by the meeting of the Board of Governors in September 2011. The recommendations given in this plan include the reinforcing of the IAEA's main activities to maintain a high level of nuclear safety in the world (establishing safety standards, the use of peer-review structures such as the IRRS's and OSART's, revision of the international Conventions relating to nuclear safety, accident notification and assistance to countries suffering an accident, etc.), activities to which the CSN has contributed extensively for many years.

The CSN participated in the Ministerial-level Nuclear Safety Conference on Fukushima organised by the IAEA and the Japanese Government, which took place in December 2012 in Fukushima, Japan.

- Section 4.1.8 of the PR: Strengthening communication mechanisms through regional and bilateral cooperation

  The CSN attaches great importance to bilateral relations with other regulatory bodies. It has numerous technical cooperation agreements having as their main objective the establishment of a basis for collaboration and the exchange of information. Since the Fukushima accident, the CSN and its regulatory counterparts have reinforced the exchange of information within the framework of bilateral agreements. Spain has shared national post- Fukushima activities and approaches with other regulatory bodies, both bilaterally (China, France, Portugal, Russia, the United States) and multilaterally (FORO, INRA, WENRA and HERCA).

  The CSN has always been deeply involved in enhancing communications with "stakeholder groups". In this respect, in May 2012 the CSN organised an International Workshop on Crisis Communication: Facing the Challenges, in collaboration with the NEA, the main objective being to bring together senior-level regulators and communicators from nuclear regulatory organisations in order to share best practices and to improve crisis communications based on lessons learnt from the Fukushima accident.

  Furthermore, in June 2012 the IAEA organised the International Experts' Meeting on Enhancing Transparency and Communication Effectiveness in the event of a Nuclear or Radiological Emergency. The CSN participated in the Working Session dedicated to challenges in Communication during the Fukushima Nuclear Emergency, presenting the Spanish practices.

At the extraordinary review meeting of the CNS, the need for the contracting parties to cooperate with neighbouring and regional countries and to assist in the establishment of nuclear and regulatory infrastructures was highlighted. In this respect, the CSN is giving priority to enhancing bilateral relations with Portugal and Morocco, promoting the signing of a specific agreement for collaboration and mutual cooperation.

At regional level, Spain is working with the Ibero-American Forum of Radiological and Nuclear Regulatory Bodies (FORO) on a new project aimed at harmonising and updating the working methodologies for preparedness for and response to nuclear and radiological emergencies, including communication mechanisms.

The CSN is assisting in the establishment of nuclear and regulatory infrastructures within the framework of the European Commission's Instrument for Nuclear Safety cooperation (INSC), which seeks to achieve greater convergence of international regulatory frameworks. The CSN has participated actively in projects to strengthen the regulatory bodies of Brazil, Morocco and China.

- Section 4.1.9 of the PR: Effectiveness of experience feedback mechanisms

The CSN is committed to the systematic evaluation of domestic and international operating experience, and participates in the Working Group on Operating Experience (WGOE) of the NEA, in the INES and International Reporting System (IRS) of the IAEA, and as an observer in the European project on operating experience feedback.

In 2012 the CSN set up an internal International Incidents Review Panel (PRIN), the function of which is to systematically review the different documents on international operating experience and assess the need for the Spanish nuclear power plants to take actions in this respect. This panel of experts meets quarterly.

Finally, it should be pointed out that the CSN is complying with the main statements identified in the discussions of topic 6 of the second extraordinary review meeting of the CNS.

- Section 4.1.10 of the PR: Strengthening and expanded use of IAEA Safety Standards

As was agreed by the Contracting Parties during the extraordinary review meeting of the CNS, the CSN recognises that IAEA Safety Standards may be used in conjunction with the adoption of best practices and the fulfilment of the legally binding European Community framework as a tool to continuously improve nuclear safety.

The CSN also welcomes the revision of IAEA Safety Standards in the light of the Fukushima event and stresses the need for these Standards to be reviewed continuously, recognising the importance of the strengthening and expanded use of the IAEA Safety Standards.

The IAEA IRRS review programme has a role to play since the peer reviews are concentrated on key areas of regulatory activity identified within IAEA safety standards to assess the effectiveness of the regulatory body and the use of these standards in the development of national nuclear safety regulations.

The CSN has fostered the use of the IAEA Safety Standards, as is demonstrated through the major efforts made in financing the translation of these Standards into Spanish, in order to facilitate the understanding and use of these documents in all Spanish-speaking countries.

Finally, it is worth pointing out that the WENRA harmonisation efforts have implied the incorporation of most of the relevant IAEA requirements into the Spanish national regulations and standards.

3.3 Part III, additional topics addressed by the CSN

- Complementary Technical Instructions (ITCs) relating to the potential loss of large areas of a NPP (events that might be induced by malicious acts)

In addition to all the topics and actions covered by the Stress Tests and the ENSREG Peer Reviews, and in a separate but totally coordinated process, the CSN has fulfilled a programme aimed at protecting the plants against other severe events that might be induced by malicious acts and seriously impact the safety of the installation, the environment and public health.

It is important to point out that the actions requested by the CSN were focused on the "mitigation" of the consequences of these extreme situations.

On July 1st 2011, the CSN issued a first set of ITCs, requesting the preparation, before the end of 2011, of the plant-specific analysis to prepare the installations to cope with these situations, including the proposals for new material and/or human resources. The ITCs required that consideration be given to the three main aspects of the problem within the scope of the analysis:

- The capacity to fight major fires beyond the plant design basis

- The capacity to mitigate potential fuel damage (both in the reactor core and in the spent fuel storage facilities)

- Ways to limit or control radioactive emissions, in the form of liquid or gaseous releases

On July 27th 2012 the CSN issued additional ITCs incorporating some clarifications regarding the process, including the need to draw up an implementation plan fully consistent with the one already prepared for the incorporation of the conclusions of the Stress Tests.

3.4 Part IV, implementation of activities:

The Complementary Technical Instructions issued by the CSN following the Stress Tests (ITC-ST) considered a schedule for implementation divided into 3 periods: short, medium and long-term, which corresponded to the periods ending in the years 2012, 2014 and 2016. The dates were essentially the same for all the plants, with minor differences referring to certain plant-specific modifications. The tables shown in attachment 1 explicitly included the deadline for each of the actions. Attachment 2 also included the dates by which the CSN expected to have all the actions derived from the ENSREG Peer Review process fully finished.

4.- RELEVANT ASPECTS OF THE REVISED NAcP

As it has been pointed out above, revision 2 of the NAcP is an update of the revision 1 of the plan previously approved by the CSN in December 2014. This revision describes the updates and changes made now to the Plan.

4.1 Aspects contemplated in the ENSREG ToR

Dealt with below are the different aspects contemplated in the ToR approved by ENSREG in relation to the minimum contents of this revision of the NAcP:

4.1.1 Issues set out in the Rapporteurs' reports of the 2013 and 2015 Workshops

Both Rapporteurs' reports for Spain contained essentially a summary of the good practices and positive measures included in the NAcP submitted by the CSN. However, two concerns or challenges were mentioned:

- The first referred to the ambitious timeframe established for the implementation of all the improvement measures (*The timeframe to implement all the improvement measures by the end of 2016 is ambitious and commendable. Nevertheless, some measures scheduled for the long term are crucial, such as filtered venting and the installation of PARs. The installation of filtered venting at one plant, where it was not previously requested, is scheduled to the 2017 refuelling outage).*

  In order to update the revision 1 of the NAcP it is worth to mention that PARs have been installed according to schedule in all the Spanish NPPs.

  Currently all the NPPs have the filtered venting system installed. Some of them were installed with small delays because of the refuelling outage calendars.

  Cofrentes NPP, which was not previously requested to install a filtered venting system because of its particular design (BWR with suppression pool and already provided with a Hardened Containment Venting System), has finally installed it in 2017 (according to schedule).

- The second referred to the recommendation that the new WENRA reference levels in relation to external hazards be implemented in an "appropriate and timely" manner (*A challenge for Spain is the appropriate and timely implementation, in its regulation and practices, of the outcomes of the WENRA on-going Review of the harmonisation of the reference levels in the field of external hazards).*

  The CSN has committed to finish the implementation on the national regulation of the new WENRA reference levels in the future Safety Instruction (IS) about characterisation and assessment of NPPs sites, which is currently in the internal comments phase and is foreseen to be issued in 2018. However, it is worth to mention that only reference level 4.2 (probability of exceedance of extreme natural events) of Issue T, is not yet implemented on the Spanish national regulation.

The Rapporteurs report of the 2015 workshop noted that *"By the end of 2014 practically all the planned analyses have been completed by the licensees, but in many cases the review by CSN is not completed yet. In these cases where the analysis results are still being reviewed by the regulator, the related modifications are being implemented – or even finished – by the licensees".*

The CSN regulations (IS-21) specifies the methodology to identify the design modifications that need to be authorized before its actual implementation due to their impact on safety. Most of the design modifications carried out as a result of the stress test didn't need the explicit CSN and Minetad approval, rather they constitute a safety improvement.
However, and due to the safety relevance of three of the major improvements (Containment Filtered venting, Passive Autocatalytic recombines and Alternative Emergency Management Centre), the CSN decided to perform a complete process of authorisation for this three cases, including the corresponding technical evaluation.

Nevertheless, as the complementary analyses carried out by the licensees must meet the CSN requirements, additional reinforcements could be required if deemed necessary.

4.1.2 Progress in the implementation and updating of the NAcP

Attachments 1, 2 and 3 to this document contain a detailed summary of the degree of compliance achieved to date in the Spanish plan.

In summary it may be stated that no significant aspects are appreciated that might have an impact on the Spanish NAcP basic objectives. Mention may be made of the following relevant aspects that have now been completed:

- In early 2014 the nuclear utilities completed the implementation of the new Emergency Support Centre (ESC), which is capable of supplying trained personnel and equipment to any Spanish nuclear power plant in less than 24 hours.

- Implementation at all the nuclear sites of mobile equipment (pumps, electrical generators, etc.) allowing for quick connection to the fixed systems of the plants.

- Verification and, where appropriate, reinforcement of the seismic resistance capacity of equipment of importance for accident management to a "seismic margin" of 0.3 g (PGA).

4.1.3 Main changes to the NAcP since the 2015 Workshop

The plan has remained without any major modifications, however it is worth to remark these aspects:

- The following additional measures have been added since 2015 Workshop:

    - A "Manual of Functionality Requirements for Extensive Damage Management" has been developed in each NPP. The objective of these manuals is to have a document to allow the control of the SSCs implanted in this process in regard to functionality and availability.
    - A new appendix has been agreed by the CSN and the licensees for the Final Safety Analysis Report (FSAR), which will include the plant specificities of the Design Extension[2], both DEC-A and DEC-B. This appendix will be incorporated in the FSARs of the plants in February 2018.

- The measures foreseen have not been eliminated or significantly modified.

- The main changes introduced in overall scheduling are as follows:

[2] See foot-note in page 8

- Implementation of the filtered containment venting systems have been carried out during the 2016 and 2017 refuelling outages. Cofrentes NPP (BWR) has also installed this improvement, although it was already fitted with a *hard* vent.
- The revision and acceptance by the CSN of the analyses of dam rupture scenarios had undergone something of a delay due to the existing uncertainties, these having emerged during the review that was performed by the CSN. This issue was finally closed in 2016.
- The ITCs contemplated within the framework of the updating of seismic hazards, foreseen for issue in 2013, were finally issued in May 2015. The licensees are jointly performing the due analysis which are scheduled to be finished in 2021. The CSN is closely following this project.
- The implementation of the Alternative Emergency Management Center (AEMC) and its incorporation into the Site Emergency Plan (SEP), initially scheduled for December 2015, had been delayed. This activity was finally ended in November 2016.
- The full implementation of the "Manual of Functionality Requirements for Extensive Damage Management" mentioned above was initially scheduled in December 2016. This implementation was delayed and the Manuals were finally implemented in June 2017.
- The plants were required to carry out a specific analysis of severe accidents starting under shutdown conditions. The completion of these analyses were scheduled for December 2014 and finally concluded in December 2015.

4.1.4 Relevant results of additional studies and analyses identified in the NAcP

The results obtained from these analyses (explicitly identified in Attachment 1) are as follows:

- Analysis of internal flooding due to the circumferential rupturing of non-Seismic Class piping (A1 in Attachment 1)
  Results: The analyses have been completed and have meant the incorporation of improvements at the plants.

- Analysis of water containers rupturing with major fluid releases (A2)
  Results: The analyses have been completed and have meant the incorporation of improvements at some plants.

- Analysis of dam rupture scenarios (A3).
  Results: Already commented in section 4.1.3. A more extensive description is given in section 4.1.5.

- Analysis of possible combinations of credible extreme natural events (A4)
  Results: The analyses have been completed without significant aspects for the implementation of improvements having been identified.

- Analysis of extreme temperatures on site (A5)
  Results: The analyses have been completed without significant aspects for the implementation of improvements having been identified.

- Site access capacity studies (A6)
  Results: The analyses have been completed and have meant the incorporation of improvements at several plants.

- Analysis of potential risk due to H_2 in buildings annexed to containment (A7)
  Results: The licensees have carried out the studies requested. Considering the implementation of PARs and FCVS, the estimated amounts of hydrogen at the Containment annex buildings are

well below 4%, and no significant aspects for the implementation of improvements have been identified.

- Analysis of consequences of the containment flooding strategy for instruments (A8)
  Results: The analyses have been completed and have meant the incorporation of improvements at some plants.

- Analysis of possible improvements to be implemented for severe accidents arising during shutdown (A9)
  Results: The analyses have been completed and have meant the development of severe accident guidelines specific for shutdown conditions.

- Analysis of the human resources of the emergency response organisation (I7)
  Results: Following a number of interactions between the CSN and the licensees, the latter have developed specific methodologies taking into account the experience existing in the USA.

- Analysis of I&C survival in Severe Accident Environments (I17)
  Results: The analyses have been completed and as, a result, the existing Severe Accident Mitigation Guidelines (SAMG) have been improved including a list with the I&C that would likely remain available.

- Analysis of Control Room habitability improvements (I20)
  Results: The analyses have been completed and have meant the incorporation of improvements at all the plants.

4.1.5 Good practices and challenges identified during implementation of the Plan

The main good practices identified to date by both the CSN and the licensees of the plants have been as follows:

- ✓ Adequate implementation of protocols, including periodic testing, for the quick and preferential recovery of off-site electrical feed.

- ✓ Actions required (procedures and tests) for the safe shedding of Direct Current loads.

- ✓ Actions required (procedures and tests) to allow for the remote manual use of relevant equipment in the event of loss of direct current power.

- ✓ Implementation of new equipment (fixed and portable) for extended SBO. This equipment is subject to a specific surveillance program and is designed to be used under the general philosophy of "plug & play".

- ✓ As a result of the tracking of the international main pump seal improvement programmes, three out of the five Westinghouse PWR groups currently existing in Spain have installed new seals in the main pumps. The CSN is assessing the need to require the installation of these improved seals in the remaining two groups.

- ✓ Verification and, where appropriate, reinforcement of the seismic resistance capacity of equipment of importance for accident management, up to a "seismic margin" of 0.3 g (PGA) equal for all the sites.
- ✓ Implementation of a Fire Protection subsystem with seismic design.
- ✓ Issuance of a new ITC requiring the licensees to update seismic characterizations of the NPPs sites according to the most advanced methodologies currently known (IAEA, US-NRC,...).
- ✓ Issuance of a new requirement to the licensees to verify the analysis of dam rupture scenarios every ten years, considering the results obtained from surveillance, auscultation and maintenance processes.
- ✓ Implementation of additional measures (specific to each site) to increase protection against external flooding.
- ✓ Implementation of the new Emergency Support Centre (ESC) at national level.
- ✓ Implementation of the Alternative Emergency Management Centre (AEMC), the Passive Autocatalytic Recombiners (PAR) and the Containment Filtered Venting System at all the NPPs.
- ✓ The CSN has promoted the implementation of an early warning system to the plants in case of extreme weather conditions, organized together with the Meteorological State Agency.
- ✓ Improvements to facilitate alternative site access in case of extreme environmental situations have been developed
- ✓ The communication in case of emergency has been reinforced through the implementation of satellite technology and by electrically feeding the communication equipment with diesel groups.
- ✓ Improvement of the capacity to handle large masses of contaminated liquids (see section 4.2.3)
- ✓ Development at all the plants of Radiation Protection Guidelines complementary to the SAMG.

The main challenges identified by both the CSN and the plant licensees have been as follows:

- ✓ There is no reference standard for the design and implementation of this type of improvement. The CSN has drawn up a generic document on evaluation criteria that is known to the licensees and is being applied by the CSN evaluators and inspectors. In specific cases, engineering judgement criteria have been applied.
- ✓ Emergency Response Organisation (ORE) capabilities analysis methodology: this was a novelty issue; the CSN has requested the licensees to develop their own methodology, which was finally based on that developed in the USA by NEI (already mentioned in section 4.1.4).
- ✓ The performance of special tests contemplated in the NAcP, such as for example the testing at Westinghouse PWR plants of the local manual operation (with loss of Direct Current power) of the steam generators relief valves and the auxiliary feedwater turbine-driven pumps.
- ✓ Certain developments conditioned by the work performed at international level, such as for example the drawing up of guidelines on severe accidents in shutdown conditions, which are

closely related to projects initiated by owners groups in the USA, or the implementation of new main pump seals at Westinghouse PWR plants.

4.2 Other relevant aspects associated with implementation of the NAcP

4.2.1 Additional CSN ITCs:

With a view to facilitating simultaneous and coordinated compliance with the two sets of requirements issued by the CSN for the nuclear power plant licensees (those deriving from the stress tests and those arising as a result of the ITCs issued by the CSN to improve the capacities of the plants to respond to severe events that might be induced by malicious acts), in April 2014 the CSN issued a new "adapted" ITCs that brings together in a single document all those requirements that - given the terms foreseen for implementation – were still pending a solution by the licensees. It is important to point out, however, that these ITCs do not incorporate any new requirements.

4.2.2 Situation of Santa María de Garoña NPP:

Since July 7th 2013 the Garoña nuclear power plant was in a situation of shutdown pending the dismantling phase. In May 2014, the licensee decided to apply for renewal of the plant operating permit with a view to returning the facility to the operating situation, this option being compatible with the Spanish legislation.

In February 2017, the CSN issued a favourable report for the renewal of the plant operating permit, and in August 2017, the Minetad finally denied the renewal of the plant operating permit.

4.2.3 Relevant actions deriving from the CSN ITCs and relating to the potential loss of large areas of a nuclear power plant (events that might be induced by malicious acts)

- Specific analysis at each plant of the appropriateness of redistributing the spent fuel stored in the pool, in order to improve the capacity to cool it in the event of total loss of water inventory. All the licensees have carried out these analyses and as a result have performed different actions, with a different scope depending on the actual conditions of each facility.

- Analysis and implementation of possible measures for the management of potential large masses of radioactively contaminated water. The licensees have carried out these analyses and as a result have implemented different measures, including the development of specific procedures.

Currently, Garoña NPP has fully implemented all the Fukushima derived modifications that are applicable for the definitive shutdown and future dismantling of the installation.

4.2.4 Relevant actions relating to emergency preparedness, emergency response and post-accident management off site

As regards the thirteen points described in section 3.2.2 of this report, which deals with emergency preparedness, emergency response and post-accident management off site (Topic 5 of CNS-EM), the CSN is carrying out the following actions:

- Point 1 has already been implemented, although the part applicable to the participation of the Military Emergency Response Unit (UME) in the off-site emergency remains to be incorporated in the PLABEN.

- As regards points 2 to 11, the new PLABEN is being developed in coordination with the DGPCE (Ministry of the Interior) and might be approved throughout 2018; this revision will incorporate the recommendations issued by WENRA and HERCA. The revision of the different provincial emergency plans will commence subsequently.

- As regards point 12, the CSN has defined a plan for the improvement of its capacities that includes the renewal in 2018 of the network of automatic stations (REA) and the incorporation of new mobile units.

- Finally, and in relation to point 13, the CSN has set up a working group with the nuclear sector in which the decision has been taken to incorporate a new satellite-based voice communications network, this already being operative.

  The CSN has also stablished a collaborative environment with the Spanish Military Emergency Response Unit (UME) to make available their means, including the communication ones, if necessary.

5. CONCLUSIONS

In response to the accident occurred on March 11th 2011 at the Fukushima Daiichi NPP in Japan, all the European countries carried out actions aimed at verifying and improving the safety measures in place at their plants. This effort was fostered and coordinated by ENSREG, which established the need of all the European countries owning nuclear installations to develop an effectively implement the corresponding National Action Plan (NAcP) to follow up the practical and on-time implementation of the commitments established after the European Stress Tests.

According to this ENSREG approach the CSN developed the country NAcP, affecting all the Spanish NPPs. The NAcP has been the subject of an intense process of evaluation and supervision by the CSN along these last years.

The main conclusion of this revision 2 of the NAcP is that most of the actions anticipated in the Plan has been already implemented in the NPPs. The only pending point, really a minor point, corresponds to the activity of adaptation of the national regulation to the updated WENRA Reference Levels (issued in 2014) which is currently on-going.

6. REFERENCES:

1. "Action plan. Follow-up of the peer review of the stress tests performed on European nuclear power plants" (25/07/2012)

2. "Compilation of recommendations and suggestions. Peer review of stress tests performed on European nuclear power plants" (26/07/2012)

3. "Stress tests carried out by the Spanish nuclear power plants. Final Report" (21/12/2011)

4. "Final Summary Report of the 2nd Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety". Ref: CNS/ExM/2012/04/Rev.2 (31/08/2012)

5. "2nd Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety. Report of the President of the 2nd Extraordinary Meeting". Ref: CNS/ExM/2012/04/Rev.2 (August 2012).

6. "Vienna Declaration on Nuclear Safety on principles for the implementation of the objective of the Convention on Nuclear Safety to prevent accidents and mitigate radiological consequences" (09/02/2015)

7. ACRONYMS

AEMC :	Alternative Emergency Management Centre
CNS:	Convention on Nuclear Safety
CNS-EM:	2nd Extraordinary Meeting of the CNS (08/2012)
CSN:	*Consejo de Seguridad Nuclear* (Nuclear Safety Council)
ENSREG:	European Nuclear Safety Regulators Group
EOP:	Emergency Operating Procedure
ESC:	Emergency Support Centre
FSAR:	Final Safety Analysis Report
HERCA:	Heads of the European Radiological protection Competent Authorities
IAEA:	International Atomic Energy Agency
INES:	International Nuclear and Radiological Event Scale (IAEA)
IRRS:	Integrated Regulatory Review Service (IAEA)
IRS:	Incident Reporting System (IAEA)
ITC:	*Instrucción Técnica Complementaria* (Complementary Technical Instruction of the CSN)
ITC-ST:	CSN ITC issued with the conclusions of the Stress Tests (15/03/12)
KWU:	*Kraftwerk Union Aktiengesellschaft*
Maex:	Ministry of Foreign Affairs
Minetad:	Ministry of Energy, Tourism and Digital Agenda
NAcP:	National Action Plan. Agreed to by ENSREG in 07/2012
NEA:	Nuclear Energy Agency (OECD)
PR:	CNS-EM President's Report
SAM:	Severe Accident Management
SAMG:	Severe Accident Management Guidelines
SSAMG:	Shutdown SAMG (severe accident management guidelines for shutdown conditions)
SBO:	Station Blackout (loss of all a.c. power)
SFP:	Spent Fuel Pool
SSC:	Structures, systems and components
ST:	European stress tests
TSC:	Technical Support Centre
UHS:	Ultimate Heat Sink
VDNS:	Declaration on Nuclear Safety
VPN:	Virtual Private Network
WENRA:	Western European Nuclear Regulators Association

ATTACHMENTS

- **ATTACHMENT 1: REQUIREMENTS INCLUDED IN THE CSN ITC-ST INSTRUCTIONS**
  - **TABLE 1.1: GENERIC REQUIREMENTS**
  - **TABLE 1.2: PLANT SPECIFIC REQUIREMENTS**

- **ATTACHMENT 2: RECOMMENDATIONS AND SUGGESTIONS OF THE PEER REVIEWS CARRIED OUT IN SPAIN**

- **ATTACHMENT 3: ENSREG GENERIC RECOMMENDATIONS AND SUGGESTIONS**

- **ATTACHMENT 4: CNS-EM COMMITMENTS AND RECOMMENDATIONS**

ATTACHMENT 1: REQUIREMENTS INCLUDED IN THE CSN ITC-ST INSTRUCTIONS

In these two tables, the first column identifies the Type of requirement issued by the CSN: **Gx** stands for "generic requirement", **Ix** for "Improvement Implementation", and **Ax** means "Additional Analysis needed". Those cases where the CSN clearly expects the implementation of improvements following the conclusions of these new analyses are categorised as **Ix**.

TABLE A-1.1: GENERIC REQUIREMENTS

T	REQUIREMENT	DATE SET OUT IN NAcP$^{rev.0}$	CURRENT STATUS
	TG: GENERIC REQUIREMENTS		
G1	Submittal to the CSN of a proposal containing a detailed schedule of the process of implementation of the improvements contemplated in the ITC-ST.	15/09/2012	Completed
G2	Clarification of the meaning of Short, Medium and Long Term for these ITC-ST	n/a	n/a
G3	Generic aspects to be considered for the implementation of improvements associated with these ITC-ST (operating procedures and personnel initial and on-going training procedures; new equipment: this should be designed in such a way as to maintain its capacity under the conditions associated with the events contemplated in the ITC-ST; storage and specific program of surveillance and periodic testing of this equipment).	n/a	n/a
G4	Study of the actual conditions of use of the new equipment, such that it may be rapidly and efficiently performed in accordance with the general philosophy of "plug and play".	n/a	n/a
G5	Use of realistic hypotheses and, where appropriate, calculation codes in the analyses associated with the ITC-ST	n/a	n/a
	T1: EXTREME NATURAL EVENTS		
I1	Implementation of the necessary improvements to increase the seismic resistance capacity of equipment relating to the following to 0.3 g: - The two "safe shutdown paths" defined in the IPEEE - Containment integrity - Mitigation of station blackout (SBO) situations	31/12/14	Completed

T	REQUIREMENT	DATE SET OUT IN NAcP[rev.0]	CURRENT STATUS
	- Severe accident management - SFP integrity and cooling (including liner & racks)		
A1	Analysis of internal flooding produced by circumferential breaks on pipes not designed as Seismic Category I, taking into account the standards currently applicable in the USA.	31/12/12	Completed
A2	Analysis of breaks implying major releases of fluids, with the objective of verifying the existence of both an effective detection capacity and suitable barriers for these scenarios. Implementation of improvements deriving from analysis.	31/12/12 31/12/14	Completed
A3	Analysis of dam break scenarios[1] included in the ST's with respect to those contained in the corresponding dams' emergency plans, such that the two studies may be brought into suitable harmony.	31/12/12	Completed
I2	Implementation of additional measures (miscellaneous and specific to each plant) to increase protection against off-site flooding.	31/12/12	Completed
A4	Analysis of potential combinations of natural external events credible at the site.	31/12/12	Completed
A5	Analysis of extreme temperatures at the site, with identification of existing margins and possibilities for improvement.	31/12/14	Completed
	2.- LOSS OF SAFETY FUNCTIONS		
I3	Implementation of protocols to guarantee the rapid recovery of off-site electrical feed from nearby hydroelectric stations.	31/12/14	Completed
I4	Implementation of new equipment (fixed or portable) to cope with prolonged SBO conditions: ✓ To replace primary circuit inventory ✓ To provide electrical feed for equipment and instrumentation ✓ Availability of communication and lighting systems	31/12/14	Completed
I5	Demonstration of the feasibility of the manual actions required in a situation of total loss of electric supply, including batteries.	31/12/12	Completed

T	REQUIREMENT	DATE SET OUT IN NAcP[rev.0]	CURRENT STATUS
		+1st Refuelling outage	
I6	Demonstration of the capacity to fully close the containment in the event of SBO if its integrity was not established at the start of the event.	31/12/13	Completed
	T3: ACCIDENT MANAGEMENT		
I7	Analysis of the suitability of the human resources currently assigned to the ORE (emergency response organisation). Implementation of improvements deriving from the analysis.	15/09/12 31/12/13	Completed
I8	Definition of characteristics and scope of the agreements for mutual assistance between nuclear power plants in emergencies. Development of the associated operating procedures.	15/09/12	Completed
A6	Completion of the site accessibility studies in the event of extreme natural events (including possible proposals for improvement).	31/12/12	Completed
I9	Report containing a definition of the characteristics of the AEMC and compensatory measures to be adopted up to its final implementation. ✓ Implementation (on site)	31/06/12 31/12/15	Completed
I10	Report containing a definition of the resources of the ESC and its incorporation in the On-site Emergency Response Plan. ✓ Implementation (centralised)	31/12/12 31/12/13	Completed
I11	Analysis of improvements to emergency communication systems[2] including their reinforcement for situations of prolonged SBO. ✓ Implementation of improvements	31/12/12 31/12/15	Completed
I12	Incorporation in the On-site Emergency Response Plan of homogeneous "reference levels" for optimisation of the radiological protection of personnel intervening in emergencies, consistent with the criteria of the IAEA and ICRP.	30/04/13	Completed

T	REQUIREMENT	DATE SET OUT IN NAcP$^{rev.0}$	CURRENT STATUS
I13	Definition of strategies for alternative RCS/Containment injection and problems associated with the quality/chemistry of water from alternative sources.	31/12/14	Completed
I14	Study of technology alternatives for the filtered containment venting system. Implementation on site.	31/12/13 31/12/16	Completed
I15	Hydrogen control: engineering study detailing criteria for PAR implementation in containment. Implementation on site.	31/12/13 31/12/16	Completed
A7	Hydrogen control: analysis of potential risk due to hydrogen in buildings adjacent to containment.	31/12/13	Completed
I16	Analysis of possible improvements to reinforce the capacity to depressurise the primary system and avoid possible high-pressure core damage sequences.	30/06/13	Completed
A8	Analysis of possible consequences of containment flooding strategies for equipment (instrumentation) located inside containment.	31/12/12	Completed
I17	Analysis of critical instrumentation required for accident management, and guarantee of its operability under SBO and severe accident conditions.	31/12/12	Completed
A9	Analysis of possible improvements to be implemented in relation to severe accidents that might develop from an initial shutdown situation.	31/12/14	Completed
I18	Implementation of measures to address accidents in the SFP: alternative water make-up and spraying of assemblies stored in the pool.	31/12/14	Completed
I19	Analysis of additional SFP instrumentation measures, taking into account also the prolonged SBO situation: range, seismic category, environmental qualification, etc. Implementation of improvements.	31/12/12 31/12/14	Completed
I20	Analysis of possible improvements of electrical feeds to control room habitability systems for situations of prolonged SBO.	30/06/12	Completed
I21	Analysis of resources required to estimate radioactive emissions: availability of sampling system during SBO, operability of radiation monitors under severe accident conditions, improvements to Emergency Radiological Surveillance Plan (ERSP).	31/12/12	Completed

T	REQUIREMENT	DATE SET OUT IN NAcP[rev.0]	CURRENT STATUS
	Implementation of improvements identified.	31/12/14	
I22	Implementation of an ON-LINE environmental radioactivity alert network with data reception in the control room and TSC (with subsequent dispatch to the SALEM)	31/12/14	Completed
I23	Analysis of human resources and additional radiological protection equipment to address severe accidents. Implementation of measures identified.	31/12/12 31/12/14	Completed
I24	Definition and drawing up of action guidelines (*ad-hoc* to the SAMG[4]) contemplating the radiological protection of personnel performing local recovery actions.	31/12/13	Completed
I25	Performance of level 2 PSA in "other operating modes" (this was already foreseen and the completion date is now brought forward).	31/12/14	Completed

Notes:

1 At plants that might be affected by dam rupture.
2 The compensatory measures contemplated have been adopted.
3 Except those associated with implementation of the AEMC
4 Under development at Trillo NPP for the current Severe Accidents Manual (SAM) and in the future for the SAMG
5 Certain specific cases pending

TABLE A-1.2: PLANT-SPECIFIC REQUIREMENTS

The numbering included in the first column is a continuation of that used in table A-1.1

T	Plant	REQUIREMENT	DATE SET OUT IN NAcP$^{rev.0}$	CURRENT STATUS
		T1: EXTREME NATURAL EVENTS		
A10	**Vandellòs 2**	Analysis of the seismic resistance of stores of combustible materials prone to producing fires.	31/12/14	Completed
I26	**Cofrentes**	Implementation of new Fire Protection sub-system of seismic design.	31/12/14	Completed
I27	**Almaraz**	Performance of Fire Protection diesel pump seismic qualification.	31/12/12	Completed
I28	**Garoña**	Submittal of study to reinforce the capacity of the current intake structure and make available several points to take water from the River Ebro. Implementation of improvements.	31/12/12 31/12/16	Completed n/a[1]
		T2: LOSS OF SAFETY FUNCTIONS		
A11	**Westinghouse: 5 groups**	Tracking of international main pump seal improvement programmes.	n/a	Completed
A12	**Cofrentes**	Analysis of alternatives for heat removal from the suppression pool in the event of SBO, prior to possible opening of the containment vents.	31/12/12	Completed
I29	**Garoña**	Implementation of measures to increase the reliability of the isolation condenser (IC).	31/12/12	n/a[1]
		T3: ACCIDENT MANAGEMENT		
I30	**Trillo**	Development of plant-specific SAMG, including the different aspects required generically of the rest of the plants.	31/12/16	Completed
A13	**Vandellòs 2 Cofrentes**	Revision of dose rate studies in the vicinity of the SFP on the basis of potential pool water inventory loss.	30/06/12	Completed
I31	**Cofrentes**	Availability of alternative electrical feed for the containment hydrogen igniters.	31/12/12	Completed
I32	**Cofrentes**	Availability of air supply to inflatable spent fuel pool (SFP) seals.	31/12/12	Completed

T	Plant	REQUIREMENT	DATE SET OUT IN NAcP$^{rev.0}$	CURRENT STATUS
A14	**Garoña**	Completion of analyses to prevent inadvertent draining of SFP, including the seismic capacity of components ensuring leaktightness.	31/12/12	Completed[1]

Notes:

1 Garoña NPP is currently in a situation of definitive shutdown as the renewal of the plant operating permit has been denied by the Minetad (see section 4.2.2 of this report). The dismantling phase is expected to start in 3-4 years, once the spent fuel pool has been emptied and the spent fuel elements transferred to dry storage containers.

ATTACHMENT 2: RECOMMENDATIONS AND SUGGESTIONS OF THE ENSREG PEER REVIEWS CARRIED OUT IN SPAIN

The following table summarises the recommendations and suggestions (**Rx** and **Sx**) emanating from the first Peer Review performed in March 2012, along with the additional recommendations (**Fx**) arising from the subsequent tracking ("fact-finding review") in September 2012.

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
	RECOMMENDATIONS					
R1	*It is generally observed that the repercussions of Fukushima will require the implementation of important modifications at the plants, along with longer-term work contributing to the international efforts to identify the lessons learned from the accident and apply their implications to the Spanish plants. In order to be able to meet the workload that these activities will imply, the review team* ***recommends*** *that the CSN's technical evaluation human resources be strengthened.*	1.5	The Council will request that the Government increase its human resources management capacity in order to reinforce its technical teams, thereby addressing the workload implied by the new tasks arising from Fukushima and other licensing exercises.	2013	The CSN has arranged a staff increase with the Government, this currently being under way. **Note:** in addition, the CSN has initiated a process of analysis of aspects such as "Knowledge management",	Completed: The CSN personnel was increased for three years (2011-2014), in order to reinforce the capacity for a timely evaluation of the issues aroused from Fukushima.

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
					the ultimate objective of which is to prevent the loss of the technical experience accumulated by the organisation.	
R2	*For extreme temperatures it is recommended that consideration be given to the possibility of improving the coherence between the return periods associated with the design bases of the different sites, in keeping with international standards. Additional analyses are under way.*	2.3.3	The CSN will identify those plants that should request modification of the return period. WENRA will develop a new reference level (RL) for off-site events. Consequently, this issue will be addressed by the CSN in the future RL implementation plan. Subsequently, the CSN will issue an instruction (IS) for their incorporation in the applicable national standards.		New WENRA RLs pending implementation	On-going: The CSN is developing a new IS, currently in draft, that will include WENRA RLs corresponding to Issue T "Natural Hazards".

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
R3	*The current design characteristics, combined with current accident management (AM) measures, point to the existence of time margins for the control or mitigation of severe accidents at the Spanish NPP's. However, the assumptions on which these margins are based (for example, 30 to 40 hours for uncovering of the core in complete SBO scenarios) may require verification (see Section 1.4). In particular, the values reported to the review team appear to be low at one plant (Trillo) and high at another (Almaraz); these values suggest an inconsistent analytical approach. It is recommended that these possible inconsistencies be investigated in order to guarantee the use of a robust and appropriate approach at all the plants.*	4.3	The CSN is performing a detailed review of the analyses submitted by the licensees on September 15th 2012 (response to the ITC-ST, point 4.1.1) in relation to their Emergency Response Organisations, in which they were required to explain the time available for each manual action, including the margin with respect to the appearance of cliff-edge situations. The review will pay special attention to the basic hypotheses and the consistency of the calculations performed.	Preliminary evaluation of the new analyses before December 31st 2012	The CSN is addressing this task within the framework of the review of the plant plans in order to define the composition of the plant Emergency Response Organisations (see Attachment 1, point I7)	Completed: The licensees have developed specific methodologies taking into account the experience existing in the USA. As a result, the composition of the plant Emergency Response Organisations has been increased.
R4	*The review team considers that all the improvements identified by the licensees and the CSN will be important to increase the robustness of the plants. Consideration should be given to the following recommendations of the Peer Review team to support these recommendations:* *Complete the development of a full set of requirements for accident management integrated in the Spanish legal framework, in accordance with the work already initiated*	4.3	R4.1 and R4.3: Accident management requirements: - Completion and publication of the new CSN instruction (IS) on Emergency and Severe Accident Management Procedures. - Inclusion in the IS on Severe Accident Management of: i) aspects relating to Procedures and Guidelines for emergency situations initiated	R4.1 and R4.3: December 2013 December 2014 (*) The final implementation of the new SAMG	R4.1 and R4.3: Publication foreseen during the first half of 2015	R4.1 and R4.3: Completed New IS-36 on Emergency and Severe Accident Management Procedures has been published

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
	in the instructions on operating and severe accident management procedures; *Include accident management as an explicit subject in the CSN safety guide on the contents of the Periodic Safety Review (PSR);* *Develop severe accident management guidelines (SAMG) for accidents initiated during shutdown conditions and speed up plans for the inclusion of SAMG addressing mitigation issues relating to spent fuel pools;* *Completely include off-site events in the probabilistic safety assessments, including evaluations of the reliability of accident management under such conditions.*		during shutdown, and ii) new WENRA reference levels on Accident Management. R4.2: Specific inclusion of these aspects in the next revision of CSN Safety Guide GS 1.10, on PSR. R4.4: Off-site event PSA will be considered as a possible alternative for compliance with CSN Instruction IS-25. In this respect, the contents of the new WENRA reference levels (RL) for off-site events will be taken into account.	at the Spanish plants is foreseen for 2016. R4.2: December 2013 R4.4: 2014/2016	R4.2: Foreseen for 2015, on completion of the PSR. R4.4: Pending implementation of the	in January 2015. R4.2: Completed The revision 2 of the CSN Safety Guide GS 1.10 has been issued in May 2017. This revision includes specific mention to accident management. R4.4: Completed The new WENRA RLs do not require

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTA-TION SCHEDULE (NAcP$^{rev.0}$)	NAcP$^{rev.1}$ STATUS	CURRENT STATUS
					new WENRA RLs.	off-site event PSA. If needed, an off-site event PSA could be finally required to any plant as a result of the application of the new ITC requiring a reassessment by the licensees of the seismic risk of each site (see S1). The CSN is developing a new IS, currently in draft, that will include WENRA RLs corresponding to Issue T

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
						"Natural Hazards".
	SUGGESTIONS					
S1	*Within the framework of the update on seismic risks requested by the CSN, it is suggested that consideration be given to the incorporation of geological and palaeoseismological data characterising relevant active faults.*	2.3.3	- Issuing by the CSN of a new ITC that will require a reassessment by the licensees of the seismic risk of each site. This assessment will take into account geological and palaeo-seismological data characterising relevant active faults. - Submittal to the CSN of the new assessments by the licensees.	- CTI: May 2013 - Implement a-tion schedule: 2016	- Foreseen for first quarter of 2015	Completed - Issued in May 2015
S2	*It is suggested that consideration be given to the adoption of a consistent approach to the return periods associated with heavy rain scenarios at the different sites.*	2.3.3	- Implementation of the new WENRA RL's for off-site events, currently in the development phase. - Incorporation of the new RLs in the Spanish legal standards.	- WENRA: T.1 New RLs in 2013 - Implement a-tion schedule : 2014	Pending implementa-tion of the new WENRA RLs.	On-going The CSN is developing a new IS, currently in draft, that will include WENRA RLs and return periods corresponding

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
						to Issue T "Natural Hazards".
S3	*It is suggested that consideration be given to improving volumetric protection against the external flooding of buildings containing safety-related SSC's. An assessment of this issue by the licensees is under way and possible safety enhancements should be implemented where necessary.*	2.3.3	Supervision of the licensees' implementation plan, for which the CSN will take this suggestion into account.	Implementation schedule: foreseen 2013	Completed (see Attachment 1, points A3 and I2)	Completed (see Attachment 1, points A3 and I2)
S4	*The Peer Review team recognises that certain NPP's have already implemented some of the measures proposed (for example, portable emergency equipment in the control room for communications and lighting in the event of SBO) and suggests that the CSN address this issue with the rest of the plants.*	2.3.3	Supervision of the licensees' implementation plan, for which the CSN will take this suggestion into account.	Implementation schedule: foreseen 2013	Completed	Completed
	RECOMMENDATIONS (*FOLLOW-UP*)					
F1	*The non-seismic qualification of the fire brigade building is an issue to be considered for subsequent study.*	N/A	Issuing of a letter to the licensees for analysis of the applicability of this recommendation to each plant and, where appropriate, proposal of whatever improvements might have been identified.	CSN letter sent to licensees requiring a response prior to May 30th 2013	Completed	Completed

#	PEER REVIEWS: RECOMMENDATIONS AND SUGGESTIONS (Rx/Sx/Fx)	Final PR report[3]: Chapter	ACTIONS	IMPLEMENTATION SCHEDULE (NAcP rev.0)	NAcP rev.1 STATUS	CURRENT STATUS
F2	*The schedule for the implementation of the improvements mapped out is considered to be appropriate, but very challenging.* *Note: In this context it might be difficult to complete all the foreseen modifications on time.*	N/A	The CSN's Board of Commissioners will oversee compliance with the measures required in order to ensure that the criterion of safety prevails at all times.	2013/2016	In accordance with this criterion, any deviation to the foreseen schedule must be evaluated and eventually accepted by the CSN's Board of Commissioners.	Completed There have been small delays which have been evaluated by the CSN's Board of Commissioners

ATTACHMENT 3: ENSREG RECOMMENDATIONS AND SUGGESTIONS

This table summarises the CSN approach regarding the recommendations included in the set of ENSREG recommendations (EC&R) [2].

Notes: 1. All the aspects addressed relate to the 3 issues considered by ENSREG (T-1 to T-3) or to a fourth additional issue corresponding to generic questions (T-G).
2. The column "ITC-ST Requirements" includes where necessary a cross reference to tables 1.1 or 1.2 in attachment 1.

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
1	*The Peer Review steering committee recommends WENRA to use the best knowledge available in Europe to develop instructions for the assessment of natural risks, including earthquakes, flooding and extreme meteorological conditions, along with the corresponding instructions for the assessment of margins beyond the design bases and the effects of possible cliff-edge situations.* *In this respect, the harmonisation of design basis methods should be integrated with the use of deterministic and probabilistic methods, the definition of probabilistic thresholds and the clarification of beyond design basis scenarios (BDBA/DEC) considered in the safety assessment. Other studies will use advanced data and methods and address external risk data trends.* *The safety assessments shall incorporate the timely feedback of operating experience and include organisational and human aspects; the applicable regulatory guides and regulations shall be regularly updated. In order to avoid "blind areas", consideration shall be given to the performance of a Peer Review of the assessments.*	T-1	EC&R (2.1)	The CSN actively participates in current WENRA tasks relating to this issue, and is fully committed to adopting whatever recommendations might arise within the framework of the European harmonisation programme.	n/a	n/a
2	*The Peer Review steering committee recommends ENSREG to stress the importance of the Periodic Safety Reviews (PSR's). In*	T-G	EC&R (2.2)	The CSN will adhere to the measures proposed within the	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
	particular, ENSREG should emphasise the need to reassess natural risks and relevant measures at the plants with the appropriate frequency, and at least once every 10 years.			framework of ENSREG in relation to improvement of the PSR's.		
3	*The urgent implementation of the measures recognised to protect containment integrity is one of the findings of the Peer Review that should be considered by the national regulators.*	T-3	EC&R (2.3)	Actions already required by the CSN ITC-ST: - Implementation of additional measures to improve the primary circuit depressurisation capacity in order to prevent high pressure core meltdown sequences. Before Fukushima, the CSN had already requested the Trillo plant to implement the capacity to manually depressurise the primary system, this not being available previously. The ITCs require improvements in order to make these actions more reliable under loss of alternating and direct current conditions and also in severe accident cases. - Installation in containment of Passive Autocatalytic Recombiners (PAR) to minimise the risks associated with hydrogen.	- I16 - I15	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				- Implementation of effective filtered containment vents to prevent overpressure conditions.	- I14	
4	*The necessary implementation of measures allowing accidents to be avoided and their consequences limited in the event of extreme natural risks is one of the findings of the Peer Review that the national regulators should consider.*	T-1	EC&R (2.4)	The ITC-ST require the licensees to implement numerous measures to prevent accidents and limit their consequences, such as for example the following: - New mobile equipment to be stored in a safe location protected against earthquakes and flooding. - Strengthening of instrumentation and communications systems. - New AEMC (Alternative Emergency Management Centre) protected against earthquakes, flooding and radiation. - New Emergency Support Centre (ESC) at national level, capable of moving suitable personnel and equipment to the sites in less than 24 hours.	 - G3, G4, I4 - I4, I11 - I9 - I10	See table A-1.1
5	*Deterministic methods should form the basis for risk assessment. Probabilistic methods, including probabilistic safety assessments (PSA), are useful as a complement to deterministic methods.*	T-1	n/a	This has been the habitual CSN practice for many years and continues to be so.	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
6	*Risk Frequency: use of a return period of 10^{-4}/year (with at least one horizontal acceleration of the terrain of 0.1g for earthquakes) for the fitting of plants with respect to off-site events.*	T-1	EC&R (3.1.1)	The CSN has undertaken to adhere to all the WENRA actions. Specifically, the return period is one of the issues currently pending resolution.	n/a	n/a
7	*Secondary Effects of Earthquakes: possible secondary effects of earthquakes, such as flooding or fires occurring as a result of the event, for future assessments.*	T-1	EC&R (3.1.2)	The Spanish licensees have already analysed this issue during the stress tests, identifying significant improvements that will be implemented in accordance with the ITC-ST.	I1, A1, A2	See table A-1.1
8	*"Protected Volume" approach: application of this approach to demonstrate protection against flooding in specific rooms or buildings.*	T-1	EC&R (3.1.3)	The ITC-ST have required the implementation of additional protections for buildings identified as being prone to flooding.	I2	See table A-1.1
9	*Early Warning Notifications: implementation of an early warning system for extreme meteorological conditions, along with development of suitable procedures to be adhered to by the operators in the event of warning.*	T-1	EC&R (3.1.4)	The CSN will require the licensees to put into place the necessary agreements with the Spanish authorities responsible for these matters (State Meteorology Agency - AEMET- and Ministry of the Environment) in order to be alerted in the event of possible extreme conditions. The CSN will establish the necessary contacts with these	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				authorities to facilitate these agreements.		
10	*Seismic Monitoring: installation of seismic monitoring system with associated procedures and training.*	T-1	EC&R (3.1.5)	This type of instrumentation, and the associated procedures, was previously installed at all the Spanish plants.	n/a	n/a
11	*Qualified review rounds: development of specifications contemplating the performance of qualified review rounds at the plants in relation to earthquakes, flooding and extreme meteorological conditions, in order to ensure the systematic search for and correction of possible non-conformities (for example, appropriate storage of equipment, especially temporary and mobile equipment and tools used to mitigate external events beyond the plant design basis).*	T-1	EC&R (3.1.6)	During the stress test process, all the Spanish plants carried out inspection rounds relating to resistance to earthquakes and flooding. The CSN is currently preparing a note that will be sent to the licensees requesting a comparison of the scope and characteristics of the inspections performed at the plants with the the specific methodologies validated internationally for this purpose.	n/a	n/a
12	*Assessment of the margin to flooding: analysis of flooding levels increased beyond the design basis and identification of potential improvements, as required by the initial ENSREG specification for the stress tests.*	T-1	EC&R (3.1.7)	This analysis had already been performed in part by certain of the Spanish plants. The CSN is preparing a note to be sent to the licensees to identify those situations in which these studies are to be carried out in greater detail.	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
13	*Margins with respect to External Risks: jointly with recommendations 2.1 and 3.1.7, the formal assessment of all type of off-site risks, including earthquakes, flooding and severe meteorological conditions, and identification of potential improvements.*	T-1	EC&R (3.1.8)	In addition to the aspects deriving from the CSN's participation in WENRA activities, the ITC-ST require important improvements in relation to margins. Nevertheless, the CSN is preparing a new ITC to be sent to the licensee requiring a review of the site seismic characterisation analyses. The CSN has already issued several requirements in relation to flooding and other natural off-site events. Once the licensees' responses have been received, the CSN will decide whether additional communications would be appropriate. April 2013.	A3, I2 A4	See table A-1.1
14	*Alternative Cooling and Heat Sink: provision of alternative cooling media, including alternative heat sinks. The following might be included as examples: alternative make-up by gravity via the steam generators (SG's), alternative tanks or wells on site, aerocoolers or sources of water available nearby (reservoirs, lakes, etc.) as an additional means of core cooling.*	T-2	EC&R (3.2.1)	All the Spanish PWR plants may be cooled alternatively via the SG's. The ITC-ST require improvements to increase the robustness of this strategy, on both the relief valves and feedwater sides. As regards BWR plants, the ITC-ST require the following, in addition to other improvements:	I4, I5, I28, A12	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				- Garoña NPP: i) Improved isolation condenser reliability (isolation signals, make-up capacity, valve actuation); ii) UHS intake structure reinforced and diversified. - Cofrentes NPP: i) availability of cooling capacity via the RCIC system (turbine-driven pump moved by main steam and with the capacity to inject water to the reactor at high pressure); the ITC-ST requires improvements to increase the robustness of this strategy; ii) the ITC-ST also requires the study of additional suppression pool heat removal modes.		
15	*Alternating current supplies: Improvement of electrical energy supplies on and off site.*	T-2	EC&R (3.2.2)	The ITC-ST require improvements in this field: - Alternative off-site feed: protocols and tests - Additional electrical generators (fixed) - New mobile electrical generators	I3, I4, I31	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
16	*Direct current supply: Improvement of this electrical energy supply.*	T-2	EC&R (3.2.3)	The ITC-ST require the implementation of procedures (and tests) for the reliable shedding of non-essential d.c. loads. The licensees' proposals also include the capacity to recharge the batteries from mobile generators and the availability of portable batteries for specific cases.	I5	See table A-1.1
17	*Operational and Preparatory Actions: implementation of operational or preparatory actions with respect to the availability of "consumables".*	T-2	EC&R (3.2.4)	This issue had already been analysed in depth during the ST's, the conclusion being that there is sufficient capacity on the sites for at least three days and up to a week with only the arrival of light supplies from outside.	n/a	n/a
18	*Instrumentation and monitoring: improvement of instrumentation and monitoring.*	T2/T-3	EC&R (3.2.5)	The ITC-ST include requirements relating to the improvement of the primary system and containment instrumentation in relation to situations of prolonged SBO and severe accidents. Improvements are also required to the SFP level and temperature instrumentation.	I4, I17, I19, I21, I22, A9	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
19	*Improvements during Shutdown* *Improved safety under shutdown conditions and during mid-loop operation. Examples of these improvements would include the reduction or prohibition of mid-loop operation, the incorporation of specific equipment, procedures and exercises, the use of other available sources of water (e.g., hydroaccumulators), the requirement that the SG's be available during operation under shutdown conditions and the availability of feedwater in all modes.*	T2/T-3	EC&R (3.2.6)	The ITC-ST require the licensees to perform a detailed analysis of severe accidents occurring under shutdown conditions. It is also important to stress that a joint task force (CSN-Sector) has been meeting since 2008 to improve the application at the plants of the "safe shutdown" concept and guarantee adequate compliance with the recommendations of the NUMARC 91-06 document, which defines the concept of "shutdown critical safety functions". One of the results of this group has been the establishment of restrictions on mid-loop operation at Spanish PWR plants. Also as a result of this task, the plants are developing specific procedures and contingencies for events initiating during shutdown.	A9, I6	See table A-1.1
20	*Reactor Coolant Pump Seals: use of thermo-resistant (leak-proof) seals for the primary pumps.*	T-2	EC&R (3.2.7)	The ITC-ST require this issue to be addressed at plants presenting this weakness.	A11	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
21	*Ventilation: improved ventilation capacity under SBO conditions to ensure the operability of the equipment.*	T-2	EC&R (3.2.8)	SBO analyses carried out long before Fukushima had already considered this issue. Furthermore, the ITC-ST require the licensees to analyse the possibility of reinforcing the control room ventilation and filtering systems for prolonged SBO situations.	I20	See table A-1.1
22	*Main and Emergency Control Rooms: enhancement of the main control room (MCR), emergency control room (ECR) and technical support centre (TSC) in order to ensure continuous operability and adequate conditions of habitability in the event of complete loss of electrical power (SBO) and loss of d.c. power (this is also applicable to the recommendations in Issue 3).*	T-2	EC&R (3.2.9)	The ITC-ST require an analysis of the feasibility of improving the electricity supply to the MCR habitability system (in the case of Cofrentes its implementation is required). Most of the Spanish plants have a remote shutdown panel instead of an ECR; its potential improvement was analysed during the ST's and it was concluded that this was unnecessary and difficult to implement (they are located in buildings without habitability systems). The new AEMC's (alternative TSC's) will be equipped with a	I9, I20	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				habitability system designed for extreme situations.		
23	*Spent Fuel Pool: enhanced robustness of the spent fuel pool (SFP).*	T2/T-3	EC&R (3.2.10)	The ITC-ST require the implementation of several improvements relating to the SFP: - Reassessment of the seismic capacity of the structure and liner of the pool, fuel racks and cooling systems. - Improvements to level and temperature instrumentation. - Pool make-up capacity. - Fuel spray capacity (Both capacities from outside the building).	I1, I18, I19	See table A-1.1
24	*Separation and Independence: improved functional separation and independence of safety systems.*	T-2	EC&R (3.2.11)	In the case of previously existing systems, these characteristics are included in the corresponding design bases. Furthermore, the new mobile equipment will be stored in a separate location, protected against external and internal phenomena. At Garoña NPP, the ITC-ST also require the diversification of the UHS intake points.	I28	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
25	*Flow paths and access availability: verification of flow paths and guaranteed access under SBO conditions. Assurance of due consideration to the situation in which the isolation valves would fail and remain in the event of loss of drive and control power, in order to maximise safety. Improvement and extension of the availability of d.c. power and instrument air (e.g., through the installation of additional accumulators or greater valve capacity). Assurance of access to critical equipment under all circumstances, specifically in the event of seizing of electrically operated access turnstiles.*	T-2	EC&R (3.2.12)	The SBO analyses performed long before Fukushima already considered the capacity to take all the affected valves to the correct position. The ITC-ST require the implementation of numerous improvements relating to these issues, especially as regards the capacity to carry out local actions in special situations, such as loss of d.c. power or extreme environmental conditions. Accessibility to critical areas in the event of an accident is included within the scope of the ITCs referred to in section 3.2 of this document.	I5	See table A-1.1
26	*Mobile Devices: provision of mobile, quick-connecting pumps, electricity supplies and air compressors, procedures and personnel training through exercises.*	T-2	EC&R (3.2.13)	The ITC-ST explicitly require (points 1.3 and 1.4) the implementation of the modifications, procedures and training required to allow for the effective use of the new mobile equipment, in accordance with the plug&play philosophy.	G3, G4, I4	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
27	*3.2.14 "Bunkered"/"hardened" systems* *Provision of a "bunkered" or "hardened" system providing an additional level of protection, with trained personnel and procedures designed to address a wide spectrum of extreme events, including beyond design basis events (applicable also to the recommendations in Issue 3).*	T2/T-3	EC&R (3.2.14)	As has already been pointed out, the ITC-ST explicitly require the new mobile equipment to be kept in a safe location, well protected against, external and internal events, as well as the implementation of the procedures and training required to allow for effective use of this equipment.	G3, G4	See table A-1.1
28	*Multiple Accidents: enhancement of the capacity to address accidents occurring simultaneously in all the groups on site.*	T2/T-3	EC&R (3.2.15)	The ITC-ST require the analysis and implementation of the modifications required to address such events.	I4, I5, I7	See table A-1.1
29	*Equipment Inspection and Training Programmes: establishment of regular programmes for inspections to ensure that a variety of additional equipment and mobile devices are properly installed and maintained, particularly in the case of temporary and mobile equipment and tools used for the mitigation of BDB external events. Development of relevant staff training programmes for the deployment of such devices.*	TG/ T2/T-3	EC&R (3.2.16)	As has already been pointed out, the ITC-ST explicitly require the implementation of the procedures and training required to allow for effective use of the new equipment, as well as the definition of appropriate periodic testing programmes.	G3	See table A-1.1
30	*Further Studies to Address Uncertainties: the performance of further studies in areas where there are uncertainties.* *Uncertainties may exist in the following areas:*	T-2	EC&R (3.2.17)	- The CSN has required different enhancement actions to protect fuel stored in the SFP, including	I18, I19	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
	- *Integrity of the SFP and its liner in the event of boiling or external impact.* - *Operability of control equipment, feedwater control valves, SG relief valves, main steam safety valves, isolation condenser flow path, containment isolation valves as well as depressurisation valves during SBO conditions to ensure that natural circulation cooling would not be interrupted in the event of SBO (this is partially addressed in recommendation 3.2.10).* *Performance of additional studies to assess operation in the event of widespread damage, for example, the need for different equipment (e.g. bulldozers) to clear the route to the most critical locations or equipment. This includes the logistics of the external support and related arrangements (storage of equipment, use of national defence resources, etc.).*			preventive and mitigating measures. Additionally, the CSN is preparing a letter to the licensees requiring this specific analysis. - The SBO analysis performed long before Fukushima already considered the need for this capacity. See chapter 4.2.1 of the Spanish report on the Stress Tests. - For the widespread damage case, the ITC-ST require the licensees to implement the following: ° New Alternative Emergency Management Centre (AEMC) at each site. ° New Emergency Support Centre at national level, with the capacity to deploy adequate teams within 24 hours. ° Definition of the scope and characteristics of the agreement for mutual assistance between plants in the event of an emergency, and development of	n/a I9, I10, I8	n/a See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				the associated operating procedures. - Completion of the studies already performed on site accessibility in the event of extreme natural events (flooding and earthquakes).	A6	See table A-1.1
31	*WENRA Reference Levels: incorporation of WENRA reference levels relating to Severe Accident Management (SAM) in the national legal system and guarantee of their implementation at the facilities as soon as possible.*	T-3	EC&R (3.3.1)	- The future CSN IS on accident management (legally binding), foreseen for 2013, will explicitly incorporate all the current WENRA reference levels relating to accident management. - Furthermore, the ITC-ST have already required most of the actions foreseen, such as for example the implementation of the H_2 PAR, the filtered containment venting capacity, protection against high pressure sequences, containment flooding capacity, etc.	n/a I13, I14, I15, A7, I16, A8, I17, A9	n/a See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
32	*SAM Hardware Provisions: provisions for adequate hardware capable of withstanding external risks (e.g., by means of qualification for extreme external risks, storage in safe locations) and severe accident environments (e.g., engineering substantiation and/or qualification for high pressures, temperatures, radiation levels, etc.) implemented for performance of the selected strategies.*	T-3	EC&R (3.3.2)	The ITC-ST require the licensees to put into practice different aspects relating to this issue: - Increased seismic margins for critical components. - New mobile equipment to be kept in a safe location. - Instrumentation suitable for severe accidents. - Actions to increase the feasibility of critical local actions.	I1 G3 I17 G4, I5, I24	See table A-1.1
33	*Review of Provisions for SAM following Severe External Events: systematic review of the provisions for SAM, focussing on the availability and appropriate operation of the plant equipment in the relevant circumstances, taking into account the accident initiating events, in particular extreme external risks, and the possibility of a harsh working environment.*	T-3	EC&R (3.3.3)	The ITC-ST require the licensees to put into practice different aspects relating to this issue: - Increased seismic margins for critical components. - Mobile equipment to be kept in a safe location. - Instrumentation capable of withstanding severe accident conditions. - Actions to increase the feasibility of critical local actions.	I1 G3 G4, I5, I24 I17	See table A-1.1
34	*Enhancement of Severe Accident Management Guidelines (SAMG): in conjunction with recommendation 2.4, the enhancement of SAMG, taking into account additional scenarios,*	T-3	EC&R (3.3.4) and	The ITC-ST requires Trillo NPP to develop and implement plant-specific SAMG and the	I30	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
	including a significantly damaged infrastructure, the disruption of plant level, corporate-level and national-level communication, long-duration accidents (several days) and accidents affecting multiple units and nearby industrial facilities at the same time.		CNS-FSR (E.21)	Westinghouse plants to improve their reactor cavity flooding capacity and incorporate it in the corresponding guideline. In addition to the ITC-ST, the CSN has issued other ITCs (see chapter 3.3 of this document) requiring the implementation of Guidelines for situations entailing the potential loss of large areas of a NPP.	I13, A8	
35	*Analysis of human resources, communications and personnel training during severe long-term accidents (especially multi-unit plants) and validation of effectiveness through drills.*	T-3	CNS-FSR (E.24)	The ITC-ST require the licensees to analyse the current capacity of the emergency response personnel to address this type of situations, along with improvement of the capacities of the communications systems. Exercises and drills are already included in the processes to validate the capacities of the emergency response organisation of each plant.	I7, I21 I4, I11, I21, I22	See table A-1.1
36	*SAMG Validation: validation of the improved SAMG.*	T-3	EC&R (3.3.5)	The CSN had previously required the validation of the SAMG. The verification of this aspect is part of	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				the CSN's systematic inspection plans.		
37	*SAM Exercises* *Exercises aimed at checking the adequacy of SAM procedures and organisational measures, including additional aspects such as the need for coordinated corporate and national level measures and long-duration events.*	T-3	EC&R (3.3.6)	The CSN will reconsider the current contents of the exercises following implementation of the improvements at the plants. The SAMG are currently exercised during the annual emergency drills carried out at each plant (obviously when the scenario in question requires their use).	n/a	n/a
38	*Training in severe accident management.* *Regular and realistic exercises on SAM for personnel training. The exercises shall include the use of equipment and the consideration of accidents at plants with more than one unit and long-duration events. Use of the current NPP simulators is considered to be useful but should be improved to cover all possible accident scenarios.*	T-3	EC&R (3.3.7)	The CSN had previously required (and inspected) the performance of realistic drills. The CSN will reconsider the current contents of the exercises following implementation of the improvements at the plants. The CSN is monitoring national and international experience in the field of severe accident simulators and in the future will adopt whatever actions it deems to be most appropriate.	n/a	n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
39	*Extension of the SAMG to address all Plant States: extension of the existing SAMG to cover all plant states (full and low power, shutdown), including accidents initiated in the SFP.*	T-3	EC&R (3.3.8)	The ITC-ST require each licensee to carry out a preliminary study of this issue. The future ITC on accident management, scheduled for 2013, will explicitly consider new aspects relating to this issue and arising from on-going WENRA tasks (new reference levels).	A9	See table A-1.1
40	*Improved communications: improvement of both internal and external communications systems, including the transmission of plant parameters relating to severe accidents and radiological data to all the emergency and technical support centres and the installations of the regulatory body.*	T-3	EC&R (3.3.9)	All the Spanish plants have a data transmission system of this type fully available. Nevertheless, the ITC-ST require the licensees to improve their current internal and external communications systems.	I4, I11, I21, I22	See table A-1.1
41	*Presence of Hydrogen in unexpected locations: adequate preparation and countermeasures for the possible migration of hydrogen to locations other than those in which it is produced in the primary containment, as well as for the production of hydrogen in the SFP.*	T-3	EC&R (3.3.10)	The ITC-ST require the licensees to analyse the possibility of hydrogen leakage from the primary containment and its consequences. The presence of H_2 in other plant areas will be taken into account by the licensees in future SAMG developments.	A7	See table A-1.1
42	*Large Volumes of Contaminated Water.*	T-3	EC&R (3.3.11)	In addition to the ITC-ST, the CSN has issued other ITCs (see chapter 3.2 of this document) requiring the	n/a	Completed

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
	Conceptual preparation of solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water.			implementation of appropriate actions to address this problem.		
43	*Radiological Protection: provisions for the radiological protection of the operators and all other members of the personnel involved in SAM and emergency measures.*	T-3	EC&R (3.3.12)	The ITC-ST require the licensees to undertake relevant improvements in relation to this issue: - Analysis of the need to increase human and material resources. - Analysis of the limitations of field operators as regards the implementation of local actions and proposals for improvement. - Development of complementary guidelines (in parallel with the SAMG) for the radiological protection of field operators.	I21, I23 I5 I24	See table A-1.1
44	*On-site Emergency Centre: Availability of an emergency centre on the site, protected against severe natural risks and radioactive releases, allowing the operators to remain on site to manage a severe accident.*		EC&R (3.3.13)	As has been pointed out above, the ITC-ST include the licensees' proposals for the implementation of a new AEMC (Alternative Emergency Management Centre) on each site, protected against earthquakes, flooding and radiations.	I9	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
45	*Support for Local Operators: Suitable rescue teams and equipment that may be rapidly mobilised to provide on-site support for the local operators in the event of a severe situation.*	T-3	EC&R (3.3.14)	As has been pointed out above, the ITC-ST include the licensees' proposals for the implementation of a new Emergency Support Centre (ESC) at national level, capable of mobilising suitable personnel and equipment within 24 hours.	I10	See table A-1.1
46	*Level 2 Probabilistic Safety Assessments (PSA's)* *A comprehensive Level 2 PSA as a tool for the identification of plant vulnerabilities, the quantification of potential releases, the determination of candidate high-level actions and their effects and prioritisation of the order of proposed safety improvements. Although PSA is an essential tool for screening and prioritising improvements and for assessing the completeness of SAM implementation, low numerical risk estimates should not be used as the basis for excluding scenarios from consideration of SAM, especially if the consequences are important.*	T-3	EC&R (3.3.15)	The Spanish plants performed their specific Level 2 PSA for on-site events initiated from full power operating conditions several years ago. The CSN has required all the licensees to carry out a Level 2 PSA for "other operating modes" before 2014.	I25	See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
47	*Severe Accident Studies: performance of additional studies to improve the SAMG. The areas that might be improved through such additional studies include the following:* - *Availability of the safety functions required for SAM in different circumstances.* - *Accident timing, including core meltdown, reactor pressure vessel (RPV) failure, basemat melt-through, SFP fuel uncovery, etc.* - *PSA, including all plant states and off-site events for PSA levels 1 and 2.* - *Radiological conditions on site and associated provisions necessary to ensure the habitability of the MCR and ECR, in addition to the feasibility of management measures under severe accident conditions, accidents affecting multiple units, containment venting, etc.* - *Core cooling modes prior to RPV failure and recriticality in partially damaged cores with supply of non-borated water.* - *Phenomena associated with flooding of the cavity and risks associated with steam explosions.* - *Engineering solutions for cooling of the corium and prevention of containment basemat melt-through.* - *Severe accident simulators appropriate for the training of NPP personnel.*	T-3	EC&R (3.3.16)	- The ITC-ST require the licensees to adopt different actions in relation to all these problems (for example, improved equipment seismic margins for severe accident management, actions to address prolonged SBO situations, analysis of improvements for accidents occurring during shutdown, survival of instrumentation, etc.). - The development over time of accident sequences was already analysed during the Stress Tests. - Level 1 PSA has been completed at all the plants, the level 2 assessment will be completed in 2014 and the assessment of off-site events is in the phase of internal discussions. - The ITC-ST require analysis of the feasibility of improving the power supply to the control room habitability system (in the case of Cofrentes its implementation is required).	I1, I4, I5, I6, I13, I14, I15, A9, etc. n/a I25 I20	See table A-1.1 n/a See table A-1.1 See table A-1.1

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				Most of the Spanish plants have a remote shutdown panel instead of an ECR; its potential improvement was analysed during the ST's and it was concluded that this was unnecessary and difficult to implement (they are located in buildings without habitability systems). Nevertheless, the new AEMC's (alternative TSC's) will be fitted with a habitability system designed for extreme events (earthquakes and flooding) and will be protected against radiations. These centres should allow for adequate accident management in keeping with the foreseen use of the fixed and mobile equipment. - The ITC-ST require analysis of the feasibility of, and problems associated with, the alternative injection strategies (new or previously existing). - The current SAMG already include the cavity flooding strategy.	I13 n/a	See table A-1.1 n/a

#	*MEASURE/REQUIREMENT*	ISSUE	SOURCE	STATUS IN SPAIN	ITC-ST Requirement	CURRENT STATUS
				- The current SAMG already appropriately deal with the issue of cooling of the corium. - The CSN is monitoring national and international experience in the field of severe accident simulators and in the future will adopt whatever actions it deems to be most appropriate.	n/a n/a	n/a n/a
48	*Containment venting for new NPP's.*	T-3	CNS-FSR (23.c)	Not applicable in Spain.	n/a	n/a

ATTACHMENT 4: CNS-EM COMMITMENTS AND RECOMMENDATIONS

This table contains detailed information on the consideration given in Spain to the issues included in the two reports issued following the CNS-EM:

- The commitments of the member countries set out in the Annex of the "Final Summary" report [4]
- The different issues presented during the meeting by the rapporteurs of topics 1 to 3, subsequently included in the President's Report [5]

#	MEASURE/REQUIREMENT	ISSUE	SOURCE	STATUS IN SPAIN
1	*Consideration of the IAEA's Safety Standards for the improvement of nuclear safety.*	T-G	CNS-FSR Annex (1)	See chapter 3.2.3.c of this document
2	*Include information on how the IAEA's Safety Standards have been or will be taken into account (in particular the Safety Fundamentals and Standards) when implementing its obligations under the Convention on Nuclear Safety.*	T-G	CNS-FSR Annex (2)	The WENRA harmonisation process has meant the incorporation of the most relevant IAEA requirements in the Spanish regulations.
3	*Assurance that its regulatory body is effectively independent in making regulatory judgments based on scientific and technological grounds and taking enforcement actions and that it has functional separation from entities having responsibilities or interests, such as the promotion or utilisation of nuclear energy (including electricity production), that might conflict with safety or other important regulatory objectives or otherwise unduly influence the decision making of the regulatory body.*	T-G	CNS-FSR Annex (3)	See the detailed explanation included in Chapter 3.2.1 of this document.
4	*Assurance of the effectiveness of its regulatory body by providing for adequate legal authority, sufficient human and financial resources, staff competence, access to necessary external expertise for its decision-making based on adequate scientific and technical knowledge, access to international cooperation, and other matters needed for compliance with its responsibilities for the safety of nuclear installations.*	T-G	CNS-FSR Annex (4)	See the detailed explanation included in Chapter 3.2.1 of this document.
5	*Assurance that its regulatory body requires the licensees of nuclear installations to have adequate expertise and resources to fulfil their responsibility for the safe operation of such facilities, including effective response to any accident and mitigation of its consequences.*	T-G	CNS-FSR Annex (5)	CSN Instructions IS-11 and IS-12 respectively contain the requirements applicable in Spain for the initial and on-going training of licensed and non-licensed personnel. Both Instructions include requirements relating to severe accident situations. The CSN maintains a systematic overview of the

#	MEASURE/REQUIREMENT	ISSUE	SOURCE	STATUS IN SPAIN
				safe operation of the plants, including the fields of human resources, training, emergency drills, etc.
6	*Assurance that its regulatory body operates in a transparent and open manner, taking into account legitimate concerns over security and other sensitive interests that might be adversely affected by the public disclosure of certain information.*	T-G	CNS-FSR Annex (6)	See the detailed explanation included in Chapter 3.2.1 of this document.
7	*Include information on the efforts made to ensure the independence, effectiveness and transparency of the regulatory body.*	T-G	CNS-FSR Annex (7)	See the detailed explanation included in Chapter 3.2.1 of this document.
8	*Host, as appropriate, an international peer review mission on its regulatory framework governing the safety of nuclear installations, if the Contracting Party has an installation of this type in operation.*	T-G	CNS-FSR Annex (8)	An IRRS mission was carried out in 2008 with excellent results. Subsequently, in 2010, the corresponding follow-up mission verified the appropriate implementation of the previously issued recommendations. Spain will be hosting a new IRRS mission that will be carried out together with an ARTEMIS mission (Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation). These missions are foreseen to be held in October 2018.
9	*Host regularly, and as appropriate for the size and number of the nuclear installations existing within the country of that Contracting Party, international peer review missions on the operational safety of its nuclear installations, if the Contracting Party has an installation of this type in operation.*	T-G	CNS-FSR Annex (9)	In addition to what has already been pointed out, the Spanish NPPs host frequent international Peer Review missions (WANO).
10	*Host international peer review missions on integrated nuclear infrastructure and other relevant matters, including safety reviews of the site and design prior to commissioning its first nuclear installation.*	T-G	CNS-FSR Annex (10)	This requirement is not applicable to the current situation in Spain.
11	*Include information on any international peer review missions hosted by the Contracting Party under paragraph 1, 2 or 3 of this section in the period between two review meetings of the Contracting Parties, including a summary*	T-G	CNS-FSR Annex (11)	All this information may be accessed via the documents generated by the IRRS missions mentioned in point 8 of this table.

#	MEASURE/REQUIREMENT	ISSUE	SOURCE	STATUS IN SPAIN
	of the findings, recommendations and other results of the missions, actions taken to address these results, and plans for follow-up missions.			
12	*Make its National Report and any written questions and responses relating to that report publicly available, with the exception of any particular item of information that might adversely affect security or other sensitive interests if publicly disclosed, and request the IAEA to maintain this information, other than any information covered by the above exception, on a website open to the public.*	T-G	CNS-FSR Annex (12)	This is, and always has been, the policy of the CSN regarding this type of reports.
13	*Make any international peer review mission reports, any follow-up reports or any national responses to such reports publicly available, with the exception of any particular items of information that might adversely affect security or other sensitive interests if publicly disclosed, and request the IAEA to maintain this information, other than any information covered by the above exception, on a website open to the public.*	T-G	CNS-FSR Annex (13)	Already completed.
14	*Include in its National Report information on its efforts to enhance openness and transparency in the implementation of its obligations under the Convention on Nuclear Safety.*	T-G	CNS-FSR Annex (14)	See the detailed explanation included in Chapter 3.2.1 of this document.
15	*Enhance the robustness of the Peer Reviews of national reports submitted under the CNS through the preparation and submission of detailed reports dealing with successes and pending challenges and the frank discussion of these reports.*	T-G	CNS-FSR Annex (15)	The present document, drawn up in response to the ENSREG proposals, constitutes an adequate way of fulfilling this CNS recommendation.
16	*Results of reassessment of external hazards with emphasis on changes to the licensing basis*	T-1	CNS-PR	The ST analyses carried out by the licensees and assessed by the CSN have included an extensive review of the external hazards affecting each Spanish NPP. The subsequent ITC-ST include a series of improvements and requests for additional analyses. All the requirements issued via these ITCs are part of the Licensing Basis of the plants.

#	MEASURE/REQUIREMENT	ISSUE	SOURCE	STATUS IN SPAIN
17	*Peer reviews of assessments and their results.*	T-1	CNS-PR	See the explanation of the Peer Reviews included in Chapter 3.1.b of this document.
18	*Additional improvements carried out or planned on the basis of the reassessments*	T-1	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.
20	*Reporting of regulatory changes expected in relation to external events.*	T-1	CNS-PR	The CSN released in May 2015 an ITC for the licensees to perform a reassessment of the earthquake hazards at each site.
21	*Increased plant robustness to face unexpected challenges*	T-2	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.
22	*Retrofits at existing plants and design improvements for new NPP's.*	T-2	CNS-PR	See the explanation of the improvements for exiting plants included in Chapter 3.1.a of this document. No new plants are currently foreseen in Spain.
23	*Safety objectives to minimise off-site long- term contamination.*	T-2	CNS-PR	See the information on this issue included in Chapter 3.3.a of this document.
25	*Safety requirements for equipment used in design extension conditions.*	T-2	CNS-PR	The CSN has issued two new instructions (IS-36 and IS-37) to cover the aspects related to NPP Accident Analysis. These ISs incorporate the "design extension" as follows: – DEC-A and DBA are included in IS-37 – DEC-B is included in IS-36 Moreover, a "Manual of Functionality Requirements for Extensive Damage Management" has been developed (see chapter 4.1.3).
26	*Improvement of Regulations, Guidelines and Procedures.*	T-3	CNS-PR	In addition to the harmonisation plan, WENRA has included additional Reference Levels to take into account the lessons learned from Fukushima.
27	*Improvement of instrumentation, systems and components.*	T-3	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.

#	MEASURE/REQUIREMENT	ISSUE	SOURCE	STATUS IN SPAIN
28	*Improvement of structures.*	T-3	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.
29	*Aspects relating to multiple unit plants.*	T-3	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.
30	*Aspects relating to spent fuel.*	T-3	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.
31	*Aspects relating to organisational issues.*	T-3	CNS-PR	See the explanation of the improvements included in Chapter 3.1.a of this document.