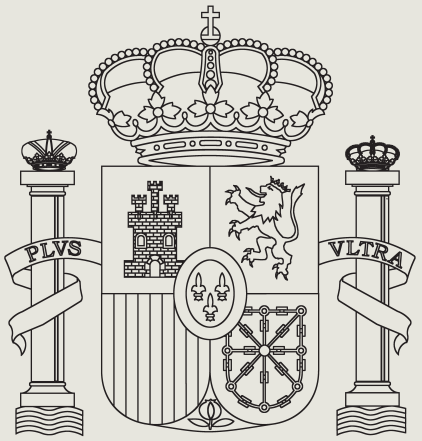
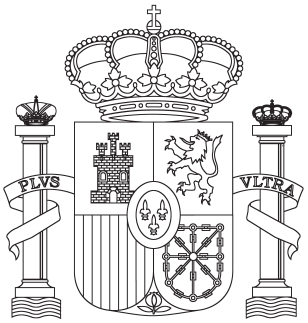


SPAIN

Convention on Nuclear Safety

Seventh National Report



ESPAÑA

Convention on Nuclear Safety

Seventh National Report

August 2016

Edita y distribuye:
Consejo de Seguridad Nuclear
C/ Pedro Justo Dorado Dellmans, 11. 28040 Madrid (España)
www.csn.es
peticiones@csn.es

Imprime: Cofás, S. A.

Depósito Legal: M-27.806-2016

Table of Contents

I. Introduction

Presentation of the Report

The present document is the Seventh Spanish National Report, issued in compliance with the obligations deriving from the Convention on Nuclear Safety, made in Vienna on September 20th 1994, in accordance with the provisions of articles 5, 20, 21 and 22 of the said Convention. Its contents cover the data and circumstances arising and occurring from January 2013 to December 2015, with only information of exceptional importance being included subsequent to this last date.

Drawing up of the Report

The drawing up of the report is the responsibility of the Nuclear Safety Council, the body solely responsible for nuclear safety and radiological protection in the Spanish State, independent from the Government and which reports only to the Spanish Parliament. In compliance with the commitments made during the second review meeting, the licensees of the Spanish nuclear power plants have contributed in the drawing up of the report, coordinated by the Spanish Electricity Industry Association (UNESA) and the Ministry of Industry, Energy and Tourism (MINETUR).

The report has been drawn up with the same structure as the different articles of chapter 2, "Obligations", of the text of the Convention, starting from article 6. Included in each article is relevant information on the contents of each obligation, with a distinction made where applicable between the activities of the licensee and those of the regulatory authority, and a brief evaluation of the degree of compliance in Spain with the requirements set out therein.

A chapter on conclusions has been added, this dealing with the commitments made during the sixth review meeting, as requested in the guidelines, and pointing out future challenges and the initiatives that are planned for implementation in the near future.

The national report includes several appendices that extend upon the information included in the different articles and present it in greater detail.

The contents and scope of this seventh report of the Convention are based on the recommendations established in section C of the Informative Circular on Guidelines relating to the national reports prescribed by the Convention on Nuclear Safety (INFCIRC/572/Rev. 5 of February 2nd 2015). This document was adopted by the Contracting Parties to the Convention during the sixth review meeting held in 2014.

This report also includes the commitments adopted by the Contracting Parties and identified in the summary report on the sixth review meeting, as well as those adopted by the Contracting Parties during the Diplomatic Conference held in 2015, which led to the so-called Vienna Declaration.

Basic description of the Spanish nuclear programme and of nuclear energy in the national energy policy

In Spain, there are eight light water nuclear reactors in operation, located on six sites. They add up to an installed power of 7,864.7 MWe, which represents 7.3% of the total installed electricity generation, and contribute around 20% of total national production. Six of the groups are pressurised water reactors (PWR), the other two being boiling water reactors (BWR). The average age of the groups, currently operating in Spain is around 31 years.

Since July 6th 2013, one of the BWR groups, Santa María de Garoña, has been in an administrative situation of definitive shutdown, although renewal of the operating permit was requested in May 2014. As of the date of the present report, this renewal procedure is pending the mandatory report by the Nuclear Safety Council.

Furthermore, there are currently two reactors in the dismantling phase in Spain. The José Cabrera nuclear power plant ceased to operate in 2006, and in 2010 ownership of the facility was transferred to ENRESA (Empresa Nacional de Residuos Radiactivos) and authorisation was granted for the performance of the dismantling process, which is scheduled for completion in 2018. For its part, Vandellós I nuclear power plant, which was shut down in 1989, reached dismantling level 2 in 2003 and is currently in the dormancy phase.

The objective of Spanish energy policy is to ensure a secure supply, the improvement of the competitiveness of the Spanish economy and compliance with the environmental objectives, aiming for a balanced and diversified contribution by the different energy sources available.

In view of this, and given that Spain is one of the European Union Member States that most depends on other countries for its energy, the Spanish government considers that for as long as the nuclear power plants currently in operation in the country meet the safety requirements imposed upon them by the Nuclear Safety Council and their licensees consider their operation to be of interest, these facilities should continue to contribute to secure the energy supply, the optimisation of energy costs and the reduction of greenhouse gas emissions.

As regards the fuel cycle, since the 1983 National Energy Plan spent fuel has been considered a waste product and the option of reprocessing is not contemplated, the only exception being the fuel from the Vandellós I plant, for technical reasons.

Diplomatic Conference of the Convention on Nuclear Safety

In December 2013, pursuant to article 32(3) of the Convention on Nuclear Safety, the Swiss Confederation submitted a proposal to the Director General of the IAEA, as the Depositary of the said Convention, regarding the amendment of article 18 of the Convention, INFCIRC/449. The Depositary communicated this proposal to the Contracting Parties on December 19th 2013.

During the sixth review meeting of the Convention, held from March 24th to April 4th 2014, the Contracting Parties present and voting decided by a two thirds majority to hold a Diplomatic Conference, to be organised within one year, in order to consider the proposal submitted by Switzerland. The Contracting Parties to the Convention also requested that the Director General of the IAEA, as Depositary, organise a consultation meeting open to all the said Contracting Parties for the exchange of points of view and to prepare the adoption of the rules of procedure. This meeting was held on October 15th 2014 at the IAEA headquarters in Vienna.

The 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 Vienna Declaration on Nuclear Safety. Furthermore, the Contracting Parties decided that *the principles shaping the said Declaration should be reflected in the actions of the Contracting Parties, in particular during the drawing up of their reports on application of the Convention, especially with regard to article 18, as well as other pertinent articles, among them 6, 14, 17 and 19, beginning with the national reports submitted by the Contracting Parties for consideration during the seventh examination meeting of the Convention on Nuclear Safety.*

Spain, as a Contracting Party to the Convention on Nuclear Safety, adopted the Vienna Declaration and, in response to the commitments reached during the aforementioned Diplomatic Conference, has included information on compliance with the safety principles adopted in its seventh report. This information has been included in each of the pertinent articles of the report under the heading "Vienna Declaration on Nuclear Safety" and in addition an Appendix has been included in order to make an integrated presentation of the actions taken by Spain in response to the principles of the said Declaration.

II. Compliance with the Obligations of the Convention

Article 6. Existing nuclear facilities

This article describes the most relevant safety issues and improvement programmes that have occurred and been developed within the nuclear power plant fleet since the last national report. Appendix 6.A includes updated data on the nuclear facilities existing in Spain and included within the scope of the Convention.

6.1 General panorama of important safety-related issues

Almaraz NPP I and II

On June 7th 2010, the Ministry of Industry, Tourism and Trade granted the plant a renewal of its Operating Permit (OP) for a period of 10 years. The OP included requirements for the implementation of a series of safety improvements, some of which are described in section 6.2.

During the period covered by this report, the licensee has reported 31 events, 29 of which were classified at level 0 on the International Nuclear Event Scale (INES), with two (the same event in either group) relating to non-compliance with the Technical Specifications (ETF) and repeated alteration of registers during the hourly fire-fighting (FF) inspection tours, these being classified at level 1. In February and April 2015, two subject-specific inspections were carried out in relation to these events classified as level 1, in application of the procedures of the Integrated Plant Supervision System (SISC). In addition, the corresponding sanction procedure for ETF non-compliance and alteration of registers has been initiated.

During this period there have been four non-scheduled automatic scrams (three in group I and one in Group II) and two scheduled outages for the revision and replacement of the exciter of the main generator in groups I and II. The reason for this was the malfunctioning of the exciter regulation system due to overvoltage conditions affecting the exciter regulator.

In addition, the following specific inspections were carried out in application of the SISC procedures for response to significant events:

2013:

— Reactive inspection in relation to event number 13/001 "Safety injection signal due to pressure variation in steam generator 3".

— Supplementary inspection in relation to a "white" finding regarding the use of commercial grade items in safety-related positions.

— Special inspection in relation to the corrosion problem detected in the essential services water system.

2014:

— Inspection in relation to a "white" finding regarding repetitive failures of the essential services water system pumps.

— Inspection due to exceeding of the threshold of indicator I1 regarding non-scheduled instantaneous reactor shutdowns per 7,000 hours of reactor criticality.

— Special inspection in relation to safety-related tank levels.

— Reactive inspection as a result of events regarding a lack of guarantee of the disconnection of loads on the safeguards busses with a safety injection signal and minimum voltage.

2015:

— Reactive inspection in relation to incidents encountered during the testing of diesel generators 4 and 5.

— Subject-specific inspection to check the counts of workers on the whole body counter. The findings of the inspection led to a warning.

The objective of these inspections was to ensure that the licensee clearly determines the scope and extent of the problems leading to them, identifies and understands the root causes leading or contributing to these problems and identifies and applies corrective actions to correct the problem and prevent its repetition.

The licensee has identified the causes of the aforementioned incidents and has established appropriate corrective actions.

Ascó NPP I and II

On September 27th 2011, the Ministry of Industry, Tourism and Trade granted the plant the renewal of its OP for a period of 10 years. The OP included the requirement that a series of safety improvements be implemented, as explained in section 6.2.

During the period covered by this report the licensee has reported 35 events, all classified at level 0 on the INES Scale.

During the period there was an automatic scram due to actuation of the alternator protections and two non-scheduled outages, one due to the inoperability of charging pump "A" and the other to the inoperability of the emergency diesel generators (EDG's) as a result of anomalies in the tightening torque of certain of the attachment bolts of the EDG intake air piping supports.

The following specific inspections were carried out in application of the SISC procedures for response to significant events:

— Reactive inspection in relation to events 14-007 (automatic safety injection actuation during functional testing of the reactor trip breaker) and 14-008 (entry into Operating Mode 3 with the phase 2 automatic containment spray and isolation actuation logics disabled during the post-refuelling outage start-up phase).

— Reactive inspection in relation to event 14-004 (incorrect positioning of a bridge on rector trip channels).

— Reactive inspection in relation to anomalies in the line from the safeguards reservoir to the cooling towers of the engineered safeguards services water system.

The objective of these inspections was to ensure that the licensee clearly determines the scope and extent of the problems leading to them, identifies and understands the root causes leading or contributing to these problems and identifies and applies corrective actions to correct the problem and prevent its repetition.

The licensee has identified the causes of the aforementioned incidents and has established appropriate corrective actions.

Cofrentes NPP

On March 10th 2011, the Ministry of Industry, Tourism and Trade granted the plant the renewal of its OP for a period of 10 years. The OP included the requirement that a series of safety improvements be implemented, as explained in section 6.2.

The plant has operated at rated power without any significant incidents, with three scheduled outages and no non-scheduled scrams. During this period the licensee reported 17 reportable events, none of which were classified above level 0 on the INES Scale.

Following each of the events that, occurred, the licensee effectively analysed and proposed corrective actions.

The 19th refuelling outage took place from September 22nd to October 31st 2013 and was carried out in accordance with the planned schedule of activities.

On April 26th 2015 a scheduled plant shutdown was performed to replace a fuel assembly.

In September 2015, a scheduled plant outage was performed for the 20th refuelling. The refuelling outage was carried out in accordance with the planned schedule of activities. The most significant modifications were the replacement of the division III EDG speed regulator, modernisation of the feedwater control system and the installation of autocatalytic passive recombiners in the drywell.

Trillo NPP

On November 17th 2014, the Ministry of Industry, Tourism and Trade granted the plant the renewal of its OP for a period of 10 years. The OP included the requirement that a series of safety improvements be implemented, as explained in section 6.2.

During this period, Trillo NPP has operated normally and the licensee has reported 18 events, none of which were classified above level 0 on the INES Scale.

Following each of the events that, occurred, the licensee effectively analysed and proposed corrective actions.

One significant aspect of this period has been the solving of the problem of using commercial grade components in safety-related positions with their having been subjected to a suitable process of dedication. As a consequence of this problem, until the third quarter of 2013, Trillo NPP was in the "regulatory response" column of the SISC action matrix due to the "white" finding (low to moderate safety significance) regarding the use of commercial grade components in safety-related positions with their having been subjected to a suitable process of dedication. This problem was identified by the CSN during an inspection performed in 2011, and led to a number of activities by both the licensee and the CSN. The licensee has restructured its supplies and spares management process, this having led among other actions to the setting up of a new division in the organisation of Trillo NPP. The CSN has carried out several inspections and evaluations to verify the effectiveness of the actions taken by the licensee to solve the problem.

The power operation of Trillo NPP has suffered the effects of neutron noise since the beginning of its operation.

As a result of the increase in enrichment in 2003 and subsequent introduction of High Thermal Performance fuel assemblies, the amplitude of this noise at the end of the cycle reached values in excess of the limitation system setpoint values, this generating overpower signals (in the case of positive amplitude) or control rod drops (in the case of negative amplitude).

In order to prevent the appearance of rod drop signals caused by noise, Trillo NPP requested authorisation to raise the setpoint of the possible control rod drop power reduction signal, this being granted and the actuations disappearing. In order to prevent actuations of the limitation system as a result of noise, Trillo NPP requested the possibility of raising the value of the neutron flux signal filter; the CSN responded favourably to this request in March 2015.

In parallel to these licensing processes, the Council has requested Trillo NPP to characterise the amplitude of the noise signal and to identify the causes for its having progressively increased.

In late 2013 the CSN requested the licensee to submit an exhaustive report on the situation and on the current understanding of the phenomenology of the neutron noise, taking into account all the demands included in previous requirements, in order for the CSN to be able to make a detailed assessment within the framework of the Periodic Safety Review associated with the request for renewal of the Operating Permit.

Given the nature of the problem, it is very difficult at this moment in time to arrive at a final explanation making it possible to take the actions necessary to eliminate or considerably reduce neutron noise amplitude. Nevertheless, the CSN values positively the actions taken by the licensee and considers the problem of neutron noise at Trillo NPP to have been duly limited and solved from the point of view of plant safety.

As from the last quarter of 2013, following verification of the effectiveness of the actions taken by Trillo NPP, the CSN once again placed the plant in the "licensee response" column of the SISC action matrix. This means that the plant processes are efficient in detecting any deviation in safety and that the CSN supervises safety via scheduled inspections.

Vandellós II NPP

On July 21st 2010, the Ministry of Industry, Tourism and Trade granted the plant the renewal of its OP for a period of 10 years. The OP included the requirement that a series of safety improvements be implemented, as explained in section 6.2.

During the period covered by this report, all the reportable events recorded (32 in total) were classified at level 0 on the INES Scale.

During the period there were eight loss of off-site power (PSE) events, four of which caused the reactor to scram, and in addition there were two non-scheduled reactor shutdowns; in all cases the reactor protection system acted in accordance with its design. Four of the eight PSE events were caused by meteorological phenomena (storms) in the area of the site.

Regarding these incidents, and in application of the SISC significant event response procedures, the CSN performed the following specific inspections:

— Reactive inspection as a result of an automatic reactor scram caused by loss of the 400 kV line, unexpectedly causing activation of the group's auxiliary transformer protection logic.

— Inspection to review the status of the modifications and actions subsequent to the aforementioned loss of 400 kV line event, revising certain aspects relating to the electrical and instrumentation systems and witnessing the testing of these systems.

— Inspection to analyse the cause of and circumstances surrounding the event affecting one pressuriser relief valve.

The objective of these inspections was to ensure that the licensee clearly determines the scope and extent of the problems leading to them, identifies and understands the root causes leading or contributing to these problems and identifies and applies corrective actions to correct the problem and prevent its repetition.

The licensee has identified the causes of the aforementioned incidents and has established appropriate corrective actions.

6.2 General overview of programmes and measures foreseen for the on-going improvement of the safety of the facilities

Almaraz NPP I and II

The OP includes a number of conditions relating to specific programmes and actuations aimed at improving plant safety and resulting from evaluation of the Periodic Safety Review (PSR) and

the Conditioned Application Standards (NAC) (information on the NAC in article 14.2.3); both processes were performed in support of the request for OP renewal.

The development of certain of these conditions has been undertaken during the period of the current report, the following warranting special mention:

- Installation of alternative shutdown panels in groups I and II in order to guarantee safe shutdown following a fire in the cable room or control room.
- Improvements to the filtering and ventilation systems of different plant buildings, including the installation of a new redundant train in each group for the spent fuel building.
- Improvements to the systems for the protection of buildings against atmospheric discharges.
- Improvements in the physical separation and electrical insulation of nuclear class circuits.
- Improvements to ageing management programmes with a view to forthcoming OP renewal.

Sections 18.1.4, 18.1.5 and 18.1.6. include details on safety and design improvements, some of which are additional to those deriving from the PSR-NAC.

The CSN is currently evaluating the licensee's request to transition to the Improved Technical Specifications (ETFM), in accordance with the NUREG-1431 standard, Rev.4.

Ascó NPP I and II

The OP contains conditions relating to the on-going safety improvement programmes established by the CSN, particularly significant among which is the requirement for completion of the implementation of the PROCURA Plan (organisational, cultural and technical reinforcement plan) in 2012. This plan was set up to address the root causes of the event entailing the release of radioactive particles to areas outside the controlled zone of Group I, reported to the CSN on April 4th 2008, which was dealt with in the Fifth Report on the Convention on Nuclear Safety. The licensee submitted its report on the implementation of PROCURA in December 2012, this including an evaluation of the effectiveness of the actions implemented.

During the first quarter of 2013, following the implementation of PROCURA, the licensee carried out an independent process of verification aimed at determining the effectiveness of the actions implemented to resolve or prevent the recurrence of the initial weaknesses. Deriving from this process are integration measures and adjustments to the actions implemented, where required, along with measures for the sustainability of the cultural change of the Ascó-Vandellós II Nuclear Association (ANAV), included in the report with the results of this effectiveness verification submitted to the CSN in June 2013.

The CSN has tracked the progress, implementation and evaluation of the effectiveness of the actions implemented by way of inspections and finally reported favourably on the PROCURA closure report on October 1st 2014.

Additionally, the OP includes several conditions resulting from evaluation of the PSR and NAC; both processes supported the request for OP renewal. The licensee has taken the following measures in relation to these conditions:

- Replacement of the SAMO-SPDS process computer system (Safety Parameter Display System) with an updated technology-based system.
- Review of nuclear class equipment spares qualification and obsolescence.
- Improvements to pressuriser relief valves (environmental qualification).
- TS improvements relating to containment blowdown isolation.
- Reassessment of plant safe shutdown capacity in the event of evacuation of the control room.

- Improvements to ventilation systems, spent fuel pool temperature and Class 1E d.c. system.
- Improvement in severe accident management.

Sections 18.1.4, 18.1.5 and 18.1.6. include details on safety and design improvements, some of which are additional to those deriving from the PSR-NAC.

The CSN is currently evaluating the licensee's request to transition to the Improved Technical Specifications (ETFM), in accordance with the NUREG-1431 standard, Rev.4.

Cofrentes NPP

The OP includes a number of conditions relating to specific programmes and actions for plant safety improvement resulting from evaluation of the Periodic Safety Review (PSR) and Conditioned Application Standards (NAC), both processes supporting the request for renewal of the OP.

As a result of the PSR the licensee is carrying out improvements to various of the facility's documents, such as the Quality Assurance Manual (aspects relating to basic radiological protection standards or criteria), the Radioactive Waste and Fuel Management Plan, the scope of the annual operating experience reports and new standards, aspects relating to the results of dosimetry controls, initial and on-going training activities and application of the Maintenance Rule, aspects relating to environmental qualification, severe accident management, probabilistic safety assessment, deterministic studies of on-site flooding, seismic margins and design of the remote shutdown system and improved design of the fuel range reactor vessel water level signal obtained for post-accident recorders.

As a result of NAC analysis, the licensee is also undertaking various improvements at the facility, such as the following:

- Analysis of the containment combustible gas control system.
- Reassessment of plant safe shutdown capacity in the event of evacuation of the control room.
- Modification of temperature difference channels as regards measurement accuracy.
- Implementation of Class 1E battery charger trip in response to output overvoltage.
- Completeness of the testing programme in accordance with the ASME code.
- Verification of analyses of actuator capacity guaranteeing the integrity of blowdown isolation valve seat sealing and proposals aimed at minimising the operating time of the blowdown system and in relation to operating requirements, leak testing and the replacement of containment blowdown isolation valve gaskets.
- Various analyses of compliance with the single failure criterion of different plant logics in response to failure of a sensing line.
- Cable separation.
- Protection against atmospheric discharges.
- Revision of the Dose Reduction Master Plan (DRMP), contemplating an independent audit of the plant ALARA programme.

In relation to this last aspect, in addition to monitoring and evaluation by the CSN, the Electric Power Research Institute (EPRI) carried out an independent audit of the ALARA programme of the facility covering organisational aspects, responsibilities assigned, scope, application and effectiveness of the DRMP, the results of which were included in the EPRI document "Optimized Site-Specific ALARA Assessment: Cofrentes Power Plant", dated January. 2012. Subsequent to this, the CSN performed an inspection in March 2013 of the specific application of revision 9 of the DRMP, issued by the licensee in December 2012, during refuelling outage

number 19. Likewise, in July 2013, the CSN issued an evaluation and tracking report on revision 9 of the DRMP and subsequently performed an inspection covering this issue during refuelling outage number 19.

This tracking led to the conclusion that, as regards organisation, the licensee has improved in relation to the definition of responsibilities, the commitment of the organisation and the planning of the refuelling outage and a dose reduction has been observed.

Sections 18.1.4, 18.1.5 and 18.1.6. include details on safety and design improvements, some of which are additional to those deriving from the PSR-NAC.

Trillo NPP

The OP includes a number of conditions relating to specific programmes and actions for plant safety improvement resulting from evaluation of the Periodic Safety Review (PSR) and Conditioned Application Standards (NAC), both processes supporting the request for renewal of the OP. In this context the main improvements implemented at the plant during the period of the report are as follows:

— Improvements in ventilation system containment isolation valve and damper leak testing (PSR-NAC).

— Improvements in filtering and ventilation system testing.

— Improvements to the Technical Specifications in relation to containment isolation.

— Improvements to the ageing management programmes.

— Improvements in the testing of safety-related systems.

Sections 18.1.4, 18.1.5 and 18.1.6. include details on safety and design improvements, some of which are additional to those deriving from the PSR-NAC.

Vandellós II NPP

The OP includes a condition relating to the programmes for plant safety improvement, requiring the performance of the action proposals deriving from the PSR and NAC, which along with other analyses and processes supported the request for renewal of the OP.

Particularly noteworthy during the period under consideration has been the development of the following requirements, which are associated with the aforementioned condition:

- Completion of the studies on severe accident management capacity and use of the severe accident management guidelines.
- Reassessment of safe plant shutdown in the event of the control room being evacuated. In this respect, compliance with CSN Instructions IS-27, on general design criteria relating to the electrical independence of safe shutdown equipment control circuits between their remote position and the control room, and IS-30, on control room fire protection requirements, is required.
- Actuations aimed at widening the scope of off-site event APS's to bring them more into line with situations occurring on the plant site.
- Implementation of a fuel building ventilation system design modification to ensure the filtering of any potential leak of radioactivity.

Additionally, the OP includes a number of conditions deriving from PSR and NAC evaluation that require different improvements to other safety-related aspects, such as the performance of analyses to improve the electrical system of the plant, submittal of a proposal for improvement regarding compliance with the Maintenance Rule and revision of the safety system design bases, among others.

Sections 18.1.4, 18.1.5 and 18.1.6. include details on safety and design improvements, some of which are additional to those deriving from the PSR-NAC.

In April 2015 the plant replaced the reactor vessel closure head, this constituting a conservative preventive initiative by the licensee. Although no defects caused by primary water stress corrosion cracking (PWSCC) had been detected in the Inconel 600 materials of the vessel head, categorised as being of low susceptibility, wear of the thermal sleeves caused by friction against the penetrations was confirmed.

6.3 Identification of facilities for which a shutdown decision exists

The OP granted by the Ministry of Industry, Tourism and Trade on July 3rd 2009 authorised the operation of Santa María de Garoña NPP until July 6th 2013.

In late 2012, the licensee decided to shut down the plant voluntarily and started to unload fuel from the reactor vessel to the irradiated fuel pool. The plant has remained in this situation throughout the period covered by this report. From the licensing point of view, the Ministry of Industry, Energy and Tourism declared the definitive shutdown of Santa María de Garoña NPP on July 6th 2013.

On May 27th 2014, the licensee of the plant submitted a request for renewal of the OP on the basis of section of article 28 of the Regulation on Nuclear and Radioactive Facilities (RINR), which establishes that within one year of the shutdown declaration a licensee may request renewal of the OP as long as the shutdown occurred for reasons other than nuclear safety and radiological protection.

According to the said RINR, the procedure applicable to such requests is the same as that used for other OP renewals, to which shall be added whatever additional requirements the regulatory authority might consider to be appropriate in each case. In the specific case of Stª Mª de Garoña, the CSN issued Complementary Technical Instruction ITC-14.01. The CSN continues to evaluate the request for renewal of the OP and the mandatory report is expected to be issued to the Ministry of Industry, Energy and Tourism during the second half of 2016.

During the period of this report there has been no event reported above level 0 on the INES Scale.

6.4 Position regarding continued nuclear power plant operation

All the Spanish nuclear power plants meet the requirements of the different articles of the Convention on Nuclear Safety. The Spanish nuclear power plants are subject to a system of OP renewal for a given period. Likewise, every 10 years the plants carry out a PSR, updating the situation of the continuous safety assessment programmes that are performed systematically and analysing the applicability of the changes occurring in the standards over the ten-year period (NAC). Facilities requesting long-term operation must include in their PSR an integrated ageing assessment and management plan, among other additional requirements.

In view of the level of safety with which the Spanish nuclear power plants are operating, the current position of the licensees is to request the renewal of their respective Operating Permits as they expire. In keeping with this position, the Trillo plant has applied for such renewal within the timeframe established for this purpose and following the issuing of the mandatory CSN report setting out the limits and conditions associated with this authorisation in relation to the nuclear safety and radiological protection of the facility, and has been granted the renewal of its Permit by the Ministry of Industry, Energy and Tourism for a period of ten years. The other plants plan to proceed in a similar manner when the time comes. In addition to nuclear safety requirements, the continued operation of the plants must be analysed in terms of economic feasibility, as regards both the conditions imposed, where appropriate, for operation during the period considered and the national economic framework in which their operation takes place.

6.5 Vienna Declaration

Among the information contained in this chapter, important elements are included illustrating Spain's compliance with the commitments deriving from the Vienna Declaration.

Thus, section 6.1 details safety significant events that have occurred at the Spanish nuclear power plants during the period of the report and the response measures taken by both the licensees and, where necessary, the CSN. In general, it may be concluded that in all the incidents that have occurred the licensee has identified the causes and established the appropriate corrective actions. The processes to respond to safety significant events established by both the licensees and the CSN constitute in themselves systematic safety assessment and review mechanisms, which give rise to improvements in plant design and/or operation. It should also be pointed out that all reportable events are classified in accordance with the INES Scale.

Section 6.2 describes the safety improvements specific to each plant implemented over the period covered by this report. Many of these actions contribute to the objective of improving the design in order to prevent accidents and mitigate radioactivity emissions in the event of an accident occurring. Most of these improvements come about as a result of the PSR's and NAC, which are perfectly established and consolidated, periodically performed exhaustive and systematic processes carried out in accordance with IAEA standards and other good practices acquired through the experience accumulated and exchange with peers.

In the PSR's and NAC, the plants identify safety improvements for implementation during the following period. These improvements are prioritised on the basis of their degree of benefit for safety. The improvements identified, and others considered by the CSN, may be incorporated as conditions in the corresponding OP renewal or by way of specific Complementary Technical Instructions. Contemplated among the regulatory requirements for PSR performance (Safety Guide GS1.10, included by reference in the OP) is the revision of the standards issued by the IAEA.

Finally, section 6.4 explains that the justification of continued plant operation rests on the continuous safety review programmes established, in particular on the PSR and NAC.

APPENDIX 6.A

Basic characteristics of the Spanish nuclear power plants

Basic characteristics of nuclear power plants

	Almaraz	Ascó	Vandellós II	Trillo	Santa María de Garoña	Cofrentes
Type	PWR	PWR	PWR	PWR	BWR	BWR
Number of groups	2	2	1	1	1	1
Thermal power (MW)	Group I: 2,956.6 Group II: 2,955.8	GI: 2,940.6 GII: 2,940.6	2,940.6	3,010	1,381	3,237
Electrical output (MW)	GI: 1,049.43 GII: 1,044.45	GI: 1,032.5 GII: 1,027.2	1,087.1	1,066	466	1,092.02
Cooling	Open: Arrocampo reservoir	Mixed: River Ebro - Towers	Open: Mediterranean Sea	Closed: towers, make-up from River Tajo	Open: River Ebro	Closed: towers, make-up from River Júcar
Preliminary authorisation	GI: 29-10-71 GII: 23-05-72	GI: 21-04-72 GII: 21-04-72	27-02-76	04-09-75	08-08-63	13-11-72
Construction permit	GI: 02-07-73 GII: 02-07-73	GI: 16-05-74 GII: 07-03-75	29-12-80	17-08-79	02-05-66	09-09-75
Start-up permit	GI: 10-13-80 GII: 15-06-83	GI: 22-07-82 GII: 22-04-85	17-08-87	04-12-87	30-10-70	23-07-84
Operating permit	GI y GII: 08-06-10	GI: 02-10-11 GII: 02-10-11	26-07-10	17-11-14	05-07-09[1]	20-03-11

[1] New operating permit requested on 27/05/2014

Article 7. Legal and regulatory framework

7.1. Establishment and maintenance of the legislative and regulatory framework

7.1.1. General overview of the main legislative framework in relation to nuclear safety.

In the area of Nuclear Safety, the following laws were approved and officially published during the period from January 2013 to December 015:

Law 15/2012, of December 27th, on fiscal measures for energy sustainability

This was not included in the previous report for the Convention. Its objective is to bring the Spanish fiscal system into line with a more efficient and environmentally friendly and sustainable usage, in keeping with the basic principles governing fiscal, energy-related and environmental policy in the European Union.

Law 21/2013, of December 9th, on environmental assessment

This law brings together in a single text the legal system governing the evaluation of environmental assessment plans, programmes and projects, and establishes a set of common provisions facilitating the application of the previous regulation, which is revoked.

It aims to be an efficient instrument for environmental protection by simplifying the procedure for environmental assessment and increasing the legal security of the operators. This law establishes the bases that are to govern the environmental assessment of those plans, programmes and projects that might have a significant effect on the environment, guaranteeing a high level of environmental protection throughout the national territory, with a view to promoting sustainable development.

Law 24/2013, of December 26th, on the Electricity Industry

This is the main legal instrument regulating the electricity industry overall, including electricity generation by nuclear means. The Ninth Additional Provision of this law establishes that *"those electricity generating facilities to which the special legislation dealing with nuclear energy is applicable shall be governed by such legislation, as well as by the provisions of the present law"*.

It entails an overall reform of the sector, based on a new regime of electricity system revenues and expenses, aimed at recuperating the financial sustainability of the said system. The provisions of legal standing previously covered by different standards approved subsequent to the entry into force of Law 54/1997 are integrated in a single text, and consideration is also given to the European standards applicable to the electricity industry.

This law provides that every year the Ministry of Industry, Energy and Tourism shall, following a report by the Executive Committee of the Government for Economic Affairs, approve the forecasts regarding the annual evolution of the different electricity system revenue and expense items for the next six years.

It modifies the system of sanctions, adapting it to the evolution of the sector, and reinforces the mechanisms for control of the system by the public authorities in relation to inspection, the registration of activities and the control of fraud.

Despite the revocation of previous Law 54/1997, its following Additional Provisions remain in force:

— Six "Fund for the financing of activities included in the General Radioactive Waste Plan".
— Seven "Paralysing of nuclear power plants under moratorium".
— Twenty-three "Subsidiaries of the company Red Eléctrica Corporación, S.A.", and
— Twenty-first Additional Provision "On the adequacy of access tolls and the maladjustment of revenues from electricity sector regulated activities", but with new wording.

Royal Decree-Law 13/2014, of October 3rd, adopting urgent measures in relation to the gas system and ownership of nuclear power plants

This standard is adopted in order to put an end to situations of delay in compliance with the obligations contemplated in article 28 of the Nuclear Energy Act, Law 25/1964 of April 29th, as a result of its modification by Law 12/2011, of May 27th, on Civil Liability for nuclear damage or damage caused by radioactive materials, which require that "the licensee of an operating permit for a nuclear power plant be a legal person having the management of nuclear power plants as its sole objective and the material, economic-financial and human resources necessary to guarantee the safe operation of such facilities". In this respect it provides that, "as of the date of entry into force, the ownership of the operating permit of a nuclear power plant not adapted to the conditions of sections 2 and 3 of article 28 of Law 25/1964, of April 29th, shall be understood to be transferred to the entity commissioned to operate the nuclear power plant by the licensees of the operating permit. As a result, whatever adaptation plans might be under way shall be made null and void".

Law 17/2015, of July 9th, on the National Civil Defence System

This Law repeals the previous Civil Defence Act of 1985 and the reference made to the latter by the nuclear emergency plan or PLABEN shall be understood as being to this new law, which aims to reinforce mechanisms strengthening and improving the protection of the public in the event of emergencies and catastrophes, in compliance with the principle of international solidarity. The law establishes that accidents occurring at facilities or in processes in which nuclear or radioactive substances are used or stored are the subject of Special Plans, responsibility for which shall be of the State, without prejudice to the participation of the Administrations of the autonomous regions and local entities.

Law 34/2015, of September 21st, partially modifying the General Tax Act, Law 58/2003, of December 17th

This creates a state tax to cover the rendering of response services by the Guardia Civil on the site of nuclear power plants or other nuclear facilities.

7.1.2. Ratification of conventions and legal instruments relating to nuclear safety

The following Directives have been approved during this period:

Directive 2013/59/EURATOM, of December 5th 2013, establishing basic safety standards for protection against risks arising from exposure to ionising radiations. This repeals five previous directives dealing with this issue, bringing them together in a single basic safety standard applicable to the protection of the health of people subjected to occupational, medical and population-specific exposures. Given the amplitude of the issues impacted by the Directive, a period of 4 years is established for transposition.

Council Directive 2014/87/EURATOM, of July 8th 2014, modifying Directive 2009/71/EURATOM, establishing a community framework for the nuclear safety of nuclear facilities. The aim is to implement improvements in nuclear safety in the wake of the Fukushima accident, to be applied by the member countries.

The objective of the reform is to maintain and promote the on-going improvement of nuclear safety. It requires the member States to adopt adequate national provisions in order to achieve a high level of nuclear safety in the protection of the workers and the general public against the risks posed by ionising radiations from nuclear facilities. It includes provisions covering the following:

— establishment of a national legal framework for the nuclear safety of civil nuclear facilities;

— organisation, functions and responsibilities of the competent regulatory authorities;

— obligations of licensees;

— initial and on-going training of the personnel; and

— information to the public.

7.1.3. Implementation of WENRA terms of reference

In its study on the harmonisation of reactor safety, published in January 2006, WENRA set out the conditions to be met by the requirements established by the different regulatory authorities in order for them to be considered "national requirements". On the basis of this study, each WENRA member country drew up an action plan for the performance of the harmonisation committed to. Both the CSN instructions and the RINR itself are perfectly embedded in the Spanish regulatory framework and in addition fulfil the WENRA requirements for consideration as "national requirements".

The action plan drawn up by the CSN contemplates the issuing of fifteen CSN instructions, plus certain minor modifications to the Regulation on Nuclear and Radioactive Facilities, covering different safety issues established in the WENRA reference levels.

In compliance with the overall action plan established by the CSN, fourteen of the fifteen instructions foreseen have been issued, two of these having been drawn up during the revision period covered by this report. The last IS is still pending and is currently being drawn up.

In September 2014, WENRA published new reference levels following their revision as a result of the accident at Fukushima nuclear power plant. A total 101 reference levels were affected, some of them being newly published.

The action plan has been revised to take into account the new reference levels introduced in 2014.

Spain participates actively in WENRA through the reactor harmonisation working group (RHWG) and the working group on waste and dismantling (WGWD). The process of harmonisation with the reference levels revised following Fukushima is being carried out in accordance with the programme and schedule established by the RHWG. In accordance with this programme, the process of self-assessment that led to the drawing up of the action plan finished in October 2015. The incorporation of the WENRA reference levels revised in the wake of Fukushima has a minor impact on the Spanish regulatory framework and the Spanish plants, since many of the new WENRA requirements were already incorporated by the CSN in the Complementary Technical Instructions (ITCs) (compulsory instructions associated with the operating permits of the facilities) issued to all the nuclear power plants, and other nuclear facilities, as a result of the Fukushima accident. Additionally, the two new CSN Instructions issued during the period covered by this report (published in February 2015) have also incorporated many of the revised reference levels. The results of the self-assessment and the action plan of all the member countries will be subjected to a peer review process throughout 2016.

According to the latest harmonisation status report, as of December 31st 2015, of the 330 WENRA reference levels in force (including those revised following Fukushima), 12 remain to be incorporated into the national standards.

7.2. National requirements and regulation in relation to nuclear safety

7.2.1. General framework of the secondary legislation regarding nuclear safety

In addition to the laws listed in the previous section, the period from January 2013 to December 2015 has seen the approval of the following Royal Decrees affecting the area of nuclear safety:

Royal Decree 102/2014, of February 21st, for the responsible and safe management of spent nuclear fuel and radioactive waste

This Royal Decree introduces a modification in art. 28.1 of the RINR, which regulates the authorisation of definitive shutdown. The novelty consists of establishing the definitive nature of the shutdown declaration when this has been issued for reasons of nuclear safety or radiological protection. When the shutdown has come about for other reasons, the licensee may request the renewal of the operating permit within one year of the date on which the said declaration enters into force, submitting an update of the corresponding documents plus whatever additional documentation or requirements might be determined. After one year without renewal having been requested, the shutdown declaration becomes definitive.

Royal Decree 1086/2015, of December 4th, modifying Royal Decree 1308/2011, of September 26th, on the physical protction of nuclear facilities and materials and radioactive sources

This modification meets the need to update Royal Decree 1308/2011 to the legislation approved since its entry into force in relation to cybersecurity, critical infrastructures and transparency. It also embodies the experience acquired during the preparation of the document known as the nuclear facilities "Physical Protection Plan" and the need to coordinate its approval with the Specific Protection Plan contemplated in Royal Decree 704/2011, of May 20th, approving the Regulation on the protection of critical infrastructures.

One of the most significant novelties, introduced in order to comply with the criteria defined in Royal Decree 1308/2011, on the "Design basis threat", is the implementation of a new environment of protection for the nuclear power plants and the future Centralised Temporary Storage (ATC) facility for spent nuclear fuel and high level radioactive waste, through the setting up of an adequate permanent response system to neutralise or mitigate the damage that might be caused by the materialisation of this threat. In keeping with the provisions of articles 11.1, paragraphs a), c) and e), and 12.1, letter B), paragraph d) of Constitutional Law 2/1986, of March 13th, on Security Forces and Bodies, this system will be made up of members of the Guardia Civil, constituting permanent response units. In this respect the Royal Decree stipulates a term of four years, as from entry into force, for the Ministry of the Interior to organise the deployment and implementation of the Response Units, in keeping with the adaptation of the organic structure, the necessary staffing from the workforce and resources, in the Directorate General of the Guardia Civil.

Another novelty is that it is now stipulated that modifications of the facilities Physical Protection Plans and of the transport Plans must be approved by the Directorate General for Energy Policy and Mines, following mandatory reports by the Ministy of the Interior and the CSN.

7.2.2. Provisions and guidelines drawn up and published by the regulatory authority

During the period covered by this report, the CSN has approved a number of CSN Instructions pursuant to the legal powers bestowed upon this Body by article 2.a) of Law 15/1980, of April 22nd, creating the CSN. These Instructions are binding technical standards necessarily to be adhered to by the addressees that are integrated into the legal system.

In this respect, the following CSN Instructions have been approved since the sixth National Report and compliance with them is compulsory for the licensees of all the nuclear power plants.

- **CSN Instruction IS-30 (Revision 1), of February 21st 2013, on the requirements of the nuclear power plant fire protection programme** (Official State Gazette of March 14th 2013). This is revised with a view to adapting it to the experience gleaned from its application, as well as to the need to regulate the different specific features of the design and original licensing bases of the fire protection systems of the different Spanish plants. This is also necessary in view of the recent evolution of the fire-fighting regulations, which has underlined certin areas for improvement. The first edition of this Instruction took into account the WENRA reference levels document in chapter S (Fire protection against internal fires).
- **CSN Instruction IS-10 (Revision 1), of July 30th 2014, on *Criteria for the reporting of events at nuclear power plants*** (Official State Gazette of September 19th 2014). This is revised taking into account the experience acquired since the previous 2006 edition, with a view to facilitating and clarifying the reporting of events occurring at nuclear power plants, modifying both the general conditions for reporting and the type of events to be reported.
- **CSN Instruction IS-36, of January 21st 2015, on emergency operating and severe accident management procedures at nuclear power plants** (Official State Gazette of February 17th 2015). This Instrucion establishes the requirements to be met by the Spanish nuclear power plants as regards the operating procedures necessary to guarantee that the plant is operated safely and without undesirable consequences for safety, indicating how to interact with the plant systems in response to possible operational situations, including severe accidents. These procedures are to be subjected to verification and validation processes in order to guarantee the suitability of the transient and accident management strategies that they contain. The users of these documents must receive adequate periodic initial and on-going training. Consideration has been given to the revision of the WENRA reference levels, which has incorporated new requirements associated with the lessons learned from the Fukushima accident.
- **CSN Instruction IS-37, of January 21st 2015, on design basis accident analysis at nuclear power plants** (Official State Gazette of February 26th 2015). Following the Fukushima accident, the importance of aspects relating to the capabilities and resources required to manage an accident exceeding the design basis of the facility became quite clear. The regulatory practice applied to date in this respect has consisted of verifying compliance with the technical standards required in the country of origin of the technology, with whatever specific adaptations might be considered necessary. This Instruction develops the contents of nuclear power plant accident analysis, thereby contributing to compliance with Council Directive 2014/87/EURATOM, of July 8th 2014, article 6 of which requires that the national legal framework demand that the licensees "periodically assess and verify and permanently improve the nuclear safety of the nuclear facilities, to the extent that is reasonably possible and in a systematic and verifiable manner".

A complete list of all the CSN Instructions may be found in the organisation's website (www.csn.es)

The Nuclear Safety Council Safety Guides are recommendatory documents, except in those cases in which a legal provision gives them compulsory status. Their objective is to achieve better compliance with regulatory forecasts and precepts, guiding the administrated entity in adequate decision-making rather than imposing solutions.

The following may be singled out from among the new issues or revisions addressed by the Nuclear Safety Council Safety Guides published during the period covered by this report and relating to matters dealt with by the Convention:

- **Safety Guide GS-04.03**. Methodology for checking of the radiological status of a site prior to its release. Generic release levels. Approved on December 4th 2013.

In the process of drawing up the CSN Instructions and Safety Guides, the participation of the stakeholders is facilitated and they are able to provide feedback. Likewise, the members of the public are kept informed in both cases through the computer-based and telematics media.

7.3. Licensing system

7.3.1. Systems and processes for the granting of licences, including the types of activities subject to licensing and, where appropriate, the procedure for the granting of new licences

Pursuant to article 12 of Royal Decree 1836/1999, of December 3rd, approving the Regulation on Nuclear and Radioactive Facilities (RINR), nuclear facilities shall, depending on each particular case, require the following authorisations, the contents of which were already included in the Sixth National Report. The novelty here is the "dismantling and decommissioning" permit (letter g), which is deal with in section 7.2.1 of Royal Decree 102/2014, by which it was created.

a. Preliminary or site authorisation.
b. Construction permit.
c. Operating permit.
d. Modification permit.
e. Modification performance and assembly permit.
f. Dismantling permit.
g. Dismantling and decommissioning permit.

The following shall also require authorisation:

h. The temporary storage of nuclear substances at facilities in the construction phase and not holding an operating permit.
i. Change of ownership of nuclear facilities.

These authorisations are granted by the Ministry of Industry, Energy and Tourism, following a report by the Nuclear Safety Council, as set out in the RINR.

7.3.2. Public and stakeholder participation

Mention should be made of the specific requirement regarding public information included among the arrangements for applications for preliminary authorisation, contemplated in article 15 of the RINR, according to which the Ministry of Industry, Energy and Tourism shall submit a cop of such applications to the respective Regional Office of the Government for the opening of a period of public information, this to begin with the publication in the Official State Gazette and that of the corresponding Autonomous Community of an announcement describing the objective and main characteristics of the facility. This announcement shall state that persons and entities considering themselves to be affected by the project may, within thirty days, submit in writing whatever allegations they deem to be appropriate to the corresponding Regional Office of the Government.

On completion of this period of public information, the Regional Office of the Government shall issue a report on the allegations and documentation submitted, sending the file to the Ministry of Industry, Energy and Tourism, with a copy to the Nuclear Safety Council.

The RINR also provides that prior to the granting of the aforementioned authorisations (with the exception of those referred to in letters e) and g) of article 12 of the RINR), the corresponding documentation shall be provided to those Autonomous Communities that have competences in relation to land planning and the environment and that house the facility or planning zone contemplated in the basic standards on planning for nuclear and radiological emergencies, in order for such communities to be able to submit allegations within a period of one month.

7.3.3. Legal provisions to prevent the operation of a nuclear facility without a valid licence

Finally, it should be pointed out that the performance of activities without a licence will give rise to application of the penalties contemplated in the system of sanctions established in Chapter XIV of the Nuclear Energy Act. For example, the performance of any regulated activity without having obtained the corresponding authorisation, or if the latter has expired or been suspended or repealed, and whenever this implies a serious threat for the safety or health of people or of serious damage to property or the environment, shall constitute a very serious infringement (article 86).

7.4. Regulatory system associated with inspection and the penalty process

Basic features of inspection programmes

Inspections make it possible to obtain the information required to verify compliance with the applicable legislation in force, CSN instructions and the specific conditions imposed in the regulatory authorisations, licences or permits.

The inspections performed by the technical staff of the Nuclear Safety Council may be of the following types:

— Relating to licensing: these ensure that facility authorisation processes are carried out in accordance with the requirements of the regulations governing nuclear safety and radiological protection. This type of inspection is applied in the case of requests requiring a CSN report.

— Control: these are performed to ensure that the operation of the facilities meets the requirements used as a basis for granting of the corresponding authorisation. They include the systematic (periodic) control inspections aimed at verifying the actual operating conditions of the facility, as well as other occasional control inspections carried out without any previously established frequency.

— Special: these cover the inspection functions attributed to the CSN, other than those described above, that arise as a result of incidents, exceptional situations entailing intervention in the event of radiological emergencies, formal complaints, etc.

The Basic Inspection Programme (PBI) is comprised of systematic control inspections, while the additional or supplementary inspections carried out as a result of the findings of the former are considered to be occasional control inspections.

The PBI inspections, carried out every two years, cover aspects such as design modifications, component design basis, compliance with surveillance requirements, operating experience, etc.

The CSN has implemented the Integrated Plant Supervision System (SISC), inspired by the US NRC's Reactor Oversight Program (ROP), which includes the PBI.

Section 19.3 of the Fourth National Report on the Convention on Nuclear Safety describes the SISC with a reasonable level of detail.

The main objectives of the SISC are as follows:

- To concentrate inspection efforts in the areas of highest potential risk.
- To centre the greatest attention on the weakest operating plants.
- To use objective plant operation measures.
- To provide rapid, understandable and predictable assessments of plant operation.
- To reduce unnecessary regulatory burdens on the plants.
- To respond to deviation or cases of non-compliance in a manner that is predictable and proportional to the risk.
- To increase the transparency of the CSN supervision processes.

General overview of the regulatory inspection and assessment process in relation to NPP safety

After nine years of operation, it may be concluded that the SISC has responded very acceptably to the expectations of the licensees and the CSN.

A novelty introduced in the SISC is that now the CSN also oversees three transversal areas that affect all the pillars of the system: human and organisational actuation (HOA); identification and resolution of problems (IRP); and safety-oriented working environment (SOWE). This supervision is accomplished through the performance of the licensee in relation to 13 transversal components associated with the aforementioned areas. These components are as follows: decision-making processes, resources, internal communication and cohesion, work planning and coordination, work practices and supervision, functions and responsibilities, continuous learning environment, organisational change management, safety-oriented policies and strategies, identification, assessment and resolution of problems and areas for improvement and, finally, the safety-oriented working environment. The implementation of this modification in the supervision of the transversal elements of the SISC was performed on July 1st 2014, a pilot period of one year (until July 1st 2015) being established, during which neither the results of the supervision of components nor the potential significant transversal components identified would be made public. On completion of this pilot period, the CSN drew up a report evaluating the experience gleaned during the year and it was agreed that the period should be extended until April 2016 in order to incorporate minor modifications in the systematic approach adopted, resulting from the lessons learned.

This supervision is accomplished in two ways:

1. Identification of weaknesses in transversal components affecting safety, in each of the findings deriving from the inspections.
2. Implementation of additional actions, relating to the Safety Culture, depending on the classification of a nuclear power plant in the Action Matrix.

By the end of 2012, tools were already available for the application of the new criteria for the transversal aspects and training of the CSN and nuclear power plant personnel began.

Training on the supervision of plant performance has meant an important challenge for both the CSN and the nuclear sector, since it requires the CSN inspectors to not only identify potential findings resulting from cases of licensee non-compliance that might reasonably have been avoided but also to attempt to establish the root causes leading to such cases or favouring their occurrence, assigning transversal components to each finding wherever possible using only the information obtained during the inspection.

An important conclusion is that the nuclear facility supervision function has been profoundly modified as a result of implementation of the SISC.

The supervision and control process has been much more efficient, with the licensee himself systematically and constantly striving to identify problems and apply the corrective actions most

adequate for their resolution without requiring CSN supervision, wherever possible. The SISC has also helped to optimise the process of penalties and make it more objective, since in the majority of cases in which the licensee has committed an infringement considered to be slight and the finding associated with the non-compliance is classified in accordance with the SISC as belonging to the green category, a process allowing the licensee to be warned is initiated automatically, removing the need for the Ministry of Industry, Energy and Tourism to initiate sanctions proceedings in response to a proposal by the CSN. This has meant greater homogeneity in the warnings issued.

In short, application of the SISC has contributed to making the CSN's supervision and control function more objective and predictable for the public and the plant licensees.

In 2013, 133 green inspection findings were identified and 1 white, in 2014 there were 155 green findings, with the Santa María de Garoña plant no longer counting, and in 2015 there were 134 green findings.

Although affected by a high degree of difficulty for the development of its applications and their suitable management in the first few years after its start-up, the corrective actions programme (PAC) is currently considered to be a fundamental tool to support the SISC, in as much as it refers to the activities to be carried out by the licensees to correct deficiencies and identify and solve problems before they evolve into an incident with more serious consequences. One way or another, it continues to require major effort, both by the licensees for its development and by the CSN for its adequate supervision.

In conclusion it may be said that in 2013 all the plants were in the licensee response column, except for Almaraz and for three quarters the Trillo plant, allowing the actions aimed at correcting the failures identified to be carried out directly by the licensees.

From the first quarter of 2013, groups I and II of the Almaraz plant were in the "Regulatory response" column of the action matrix, Group I due to a white finding relating to the use of unqualified components installed in safety systems, affecting the mitigation systems safety pillar, and Group II as a result of a white finding due to the repeated failure of the essential services water system pumps, affecting the initiating events safety pillar. From the last quarter of 2012 to the third quarter of 2013, Trillo nuclear power plant was also in "Regulatory response" due to a white finding assigned to the "Mitigation Systems" safety pillar and resulting from non-compliance with the requirements of CSN Instruction IS-19 on the management system and the Quality Manual.

In 2014 all the plants were in the licensee response column and in 2015 only Almaraz group II was in the "Regulatory response" column as a result of a white indicator relating to emergency diesel generator failures and unavailabilities.

All this information, along with details of each individual inspection finding and/or operating indicator, is accessible to the public on the CSN website, and is updated quarterly.

Furthermore, on January 8th 2014 the Plenary of the Council approved a new supervision and tracking system (STS) for Santa María de Garoña nuclear power plant, adapted to the shutdown situation. As a result, in 2014 and 2015 this plant no longer appears in the SISC supervision programme, its corresponding six-monthly reports being programmed in the SSG.

7.5. Compliance with the regulation applicable to licences

In accordance with Law 15/1980, of April 22nd, creating the Nuclear Safety Council, and the Nuclear Energy Act, Law 25/1964, of April 29th, in the event of non-compliance the CSN may propose the opening of whatever sanctions proceedings it deems to be appropriate and issue warnings.

In relation exclusively to nuclear power plants, during the period 2013-2015 the CSN has issued a total ten warnings and three proposals for the opening of sanctions proceedings.

Article 8. Regulatory authority

8.1. Establishment of the regulatory authority

In Spain, the responsibilities for nuclear safety and radiological protection are distributed among several different authorities.

The Government is responsible for designing energy policy and dictating compulsory regulations.

The Ministry of Industry, Energy and Tourism (MINETUR) is the department of the General State Administration having competence in the field of nuclear energy, with responsibility for granting authorisations for nuclear facilities, following a mandatory and binding report by the Nuclear Safety Council and, where appropriate, by other ministerial departments, as well as for issuing standards proposals, adopting provisions for the enacting of the standards in force and applying the system of penalties relating to nuclear energy.

The Nuclear Safety Council is the State body solely responsible for nuclear safety and radiological protection. It is an entity existing under Public Law and independent from the General State Administration that reports to Parliament on the performance of its activities and interacts with the Government through the MINETUR.

8.1.1. MINETUR functions and responsibilities

Pursuant to Royal Decree 344/2012, of February 10th, the Ministry of Industry, Energy and Tourism (MINETUR) exercises the following functions within the scope of the Convention on Nuclear Safety:

- Granting of permits for nuclear and radioactive facilities, following a mandatory report by the CSN. Such reports shall be binding when negative in their findings and when imposing conditions necessary for safety.
- Drawing up of standards proposals and application of the system of penalties.
- Tracking 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 area.

8.1.1.a) Organisational structure

Royal Decree 344/2012 sets out the basic organisational structure of the MINETUR. Within the MINETUR, the Secretariat of State for Energy is the senior body responsible for energy matters and, within the latter, the Directorate General for Energy Policy and Mines, to which reports the Sub-Directorate General for Nuclear Energy, is the management body performing the functions referred to in the previous section and specifically applicable in the field of nuclear energy.

2 Except second and third category radioactive facilities located in Autonomous Communities to which administrative competence in the field has been transferred.

8.1.1.b) Coordination of nuclear R&D&i activities

Through the Sub-Directorate General for Nuclear Energy, the MINETUR participates in coordinating certain research, development and innovation activities in the field of nuclear energy in Spain via its participation in the Nuclear Fission Energy Technology Platform (CEIDEN).

The objective of CEIDEN, which was set up in 2007, is to coordinate the different national R&D plans and programmes relating to nuclear fission energy, along with participation in international programmes, ensuring coherent orientation of the efforts of the entities involved.

The CEIDEN Platform currently has 102 members and around 20 collaborating entities. The following are represented in its Management Council: the MINETUR, through the Sub-Directorate General for Nuclear Energy, the CSN, the Ministry of Economy and Competitiveness (MINECO), CIEMAT, the universities and representatives of companies linked to the nuclear energy sector.

For additional information on these and other CEIDEN programmes, please go to www.ceiden.com/

8.1.1.c) Participation in international organisations and activities

Through the Sub-Directorate General for Nuclear Energy, the MINETUR actively participates in nuclear energy-related activities promoted by the international organisations to which Spain belongs.

The MINETUR collaborates in reaching bilateral agreements with other countries in relation to the peaceful use of nuclear energy and represents the Spanish Government in the contributors' meetings of the different international funds to which Spain contributes.

Within the framework of the European Union, the MINETUR advises the Spanish Permanent Representation for its participation in the working groups of the Council dealing with matters regulated by the EURATOM Treaty.

Within the framework of the International Atomic Energy Agency (IAEA), the MINETUR is part of the Spanish delegation to the Agency's General Conference.

Likewise, the MINETUR is part of the Spanish delegation to the Steering Committee of the OCDE Nuclear Energy Agency (NEA), and participates in several of the Agency's technical committees.

8.1.2. CSN functions and responsibilities

The CSN's main functions as regards the nuclear power plants are as follows:

- The issuing of proposals to the Government regarding the necessary regulations within its realm of competence and of Instructions, Guides and Circulars of a technical nature within this area.
- The issuing of mandatory reports to the MINETUR in order for the latter to reach decisions regarding the granting of the legally established authorisations. Such reports shall be binding when negative in their findings and when imposing conditions necessary for safety.
- The performance of controls and inspections at all the facilities and during all phases, especially the phases of design, construction, start-up and operation, as well as during the transport, manufacturing and homologation of equipment incorporating radioactive sources or generating ionising radiations.
- In this respect, the CSN is authorised to suspend activities and the operation of the facilities for reasons of safety.

— Collaboration with the competent authorities in the drawing up of the criteria to be met by the off-site emergency plans and physical protection plans of the nuclear and radioactive facilities and, following the writing of these plans, participation in their approval and coordination of the support and emergency response measures.

— The issuing of proposals regarding the opening of sanctions proceedings in the event of infringements relating to nuclear safety and radiological protection, in accordance with the legislation in force, and the issuing of technical reports for suitable qualification of the events.

— Control of the measures for the radiological protection of professionally exposed workers, the public and the environment. As regards the radiological protection of the environment, the CSN controls and oversees radiological quality throughout the entire Spanish territory and assesses the environmental radiological impact of nuclear and radioactive facilities and activities involving the use of ionising radiations.

— The issuing of favourable reports on new designs, methodologies, simulation models or verification protocols relating to nuclear safety and radiological protection.

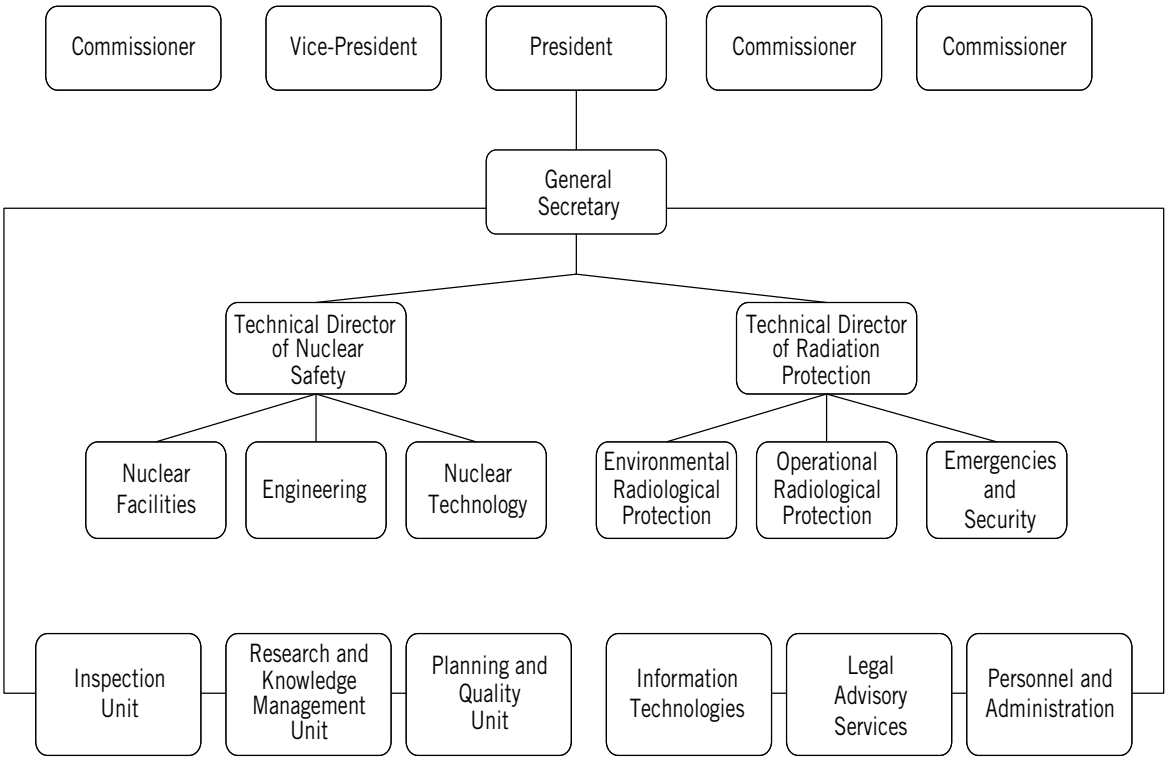
— The granting and renewal of operator and supervisor licences and Radiological Protection Service Head diplomas.

In short, the functions and responsibilities of the CSN have not been modified with respect to the previous Report and the Council continues to work in accordance with the legislative changes that have occurred in recent years.

8.1.2.a) CSN structure

The organisational structure of the CSN was modified in view of the approval of Royal Decree 1440/2010, of November 5th, and is currently as follows (figure 8.1):

Figure 8.1: Organisational flowchart of the CSN



Plenary of the Council

Pursuant to the Law by which the Nuclear Safety Council was created and its charter, the Plenary of the Council is currently made up of the following persons:

— President: Fernando Marti Scharfhausen, appointed on December 28th 2012 by Royal Decree 1732/2012.

— Vice-president: Rosario Velasco García, appointed on February 22nd 2013 by Royal Decree 138/2013.

— Commissioner: Fernando Castelló Boronat, appointed on February 22nd 2013 by Royal Decree 139/2013.

— Commissioner: Cristina Narbona Ruiz, appointed on December 28th 2012 by Royal Decree 1733/2012.

— Commissioner Javier Dies Llovera, appointed on October 16th 2015 by Royal Decree 934/2015.

The Council is assisted by a Secretariat General, headed by María Luisa Rodríguez López, appointed by RD 268/2013, of April 12th.

Units reporting directly to the Secretariat General

In addition to the two technical directorates, three General Sub-directorates and three Units report to the Secretariat General:

- Sub-directorate of Information Technology.
- Sub-directorate of Personnel and Administration.
- Sub-directorate of Legal Advisory Services.
- Inspection Unit.
- Research and Knowledge Management Unit.
- Planning, Evaluation and Quality Unit.

Technical Directorate for Nuclear Safety

This Technical Directorate groups together all functions relating to the safety of nuclear facilities, with the exception of those relating to the disposal of low and intermediate level radioactive wastes, which are the responsibility of the Technical Directorate for Radiological Protection. It is also in charge of everything relating to safety in the transport of nuclear substances and radioactive materials.

Three Sub-directorates report to the Technical Directorate for Nuclear Safety:

- Sub-directorate of Nuclear Facilities.
- Sub-directorate of Nuclear Technology.
- Sub-directorate of Engineering.

Technical Directorate for Radiological Protection

In addition to the inspection and control of radioactive facilities, the radiological protection of the workers and the management of low and intermediate level radioactive waste, this Technical Directorate undertakes responsibility for the radiological protection of the public and the environment and for radiological emergencies.

Three Sub-directorates report to the Technical Directorate for Radiological Protection:

- Sub-directorate of Environmental Radiological Protection.

- Sub-directorate of Operational Radiological Protection.
- Sub-directorate of Emergencies and Security.

8.1.2.b) Development and maintenance of human resources over the last three years

As of December 31st 2015, the workforce of the CSN was comprised of 451 people.

Table 8.2. Distribution of Nuclear Safety Council personnel as of December 31st 2015

	Council	Secretariat General	Technical Directorates	Total
Upper Management	5	1	2	8
NS and RP Body Civil Servants	7	16	186	209
Civil servants of other Corps or Brackets	7	98	36	141
Temporary Personnel	26	0	0	26
Laboral-Workers	2	46	19	67
Totals	**47**	**161**	**243**	**451**

The evolution of the workforce during the period 2013-2015 is shown in table 8.3.

Table 8.3. Structure of the CSN workforce 2013-2015

	2013	2014	2015
Upper Management	8	8	8
NS and RP Body Civil Servant	211	205	209
Civil servants of other Corps or Brackets	137	137	141
Temporary Personnel	24	27	26
Laboral-Workers	69	69	67
Totals	**449**	**446**	**451**

The number of women working for the Nuclear Safety Council represents 52% of the total, the number of men making up the remaining 48%.

The average age of the Organisation's personnel is 53 years.

As of December 31st 2015, the qualifications of the workforce were distributed as follows: 68.96% post-graduates, 6.21% graduates and 24.83% other qualifications.

8.1.2.c) Measures for the development and maintenance of competence

In view of its specific nature, the CSN attaches special importance to the training of its human resources. During the three-year period from 2013 to 2015, the drawing up of training plans has continued, with the objectives aligned with those of the CSN Strategic Plan in force, the training being grouped into seven programmes, one of them sub-divided into four areas:

- Advanced Training and Recycling.
  - — Sub-programme on Nuclear Safety.

  - — Sub-programme on Radiological Protection.
  - — Sub-programme on Transversal Training Areas.
  - — Sub-programme on Initial Technical Training.
- Management Development.
- Administrative Management.
- Prevention.
- Computer Systems.
- Languages.
- Skills.

During the three-year period 316 courses have been delivered, this giving an average of 105 courses per year. An annual average of more than 33,666 hours have been set aside for training, equivalent to 4.29 % of the working day. The investment in training amounted to 1,264.324 Euros, equivalent to almost 421,441 Euros a year.

Promotion of the Council's presence at national and international forums (congresses, meetings, seminars) relating to its functions and competences has continued.

The challenge facing the CSN is to maintain and enhance its high technical and professional level and its knowledge.

The CSN is currently developing a knowledge management model adapted specifically to its needs and based on IAEA recommendations that will be fully incorporated in its Management System and will make use of the characteristic elements of knowledge management already available to it.

The knowledge management process for the CSN must address the four basic pillars of the model recommended by the IAEA. It is structured as a cyclic transversal process comprising the following stages:

- Identification of the capabilities required by the CSN for performance of its mission (necessary capabilities).
- Periodic evaluation of the resources available at the CSN (available resources).
- On-going evaluation of the gaps, shortcomings and losses of CSN information, documentation and knowledge (gaps and shortcomings).
- Programme for the preservation of critical knowledge and on-going improvement of capabilities (acquisition and preservation).
- In-house communication plan to ensure the distribution and accessibility of knowledge and information (accessibility and availability).
- Independent evaluation programme and periodic review of the KM process (evaluation and review).

8.1.2.d) Development in relation to sources of finance over the last three years

Every year the CSN draws up a proposed budget of expenses and revenues that are integrated in the General State Budget and submitted to Parliament for approval. The revenues approved by Parliament for the period 2013 to 2015 are as follows:

	2013	2014	2015
REVENUES	47,311,670.00	46,611,640.00	46,507,130.00
EXPENSES	47,311,670.00	46,611,640.00	46,507,130.00

Practically all the economic resources are obtained through collection of the fees and public prices charged for the services provided by the CSN in performance of its functions.

The conditions governing such income are regulated by Law 14/1999, of May 4th, on Fees and Public Prices for the services provided by the Nuclear Safety Council.

The channels for financing are currently as follows:

Financing through fees and public prices for:

— The performance of studies, reports and inspections prior to the operating and decommissioning permits for nuclear and radioactive facilities issued by the Ministry of Industry, Energy and Tourism.

— The inspection and control of operating nuclear and radioactive facilities and related activities.

— The granting of licences for the personnel who are to operate or supervise the operation of nuclear and radioactive facilities.

— Reports, tests or studies on new designs, methodologies, simulation models or verification protocols relating to nuclear safety or radiological protection.

For the three-year period under consideration, this channel of financing amounts to approximately 98.5% of income.

State Transfers

The Nuclear Safety Council carries out controls on the radiological protection measures aimed at the general public and the environment. The performance of these functions is not financed via the fees and public prices regulated by Law 14/1999, since it does not constitute a taxable event.

Financing is obtained via the General State Budget, through credits issued by the Ministry of Industry, Energy and Tourism.

For the three-year period under consideration, this channel of financing amounts to approximately 0.8% of income.

Other resources

The remainder of the financing, approximately 0.6%, corresponds fundamentally to equity revenues deriving from interests on bank accounts.

Of the total financing for the period 2013-2015, approximately 56% goes to covering personnel costs and 31% to expenses relating to goods and services.

8.1.2.e) Declaration regarding the adequacy of resources. Novelties in relation to financial resources over the last three years

The Nuclear Safety Council has not experienced any financial difficulties during the period 2013-2015, in spite of the economic crisis that started in 2008. This did, however, make it necessary to design a budgeting stability scenario that involved the adoption of measures to redimension the organisation and its human resources in a more adequate manner. It also meant limiting the creation of new positions for civil servants belonging to the nuclear safety and radiological protection corps.

As a result, from 2011 onwards the incorporation of new technicians belonging to the nuclear safety and radiological protection corps was reduced, until the years 2014 y 2015, in which 6 and 20 new positions respectively were created. Consequently, a trend towards a more normal situation may be considered to have been initiated.

8.1.2.f) CSN quality management system

The CSN has implemented a process-oriented Management System based on the requirements of the IAEA (GS-R-3) and the ISO 9001: 2008 standard. The processes, which cover all the Organisation's activities, are classified as follows:

- Strategic, including the operation of the Council, information and communication and the development of standards.
- Operational, including the authorisation, evaluation, supervision and control of facilities and activities (including transport), the issuing of personnel licences, the radiological protection of the workers, the public and the environment, emergency management and security.
- Support, including institutional and international relations, research and development, economic and human resources management (including training), information systems, documentation and the administration of the Management System.

The documents describing the System are organised hierarchically: System Manual, Organisation Manual, process descriptions and procedures.

The Management System is subject to on-going improvement. In addition to evaluation of compliance with the plans and objectives, the CSN has established an internal auditing plan and systematically undergoes external evaluations by national and international bodies. The following may be singled out in this respect:

- The internal auditing plan ensures that all the operating processes are audited every four years, and the others at least every five years.
- In addition to the economic-financial audits and controls required of all public bodies, the CSN is required to report systematically to the Spanish Parliament and to the parliaments of autonomous communities possessing nuclear facilities. The Parliament is responsible for the continuous control of the CSN's actuations.
- Council Directive 2009/71/Euratom, of June 25th 2009, requires the Member States of the European Union to perform ten-yearly self-assessments of their regulatory framework and authorities and to host an international peer review. The Management System in place at the CSN and its experience in the performance of self-assessments and peer reviews of an international nature will facilitate compliance with this requirement. At this juncture it is relevant to mention that the CSN was subjected to an IAEA IRSS mission in 2008 and that the corresponding follow-up mission took place in 2011.

8.1.2.g) Transparency of regulation activities, including the measures adopted to improve transparency and public communication

The communication policy of the Nuclear Safety Council is defined in accordance with Law 15/1980, of April 22nd, by which the CSN was created.

The obligations of this law regarding information and communication are channelled along three paths:

— Transmission of information to State institutions: every year the CSN submits a detailed report on its activities to the Spanish Parliament and the Parliament of autonomous communities having nuclear facilities in their territory. This annual report is presented before the Parliamentary Commission for Industry, Energy and Tourism through the appearance of the president of the Council. Likewise, and within the framework of relations with the Parliament, the CSN responds to parliamentary initiatives and fulfils the resolutions issued by the Commission for Industry, Energy and Tourism in response to the annual reports.

— Information forums in the vicinity of nuclear power plants: the CSN participates in information forums in the vicinity of nuclear power plants in order to report on aspects relating to their operation and emergency preparedness. The Regulation on Nuclear and Radioactive Facilities (RINR) (Royal Decree 1836/1999, of December 3rd regulates the operation of the Local Information Committees, presided over by the Ministry of Industry, Energy and Tourism and held annually. The CSN actively participates in these forums, presenting yearly relevant aspects relating to the control and operation of the facilities.

— General public information policy: article 14 of Law 15/1980 provides that the CSN shall facilitate access to information and the participation of the members of the public and civil society, informing the public of all relevant events relating to the operation of the nuclear and radioactive facilities, especially as regards safe operation, the radiological impact for people and the environment, events and incidents occurring at these installations and the corrective measures put into place in order to avoid repetition of the events, making use of information and communication technologies.

Through its institutional web-site the CSN provides information on inspection reports, the minutes of Council Plenary meetings, the technical reports on which the Council's agreements are based and all relevant events relating to the operation of the nuclear and radioactive facilities (plant operating status, information on the quality of the environment measured by the Network of Automatic Stations and the Environmental Radiological Surveillance Network), news items, reviews and press releases on events at nuclear power plants and radioactive facilities, SISC (Integrated Plant Supervision System), etc.

In July 2015 the CSN started up a new institutional web-site with a view to improving communication and transparency. All the organisational units of the Council participated in this project, revising all aspects of the portal, including its contents, structure, presentation, accessibility and browsing. The technical platform has also been replaced with another better suited to new requirements and current and future functionalities.

As regards the information provided to the media and interest groups, and apart from what is included in the institutional portal, the CSN responds to direct requests presented by the media, applying criteria of transparency and agility within a framework of technical accuracy.

The legal requirement regarding transparency obliges the CSN to submit its instructions and safety guides to public scrutiny during the phase of their preparation, for which it has set aside an area in the institutional portal via which comments may be made. Furthermore, the procedure to be adhered to for communications made by physical or legal persons has been established, in accordance with article 13 of Law 15/1980. The Council also makes a form available to the workers at nuclear and radioactive facilities for them to be able to report on any event affecting the safety of such installations, guaranteeing confidentiality.

The CSN also uses other channels of communication, such as the Information Centre and the issuing of publications free of charge, these being generally available via the website in electronic format.

During the period covered by this report, an image study has been carried out in order to identify the expectations of stakeholder groups in relation to independence, transparency and information in the activities of the Nuclear Safety Council. The study was presented to the Advisory Committee on public information and participation during its ninth meeting in June 2015.

At international level the CSN has continued to collaborate in the Public Communication Working Group of the NEA/OCDE regulatory activities committee, sharing the experiences and good practices of the regulatory bodies in relation to communication. Particularly significant in 2014 was the first workshop with European stakeholder groups. In addition, work continues within the ENSREG group on transparency to safeguard the principles of transparency and accessibility of information for the citizens of Europe.

Other channels of communication

Organisation of conferences, seminars and training activities:

The CSN participates or collaborates with other institutions in the organisation of different events aimed at promoting understanding of issues relating directly or indirectly to its functions.

Information centre:

The Council has an interactive space on all activities relating to the CSN mission, this being open to the public free of charge and for the most part receiving visits from educational centres and institutional delegations from Spain and abroad.

Issuing of publications

The Council is actively involved in the publishing of technical and informative works, within the framework of the annual publications plan.

In addition, the CSN publishes a journal on nuclear safety and radiological protection, the objective of which is to serve as a means of communication with the public to facilitate the understanding of questions relating to the organisation's activity. Besides spreading knowledge of radiological protection and nuclear safety, this journal, *Alfa, Revista de Seguridad Nuclear y Protección Radiológica,* includes a section with information on the activities of the CSN and the decisions of the Plenary.

8.1.2.h). Advisory committees

Advisory committee on public information and participation

The Advisory Committee on Public Information and Participation in relation to nuclear safety and radiological protection (from hereon the Advisory Committee) was set up pursuant to article 15 of Law 15/1980, creating the Nuclear Safety Council (CSN), with the mission of issuing recommendations to the CSN with a view to favouring and improving transparency, access to information and public participation in matters relating to the CSN's realm of competence.

It was constituted on February 24th 2011, during its first meeting, thereby complying with the provisions of Resolution number 24 of the Parliamentary Commission for Industry, Tourism and Trade.

It is provided with an Analysis Commission whose mission is to analyse recommendation proposals and draw up an assessment report serving as a basis for decision-making by the Advisory Committee.

Since its creation, and as of closure of this document, a total 9 meetings have been held, the following recommendations having been issued to date:

1. Recommendation (meeting of 21/05/2012). In view of public concern regarding the problem of contamination at Palomares and the need to finalise the Rehabilitation Plan, the Advisory Committee recommended that the CSN take communication measures to inform the members of the public of the situation in the area and the progress of the Plan. It also recommended that an informative subject-specific document on the actual consequences of the Palomares accident be published. This recommendation was adhered to by the Council.
2. Recommendation (meeting of 21/05/2012). The Advisory Committee recommended that the CSN make greater efforts to achieve maximum transparency in information and communication to the public regarding the process of reviewing the Nuclear Emergency Plans (PEN) as a result of the Fukushima accident, with special emphasis on the transmission of information to populations residing in areas close to nuclear power plants. This recommendation is considered to have been adhered to by the Council.

3. Recommendation (meeting of 21/05/2012). The Advisory Committee recommended that a public conference be held to present the final results of the Spanish report on the stress tests performed at the country's nuclear power plants. This recommendation was adhered to by the Council.
4. Recommendation (meeting of 25/10/2012). The Advisory Committee recommended that the CSN carry out studies to identify the expectations of stakeholder groups related to nuclear safety and radiological protection regarding the work of the CSN and to identify appropriate actions to progress in terms of transparency, independence and credibility. The study and its conclusions were submitted during the committee meeting held on June 25th 2015.

8.2. Situation of the Regulatory Authority

Since it was created in 1980, the Nuclear Safety Council has successively developed all its functions and competences, such that it now has all the regulatory capacities and legal instruments required to perform its functions with full guarantees of the regulated entities and activities being carried out in accordance with the most demanding international standards, criteria and guidelines.

Both the law by which the Nuclear Safety Council was created and its charter establish mechanisms to guarantee that its actuations have the necessary credibility and foster the trust of the society that it has the mission of protecting, as well as to guarantee its independence in the performance of the functions assigned to it.

8.3. Coordination between the MINETUR and the Nuclear Safety Council

In keeping with the provisions of Royal Decree 344/2012, of February 10th, the CSN maintains relations with the Government via the MINETUR.

While the CSN is the State organisation solely responsible for nuclear safety and radiological protection, the MINETUR is the department in charge of proposing and enforcing Government policy in relation to energy matters, and among these the issue of nuclear energy.

8.3.1. Authorisation of nuclear and radioactive facilities

The MINETUR is responsible for granting authorisations for nuclear and radioactive facilities, following a mandatory report by the CSN. This report is binding when negative in its findings, or as regards the conditions imposed when positive.

8.3.2. Sanctions proceedings in the event of infringements relating to nuclear safety, radiological protection or/and physical protection

The MINETUR is the competent authority for the enforcement of the penalties deriving from the system of sanctions.

Generally speaking, the system of penalties applicable in Spain is established in the Nuclear Energy Act, Law 25/1964, of April 29th, in Law 30/1992, of November 26th, on the Legal System of the Public Administrations and Common Administrative Procedure and in Royal Decree 1398/1993, of August 4th, approving regulation of the procedure for the exercising of sanctioning powers.

Depending on their seriousness, Law 25/1964 classifies infringements as very serious, serious and slight, setting out the criteria for their correct classification. It also establishes the applicable penalties, these consisting of fines that vary in amount depending on the type of facility affected and the seriousness of the infringement committed.

The aforementioned Law 25/1964 also establishes the procedure and competences for the enforcement of penalties:

- In the event of non-compliance with legal or regulatory precepts relating to nuclear safety, radiological protection or physical protection, the CSN shall propose the initiation of the corresponding sanctions proceedings, informing the competent authority (MINETUR) of both the events constituting the infringement and whatever relevant circumstances might be necessary for their suitable qualification.
- Likewise, the MINETUR may initiate sanctions proceedings on its own initiative in the event of infringements relating to issues other than nuclear safety or radiological protection.
- The MINETUR Directorate General for Energy Policy and Mines is the instructing body that, after receiving allegations, carrying out tests and fulfilling the process of audience, draws up a Resolution proposal that it submits to the body that will issue the Resolution. This proposal includes the proven events, infringements, responsibilities and penalty. Depending on the seriousness of the infringement, the Resolution will be issued by the Director General of Energy Policy and Mines, the Minister of Industry, Energy and Tourism or the Cabinet of Ministers.
- In the event of infringements that might be qualified as slight, the CSN may, instead of initiating sanctions proceedings, issue a warning to the licensee of the facility and require that the latter apply the corresponding corrective measures. If this requirement is not met, the CSN may enforce coercive fines. The MINETUR does not intervene in this procedure.

Likewise, the CSN is empowered by law to suspend the operation of any nuclear or radioactive facility for reasons of safety.

Article 9. Responsibility of the licensee

9.1. Legislation assigning fundamental responsibility for safety to the licensees

Article 36 of the Nuclear Energy Act, Law 25/1964, of April 29th, explicitly states that "the licensee of the nuclear or radioactive facilities or of the activities relating to ionising radiations shall be responsible for their safety".

Article 8 of Royal Decree 1836/1999, of December 3rd, approving the Regulation on nuclear and radioactive facilities, establishes that "the licensee of each permit shall be responsible for the operation of the facility or activity under conditions of safety and at all times in compliance with the provisions of the official documents in accordance with which the corresponding authorisation is granted".

In addition, section 3 of this same article establishes that the licensee shall continuously strive to improve the conditions of nuclear safety and radiological protection of his facility. In this respect he shall analyse the best existing techniques and practices in accordance with the requirements established by the Nuclear Safety Council (CSN) and implement those considered by this body to be appropriate.

The Nuclear Safety Council 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 article 2 of Law 15/1980, of April 22nd, creating the CSN.

9.2. Description of the main means by which the licensee fulfils his fundamental responsibility for safety

The licensee fulfils these obligations by operating the facility in accordance with the limits and conditions set out in the Operating Permit granted by the Ministry of Industry, Energy and Tourism (MINETUR), following a mandatory and binding report by the CSN.

These limits and conditions identify the official documents with which compliance is compulsory: Safety Study, Technical Specifications, Operating Regulation, Site Emergency Plan, Quality Assurance Manual, Radiological Protection Manual, Radioactive Waste Management Plan and Physical Protection Plan.

The operation of the plant must also meet the requirements of the Instructions issued by the CSN in accordance with Article 2.a of Law 15/1980, of April 22nd, creating the Nuclear Safety Council, according to which the CSN "may draw up and approve instructions regarding nuclear facilities and activities relating to nuclear safety and radiological protection". "The instructions are technical standards on nuclear safety and radiological protection that will be binding upon those affected by their scope of application once notified or, where appropriate, published in the Official State Gazette".

One of the obligations of the licensee is to issue a series of reports to the CSN, some periodically others referring to specific activities, such as refuelling activities or events fulfilling certain reporting criteria.

In addition, the licensees have safety-oriented management policies and systems pursuant to the provisions of CSN Instruction IS 19, on the requirements of the management system at nuclear facilities. These management policies and systems are subject to systematic supervision and control by the CSN. Furthermore, as explained in article 14.3.4, the licensees have their own procedures, guidelines (occasionally referring to the sector overall) and organisational arrangements

facilitating and guaranteeing compliance with the requirements and establishing internal control mechanisms.

9.3. Description of the mechanisms by which the regulatory authority ensures compliance by the licensees with their fundamental responsibility in relation to safety

The CSN possesses a variety of instruments to verify that the licensees fulfil their obligations.

The first and most powerful is the inspection plan, which comprises the following:

- The Basic Inspection Plan, by means of which the CSN performs specific periodic checks at the plant with respect to all safety significant activities.
- The generic issues inspection plan on concerns arising in general as a result of Spanish or international operating experience.
- Reactive inspections organised in response to safety significant events of importance because of their consequences or causes.
- Licensing inspections, organised within the framework of a process of authorisation, for example a design modification, ETF change or operating permit renewal.

An essential part of the inspection programme is performed by the CSN resident inspectors, two at each plant, who review and assess day-to-day plant operating events with the help, where appropriate, of a support structure at the CSN offices, which manages technical collaboration with the rest of the CSN organisation when the matter so requires.

The CSN also monitors the operating indicators, which, in accordance with the procedures of the Integrated Plant Supervision System (SISC) in force, require a series of actions by both the licensee and the CSN when certain thresholds are exceeded.

The CSN analyses the reports submitted by the plants, in some cases on an individual basis and in others as part of the documentation used to prepare its inspections.

Any deviations identified by the CSN during the inspection process are considered to be "inspection findings" and are categorised depending on their importance. Derived from this process are the actions to be performed by the licensee and, where appropriate, the depth of the corresponding tracking to be performed by the CSN, in accordance with the SISC methodology.

In the event of non-compliance of a legal or regulatory requirement, the CSN may propose that the MINETUR initiate sanctions proceedings against the plant.

If the non-compliance constitutes a slight infringement and a series of circumstances exists underlining its low degree of significance, the Nuclear Energy Act allows the CSN to issue a warning directly to the licensee pointing out the non-compliance identified and the corrective measures that the latter should implement.

At a predetermined frequency, as set out in their respective operating permits, the licensees submit reports to the CSN on the monitoring of in-house and industry operating experience, the results of and modifications deriving from analyses of the new standards in the country of origin of the technology, the results of the environmental radiological surveillance programme, the results of worker dosimetry controls, activities performed within the framework of the radioactive waste and spent fuel management plan, activities performed for the initial and ongoing training of the licensed and non-licensed personnel of the facility and the exit of radioactive packages from the installation. These reports are subject to CSN supervision.

9.4. Description of the mechanisms by which the licensee maintains open and transparent communications with the public

All the Spanish nuclear power plants have a policy of open and transparent communications providing the public with adequate and accurate information on the activity of each facility.

Information on nuclear power plants

1. **Communication and relations with the media**.- The Spanish nuclear power plants are equipped with organisations in charge of providing the media and society in general with information on the situation of each facility. This is accomplished through the issuing of press releases, communiqués and information, press conferences and meetings with the media, specific items of information, collaborations with the media, etc. Especially noteworthy is the boost given to the website of each plant as a tool for communication. Initiatives also exist for the use of other direct and interactive public communication tools (for example the social media).
2. **Publications**.- The nuclear power plants have their own periodic publications (corporate magazines) that include the most important news items on the facility and its surroundings, as well as on the nuclear sector in general. There are also specific publications such as subject-specific brochures and technical and other reports, etc.
3. In addition, all the Spanish nuclear sites have an **information centre**. These are installations where the operation of the plant, the measures to guarantee its safety, environmental quality and radioactive waste management are explained in a practical and informative manner.

Information by other organisations

Special mention might be made within the nuclear sector of the role played by the **Nuclear Industry Forum**, which undertakes important informative and educational tasks. Especially significant within its organisation are the **Communications Committee**, for the exchange of experiences and joint initiatives, the Publications Committee and the Training Committee, active especially in the area of collaboration with the world of education. UNESA, an association that brings together the country's leading electricity utilities, publishes general information on the operation of the Spanish nuclear power plants.

Information by public institutions and organisations

A unique initiative as regards information and public participation are the **Local Information Committees** of each facility. These are forums in which national, regional, provincial and local institutions, the plants themselves and the most representative entities and associations in each area are represented, along with the regulatory authority. These forums are called upon periodically to report on the main aspects relating to each plant, activities that are presented and debated by all the organisations represented.

Information for public institutions and representatives

Furthermore, each facility and representatives of the sector appear on their own initiative, or when required to do so by the provincial, regional and national institutions – specifically commissions of the Congress and Senate – to report on and explain the activity, plans and projects of each installation.

In short it may be stated that the nuclear facilities, and Spanish nuclear sector overall, carry out a series of activities that guarantee public information and communication and access to information by society, such that the transparency of their activities is adequately ensured. The objective of this effort is to achieve public trust in the generation of electricity by nuclear means.

9.5. Mechanism ensuring that the licensee of the facility has resources (technical, human and financial) and powers appropriate for the effective management on site of an accident and the mitigation of its consequences

The actions and measures relating to the suitable management of accidents on the site and the mitigation of their consequences are dealt with in different chapters of this report. All matters relating to the resources set aside by the licensee for emergency preparedness and the site emergency plans are addressed in section 16. Aspects relating to the design and implementation of systems with functions relating to the prevention of accidents and the mitigation of their consequences are included in section 18. Finally, section 19, and more specifically heading 19.4, covers emergency operating (POE) and severe accident procedures and guidelines (SAMG).

In their annual action plans, which are mentioned in section 10.2, the plant licensees establish schedules and assign appropriate resources for the performance of these actions and measures, which lead to the on-going improvement of resources for the management of and response to whatever accidents might occur at the facility.

Finally, the coverage of risks relating to liability as a result of accidents is dealt with in section 11.1 of this report.

9.6. Vienna Declaration

Among the information contained in this chapter, certain elements are included that illustrate compliance by Spain of the commitments deriving from the Vienna Declaration.

Section 9.1 refers to the legal provisions that establish the obligation of the licensees to study and, where appropriate, implement safety improvements based on state-of-the-art technologies and best practices, as well as to the power of the CSN to require safety improvements (for example in plant design) from the licensees.

The periodic reports on different aspects of safety described in sections 9.2 and 9.3, to be drawn up by the licensees and supervised by the CSN, constitute complementary mechanisms for periodic and systematic safety assessment, from which proposals for improvement may arise.

Finally, section 9.5 details mechanisms guaranteeing the suitable management of on-site accidents and measures to reduce their consequences, basically off-site emissions of radioactivity.

Article 10. Priority to safety

10.1. Regulatory requirements and provisions regarding policies and programmes to be applied by the licensee to prioritize safety in nuclear activities for design, construction and operation of nuclear installations

As established in article 8.3 of the Regulation on Nuclear and Radioactive Facilities, the licensee shall continuously strive to improve the nuclear safety and radiological protection conditions of his facility. To accomplish this he shall analyse the best existing techniques and practices, in accordance with the requirements established by the Nuclear Safety Council, and implement those that are considered to be best suited by the said organisation.

The nuclear power plants have established management systems in keeping with the requirements of IAEA GS-R-3, "The management system for facilities and activities", and CSN Instruction IS-19 "on the requirements of the management system of nuclear facilities". These requirements define the way in which to establish, implement, assess and continuously improve a management system integrating nuclear safety, the prevention of occupational risk, environmental protection, physical protection, quality and economic aspects, in order to ensure that suitable consideration is given to nuclear safety in all the activities of the organisation.

The objective of the requirements of the management system is to ensure that safety is not compromised, with consideration given to the implications of all actuations, not separately within the framework of different management systems but in an integrated manner with respect to safety. The nuclear safety policy is one of those defined within the management system.

The management systems establish measures for safe plant management, beginning with the suitable planning of activities and the availability of economic resources and duly qualified human resources. Indicators are established during the performance of activities, making it possible to identify any negative trends in the results obtained. The action plans are revised annually on the basis of the results obtained from evaluation of the previous year and depending on any new needs identified. These action plans identify the most important activities to be addressed over a period of 5 years.

Self-assessment programmes have been set up allowing those responsible for activities or processes to critically assess the results obtained with respect to defined expectations, the aim being to identify non-conformities or proposals for improvement making it possible to improve the quality of the processes. Written procedures have been established on how to perform these self-assessments: the process begins with a definition of the expectations to be assessed, followed by analysis of the data obtained, this providing the difference between the expectations and the reality obtained and allowing areas for improvement to be identified and communicated to the organisation.

Systems have been set up for the evaluation of the in-house and industry operating experience, with a view to identifying the root cause of internal incidents and prevent them from being repeated. The aim of using the operating experience of the industry is to identify areas for improvement allowing the organisation to progress with respect to practices identified at other plants and considered to be interesting for implementation in house.

The management system establishes the performance of independent in-house evaluations of safety-related activities and processes, these being carried out by members of the personnel not directly involved in the activity. The following are examples of independent evaluations: quality audits, independent supervisions, evaluations performed by different committees (nuclear

safety, ALARA, environmental, occupational safety and health committees, etc.).

The external evaluations provide the organisation with information by comparing the best practices in the sector with the way activities are performed at the plant and allowing areas for improvement to be identified. The evaluations performed by WANO through its Peer Reviews and those carried out by the IAEA through OSART missions at the Spanish nuclear power plants during the period have been as follows:

Plant	Evaluation	Date
Trillo	Peer Review (WANO)	2013
Cofrentes	Peer Review (WANO)	2014
Vandellós II	Peer Review (WANO)	2014
Almaraz	Peer Review (WANO)	2014
Iberdrola G.N./Cofrentes	Corporate Peer Review (WANO)	2015
Ascó	Peer Review (WANO)	2015
Trillo	Peer review follow up (WANO)	2015
CNAT /Almaraz-Trillo	Corporate Peer Review (WANO)	2015

Analysis of the results of the external evaluations (WANO and IAEA) identifies common issues that allow projects common to all the plants to be identified, with a view to moving forward together in these areas (definition of behavioural expectations, leadership, use of human error reduction tools, presence of managers in the field, etc.).

As regards the safety culture, all the plants have established a programme for its improvement based on a common guideline. This is part of another further-reaching programme known as the "Human and organisational factors improvement programme", which is explained in article 12.

The safety culture improvement programme establishes requirements regarding the training of specialists in this area. This training is delivered jointly to all the plants in order to ensure homogeneous criteria. Possible areas to be worked on are also identified, and in certain of them joint projects are carried out between all the plants (leadership improvement, safety culture at collaborating companies.). The safety culture programmes are periodically evaluated by the CSN.

There is a commitment to perform internal safety culture assessments every two years and an external evaluation every six years. It is recommended that a combination of different techniques be used for these assessments, such as surveys, interviews, behaviour observations, working group discussions, documentary reviews, etc.

Furthermore, although in general not external assessments, mention may be made of other organisations and forums that are a source of information and of lessons learned for the plants, in addition to WANO. For example, all the plants are in close contact with the BWROG and PWROG owners groups, with EPRI and with NEI, institutions of which they are members, either directly or through UNESA.

10.2. Measures taken by the licensees to implement arrangements for the priority of safety, examples of good practices and safety culture achievements

Every year the Spanish nuclear power plants review their Action Plans, in which the most important short and medium-term activities aimed at improving plant safety are identified.

Management of the corrective actions programme makes it possible to identify the priority of the actions to be taken at the plants depending on their safety significance. Categorisation of the actions is accomplished by means of a classification (A, B, C and D) based on the influence of the problem on plant safety, as well as on radiological protection. Identification of the root cause and compliance with the schedule mapped out for the actions allow the causes of the incident to be eliminated, and therefore its repetition to be avoided.

Measures are taken to reinforce behavioural expectations and leadership at all levels, ratifying the maximum importance of safety. The different documents issued for this purpose by both the IAEA and WANO are used.

Technical missions are received at the plants and there is participation in technical missions and assessments overseas. During 2013, 2014 and 2015, experts from the Spanish nuclear power plants participated in 41 WANO peer reviews at other plants and in 26 WANO technical missions at such facilities.

10.3. Regulatory processes for monitoring and oversight of arrangements used by the licensees to prioritize safety

The supervision carried out by the CSN is framed within the following activities:

- The nuclear power plant Management Systems establish the processes of long-term strategic planning, the analysis and prioritisation of projects defining the medium-term investments plan (5 years) and the operating plan or annual budget. The CSN is informed annually of the planning of nuclear power plant investments and oversees the improvement plans to maintain and reinforce safety aspects. Furthermore, the CSN annual inspection plan contemplates the performance of Management System inspections.
- Supervision of the safety culture is included within the framework of the Integrated Plant Supervision System (SISC), and is accomplished by means of the tools provided by this programme, in particular supervision via programmes by means of inspection procedure PT.IV.224 *"Organisation and Human Factors (O&HF) Programmes",* one of the objectives of which is inspection of the process established at each nuclear power plant in its safety culture programmes (specialists, means, evaluations, on-going actions, etc.).

10.4. Means used by the regulatory body to prioritise safety in its own activities

The overall objectives and strategies of the organisation are established by the Council and included in the CSN Strategic Plan, which represents the commitment of the entire organisation in relation to the fundamental objective of nuclear and radiological safety and to the means available to fulfil it. These objectives are set out in annual plans approved by the Council.

The CSN Management System Manual (MSG) establishes, as safety policy, that priority shall be given to aspects essential for safety, optimising efficiency in the use of CSN and licensee resources.

All of the CSN's strategic planning revolves around nuclear and radiological safety as the sole objective, with respect to which the body of strategic policies or courses of action defined, the decisions taken and the activities performed shall be validated and aligned. This decision allows for the hierarchical structuring of other objectives and makes it possible to reduce the degree of discretional approaches in the Council's regulatory activities, with management unified around this reference.

In view of the fact that responsibility for the safety of facilities and activities lies with the licensee, and that this responsibility cannot be delegated, this single fundamental CSN objective shall be understood as consisting of establishing the regulatory standards and framework and

overseeing compliance with them for the protection of persons and the environment against the risks associated with ionising radiations.

In compliance with this objective, and as a result of the periodic safety reviews, the CSN establishes requirements for the implementation of safety improvements. In addition, and since the Fukushima accident, the CSN has also required the implementation at the Spanish nuclear facilities of all the safety measures deriving from this accident and promotes the improvement of the necessary controls and standards.

Indicated below are the general lines for the prioritisation of CSN activities in its operating practices relating to nuclear power plants.

Standards development process

A strategic objective of the Council is the development of the standards pyramid and the commitment to bringing nuclear safety and radioactive waste and spent fuel management standards into line with WENRA, adapting the legislation to current needs and taking into account international standards developments and the harmonisation activities contemplated in the European standards.

Supervision and control process

Another strategic objective of the Council is to make available a **regulatory system** and practices comparable to those of the most advanced countries, adapted to the changing demands of the surroundings, guaranteeing a high level of safety of the facilities and activities throughout their life cycle and:

- Focussing on aspects essential for safety, reinforcing the responsibility of the licensees.
- Seamlessly integrating deterministic and probabilistic methodologies, maintaining sufficient safety margins and the principle of defence in depth.
- Oriented progressively towards a performance-based process aimed at overseeing safety-significant processes making CSN actuations systematic, integral, predictable and risk informed.

The Integrated Plant Supervision System (SISC) described in other sections of this report was established with a view to achieving this strategic objective. This process is subject to independent audits performed by persons not participating in it and the results of the SISC are published on the CSN's website.

Permit granting process

With the objective of developing an integrated and specific model for the licensing of nuclear facilities, in all their phases, the CSN has developed procedures for the evaluation of licence applications that systematise the scope and contents of such assessments.

This process is subject to independent audits performed by persons not participating in it. The CSN publishes the reports on which its authorisation process decisions are based on its website.

Sanctions process

The CSN has established an in-house procedure for the processing of sanctions proceedings proposals.

The Sanctions Proceedings Review Committee (CRES) is responsible for analysing proposals for the initiation of sanctions proceedings, warnings, precautionary measures, interventions, prohibitions and reprimands; for unifying criteria and advising on the proposal initiated by the

corresponding organisational unit and the allegations of the stakeholders, where appropriate, formalising the agreements reached in documents.

10.5. Vienna Declaration

Among the information contained in this chapter, important elements are included that illustrate Spain's compliance with the commitments deriving from the Vienna Declaration.

Thus, section 10.1 specifies the regulatory provisions that require the licensees to analyse safety-related best practices for their possible implementation. Section 10.2 explains that the action plans of each licensee identify and specify safety improvement activities and that the licensees' internal processes, such as the corrective actions management programmes, contemplate mechanisms for the prioritisation of improvement actions, based on their safety significance.

Sections 10.1, 10.2 and 10.3 describe different important licensee programmes and activities relating to periodic and systematic safety aspect evaluations, such as self-assessment programmes; independent in-house evaluations, including quality audits; independent supervisions, and evaluations of the licensee's nuclear safety, ALARA and other committees; external evaluations, especially those performed by WANO (peer reviews) and the IAEA (OSART and other missions); in-house and industry operating experience evaluations and in-house and industry safety culture evaluations.

Attention is brought also to the mechanisms established by the licensees to acquire and share best practices and lessons learned with organisations such as WANO, the BWROG and PWROG owners groups, EPRI or NEI.

Finally, in dealing with the measures implemented at the regulatory authority itself to guarantee priority for safety, section 10.4 mentions certain elements that contribute to compliance with the principles of the Vienna Declaration, such as the processes in place for the establishment of on-going improvement requirements regarding the safety of the facilities (for example via the results of the PSR's). Particularly significant in this respect is the specific process applied in the wake of the Fukushima accident, many of whose required improvement actions are in line with the principles of the Vienna Declaration Also noteworthy is the strategic CSN objective of having regulatory practices comparable to those of the most advanced countries, for which appropriate mechanisms are in place at regulatory level for the comparison and acquisition of best practices. Mention should be made also of the CSN internal processes subject to independent audits, and the CSN audits programme constitutes a mechanism for periodic and systematic review.

Article 11. Financial and human resources

11.1. Financial resources

As regards investments in safety by the operator, the Integrated Management System includes a series of procedures for the planning of safety-related investments. The objective of this system is to ensure that all investment needs are detected and receive due attention, with any of the organisation's units being entitled to propose actions implicitly involving new investments. For prioritisation these are classified in accordance with the following criteria in the order shown below:

1) Regulatory authority requirements.
2) Improvement of nuclear safety, radiological protection, the prevention of risk and environmental protection.
3) Technology updating or improvement of the plant.
4) Profitability.

As regards the availability of the financial resources necessary in the event of a radiological emergency, the Spanish plants have an ensured coverage contemplating both the potential radiological impact outside the facilities and the potential cost of decontamination of the latter. This coverage is regulated by Law 12/2011, of May 27th, on civil liability for nuclear damage or damage caused by radioactive materials.

11.2. Human resources

Arrangements and Regulatory requirements relating to the qualification, training and retraining of staff for nuclear installations

The CSN has a number of CSN Instructions defining the requirements for the qualification of staff working at nuclear power plants.

On the one hand there is CSN Instruction IS-11, on nuclear power plant operating personnel licences, and on the other CSN Instruction IS-12, which defines the qualification and training requirements corresponding to non-licensed nuclear power plant personnel, whose functions relate to the safe operation of the plant, through the efficient and safe performance of the tasks assigned to each job post. The term qualification includes academic background, experience and initial and on-going training.

There is also CSN Instruction IS-03, on qualifications to obtain recognition as an expert in protection against ionising radiations. This Instruction also sets out the minimum training and experience requirements that the CSN considers necessary for candidates to obtain recognition as experts in protection against ionising radiations, as regards both those responsible for the Radiological Protection Service and the technical people under their charge.

The CSN also has IS-06, which defines the scope and content of radiological protection training programmes for outside workers at nuclear facilities, this being applicable to external companies, facilities and outside workers.

The nuclear power plant procedures and practices are adapted for compliance with the requirements defined by the CSN in the aforementioned Instructions, including both the plant personnel and permanent and sporadic contractors, defining type profiles and analysing the suitability and training requirements for all the staff.

Methods used for the analysis of competence requirements and training needs for all safety related activities in nuclear installations

In order to analyse the skills required and the training needs associated with all nuclear safety-related activities performed at nuclear facilities, a systematic design inspired by the SAT (*Systematic Approach to Training*) methodology has been adopted, the aim of which is to determine the following: learning objectives, based on the results obtained from a previous job post analysis; the design of the initial and on-going training programme and its implementation based on the said learning objectives; the tools and human resources necessary for satisfactory performance; assessment of the degree of personal compliance with the learning objectives mapped out; and finally the evaluation and revision of the initial and on-going training programme, based on the performance of the personnel in the job post.

Both the initial and on-going training programmes are the result of this systematic process. The degree of complexity of the process has been chosen depending on the different job posts, the most complete being that corresponding to the licensed operating personnel.

Training Committees have been set up for the effective management of the training programmes, in which the presence of the line managers is essential. Their participation in the different phases of the training process is fundamental for the training to focus on improving the performance of the personnel.

The licensee of a nuclear power plant is required to ensure that all the personnel are in possession of qualifications suitable for the functions assigned to them.

Incoming personnel and those changing their job post are qualified in accordance with the regulation and application of the SAT methodology referred to above, which requires the following:

- Performance of initial training by incoming personnel in accordance with the initial training plan defined for each plant job post.
- Performance of the necessary training by personnel changing their job post following the corresponding analysis of the training that would be required to occupy the new job post.
- On-the-job training, under the supervision of experienced personnel.
- Overlapping when necessary.

The renewal of qualification is undertaken on average every five years.

Arrangements for initial training and retraining of operations staff, including simulator training

The initial qualification of control room operators lasts 36 months, including classroom sessions, tutored study, practical sessions on the simulator and on-the-job training. The simulator practical sessions are to last at least 240 hours and the on-the-job training 1,200 hours.

In the case of the initial qualification of control room supervisors, the requirement is for a minimum three years of experience as an operator and completion of a training course lasting at least 12 months, including at least 100 hours of practical training on the simulator and 500 hours of on-the job training.

Once the control room operator or supervisor licence has been obtained, the personnel must attend an annual on-going training programme made up of 100 hours of classroom training and at least 20 hours on the simulator, the latter currently amounting in practice to between 40 and 50 hours per year.

In the case of personnel holding a control room operating licence, the regulations require that this be renewed every six years.

The entire process is documented and regularly inspected.

Capacities of plant simulators used for training with regard to fidelity to the plant and scope of simulation

Each nuclear power plant has its own full-scope simulator replicating the control room.

As regards simulator capacity, the operating range has been extended to include normal, off-normal and emergency manoeuvres associated with operation with a reduced primary inventory or during refuelling. The simulators have incorporated plant digital control system modernisations with maximum physical and functional fidelity, using the very latest simulation solutions. The most relevant design modifications have been installed up front on the simulators, serving as a validation platform from the functional point of view and as regards aspects relating to human factors engineering.

Arrangements for training of maintenance and technical support staff

As has been pointed out above, the nuclear power plant procedures and practices are adapted for compliance with the requirements defined by the CSN Instructions, this including both the plant personnel and permanent and temporal contractors and the definition of type profiles and performance of suitability and training requirements analyses for all the workers.

Improvements to training programmes as a result of new insights from safety analyses, operational experience, development of training methods and practices

An important novelty during the period covered by the report has been the incorporation in the initial and on-going training programmes of the training and qualification requirements deriving from the new personnel tasks that have appeared as a result of the implementation of nuclear power plant improvements in the wake of the Fukushima accident, with an important component of practical training.

Methods used to assess the sufficiency of staff at nuclear installations

Planning of the workforce is accomplished taking into account the implementation of the Strategic Plan, retirement plans and the time dedicated to the qualification activities described above. Uniquely, control room vacancies are planned eight years in advance.

The dimensioning of a qualified and experienced workforce is based on the following:

- Compliance with the applicable regulations.
- Experience of the workload associated with the different processes for the management of plant operation.
- Benchmarking with plants having the same technology and similar regulations.

Description of the national supply of and demand for experts in nuclear science and technology

New recruiting is planned with sufficient notice for there to be sufficient time to schedule the necessary training in the case of personnel retiring, with adequate overlapping in order for handover to be achieved with the maximum possible transfer of knowledge. In the case of organisational reinforcements, the training required is provided prior to the job post being occupied.

In Spain there are several educational programmes that provide students with a profound understanding of the theoretical and practical fundamentals of nuclear engineering and of the technology associated with power production by means of nuclear fission. These educational programmes include the collaboration of the CSN, the licensees and national and international organisations. The following are examples:

— Master in Nuclear Science and Technology (Polytechnic University of Madrid).
— Master in Nuclear Engineering and Applications-MINA (Ciemat).
— Master in Radiological Protection at Radioactive and Nuclear Facilities (Polytechnic University of Valencia).
— Master in Nuclear Engineering (Polytechnic University of Catalonia).
— European Master in Nuclear Energy-EMINE (Polytechnic University of Catalonia).

The supply of graduates in disciplines relating to nuclear technology currently outstrips the demand of the Spanish nuclear sector.

Regulatory review and control activities

The CSN carries out supervision and control activities in relation to the human resources of nuclear power plants in the following ways:

- Each plant is required to have analysed and documented the technical capacity and minimum staffing needs of each department to ensure safe plant operation.
- Organisational and human resources changes relating to nuclear safety or radiological protection functions shall be analysed and documented, in order to guarantee that the functions continue to be adequately performed and that neither the change nor its management has a negative impact on safety.
- Every year the nuclear power plants submit a report to the CSN with modifications or updates relating to the optimisation of the human resources of their organisation. The CSN performs an annual supervision of the organisational changes at the nuclear power plants, revising in detail the most significant at each facility.

As has been pointed out above, as regards the qualification of personnel performing safety-related functions, the CSN has instructions IS-11 for licensed operating personnel and IS-12 for other members of nuclear power plant staff.

As regards licensed operating personnel, the awarding of this license by the CSN requires that candidates be suitably qualified beforehand and that they pass the examinations (written, control room simulator and plant) set by the CSN's Operating Licenses Tribunal. The renewal of operating licenses is granted by the CSN every six years, on application and following checking of compliance with the requirements established in IS-11.

The CSN performs two-yearly inspections of nuclear power plant personnel training programmes, both those for plant staff and those for permanent and temporal contractor personnel. These inspections cover both the licensed operating personnel and other persons performing safety-related functions. These inspections include aspects relating to both the supervision of the policy, organisation, human and material resources, processes and procedures put into place by the licensee for the systematic design of personnel training and to the resulting training programmes and their implementation, as well as to checks of compliance with personnel qualification requirements (academic qualification, experience and initial and on-going training). Also included within the scope of these inspections are aspects relating to maintenance of the physical and functional fidelity of full-scope replica simulators.

11.3. Vienna Declaration

Among the information contained in this chapter, items are provided illustrating compliance by Spain with the commitments deriving from the Vienna Declaration.

Section 11.2 explains that the training and qualification requirements deriving from the implementation of post-Fukushima improvements at nuclear power plants have been incorporated in the initial an on-going training programmes, with a high degree of practical training.

Article 12. Human factors

12.1. Arrangements and regulatory requirements taking into account human and organisational factors for the safety of nuclear installations

The main requirements relating to human and organisational factors are set out below.

IS-19, on the requirements of the nuclear facility management system (2008): applied to the organisation, this instruction defines the requirements for the establishment, implementation, evaluation and on-going improvement of a management system at nuclear facilities, integrating nuclear safety and radiological protection, the prevention of occupational risks, environmental protection, physical protection and quality.

IS-21, on the requirements applicable to modifications at nuclear power plants (2009): human factors methods and criteria are required to be adequately incorporated in all phases of the modifications process and activities.

IS-26, on the basic nuclear safety requirements applicable to nuclear facilities (2010): the licensee of the facility is required to take into account human factors-related aspects throughout the lifetime of the installation, such that operational safety is improved under both normal conditions and during operational events and accident situations. Furthermore, the licensee of the facility is required to pay special attention to and have specific programmes for the reduction, detection and correction of human errors.

IS-27, on general nuclear power plant design criteria (2010): the design of safety-significant SSC's must take into account the principles and techniques of human factors engineering. Furthermore, human factors shall be taken into account in the design of the control room. The control room shall be equipped with visual and, where appropriate, acoustic devices identifying those processes and conditions that have deviated with respect to their normal condition and that might affect safety. The operator shall have available the information required to be able to check the actuation and effect of automatic actions.

12.2. Consideration of human factors in the design of nuclear installations and subsequent modifications

The objective of human factors engineering in design is to ensure suitable consideration of the role and contribution of persons to the safe and reliable operation of the facilities, guaranteeing that any modifications generated are compatible with human characteristics and limitations.

The following are activities relating to human factors in design modifications: the revision of control room panels, improvement of the man-machine interface, evaluation of changes in the location of items, variations in working conditions, systematic changes, the use of new tools, simulator tasks, etc.

All aspects of the man-machine interface in the control rooms of the Spanish nuclear power plants have been studied in depth in accordance with the provisions of NRC publications NUREG 0700 revision 2 (*Human-System Interface Design Review Guidelines*) and NUREG 0711 revision 2 (*Human Factors Engineering Program Review Model*).

A general systematic approach has been established for the review of design modifications from the point of view of human factors, based also on the aforementioned documents (NUREG 0700 y 0711).

12.3. Licensee methods and programmes for analysing, preventing, detecting and correcting human errors in the operation and maintenance of nuclear installations

The Spanish nuclear power plants have established safety improvement programmes in relation to organisation and human factors, allowing for the identification, control and reinforcement of "organisational" and "human" aspects before they can have a negative influence on plant safety and availability.

The objectives of the O and HF programme are as follows:

- To minimise or avoid to the extent possible organisational and human factors issues having a negative impact on plant safety and availability, analysing whatever problems might arise as a result of such issues and identifying and performing the corrective actions required to prevent repetition.
- To carry out organisational activities relating to external and internal evaluations, including those pertaining to the safety culture.
- To respond to the organisational requirements relating to the safety culture and human factors proposed by external organisations.
- To evaluate organisational changes in keeping with the systematic approach established.
- The design of equipment, systems and the man-machine interface, as well as design modifications, are carried out taking into account human capabilities and limitations and in accordance with recognised human factors principles and practices.
- Monitoring of the activities performed through supervision.
- To collaborate in organisation and human factors training and research projects.
- To participate in external forums for debate, exchange and research on organisation and human factors improvements.

In addition, the O and HF programme aims to:

- Establish objectives and expectations for self-assessment of the programme.
- Coordinate the different projects and activities, homogenising criteria.
- Make available technicians with expert knowledge of human error minimisation.
- Allow for medium and long-term continuity of the programme.

With a view to using synergies between plants, a coordination group of specialists in organisation and human factors has been set up within UNESA, the aim being for them to exchange information, coordinate relations with the Nuclear Safety Council and undertake research projects and develop courses for specialists in organisation and human factors. Each plant has defined an organisation responsible for drawing up improvement plans relating to human and organisational factors. These organisations include experts in these areas. Common training has been defined for specialists in organisation and human factors, and this training is delivered jointly for all the plant specialists.

Programmes have also been established to check the fitness for duty of people working at nuclear power plants.

The use of control room simulators allows behaviour to be observed during training. Attitudes such as leadership, a questioning attitude, teamwork and the use of error minimising tools are reinforced during the performance of different scenarios on such simulators.

Human factors simulators have been established at the plants and allow expected behaviours to be reinforced through the simulation of real plant tasks and practices.

In particular, plans have been drawn up to strengthen behavioural expectations. One of the first steps taken consisted of reviewing these behavioural expectations, comparing them with the best nuclear industry standards. Plans were then established to communicate and increase awareness of these expectations. Once defined and communicated, compliance with the expectations was supervised in order to identify weaknesses and set out actions to correct them.

The use of human error minimisation tools such as adherence to procedures, pre-work briefings, post-work debriefings, double checking, independent verification, use of the phonetic alphabet, use of operating experience, etc. has been reinforced.

Work continues within the programmes to strengthen the safety culture and the organisation and human factors programmes. There are common procedures among the nuclear power plants for the performance of internal safety culture assessments, the commitment being that these are performed every two years.

External evaluations of the safety culture are performed periodically and there is participation in international congresses and groups related to the safety culture and organisational and human factors issues.

All the common activities of the Spanish nuclear power plants are coordinated by a group of specialists in organisation and human factors at UNESA, where experiences are exchanged and common projects carried out.

Human factors simulators have been developed, reinforcing behavioural expectations and the use of error minimisation tools.

Periodic safety culture and human and organisational factors courses have been established for all nuclear power plant workers (in-house and contracted).

12.4. Self-assessment of managerial and organisational issues by the operator

The Spanish nuclear power plants have established self-assessment programmes aimed at pursuing the on-going improvement of the activities and processes performed in the Organisation, through the identification and evaluation of deficiencies and opportunities for improvement, with the personnel involved directly in the critical examination and improvement of their own work and results.

A method has been established for the preparation, revision, approval and subsequent evaluation of organisational changes in the company, reasonably ensuring adequate identification and assessment of the impacts that such change might have on safe operation of the plant prior to its implementation.

12.5. Arrangements for the feedback of experience relating to human factors and organisational issues

The analysis of inputs to the corrective actions programme makes it possible to identify negative trends in areas relating to organisation and human factors. The study of trends is established at the nuclear power plants.

Groups of specialists in the corrective actions programme and specialists in organisation and human factors have been established through UNESA, allowing information to be exchanged and common criteria to be set up for the treatment of information obtained from the analysis of trends, establishing common activities aimed at progressing in the areas for improvement identified.

The performance of supervisions of behaviour, in accordance with the human behaviour expectations defined at each plant allows for the identification of areas for improvement through reinforcement of those responsible for the work, the communication of expectations and the reinforcement performed during training courses.

The periodic performance of internal and external safety culture evaluations is another source of information that allows insight to be gained into the actual status of activities at the plants.

The evaluation and spreading of in-house and industry operating experience relating to human and organisational factors allows the organisation to maintain awareness of the actual problems existing in these areas, and also allows actions to be taken with a view to resolving them.

12.6. Regulatory review and control activities

The CSN monitors requirements and standards relating to human and organisational factors and issued in the country of origin of the projects, as well as international practices, adapting its regulatory standards and practices accordingly. The licensees of nuclear facilities are responsible for the performance of the actions required to meet the applicable requirements and establish on-going improvement processes in this area, and the function of the CSN is to supervise such activities in order to ensure that they are adequate. In this respect, the CSN has continued to carry out its evaluation and inspection tasks.

Throughout this period the CSN has monitored the implementation status of the O and HF programmes themselves and the projects and activities they include, through the evaluation of licensee requests, the meetings of the mixed CSN-UNESA working group on Organisation and Human Factors and, especially, the basic two-yearly CSN inspection plan relating to human and organisational factors. Among the projects and activities supervised by the CSN, special mention may be made of the development of human factors simulators at the Spanish nuclear power plants, the safety culture programmes, the analysis of human factors in operating experience, human factors engineering in design modifications, work supervision and behaviour observation activities, projects for analysis of the feasibility of human actions and the management of organisational changes.

12.7. Vienna Declaration

Among the information contained in this chapter there are items illustrating compliance by Spain with the commitments deriving from the Vienna Declaration.

Section 12.3 describes the plans set up for the strengthening of behavioural expectations, the safety culture and the organisation and human factors programmes at nuclear power plants. Also explained is the periodic evaluation of these plans.

Article 13. Quality Assurance

13.1. Arrangements and regulatory requirements for quality assurance programmes, quality management systems or management systems of the licensees

The Nuclear Safety Council requires all the nuclear power plants to have a quality assurance programme in place. The Regulation on Nuclear and Radioactive Facilities requires that a quality assurance programme be set up; CSN Instruction IS-19, on nuclear facility management system requirements, indicates that the quality assurance systems shall meet the requirements of the Spanish UNE-73401:1995 standard: "Quality assurance at nuclear facilities", which establishes the 18 criteria on which quality assurance manuals are to be based.

13.2. Status regarding to the implementation of integrated management systems at nuclear installations

As has been indicated above, the nuclear facilities have in place management systems complying with the provisions of CSN Instruction IS-19, based on the safety requirements of IAEA GS-R-3. These systems define ways to establish, implement, evaluate and continuously improve a management system integrating nuclear safety, the prevention of occupational risk, environmental protection, physical protection, quality and economic aspects, in order to guarantee that adequate consideration is given to nuclear safety in all the activities of the organisation.

13.3. Main elements of a typical quality assurance, quality management or management system programme covering all aspects of safety throughout the service lifetime of the nuclear installation, including delivery of safety related work by contractors

The objective of implementing a quality assurance programme is to be able to reasonably assure the suitability of the structures, systems, equipment and components, and of the use made of them, in order to achieve the safe, reliable and documented operation of the plants.

The quality assurance programme establishes the application of a set of systematic, documented and planned activities relating to the safety of the facility. The programme is applied to activities such as design, procurement, manufacturing, the handling and transport of materials, materials storage, construction, assembly, the testing of systems and equipment, start-up, the operation of the facility, inspection, system maintenance, the repair of equipment, refuelling activities and design modifications that might affect the quality of safety-related items.

The requirements established in the quality assurance programme are applied to all activities affecting the safety functions of safety-related structures, systems, equipment or components. Applicability extends to all in-house and external organisations participating in safety-related activities.

13.4. Audit programmes of the licensee

The quality assurance programme implemented at the nuclear facilities requires the establishment of a planned and documented programme of in-house and external audits aimed at ensuring that all aspects of the said quality assurance programme are fulfilled and that the programme is effective. The objective of the in-house auditing programme is to cover all the

activities contemplated in the quality assurance programme of the plants in three or four-year cycles. These audits are performed in accordance with written procedures or checklists. The personnel carrying out these audits must be appropriately trained and accredited for the performance of this activity.

Measures are established for tracking of the corrective actions and to check that deficiencies discovered during the audits, and wherever possible their causes, are corrected within the timeframe agreed to.

The Spanish plants have worked, under UNESA coordination, on the drawing up of common checklists for the performance of audits in different areas based on the best nuclear industry standards defined by INPO and WANO.

13.5. Audit of vendors and suppliers by licensee

The quality assurance programme indicates that the procurement of equipment and/or contracting of services for safety-related positions must be with evaluated and approved suppliers. For this purpose an annual programme of external audits is established in order to check the capacity of the supplier to provide items or services meeting the requirements established in the procurement or contracting documents.

With a view to optimising the supplier evaluation process, the Spanish nuclear power plants have established a systematic approach based on written procedures for the common evaluation of suppliers, such that an evaluation performed by one plant in accordance with these procedures may also be of use to other plants. Within UNESA a group has been set up to coordinate common evaluations for all the plants. A computer application is available for the control and tracking of common evaluations, and serves as a depository for the documentation generated. Collaboration agreements are in place with international groups of evaluators of nuclear power plant suppliers.

13.6. Regulatory review and control activities

As has been pointed out above, in compliance with the requirements of CSN Instruction IS-19, the nuclear facilities have implemented a management system in keeping with GS-R-*3 "The Management System for Facilities and Activities"*. This management system is currently in a phase of improvement, especially as regards the definition and management of processes. The supervision of this management system is undertaken by the CSN by means of a Basic Inspection Programme that includes systematic inspections covering different objectives of GS-R-3 (the aim being to verify compliance with the standards and the operating permit every two years). In addition to these inspections, an inspection is performed every year (at one or two nuclear facilities) to evaluate the application of the management system and processes.

As regards the evaluation and inspection of quality assurance activities at nuclear power plants, the areas to which special attention has been paid in recent years have been as follows:

- Management and use of safety system spares: acquisition of alternative spares, management of spares in storage, measures to prevent and control infrastocks, activities to prevent work orders from being postponed due to lack of spares, procurement of nuclear class spares and commercial grade spares, fraudulent items and the performance of the corresponding dedication processes.
- Contracting of services and control and supervision of safety-related work performed by contractors.
- Quality plans for the construction of individualised temporary storage (ATC) facilities.
- Control of corrective actions and of the programmes regulating them.

These activities have been associated with the performance of the following inspections:

- Two-yearly inspections of the implementation of design modifications at nuclear power plants.
- Inspection of the implementation of quality plans for certain design modifications.
- Inspections of the activities undertaken by the licensees to control work performed by contractors during refuelling outages.
- Inspection of the use and management of nuclear class and commercial grade spares (dedication plans).
- Inspections of the application of the management system (IS-19).
- Inspections of the implementation of corrective actions programmes.

Article 14. Assessment and verification of safety

14.1. Assessment of safety

14.1.1. Arrangements and regulatory requirements to perform comprehensive and systematic safety assessments

The Regulation on nuclear and radioactive facilities (RINR) establishes the requirements to be met by the licensees in relation to the different authorisation processes (preliminary or site, construction, operation, modification, dismantling and declaration of decommissioning) throughout the different phases of the facility.

Among the applicable requirements, the RINR establishes the performance of accident analyses and assessment of the risks arising from operation of the facility.

The RINR also establishes the requirement that an analysis of modifications be performed in order to determine whether or not they require ministerial authorisation before being placed in service. CSN Instruction IS 21, which refers to plant design modifications, develops this requirement. The RINR also establishes what types of modifications require construction and assembly permits.

Instruction IS-21develops requirements applicable to the following:

1) Modifications to plant structures, systems and components.
2) The performance of tests not described in the Safety Study or Technical Specifications.
3) Modifications to assessment methods, procedures, manuals or other documents.
4) Temporary modifications.
5) Degraded or non-conforming conditions.

IS 21 establishes requirements for the performance of preliminary assessments (preliminary analyses) and safety assessments of modifications to be performed by the licensees, in order to determine whether they can be implemented under their responsibility, require a favourable report by the CSN or authorisation by the Ministry, following a favourable report by the CSN, before their assembly or start-up.

The modifications referred to in the instruction include both physical changes to structures, systems and components and changes in operating conditions, these being understood as referring to changes in the practices of the facility, procedures, the analyses performed to demonstrate compliance with the design bases and the assessment methods used for these analyses.

The preliminary assessment determines whether the modification affects safety-related issues and the safety assessment determines whether the modification changes the criteria, standards and conditions on which the authorisation is based. When a modification requires authorisation, a safety assessment must be performed to demonstrate that once the modification has been implemented the applicable safety criteria, standards and requirements will continue to be fulfilled.

As established in IS 21, during the first three months of the year the licensees must submit to the Ministry of Industry, Energy and Tourism and to the Nuclear Safety Council a report on permanent modifications, including modifications to the basic plant design, installation and operation documentation foreseen, implemented or in the implementation phase at the plant. The preliminary analyses and safety assessments performed shall be attached to this report.

CSN Instruction IS-26, relating to the basic safety requirements applicable to nuclear facilities, establishes that the licensees shall perform periodic safety reviews (PSR) at least once every 10 years. The objectives of the PSR are described in section 14.2.3. Safety guide GS-1.10 "NPP periodic safety reviews" establishes directives for PSR performance by the licensees. The operating permit requires that the PSR results be submitted along with the application for permit renewal.

Following the approval of Council Directive 2014/87/EURATOM, of July 8th 2014, Spain, like all the member states of the European Union, is obliged to perform a detailed review of a specific nuclear facility safety issue every six years within the scope of the directive, additional to the PSR's. The results of this review shall be included in a national report that will be subject to a process of peer review among the different European Union countries. The results of this process are expected to be published. The first review will take place in 2017 and will deal with the specific issue of nuclear facility ageing management.

It should also be pointed out that CSN Instruction IS 37 establishes requirements for the performance of accident analyses at nuclear power plants.

Furthermore, and has also been indicated above, mention should be made of the safety assessments performed at all the Spanish plants in the wake of the Fukushima accident by way of the so-called stress tests, agreed to within the context of the European Union. These have included verification of compliance with the plants' design bases and of their resistance to extreme natural events and capacity to withstand situations involving the loss of relevant safety functions and to manage severe accidents. The performance of these tests and the implementation of licensee proposals for improvement, and additional analyses and improvements that the CSN has considered to be necessary, have been required by the CSN via Complementary Technical Instructions (ITC 1/3), issued to each licensee during 2011 and 2012. The CSN also established additional requirements for situations of potential loss of major areas of the plant, along with the associated terms for implementation, through the corresponding Complementary Technical Instructions (ITC 2/4), issued in 2011 and 2012. In April 2014 the CSN issued a ITC compiling ITCs 2, 3 and 4.

14.1.2. Safety assessments within the licensing process and safety analysis reports for different stages in the lifetime of nuclear installation

Trillo NPP

During the period considered (November 2014), the operating permit of Trillo NPP was renewed for a period of ten years. The licensee's request was accompanied by the plant's second periodic safety review (PSR), the revisions in force of the official operating documents, an updated revision of the probabilistic safety assessment (APS) studies, an analysis of the ageing of the plant and an analysis of the experience accumulated throughout the period of validity of the previous operating permit. For its part, the CSN has continuously monitored and supervised the operation of the plant throughout the period of validity of the said permit and has evaluated compliance with the applicable nuclear safety and radiological protection conditions. Likewise, the PSR corresponding to the period from January 1st 2002 to December 31st 2012 and the analyses of compliance with the conditioned application standards have been evaluated.

The PSR was performed in accordance with the content and structure of the aforementioned Safety Guide 1.10 "Periodic safety reviews at nuclear power plants", with the following scope:

- In-house and industry operating experience.
- Register of plant operating data.
- Experience regarding radiological impact.
- Changes to regulations and standards.

- Equipment performance.
- Design modifications.
- Configuration management, Official Operating Documents (DOE).
- Management system.
- Probabilistic safety assessment (APS).
- Status of safety assessment and improvement programmes.

For operating permit renewals, eight limits and conditions have been established in relation to nuclear safety and radiological protection, with generic requirements relating to identification of the licensee and responsible operator, maximum authorised power, official plant operating documents, annual reports required by the RINR, exit of radioactive packages from the site, conditions for requests for future extension of the OP, requirements for requests for definitive shutdown and improvement programmes, plus two specific conditions deriving from analysis of the standards. In addition, 18 complementary technical instructions have been issued, establishing conditions for compliance with the aforementioned conditions.

The following are particularly significant among the modifications performed during the period of this report and requiring reporting by the CSN:

— Extension of the physical protection permit.

— Implementation of improvements to the fire-fighting systems in compliance with CSN Instruction IS-30 on requirements of the PCI programme at nuclear power plants, revision 1, of February 21st 2013.

— Improvements to the main pump trip circuit in response to spurious actuations in the case of fire.

— Modification of the turbine control, protection and bypass system.

— Modification of primary circuit bleed and feed.

— Authorisation for the housing of casks containing nuclear fuel with a burnup of up to 49,000 MWd/TU at the Trillo NPP independent temporary storage (ATI) facility.

Santa María de Garoña NPP

On December 16th 2012, the licensee performed a programmed shutdown and unloaded the fuel assemblies from the reactor core to the spent fuel storage pool. Since then the plan has remained in the shutdown situation.

The definitive shutdown of Santa María de Garoña nuclear power plant was declared by Ministerial Order IET/1302/2013. This declaration empowered the licensee to possess and store irradiated slightly enriched uranium fuel assemblies in accordance with the limits and conditions associated with the specific authorisations for the storage of irradiated fuel. During its meeting of June 3rd 2013, the Nuclear Safety Council agreed to issue 16 complementary technical instructions to Santa María de Garoña NPP, establishing requirements for compliance with the said conditions.

By virtue of this 2013 Order, Santa María de Garoña NPP was switched to the definitive shutdown situation on July 5th 2013. On May 27th 2014, Santa María de Garoña NPP submitted a request for renewal of its operating permit, in accordance with the provisions of article 28.1 of the RINR, which allows such requests to be made within one year of entry into the shutdown condition, as long as such entry has not occurred for reasons of safety.

Following the decision by Nuclenor (the licensee) to go to a situation of definitive shutdown, the licensee submitted a proposal to the CSN in March 2013 for revision of the scope of ITCs 2/3/4, issued following Fukushima, to adapt them to the new condition of definitive shutdown,

and on July 15th 2013 the Nuclear Safety Council issued a ITC, ref. CSN/ITC/SG/SMG/13/02, relating to the adaptation of the post-Fukushima ITCs to this condition. This ITC cancelled and replaced the ITCs issued previously by the CSN in relation to this matter and required the licensee to submit to the CSN within three months of its issue a detailed plan of all the actions to be taken, along with a schedule for their implementation.

Subsequently, following Nuclenor's decision to request renewal of the operating permit, the CSN issued a new Complementary Technical Instruction (ITC-14.01) on July 30th 2014, on additional documentation and requirements relating to this request, identifying the actions to be taken by Santa María de Garoña NPP for renewal of the operating permit and the loading of fuel, additional to those established in article 28.1 of the RINR, and for the implementation of modifications deriving from the post-Fukushima stress tests and from the requirements regarding the situation of potential loss of major plant areas, restoring the requirements set out in the aforementioned ITCs 2/3/4).

The CSN is currently carrying out the evaluations necessary to report on the request for renewal of the operating permit, the most significant of which are as follows:

- Installation and placing in service of the following design modifications:
  1. New stand-by gas treatment system (SBGTS).
  2. Improvements to the containment isolation system.
  3. Improvements in electrical separation and isolation.
  4. Improvements to the fire-fighting systems.
- Compliance with the requirements established in ITC-14.01.
- Periodic safety review.
- Analysis of conditioned application standards.
- Analysis of compliance with the limits and conditions of the last operating permit (2009) and shutdown authorisation and associated complementary technical instructions.
- Revision of the official operating documents.
- Other issues necessary for power operation, required by the CSN or established on the initiative of the licensee.

In addition, before loading fuel Stª Mª de Garoña NPP must submit for CSN approval and implement the design modifications corresponding to the new Alternative Emergency Management Centre (CAGE), a filtered containment venting system and the installation of passive autocatalytic recombiners (PAR) in containment.

Stª Mª de Garoña NPP has initiated the construction of an individualised temporary storage (ATI) facility for dry storage casks, the authorisation and assembly of which have been reported on favourably. Ministerial authorisation was granted in October 2015.

Almaraz NPP

The following are particularly significant among the modifications performed during the period of this report and requiring reporting by the CSN:

- Implementation and start-up of the alternative shutdown panel in groups I and II.
- Implementation and start-up of the redundant fuel building filtering system of groups I and II.
- Use of the new VIPRE-W code to verify the design of non-LOCA safety and thermo-hydraulic analysis.
- Storage of group II fuel assembly DL-52 in region II of the spent fuel pool.

Ascó NPP

The following are particularly significant among the modifications performed during the period of this report and requiring reporting by the CSN:

- Start-up of the individualised temporary storage (ATI) facility for spent fuel at the Ascó I and Ascó II plants.
- Installation of passive autocatalytic hydrogen recombiners (PAR) in the containments of Ascó I and Ascó II.
- Placing in service of the containment isolation part of the filtered containment venting system (FCVS).
- Removal of the sections corresponding to the fire-fighting (PCI) systems from the TS's and their transfer to a new appendix of the Fire Fighting Manual "Appendix A2: Fire-fighting Operations Requirements Manual".
- Migration of the Digital Reactor Control System (DRCS) to the OVATION platform and change of main turbine-driven feedwater pump control.
- Use of the optimised ZIRLO alloy as a cladding material for fuel rods.
- Use of the VIPRE-W code to verify thermohydraulic and Non-LOCA safety design at Ascó I and Ascó II, in replacement of the THINC code.
- Use of the GOTHIC code and corresponding methodology developed in both the analyses of containment response and analyses of the capacity of the ultimate heat sink at Ascó I and II, in replacement of the previously used COPATTA-ASCO code.

Cofrentes NPP

The following are particularly significant among the modifications performed during the period of this report and requiring reporting by the CSN:

- Request for authorisation for the updating of safety assessment methods used in the design and evaluation of refuelling outages at Cofrentes nuclear power plant.
- Request for favourable reporting on the scrap declassification process test plan.
- Design modification proposal regarding ultimate heat sink (UHS) temperature and essential services water system (P40) individual and total flow requirements, based on reanalysis of the UHS and evaluation of the residual heat removal (RHR) system pump seals.
- Installation of passive autocatalytic recombiners (PAR)
- Channel demonstration programme for the use of NSF material in GNF2 design fuel assemblies.
- Request for authorisation of the design modification for the use of a new marathon control rod model and corresponding safety study review.
- Updating of the mechanical design basis of the SVEA-96 OPTIMA2 fuel assembly and approval of the corresponding safety study review.

Vandellós II NPP

The following are particularly significant among the modifications performed during the period of this report and requiring reporting by the CSN:

- Replacement of the safety class (Class 1E) monitors of the radiation surveillance system.
- Replacement of the reactor vessel closure head.
- Modifications in order to comply with instruction CSN IS-30, revision 1, on protection against fires.

14.1.3. Periodic safety assessments of nuclear installations during operation, including references to appropriate standards and practices and illustrative examples of the way in which consideration is given to new data and the main results of these assessments for existing nuclear facilities, including the summary of significant results for individual nuclear installations and not only according to their type and generation

ACs has already been indicated above, CSN Instruction IS 26 establishes the requirement that a periodic safety review (PSR) be performed at least every 10 years, and safety guide GS-1.10 "NPP periodic safety reviews" establishes directives for PSR performance by the licenses and is the reference tool for the evaluation of such reviews by the CSN. One of the objectives of the PSR is analysis of the performance of the facility regarding the different aspects of nuclear safety over a sufficiently long period of time to be able to identify trends, analyse the situation of the facility with respect to international standards and the standards of the country of origin of the project and assess the nuclear safety of the installation on the basis of the results obtained in the different areas making up the scope of the PSR. In the case of facilities requesting authorisation for long-term operation (beyond design lifetime), the PSR must also include an integrated ageing assessment and management plan containing Ageing Management Reviews (AMR) and Time Limited Ageing Analyses (TLAA), as established in CSN Instruction IS 22 on ageing management at nuclear power plants. One of the product of PSR's is the preparation of on-going or new safety improvement programmes, depending on the results of the different analyses.

A particularly significant activity within PSR's is analysis and comparison with the standards. This activity, which is described below, is known as conditioned application standards.

The standards of the country of origin of the technology have been taken into account from the very beginning of the licensing of the Spanish plants through requirements relating to their consideration in both the preliminary authorisations and operating permits.

The operating permits currently include the condition that within the first quarter of each calendar year the licensee submit a report on the measures taken to adapt the operation of the plant to the new national nuclear safety and radiological protection requirements and to the standards of the country of origin of the technology. In this last case, an analysis of the applicability to the plant of the new requirements issued by the regulatory authority of the said country of origin shall be included.

Likewise, in the area of PSR the licensees are required to carry out an overall analysis of the applicability of the new standards issued in the country of origin of the technology or in other countries or by reference organisations (IAEA). The basic parameters of applicability of these new standards (design or operation, plant type and construction or start-up date) expressed in their publication, will not generally coincide with those of the Spanish plant being considered, as a result of which their eventual full or partial application is conditioned to a preliminary selection and to a study of the improvements that their application might imply. The term conditioned application standards has been proposed for such cases, and it is considered that the CSN should be responsible for performing the preliminary analysis and the selection of the most suitable standards to improve safety.

The PSR's should also include an update of the probabilistic safety assessment, evaluating risk informed design modifications and incorporating the operating experience gleaned since the last update.

The only Spanish nuclear power plant to perform a PSR during the period covered by the present report has been Trillo. By way of an example, Appendix 14.A. includes the complementary technical instructions issued in reference to the operating permit and resulting from the CSN's evaluation of the plant's periodic safety review. For more information please visit the CSN website, which includes all the ITCs issued to nuclear power plant licensees.

14.1.4. Regulatory examination and control activities

The CSN has implemented a management system based on IAEA Safety Standard GS-R-3 "The management system for facilities and activities" and on standard UNE-EN ISO 9001-2008, which establishes the processes and corresponding procedures for the CSN's actuations to be systematic, integral and predictable and for periodic review of the status of the main elements of the regulatory process, taking into account the most advanced national and international practices.

The actuations for evaluation of the requests submitted by the licensees are carried out in accordance with the systematic approach defined in the CSN procedures and safety guides, which further develop the regulatory requirements defined in the Regulation on nuclear and radioactive facilities (RINR) and the instructions issued by the CSN. As has been pointed out, the instruction applicable to design modifications is IS-21.

Within the integrated plant supervision system (SISC), the CSN includes in the basic inspection plan (PBI) the performance of two-yearly nuclear power plant inspections aimed at verifying the correct application of IS 21 by the licenses. Special importance is given in these inspections to the supervision of modifications not requiring authorisation or favourable appreciation and to the implementation of temporary modification at the facility.

An important part of the evaluation process associated with requests for the renewal of plant operating permits is the evaluation of the results of the PSR's performed by the licensees and the conditioned application standards, from which safety improvement conditions are derived applicable to the new operating permit, these being developed in certain cases by way of complementary technical instructions.

14.1.5. Improvements as a result of the stress tests deriving from the accident at Fukushima nuclear power plant

As has been pointed out above, the post-Fukushima requirements applied by the CSN to the Spanish nuclear power plants were incorporated in four Complementary Technical Instructions (ITC-1/3), issued by the CSN during 2011 and 2012.

Simultaneously to the requirements deriving from the stress tests aimed at incorporating the lessons learned from the Fukushima accident, the CSN required the licensees to identify situations resulting in the loss of major plant areas, with a view to identifying the improvements to be incorporated for their management, by means of instructions ITC 2/4, issued in 2011 and 2012. The Spanish plants carried out these analyses considering a large fire at the plant. Finally, in April 2014, the CSN issued a new ITC dealing with the adaptation of ITCs 2/3/4 in order to consistently contemplate the requirements of these instructions with end dates after December 31st 2013.

The programmes for the implementation of the improvements required in the post-Fukushima ITCs issued by the CSN had the following schedules: short (December 31st 2012), medium (December 31st 2013 and 2014) and long (December 31st, 2016).

In February 2013 the CSN required the licensees to submit a six-monthly follow-up report on activities relating to these post-Fukushima ITCs, which were to be provided during the month following each calendar six-month period, with a previously established content allowing for easy identification of the progress made at each plant and explaining any possible problems might be found regarding compliance with the terms set out for the completion of the said activities.

As regards the implementation of the improvements required in the post-Fukushima ITCs, the CSN considered it necessary to subject the three following design modifications to a specific process of authorisation prior to their being put into service: construction and start-up of the Alternative Emergency Management Centre (CAGE), installation and placing in service of a filtered containment venting system (FCVS) and installation and placing in service of passive autocatalytic hydrogen recombiners (PAR) in containment.

The Plenary of the Council has issued a document containing the evaluation criteria applicable in the licensing processes for these design modifications.

On reception of the six-monthly reports issued by the plant licensees on progress in compliance with the post-Fukushima requirements, the CSN draws up its own follow-up reports in which it also analyses the progress made in relation to the supervision by the body of the activities performed.

The scope, methodology, dedication of resources and generation of records relating to the supervision activities to be performed by the CSN have been included in a specific guideline approved internally at the highest level.

The following are particularly significant among the improvements to be implemented at the plants (Garoña NPP is excluded since it has been treated differently, as explained above in the section on this plant).

Alternative Emergency Management Centre (CAGE):

The CAGE is conceived as an alternative centre at each nuclear power plant for the management of very severe situations at the facility. In this respect it will be designed in accordance with suitable criteria allowing it to maintain its functions in extreme situations, in compliance with the criteria adhered to in the European and Spanish post-Fukushima process. The objective of the CAGE building is to constitute a safe place from which to manage emergencies in beyond design basis accident scenarios, to contain all the equipment required to cover basic needs regarding light, air, water and food autonomously during the accident and to make available areas for management of the emergency and coordination of work, medical services, radiological control and dosimetry, decontamination area, communications, etc.

The Almaraz, Trillo and Cofrentes plants have already submitted their respective requests for favourable appreciation to the CSN and are currently being evaluated by specialist areas. Completion of the implementation of the CAGE at these plants has been postponed from 31-12-2015 to 30-06-2016.

The Ascó and Vandellós II plants have not yet submitted their requests for favourable appreciation for start-up. Completion of the implementation of the CAGE at these plants has been postponed from 31-12-2015 to 30-11-2016.

Filtered containment venting system (FCVS):

The function of the venting system is to protect containment against the overpressure failure mode. It is designed to depressurise the containment in a reasonably short space of time under severe accident conditions. The venting system is filtered in order to reduce the amount of radioactive material released to the environment by means of a filtering system with high decontamination factors.

Ascó NPP has submitted its request for authorisation of the FCVS; the first phase (containment isolation part) was implemented in group 1 during the November 2015 refuelling outage and the second phase will be implemented before 31-12-16. In group 2 the first phase was implemented during the refuelling outage in May 2016 and implementation of the second phase is expected before 31-12-16.

The Almaraz, Cofrentes, Trillo and Vandellós II plants have not yet submitted their respective requests for authorisation of this modification, and are expected to do so during 2016.

Passive autocatalytic recombiners (PAR):

The PAR provide the capacity to control the concentration of combustible gases in containment by recombining hydrogen and oxygen and thereby limit the occurrence of whatever combustible

gas deflagrations and detonations might occur during severe accident scenarios, contributing to maintenance of the structural capacity of the containment and minimising the releases of fission products off site.

The Almaraz, Ascó and Cofrentes plants have submitted their respective requests for favourable appreciation, and the forecasts for installation are as follows:

- Almaraz NPP: PAR were installed in group 1 during the January 2016 refuelling outage and will be installed in group 2 during the outage scheduled for the end of 2016.
- Ascó NPP installed PAR in group 1 during the November 2015 refuelling outage and in group 2 during the outage in May 2016.
- Cofrentes NPP installed them in the drywell during the refuelling outage in October 2015 and is expected to install the remainder, in containment, throughout 2016.
- Vandellós II NPP has not yet submitted a request for favourable appreciation and is expected to install APR's in late 2016.
- Trillo NPP installed them as part of the improvements applied at German design plants in the wake of the Chernobyl accident.

14.2. Verification of safety

14.2.1. Arrangements and regulatory requirements for the verification of safety

The operating permits require the licensees to periodically submit a series of reports relating to the tracking of in-house and industry operating experience and the results and modifications deriving from the analysis of new standards in the country of origin of the technology, the results of the environmental radiological surveillance programme, the results of the dosimetry controls applied to the workers, the activities performed within the framework of the radioactive waste and spent fuel management plan, the activities relating to the initial and on-going training of the facility's licensed and non-licensed personnel and the exit of radioactive packages from the facility.

The operating permits also establish criteria to determine when changes implemented in the official operating documents: Technical Specifications, Safety Study, Site Emergency Plan, Operating Regulation, Quality Assurance Manual, Radioactive Waste Management Plan and Radiological Protection Manual, require or do not require authorisation; in certain cases the applicable screening process is set out in complementary technical instructions. Any modification to the Site Emergency Plan or Technical Specifications requires ministerial authorisation. Changes to the Safety Study (SS) require or do not require authorisation depending on whether the design modification giving rise to such SS change requires or does not require authorisation in application of IS 21.

As has already been pointed out, CSN instruction IS 21, on design modifications at nuclear power plants, establishes the requirements to be met by the licensees for the implementation of design modifications at the plants, establishing a screening process based on the potential impact of the modification on nuclear safety, this determining whether or not a modification at the facility requires ministerial authorisation or the favourable appreciation of the Plenary of the Council.

The requirements applicable to in-service inspections at nuclear power plants are established in CSN instruction IS 23, and the requirements applicable to nuclear power plant aging management in CSN instruction IS 22. The Technical Specifications establish the testing requirements necessary to verify the operability of safety systems and the requirements applicable in this case are included in CSN instruction IS 32.

Likewise, CSN instruction IS 15, relating to the supervision of nuclear power plant maintenance efficiency, sets out the provisions necessary for the licensees to assess, among other things, the suitability of the licensees' maintenance systems, in terms of the availability and reliability of

safety significant systems.

As regards periodic safety reviews, and as has already been indicated above, CSN instruction IS 26 establishes that at least once every ten years the licensees shall carry out such a review, and the operating permits, among other documents, require the submittal of a periodic safety review along with the request for renewal of the permit.

14.2.2. Main elements of programmes for continued verification of safety (in-service inspection, surveillance, functional testing of systems, etc.)

Throughout the period corresponding to this report, the licensees of the nuclear power plants have continued to update the design bases and licensing documents of each facility. The objective of this activity has been to compile the design bases and licensing bases for each safety-related system. Updating of the design bases requires verification of the hypotheses, data and results of the accident analyses included in the Safety Study, identification of the design bases of the support components necessary for the performance of the safety functions and the design modifications incorporated in the safety systems. Also included is the review of the current physical reality of each of the systems and the operating procedures, with a view to aligning the operating practices and the design of the systems. The end product of this process is an updated Safety Study suitably contrasted and aligned with the design basis documents.

The series of periodic examinations and tests performed on the structures, systems and components throughout the operating lifetime of the plant is known as in-service inspection and is aimed at verifying their structural integrity and functional capacity.

Up until the issuing of CSN Instruction IS-23 on in-service inspections at nuclear power plants, in November 2009, and given the absence of standards governing these activities in Spain, the nuclear power plants developed their in-service inspection programmes in accordance with the standards defined in the regulations of the country of origin of the technology and accepted in the operating permit, the basic standard applied being section XI of the code of the American Society of Mechanical Engineers (ASME) and this association's Operation and Maintenance code (ASME-OM), required by the Technical Specifications. Consequently, this code is considered to be an acceptable reference for the drawing up of the in-service inspection and testing programmes defined for these facilities, which are included in the In-Service Inspection Manual (ISIM). The aforementioned CSN instruction endorses and consolidates this same practice.

The inspection systems used for in-service inspections must be qualified in accordance with the methodology accepted by the CSN and have the scope established therein. The non-destructive testing (END) methods and techniques used must be selected taking into account the different characteristics and nature of the structures, systems and components, the typology of defects, accessibility conditions and the different levels of radiation, as well as the degree of automatisation of the equipment used for performance of the examinations. These methods and techniques are adequately described in procedures.

The evaluation of the results of these inspections and their comparison with the applicable acceptance criteria allow the objectives of these in-service inspection programmes to be verified. The comparison of these results with those obtained during the basic reference inspection (pre-service) and previous in-service inspections performed makes it possible to analyse trends observed, explain any changes and adopt the actions appropriate in each case.

In addition to the in-service inspection contemplated in the ASME Code, the plants have additional in-service inspection plans deriving from other regulatory requirements or their operating experience. These plans include aspects such as the surveillance of erosion-corrosion phenomena.

The guideline on those anomalous conditions (degraded and non-conforming conditions) that might arise during operation of the plant has been applied since 2007, and was revised in 2016 in view of experience of its application.

To date the performance of a Periodic Safety Review at a nuclear facility has been linked to the granting of the renewal of its operating permit. The overall review of an installation over prolonged periods of time allows operation to be evaluated from a viewpoint that is complementary to daily tracking. The results of the Periodic Safety Review may be used to improve operation during the following period.

This same systematic way of working is considered to be equally valid for those cases in which the renewal of the operating permit exceeds the lifetime originally considered in the initial design of the facility. It is understood that in this case special conditions, both administrative and relating to management of the ageing of the facility, should be included, such that the operation of the plant may be extended beyond the initial design lifetime.

14.2.3. Elements of the ageing management programme

The control of the ageing of the structures, systems and components (SSC) is a fundamental part of nuclear power plant lifetime management. In compliance with the limits and conditions of the operating permits, the licensees draw up an annual report in which they identify new inspection, surveillance and maintenance activities for the detection and control of ageing processes. The methodology used is described in the LWR nuclear power plant remaining lifetime assessment system, developed jointly by the nuclear power plants associated within UNESA.

In July 2009, CSN instruction IS-22 on safety requirements for the management of nuclear power plant ageing and long-term operation was published, establishing the terminology and criteria for the management of nuclear power plant component ageing and determining the scope of the activities to be performed during both the design lifetime of the facility and long-term operation. The aforementioned instruction IS-22 provides that the nuclear power plants shall incorporate the conclusions of their analyses in a Lifetime Management Plan (PGV).

This PGV is in keeping with the scope required by IS-22, identifies the ageing mechanisms for that scope and evaluates current maintenance practices, determining whether they need to be extended or modified. In addition, when the period covered by the analyses partially or fully exceeds the initially considered design period, the analyses performed (studies, calculations) are re-evaluated using a defined design lifetime hypothesis (Ageing Management Reviews –AMR–).

As has been pointed out above, during the first six months of each year the nuclear power plants submit a report on the activities performed within the framework of the PGV, specifying proposals for improvement. The scope of the PGV's coincides with that described in articles 54.3, 54.4 and 54.21 of the US standard 10CFR54 (Requirements for operating licence renewal), during their design lifetime. Beyond this period, the applicable requirements of this standard associated with the AMR's shall also be met and the PIEGE (Integrated Ageing Management Plan) shall also be drawn up. Furthermore, the plants shall submit a review of the PGV within the framework of the PSR's.

14.2.4. Arrangements for internal review by the licensee of the safety cases to be submitted to the regulatory body

The detailed criteria governing all design modifications, regardless of whether these refer to the operating conditions (changes in the practices of the facility, procedures, analyses performed to demonstrate compliance with the design basis and evaluation methods used for these analyses) or to physical changes to the structures, systems or components of the facility, are contained in CSN Instruction IS-21 on requirements applicable to modifications at nuclear power plants.

The nuclear power plants have procedures for the implementation of the different stages of analysis established by this instruction (preliminary analysis, safety assessments and safety analy-

sis), by means of which the impact on safety of all the changes to be introduced is assessed. If from the analysis it is concluded that the authorisation of the Administration is not required, the licensee may implement the modification or place it in service unilaterally. Otherwise, the modification must be presented for consideration by the Administration, requesting favourable appreciation or authorisation. The procedures define different bodies within the organisation for the technical review and approval of the changes, among which in all cases are the plant Safety and Quality departments. Additionally, in those cases in which it is necessary to request the authorisation of the Administration, the modification is reviewed by the Nuclear Safety Committees of the plant and the operator, which provide an additional independent review of the technical and safety-related analyses to be submitted in support of the request. In certain cases, either systematically or depending on the importance and magnitude of the changes requested, an independent review is performed by organisations other than the one initiating the change. This independent review may be carried out by organisations internal to the licensee or by entities outside his organisation.

The information provided by the probabilistic methodologies included in the plant Probabilistic Safety Assessments (APS) and dealing with the impact on safety of the requests presented constitutes a valuable mechanism that is occasionally used as additional backing for the request made. The nuclear power plants have updated APS models that are regularly inspected by the CSN.

14.2.5. Regulatory review and control activities

As has been indicated above, in section 7.4, the CSN dedicates a significant part of its resources to the inspection of the operating nuclear power plants and possesses an integrated plant supervision and control system (SISC). An instrument for continuous supervision included in the SISC is the Basic Inspection Plan, which has a period of validity of two years and is applied equally to all the facilities.

Both the specialists working at the CSN headquarters and the Council's on-site resident inspectors (two inspectors per site) intervene in the performance of the inspections included in this programme, the latter also carrying out day-to-day monitoring of the plant and events and overseeing the way operating events are solved and compliance with the Technical Specifications or other CSN requirements. Inspections are performed within the framework of the Basic Inspection Plan that include the participation of specialists in various disciplines in relation to safety-significant aspects of the facility, such as design modifications, the effectiveness of maintenance, design bases of structures, systems and components, surveillance requirements, the site emergency plan, operational radiological protection, etc.

The most important conclusions of the annual operations evaluation of plants in operation in 2013 were as follows:

The operation of the facilities was satisfactory from the point of view of the degree of compliance with the applicable regulations.

No regulatory actuation is required, except for what is generally established for all the operating plants, with the exception of Almaraz NPP, which has been in the regulatory response column as a result of a white finding in each group. The actions foreseen in the applicable procedures of the SISC for a plant in the "regulatory response" column of the action matrix have been adopted.

All the indicators have been in the green band, except during the first three quarters, in which there was on in the white band for Almaraz I (reactor scrams).

All the inspection findings identified in 2013 were categorised as green, except for one white at Almaraz II in relation to the essential services water pumps.

The most important conclusions of the annual operations evaluation of plants in operation in 2014 were as follows:

The operation of the facilities was satisfactory from the point of view of the degree of compliance with the applicable regulations.

Given that all the plants are in the licensee response column, no regulatory supervision and control efforts are required in addition to those scheduled by way of the annual inspections programme included in the PAT for 2015, plus whatever non-programmed events might occur throughout the year.

All the operation indicators have been green throughout 2014.

The most important conclusions of the annual operations evaluation of plants in operation in 2015 were as follows:

The operation of the facilities was satisfactory from the point of view of the degree of compliance with the applicable regulations.

No regulatory actuation is required, except for what is generally established for all the operating plants, with the exception of Almaraz NPP, which has been in the regulatory response column during the last two quarters of 2015 due to the DG mitigation systems reliability indicator changing to white.

All the indicators have been in the green band, with the exception of the DG mitigation systems reliability indicator of group II of the Almaraz plant, which has been in the white band during the last two quarters of the year.

All the inspection findings encountered this year have been categorised as green.

14.3. Vienna Declaration

What is indicated in articles 14.2.2 and 14.2.3 is clearly included under principle 2 of the Vienna Declaration, in relation to the periodic and ordinary performance of exhaustive and systematic safety assessments and the implementation of reasonably feasible safety improvements.

It should be pointed out that as a result of the PSR's and the performance of the stress tests and analyses of situations of major area losses at the Spanish nuclear power plants, safety improvements have been implemented in different areas, such as for example the following:

- Improvements in protection against fires (protection against spurious events caused by fires, seismic PCI, etc.) (Trillo, Stª Mª de Garoña, Almaraz, Ascó, Vandellós).
- Improvements[1] in the electrical separation of trains, containment isolation and the standby gas treatment system (Stª Mª de Garoña NPP)
- Improvements to the remote and alternative shutdown systems (Almaraz NPP).
- Improvements in the calculation methodologies used in accident analysis (Ascó, Almaraz).
- Improvements to address situations of loss of major areas, complete loss of power supply and loss of the ultimate heat sink as a result of the analyses performed within the stress tests and tests on loss of major areas.

The implementation of all these modifications, outstanding[3] among which are the filtered containment venting systems, passive autocatalytic recombiners, the new emergency management

[3] Certain of these modifications are not yet in service, but are in the final phases of implementation.

centre, portable pumping and power supply equipment and reinforcement of the instrumentation systems, among others, has contributed to strengthening the Spanish nuclear power plants with respect to beyond design basis situations.

As regards principle 3, articles 14.2.1 and 14.3.1 explain in detail the regulatory framework that requires the plants to perform reasonably feasible exhaustive and periodic safety assessments, underlining IS 21 in relation to the treatment of design modifications and IS 26 in relation to the performance of periodic safety reviews. It should be pointed out that safety guide GS 1.10, which establishes directives for the performance of PSR's by the licensees, is currently under revision, for adaptation to the IAEA's guideline SSG-25 "Periodic Safety Review for Nuclear Power Plants". The CSN plans for the next plant to perform a PSR to be able to do so in accordance with the new guideline.

APPENDIX 14.A

Complementary Technical Instructions issued to Trillo NPP in association with the conditions of the operating permit.

ITCs 11 to 18 inclusive are associated with the results of PSR/NAC evaluation (they are linked to conditions 7, 8 and 9 of the operating permit).

SUBJECT: COMPLEMENTARY TECHNICAL INSTRUCTIONS RELATING TO THE OPERATING PERMIT FOR TRILLO NPP

On November 15th 2013, the licensee of Trillo NPP submitted a request to the Ministry of Industry, Energy and Tourism for the renewal of its operating permit for a period of ten years, this request resting on the conclusions of the Periodic Safety Review submitted in compliance with condition 2 of the Ministerial Order of November 16th 2004, by means of which the operating permit in force was granted.

During its meeting of October 8th 2014, the Nuclear Safety Council studied the request, along with the report drawn up by the Technical Directorate for Nuclear Safety as a result of the evaluations performed, and agreed to issue a favourable decision on the basis of the provisions of article 2.b) of Law 15/1980 creating the Nuclear Safety Council. It also agreed to issue to Trillo NPP the Complementary Technical Instructions attached hereto.

The present document replaces and leaves null and void the document referenced CNTRI-TRI-SG-14-01 (CSN exit registration number 8967, of November 18th 2014) due to an error in the numbering of the Complementary Technical Instructions.

A contentious-administrative appeal may be filed against the present agreement within two months of the day following notification thereof before the Contentious-Administrative Tribunal of the National High Court, pursuant to the provisions of article 46 and the fourth additional provision of Law 29/1998, of July 13th, on Contentious-Administrative Jurisdiction, without prejudice to the possibility of filing an appeal for reconsideration before the Nuclear Safety Council within one month of the day following notification of the present agreement, as set out in articles 107, 116 and 117 of Law 30/1992, of November 26th, on the Legal Regime of the Public Administrations and Common Administrative Procedure, as worded in Law 4/1999, of January 13th.

Madrid, November 19th 2014

THE SECRETARY GENERAL

COMPLEMENTARY TECHNICAL INSTRUCTIONS RELATING TO THE OPERATING PERMIT FOR TRILLO NPP

1. **Complementary Technical Instruction No 1** associated with condition 3 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   All revisions of the documents referenced in the Operating Permit must include an identification of the changes made and the corresponding requests for authorisation shall be accompanies by a document justifying each such change.

   In the case of the Operating Regulation, revisions including changes to the operations organisation shall be accompanied by a document on management of the change, with the following contents: analysis of organisational changes, identification of documents affected and schedule for their updating, training required by persons affected by the changes and corresponding training plans, assessment of the impact of the changes on the technical capabilities of the organisation and description of the process and programme for implementation of the changes.

2. **Complementary Technical Instruction No 2** associated with condition 3.3 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   Changes in the Operating Regulation relating to the items listed below imply a reduction of the requirements as regards requests for approval by the Directorate General for Energy Policy and Mines, following a report by the Nuclear Safety Council, prior to their entry into force:

   a) Modification of the organisational structure affecting the hierarchical or functional resources required in the standards for groups having assigned functions or responsibilities in specific areas.

b) Modification of the functions or responsibilities assigned to the operations organisation when they have implications for nuclear safety or radiological protection during normal operation or in the event of an emergency.

c) Modification of the composition or functions of the PNSC or ONSC.

d) Modification of the initial and on-going training programmes for licensed personnel or personal having functions in the licensee's emergency response organisation, when they have an impact on the specific qualification required for such personnel.

e) Modification of the series of reports or notifications to be submitted to the administration, of the books or records documenting the performance of activities relating to plant safety or radiological protection or of the contents established for these documents.

3. **Complementary Technical Instruction No 3** associated with condition 3.4 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   Changes to the Quality Assurance Manual relating to editorial aspects or to those listed below do not imply any reduction in the commitments as regards requesting the favourable appreciation of the Nuclear Safety Council prior to their entering into force:

   a) Use of standards accepted by the CSN more recent than those applied in the programme in force.

   b) Use of quality assurance criteria approved by the Ministry of Industry, Tourism and Trade as a result of a CSN Decision, as long as the conditions for approval are similar.

   c) Modifications to the description of the posts and functions of the organisation, as long as authority and responsibility in relation to quality assurance issues are clearly defined.

   d) Modifications in the organisation, as long as there is a guarantee that the persons and organisations responsible for quality assurance functions continue to have the authority and organisation freedom required, including independence with regards to costs and schedules.

4. **Complementary Technical Instruction No 4** associated with condition 3.5 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   The aspects listed below affect basic radiological protection standards or criteria, as regards requesting the favourable appreciation of the Nuclear Safety Council prior to their entering into force:

   a) Incorporation of changes deriving from application of the new basic national regulations on radiological protection.

   b) Practical application of the regulatory precepts relating to the radiological classification of areas and personnel.

   c) Requirements for access and standards on the presence of workers and members of the public in the controlled zone.

   d) Reference levels used for the radiological control of materials and persons at the exit from the controlled zone.

5. **Complementary Technical Instruction No 5** associated with condition 3.6 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   Revisions of the Radioactive Waste and Spent Fuel Management Plan require the favourable appreciation of the Nuclear Safety Council prior to their entering into force in the following cases:

   a) Generation of waste types differing in their origin, nature or physical-chemical or radiological characteristics from those included in the revision in force of the Radioactive Waste and Spent Fuel Management Plan.

   b) Selection of radioactive waste or spent fuel management routes different from those contemplated in the Radioactive Waste and Spent Fuel Management Plan or implying the alteration of the commitments made by the licensee in relation to management actions.

   c) Modifications to the facility implying significant variations in the quantities of radioactive wastes generated or activities relating to their management or variations in the capacity of any of the spent fuel storage modes implemented.

d) Modifications to the methodology used for classification of the facility in waste zones affecting the criteria applied for their establishment, the criteria for temporary evolutions of such areas and their return to the initial classification or the criteria for the definitive evolutions of zones.

e) Modifications implying the definitive evolution of an area classified as a "radioactive waste zone" into a "conventional waste zone".

6. **Complementary Technical Instruction No 6** associated with condition 4.1 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

The annual in-house and industry operating experience report shall contain the following:

a) In-house events.

A table shall be submitted including all the events reported during the year, with reference to the NSI, date, title of the event and, in each case, a brief description of the remedial or corrective actions and the status of implementation of each.

b) Events at other Spanish nuclear power plants.

A table shall be submitted including all the events reported by other Spanish NPP's during the year and considered to be applicable with the same contents as in the previous section. For each experience, the table shall indicate the reference, date and title of the event. These shall be ordered by type and date of issue and the final result of the applicability analysis shall be included: closed, open, not applicable. When the result is not applicable, the exclusion criterion used shall be indicated.

c) Industry experience.

A table shall be submitted summarising the experiences received during the year from the organisations listed below. For each experience, the table shall indicate the reference, date and title of the event. These shall be ordered by type and date of issue and the final result of the applicability analysis shall be included: closed, open, not applicable.

The different types of industry experiences to be considered are as follows:

— INPO Event Reports Level 1 (IER-1), equivalent to the former Significant Operating Event Reports (SOER) issued by the Institute of Nuclear Power Operations (INPO*).*

— INPO Event Reports Level 2 (IER-2), equivalent to the former Significant Events Reports (SER) also issued by INPO:

— Written recommendations from suppliers regarding safety-related components, equipment and services.

— Wieterleitungsnachricht (circulars on operating experience) issued by the GRS (German Nuclear Safety Society.).

— Applicable Service Reports and Experience Reports issued by Craftwork Unión Aktiengesellschaft (KWU).

d) Experiences whose assessment has been formally required by the CSN.

In the four sections:

— For each experience, in-house or industry, required by the CSN, an individual analysis shall be submitted including a brief summary of the experience, the reasoned conclusions of the applicability analysis carried out by the operator and a description and status of implementation of each associated remedial or corrective action, date of closure or expected date of closure, depending on status, and justification of any delays in performance that might prevent it from being closed on the foreseen date.

— The status of the corresponding experiences not closed in previous annual reports shall be submitted, along with their individual analyses.

— An experience shall be considered to be closed when all the corrective actions deriving therefrom, including training actions, have been performed and the official operating doc-

uments have been updated, with the exception of the Safety Study, for which entry into the change control process shall suffice.

— An estimated data of closure shall be included for each pending corrective action.

7. **Complementary Technical Instruction No 7** associated with condition 4.2 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   The annual report on new standards shall include the systematic analysis of the documents listed below:

   a) National regulatory provisions on national security and radiological protection.

   b) Nuclear Safety Council instructions.

   c) Requirements and standards of the country of origin of the design, in particular:

      — Changes in the German Federal Legislation potentially applicable o Trillo NPP.

      — Requirements issued by the BMU.

      — Technical Nuclear Safety Standards (KTA) of the Federal Republic of Germany.

      — Recommendations of the Commission for Rector Safety (RKA) of the Federal Republic of Germany.

      — Recommendations of the Commission on Radiological Protection.

   d) Requirements formulated by the US regulatory authority, particular:

      — Modifications to the sections of parts 50 and 100 of chapter 10 of the US Code of Federal Regulations (10 CFR) required by the CSN.

      — New NRC generic letters or revision of existing letters.

      — New NRC bulletins or revision of existing bulletins.

      — Generic NRC orders (overall, supplier, technology).

   e) Other documents issued by the US regulatory authority and not having the standing of legal requirements, despite the licensee being requested to perform an analysis and positioning regarding their applicability to the facility:

      — Revisions of regulatory guides (RG) issued by the NRC, forming part of the plant licensing basis.

      — New regulatory guides (RG) issued as a result of changes or new requirements by the US regulatory authority, with compliance required by the CSN.

      — Other regulatory guides (RG), different from the two previous categories, application of which the licensee considers to be of special interest for his facility, without their being part of the licensing basis.

      — Summary of regulatory issues (RIS). Only RIS's having the following objectives shall be revised:

        • Endorsement of industry positions

        • NRC technical or action policy positions

An individual analysis shall be submitted for each new requirement/recommendation issued during the period covered by the report, as well as for those corresponding to previous years and pending closure in the previous report. Such analyses shall include at least the reference, data, title, a summary of the requirement/ recommendation, the reasoned conclusions of the applicability analysis performed by the licensee identifying any appropriate background issues (except for modifications to 10 CFR50 and 100 required by the CSN, which are always applicable), the open or closed status and, where appropriate, the corrective actions planned or performed, indicating the status of each, the date committed to for closure and the justification of any delays in performance preventing closure on the foreseen date. If the corrective actions consist, of the performance of studies or analyses, the results shall be indicated on completion thereof.

Likewise, the annual report on standards shall include a history in table format ordered by requirement/recommendation type and date of issue, establishing in each case its reference, date, title and status (open or closed). In the case of KTA's, RSK's, SSK's, Regulatory Guides and their revisions, a complete list of all those forming part of the plant licensing basis and of those others not part of the licensing basis but considered to be applicable shall be included, the distinction between the two being specified.

A requirement/recommendation shall be considered closed when all the corrective actions deriving from it have been carried out, including the delivery of all the training identified to all the personnel for whom it is designed and the updating of the plant documents, with the exception of the Safety Study, for which entry into the change control process shall suffice.

8. Complementary Technical Instruction No 8 associated with condition 4.4 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

The annual report on the results of the dosimetry controls applied to the operating personnel and defined in condition 4.4. shall contain the following:

a) Summary of external dosimetry (official): distribution of annual doses in accordance with the format of the following table, to be broken down by in-house personnel, contractor personnel and totals.

(*) Recording level. The recording level established for thermoluminescence dosimetry is 0.1 mSv/month. Values below this recording level shall be counted as zero is dose accounting.

Dose interval (mSv/y)	Number of workers	Collective dose (mSv)
Dose < R.L. (*)		
R. L. < Dose < 1.00		
1.00 < Dose < 2.00		
2.00 < Dose < 3.00		
3.00 < Dose < 4.00		
4.00 < Dose < 5.00		
5.00 < Dose < 6.00		
6.00 < Dose < 10.0		
10.0 < Dose < 20.0		
20.0 < Dose < 50.0		
Dose _>_ 50.00		
Total		
Total (dose < 20 mSv/y)		
Total (dose < 50 mSv/y)		
Total (dose > R.L.)		

b) Summary of internal dosimetry: Results obtained in the monitoring programme by means of direct whole body radioactivity measures:

Total number of controls performed

Total number of workers controlled

Number of workers with contamination in excess of the recording level

Number of workers with contamination in excess of the investigation level

c) Analysis of trends of the indicators listed below over the last five years of operation. Apart from the data requested, this analysis shall include whatever additional information might be pertinent for the interpretation of these trends (noteworthy events, operational circumstances, etc.):

1) Annual collective dose.

2) Annual collective dose due to power production (mSv.p/MWh).

3) Collective dose (operational dosimetry) during refuelling outages.

4) Number of contractor workers during refuelling outages (and percentage this represents with respect to the total number of workers).

5) Man-hours used during refuelling outages.

6) Collective dose per hour x person during refuelling outages.

7) Dose rates in the locations included in table 3.A (BWR) or 3.B (PWR) in CSN Safety Guide 1.5, "Documentation on refuelling activities at light water nuclear power plants".

d) The data corresponding to previous sections a, b, c1 and c2 shall be submitted to the CSN no later than February 20th of each calendar year, in order to facilitate the preparation of the CSN's Annual Report to Congress and the Senate.

9. **Complementary Technical Instruction No 9** associated with condition 4.5 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

   The contents of the annual report on the activities of the Radioactive Waste and Spent Fuel Management Plan defined in condition 4.5 shall be in accordance with the provisions of section 6 of CSN Safety Guide 9.3.

10. **Complementary Technical Instruction No 10** associated with condition 4.6 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

    The annual report on the initial and on-going training of all the personnel, defined in condition 4.6, shall contain three sections: the first on the initial and on-going training programme to be delivered during the year to the licensed operating personnel (operators and supervisors), the second indicating the effective training performed during the previous year by operating license personnel, and the third on the training delivered to non-licensed personnel working for the plant whose functions are e related to safe plant operation.

11. **Complementary Technical Instruction No 11** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit, in relation to the Analysis of New Standards.

    The licensee shall consider the following documents to be applicable to Trillo NPP and analyse them in the report on new standards to be submitted during the first quarter of 2015:

    — RSK 444 "Testing and surveillance programme for paper and oil insulation transformers and dry transformers at German plants".

    — RSK 453 "Repercussions of the stability of the German network for nuclear facilities and guarantees of adequate supply to their equipment from the off-site network".

12. **Complementary Technical Instruction No 12** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit, in relation to the Characteristics of the Site.

    Within two years the licensee shall revise the contents of chapter 2 of the Safety Study (SS) of Trillo NPP to explicitly include the design bases applied at the plant in relation to the site.

    Furthermore, within the same time period the licensee shall submit a systematic plan to keep the information contained in this chapter updated, indicating the scope and frequency of this updating, such that the current situation of the site and the validity of the design bases associated with it are covered. The first updating performed in accordance with the plan shall be included in the next ordinary revision of the SS carried out following the one indicated in the previous paragraph.

13. **Complementary Technical Instruction No 13** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit, in relation to the Conditioned Application Standards.

    1. The licensee shall include the following standards in the Licensing Basis of Trillo Nuclear Power Plant:

       a) KTA 3506 (1984). Tests and inspections of the instrumentation and control equipment of the safety system of NPP's.

b) KTA 1203. Requirements for the accident management manual, section 5: Requirements Pertaining to Emergency Manual, Part 0 – Table of Contents and Introduction, and section 7: Requirements Pertaining to Emergency Manual, Part 2 – Emergency Measures.

c) KTA 3601 (2005). Ventilation systems in nuclear power plants, section 7.2

d) IEEE STD 765-2006. Preferred power supply (PPS) for NPP's.

e) R.G. 1.36 revision 0. Non-metallic thermal insulation for austenitic stainless steel. This shall be applied exclusively to future modifications of the facility.

f) R.G. 1.52 revision 3. Design, inspection and testing criteria for air filtration and adsorption units of post-accident engineered safety feature atmosphere cleanup systems in light water-cooled nuclear power plants, section 6.

g) R.G. 1.124 revision 2. Service limits and loading combinations for class 1 linear type supports. This shall be applied exclusively to future modifications of the facility.

f) R.G. 1.140 revision 2. Design, inspection and testing criteria for air filtration and adsorption units of normal atmosphere cleanup systems in light water-cooled nuclear power plants, section 6.

i) R.G. 1.180 revision 1. Guidelines for evaluating electromagnetic and radio-frequency interference in safety-related I&C systems. The following aspects shall be incorporated for future modifications of the facility

   a. Consider the performance of interference tests above 1 GHz, or demonstrate that such interferences are not possible in the plant.

   b. Electromagnetic compatibility should also be considered for non safety-related equipment whose failure might affect safety functions.

      As an alternative to the US military standard MIL-STD-461E, referenced in the S.G., the licensee may use international (IEC) or European (EN) standards.

j) R.G. 1.200 revision 2. An approach for determining the technical adequacy of probabilistic risk assessment results for risk-informed activities.

k) G.L. 89.22 (October 1989). Potential for increased roof loads and plant area runoff depth at licensed NPP's due to recent change in PMP criteria developed by the national weather service.

Modifications to the Safety Study deriving from changes to the Licensing Basis shall be incorporated in the study in the revision following the 2015 refuelling outage.

2. The licensee shall submit to the CSN within six months a revision of the analysis performed in order to comply with the Complementary Technical Instruction on Conditioned Application Standards corresponding to the following standards:

   a) IEEE STD 765-2006: Preferred power supply (PPS) for NPP's.

   b) KTA 3504 (2006): Electrical drive mechanisms of the safety system in NPP's.

   c) KTA 3705 (2006): Switchgear, transformers and distribution networks for the electrical power supply of the safety system in NPP's.

   d) BTP 6-4: Containment purging during normal plant operations.

   e) KTA 3601 (2005), section 7.2: Ventilation systems in nuclear power plants.

   f) R.G. 1.52 revision 3, section 6: Design, inspection and testing criteria for air filtration and adsorption units of post-accident engineered safety feature atmosphere cleanup systems in light water-cooled nuclear power plants.

   g) R.G. 1.140 revision 2, section 6: Design, inspection and testing criteria for air filtration and adsorption units of normal atmosphere cleanup systems in light water-cooled nuclear power plants.

   h) R.G. 1.23 (rev. 1, March/2007): Meteorological monitoring programs for nuclear power plants.

i) G.L. 89.22 (Oct./1989). Potential for increased roof loads and plant area runoff depth at licensed NPP's due to recent change in Probable Maximum Precipitation criteria developed by the national weather service

14. Complementary Technical Instruction No 14 associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit, in relation to the Conditioned Application Standards.

1. As regards the application of the standard KTA 3601 (2005), *Ventilation systems in nuclear power plants,* the licensee shall carry out the actions proposed for compliance with the following:

   a) Implementation within two years of renewal of the operating permit of a systematic approach for the performance of periodic leak testing, with a frequency of one year, of all manual or actuated dampers considered by design to be leak-proof or having limited leakage values and, as such, being included in the EFS and forming part of systems classified as Class 1 or Class 2 in accordance with KTA 3601 of 2005.

   The licensee shall assess whether there are any design-induced limitations for the performance of these tests and, where appropriate, shall identify such limitations, assess their consequences and propose compensatory actions to guarantee compliance with the objectives of the affected test. The licensee shall submit a report with this information to the CSN within one year.

   b) Completion within four years of renewal of the operating permit of leak testing of impulsion lines downstream of the following fans: 0TL61/62-D101, 0TL86/87/88-D101, 1/2/3/4TL90-D102/3/4, 0TL21-D111/121, 0TL22-D111/121, 0TL25-D131/141, 0TL27-D111/121 and 0TL28-D111/121.

   c) Performance of a functional test, one redundancy per year, of the coils of the following systems:

      • TL75/76/77/787.

      • UV21/22/23/24-B701, UV27-B711/2/3/4, UV41/43-B752, UV42/44-B751 and UV 61/62/63/64-B751.

      The coil tests shall include at least measurement of air flow, air side differential temperature, water flow and water side differential temperature, with the system operating with design air and water flows for the existing thermal load conditions.

      The first test on each of the coils shall be performed within two years of renewal of the Operating Permit.

      Exceptionally, if the licensee identifies particularly significant limitations for performance affecting specific items of equipment, the functional tests may consist of carrying out indirect checks demonstrating the operability of the coils. Within one year of renewal of the Operating Permit, the licensee shall submit a report to the CSN identifying these possible exceptions and justifying in each case the impossibility of performing the test and the alternative test method.

2. As regards the application of R.G. 1.52, revision 3: *Design, inspection and testing criteria for air filtration and adsorption units of post-accident engineered safety feature atmosphere cleanup systems in light water-cooled nuclear power plants*, and R.G. 1.140, revision 2: *Design, inspection and testing criteria for air filtration and adsorption units of normal atmosphere cleanup systems in light water-cooled nuclear power plants*, the licensee shall carry out the following actions within the periods indicated:

   a) Performance of the following tests, considered to be initial tests by ASME N510 of 1989, for all the filtering units of the ventilation systems included in the TLM system:

      • Structural integrity test.

      • Leak test.

      • Flow distribution test and capacity test.

      • Air-aerosol mix uniformity test for systems TL-6, TL-22, TL-25 and TL-28.

The licensee shall assess whether there are any limitations for the performance of these tests due to the design of the filtering units and, where appropriate, shall identify such limitations, assess their consequences and propose compensatory actions to guarantee compliance with the objectives of the affected test. The licensee shall submit a report with this information to the CSN within one year.

b) Analysis of whether the heaters test procedure meets the requirements of ASME N510 of 1989 and, where appropriate, completion of this procedure in order to meet the requirements within one year of renewal of the Operating Permit.

c) The licensee shall perform monthly tests on TL-6, checking for start-up of the fans and connection of the heaters for a minimum 15 minutes.

d) The licensee shall include in the adsorbent and HEPA filter procurement specifications the requirement that there be compliance with ASME AG-1 1997 or an alternative nuclear design standard that includes the same quality and suitability requirements.

e) All HEPA filters and adsorbent filters of the filtering units of the TL system shall meet the requirements of the standard indicted in the previous paragraph.

The licensee shall complete all the actions indicated in the previous points within one year of renewal of the Operating Permit, with the exception of points a), in relation to the period for test completion, and e), for which a period of two years is considered to be adequate.

15. **Complementary Technical Instruction No 15** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit, in relation to the Conditioned Application Standards.

1. As regards the application of the standard BTP 6-4, *containment purging during normal plant operations.*

a) The licensee shall within one year a proposal for modification of the ETF's to include blocking of the opening of the DN 600 isolating dampers of the containment ventilation systems (TL16/26) in Operating States 1, 2 and 3 with an average primary temperature in excess of 93ºC. Also included shall be the monitoring of this closed position and a maximum closing time of 5 seconds.

While this change is being incorporated in the ETF's, the licensee shall keep the DN 600 purge closed in Operating States 1, 2 and 3 with an average primary temperature in excess of 93ºC during refuelling outage shutdown and start-up processes.

b) The licensee shall within three months submit to the CSN information on the performance of start-up testing of DN 300 blowdown system dampers TL8 and TL17 or otherwise perform these tests during the next refuelling outage.

c) The licensee shall within one year submit a proposal for modification of the ETF's to establish the frequency of testing of DN 300 blowdown system dampers TL8 and TL17 (RV 4.5.2.1 and 4.5.2.2) in accordance with table 4-2 of KTA 3404 (once every six months).

16. **Complementary Technical Instruction No 16** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

Within six months the licensee shall submit to the CSN a revision of the second Periodic Safety Review, of October 2013, with all the improvements deriving from the evaluation performed by the CSN incorporated.

17. **Complementary Technical Instruction No 17** associated with condition 7 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

The Ageing Management Programmes for KWU supplied equipment environmentally qualified in accordance with KTA-3505 and for which no qualified lifetime has been defined shall be based at least on the following activities:

— Performance of a study of degradation phenomena due to ageing for each item of equipment, identifying the degradable parts of the equipment that are critical for compliance with its safety function in the event of an accident and the significant resulting ageing effects on such parts.

— Evaluation of the validity of the surveillance tests and/or maintenance practices currently applied to each item of equipment in order to detect and control these aging effects during the period of equipment installation in then plant.

— Proposal of necessary improvements to these tests and procedures and development of the necessary ageing management programmes.

— As an alternative to the ageing management programmes indicated, the licensee may opt for requalification or for the preventive replacement of the affected equipment.

18. Complementary Technical Instruction No 18 associated with condition 9 of the Appendix on Nuclear Safety and Radiological Protection Limits and Conditions of the Operating Permit.

The licensee shall revise the existing procedures or develop new test procedures for the instrumentation and control of safety-related systems, including the verification of coincidence logics as a planned safety function, in accordance with the following scope and milestones:

— December 2015:

Study and incorporation in procedures (existing or newly created) of coincidence logic tests of stand-alone systems/controls in the Technical Specifications (ETF).

— December 2016:

Study and incorporation in procedures (existing or newly created) of coincidence logic tests of non stand-alone systems/controls in the Technical Specifications, including safety interlocks.

— December 2018:

Study and incorporation in procedures (existing or newly created) of actuation signal tests in significant systems considered in Probabilistic Safety Assessment, including where appropriate certain protection signals for operational controls. As regards scope, the systems would be those incorporated in the ETF's on the basis of criterion 4 of IS-32, fire-fighting system UJ and of the systems included in the two previous groups, the signals that may be considered in the indicated scope.

Article 15. Radiation protection

15.1. Arrangements and regulatory requirements regarding the radiation protection at nuclear facilities

15.1.1. Regulation on the Protection of Health against Ionising Radiations

The basic standards governing the radiological protection of professionally exposed workers and members of the public against the risks arising from exposure to ionising radiations are established in Royal Decree 783/2001, approving the Regulation on the Protection of Health against Ionising Radiations, which transposes Council Directive 96/29 EURATOM to the national legislation and which has been modified by Royal Decree 1439/2010.

15.1.2. Other provisions

Aspects relating to the radiological protection of outside workers at nuclear power plants are subject to special attention by the CSN, since experience shows that more than 80% of the occupational doses recorded at such facilities correspond to such workers.

The radiological protection of outside workers at risk of exposure to ionising radiations is specifically regulated by Royal Decree 413/1997, of March 21st 1997, which transposes the contents of Council Directive 90/641/EURATOM 1990, relating to the operational protection of outside workers at risk of exposure to ionising radiations due to their intervening in the controlled zone.

As an additional development, the Nuclear Safety Council has published several Instructions on the procedures to be adhered to in order to comply with certain requirements set out in the national legislation.

15.2. Regulatory expectations for the licensee processes to optimize radiation doses and to implement the ALARA principle

The three basic principles of justification, optimisation and limitation of individual doses on which the radiological protection system rests are incorporated in the Spanish legislation by means of the *Regulation on the protection of health against ionising radiations.*

In the nuclear electricity-generating sector, the practical application of the principle of optimisation (or ALARA principle) constitutes a basic objective to be achieved through the implementation at the nuclear power plants of the criteria and systematic approach defined in CSN Safety Guide GS-1.12, *"Practical application of the optimisation of radiological protection in the operation of nuclear power plants".*

This Guide sets out the general framework to be considered by the nuclear power plant organisations in order to comply with the ALARA principle, contemplating the following criteria, among others:

- Compliance with the ALARA principle must constitute an objective during plant operation and in the planning of all its activities, and must also be part of the plant modification and modernisation plans, including dismantling and decommissioning. Specifically, it has been applied to the design or modification projects associated with the plant individualised temporary storage facilities for irradiated fuel.

- The management of the organisation of the plant must be committed to the implementation of the ALARA principle in all phases, from design to decommissioning, as part of the safety culture.
- The commitment of the management must be cascaded to all those included in the organisation of the plant and extend to external companies involved in the performance of the most significant tasks from the radiological point of view.
- Suitable means shall be set up to inform, train and motivate all the plant workers on compliance with the ALARA principle.

The aforementioned Safety Guide establishes that the commitment of the plant organisation to the ALARA principle must materialise in the implementation of an ALARA programme in which:

- Radiological indicators are defined to verify the degree of efficiency in the implementation of the ALARA principle.
- A systematic approach is set up for the ALARA review of the radiologically most significant tasks.
- A plant policy is defined for everything relating to source term reduction.
- A systematic approach is set up for the ALARA review of design modifications.
- Initial and on-going training programmes are established for the implementation of the ALARA principle.
- The content and scope of the internal audits programme to be established to verify the degree of implementation of the ALARA programme are defined.

Since the beginning of the 1990's, the putting into practice of this doctrine has led to important modifications to the operating organisations of the Spanish nuclear power plants, with a view to ensuring that they are all seriously and formally committed to complying with the ALARA principle.

These premises are transferred to the official operating documents, specifically the Operations Regulation and the Radiological Protection Manual.

15.3. Implementation of radiation protection programmes by the licensee

The Regulation on the Protection of Health against Ionising Radiations establishes the following dose limits:

Exposed workers:

- Effective dose limit: 100 mSv in five official consecutive years, subject to a maximum effective dose of 50 mSv in any one official year.
- Skin dose limit (averaged over 1 cm^2): 500 mSv per official year.
- Lens dose limit: 150 mSv per official year.
- Dose limit for hands, forearms, feet and ankles: 500 mSv per official year.

Members of the public:

- Effective dose limit: 1 mSv per official year. Under special circumstances the Nuclear Safety Council may authorise a higher effective dose value in a single official year, as long as the average over five official consecutive years does not exceed 1 mSv per official year.
- Skin dose limit (averaged over 1 cm^2): 50 mSv per official year.
- Lens dose limit: 15 mSv per official year.

Special protection during pregnancy or lactation

- As soon as a pregnant woman informs the licensee of the practice of her condition, the protection of the foetus shall be comparable to that for members of the public.
- The CSN has established by means of Technical Instructions that, as regards the tracking of the foetus dose limit (1 mSv as from the moment of declaration of pregnancy), this limit shall be considered equivalent to a dose value of 2 mSv recorded with the dosimeter placed on the pregnant woman's abdomen.
- As from the moment in which a nursing mother informs the licensee of the practice of her condition, she shall not be assigned any work that implies a significant risk of radioactive contamination.

Dose limit for trainees and students:

- The dose limits for trainees and students of more than eighteen years of age who have to use sources during the course of their studies shall be the same as those for professionally exposed workers.
- The dose limit for trainees and students of between sixteen and eighteen years of age who have to use sources during the course of their studies shall be 6 mSv per official year. Without prejudice to this dose limit:
  - — Lens dose limit: 50 mSv per official year.
  - — Skin dose limit (averaged over 1 cm^2): 150 mSv per official year.
  - — Dose limit for hands, forearms, feet and ankles: 150 mSv per official year.

Administrative dose controls

At nuclear power plants administrative effective dose controls are established for all the exposed workers, these not having regulatory implications equivalent to dose limits. They are applied as an internal control in order to ensure that the dose limits established by the legislation are not exceeded and in order to achieve the objective of optimising dose, keeping it as low as reasonably achievable.

The administrative dose controls are defined in the Radiological Protection Manual for the different plant operating modes: normal operation, exceptional work and shutdowns.

Appendix 15.A includes exposed worker dosimetry information for the year 2015.

ALARA exposures

The implementation of the ALARA principle within the different operating organisations responds in all cases to the same breakdown:

1. A management level that drives and approves the ALARA culture and dose objectives, providing the necessary resources.
2. An executive level that proposes the ALARA culture and dose objectives, analysing the results and taking corrective actions.
3. A technical level that performs analysis, planning and tracking of the work, reviews the results and proposes improvement actions.

The Radiation Work Permit (PTR) is an operational tool that favours the implementation of the radiological protection programme by the licensee, and constitutes an order establishing the work to be performed, its estimated duration, the radiological conditions of the work area and the dosimetry and radiological protection requirements.

The regulatory control of the radiological protection of the population is implemented by means of the effluent limitation, surveillance and control programmes of the plants and the environmental radiological surveillance programmes in their area of influence.

Compliance with radioactive substances emission conditions

The Spanish standards establish that the release of radioactive effluents to the environment must abide by the established limits and, in addition, guarantee that such releases be as low as possible, taking into account economic and social factors. Furthermore, in CSN instruction IS-26, of June 16th 2010, on basic nuclear safety requirements applicable to nuclear facilities (Official State Gazette No 165 of July 8th 2010), the Nuclear Safety Council establishes that in addition to the aforementioned economic and social factors, consideration should be given to the best techniques available to minimise the release of radioactive effluents.

The nuclear power plant effluent limitation, surveillance and control systems have led to actual release values far below the authorised limits, which are comparable to those at international level.

Appendix 15.B. indicates the limitation applicable to environmental releases of radioactive substances from the Spanish nuclear power plants.

Table 15.B.1 indicates the activity released by the nuclear power plants during 2015. The radiological impact associated with the releases is not significant, the activities released representing only a minor fraction of the authorised dose limits.

The effective doses calculated for the most exposed member of the public, considering highly conservative hypotheses, have not in any case exceeded the limit of 0.1 mSv authorised for radioactive effluents, the maximum estimated value for 2015 being 0.004 mSv/year.

Environmental radiological surveillance

Each nuclear power plant has a programme for the environmental radiological surveillance of its surroundings, in keeping with CSN directives, the annual schedule and results of which are evaluated by the CSN. Appendix 15.C describes the content of the environmental radiological surveillance programmes and their most significant results in 2014, the most recent available as of the drawing up of this report.

The evaluation of these results underlines the fact that the environmental radiological impact of the Spanish nuclear power plants continues to be far below the established limits and that environmental quality around the facilities remains under acceptable conditions from the radiological point of view, without there being any risk for persons as a result of their operation.

15.4. Regulatory review and control activities

The integrated plant supervision system (SISC) includes the following:

- Inspection of the occupational radiological protection of the public and the environment.
- Application of the methodology established to categorise findings.
- Supervision of the operational indicators defined by the programme.

Furthermore, the aspects of occupational radiological protection and the application of the ALARA principle during refuelling outages are assessed through the supervision of the final refuelling reports submitted by the licensees in accordance with the provisions of CSN Instruction IS-02 "on the documentation of refuelling activities at light water nuclear power plants". Likewise, the CSN has defined the scope and content of the effluent surveillance and control programmes and the environmental surveillance programme for each nuclear power plant. It inspects their application and evaluates their results. In addition, the CSN carries out an environmental radiological surveillance programme independent from that of the licensee in the area surrounding each plant, this allowing results to be contrasted.

Appendix 15.C extends the description of these programmes.

APPENDIX 15.A

Information relating to personal dosimetry included in the CSN report to the Congress and Senate, corresponding to year 2015

A. External exposure

The statistical results for accumulated doses in 2015 for the nuclear power plants overall are as follows:

Collective dose

The following table shows the annual collective doses for each of the nuclear power plants in 2015. There were four refuelling outages at PWR nuclear power plants: Almaraz II, Ascó I, Vandellós II and Trillo, and one at a BWR plant: Cofrentes.

The Santa María de Garoña plant has not been in operation since 2012 and has been granted a definitive shutdown declaration.

Almaraz I and II	572.10	mSv·person
Ascó I and II	537.88	mSv·person
Garoña	119.9	mSv·person
Cofrentes	2,466.82	mSv·person
Vandellós II	906.08	mSv·person
Trillo	259.75	mSv·person

These data mean that the average collective dose per reactor during 2015 was 607.82 mSv·person. By reactor type, this parameter gave a value of 1293.36 mSv·person for BWRs and 379.30 mSv·person for PWR's.

By way of reference data, figures 15.A.1. and 15.A.2. include comparative graphs of the evolution of the three-year collective dose parameter in Spain, Europe, Asia and the United States, by reactor type. The international data have been taken from the database published by the ISOE (Information System on Occupational Exposure).

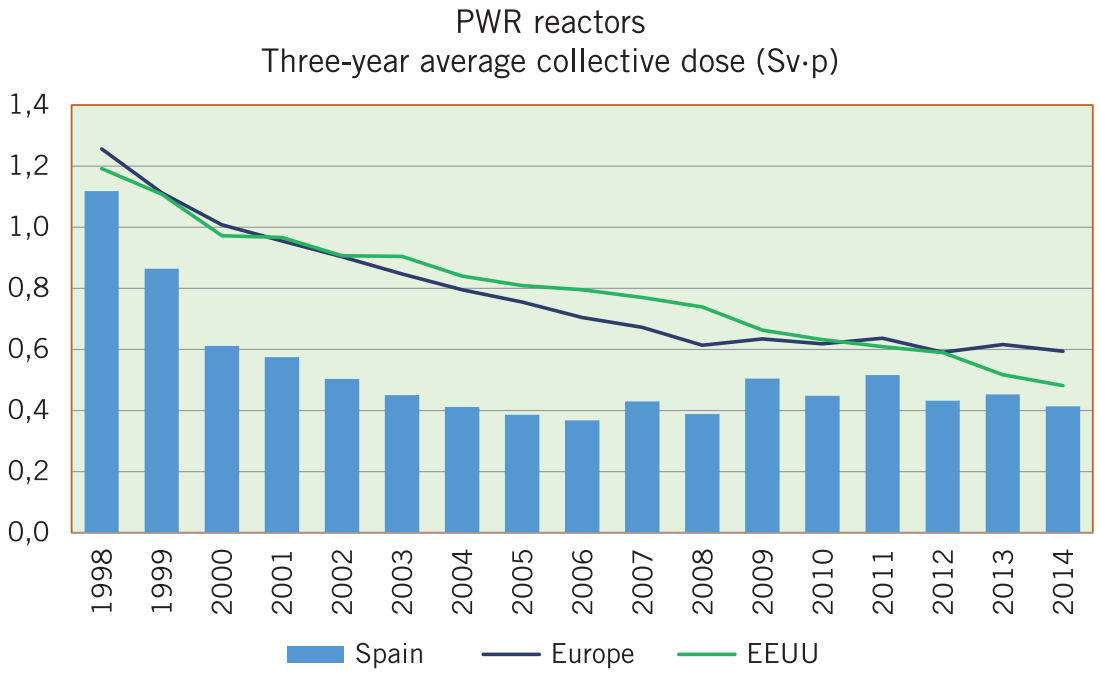


Figure 15.A.1 Three-year average collective dose (Sv·person) for PWR reactors. International comparison

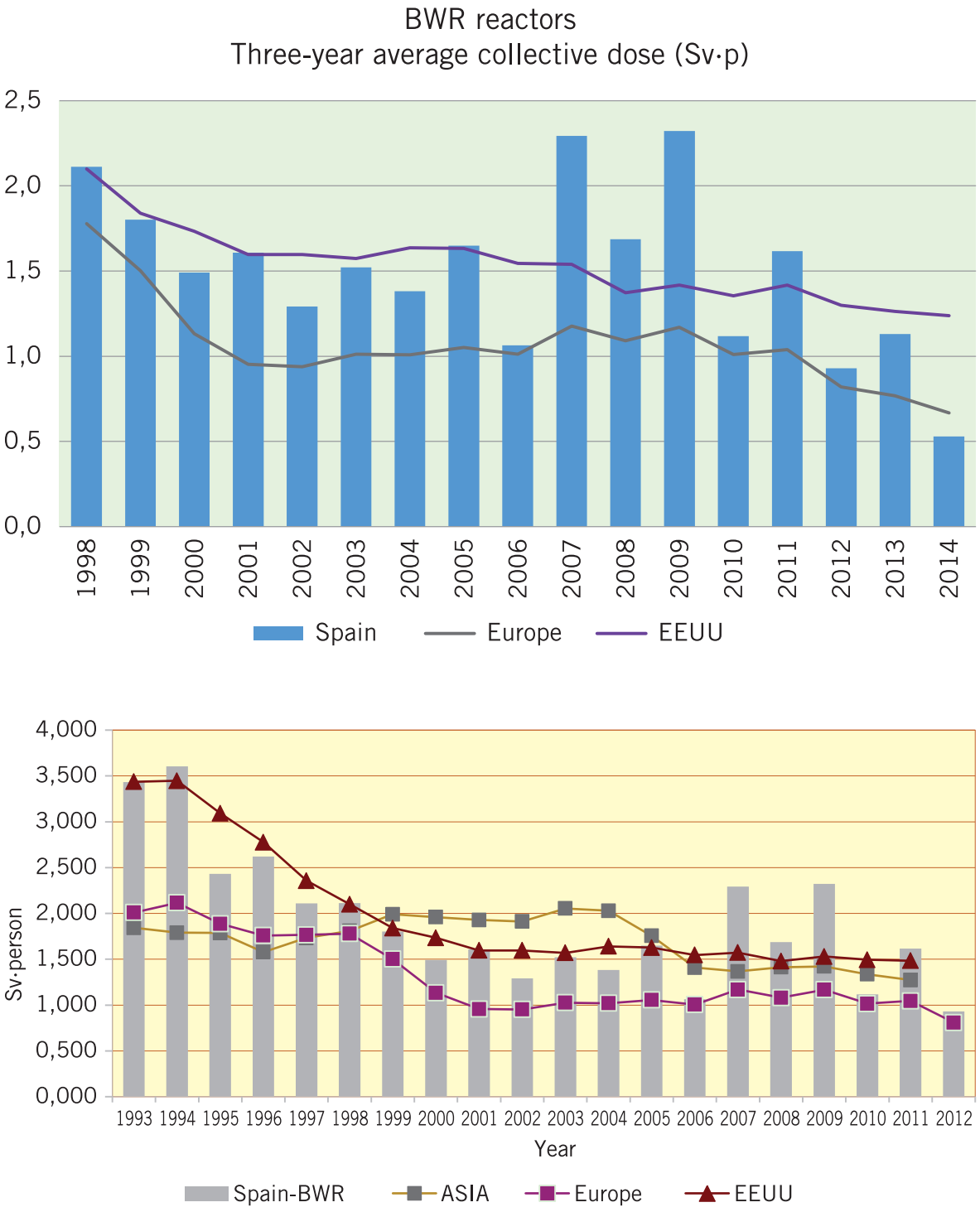


Figure 15.A.2. Three-year average collective dose (Sv·person) for BWR reactors. International comparison

B. Internal exposure

As regards internal dosimetry, controls were applied through direct measurements of whole body radioactivity of all workers exposed to a significant risk of radionuclide incorporation, and in no case were values in excess of the established recording level (1 mSv/year) detected.

APPENDIX 15.B

Limitation, surveillance and control of releases of radioactive substances at the Spanish nuclear power plants

The system for the limitation, surveillance and control of radioactive releases from nuclear power plants is based on the same principles, criteria and practices as were described in previous reports.

Since 1997 the release limit for nuclear power plants has been established as an effective dose of 0.1 mSv/year for the overall liquid and gaseous effluents from each reactor. This limit guarantees, with a very large safety margin, that the doses that might be received by the most exposed member of the public are lower than the dose limits for the public established in the Regulation on the Protection of Health against Ionising Radiations: 1mSv/year effective dose and 50 mSv/year equivalent skin dose. This release limit is applicable both during the operating phase of the nuclear power plants and during their dismantling.

As a result of the application of this release limitation system, the actual values of the discharges continue to be far below the authorised limits and perfectly comparable to those experienced at international level. Table 15.B.1 shows the effluents released from the Spanish nuclear power plants during 2015; the effective dose estimated for the most exposed member of the public as a result of these releases represents at most 4% of the authorised dose limit for radioactive effluents.

Table 15.B.1 Radioactive effluents from nuclear power plants. Activity released in 2015 (Bq) [1]

	PWR PLANTS					
	José Cabrera [2]	Almaraz I y II	Ascó I	Ascó II	Vandellós II	Trillo
Liquid Effluents						
Total except Tritium and Dissolved Gases	$1.52\ 10^{8}$	$5.38\ 10^{9}$	$2.51\ 10^{9}$	$2.64\ 10^{9}$	$6.68\ 10^{9}$	$3.06\ 10^{8}$
Tritium	$1.40\ 10^{11}$	$4.30\ 10^{13}$	$2.47\ 10^{13}$	$1.56\ 10^{13}$	$9.92\ 10^{12}$	$1.14\ 10^{13}$
Dissolved Gases	- -	$7.20\ 10^{7}$	$4.56\ 10^{8}$	$2.07\ 10^{7}$	$1.16\ 10^{8}$	(3)
Gaseous Effluents						
Noble Gases	- -	$2.07\ 10^{12}$	$6.12\ 10^{11}$	$6.16\ 10^{10}$	$2.22\ 10^{10}$	$1.08\ 10^{11}$
Halogens	- -	$6.64\ 10^{4}$	UD	UD	$2.76\ 10^{6}$	UD
Particles	$5.46\ 10^{5}$	$1.55\ 10^{6}$	$5.78\ 10^{6}$	$8.39\ 10^{6}$	$4.45\ 10^{7}$	UD
Tritium	$3.70\ 10^{9}$	$5.29\ 10^{12}$	$5.96\ 10^{11}$	$7.31\ 10^{11}$	$2.60\ 10^{11}$	$5.91\ 10^{11}$
Carbon-14	- -	$3.70\ 10^{11}$	$1.06\ 10^{11}$	$1.19\ 10^{11}$	$1.32\ 10^{11}$	$1.43\ 10^{11}$

	BWR PLANTS	
	CN S.M. Garoña[4]	CN Cofrentes
Liquid Effluents		
Total except Tritium and Dissolved Gases	$3.91\ 10^{7}$	$3.51\ 10^{8}$
Tritium	$1.81\ 10^{11}$	$9.85\ 10^{11}$
Dissolved Gases	UD	$4.20\ 10^{7}$
Gaseous Effluents		
Nobles Gases	UD	$1.74\ 10^{13}$
Halogens	- -	$3.77\ 10^{9}$
Particles	$8.90\ 10^{5}$	$4.08\ 10^{7}$
Tritium	$3.43\ 10^{11}$	$2.87\ 10^{12}$
Carbon-14	- -	$2.00\ 10^{11}$

(1) DT: Decision threshold.

(2) Effluents generated as a result of plant dismantling.

(3) The liquid releases do not entrain dissolved gases since these are removed during the gas treatment process.

(4) In the definitive shutdown situation since July 6th 2013.

APPENDIX 15.C

Environmental radiological surveillance programmes in the areas of influence of the Spanish nuclear power plants

Radiological surveillance around the Spanish nuclear power plants is accomplished by way of two independent programmes undertaken by different responsible organisations.

The first is carried out by the licensee in accordance with Nuclear Safety Council directives and is subject to regulatory control by the CSN.

The second is performed by the Nuclear Safety Council itself, in collaboration with national laboratories or universities in the region in which the facility is located, and in certain cases through the assignment of functions to the governments of the Autonomous Communities. This programme is completely independent from that performed by the licensee as regards the taking of samples and the laboratories performing the analytical determinations. The sampling points, type of samples and analyses carried out coincide with those performed by the licensees. The scope stands at around 5% of the programme performed at each facility and may reach up to 50% depending on the type of sample.

At present eight environmental radiological surveillance programmes are in service around the respective nuclear power plants, five in operation, one in the definitive shutdown situation, one in dismantling and one in the latency phase, taking some 8,000 samples a year and carrying out some 13,000 analytical determinations.

Table 15. C. 1 includes a summary of the programmes performed around the operating nuclear power plants.

By way of illustration, table 15. C. 2 shows the average values of the results obtained from the analyses (without considering values below the detection limits) of samples of air within the environmental radiological surveillance programmes carried out around the plants in 2014.

Table 15.C.1 Licensee ERSP's at operating nuclear power plants

Sample type	Sampling frequency	Analyses performed
Air	Continuous sampling with weekly filter change	Total beta activity, Sr-90, γ spectrometry, I-131
Direct radiation	Change of dosimeters after a maximum exposure period of one quarter	Integrated dose rate
Drinking water	Fortnightly or more frequent sampling	Total beta activity, other beta, Sr-90, Tritium, γ spectrometry
Rainwater	Continuous sampling with monthly sample collection	Sr-90, γ spectrometry.
Surface and groundwater	Monthly or more frequent sampling of surface water and quarterly or more frequent sampling of groundwater	Total beta activity, other beta, Tritium, γ spectrometry
Soil, sediments and indicator organisms	Annual sampling of soil and six-monthly sampling of sediments and indicator organisms	Sr-90, γ spectrometry
Milk and crops	Fortnightly sampling of milk during pasture-feeding periods and monthly during the rest of the year. Crop sampling during harvesting period.	Sr-90, γ spectometry, I-131
Meat, eggs, fish, seafood and honey	Six-monthly sampling	γ spectrometry

Table 15.C.2 ERSP's at nuclear power plants, 2014

Nuclear power plant	Air. Average value Bq/m^3			
	ß-Total	I-131	Sr-90	Cs-137
Almaraz	6.88E-04	<LDL	<LDL	<LDL
Ascó	6.82E-04	<LDL	<LDL	<LDL
Cofrentes	7.05E-04	<LDL	<LDL	<LDL
Vandellós II	6.15E-04	<LDL	<LDL	<LDL
Trillo	5.13E-04	<LDL	<LDL	<LDL
Santa María de Garoña[1]	3.95E-04	—	<LDL	<LDL
José Cabrera[2]	5.75E-04	—	<LDL	<LDL

LDL: Lower Detection Limit

[1] In definitive shutdown

[2] In dismantling

Article 16. Emergency preparedness

16.1. Emergency plans and programmes

The planning and preparation for situations of nuclear emergency are governed, in the case of emergencies deriving from accidents at nuclear power plants, by the Basic Nuclear Emergency Plan (PLABEN) and the directives driving from it.

General provisions on nuclear emergencies are also included in the law creating the CSN, the Regulation on Nuclear and Radioactive Facilities, in the Regulation on the Protection of Health against Ionising Radiations, in the agreement reached by the Cabinet on public information on applicable health protection measures and how to proceed in the event of a radiological emergency and in the basic civil defence standards.

Each of the nuclear power plants has a Site Emergency Plan that establishes and documents the necessary response by the licensee to possible emergency situations.

The most noteworthy of the modifications introduced in the legal and regulatory framework governing nuclear emergencies during this period are summarised below:

16.1.1. Arrangements and regulatory requirements for on site and off site emergency preparedness

Post-Fukushima Complementary Technical Instructions

Within the framework of the "stress tests", the Nuclear Safety Council (CSN) issued a series of complementary technical instructions (ITC) for each of the Spanish nuclear power plants, requiring the licensees to carry out measures and actions aimed at redimensioning their organisations in order to be able to adequately manage emergency situations, taking into account the new scenarios contemplated in the European stress tests. This process has included the review and analysis of both human and material resources and the adoption of mitigation measures to respond to beyond design basis accidents relating to the loss of major areas of the nuclear power plant.

As a result of the stress tests performed by all the Spanish nuclear power plants, the reports and assessments of which are included in the national action plan reports for 2012 and 2014, subjected to assessment peer reviews in Luxemburg (2013) and Brussels (2015) respectively, design modifications have been carried out to address emergencies and improvements in accident management.

The improvements identified are as follows:

- Adaptation of the human and material resources assigned to the emergency response organisation since early 2014.
- New Emergency Support Centre (CAE), in operation since early 2014.
- Alternative Emergency Management Centres (CAGE), to be operative at the sites by late 2016.

All modifications affecting on-site emergency management are to be included in the Site Emergency Plan (PEI) of all the nuclear power plants, as required by the CSN in the corresponding ITCs

The implementation status of these improvements is described in section 16.1.5 of the present report.

Basic Nuclear Emergency Plan (PLABEN)

The previous report submitted by Spain to the Convention listed eleven points for the review and improvement of the PLABEN. At present work continues on an in-depth review of the PLABEN that goes further than the eleven points initially considered and attempts also to incorporate the international trends and recommendations that have been consolidated in recent years and are listed below.

The EU has published Council Directive 2013/59/EURATOM, which will require legislative modifications by the member States in emergency management, since this directive is to be transposed to the national standards by February 6th 2018. In this respect a working group has been set up, made up of representatives of different ministries and of the CSN and led by the Ministry of Industry, Energy and Tourism (MINETUR), which is analysing the documents affected by the said directive.

Likewise, as a member of the EU, Spain is participating in the HERCA working group on emergencies which, along with the WENRA ad hoc group, is issuing recommendations aimed at harmonising the criteria and reference levels that the EU member countries would adopt in the event of a nuclear emergency affecting several member States. Work is on-going for the implementation of the HERCA-WENRA approach.

Furthermore, the work performed by the IAEA regarding the revision of the standards dealing with emergencies, and the "Assessment and Prognosis" project, is being monitored.

In short, throughout the EU, and consequently in Spain, an ambitious process is currently under way for the revision of the standards and criteria applicable to emergency management. Spain is expected to complete this process through the approval of the new PLABEN before the end of 2016 or the beginning of 2017.

16.1.2. Legislation on emergency management

In addition to the information included in the sixth national report on the Convention on Nuclear Safety, during the period dealt with herein Law 17/2015, of July 9th, on the National Civil Defence System was approved.

16.1.3. New Procedures: CSN Emergency Action Plan (PAE)

The CSN has an Emergency Action Plan (PAE) that includes the Emergency Response Organisation (ORE) and sets out the functions, specific resources and basic action procedures of its management and technical staff, their interactions and general directives on their education and training.

The ORE, which is complementary to the normal work organisation, has an operating structure with a single command responsible for the management function and for decision-making in which the technical and logistical units participate in accordance with an action plan drawn up specifically for emergency situations, activated depending on the seriousness of the accident giving rise to the emergency.

In the event of an emergency, the ORE acts in accordance with the PAE and independently from the regulatory and control function assigned to the CSN, having the following as its functions:

- Collaborating in taking the emergency situation to safe conditions.
- Contributing to mitigating the radiological consequences for persons, property and the environment of the accident that gave rise to the emergency situation.
- Reporting to and advising the authorities in charge of directing the applicable emergency plan on the adoption of measures to protect the population.

- Informing the population of the risks associated with the emergency situation.
- Compliance with the international commitments regarding prompt notification and mutual assistance as they affect the CSN.

The Plan includes processes for the incorporation of manpower from the CSN's basic structure into the emergency response organisation and the critical emergency tasks to be performed in each situation in order to adequately cover the responsibilities assigned to the body within the national emergency response system.

In addition, the Plan considers the activation and in situ actions of a series of services for intervention in affected areas as regards the level of off-site response in the event of a nuclear emergency.

The ORE operates basically from an emergency centre (Salem) that is permanently on alert and attended by an on-shift technician and a communications officer, backed by an emergency stand-by unit comprising 12 persons and able to respond to an emergency situation in less than one hour.

The CSN Emergency Action Plan includes a personnel training plan with three levels of involvement (informative, organisational and technical). Likewise, the PAE includes a programme of exercises and drills of internal, national and international scope that allows the operability of its capacities to be periodically checked and appropriate improvements to be made.

As was pointed out in the previous report, the PAE is being revised within the framework of the process of revision of the standards relating to emergency management, and at the moment a draft is available improving the following aspects:

- Reinforcement of confidentiality in the issuing of official technical communiqués on the situation and evolution of nuclear accidents.
- Actions during long-lived emergencies.
- Improvement of tools for the assessment of consequences and assistance in decision-making.
- Improvement of the reliability of the media for emergency communications between the CSN, other organisations involved in nuclear emergency management and the nuclear power plants, in particular in response to extreme natural events.
- Reinforcement of the availability of technicians for deployment to areas affected by an emergency or nearby.
- Introduction of back-up Salem activation mechanisms.
- Provision of personnel to respond adequately to requests for information by international organisations and neighbouring countries in the event of an emergency.

Also during this period, the CSN Emergency Procedures Manual has been completed, with the publishing of procedures regulating the following:

- Operations Coordination Group and actions of the groups coordinated by it.
- Information and Communications Group.
- International notifications.
- Operation of the emergency stand-by unit.
- Preparation, evaluation and tracking of exercises and drills.
- Training of intervention personnel.
- Implementation of the State Emergency Digital Radiocommunications System (SIRDEE).

Also, a computer application has been developed to facilitate the reception and interpretation of whatever data might be sent continuously to the Salem by the mobile radiological characterisation units.

16.1.4. Implementation of the main elements of the national emergency preparedness plan, including the chain of command and roles and responsibilities of the licensee, the regulatory body and other main actors, including State organisations

Summarised below is the role played by each organisation in the management of nuclear emergencies, in accordance with the standards in force in Spain:

- The off-site management of an emergency is undertaken by a national authority in the province in which the nuclear power plant is located (Regional Office or Sub-office of the Government) via the corresponding off-site Nuclear Emergency Plan (PEN).
- The tracking of the emergency at national level, with a view to providing extraordinary resources for emergency management and arranging for international assistance, is undertaken by different Ministries and State institutions coordinated by the Ministry of the Interior (DGPCE), via the Central Nuclear Emergency Response and Support Plan (PENCRA).
- As the regulatory authority, the CSN is the institution responsible for the technical assessment of the emergency situation and its possible evolution. It issues appropriate recommendations to the off-site emergency management team for the adoption of measures to protect the population and intervening personnel and undertake the monitoring of the operational status of the affected plants. All the above is accomplished via the Emergency Action Plan.
- The holders of nuclear power plant operating permits are responsible for the management of nuclear emergencies on the plant sites, through their Site Emergency Plans, and coordinate with the CSN and the off-site emergency management team.

16.1.5. Implementation of emergency preparedness measures by the licensees and off-site nuclear emergency plans

Site Response Level

The actions for preparation for and response to emergency situations at this level are contained in the Site Emergency Plans (PEI-Self-protection) of the nuclear facilities.

The objective of these plans is to describe the actions planned by the licensee of the nuclear facility to reduce the risk of a radiological emergency and, if one were to occur, limit the release of radioactive material to the environment.

The wording of the descriptions of the PEI initiating events of all the nuclear power plants have been reviewed by a CSN-UNESA mixed group, in order to prevent interpretation errors in their identification. These modifications have been included in the UNESA guideline "Classification of emergencies and listing of NPP PEI initiating events" (CEN-33-13). Using this guideline as a basis, the licensees have revised the text of various PEI initiating events for all the nuclear power plants.

During this period, a PEI review has been carried out on the basis of the results of the stress tests with a view to incorporating the following:

- The results of the analyses of the sizing of the licensees' Emergency Response Organisations (ORE), fundamentally to address accidents simultaneously affecting several

groups, and improvements to meet the requirements in this respect established in the specific standards of the CSN. Following the performance of these analyses, adjustments have been made in the licensees' staffing of the PEI ORE, with increased numbers of operating shift and stand-by personnel.

- Improvements to adapt the reference dose levels for workers belonging to the licensee's emergency organisation depending on the functions foreseen in the event of an emergency.
- New emergency management support centres have been built or are under construction:

— A single Emergency Support Centre (CAE) for all the plants, located near Madrid and now fully operational. Prior to its entry into service, validation tests were performed at each plant. In addition to an on-going training programme, every year a practical drill is performed at the plant with CAE resources.

— An Alternative Emergency Management Centre (CAGE) at each site, the periods for implementation being set out in article 14.2.5.

— An Alternative Technical Support Centre at each site, to be provisionally operative until the CAGE enter into service.

- In addition to the portable equipment available in safe areas at each site, there are portable resources at the CAE that, if necessary, would be transferred to the affected site by road or air in order to address events involving loss of power supply and of the ultimate heat sink: motor-driven diesel generators, lighting equipment, stand-alone compressors, instrumentation and quick connections facilitating the use of such equipment.
- More robust stand-alone communications equipment and dedicated diesel generators are available to guarantee the availability of communications between the licensees' emergency management centres and the outside world during the postulated scenarios in the event of SBO (Station Blackout) lasting more than 72 hours.

In addition, the licensees have included the following in the procedures enacting their PEI

- Emergency management procedures to address extensive damage implying the loss of personnel for the habitual management and control of the emergency. In such situations, use of the Extensive Damage Mitigation Guidelines is contemplated in order to maintain the integrity of the fuel in the core and pool and the primary containment, preventing or minimising to the extent possible off-site releases of radioactivity.
- The protocol for mutual assistance between plants in the event of an emergency has been revised and a procedure has been established to speed up access to the plant for off-site support teams during emergencies.
- A collaboration agreement has been signed between the Military Emergency Response Unit (UME) and UNESA (the Association of the Spanish Electricity Industry), in keeping with criteria established by the CSN, regarding the participation of the UME in situations of extreme seriousness inside the Spanish nuclear power plants. The UME has been provided with generic training on nuclear emergencies and specific training on each site, which will be refreshed periodically. Practical exercises have been carried out at each of the sites.

Off-Site Response Level

The actions for preparation for and response to emergency situations at this level are established in the nuclear power plant off-site Nuclear Emergency Plans (PEN), which in turn include the Municipal Nuclear Emergency Action Plans (PAMEN) and the Central Nuclear Emergency Response and Support Plan (PENCRA).

The PENCRA establishes the systematic approach to be adopted to provide the management of each PEN with the additional support and resources it needs. The PENCRA is a model for response at national level that contemplates the mobilisation of all the resources and capabilities of the Spanish State required to put together such a response, including the reception and rendering of international assistance.

The management of national resources in support of the off-site PEN's is accomplished via the Directorate General for Civil Defence and Emergencies (DGPCE), a division of the Ministry of the Interior, as the organisation in charge of coordinating all the necessary support from the different organisations of the Central Administration, other Public Administrations and private entities.

These national resources have been increased through the creation of the Military Emergency Response Unit (UME), reporting to the Ministry of Defence, by Cabinet agreement on October 7th 2005, since among the competences of this unit is that of addressing emergencies deriving from the risks of technology, including nuclear technology. The CSN participates within the collaboration agreement with the UME in the areas of telecommunications, training, operational coordination in emergencies and the provision of joint equipment.

Work continues on adaptation of the PEN Radiological Group Action Plans in order to reinforce support for them from the CSN Emergency Response Organisation, taking full advantage of the progress made in new technologies relating to communication tools, the estimation of radiological consequences and data transmission.

Finally, a framework collaboration agreement has been signed between the DGPCE, the CSN and UNESA regarding the collaboration of the Spanish nuclear power plant licensees in the implementation and maintenance of the effectiveness of the off-site emergency plans. Specific agreements will have to be reached, subscribed by the corresponding parties, for the development and implementation of the aforementioned framework agreement.

16.1.6. Training and exercises, evaluation activities and main results of performed exercises, including lessons learned

In all the off-site nuclear plans, two exercises are being performed each year, with the participation of the Radiological Group personnel. These exercises are generally about radiological access controls or the activation of a Classification and Decontamination Station (CDS) or a CECOPAL (municipal coordination centre), with a view to maintaining the habitual training of the personnel involved in the plan and facilitate the exchange of the personnel intervening in different emergency plans.

Every year, and in relation to the capacity to respond and address emergencies of the nuclear power plant licensees, the CSN draws up its annual mandatory programme for the performance of drills within the framework of the nuclear power plant PEI's. The CSN establishes the minimum scope of these drills and adopts measures to ensure the confidentiality of the scenarios and prevent the participants from learning of their details. In the case of operating nuclear power plants, this scope normally implies the declaration of a Category III or Category IV emergency and, additionally, includes assumptions regarding fires, the control and repair of damage and the rescue of and first aid for wounded and contaminated personnel.

In November 2013 the CURIEX-2013 (Cáceres Urgent Response International EXercise) drill was carried out in the surroundings of Almaraz nuclear power plant (CNA), in response to a hypothetical accident at that facility. Within the Basic Nuclear Emergency Plan (PLABEN), this is understood as a general drill simulating the Almaraz nuclear power plant off-site nuclear emergency plan (PENCA).

The exercise focussed on the response of the off-site nuclear emergency plan. The response of the licensee's emergency response organisation is checked annually through the performance of the site emergency plan (PEI) drill and was not part of the CURIEX exercise.

The exercise contemplated all the resources associated with the PENCA, other nuclear and radiological response resources supporting the PENCA and coming from national organisations, activated through the Central Response and Support Level Plan (PENCRA), and Nuclear, Radiological, Biological and Chemical Defence Plan support resources (international, also activated through the PENCRA and belonging to the European Civil Protection Mechanism).

The exercise contemplated an urgent phase, with actions fundamentally in the field, as a desktop exercise to simulate the first stages of the recovery phase.

The detailed technical scenario for the urgent phase, on November 5th and 6th, contemplated an accident evolving to PEI Category IV in one of the groups of Almaraz NPP. This meant the PENCA reaching situation 3 and that in planning zone I – with a radius of 10 km around Almaraz NPP – it was necessary, in view of the category of the accident, for the CSN's ORE to recommend the countermeasures foreseen in the PENCA for situation 3 to mitigate the radiological consequences for the population, i.e., confinement, radiological prophylaxis and evacuation of the population.

During the planning of the exercise, the CSN performed dose estimates at different points on the routes, to which mobile radiological characterisation units were sent. This was accomplished using the Radiological Assessment System for Consequence AnaLysis (RASCAL) calculation code and applying emergency notification by means of RASCAL (NERAS), which adapts the code to the characteristics of the Spanish nuclear power plants.

Outstanding among the lessons learned from CURIEX is the need to prepare reception areas for the extraordinary means and resources, from Spain and abroad, in adequate, previously determined places close to the potentially affected areas, facilitating the coordination of their actions and improving their efficiency and effectiveness.

16.1.7. Regulatory review and control activities

The CSN verifies and inspects the operability of the licensees' PEI's and, given that they are official operating documents, checks that these plans are updated and revised in accordance with directives emanating from the CSN. The control and supervision activities also include the licensees' emergency preparedness training programme and the performance of the mandatory annual emergency drills carried out by the licensees in accordance with a Basic Inspection Plan.

The CSN supervises and inspects the performance of the mandatory annual drills established in the PEI's of the nuclear power plants.

As regards the supervision and control function of the CSN, and in relation to emergency management, special mention should be made of the activities for the tracking of the indicators and the resolution of possible findings on the Emergencies Pillar of the Integrated Plant Supervision System (SISC).

16.1.8. International agreements

As was pointed out in the previous report, in 2010 a bilateral agreement was signed between the CSN and the French ASN (Autorité de Sûrete nucléaire), establishing bilateral mechanisms for the prompt notification of nuclear or radiological accidents occurring anywhere in either of the two countries and potentially affecting the national territory, the population or the environment of the other, or giving rise to concern among the people.

The cooperation between the two institutions has led to the establishment of mechanisms for prompt mutual notification in the event of a nuclear or radiological emergency potentially affecting either of the two countries.

This is being carried out by means of an emergency information exchange protocol that was drawn up and tested in exercises and drills in 2015, taking advantage of the presence of an ASN technician at the CSN sub-directorate for emergencies and physical protection.

Also during the period, on July 30th 2015 a cooperation agreement was signed between the Portuguese Environmental Agency, the National Civil Defence Authority, the Technical Institute of the University of Lisbon of the Republic of Portugal and the Nuclear Safety Council in the field of nuclear and radiological emergencies and environmental radiological protection.

16.2. Information of the public and neighbouring States

16.2.1. Arrangements for informing the public in the vicinity of nuclear installations about emergency planning and emergency situations

What was established in the Cabinet Agreement of October 1st 1999 on programmes for preliminary information for the population around nuclear power plants and the training of those intervening in situations of nuclear emergency has been developed and reinforced through the approval of the guideline on preliminary information for the public in the off-site nuclear emergency plans and the guideline on the training and qualification of those intervening in such plans.

The programmes for preliminary information for the population included in the different nuclear emergency plans are led by the Directorate General for Civil Defence and Emergencies. In addition to participating in their delivery, the CSN issues recommendations allowing the different information programmes of the respective nuclear emergency plans to be homogenised.

At all the nuclear power plant sites the annual meeting of the local information committee continues to be held, led by managers from the MINETUR with the participation of CSN staff members, in accordance with the provisions of art.13 of the RINR.

16.2.2. Arrangements to inform competent authorities in neighbouring States, as necessary

Spain is a signatory to the IAEA Conventions on Prompt Notification and Mutual Assistance and, as a European Union (EU) Member State, abides by the requirements of Council Decision 87/600 EURATOM on Prompt Notification and Information Exchange.

Through its Emergency Room (Salem), the CSN is the Spanish National Warning Point in the system implementing the IAEA Convention on Prompt Notification (EMERCON/ ENAC). Exercises of different scope and promoted by the IAEA are performed periodically in order to check for the adequate operation of the system (ConvEx Exercises).

As regards the IAEA Convention on Mutual Assistance, the Spanish Warning Points are the DGPCE, through its Operations Coordination Room (SACOP), and the CSN though the Salem.

The system that implements the contents of the EU Directive 87/600 EURATOM on prompt notification is known as ECURIE (European Community Urgent Radiological Information Exchange). The warning point in Spain for contacts with the web-ECURIE Management Centre is the CSN, through the Salem. Messages sent to web-ECURIE may be alerts, for emergency notifications, or informative messages, voluntary reports on events and incidents of lesser importance that may be of use to the competent authorities of other member countries. Spain regularly participates in the ECURIE exercises performed to test information exchange capacities.

Article 5 (2) of Council Directive 87/600/Euratom requires the web-ECURIE system to be regularly checked by means of exercises of differing scope and classified from 0 to 3.

In the event of a nuclear or radiological emergency, the European Union provides other support systems, such as EURDEP (European Union Radiological Data Exchange Platform) and ENSEMBLE (Atmospheric dispersion forecast model results).

As regards the EURDEP programme, the CSN submits data from the network of automatic environmental radiological surveillance stations (REA) and the stations of the autonomous communities daily, in accordance with the commitment acquired by the countries participating in this programme. In the event of an emergency and during the performance of exercises, the data are submitted at a frequency of less than one hour.

As regards the provisions governing information for neighbouring countries, section 16.1.8 of the present report indicates the bilateral collaboration agreements and methods that allow for this.

As has been pointed out in section 16.1.3, the CSN has updated its procedures relating to international information exchange and notification in its Emergency Procedures Manual.

Article 17. Siting

17.1. Evaluation of site-related factors

During the period of the report there have been no substantial changes as regards the subject of this article, as a result of which the contents of his section have undergone few variations with respect to the sixth report on the Convention on Nuclear Safety.

17.1.1. Arrangements and regulatory requirements relating to siting and evaluation of the sites of nuclear installations, including the applicable national laws

The specific requirements and criteria for the performance of site studies relating to the safety of nuclear facilities, and for the assessment of their acceptability, are expressly contemplated in CSN Instructions IS-26 *on basic nuclear safety requirements applicable to nuclear facilities* and IS-27 *on general nuclear power plant design criteria,* which include both the Spanish practices previously applied and the standards in force of the international organisations to which the Spanish State belongs (IAEA standards) and the standards available in the country of origin of the technology of each facility (USA and Germany), as well as the WENRA reference levels published in 2008.

The fourth section of CSN Instruction IS-26, on basic nuclear safety requirements applicable to nuclear facilities, is dedicated to the site and addresses the general criteria applied and the monitoring of site conditions over time. All potential nuclear facility sites must be duly assessed in order to determine the effects that they might have on the surrounding population and environment, as well as the conditions that the site might impose on the design of the facility. This assessment includes different factors, such as population density and distribution, meteorology, surface and subterranean hydrology, geology, seismology, land and water usage and other ecological and environmental factors, such as those attributable to human activity. Also analysed is the availability of services off the site that might help to maintain the safety of the facility and the protection of the public, such as electricity supplies, fire-fighting services, accesses, communications and emergency preparedness services, among others.

Those characteristics of the site that might affect the safety of the facility, the risks associated with off-site events (natural or attributable to human activity) and the conditions of the surroundings that might be affected by the operation of the installation are overseen and monitored throughout the entire lifetime of the facility, from start-up to decommissioning.

Instruction IS-27, on general nuclear power plant design criteria, includes two criteria dedicated to the site: Criterion 2, design bases for protection against natural phenomena, which establishes consideration of the most severe phenomena registered historically and the addition of a margin sufficient to take into account the limitations of the historical data, and Criterion 4, environmental design bases and dynamic effects, which requires the protection of structures, systems or components (SSC) related directly or indirectly to safety against events and conditions occurring off-site.

In addition, in 2015 the CSN issued a ITC to all nuclear power plant licensees requiring the performance of a reassessment of the seismic risk of each site, as detailed in section 17.3.1.

In all cases, the design parameters associated with a site (seismology, hydrology, meteorology, etc.) should be obtained by means of an adequate combination of deterministic studies (maximum foreseeable) and probabilistic studies (allowing for the bounding of uncertainties), validated through the appropriate treatment of expert judgement. The identification and evaluation of the design parameters 4 should be included in the safety assessment of the facility.

Pursuant to the aforementioned principles, in compliance with article 3.19 of CSN Instruction IS 26, and in accordance with the recommendations contained in CSN Safety Guide 1.10, *NPP periodic safety reviews*, the Spanish nuclear power plants perform periodic safety reviews (PSR) every ten years, the scope and objectives of which include site-related aspects, in particular within the framework of the programmes for the on-going assessment of safety and applicability of the changes occurring in the standards in the corresponding ten-year period.

17.1.2. Regulatory review and control activities

The nuclear facility surveillance programmes are periodically inspected by the CSN (at most every four years) in order to verify adequate operation throughout the operating lifetime of each installation.

The CSN also has a specific plan for periodic inspections at each nuclear power plant in relation to site parameters, which form part of the so-called Integrated Plant Supervision System (SISC). The plan consists of performing two types of inspections, one general in its scope (every two years) and the other of limited scope (every six months). The general scope includes all risks relating to meteorological and flooding events identified for the site of each nuclear power plant and covers the revision of the licensee's supporting studies and documents, the results of the surveillance programmes applied, the incidents arising in the operating experience and the licensee's corrective actions programme. The six-monthly specific scope inspections are performed on structures, systems, equipment or components previously selected because of their significance for plant safety and the possibility of their being significantly affected by severe meteorological conditions or off-site flooding. The objectives, scope and frequency of the inspections relating to the parameters of the site are included in the corresponding CSN technical procedures.

17.2. Impact of the installation on individuals, society and the environment

17.2.1. Criteria for evaluating the likely safety related impact of of the nuclear installations on the surrounding population and the environment

Given the interaction of impacts between the environment and the nuclear facility, surveillance and assessment of the latter over time is necessary in order to ensure that possible impacts are kept within acceptable ranges or, if this were not the case, to intervene with suitable measures to limit such impacts.

The continuous surveillance of the various factors associated with the site (seismology, meteorology, hydrology, etc.) materialises through the corresponding surveillance plans, especially adapted to each site and facility and periodically revised in order to maintain their efficiency on the basis of the results obtained. Each installation draws up periodic reports on its surveillance programmes, including an analysis of the results obtained. The CSN reviews these reports and carries out periodic inspections at the facilities to ensure adequate supervision and control.

- As regards interaction with groundwaters, the plants have developed Hydrogeological Surveillance and Control Programmes for their sites, overseeing both water tables and the chemical and radiological quality of these waters, these programmes being closely related to the Environmental Radiological Surveillance Plans.

  The basic objectives of the surface and groundwater surveillance and control programmes are as follows:

  — tracking of the radiochemical (chemical and radiological) quality of surface and groundwaters, as a precaution against possible accidental emissions of radioactive effluents, among them tritium.

— the detection of anomalous concentrations of radioactive products in the waters on the site, and possible associated contamination, serving as an early indicator of the degradation of structures, systems or components and of the need for possible mitigation actions (repairs, cleaning, etc.).

— detailed insight into the hydrogeological behaviour of each site and possible groundwater impacts on the nuclear power plant structures built.

- The Spanish nuclear facilities have seismic surveillance programmes in operation, equipped with instrumentation in the field and inside buildings whose main purpose is to register any seismic movement detected on the site and compare it to the design earthquakes (operating basis earthquake, OBE, and safe shutdown earthquake, SSE). Furthermore, following the detection of an earthquake larger than the OBE at a site, in accordance with the corresponding procedures, the Site Emergency Plan of the affected facility would be activated, in one of its categories, depending on the severity of the earthquake and the its safety-related effects.
- All the Spanish plants have established programmes for the surveillance of the meteorological parameters of the site, with adequate instrumentation and transmission of the information registered to the control room of each plant and the CSN emergency room (SALEM). Certain installations have also implemented programmes for the surveillance of ground movements to auscultate overall and differential movements, which are currently in a process of stabilisation since their evolution over time has been seen to be clearly one of damping.

17.2.2. Application of these criteria in the licensing process

The licence granting and renewal processes include the analysis, evaluation and documentation of all aspects that might produce an interaction between the environment and the nuclear facility.

From the process of granting a Preliminary Authorisation for a nuclear facility, and as is the case for any other project having a potential impact on the environment, Law 21/2013 of December 9th on environmental assessment contemplates submittal by the licensee of the corresponding Environmental Impact Assessment, which is defined as *the set of technical studies and systems that makes it possible to estimate the effects caused by a given project, works or activity on the environment,* this being a widespread technique in all industrialised countries, recognised as being the most adequate instrument for the preservation of natural resources and defence of the environment.

This assessment is part of a wider process that introduces the environmental variable in decision-making regarding the advisability or otherwise of performing a project or activity, since it allows the solution that best safeguards general interests to be selected from among different possible alternatives, from a global perspective and taking into account all the potential effects.

As regards the process of licensing of a nuclear power plant, the "Preliminary" and "Final" "Safety Studies" include a large section on "Site Characterisation", which contains an exhaustive study of the most relevant aspects of the site, including the site design basis, geography and demographics, nearby industries, transport infrastructures and military installations, meteorology, hydrology (surface and groundwaters), geology and seismology. These studies are revised and updated throughout the lifetime of the plant in order to guarantee that the conditions initially considered are maintained. The preliminary safety study is a prerequisite for granting of the construction permit, while the final safety study is required for the operating permit.

As has already been pointed out, in the license renewal process the nuclear facilities are required to perform a Periodic Safety Review (PSR), the scope of which shall include specific aspects of the site affecting the continuous safety assessment programmes and the applicability of the

changes that have occurred in the standards during the period covered by the PSR. During the plant PSR evaluation process, each facility is required to revise and update if necessary the contents of chapter 2, Site, of its Safety Study, in accordance with the results obtained from the different site parameter surveillance programmes. They have also been required to draw up a systematic plan to keep the information in this chapter updated, such that the actual situation of the site and the validity of the design bases associated with it are faithfully reflected over time.

17.3. Revaluation of site-related factors

17.3.1. Activities for revaluation of site-related factors to ensure the continued acceptability of the safety of the nuclear installation conducted according to appropriate standards and practices

During the stress tests performed by the Spanish nuclear power plants in 2011, the design bases corresponding to natural events were reviewed in order to verify their suitability. Also verified was the effectiveness of the preventive measures adopted in the design, or incorporated as additions, in accordance with the principle of defence in depth. There was also an analysis of the capacity of the nuclear power plants to respond to beyond design basis natural events that might compromise safety functions and lead to severe accident situations.

In addition, and as regards seismic risk, the CSN requested several years ago that a plant specific IPEEE (Individual Plant Examination for External Events) be performed for each site, logically including seismic risk. The National Post-Fukushima Action Plan contemplates the revision of the IPEEE's and their submittal to the CSN by the licensees six months after the implementation of all the component reinforcement actions set out in the Plan.

Finally, in 2015 the CSN issued a new ITC to the licensees of all the nuclear power plants requiring the performance of a reassessment of the seismic risk of each site, for which geological and palaeoseismic data will be analysed in order to characterise existing active faults. The process has now begun and is being performed jointly for all the sites, in compliance with the most updated analytical criteria at international level (SSHAC methodology, level 3) and with widespread national and international participation.

As regards the robustness of the Spanish nuclear power plants with respect to events that might maliciously be caused by individuals, in 2011 and 2012 the CSN issued ITCs requiring the implementation of mitigation measures making it possible to respond to such events. Certain of the measures required at that time reinforce those included in the Post-Fukushima action plans and focus on the human and material resources necessary to control and mitigate the consequences of this type of events, especially the capacity to control major fires beyond those postulated in the plant design basis and the capacity to limit off-site doses in the event of containment failure, but without considering aspects such as the capacity of the containment to withstand unforeseen situations such as the impact of aircraft.

Furthermore, the licenses have analysed emergency access routes to the site following an earthquake and flooding.

As a result of these analyses and as regards access to the sites, the licensees have strengthened structures, reinforced mobile equipment and built safe areas for its location, and have also strengthened their Emergency Response Organisations where necessary. At all the sites a check has been made to ensure that the measures put into place by the licensees compensate the time that the access routes would be unusable, with consideration given to three assumptions: inaccessibility for 0 to 4 hours, inaccessibility for 4 to 24 hours and inaccessibility for more than 24 hours.

In addition to what is required in the ITCs, an agreement has been signed with the Military Emergency Response Unit (UME) and UNESA for collaboration in the situations of extreme

seriousness referred to in article 16. The functions commissioned to the UME in relation to access to the facility include the transfer of people and components to the nuclear power plant, especially under conditions of serious deterioration of the access infrastructures, the clearing or conditioning of access routes to the nuclear power plant and the clearing or conditioning of access routes on the site.

17.3.2. Results of recent reassessment activities

The results obtained within the framework of the European stress tests in relation to the response of the nuclear power plants to extreme natural events (earthquakes, flooding, extreme weather conditions) beyond their design basis have made it possible to determine that there is a high degree of resistance to such phenomena, as will be described below. Studies and analyses deriving from the results of the stress tests have continued during the period of the report.

Earthquakes

All the plants have reviewed their structures, systems and components design bases with respect to earthquakes. The conclusions indicate that the design bases are suitable fulfilled. In addition, the plants have reviewed the data on the earthquakes occurring in the surroundings of the site from the cut-off date considered in the studies for definition of the Design Basis Earthquake (DBE) to the first six months of 2011, concluding that if the methodology used in the initial studies is applied, the DBE values initially adopted, which are between 0.10g and 0.20g, continue to be valid.

The possible indirect effects induced by an earthquake inside the facility have been analysed. In this respect consideration has been given to explosions and fires, as well as to internal flooding due to pipe rupture. The CSN considers the barriers and protective actions identified in the plant reports to be adequate.

The scope of the seismic margin analysis has been extended to include the SSC's necessary to guarantee the integrity and cooling of the spent fuel pool. Among the measures aimed at guaranteeing a greater robustness of the plant to seismic events, the plants have revised or proposed revision of the margins of equipment used to reach safe shutdown when necessary and to address station blackout (SBO) and severe accident situations. It has been determined that these SSC's may be assigned a seismic margin equal to or greater than 0.3g or, otherwise, additional measures for compliance have been implemented.

Another aspect analysed has been the possibility of loss of water from the spent fuel pool or from the heat sink reservoirs, when applicable, as a result of the movement caused in the water by the earthquake (sloshing), and it was concluded that for the earthquake intensity considered, both the DBE and the seismic margin of 0.3g, this effect would not be relevant in either case.

In those cases in which the plant is located in a river basin with dams located upstream, the structural resistance of these dams was analysed in order to verify that they would withstand an earthquake of the same intensity as the plant design basis earthquake. Also analysed was whether these dams would withstand larger earthquakes, and the seismic margins available in each case were quantified.

Complementary to the above, and when considered suitable, the licensees have analysed the consequences that the rupturing of these dams would have on the site. In this respect, an assessment was made of the propagation of a flood that might cause credible rupturing, until it reached the nuclear power plant site, in order to determine the maximum height of the flooding at the plant for this reason and how long it would take to reach the maximum peak.

As regards seaquakes, the only Spanish plant built on the coast, Vandellós II, has a very high protection margin, since its safety systems are located at more than 20 metres above sea level.

- Improvement actions adopted

The improvements already undertaken by the Spanish nuclear power plants to strengthen their response capacity in the event of extreme earthquakes are as follows:

— Design modifications to improve earthquake resistance to 0.3g in the case of SSC's used to reach safe shutdown, if necessary, in order to address station blackout (SBO) and a severe accident situation, implementing the necessary modifications for SSC's with lower values or replacing them.

Flooding

All the plants have revised their design basis for floods caused by off-site natural events, including the hydrological and meteorological data registered at each site throughout their entire period of operation. The conclusions drawn indicate that the levels of flooding adopted as the design basis continue to be valid.

In addition to the analyses of flooding due to dam rupture commented on above, the additional studies performed contemplate flooding for other reasons, such as intense local rainfall, flooding in rivers and gorges, seaquakes, waves and rises in sea level or groundwaters. These analyses have studied the maximum expected event and also the existing safety margins, with different proposals for improvement applicable to each case being established.

- Improvement actions adopted

The improvements already performed by the Spanish nuclear power plants to strengthen their capacity to respond to extreme flooding events are as follows:

— Analysis of the site and surroundings with actual models of the natural features of the terrain (gorges, slope, terraces, etc.) to define potential improvement actions.

— Analysis of the site drains network (surface and groundwaters), to identify possible improvement actions.

— Resolution of vulnerabilities encountered and implementation of the improvements identified in the site flooding study, with a view to reinforcing the leaktightness of doors, buildings and the capacity of drains and spillways.

- Other natural events

The analyses performed by the plants were based on a preliminary process of probabilistic screening in which use was made of the available IPEEE results to establish the off-site events, other than earthquakes and flooding, that might have an impact on safety at each site. The following off-site events were considered, among others: strong winds, electrical storms, hail, snowfall, extreme temperatures (high and low), ice, drought and forest fires.

For each of these events, the plants have reviewed the original design basis and have checked that the plant structures and components located outdoors are adequately designed. In addition, attempts have been made to verify the existence of safety margins beyond the design basis for credible events at each site, and various reinforcement measures have been implemented.

- Improvement actions adopted

The improvements already performed by the Spanish nuclear power plants to strengthen their capacity to respond to other extreme natural events are as follows:

— Specific reassessment of off-site natural events (hail, extreme temperatures and lightning strikes) and subsequent implementation of improvement actions.

17.3.3. Regulatory examination and control activities

Every two years the CSN carries out inspections at the plants on extreme meteorological conditions and flooding and the ultimate heat sink within the framework of the Integrated Plant Supervision System (SISC). Furthermore, although they are not included in the SISC, the CSN also performs periodic scheduled inspections of the plants' seismic surveillance systems.

The process of designing and implementing the measures required by the CSN in the post-Fukushima ITCs is subjected to a continuous programme of supervision, including numerous inspections at all the plants to verify aspects relating to the site and the associated protective measures implemented.

17.4. Consultation with other Contracting Parties potentially affected by the facility

One of the CSN's strategic lines of action consists of driving institutional relations and communication policies with other organisations present on the international scene. In this respect, the CSN participates actively in different international forums in order to exchange experiences and technical and regulatory insights regarding nuclear safety and radiological protection, learn of good practices allowing the safety of Spain's installations to be reinforced and strengthen international cooperation. Likewise, the CSN maintains cooperation agreements and protocols with its overseas peers, in particular with the competent authorities of neighbouring countries, for the exchange of information in the event of incidents and to reply to other specific consultations on the Spanish nuclear facilities.

Article 8.3 of Council Directive 2014/87/EURATOM, of July 8th 2014, which modifies Directive 2009/71/Euratom, establishing a Community framework for the nuclear safety of nuclear facilities, requires the competent regulatory authority to participate, as appropriate, in cooperation activities on the nuclear safety of nuclear facilities with the competent regulatory authorities of other member States in areas surrounding such installations, among other things through the exchange and/or shared use of information.

17.5. Vienna Declaration

As part of the information contained in this chapter, important items are provided that illustrate Spain's compliance with the commitments deriving from the Vienna Declaration.

Section 17.1 explains that in compliance with CSN Instruction IS 26, and in accordance with the recommendations contained in CSN Safety Guide 1.10, *NPP periodic safety reviews*, the Spanish nuclear power plants perform periodic safety reviews (PSR) every ten years, the scope and objectives of which include aspects relating to the site, in particular, to the programmes on continuous safety assessment and assessment of the applicability of the changes occurring in the standards during the corresponding ten-year period.

Section 17.2 establishes the standards to be used to analyse, assess and document all aspects that might give rise to interaction between the environment and the nuclear facility during the process of granting licences. In these processes the nuclear facilities are required to perform a periodic safety review (PSR), the scope of which shall include those aspects of the site that specifically affect the programmes on continuous safety assessment and assessment of the applicability of the changes occurring in the standards during the period covered by the PSR. Likewise, information is included on the "Preliminary" and "Final" Safety Studies and their contents relating to characterisation of the site, these being updated throughout the lifetime of the nuclear power plants.

Section 17.3.1 refers to the issuing in 2015 of a CSN ITC to the nuclear power plant licensees for reassessment of the seismic characterisation of the sites, as set out in the National Post-Fukushima Action Plan.

Section 17.3.2 deals with the results obtained within the framework of the European stress tests regarding the response of the nuclear power plants to off-site natural events beyond their design bases, checking for a high degree of resistance to such phenomena. Likewise, the improvement actions adopted to reinforce the capacity of the Spanish nuclear power plants to withstand earthquakes, flooding and other natural events are described.

Finally, section 17.4 describes the relations existing between Spain and other contracting parties with the fundamental objective of exchanging experiences and technical and regulatory insights in relation to nuclear safety and radiological protection and promoting cooperation between regulatory authorities.

Article 18. Design and construction

18.1. Implementation of defence in depth

18.1.1. Arrangements and regulatory requirements relating to the design and construction of nuclear installations

Royal Decree 1836/1999, of December 3rd, approving the regulation on nuclear and radioactive facilities establishes the requirements relating to the design of new nuclear power plants in chapters II "preliminary authorisation" and III "construction permit". Chapter II requires the submittal of a descriptive report and a preliminary construction plan. Chapter III requires the submittal of the general facility design project.

The CSN possesses a structured set of technical standards relating to the design and construction of nuclear facilities that contemplates the principles of defence in depth. These technical standards take into account the applicable international standards, beginning with those of the IAEA and incorporating the WENRA reference levels. They are also based on the technical standards of the countries of origin of the technology of the Spanish nuclear power plants.

The most important standards, from the point of view of nuclear facility design and construction, are as follows: CSN Instruction IS 26 relating to the basic nuclear safety requirements applicable to nuclear facilities, and CSN Instruction IS 27 on design criteria applicable to nuclear power plants, already referred to above.

During the period covered by this report the CSN has issued the following CSN Instructions containing regulatory criteria relating directly or indirectly to the design, construction and operation of nuclear facilities.

Revision 1 of CSN Instruction IS-30 on the requirements of the programme for protection against fires at nuclear power plants. The objective is to require that the licensees of Spanish nuclear power plants with operating permits implement a fire-fighting programme and define the criteria to be met by it.

Instruction IS-36 on emergency operating procedures and severe accident management at nuclear power plants. The objective in this case is to regulate the requirements to be met by nuclear power plants in relation to the procedures and guidelines applicable in the event of an emergency, or in the management of severe accidents, and the means required for this.

Instruction IS-37, on the analysis of design basis accidents at nuclear power plants. The objective is to enact the provisions of the Regulation on Nuclear and Radioactive Facilities that require an analysis of foreseeable accidents and their consequences as part of the documentation linked to the granting of nuclear power plant construction and operating permits. This is applicable to the licensees of nuclear power plant construction and operating permits.

18.1.2. Status with regard to the application for all the nuclear installations of the defence in depth concept, providing multiple levels of protection of the fuel, the primary pressure boundary and containment, taking into account internal and external events and the impact of related sequential natural external events (for example, a tsunami caused by an earthquake, a mud slide caused by heavy rain)

The section *defence in depth* of Instruction IS-26 establishes that during design, construction, operation and dismantling and the transport and the management of the radioactive wastes generated, the licensee of a nuclear facility shall incorporate multiple barriers to prevent and mitigate off-site releases of radioactive material in excess of the authorised limits.

The principle of defence in depth, or safety at all costs, is already incorporated in the design and operation of nuclear power plants and is applied to both the physical barriers and the engineered safeguards whose function is to protect them.

Defence in depth is guaranteed through the application of the following levels of protection.

- Minimisation of deviations from normal operation and of system failures.
- Detection and control of such deviations.
- Availability of structures, systems and components (SSC) and procedures capable of taking the plant to safe conditions following a design basis accident, maintaining at least one radioactive material confinement barrier.
- Minimisation of the probability of occurrence of beyond design basis accidents and uncontrolled releases of radioactive material, with procedures or guidelines capable of managing such situations.
- Attenuation of the radiological consequences of radioactive material releases resulting from whatever accidents might occur.

All the nuclear power plants incorporate these levels of protection in both their physical design and their action guidelines and procedures.

The severe accidents programme already implemented provides adequate protection for the nuclear power plants against beyond design basis accidents, including extreme external natural events.

In response to the Fukushima accident, as a result of the European stress tests process and associated peer reviews and in accordance with the provisions of the National Action Plan, the response of the Spanish nuclear power plants to extreme natural events and all their credible combinations has been reassessed and the applicable improvement actions have been established. Section 18.1.4 provides more information in this respect.

18.1.3. Degree of use of design principles such as passive safety or risk-free failure, automation, physical and functional separation, redundancy and diversity

As the Spanish nuclear power plants were built, improvements were incorporated in their designs, applying stricter criteria in relation to physical separation, redundancy, diversity, the analysis of new types of accidents not considered in the initial design, etc., for both operations and accident situations within the design basis of the plants.

Furthermore, when renewing their operating permits all the plants have been required to make improvements or introduce certain design modifications to increase the safety of the facility in view of the appearance of new and more demanding regulatory criteria. Given this practice, and with the implementation of the periodic safety reviews, on the one hand, and the conditioned application standards on the other, it may be concluded that all the Spanish nuclear power plants have similar levels of safety.

In addition, all the plants have to comply with the previously existing standards and the new standards established during the period of time covered by this report (see section 18.1.1). If any of the plants failed to satisfy a given criterion, it would have to carry out the corresponding design modification in order to fulfil it.

18.1.4. Implementation of design measures or changes (plant modifications, backfitting) to prevent beyond design basis accidents and mitigate their radiological consequences if they were to occur (this is applicable to the entire nuclear installations, including spent fuel pools)

In addition to the measures that the Spanish plants have been applying in recent years, and which have been described in previous reports, this period has seen the near completion of all the activities that the CSN and the licensees of the facilities themselves have considered to be of interest in order to avoid events like the Fukushima accident. First the stress tests and later the analyses of the response of the plants to the loss of major areas have resulted in physical and procedural modifications that have meant validation of the levels of safety of the current designs and a demonstration of robustness with respect to this type of events. All these analyses, and most of the design modifications, have been addressed or performed in accordance with a demanding schedule.

Although the activities are specific to each plant, the following may be singled out as being generally applicable in all cases:

- The implementation of measures to address extensive damage accident scenarios, including interfaces with existing plant facilities, resources and portable equipment, equipment storage areas, heliport, etc., as well as the definition of a new emergency organisation.
- A common Emergency Support Centre (CAE) sharing resources among the different Spanish nuclear power plants and capable of providing support in the event of an emergency at any of the sites.
- Acquisition of 380 V a.c. portable diesel generators to provide feed for the minimum critical loads defined in the prolonged loss of a.c. feed scenario (SBO) and for the installation of emergency connection systems for this equipment.
- Acquisition of portable diesel pumps for the extinguishing of a major fire in the absence of off-site power supply or in the event of damage to the plant's fixed fire-fighting systems. Another of the objectives of these pumps is to provide reactor or containment make-up water if necessary.
- Checking of the recovery of power from nearby hydroelectric stations with nuclear power plant support protocols.
- Drawing up of Extensive Damage Mitigation Guidelines (EDMG) and the new Extensive Damage Emergency Guidelines (EDEG).
- Filtered Containment Venting Systems.
- Passive autocatalytic hydrogen recombiners (PAR).
- Alternative Emergency Management Centres (CAGE).

The incorporation of safety improvements is not a new process, since from the very beginnings of their operation the nuclear power plants have been implementing design modifications that have improved their safety.

Likewise, the performance of emergency drills has continued, these having required the use of severe accident guidelines in certain cases. In addition, training on the application of these guidelines has been delivered at all the nuclear power plants.

18.1.5. Application of particular measures to maintain, where appropriate, the integrity of the physical containment to avoid long-term off-site contamination, in particular actions taken or adopted to cope with natural hazards more severe than those considered in the design basis

In order to prevent containment overpressure conditions, changes are being made to the Emergency Operating Procedures (POE) and Severe Accident Management Guidelines (SAMG) with a view to better managing the hydrogen generated during a severe accident. Furthermore, passive autocatalytic recombiners (PAR) are being installed in those areas of the containment (primary or secondary) that might pose a risk of hydrogen accumulation.

As regards the prevention of containment overpressure conditions, and in addition to the aforementioned changes to be incorporated in the POEs and SAMG's, the plant licensees will install filtered containment venting as an additional protection measure. The implementation of filtered venting provides adequate protection against the risk of failure of the containment building as a result of overpressure, reducing the radiological implications that unfiltered venting would imply.

In addition, the modifications required to allow for containment venting to be performed in situations of prolonged loss of power will be implemented.

As regards the reduction / mitigation of off-site fission product releases, and in addition to filtered containment venting, the plants are analysing the strategy of spraying the containment, or any other building, from the outside.

The plant licensees have incorporated the analysis of severe accidents that might initiate with the plant in the shutdown condition in their probabilistic safety assessment (APS) updating programmes.

The implementation of the different improvement actions identified adheres to the schedule mapped out in the CSN's post-Fukushima complementary technical instructions, and is appropriately included in plant configuration control, the procedures and guidelines (EDMG and EDEG), site emergency plans (PEI) and initial and on-going training programmes.

18.1.6. Improvements implemented for designs to NPP as a result of deterministic and probabilistic safety assessments performed since the previous national report on the convention and an overview of the main improvements implemented since the commissioning of the nuclear installations

As regards the probabilistic safety assessments, the nuclear power plants have continued to carry out different applications thereof in support of their licensing and safety improvement processes. These have consisted of performing and submitting risk-informed modifications, structures, systems and components prioritisation applications and operating risk assessments. An example is the assessments of compliance with section 3.4 of CSN Instruction IS-15 on requirements regarding the monitoring of maintenance effectiveness at nuclear power plants, through the use of the Safety Monitor, verification of the refuelling programmes in accordance with the Outage Safety Guide or the implementation at certain plants of programmes allowing testing and maintenance tasks to be focussed on those items of equipment that are most significant from the point of view of risk (in-service inspection of piping, in-service testing of check valves, motor or air-operated valve programmes and the maintenance rule). Likewise, the on-going design and operating procedure assessment and improvement process continues. The following activities relating to the use of APS's are particularly noteworthy:

- At Vandellós II and Ascó I and II the flooding protection manuals continue to be applied, containing design criteria that allow an acceptable level of risk to be maintained, along with the maintenance, inspection and acceptable testing programme. In addition,

following analysis of the results of the Flooding APS, design modifications significantly reducing the risk of tube rupture have been implemented. Likewise, and as a result of the new APS developments required by Instruction IS-25, areas for improvement have been identified in the emergency response operating procedures. An example of the above is the changes made to the procedures applicable during shutdown in order to improve aspects relating to containment isolation and the applicability of the SAMG's to this operating situation, or the improvements in the loss of spent fuel pool cooling procedure.

- In the case of the Almaraz I and II and Ascó I and II plants, the process of adopting the NFPA-805 standard (USA) as the licensing basis for fire protection systems continues, which will allow PSA results to be used in this area. The Almaraz I and II plants have performed the level 2 shutdown APS and are currently involved in development of the level 2 APS for flooding.
- In the case of Cofrentes NPP, and in view of the results of the Site Flooding APS, the layout of the fire-protection system piping has been modified in the services building, in order to avoid the possibility of Control Room flooding in the event of pipe rupture. Furthermore, in view of the results obtained from the analysis of seismic margins in the interim plant evaluation event extension (IPEEE), certain components have been identified and modified in order to achieve a "high confidence in a low probability of failure" (HCLPF) below the 0.30 g comparison earthquake (SME) level. In addition, the CSN has issued a complementary technical instruction including the requirement that severe accidents initiating with the plant in the shutdown condition be analysed in order to identify measures, both physical modifications and procedural changes, to improve the management of these accidents. In this respect, the Level 2 internal events Other Operating Modes APS has served as a basis confirming the adequacy of the improvements implemented or in the implementation phase, as a result of the stress tests, as regards protection against severe accidents.
- Trillo NPP has concluded its full-scope APS on fires at power, in accordance with the US NRC's NUREG/CR-6850, as well as its level 2 shutdown and other Sources APSs.
- Santa María de Garoña NPP has carried out a level I irradiated fuel pool APS applicable to its current definitive shutdown situation. This analysis has served to validate and complete the shutdown safety guide applied for the monitoring and minimisation of risk at the facility due to system and equipment unavailabilities.

Likewise, the APS results are used in support of the regulatory supervision process (SISC) for both the definition and calculation of operating indicators and the categorisation of findings.

During the period covered by the present report, the nuclear power plants have planned, designed and implemented the following design modifications, which imply design improvements additional to those included in sections 18.1.4 and 18.1.5.:

In the case of Vandellós II NPP:

- Coordination of direct current switches.
- Providing command over the open-close control of the 110 kV sub-station breaker that feeds the start-up transformer.
- Replacement of the Radiation Monitoring System class chains.
- Replacement of reactor vessel head.
- Improvements to motor-operated valves.
- Improvements in the design of the fuel building ventilation system.
- Delay in reactor coolant pump "A" restart during slow transfer.

- Improvement of fire-fighting system seismic capacity.
- Replacement of battery chargers.
- Improvements to reactor digital control system.

In the case of Ascó I and II NPP's:

- Placing in service of the new fire-fighting seismic ring and new pump house.
- New use of the VIPRE-W code to verify thermohydraulic and non-LOCA safety design.
- Use of the GOTHIC methodology in containment response analysis.
- Actions to improve the cold source.
- Replacement of battery chargers.
- Improvements to motor-operated valves.
- Updating of the CALDON feedwater flow measurement system.
- Replacement of alternator and transformer electrical protections.
- Improvements to security systems.
- Application of hard sludge lancing and chemical cleaning in the steam generators of both groups.
- Migration of the reactor digital control system to the Ovation platform and change of main turbine-driven feedwater pump (TBAAP) control.
- Modifications of fire-resistant doors and passive protections in cable trays and HVAC ducts.
- Improvements in ventilation systems, spent fuel pool temperature and Class 1E direct current system.
- Installation of vents in piping to prevent the accumulation of gases.
- Replacement of SAMO process computer with the computer based on the Ovation platform.

In the case of Cofrentes NPP:

- Implementation of a seismic sub-system for protection against fires (PCI) with an additional water make-up capacity in beyond design basis scenarios, and other PCI system and passive protections improvements.
- Modernisation of vessel level control system and turbine-driven feedwater pumps.
- Improvement of the design of the fuel range reactor vessel water level signal for post-accident recorders.
- Improvements to turbine-generator set, including stator rewinding.
- Improvement and replacement of motor and air-operated valves.
- Introduction of a new control rod design.
- Improvements to EDG's.
- Installation of permanent shielding to reduce dose and eliminate hot spots.
- Replacement of natural draught cooling tower refill.
- Replacement of feedwater heater 5B.
- Replacement of effluent stack radiation monitors.

- Modernisation of electrical bus breakers.
- Implementation of Class 1E battery charge trip on output overvoltage.
- Cable separation.
- Replacement of cables in steam tunnel.
- Improvements to control room sealing.
- Improvements to lightning protection system.
- Improvements to security systems.

In the case of Almaraz I and II NPP's:

- Redundant fuel building ventilation filtering system.
- Cybersecurity improvements.
- PCI improvements (fire-resistant separation).
- Modifications associated with the change of the fire-fighting licensing basis through transition to the NFPA-0805 standard.
- Separation of electrical feeds.
- Improvements to controlled zone and control room ventilation filtering.
- New PCI seismic system.
- New alternative shutdown panel.

In the case of Trillo NPP:

- Updating of motor-operated valves (end of programme).
- Primary circuit bleed and feed.
- Modification of turbine control, protection and bypass system.
- Improvements to PCI: detection, extinguishing and fire-resistant separation.
- Improvements in the main pump trip circuit to address spurious actuations in the event of fire.
- Improvements to containment sumps (2x2 mesh, differential pressure instrumentation and backwashing).
- Renewal of METRON switches.
- Cybersecurity improvements.
- New transformer for in-house consumptions.

In the case of Santa María de Garoña NPP:

Although the plant is in the definitive shutdown situation, projects additional to those resulting from post-Fukushima improvements and mentioned in section 18.1.4 are being carried out. These will allow for compliance with the most demanding current standards in the event of a new operating permit being granted.

- Replacement and modernisation of the stand-by gas treatment system, the function of which is to filter the containment atmosphere in the event of an accident.
- Protection of safety-related equipment in the turbine building against the consequences of a generalised fire in the area.

18.1.7. Regulatory review and control activities

In order to verify that the nuclear power plants are operating in accordance with the applicable standards and the requirements established by the regulator, and that the actions required in the different authorisations and approvals are being adequately implemented, the CSN carries out the necessary assessments and inspections.

Furthermore, as has been explained in article 14 and pursuant to CSN Instruction IS-21 on the requirements applicable to modifications at nuclear power plants, for each design modification the licensee must perform an analysis such that, depending on the result, modifications responding positively to the criteria established in IS-21 must be previously authorised by the MINETUR, following a favourable report or appreciation by the CSN.

The systematic control of modifications implemented at nuclear power plants is accomplished by way of the Basic Inspection Programme, in which there is a specific two-yearly inspection of design modifications at each facility.

18.2. Incorporation of proven technologies and methodologies

When a new design is to be incorporated, a preliminary process of homologation must be run to demonstrate, through analysis, testing programmes, previous experience or a combination thereof, that the design is suitable. As the Spanish nuclear power plants are of US or German design, in most cases there is previous experience of application of the technologies and methodologies incorporated in the designs.

During this period, the fuel rod thermo-mechanical analysis methodologies and BWR reactor transient analysis methods have been updated, considering the effect of conductivity degradation with burnup, and a restriction on the burnup limit associated with a BWR fuel design has been eliminated. Acceptance of the use of these methodologies has been subject to a detailed process of evaluation, with consideration given to the experience of application in other countries, as well as of their validation with respect to data obtained from experimental installations, including detailed analysis of fuel performance.

Likewise, during the period covered by this report, certain licensees have submitted requests for the incorporation of digital instrumentation in safety systems, such as radiation monitors, or in control systems. These applications have been accepted following consideration of the applicable regulatory guides.

18.2.1. Arrangements and regulatory requirements for the use of technologies proven by experience or qualified by testing or analysis

The application of CSN Instruction IS-21 on design modifications at nuclear power plants allows for the identification of those modifications that the licensees may implement without the need to request their authorisation and those others that do require such authorisation. Instruction IS-21 itself identifies the documentation that is to accompany such requests. The Regulation on Nuclear and Radioactive Facilities provides that whenever the regulatory authority considers a modification to be of major scope or importance, the licensee shall request authorisation for performance and assembly.

CSN Instruction IS-26 on basic nuclear safety requirements applicable to nuclear facilities establishes in its article 5.16 that "the design of safety-significant structures, systems and components must be based on technologies proven and validated under conditions similar to those encountered in operation".

Furthermore, art. 82 of the RINR establishes the power of the CSN to issue declarations of favourable appreciation of new designs, methodologies, simulation models or verification protocols, in response to requests. Such declarations may be required of the licensees in an autho-

risation process or as a result of any regulatory process. Likewise, the CSN is empowered to issue certifications and homologations for new designs and models (art. 83 of the RINR).

18.2.2. Measures taken by the licensees to implement proven technologies

The components of safety systems are subject to a process of environmental and seismic qualification that takes into account the conditions under which they are to perform their function. The results of the environmental qualification are included in the appropriate environmental qualification manual, which specifies the environmental conditions that the equipment in question is required to withstand. Furthermore, the modernisation of safety-related systems by means of digital electronic equipment has made it necessary to extend the qualification of such equipment to cover new aspects in order to prevent possible vulnerabilities due to the technology on which they are based. Thus, this equipment must be qualified in order to ensure its electromagnetic compatibility with the equipment existing in the plants, the maximum quality and safety requirements must be adhered to in both software design and the development environment, and consideration must be given to cybersecurity aspects in the development of such equipment.

During the previous period, the regulatory authority and the electricity industry jointly drew up a project for the assessment and optimisation of the methodologies applied to the software-based instrumentation and control equipment dedication process. In those cases in which this type of technology has been implemented, the industry standards of the county of origin of the technology have been applied. The electricity industry is currently addressing a pilot project for the qualification / dedication of equipment with embedded or smart software.

During the period 2013-2015, the Spanish NPP's have completed or initiated the following I&C projects incorporating new digital technologies. Several of these are considered to be important for safety, in accordance with the definition included in Instruction IS-21:

ASCÓ I and II NPP's

- Replacement of the SAMO process computer.
- Migration of the reactor digital control system and the turbine-driven main feedwater pump control system.
- Migration of the electrohydraulic digital control system.
- Control of main steam heaters and reheaters drains tank.

Vandellós II NPP

- Migration of the plant process computer.
- Digitalisation of the reactor digital control system and the turbine-driven main feedwater pump control system.
- Implementation of the new radiation monitoring system.
- Change of the ventilation and air-conditioning control system.

Trillo NPP

Modifications to the following systems, sub-systems or components:

- Monitoring of primary vibrations.
- Environmental radiation monitoring network.
- Turbine and turbine bypass control and protection.
- New Iskamatic boards.

- Airball system measurement and control cabinets and sensors for radiation detector calibration.
- Safety and non-safety recorders.
- Core level measurement system.
- New Contronic boards.

Almaraz I and II NPP's

Modifications to the following systems, sub-systems or components:

- Steam generator relief valve control loop boards.
- Environmental radiation monitoring network.
- Safety and non-safety recorders.
- New ICCM (Inadequate Core Cooling Monitor) boards.
- New RPS (Reactor Protection System) boards.
- Turbine-driven auxiliary feedwater pump control.

Cofrentes NPP

Modifications to the following systems, sub-systems or components:

- Spent fuel pool level and temperature measurement.
- Wireless communications.
- Replacement of main stack radiation measuring equipment.
- Modernisation of feedwater level and flow control.
- Modifications deriving from the application of Instruction IS-32.
- Replacement of relays to ensure seismic margin.

Santa María de Garoña NPP

- Despite the definitive shutdown situation, the plant continues to invest in and carry out the projects required by the CSN to obtain a new operating permit. Among the projects being performed to adapt the plant to the new design requirements, special mention may be made of the divisional cable separation project.

Finally, the plants have addressed the analysis of the cybersecurity requirements and technical solutions to be applied for digital systems. These requirements affect both safety-related and non safety-related equipment. The NPP's have drawn up cybersecurity plans, guidelines and procedures in accordance with the applicable regulatory requirements.

18.2.3. Regulatory review and control activities

Design modifications implying the incorporation of new technologies and methodologies, which, depending on their impact on safety, require authorisation or favourable appreciation, or those that imply modifications to the official operating documents of the plant, are subjected to a formal process of regulatory evaluation. Licensing inspections may be performed within the process of evaluating a design modification of this type, if the CSN so decides.

Furthermore, as has already been pointed out, the CSN performs two-yearly plant inspections in relation to the implementation of design modifications as part of the integrated operating plant supervision system (SISC) process, in which the preliminary and safety assessments performed by the licensees to determine whether or not a modification (temporary or permanent)

requires authorisation, its physical implementation and the tests carried out prior to the placing in service of the modifications, as well as other types of modifications of a documentary nature, are verified, the aim being to check for compliance with the requirements of CSN Instruction IS-21. These inspections are particularly important in the case of design modifications incorporating new technologies or methodologies.

Likewise, in the framework of the inspections contemplated in the Basic Inspection Programme, the conditions established in the equipment environmental qualification manuals are verified, this being especially important in the case of modifications involving the introduction of digital technologies.

18.3. Design for reliable, stable and manageable operation with specifications relating to human factors and man-machine interfaces

18.3.1. Arrangements and regulatory requirements for reliable, stable and easily manageable operation, with specific consideration of human factors and man-machine interfaces

As established in CSN Instruction IS-26, structures, systems and components must be designed, manufactured, installed and operated in accordance with their safety classification and taking into account the maintenance, inspection and testing capacity to guarantee their functional capabilities throughout the lifetime of the facility. When the intervention of a system is required in operating events and rapidly evolving accidents, its actuation must be automatic, in order to maintain the facility in safe conditions without the need for the manual intervention of the operating personnel during a period sufficient for the necessary subsequent actions to be considered and implemented. Likewise, the structures, systems and components of the facility must be designed in such a way as to ensure compliance with their safety functions under the environmental and seismic conditions considered in the expected operating events and design basis accidents, incorporating suitable protections against off and on-site events.

The CSN considered it necessary for the nuclear facility licensees to formally include requirements relating to human factors in their design modifications management procedures, with the participation of specialists in this discipline. Thus, CSN Instruction IS-27 on general nuclear power plant design criteria establishes that "the design of safety-significant structures, systems and components must take into account the principles and techniques of human factors engineering", and the aforementioned CSN Instruction IS-21 includes among its requirements the need for "human factors methods and criteria to be adequately incorporated in all phases of the modifications process and activities".

18.3.2 Implementation of measures adopted by the licensee

The projects for modifications at Spanish nuclear power plants take into account those elements that constitute the human factors-related methodology of the US NRC's NUREG-0711, to a greater or lesser extent and depending on their scope and safety significance.

During this period the plants have formalised in procedures the human factors analysis methodologies used in design modifications, which were actually applied previously in a non-systematised manner.

The fundamental objective of these methodologies is that the user-system interface be designed in accordance with principles minimising the human errors deriving from this interface and that design modifications do not generate tasks or activities exceeding human capabilities or leading to situations that might be considered error precursors.

In this respect, the plant procedures classify design modifications to identify those that modify the man-machine interface with safety functions. The methodology of the US NRC's NUREG-

0711 methodology is applied to the latter, this analysing the 12 elements of human factors engineering in the 4 phases (planning and assessment, design, verification and validation and start-up and operation).

18.3.3. Regulatory review and control activities

Design modifications requiring authorisation or favourable appreciation, or those implying modifications of the plant's official operating documents, are subject to a formal process of regulatory evaluation. This group of modifications includes all those having an important impact on safety. The evaluation process includes human factors and man-machine interface aspects when the CSN considers them to be significant. Licensing inspections may be performed as part of the design modification evaluation process if the CSN deems this to be appropriate.

In addition, the CSN routinely supervises these aspects in its Basic Inspection Programme.

18.4. Vienna Declaration

This chapter is probably the most important as regards justification of compliance with the commitments deriving from the Vienna Declaration, especially in relation to the first principle: *the design, site selection and construction of new nuclear power plants shall be in keeping with the objective of preventing accidents during start-up and operation and, if an accident were to occur, to mitigate emissions of radionuclides that might cause long-term contamination off site, as well as to avoid early radioactive emissions or radioactive emissions of sufficient magnitude as to require long-term actions and protective measures.*

In Spain there are no plans to build new nuclear power plants, but it is understood that the principle is fully applicable, as regards design and operation, to the existing plants. Indeed, many of the actions taken as a result of the Fukushima accident are aligned with this principle. Furthermore, the other two principles reinforce the application to the operating plants of the first, from the dual perspective of safety assessments and consideration of the IAEA standards and of international good practices, processes or aspects leading to proposals for plant design and operation improvements, in accordance with the first principle.

Thus, section 18.1, dedicated to the application of the principles of defence in depth, includes the legal provisions referring to plant design, among them the standards issued by the CSN during the period of the report, particularly significant among which in this respect is Instruction IS-36 on emergency operating procedures and severe accident management, and Instruction IS-37 on design basis accident analysis. Also analysed is the application to the Spanish plants of the principles of defence in depth included in Instruction IS-26, explaining and justifying the way in which these principles are guaranteed.

Particularly important from this standpoint are sub-sections 18.1.4 and 18.1.5, the first detailing the measures applied in design to prevent beyond design basis accidents and mitigate their radiological consequences in the event of their occurring, and the second explaining the measures aimed at guaranteeing containment integrity, in particular with respect to situations involving extreme natural events. In the case of Spain, the vast majority of these measures are included within the framework of the response actions following the Fukushima accident and the programme for actions to respond to accidents involving the loss of major areas of the plant (both programmes have been carried out in Spain simultaneously and in coordination). The main design modifications performed and under way at each plant to improve the safety of the facilities are described.

The design improvements necessary for the development of the first principle of the Vienna Declaration frequently imply the implementation of new technologies and methodologies. Section 18.2 sets out the measures adopted to guarantee the adequate and safe implementation of these technologies and methodologies at the Spanish nuclear power plants. Likewise, the most important modifications carried out in this area during the period of the report are described.

A key aspect of the implementation of design modifications, and especially those having a high impact on safety, such as those relating to the development of the first principle of the Vienna Declaration, is the consideration of human factors and aspects associated with man-machine interaction in the development and implementation of the modifications and subsequent operation of the plant. The consideration of these aspects at the Spanish plants to guarantee reliable and safe operation is summarised in section 18.3.

Article 19. Operation

19.1. Initial authorisation

The regulatory requirements for the initial authorisation of new nuclear power plants are those set out in the Regulation on Nuclear and Radioactive Facilities (RINR), approved by Royal Decree 1836/1999, of December 3rd. These requirements are specified for each plant in the official operating documents required for the granting of the preliminary authorisation and construction and operating permits.

The preliminary or site authorisation is an official recognition of the proposed objective and the suitability of the site selected, and its granting entitles the licensee to request the construction permit for the facility and initiate the preliminary infrastructure works authorised.

The construction permit entitles the licensee to initiate construction of the facility and to apply for the operating permit at the appropriate time.

The operating permit entitles the licensee to load the nuclear fuel or introduce nuclear substances in the facility, to carry out the programme of nuclear tests and to operate the installation within the conditions established in the permit. This permit is provisional until the nuclear tests are satisfactorily completed.

The granting of the aforementioned authorisations corresponds to the Ministry of Industry, Energy and Tourism.

In Spain no initial authorisations have been granted for nuclear power plants since the 1980's.

19.2. Operating limits and conditions

19.2.1. Arrangements and regulatory requirements for the definition of safe boundaries of operation and the setting of operational limits and conditions

The regulation on nuclear and radioactive facilities establishes the contents of the documentation to be included in the request for the Operating Permit (OP) of each plant. A standardised model of the OP is included as Appendix 19.A.

The list of "Official Operating Documents" (DOE) established by the regulation on nuclear and radioactive facilities is as follows:

a) Safety Study.
b) Operating Regulation.
c) Technical Specifications.
d) Site Emergency Plan.
e) Quality Assurance Manual.
f) Radiological Protection Manual.
g) Radioactive Waste and Spent Fuel Management Plan.

CSN Instruction IS-32 on nuclear power plant Technical Specifications establishes the requirements applicable for the drawing up and maintenance of this document.

The OP, on the one hand, and the DOE's on the other, contain a set of requirements that define the operating framework, compliance with which guarantees the safe operation of the plant.

19.2.2. Implementation of operational limits and conditions, their documentation, training in them, and their availability to plant personnel engaged in safety related work

The ETF's contain the limit values of variables impacting safety, the actuation limits of automatic protection systems, minimum operating conditions, the schedule for the periodic reviews, calibrations and inspections of systems and components and operational control, and constitute the set of technical requirements and limits governing the operation of the Spanish nuclear power plants.

The ETF's are adapted to each nuclear power plant from standard documents drawn up in the country of origin of the facility, and are coherent with the bounding conditions and hypotheses considered in the accident analyses of each installation.

The ETF's have a clearly defined structure and typically comprise the following chapters:

- Definitions.
- Safety limits and limiting setpoints of the safety systems, with their bases.
- Limiting conditions for operation (LCO), including the actions required if these LCO conditions are not met and monitoring requirements or demands.
- Design characteristics.
- Administrative standards.
- Bases of the LCO's and MS's.

The TS's are developed for use and documentation in a surveillance or monitoring plan and procedures, which establish the performance frequencies applicable to each requirement, the way in which the tests associated with each requirement are to be carried out and the corresponding acceptance criteria.

The ETF's are an essential objective in the initial and on-going training of the personnel with responsibilities for safety-related tasks, especially the control room operations personnel, and knowledge of them and their use is part of the examination set by the CSN for operating personnel licences.

The ETF's establish the operability requirements (LCO) of the structures, systems or components (SSC) included within their scope, as well as the actions and time periods applicable in the event of their being inoperable.

In certain cases the operability of the SSC's may be questioned, in which case they will be in an *"anomalous condition"* (a general term that encompasses either the *Degraded Condition*, with the functional capacity or qualification of the SSC reduced, or the *Non-conforming Condition*, with it failing to comply with a requirements established in the licensing basis). In order to determine whether the SSC is inoperable or in an "anomalous condition", the licensee shall perform an "Operability Determination" in accordance with the applicable procedures. When the SSC is in an anomalous condition, the license shall establish and implement compensatory measures until such time as the said "anomalous condition" is definitively solved. All this must be perfectly documented in order to allow for tracking and traceability.

The procedures applied by the nuclear power plants for the treatment of anomalous conditions have been drawn up in accordance with UNESA guideline CEN-22 and set out the criteria for action in the event of an SSC being in the anomalous condition. This guideline has the consent of the CSN and in February 2016 a revision 1 was issued, introducing the concept of reduced reliability.

19.2.3. Review and revision of operational limits and conditions when necessary

Given the importance of the ETF's for the operation of the Spanish nuclear power plants, the process of revising them is highly complex and detailed, in order to guarantee that the revisions are performed suitably; consequently, any change to them requires express authorisation and in all cases it is compulsory that they be submitted to the CSN for technical analysis and assessment and a favourable report prior to implementation.

The normal ETF revision process may be initiated in response to a proposal by the licensee of the facility or by the CSN, which directly requires the Spanish nuclear power plants to revise or adapt the ETF's in the light of operating experience, new standards, etc.

The proposal for modification drawn up by the licensee is reviewed by the Plant Nuclear Safety Committee (CSNC), the maximum internal advisory body on nuclear safety and radiological protection, and following its favourable appreciation is subjected to review by the Operator Nuclear Safety Committee (CSNE), the maximum advisory body to the Directorate General in relation to nuclear power plant nuclear safety.

Subsequently, and following a mandatory report by the CSN, the Ministry of Industry, Energy and Tourism formally approves the ETF revisions.

The guidelines for the treatment of anomalous conditions are reviewed by a mixed CSN-UNESA working group.

19.2.4. Regulatory review and control activities

The CSN undertakes the regulatory control of compliance by the licensee with the limiting conditions for operation established in the ETF' and the other official operating documents.

At the nuclear power plants this supervision is performed daily and is one of the routine activities of the resident inspector. Compliance with the surveillance requirements established in the ETF's is also supervised by means of two-yearly periodic inspections included in the integrated plant supervision system (SISC).

As has been pointed out above, the CSN is required to inform the Ministry of any request for ETF modification.

19.3. Procedures for operation, maintenance, inspection and testing

19.3.1. Arrangements and regulatory requirements on nuclear facility operation, maintenance, inspection and testing procedures

At the Spanish nuclear facilities, operating, maintenance, inspection and testing activities must be performed in accordance with approved procedures. Their use is contemplated as a standard item of the principle of defence in depth through the establishment of written and approved instructions, the aim being to minimise the appearance of human error in the performance of activities.

In development of the Regulation on Nuclear and Radioactive Facilities, the CSN issued CSN Instruction IS-19 on the requirements of the nuclear facility management system, establishing that quality requirements are to be managed integrally with the other elements of the management system and that the activities associated with each process are to be performed under controlled conditions, using procedures, instructions, drawings or other appropriate means, which shall be reviewed periodically to ensure their suitability and effectiveness.

In accordance with CSN Instruction IS-26, on the basic nuclear safety requirements applicable to nuclear facilities, the licensee is required to have a set of operating procedures for normal, off-normal and emergency conditions, specifying the actions to be taken to keep the facility

under safe conditions. Likewise, the licensee shall have operating procedures or guidelines to mitigate the consequences of situations beyond the design basis. The operating procedures shall be verified and validated prior to entering into force, and shall be kept updated in order to reflect the situation of the facility and organisation. The personnel involved shall be adequately trained in their use and application.

As regards stress testing of the structures, systems and components (SSC) within the scope of the technical specifications, CSN Instruction IS-32 establishes that these tests shall be performed in keeping with written procedures including acceptance criteria allowing the operability of the SSC's to be determined. Likewise, CSN Instruction IS-23 on in-service inspection also establishes that functional tests on pumps and valves are to be performed by means of written procedures containing the test procedure to be adhered to, reference values and associated limits and applicable acceptance criteria.

CSN Instruction IS-36 on emergency operating procedures and the management of severe accidents at nuclear power plants was issued in January 2015. This Instruction sets out the requirements to be met in relation to the emergency operating procedures (PPOE), severe accident management guidelines (SAMG), extensive damage mitigation guidelines (EDMG) and emergency shutdown action guidelines (SAG). It also requires the procedures to be subject to a process of verification and validation and that the users receive periodic initial and on-going training.

19.3.2. Establishment of operational procedures and their implementation, periodic review, modification, approval and documentation

The procedures basically reflect the dynamics and development of the processes, cover the necessary activities to be performed on the equipment of the facility in any plant operating mode and ensure that the requirements contained in the official operating documents are observed. They may also reflect information flows and the responsibilities of each of those intervening, as a result of which they constitute the basic coordination system.

At the Spanish nuclear power plants there are written procedures covering all activities relating to nuclear safety and radiological protection, these being kept permanently updated.

Within the scope of the nuclear power plants themselves, the operating procedures are especially relevant, and are grouped into the following types:

- General operating procedures: these establish the conditions and the manoeuvres to be performed to operate the plant in the different operating modes, as well as to switch between modes.
- Auxiliary operating procedures: these set out in detail the manoeuvres to be performed to start up the specific systems or equipment required by the general procedures.
- Alarm operating procedures: these indicate the actions to be performed following the activation of an alarm in the control room. At some plants these procedures are integrated into those corresponding to the systems.
- Operating procedures for off-normal conditions: these address transients or problems in systems or equipment not reaching the accident category.
- Emergency operating procedures (POE): the mission of these procedures is to manage incidents / accidents, including the design basis.
- Severe accident management guidelines (SAMG): guidelines containing operating strategies for mitigation of the consequences of a severe accident.
- Extensive damage mitigation guidelines (EDMG): guidelines or procedures containing strategies to address the loss of major plant areas.

The procedures included in the previous list are, in general, adaptations of generic guidelines drawn up by the main supplier of the technology of the plant. They are revised periodically in accordance with certain administrative procedures and, depending on type and importance, different obligatory review periods are established.

The operating procedures have been revised and updated throughout the lifetime of the Spanish nuclear power plants in keeping with in-house and industry operating experience over the years.

Operating procedures affected by major changes or modifications are tested, validated and trained on the full-scope simulators prior to their use at the nuclear power plants.

When the operating procedures affect nuclear safety, they are subject to compulsory review by the Plant Nuclear Safety Committee (CSNC).

The Fukushima event and the potential loss of major areas have been analysed at sector level and a response has been provided to CSN Technical Instructions ITC-1/2/3/4/5. As a result, the emergency procedures (POE's and SAMG's) have been revised, a new series of extensive damage procedures (EDMG's) has been generated and emergency shutdown action guidelines (SAG's) are being drawn up.

19.3.3. Availability of procedures to the relevant nuclear installation staff

The Spanish nuclear power plants have a system for the maintenance and distribution of official documents, including all the procedures, which guarantees the availability of these documents for those who are to use them.

Knowledge of the operating procedures is another of the key milestones of the examinations for the granting of operations personnel licences set by the CSN for Spanish nuclear power plant candidates.

19.3.4. Involvement of nuclear installation staff in the development of procedures

At the Spanish nuclear power plants the procedures are drawn up by the personnel of the facility, more specifically by specialists in each area, structure, system or component.

They are subsequently revised by the managers of the authors and approved by the top management of the nuclear power plant.

As has been pointed out above, procedures affecting nuclear safety or radiological protection are revised by the CSNC prior to their approval.

Changes to procedures are required to go through the process of preliminary analysis, safety assessment and safety analysis established in CSN Instruction IS-21, on requirements applicable to modifications at nuclear power plants.

19.3.5. Incorporation of operational procedures into the management system of the nuclear installation

The Spanish nuclear power plants have implemented management systems having as their objective the safe, reliable and effective management of all activities, through an overall and systematic view of the different specific management systems: safety, quality, the environment, human resources, economic resources, etc.

In response to CSN Instruction IS-19, on the requirements of nuclear facility management systems, the Spanish NPP's revised their respective management systems to adapt them to the requirements of the said Instruction.

Specifically, as regards documents such as the operating procedures, an entire series of guidelines is established for their control, preparation, revision and approval, which the plants are required to fulfil.

19.3.6. Regulatory review and control activities

In accordance with the regulation on nuclear and radioactive facilities, the operating permit request from each nuclear installation must be accompanied by a quality assurance manual and an operating regulation, among other documents. The first of these documents establishes the scope and contents of the quality programme applicable to the testing and operation of safety-related systems, structures and components. The second sets out the organisation and functions of the personnel of the facility and the corresponding basic initial and on-going training programmes, and additionally the standards for operation under normal and accident conditions. These standards and the procedures through which they are enacted refer to the facility overall and to the different systems of which it is comprised.

The CSN carries out periodic inspections in relation to the maintenance of the emergency operating procedures and severe accident management guidelines. Likewise, the CSN performs inspections within the framework of the basic inspection plan relating to the surveillance requirements of the technical specifications, which focus on revision of the applicable procedures and attendance during testing. In addition, the CSN resident inspectors at the plants supervise the different processes of the licensees and the procedures by which they are carried out.

19.4. Procedures for responding to operational occurrences and accidents

Practically from the very start of their operation the Spanish nuclear power plants are equipped with a set of written procedures contemplating all the operating modes foreseen.

The current Emergency Operating Procedures were implemented at the Spanish nuclear power plants of American design at the end of the 1980's, while implementation of the Severe Accident Management Guidelines (SAMG) took place at the end of the 1990's, with a schedule similar to that applied in the USA. In the case of the German design plant, the process was performed following the programmes and timeframe applied in that country.

As a result of the stress tests carried out in Spain, the need to implement improvements to the SAMG's has been identified, in order to contemplate strategies to address accidents occurring simultaneously in more than one group on one same site, events developing from a situation of shutdown and events arising in the spent fuel pool. This has been reflected in the Complementary Technical Instructions issued by the CSN following the stress tests, the objective of the requirements being the implementation of the planned improvements in coordination with developments occurring in this respect in the countries of origin of the technologies.

19.4.1. Arrangements and regulatory requirements on procedures for responding to anticipated operational occurrences a and accidents

As has already been indicated, CSN Instruction IS-36 on emergency operating procedures and severe accident management at nuclear power plants establishes the requirements applicable to the plants for the drawing up and maintenance of accident management procedures and guidelines, developing the requirements already set out in this respect in CSN Instruction IS-26 on the basic nuclear safety requirements applicable to nuclear facilities.

In developing the off-normal and emergency operating procedures for each of the facilities, as well as for the severe accident management guidelines, the plant procedures are adapted to the generic guidelines developed by the BWR and PWR owners groups, which incorporate certain improvements springing from analysis of the Fukushima accident. This process of adapting and developing off-normal and emergency operating procedures included both generic writing guidelines and specific studies for implementation. They were also subjected to an internal process of verification and validation to guarantee both technical accuracy and possibilities for use.

In the case of the extensive damage mitigation guidelines, the Spanish nuclear power plants have approved different procedures, first performing a suitable process of verification and validation.

19.4.2. Establishment of operating procedures for emergencies based on events and/or symptoms

The first emergency operating procedures used by the nuclear power plants were based on events.

Following the Three Mile Island accident in March 1979, the need to revise a series of aspects of the emergency operating procedures was determined, this leading to the development of a "symptomatic emergency response approach".

For the establishment of this new approach, specific symptom-based emergency operating procedures were developed, these only taking into account the evolutions of certain plant parameters, with the actions to be performed being indicated on the basis of such evolutions. These procedures are performed in accordance with curves, tables and setpoints calculated using best-estimate methods and depending on the specific design of each plant.

In the case of the Spanish PWR plants, and as is the case for all other plants based on this technology, there are two sub-sets of emergency operating procedures: the optimum recovery procedures are events oriented, but symptom-based, while the functions recovery procedures (to be used if the accident situation deteriorates, but always within the framework of the emergency operating procedures) are purely symptomatic. The emergency operating procedures of the Spanish BWR plants are purely symptomatic.

In addition, in most cases technical bases were drawn up allowing the fundamentals of the procedural steps to be identified.

In developing and implementing the procedures, a basic programme was adhered to that included definition of the criteria for preparation in keeping with the owners group guidelines, for writing pursuant to technical and administrative criteria, and criteria for the integration of emergency procedures management in the training programmes, including the simulator for maintenance of the necessary control room personnel qualification and the development of a procedures validation and updating plan.

Following the Fukushima accident, various aspects for improvement were identified in the emergency operating procedures within the owners group, these now being incorporated in the plant procedures following approval of the modifications in the reference guidelines.

Some changes (for example, those referring to the fuel pools) have already been incorporated in partial revisions of the emergency operating procedures.

19.4.3. Establishment of procedures and guidance to prevent severe accidents or mitigate their consequences

Severe accidents are accident conditions beyond the design basis that imply significant degradation of the core. In general, a severe accident is considered to begin at the onset of core damage due to loss of cooling.

Preventing the accident from progressing to the point of core damage is included within the scope of the actions contemplated in the emergency operating procedures, aimed at preventing severe accidents. The maintenance of containment capacity, putting an end to core damage and reducing the release of radioactive material are objectives within the scope of the severe accident management guidelines, aimed at mitigating severe accidents.

The severe accident management guidelines developed are, therefore, specific action guidelines for flooding of the vessel and containment, containment control and control of radioactive product releases.

A programme similar in all respects to the one described in the case of the emergency operating procedures (writing criteria, initial and on-going training programmes, validation

plan, etc.) was undertaken for the development and implementation of the severe accident management guidelines.

Finally, conditions were established for transition from the emergency operating procedures to the severe accident management guidelines, along with the systematic approach for revision of the Site Emergency Plan, in order for the latter to have an organisation specifically appropriate for the management of severe accidents and the training programmes necessary to ensure the effective implementation of these activities.

Following the Fukushima accident, various aspects for improvement were identified within the owners group in the severe accident management guidelines, these now being incorporated following approval of the modifications in the owners group reference guidelines.

19.4.4. Establishment of procedures and guidance to manage accident situations at multi-unit nuclear installations and/or multi facility sites

Following the Fukushima accident in 2011, and within the European stress tests process, the CSN issued a series of Complementary Technical Instructions (ITC) requiring the licensees to carry out a complementary safety assessment considering beyond design basis events. A first set of ITCs considered events of external origin (earthquakes, flooding...), prolonged loss of power supply and/or the ultimate heat sink, etc. and required also that the accident management measures currently available for the different stages of the following scenarios be described:

- loss of the core cooling function and threat for containment integrity;
- loss of the spent fuel storage pools cooling function.

The ultimate objective of the analyses required was to identify possible improvements in plant safety to strengthen the capabilities already existing with respect to this type of extreme events.

Furthermore, since the Fukushima accident various aspects for improvement have been identified within the owners group in both the POEs and the severe accident management guidelines (SAMG), which will be incorporated following approval of the modifications in the corresponding owners group reference guidelines.

One of the relevant modifications in the POEs/SAMG's will be consideration of the new portable stand-alone equipment used in the Extensive Damage Mitigation Guidelines (EDMG), which have been drawn up taking as a reference the document NEI 06-12 (B.5.b Phase 2 & 3 Submittal Guideline Revision 2, December 2006), already implemented at the American plants, for the management of accidents involving the loss of major areas due to a large fire beyond the design basis, also possibly implying the loss of normal emergency governance and control.

The EDMG's (and associated equipment) contemplate as fundamental objectives the supply of water to the vessel for core cooling, the venting of containment to maintain its integrity or water make-up to /spraying of the pool to prevent uncovering of the stored fuel, all of the above under extreme conditions preventing use of the fixed installations of the plant.

Other modifications of the POEs/SAMG's will be aimed at achieving better management of the hydrogen generated during a severe accident. In addition, in order to improve the robustness of the plant, passive autocatalytic recombiners (PAR) are being installed in those areas of the containment in which there might be a risk of hydrogen accumulation (in the specific case of Sta. María de Garoña, in the secondary containment).

As regards the prevention of overpressure conditions in containment, and apart from the changes already identified that will be incorporated in the POEs and SAMG's, the plant licensees will install a filtered containment venting system as an additional improvement to protect containment. The implementation of the filtered venting provides adequate protection against the risk of failure of the containment due to excessive pressure and, in addition, reduces the radiological implications of non-filtered venting.

Furthermore, modifications will be performed to allow for the reliable operation of the containment venting in the event of prolonged loss of power.

As regards the reduction/mitigation of the off-site release of fission products, and in addition to the filtered venting of the containment, the plants have implemented the strategy of externally spraying the containment, or any other building.

The plant licensees shall incorporate the analysis of whatever severe accidents might initiate with the plant in the shutdown situation in their Probabilistic Safety Assessment (APS) updating programme.

In relation to accident management planning, a series of proposals for improvement has also been identified and described in section 16.2.6 of this report. Noteworthy among these is the implementation at each site of a new alternative centre for the management of emergencies and the setting up of a national support centre for emergency situations, equipped with suitable resources and teams capable of being deployed at the affected site within 24 hours.

The implementation of the different improvement actions identified adheres to the schedule established in the CSN's post-Fukushima ITCs, and these are appropriately included in the control of the plant configuration, the procedures (extensive damage emergency guidelines (EDEG), extensive damage mitigation guidelines (EDMG) and site emergency plans (PEI) and in the initial and on-going training programmes.

All this new equipment will be included for each facility in a new manual establishing the applicable operating conditions and surveillance requirements.

In the specific case of sites with multiple groups, the licensees have carried out the same analyses as are required in the stress tests, but taking into account the possibility of the accident affecting several groups.

The improvement actions required to successfully address and mitigate the accidents postulated have been identified in this manner. In this respect, the reinforcement of the emergency response organisation, the additional portable equipment to be acquired, the new emergency centres (CAGE, equipment safe storage area) and the support resources (portable equipment at CAE) have been designed and implemented taking into account the fact that the accident might simultaneously affect both groups.

Likewise, the different emergency procedures and extensive damage management/ mitigation guidelines have been developed taking into account the fact that the accident might affect either of the groups or both.

19.4.5. Regulatory review and control activities

Since the Fukushima accident, the CSN has been carrying out a scheduled inspections plan, these being performed periodically but not included in the Basic Inspection Plan, with at least one inspection per year being carried out for the implementation and updating of the POEs and SAMG's and personnel training in this area. As a result, this aspect is inspected at all the nuclear power plants over a period of six years. The performance of these inspections is contemplated in the annual planning of the Council's activities.

19.5. Engineering and technical support

19.5.1. General availability of the necessary technical support and engineering in all safety related fields for nuclear installations, under construction, in operation, under accident conditions or under decommissioning

The engineering firms and equipment suppliers that participated in the construction and start-up of the nuclear power plants currently operating in Spain have managed to maintain a large part of their capacities since that time thanks to the following:

- Participation in the on-going maintenance and updating of the design to improve the facilities.
- Participation in new investment projects for the improvement of the current facilities (replacement of steam generators, turbines, cooling towers, etc.).
- Participation in projects deriving from modifications in the wake of the Fukushima accident.
- Participation in national and international R&D projects relating to new problems deriving from operating experience and lifetime management programmes.
- Participation in the design phase of generation III projects.

The international presence of the electricity utilities, especially when oriented in part towards participation in nuclear projects, has allowed engineering and goods and services supply capacities to be maintained and developed, with benefits for the national market.

In the area of fuel, development and improvement programmes have been undertaken on the basis of the capabilities developed within the different companies and with the leadership of ENUSA in manufacturing. These programmes have warranted international recognition.

During this period, the projects for the implementation at the Spanish NPP's of modifications arising as a result of the Fukushima accident have posed a challenge as regards timeframes and the assessment and application of the latest technologies existing on the market, such as the Alternative Emergency Management Centre (CAGE), the passive autocatalytic recombiners installed in the containment or the filtered containment venting system.

The capacity of the Spanish sector to cover the needs of the nuclear facilities has been contemplated in the studies on "Spanish capacities to address a new nuclear project" and "Supply chain for the construction of a nuclear facility", performed by the CEIDEN Technology Platform. These studies assessed the capacities of the main sectors (engineering and consulting, inspection and services, construction, assembly, mechanical and electrical equipment suppliers, fuel cycle, testing laboratories,...), concluding that there are sufficient capacities in Spanish industry to provide all the technical support required in all areas relating to plant construction and operation.

Additionally, the plants have promoted the development of an R&D&i model with a series of national companies and institutions by way of a collaboration agreement within the framework of UNESA, this including a network of reference centres specialising in different areas of innovation, in such a way that the capacity required to operate the nuclear fleet under conditions of maximum safety, reliability and competitiveness be maintained at all times.

These reference centres, with recognised scientific and technical capabilities in the nuclear field, study the documentation submitted during EPRI meetings and seminars and considered to be of interest for the plants, depending on their specific area, along with the EPRI documentation sent from UNESA to each reference centre manager for analysis within the corresponding area.

ACs regards dismantling, the engineering work carried out at the Vandellós I and José Cabrera nuclear power plants, led by Enresa, has provided Spanish companies with the opportunity to develop their technical and management capabilities in this area, demonstrating their capacity to undertake dismantling processes.

19.5.2. Availability of the necessary technical support on site and also at the licensee holder or utility headquarters and procedures for making central resources available for nuclear installations

The technical support capacities needed by nuclear power plants may be said to be far-reaching in their scope and, depending on the organisation of the owner company or companies, may be configured in different ways, for which reason establishing a single philosophy would not appear to be practical. The operating regulation of each of the nuclear power plants describes the

management method, responsibilities and availability of resources at each facility. These capacities are dealt with in greater detail in the Organisation and Operations Manuals and in the lower level procedures.

Generally speaking, there must be a strategic approach to investments and R&D associated with the management of assets, with a knowledge and decision-making basis resting on the corporate organisation but supported by an essential understanding of the situation of the structures, systems and components by the plant engineering and maintenance areas.

Likewise, it would appear to be logical for the fuel and radioactive waste management strategy to have an important corporate component, with a view to optimising their unified management. The same may be said as regards the necessary agreements with the technology partners involved in the nuclear steam supply system, the turbine-generator set and other relevant plant equipment.

Other key aspects regarding technological competences are licensing and operating experience, which may be supported indistinctly by corporate organisations or the plants, although in the first case certain minimum capacities should be kept decentralised.

A corporate structure is justified to ensure independent supervision and tracking of the operation and improvement of the nuclear power plant processes.

The procedures in place to make centralised resources available to the nuclear power plant are associated with the tracking of the strategic plans, from the plant governing body and the guidelines issued by it.

19.5.3. General situation regarding dependence on consultants and contractors for technical support for nuclear installations

The availability of contractors with duly qualified and motivated technical personnel and resources is fundamental for the safe and efficient operation of the facilities. The report issued by the CEIDEN Technology Platform referred to in section 19.5.1 concludes that, thanks to the technical support provided continuously to the operating plants, the Spanish industry is able to provide all the technical support required in all areas relating to safety in plant construction and operation.

Generally speaking, there are three contractor company levels as regards dependence on them for support for the organisation.

At the first level would be the technology partners, particularly significant among which are the suppliers of the nuclear island, the turbine-generator set, the emergency diesel generators, main transformers, etc., as well as the associated design engineering. There is a high degree of dependence on these partners, especially on the supplier of the nuclear island, which makes it necessary for there to be long-standing agreements with them, throughout the entire operating lifetime of the plant.

At a second level of contractors are the specialist services and/or equipment supply companies. These are fundamental for inspections, diagnosis, maintenance, quality control, relevant repairs and equipment supply. Although the market makes different options available, the knowledge of the facility that comes with the continuity of the personnel and the unique characteristics associated with working with radiations make it advisable to maintain medium-term links with these contractors.

At the third level of contracting are companies requiring less qualified personnel, such as those involved in cleaning, scaffolding, security, etc., which normally employ a large percentage of people from the local community. There is no technical dependence but, for social reasons relating to support for the surrounding area and to historical contractual clauses, there may be important issues conditioning the decision to change or not change people even though the contractor company is changed.

19.5.4. Regulatory review and control activities

The licensees are obliged to identify and control processes sub-contracted to external organisations and, in such cases, will retain responsibility for these processes. The suppliers of engineering and/or technical support services are selected in accordance with specific criteria and their performance is evaluated.

The process of supervision and control that the CSN applies to the licensees of nuclear facilities contemplates various mechanisms that make it possible to address different aspects of the licensee's processes relating to engineering and technical support. On the one hand the CSN establishes control mechanisms with respect to the organisation of the licensees. This organisation is described in the operating regulations and is required to identify the responsibilities of the Technical Service. Modifications to the Operating Regulation that affect the hierarchical or functional dependences required in the standards for groups having functions or responsibilities assigned in specific areas are subject to CSN approval, with a detailed justification and analysis of the changes (functions, human resources and training) required. Likewise, every year the licensees of the facilities submit a report to the CSN on modifications or actions relating to the optimisation of human resources in the organisation.

The licensees have access to other external support organisations in charge of project development and providing whatever technical support might be required. In general, processes subcontracted to external organisations must be controlled by the licensee's organisation, which must verify the quality of the service in accordance with the standards. The CSN in turn oversees compliance with the aforementioned standards by means of inspections. For the direct supervision of the organisational aspects of the licensees, the CSN has established inspections relating to organisation, training and the supervision of contractors' work during refuelling outages.

Furthermore, the CSN has established mechanisms for the control and supervision of engineering tasks performed by the nuclear facilities in relation to design modifications, maintenance, etc. These mechanisms materialise both through the direct supervision of modifications at the facilities affecting nuclear safety or radiological protection, which are to be subjected to the process of CSN authorisation, and through inspections focussing on component design bases, component surveillance requirements, operating experience, etc.

19.6. Reporting of incidents significant to safety

19.6.1. Arrangements and regulatory requirements regarding the reporting of safety-significant incidents to the regulatory body

CSN Instruction IS-10 establishes the criteria applied by the CSN to require the licensees of nuclear power plants to report any events occurring at these facilities that might impact nuclear safety or radiological protection. Such events are communicated through a reportable events report to the CSN emergency room. In addition, these reports are distributed among the Spanish nuclear power plants, communicated by the CSN to the public by way of press releases and published on the Organisation's website in accordance with the internal procedures of the CSN.

Instruction IS-10 establishes a framework for the communication of significant incidents to the regulatory authority, facilitates the transfer of information on operating experience between plants and allows for communication to the public.

During the period the CSN has undertaken a review of the aforementioned Instruction on the basis of the experience acquired in its application, the aim being to clarify certain reporting criteria and achieve a greater degree of homogeneity in the safety significance of reported events.

19.6.2. Reporting criteria and procedures established in relation to safety-significant incidents and other events such as near misses and accidents

CSN Instruction IS-10 *on criteria for the reporting of events at nuclear power plants* defines the types of events to be reported, the timeframe for the reporting of each type of event, the means to be used, criteria regarding the provision of additional information and revision of the reports issued and formats for reporting.

IS-10:

- Describes 36 types of events that are to be reported, classified in eight reporting categories: A. Records, B. Occupational health and safety, C. Discharges and releases of radioactive materials or substances, D. Technical specifications, E. Operation, F. Safety systems, G. Other situations of risk and H. Off-site events.
- Indicates depending on the safety significance of each type of event, the maximum period (1 or 24 hours) for initial reporting and the format in which the initial Reportable Event Report is to be submitted to the CSN, this including the number of the reportable event, the date and time of occurrence or detection, thermal power prior to and after the event, applicable reporting criteria, a brief description of the event, the situation at the moment of notification, releases of radioactive material, if appropriate, and the measures adopted and planned.
- Requires a more detailed report to be submitted to the CSN within 30 days, this to include: the background and associated operating experience, the initial conditions, a chronological description, a detailed description of the event and whatever anomalies have occurred, the direct causes, immediate corrective actions, deferred corrective actions and the licensee's conclusions.

In order to respond to IS-10, the Spanish nuclear power plants have administrative procedures describing both the reporting process and the methodologies to be used to analyse the different events that have occurred, the aim being to include in the 30-day report mentioned in the previous paragraph all the necessary information in the manner and within the timeframe required.

As regards the Spanish nuclear power plant reporting criteria, these contemplate the full scope of IS-10, include interpretations and guidelines relating to use of the different reporting criteria issued by the CSN by means of letters or instructions and define responsibilities in the process of identification, notification and drawing up of reports for the regulatory authority, as well as their distribution. These procedures also include quantitative values or limits which, if exceeded, imply the obligation to report in the case of criteria for which IS-10 does not provide any explicit limits or when this instruction indicates that such limits are to be quantified by the licensee.

The procedures for cause analysis incorporate different methodologies validated for use by expert personnel with a view to identifying root causes, causal factors and factors contributing to the different events reported, allowing for the establishment of remedial, corrective or improvement actions making good the corresponding causes and avoiding repetition of the event. These procedures also contemplate the need to widen the scope of the conditions and causes, in order to check whether the vulnerabilities underlined by the event and its causes might be actively present or latent in other processes, equipment, systems or group of the facility.

Consistency between the administrative procedures of the Spanish nuclear power plants and the requirements of IS-10 is supervised independently by the CSN within the scope of the inspections of the plants' operating experience programmes, among others.

19.6.3. Statistics of safety-significant incidents reported in the last 3 years

During the period 2013-2015, all the events reported to the Nuclear Safety Council by the Spanish nuclear power plants have been classified as level 0 on the IAEA's International Nuclear Event Scale (INES), except in the cases set out below:

ALMARAZ 1 AND 2 (CÁCERES) INES 1
February 18th 2015

On February 18th, certain of the surveillance rounds that should be performed every hour, as established in the procedures, were not performed in areas entailing a high risk of fire. The investigation performed determined that certain of the people in charge of carrying out the hourly rounds were signing them off without their having been performed. The investigation determined that the rounds were performed at least every two hours. The omission of the surveillance rounds did not affect the performance of the plant.

VANDELLÓS II (TARRAGONA) INES 1
November 28th 2014

Following an electrical transient due to a heavy storm in the area, several items of equipment malfunctioned, among them two refuelling water storage tank level transmitters intervening in the signal actuation logic for semi-automatic transfer to the containment sumps. When the impossibility of recovering the operability of the two affected transmitters within the established timeframe was confirmed (the total number of channels is 4 and the minimum number required to be operable is 3), the group shutdown sequence required by the Technical Specifications was initiated.

19.6.4. Documentation and publication of reported events and incidents by both the licensees and the regulatory body

The reports on Reportable Events issued by the Spanish nuclear power plants in accordance with CSN Instruction IS-10 are sent to the CSN Emergency Room. From here they are widely distributed within the CSN and communicated outside in accordance with the procedures described in the national report for the fifth review meeting of the Convention on Nuclear Safety.

Events reported by other nuclear facilities are subject to a process similar to that described in the previous paragraph.

19.6.5. Policy relating to use of the INES scale

The CSN has developed a procedure for the classification of events using the INES scale, applicable to the classification of events occurring in Spain at nuclear power plants and fuel cycle facilities or activities and having any of the characteristics indicated in the INES scale User manual.

If the classification of an event relating to a nuclear facility is estimated to be higher than 0, the CSN contacts the licensee of the facility to discuss the basis of the classification and contrast data.

If the classification is level 1, it is approved by the Technical Directorate for Nuclear Safety of the CSN, the report is submitted to the Technical Office of the President for communication to the authorities and the public and is sent in parallel to the Secretariat General and the members of the CSN.

If the classification approved by the Technical Directorate is level 2 or higher, the report is submitted to the Secretary General, who calls the Council members to a meeting to discuss this classification. Once debated, the event is communicated to the public via the Technical Office of the President.

Additionally, the National INES Scale Coordinator prepares a notification form for the IAEA's INES Scale Secretary on any event classified by the CSN above level 1.

19.6.6. Regulatory review and control activities

As regards the reports on Reportable Events to be issued by the licensees in less than 1 and 24 hours, in accordance with IS-10, the CSN resident inspectors review these reports, checking that the information they contain is accurate and understandable, using both the information provided by the licensee and their own independent observations. In this respect, after receiving news of the occurrence of a reportable event, the resident inspectors gather information on the situation of the plant and the performance of the intervening equipment, components and personnel, drawing up a preliminary assessment report that is distributed to a long list of CSN addressees.

Subsequently, the Reportable Events Reports received at the CSN are analysed by the Incidents Review Panel, made up of representatives of different areas specialising in nuclear safety and radiological protection. During this panel's monthly meetings the information provided is reviewed, the corrective actions proposed are analysed and the need to perform or request additional actions to prevent repetition of the event is debated. Finally, the event is classified depending on its safety significance as significant, of interest or irrelevant.

Events classified as significant are included in the annual report to Congress and are especially monitored both by the specialist areas and during the two-yearly operating experience inspections within the framework of the basic CSN inspection plan, with special attention paid to the effectiveness of the corrective actions.

Additionally, an event may be classified as generic if it may potentially affect other plants, this possibly implying the sending of letters to the licensees for them to analyse the applicability of the event at their respective facilities and submit this analysis to the CSN within a given period. The quality and scope of these analyses, and the suitability of the actions proposed, are evaluated by members of the CSN personnel specialising in the corresponding area.

19.7. Operational experience feedback

19.7.1. Arrangements and regulatory requirements on the licensees to collect and analyse and share operating experience

The CSN has developed a methodology in the area of operating experience based on two elements: verification of the systematic approach developed by the licensees for the analysis of events and the analysis and tracking of incidents occurring at both Spanish and overseas plants.

CSN Instruction IS-26 establishes basic requirements relating to both in-house and industry operating experience. For its part, the operating permit establishes a generic condition applicable to the plants in relation to the handling of operating experience, this being enacted by way of a complementary technical instruction issued by the CSN to each facility.

As regards the tracking and analysis of events, the CSN has several fundamental tools: the periodic meetings of the national Incident Review Panel and the international Incident Review Panel, based on the use of international databases, and participation in operating experience exchange forums. In analysing international incidents, the CSN identifies those it considers to be of interest, in relation to which recommendations or requirements may be issued for the licensees of the Spanish nuclear power plants. On the basis of all the above, a framework has been established that makes it possible to identify national or international generic events that might affect the Spanish plants and perform or request the performance of measures preventing their repetition.

19.7.2. Licensee programmes for the feedback of information on operating experience from their own nuclear installation, from other domestic installations and from installations abroad

As has already been pointed out, the CSN has issued to each nuclear power plant a technical instruction complementary to the operating permit in which, among other aspects, the industry operating experience to be analysed is specified.

The industry operating experience is to be analysed in the following cases:

- Reportable events occurring at other Spanish nuclear power plants.
- Experiences reported by the competent authorities, i.e.:
  a) For nuclear power plants of US design, the event reports issued by INPO (Institute for Nuclear Power Operations) or the equivalent documents issued by WANO (World Association of Nuclear Operators).
  b) For nuclear power plants of German design, the operating experience reports (*Weiterleitungsnachricht*) issued by the Nuclear Safety Society.
- Written recommendations from suppliers, for example SAL, SR, RICS-IL, Technical Bulletins, etc., and reports on deficiencies affecting safety-related equipment; all notifications relating to the US NRC's 10 CFR 21, for plants of American design, and those relating to the experience of KWU for plants of German design.
- Operating experience analyses expressly required by the CSN.

The industry operating experience programmes of the Spanish nuclear power plants cover these requirements but are not limited to them. The licensees analyse any other document that they consider to be of special interest as regards improving the management of the different processes of each plant.

The industry operating experience analyses begin with an applicability study, with corrective or improvement actions being proposed subsequently in the light of the results.

In addition to the above, the licensees have established mechanisms for the transmission of industry operating experience for information purposes within their organisations.

As set out in the operating permit, every year the licensees are required to submit a report to the CSN covering the evolution of the in-house and industry operating experience analyses carried out at the Spanish nuclear power plants. This report, whose contents are previously mapped out, is used by the CSN to track the operating experience programmes of the facilities.

It should also be pointed out that the Spanish nuclear power plants report their most significant events to the World Association of Nuclear Operators (WANO), indicating their causes and the most important actions taken to resolve the issues, in order for this operating experience to be shared with the nuclear sector across the world. The events that are considered by WANO to provide the most significant lessons learned are included in specific reports (known as SER's or SOER's), which are transmitted to all the plants. In the case of the SOER's, their applicability is assessed by each facility.

19.7.3. National and international events analysis procedures

For many years now the Spanish nuclear power plants have had in place processes for screening, applicability analysis and the definition of actions for improvement deriving from events at other plants, both in Spain and abroad, with the objective of integrating lessons learned into the in-house practices of each plant. These processes have been evaluated repeatedly by reference organisations such as the World Association of Nuclear Operators (WANO), the US Institute of Nuclear Power Operations (INPO) and the International Atomic Energy Agency (IAEA), the conclusion in all cases being that these met the requirements and standards of the sector.

As regards in-house events, the plants have a range of different methodologies to be used depending on the significance of the event and the nature of the factors that may have caused it (depending on whether it relates fundamentally to organisational issues, human behaviour or the failure of equipment or components). Consequently, there are root cause, apparent cause and common cause methods, most of which are standard methods in the (HPES, MORT, etc.) or have been agreed to among the Spanish nuclear power plants (as is the case of the common cause analyses carried out in accordance with a systematic approach agreed to at the level of the UNESA Operating Experience Group).

As regards off-site events, each plant has a systematic approach to assess their applicability to their in-house programmes, processes or facility. Off-site events of greater safety significance are included in SOER (WANO) or IER Level 1 (INPO) type documents, and the Spanish nuclear power plants have a common systematic approach also agreed to through the UNESA Operating Experience Group.

As a general rule, the conclusions of the analyses of the most significant national and international events, as well as the actions deriving therefrom, are reviewed by high level forums within the organisations, such as the corrective actions review committees or equivalent groups.

19.7.4 Procedures for the drawing of conclusions and the implementation of any necessary modifications regarding the installation and personnel training programmes and simulators

All the plants have procedures or guidelines setting out the methodology to be adhered to when analysing operating experience. These procedures establish whether an incident requires the performance of a root cause analysis or whether it is sufficient to investigate the direct or apparent cause. The methodology most widely used at the Spanish plants to carry out root cause analysis is the Human Performance Enhancement System (HPES). In addition to studying each incident individually, trend analyses are performed to detect latent weaknesses and areas for improvement in the organisations.

A fundamental tool for the treatment of operating experience is the Corrective Actions Programme (PAC). Once a corrective action arising as a result of the analysis of an incident enters the Corrective Actions Programme, it is categorised and its priority and timeframe and the person responsible for its performance are established. The actions may be of various types: design modifications, changes to procedures, training actions, etc.

CSN Instructions IS-11, on nuclear power plant operating licences, and IS-12, defining the training and qualification requirements for in-house and external non-licensed personnel at nuclear power plants, require the training programmes to include the operating experience of incidents occurring at the plant and of those occurring at other facilities that are relevant and applicable to the plant. Likewise, the training on operating experience shall aim to clarify the root causes of incidents and the corrective actions required to prevent their repetition.

The training departments of each nuclear power plant take into account the training actions incorporated in the Corrective Actions Programme when preparing the annual training programme. The Corrective Actions Programme is an important source of information for the design of classroom sessions and simulator training. Occasionally, advantage is taken of the internal communications sessions of each department to transmit the lessons learned from the study of operating experience.

19.7.5. Mechanisms to share important experience with other operating organizations

The Spanish nuclear power plants have established mechanisms for the exchange of operating experience at both national and international level.

The CSN (as indicated in section 19.7.8) and UNESA, in representation of the Spanish plants, participate in the Working Group on Operating Experience (WGOE) of the Nuclear Energy Agency (OCDE/NEA), the objective of which is to improve nuclear safety. This is achieved by sharing operating experience and knowledge, analysing and providing the perspective of a group of experts in order to draw conclusions regarding trends and lessons learned and, in this way, be able to implement short and medium-term corrective actions. In the long term, the WGOE issues proposals regarding safety assessments, identifies areas requiring additional investigation, determines or proposes new inspection practices for regulators and shares improvements in the management of plant operation.

A permanent working group on operating experience is available to the plants through UNESA. This group is made up of the operating experience coordinators from the Spanish plants. The fundamental objective of the group is to share experiences on both events occurring at the different sites and from the in-house process of operating experience management. The group meetings are held at least quarterly. An important part of these meetings is the sharing of information on events reportable to the CSN that have occurred or have been analysed during the previous three months. A series of initiatives have been carried out by this group, the following being particularly significant:

- During the period 2013-15, the systematic approach of the Sector Incident Analysis Group (SIAG) has continued, through which a Spanish nuclear power plant may activate a group of experts from the other Spanish plants for them to analyse the root cause of any incident occurring at the requesting plant. The operation of this group is described in the UNESA guideline CEN-29 "Sector Incident Analysis Group operations guideline". During the aforementioned period, each plant has received on average 3 SIAG support missions and has in turn provided specialist technicians for an average of 6 missions to other Spanish plants.

- The plants have continued the systematic approach defined in UNESA guideline CEN-31 "Establishment of criteria for the exchange of operating experience between the Spanish nuclear power plants", revision 0, of November 2009. The guideline recognises that the main objective of the transmission and exchange of operating experience between nuclear power plants is to improve plant operation and prevent the repetition of operating incidents and problems, with a view to achieving excellence in operation. The plants make a series of commitments regarding the minimum information to be exchanged and the mechanisms to be used for this exchange, the aim being to improve and facilitate understanding of events and improve the analysis of their applicability.

- Work has continued within the framework of UNESA on the drawing up of Joint Operating Experience Reports (JOER) by the UNESA Operating Experience group, emulating the philosophy of the INPO / WANO IER / SOER documents. One such document is published by the sector each year. To date five JOER reports have been published:

  — 2011: "Tagout management at Spanish Nuclear Power Plants".

  — 2012: "Proposal regarding generally applicable Operating Experience Indicators at Spanish Nuclear Power Plants".

  — 2013: "Good practices in the use, incorporation and dissemination of operating experience at Spanish Nuclear Power Plants".

  — 2014: "Development of common cause analysis methodologies for use at Spanish Nuclear Power Plants".

  — 2015: "Recommendations for the management of high level operating experience documents (SOER/INPO Event Reports Level 1)".

- The following activities are carried out internationally for the exchange of operating experience:
  - The Spanish nuclear power plants regularly submit information on events to WANO (World Association of Nuclear Operators) for publication as Significant Event Reports (SER), Event Notification Reports (ENR), Event Analysis Reports (EAR) or Miscellaneous Event Reports (MER).
  - Participation in international seminars.
  - Sending of experts for WANO missions (Peer Reviews) or IAEA OSART (Operational Safety Review Team) missions.
  - Hosting of WANO missions (Peer Reviews) and OSART missions by the Spanish plants.

These national and international operating experience exchange activities are complementary to the industry operating experience evaluation programmes in place at each plant.

Finally, it should be pointed out that following the review and updating by WANO in 2012 of the criteria for reporting of events to WANO by the sector, these were revised throughout 2013 following the incorporation of feedback received from the sector during workshops and meetings.

19.7.6. Use of international information databases on operating experience

The two international operating experience databases most widely used by the CSN are:

- Incident Reporting System (IRS), dependent on the IAEA and the NEA.
- Nuclear Event Web-Based System (NEWS), dependent on the IAEA.

The CSN has appointed a national IRS coordinator in charge of drawing up reports on Spanish events that might be relevant for other countries from the point of view of nuclear safety.

A preliminary report may be submitted if the event is to be reported as soon as possible, or a main report once the root causes have been determined. Before being submitted formally by the coordinator to the database, these are revised by both the CSN and the IAEA.

These databases may be consulted by the CSN staff. As regards the IRS, there is a list of persons who receive notifications of the events that the different countries submit to the database; those considered to be of interest are dealt with at the meetings of the International Incident Review Panel. As regards the NEWS database, the INES Scale coordinator is responsible for uploading information on events classified as level 1 or higher. This may be consulted by all the CSN personnel and is a tool used to check the scope of the analyses performed by the licensees in relation to industry operating experience events.

In relation to the Spanish nuclear power plants, the national coordinator has provided access to the IRS for the operating experience personnel at each of the plants, who also have access to NEWS. These people access the IRS and NEWS in order to search for external events that might provide lessons learned in relation to operational aspects of their plants, and receive periodic reports on the most significant events that have been uploaded to the IRS by the different countries. Those events that the CSN's International Incident Review Panel considers to be of interest due to their potential applicability to the Spanish plants are evaluated by the latter in order to determine the lessons that might be learned, the regulator then being informed accordingly.

19.7.7. Regulatory review and control activities for licensee programmes and procedures

Every two years the CSN carries out operating experience inspections in order to check the systematic approach adopted by the nuclear power plants for analysis of in-house events, those

occurring at other Spanish plants and those deriving from international operating experience. These inspections include analysis of the licensee's organisational structure in relation to operating experience, evaluation of his resources, analysis of the quality of the procedures and checking of the scope and quality of the analysis of events. These checks include revision of the corrective actions proposed and verification of timely compliance.

Furthermore, the licensees of nuclear facilities submit an annual operating experience report, the minimum contents of which are described in the complementary technical instructions issued to each facility by the CSN. These instructions require that the reports include a summary of the analyses of in-house events, those occurring at other Spanish plants and those deriving from international operating experience considered to be applicable to the facility. These reports are distributed among the Operating Experience personnel, who perform a preliminary evaluation of their scope and quality. This evaluation is subsequently performed in greater depth during the two-yearly operating experience inspections.

19.7.8. Programmes of the regulatory body for feedback of operational experience and the use of existing mechanism to share important experience with international organizations and with other regulatory bodies

The CSN relies on a number of tools for the analysis and diffusion of information relating to operating experience: the actions deriving from the monthly meetings of the Incident Review Panel, those arising as a result of the quarterly meetings of the International Incident Review Panel, muse of the Generic Issues database (TEMGE), use of international databases and participation in international working groups.

As has been indicated in previous sections, Incident Review Panel (PRI) is a working group made up of specialists in nuclear safety and radiological protection who meet approximately once a month to analyse the information received on relevant events that have taken place at the Spanish nuclear and fuel cycle facilities. Following checking of the quality of the information received, analysis of the completeness of the corrective actions proposed and debate on the need to request the performance of additional actions, the event is classified depending on its safety significance in one of three categories: significant event, event of interest or irrelevant event. In addition, the event may be classified as generic if it might affect other Spanish plants for any of the following reasons:

- Because its direct or root causes might be reproduced.
- Because the affected systems or components are analogous.
- Because common supplier problems are represented.
- Because the lessons learned from the event might contribute to significantly improving safety at other plants.

When an event is classified as generic, the PRI may propose that a letter be sent to the affected licensee or licensees requesting information or requiring that actions be taken. This proposal is analysed and, where appropriate, implemented by the Technical Directorate for Nuclear Safety.

Events classified as generic are incorporated by the personnel of the Operating Experience area in the TEMGE database for their tracking. Also incorporated in the database are all those events that the specialists consider might have generic implications; in these cases, the actions to be performed are proposed by the specialist area, while diffusion and tracking are carried out from the Operating Experience area.

At international level, the CSN has recourse to International Incident Review Panel (PRIN), which meets quarterly and comprises the same areas as the PRI. This panel analyses events arising from various international sources of operating experience, with a view to determining their applicability to the Spanish nuclear power plants and proposing specific actions, which might range

from requesting that analysis of the event be included in the next annual operating experience report of the affected plant to the issuing of specific technical instructions to respond within a given timeframe.

Likewise, the CSN incorporates the most safety significant events occurring at the Spanish nuclear power plants in the IRS (Incident Reporting System) database.

As regards the IRS, every year meetings are held between the coordinators of the different countries in order to share more detailed information on relevant events occurring during the previous year and propose technical studies on generic issues deriving from them. In the case of the NEWS database, the INES coordinators meet every two years to explain the most relevant events and unify classification criteria. Another forum for the exchange of operating experience in which the CSN participates is the annual meeting organised jointly by the IAEA and the NEA on events reported to the IRS.

The CSN also participates in the NEA's Working Group on Operating Experience (WGOE). The objectives of this working group include the identification of safety issues of relevance from the regulatory point of view, learning lessons from operating experience and sharing information on nuclear power plant operational improvements. With a view to achieving these objectives, the working group meets every six months to exchange and analyse information on relevant incidents at the facilities of the participating countries, among other things. In addition to these meetings, the WGOE organises workshops every two or three years on specific issue of special interest to the member country regulators.

Finally, it should be pointed out that the CSN is part of the Clearinghouse, an operating experience analysis group that provides support to the regulatory authorities of the European Union.

19.8. Management of spent fuel and radioactive waste on the site.

19.8.1. Arrangements and regulatory requirements for the on-site handling of spent fuel and radioactive waste

In accordance with article 20 of the Regulation on Nuclear and Radioactive Facilities, all the Spanish nuclear installations are required to have a radioactive waste and spent fuel management plan (PGR).

On May 14th 2008, the CSN established Safety Guide El 9.3 on criteria and technical bases for the drawing up of the WMP by the licensees of nuclear facilities, and in 2009 required all the nuclear power plants to adapt their radioactive waste and spent fuel management plans to the contents of the said Safety Guide 9.3 through a series of Technical Instructions.

The objective of the PGR is to set out criteria and instructions ensuring the safety and optimisation of the management of the radioactive wastes and spent fuel generated by these facilities, with consideration given to the evolution of the standards and technology and taking into account the following:

- The situation existing at each facility as regards waste production, management and, where appropriate, disposal.
- Identification of the origin of wastes and the history of spent fuel.
- Study of management system and process alternatives and improvements.
- Justification of the suitability of current management practices or the need to implement improvements.
- Planning of studies for the implementation of improvements identified.

The PGR is the reference document for the management of the radioactive wastes generated at the nuclear facilities, both in operation and during the dismantling and decommissioning

phase, and must contain the information required for analysis of the existing management. It is applicable to the management of radioactive wastes, regardless of their level of radioactivity, and of waste materials with radioactive contents and open to declassification, to the so-called special wastes and to spent fuel. Furthermore, it is part of the objective of improving the management of the wastes and spent fuel generated at each facility.

In particular, the licensee of the facility must keep the waste inventory updated, minimise waste production, recycle and add value to the wastes produced to the extent that this is technically and economically possible and condition the final waste materials for disposal. The radioactive waste management plan shall serve also to guarantee that no radioactive wastes are managed along conventional routes.

From the point of view of the usefulness of the radioactive waste management plan for the licensees of the producing installations, the following contributions have been identified, among others:

- Constitute a tool for reflection and progress in relation to waste management.
- Constitute a tool for internal and, where appropriate, external communication regarding radioactive waste management.
- Constitute a reference document for the competent administration(s), since it commits the licensee to a certain way of managing radioactive waste, in accordance with the general operating standards of his installations.

As regards waste management on site, the CSN issued CSN Instruction IS- 31 on criteria for the radiological control of waste materials generated at nuclear facilities, the objective of which is to establish criteria for such control prior to the waste materials leaving radioactive waste areas for conventional management.

In relation to spent fuel, there are two CSN Instructions relating to spent fuel and high level wastes. The first is IS-29 on safety criteria at spent fuel and high level waste storage facilities. This instruction regulates the basic safety requirements to be met in design, manufacturing, construction, testing and operation. The second Instruction is IS-20, which establishes the safety requirements applicable to the design of spent fuel casks and defines the contents of the Safety Study and interfaces between the intervening parties. Both instructions include the international standards of the IAEA, those of the countries exporting the technology and the WENRA reference levels for storage.

Finally, it should be pointed out that in February 2014 the MINETUR published the Royal Decree on the responsible and safe management of spent nuclear fuel and radioactive wastes, in order to incorporate the legislative, regulatory and organisational framework contemplated in Council Directive 2011/70/Euratom, of July 19th 2011, establishing a community framework for the responsible and safe management of spent nuclear fuel and radioactive wastes.

19.8.2. On-site storage of spent fuel

The spent fuel from the Spanish light water plants is stored initially on the site in the pools of each of the reactors, the capacity of which has been increased in recent decades through replacement of the original storage racks with others containing borated compounds (re-racking).

In view of the saturation of the pool storage capacity, at certain plants it has been necessary to build individualised temporary storage (ATI) facilities for the dry storage of the fuel in casks. This is the case at the Trillo plant, which has had an installation of this type since 2003, and at Ascó, on whose site an ATI facility has been constructed and licensed, initiating operation in May of 2013. In addition, Santa María de Garoña nuclear power plant also plans to have an ATI facility on site, its construction being approved in October 2015. Finally, in 2015 the Almaraz plant submitted a request for authorisation of the construction and assembly of an ATI facility on its site to the Minetur.

The casks in use at the Trillo ATI facility and the cask approved in November 2014 for use at the Santa Maria de Garoña plant are dual purpose metallic casks for the storage and transport of spent fuel, while the casks at the Jose Cabrera and Ascó plants are multi-purpose metallic capsule systems housed in concrete modules, systems that are completed with a separate transport cask.

In accordance with the legislation in force, the licensing process for these individualised temporary storage facilities has consisted firstly of approving the design of the storage system and transport cask as a package B (U), and of authorising the construction, performance and start-up of the storage facility on the plant site. In all cases, ATI licensing has been accompanied by the corresponding environmental impact assessment (EIA), in accordance with the environmental regulations transposing the respective European Directives.

Information on the off-site management of spent fuel is contained in the fifth national report of the Joint Convention, available on the IAEA and Spanish Ministry of Industry, Energy and Tourism websites.

19.8.3. Implementation of on-site treatment, conditioning and storage of radioactive wastes

The low and intermediate level wastes produced at the nuclear power plants are of the following types:

- Process wastes: these are materials and chemical reagents intervening in any of the plant production processes. This group includes, for example, evaporator concentrates, ion exchange resins and filter sludges.
- Technological wastes: these are made up fundamentally of laboratory material, materials used in the maintenance of equipment, gloves and clothing.

Depending on the conditioning performed, the packages generated will be solidified wastes (resins, concentrates, sludges), compactable and non-compactable solid wastes and immobilised wastes (filters).

All the low and intermediate level radioactive waste packages conditioned at the nuclear power plants are subject to a process of preliminary acceptance by Enresa, in order to guarantee compliance with the acceptance criteria of the El Cabril definitive disposal facility.

At the end of 2014, there were a total 5,944 m^3 of conditioned radioactive wastes at the temporary storage facilities of the nuclear power plants, the degree of occupation of these facilities at the operating NPP's varying considerably from one site to another.

19.8.4. Activities to minimise the volume and activity of wastes generated to the minimum practicable for the process concerned

Since the mid 1990's there has been a Volume Reduction Action Plan between UNESA and ENRESA aimed at reducing the generation of low and intermediate level wastes.

The first of the Action Plans was signed in 1994. Since then successive volume reduction projects have been implemented and efforts have continued on the development and performance of new proposals aimed at optimising radioactive waste management and reducing the quantities generated. The UNESA-ENRESA framework agreement was updated in 2007 (in order to adapt it to the acceptance criteria of the El Cabril Disposal Facility) and in 2009 (inclusion of very low level radioactive wastes).

Following the publication of Royal Decree 102/2014, ENRESA has drawn up a new proposal for the revision of the so-called volume reduction action plan, including regulatory changes. Since 2014 ENRESA has not initiated any file for the granting of on-going projects, although the evaluation process has continued in accordance with the Agreement in force.

19.8.5. Procedures established for the clearance of radioactive waste

In the Spanish regulations, the authorisation for declassification is typified as an administrative action that allows certain waste materials with radioactive contents generated at nuclear facilities to be managed along conventional routes, without the need for subsequent regulatory controls relating to nuclear safety and radiological protection.

The CSN has determined the criteria and technical bases for the declassification of the following waste streams through the approval of action procedures common to all the nuclear power plants:

- Metallic scrap (approved in 2001).
- Active carbon (approved in 2002).
- Spent ion exchange resins (approved in 2002).
- Used oils (approved in 2003 and updated in 2009).
- Woods (approved in 2006).

The waste declassification permits establish the limits and conditions to be met by the licensees of the facilities to carry out these processes. Specifically, the limits and conditions of the authorisations for declassification determine the following aspects: the scope of the authorisation, the applicable declassification levels and verification of their compliance, the destiny of declassified waste materials, records and traceability of the process and the periodic information to be submitted by the licensees to the CSN.

The "Draft Ministerial Order regulating the declassification of waste materials generated at nuclear facilities", linked to CSN Instruction IS-31 on criteria for the radiological control of waste materials generated at nuclear facilities, is currently being dealt with by the MINETUR. The latest draft of the Project takes into account Council Directive 2013/59 Euratom, of December 5th 2013, which establishes the basic safety standards for protection against the hazards arising from exposure to ionising radiations, and considers the declassification of waste materials and the radiological criteria that should govern the authorisation process in order for the materials to be managed along conventional disposal, recycling or reuse routes.

19.8.6. Regulatory review and control activities

The operating nuclear power plants have their Radioactive Waste and Spent Fuel Management Plans authorised, their contents being in accordance with CSN Safety Guide No 9.3, Contents and criteria for the drawing up of nuclear facility radioactive waste management plans.

As regards regulatory control activities for the management of low and intermediate level radioactive waste at nuclear power plants in the operation and dismantling phases, the inspection activities included in the Integrated Plant Supervision System (SISC) are performed, in accordance with the Basic Inspection Plan, which in this respect includes two specific procedures dedicated to the declassification of waste materials with radioactive contents and to the management of low and intermediate level wastes.

This process is examined and inspected by the CSN and is based on the establishment of barriers for radiological control both at the exit from waste generation and treatment zones (1st control barrier) and from the nuclear facility (2nd control barrier) and on many occasions also at the entry to conventional waste management installations (3rd control barrier).

This entire set of regulatory review and control activities is aimed at improving radioactive waste and spent fuel management at the Spanish nuclear power plants, ensuring that this management satisfies the international safety standards.

19.9. Vienna Declaration

In relation to the Vienna Declaration, this article clearly identifies related aspects such as the development and maintenance of emergency operating procedures and severe accident management guidelines (article 19.4), revised and reinforced in the case of the Spanish plants as a result of the stress tests and the analysis of situations of loss of major areas, with the incorporation of extensive damage mitigation guidelines and the implementation of design modifications to reinforce the instrumentation required under severe accident conditions or the implementation of SSC's redundant or different from those already in place, in order to address beyond design basis situations, including severe accidents.

In this respect the regulatory framework has been strengthened by the new CSN Instruction IS-36, on emergency operating procedures and severe accident management, which incorporates an important part of the new WENRA reference levels corresponding to issue F (relating to design extension at existing plants) revised in the wake of Fukushima.

Another highly relevant aspect relating to the Vienna Declaration and dealt with in this article is the treatment of operating experience (19.7), processes which are widely implemented at the Spanish nuclear power plants and subject to regulatory control by the CSN, with an important international component, the licensees participating in numerous forums and periodically hosting peer reviews through participation in organisations such as WANO. The objective of the above is to identify potential problems and identify and implement national and international best practices to the extent reasonably possible.

All the above is supported by a high level of engineering firms and technical support services qualification, an aspect that is dealt with in section 19.5. The correct design, assembly, implementation and subsequent maintenance of the design modifications carried out at the plants require the best engineering firms and technical support services to ensure suitable performance at all times.

APPENDIX 19.A

Generic technical decision regarding operating permit renewal

SUBJECT: FAVOURABLE REPORT ON RENEWAL OF THE OPERATING PERMIT FOR _____ NUCLEAR POWER PLANT

On _____, the CSN received from the Ministry of Industry, Energy and Tourism a request for renewal for a period of ten years of the operating permit of _____ NPP (entry registration number _____), referred to in chapter IV of the Regulation on Nuclear and Radioactive Facilities, submitted by the licensee in compliance with provision 2 of the Ministerial Order dated _____ granting the Operating Permit in force to _____ NPP. The request is accompanied by the plant's Periodic Safety Review (PSR), the revisions in force of the Official Operating Documents and the updated revision of the Probabilistic Safety Assessment studies.

The CSN has continuously monitored and supervised the operation of the aforementioned plant throughout the period of validity of the current Permit and compliance with the applicable conditions regarding nuclear safety and radiological protection, and has evaluated the Periodic Safety Review.

During its meeting held on _____ the CSN agreed to issue a Complementary Technical Instruction (ref. _____) requiring the analysis of new standards not previously included in the plant's licensing basis. The CSN considered that the analysis of these standards might lead to a significant improvement in the safety conditions of the facility. The licensee submitted the required analyses, attached to the letters indicated below, along with the resulting improvement plans:

— List of documents provided by the licensee, the contents of which are incorporated into the plant licensing basis due to their being quoted in this letter.

In compliance with these plans, the license has already undertaken improvements to the plant, which are to be completed with those set out in the attached Conditions.

Likewise, in the wake of the Fukushima accident [paragraph incorporated in the report corresponding to the latest renewal], the CSN has issued Complementary Technical Instructions to the licensees of all the Spanish plants requiring them to carry out the stress tests agreed to within the framework of the European Union and to establish measures to address beyond design basis events that might imply the loss of major areas of the plant. Like all the other plants, _____ NPP will have to perform the required analyses and implement the measures necessary to reinforce safety with respect to extreme situations.

The Nuclear Safety Council will review the analyses and proposals of the nuclear power plant licensees and may issue new requirement if it deems them to be necessary.

During its meeting of _____, the Nuclear Safety Council studied the request submitted by the licensee of _____ nuclear power plant, along with the reports drawn up by the Technical Directorate for Nuclear Safety as a result of the evaluations performed, and agreed to issue its favourable decision regarding renewal of the operating permit for a period of ten years, as long as operation is carried out in accordance with the limits and conditions included in this Appendix. This agreement was reached in compliance with section b) of article 2 of Law 15/1980, creating the Nuclear Safety Council, and is submitted to the aforementioned Ministry for appropriate action.

Madrid, _____

THE PRESIDENT

APPENDIX 19.B

Generic limits and conditions associated with operating permit renewal

NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION LIMITS AND CONDITIONS ASSOCIATED WITH THE OPERATING PERMIT FOR _____ NUCLEAR POWER PLANT

1. For the intents and purposes set out in the legislation in force, the companies, acting as jointly liable entities, are considered to be the licensee and responsible operator of .....

2. The present operating permit entitles the licensee to:

   2.1. Possess and store slightly enriched uranium fuel assemblies, in accordance with the technical limits and conditions contained in the Refuelling Safety Study for each cycle and with the limits and conditions associated with the specific authorisations for the storage of fresh and irradiated fuel.

   2.2. Operate the plant to a core thermal power level of MWt.

   2.3. Possess, store and use the radioactive materials, nuclear substances and radiation sources necessary for operation of the facility.

3. The permit is granted on the basis of the following documents:

   a) Safety Study, Rev.

   b) Operating Regulation, Rev.

   c) Technical Specifications, Rev.

   d) Site Emergency Plan, Rev.

   e) Quality Assurance Manual, Rev.

   f) Radiological Protection Manual, Rev.

   g) Radioactive Waste and Spent Fuel Management Plan, Rev.

   The operation of the plant shall be carried out in accordance with the revisions in force of aforementioned documents, adhering to the updating process indicated below.

   3.1. Subsequent modifications or changes to the Technical Specifications and Site Emergency Plan shall be subject to approval by the Directorate General for Energy Policy and Mines, following a report by the Nuclear Safety Council, prior to their entry into force.

   The Nuclear Safety Council may issue temporary exemptions from compliance with any section of the documents mentioned in the previous paragraph, informing the Directorate General for Energy Policy and Mines of the start and end of the exemption period.

   3.2. Six months after start-up following each refuelling outage, the licensee shall revise the Safety Study, incorporating the modifications included in the plant from the beginning of the previous cycle to the end of the said outage that have not required authorisation according to the provisions of CSN Instruction IS-21 and the new safety assessments performed. This new revision shall be submitted to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council during the month following its entry into force.

   Revisions of the Safety Study corresponding to modifications requiring authorisation by the Directorate General for Energy Policy and Mines, in accordance with CSN Instruction IS-21, must be authorised at the same time as the modifications.

   3.3. Modifications to the Operating Regulation may be made under the responsibility of the licensee, as long as they do not imply a reduction of the requirements included in the revision in force as regards the functions and responsibilities assigned to the plant operating organisation in relation to nuclear safety and radiological protection, the personnel initial and on-going training programmes or the reports, books or records contemplated therein, in which case such modifications shall be subject to approval by the Directorate General for Energy Policy and Mines, following a report by the Nuclear Safety Council, prior to their entry into force.

   Revisions of the Operating Regulation shall be submitted to the Directorate General for Energy Policy and Mines and to the Nuclear Safety Council within one month of their entry into force.

3.4. Modifications may be made to the Quality Assurance Manual under the responsibility of the licensee as long as the change does not reduce the commitments contained in the quality assurance programme in force. Changes reducing such commitments must be favourably judged by the Nuclear Safety Council prior to their entry into force.

The commitments in question are understood to be those contained in the Quality Assurance Manual in force in the form of applicable standards and guidelines, as well as the very description of the programme as reflected in the content of the Manual, as specified in the corresponding complementary technical instructions issued by the Nuclear Safety Council.

Revisions of the Quality Assurance Manual shall be submitted to the Directorate General for Energy Policy and Mines and to the Nuclear Safety Council within one month of their entry into force.

3.5. Modifications may be made to the Radiological Protection Manual under the responsibility of the licensee except in those cases in which basic radiological protection standards or criteria are affected, as specified in the corresponding complementary technical instructions issued by the Nuclear Safety Council. In such cases the favourable appreciation of the Nuclear Safety Council shall be required prior to their entry into force.

Revisions of the Radiological Protection Manual shall be submitted to the Directorate General for Energy Policy and Mines and to the Nuclear Safety Council within one month of their entry into force.

3.6. Modifications may be made to the Radioactive Waste and Spent Fuel Management Plan under the responsibility of the licensee except in those cases identified in the complementary technical instructions issued by the Nuclear Safety Council. In such cases the favourable appreciation of the Nuclear Safety Council shall be required prior to their entry into force.

Revisions of the Radioactive Waste and Spent Fuel Management Plan shall be submitted to the Directorate General for Energy Policy and Mines and to the Nuclear Safety Council within one month of their entry into force.

4. During the first quarter of each calendar year the licensee shall submit reports on the following issues to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council, with the scope and contents specified in in the corresponding complementary technical instructions issued by the Nuclear Safety Council.

4.1. In-house and industry operating experience applicable to the facility, describing the actions adopted to improve its performance or prevent similar events.

4.2. Measures taken to adapt the plant to the new national requirements on nuclear safety and radiological protection and to the standards of the country of origin of the project. In this latter case, an analysis of the applicability to the plant of the new requirements issued by the regulatory authority of the country of origin of the project to plants of a similar design shall be included.

4.3. Results of the environmental radiological surveillance programme. The information included shall be that described in the corresponding section of chapter 6, Administrative Standards, of the Technical Specifications.

4.4. Results of the dosimetry controls applied to the operating personnel, including an analysis of the trends of individual and collective doses received by the personnel during the previous year.

4.5. Activities of the Radioactive Waste and Spent Fuel Management Plan, including activities referring to waste materials open to management as conventional wastes, very low level wastes, low and intermediate level wastes and high level wastes, as well as irradiated fuel.

4.6. Activities of the initial and on-going training programme for all members of the plant personnel whose work might impact nuclear safety or radiological protection.

5. Any exit of radioactive waste and fissionable materials packages from the site of the plant shall be reported to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council

with at least seven days prior notice. The exit of other radioactive packages shall be communicated within 24 hours of the transport decision and in all cases prior to such transport. The exit of radioactive packages from the plant site shall be subject to the system of authorisations established by the standards in force.

When the licensee is responsible for the transport of fissionable material to or from the plant and no authorisation is required pursuant to the regulations in force on the transport of hazardous goods, the Directorate General for Energy Policy and Mines and the Nuclear Safety Council shall be informed of the intention to carry out such transport operations three months before the scheduled date.

6. A minimum three years prior to the expiry of the present operating permit, the licensee may request a new permit for a period of no longer than ten years from the Ministry of Industry, Energy and Tourism. Such requests shall be accompanied by: (a) the latest revisions of the documents referred to in condition 3; (b) a Periodic Safety Review of the plant, the contents of which shall comply with the provisions of CSN Safety Guide 1.10 del CSN "Nuclear power plant periodic safety reviews", revision 1, (c) a revision of the probabilistic safety assessment; (d) an analysis of the ageing experienced by the plant's safety components, systems and structures, and (e) an analysis of the operating experience gleaned over the period of validity of the authorisation to be renewed.

   If such a request is submitted, the licensee shall provide the Nuclear Safety Council with an update of the aforementioned documents at least one year before the expiry of the current operating permit.

7. If during the period of validity of this authorisation the licensee decides to shut the plant down, he shall inform the Directorate General for Energy Policy and Mines and the Nuclear Safety Council at least one year prior to the foreseen date, unless such shutdown is due to unforeseen causes or to a resolution by the Ministry of Industry, Energy and Tourism. The licensee shall justify the nuclear safety and radiological protection conditions to be met in the operations to be performed at the facility from shutdown until granting of the dismantling permit, as specified in the corresponding Complementary Technical Instructions issued by the Nuclear Safety Council.

8. During the period of validity of this Authorisation, the licensee shall put into effect the plant Safety Improvement Programmes identified in the Periodic Safety Review performed in support of the application for the present Authorisation, modified as appropriate by way of the corresponding Complementary Technical Instructions issued by the Nuclear Safety Council.

   Likewise, the licensee shall carry out the proposed actions set out in the documentation submitted in support of the application for renewal of the Operating Permit and relating to the Periodic Safety Review and Conditioned Application Standards, within the established timeframe, as well as the actions communicated to the licensee as conclusions of the corresponding evaluation performed by the CSN.

III. Conclusions

As may be gathered from the information provided in each of the articles of this seventh report, Spain complies satisfactorily with the obligations of this Convention on Nuclear Safety.

This chapter on conclusions underlines firstly the main standards developments and commitments adhered to and completed by Spain during the period from January 2013 to December 2015, along with the most important challenges for the future in the nuclear regulatory field, the aim being to underline the most significant aspects of the period, provide an overall view of our efforts in relation to safety and address the objective of self-assessment implicit in the present report. This is followed by a section in which the licensees of the Spanish nuclear power plants underline the most relevant aspects of the period covered by the national report.

In responding to the obligations deriving from the Diplomatic Conference held in 2015, the present report includes information on the way in which Spain applies the safety principles included in the Vienna Declaration on Nuclear Safety. This information may be found in the contents of several of the articles of the report, identified under the heading "Vienna Declaration"; additionally, a summary of Spain's responses to the principles of this Declaration is included in Appendix I.

The number of Spanish nuclear facilities has not varied since the Sixth National Report for the Convention on Nuclear Safety.

Development of the regulatory framework

During the period covered by this report, the following standards impacting nuclear safety have been approved and published:

Electricity Sector Act, Law 24/2013, of December 26th.

This is the main legal instrument regulating the electricity industry overall, including electricity generation of nuclear origin.

Law 17/2015, of July 9th, on the National Civil Defence System.

This law proposes the strengthening of mechanisms promoting and improving the protection of the members of the public against emergencies and catastrophes, in compliance with the principle of international solidarity.

Royal Decree 102/2014, of February 21st, for the responsible and safe management of spent nuclear fuel and radioactive wastes.

Royal Decree 1086/2015, of December 4th, modifying Royal Decree 1308/2011, of September 26th, on the physical protection of nuclear facilities and materials and radioactive sources.

In addition, the CSN instructions referring to nuclear safety and listed in Section 7.2.2 of the present report were published. Particularly significant were those published during the period as a result of the harmonisation commitments made within the framework of the Western European Nuclear Regulators Association (WENRA):

- CSN Instruction IS-36, of January 21st 2015, on nuclear power plant emergency operating procedures and severe accident management guidelines.
- CSN Instruction IS-37, of January 21st 2015, on nuclear power plant design basis accident analysis.

Compliance with the challenges identified during the sixth review meeting of the Convention on Nuclear Safety

During the sixth meeting of the Convention on Nuclear Safety, Spain took on board the need to inform in this seventh report on the activities performed by the regulatory authority in relation to the following, this being a challenge identified by others of the contracting parties:

Maintenance and improvement of the high technical and professional level of know-how within the regulatory authority

The CSN is currently developing a know-how management model adapted specifically to its needs and based on IAEA recommendations that will be fully incorporated into its Management System and use the characteristic know-how management elements already available to it.

The CSN know-how management process will address the basic aspects of the IAEA model. It is structured as a transversal process comprising the following stages:

- Identification of the capacities required by the CSN for the performance of its mission.
- Periodic evaluation of the resources available at the CSN.
- On-going assessment of CSN information shortcomings, gaps and losses, documentation and knowledge.
- Programme for the preservation of critical knowledge and on-going improvement of capacities.
- Internal communication plan to ensure the dissemination and accessibility of knowledge and information.
- Programme for the independent assessment and periodic review of the process.

The CSN is currently immersed in the development of the know-how preservation programme.

Establishment of a working plan for incorporation into the Spanish legislation of the new WENRA reference levels established in the wake of the Fukushima Daiichi accident

The process of alignment with the reference levels revised after Fukushima is being carried out in accordance with the programme and schedule established by the reactor harmonisation working group. In keeping with this programme, the process of self-assessment came to an end in October 2015, giving way to the drawing up of the associated action plan. The incorporation of the WENRA reference levels revised following Fukushima has a minor impact on the Spanish regulatory framework and the Spanish plants, since many of the new WENRA requirements had already been incorporated by the CSN in the Complementary Technical Instructions (of an obligatory nature) issued to all the nuclear power plants (and other nuclear facilities) as a result of the Fukushima accident. Furthermore, the two new CSN instructions issued during the period of this report (published in February 2015) also incorporated many of the revised reference levels. The results of the self-assessment and action plan of all the member countries are being subjected to a peer review process throughout 2016.

As of December 31st 2015, 96.4% of the 330 WENRA reference levels in force (including those revised subsequent to Fukushima) were incorporated in the Spanish regulations. The remaining 12 reference levels are in the process of alignment.

Revision of the seismic characterisation of the sites of the Spanish nuclear power plants in accordance with the most advanced international standards

In 2015 the CSN issued a Complementary Technical Instruction to all the nuclear power plant licensees requiring the performance of a reassessment of the seismic risk of each site, for which

geological and palaeoseismic data will be analysed for the characterisation of possible existing active or seismogenic faults. The process has already been initiated and is being carried out jointly for all the sites, in compliance with the most updated analytical criteria at international level (SSHAC methodology, level 3) and with widespread participation at national and international level.

Completion of the revision and development of procedures and instructions included in the CSN emergency response organisation

The CSN has an Emergency Action Plan (PAE), including the Emergency Response Organisation, which brings together the functions, resources and basic action procedures of its management and technical staff, their interactions and general guidelines for their initial and on-going training.

The CSN has completed its Emergency Procedures Manual with the issuing of new procedures. Likewise, the emergency radiological Measurement, Assessment and Control Plan has been drawn up.

The PAE is being revised as part of the standards review process that is being carried out in Spain (within the framework of the process of transposing community directives to the national legal system), and in relation to the management of emergencies, as was pointed out in the sixth report on the Convention. A series of aspects for improvement have already been identified and work on them is currently on-going, especially as regards reinforcement of the organisation to respond suitably to the requirements for information in the event of an emergency from international organisations and neighbouring countries.

Updating of the treatment of transversal elements (human and organisational factors and the safety culture) in the Integrated Plant Supervision System (SISC)

In 2014, the CSN completed the development of a systematic approach for incorporation into the SISC of those organisational and cultural aspects (supervision of transversal components) that might have an impact on nuclear safety, through the assignment of transversal components to inspection findings.

In July 2014, a pilot application for the supervision of transversal components was initiated. The official application of the supervision of SISC transversal components began in April 2016, on completion of the assessment of the pilot application and following the incorporation of the resulting changes in the supervision system. During this period the methodology has been validated and the inspectors have become familiar with it through its use. Furthermore, the results of the supervision of these transversal components have been analysed as part of the quarterly assessment of the SISC and transmitted to the plant licensees.

The CSN has, therefore, complied with the commitment identified in this area during the sixth review meeting of the Convention on Nuclear Safety.

Future challenges for the Spanish regulatory authority

Since it was set up in 1980, the CSN has performed its functions in accordance with the provisions of the law by which it was created in order to protect the workers, the public and the environment against the harmful effects of ionising radiations, managing to ensure that the nuclear and radioactive facilities are operated by the licensees safely and establishing measures for the prevention and correction of radiological emergencies, regardless of their origin.

It has also given priority to its international presence in all relevant forums in the field of nuclear safety and radiological protection, actively collaborating in aspects relating to technical cooperation and assistance to other regulatory bodies.

Looking toward the future, the aim is to consolidate and reinforce what has been achieved thus far and to prepare for new challenges.

In this respect, the CSN has set out as a fundamental challenge the maintenance of technical and professional know-how and the acquisition of the new skills required by new technology developments.

Specifically, the following issues will need to be addressed in the near future:

- **IRRS Mission**

  For the coming two years the CSN will be involved in the preparation for and performance of the IRRS mission, which will take place in 2018, in compliance with article 8 (section 1, "peer reviews") of Directive 2014/87. The process of self-assessment and drawing up of the corresponding action plan will be carried out throughout 2017. Given the importance of this second IRRS mission it is considered to constitute a challenge, in view of both the efforts required for its performance and the fact that it has to be combined with routine licensing, supervision and control activities.

- **Licensing issues linked to long-term operation**

  During the forthcoming operating permit renewal period, all the Spanish nuclear power plants will exceed the 40 years foreseen in their original design. The regulations issued by the Council via Instructions and safety guides contemplate a transition to long-term operation, and in addition the CSN already has experience of licensing in this area (renewal of the OP for SM Garoña NPP in 2009). Nevertheless, this is considered to pose a challenge for the CSN due to the coincidence in time of the licensing processes associated with the renewal applications and the dedication required for their performance.

- **Completion of WENRA Reference Level implementation**

  Spain participates actively in WENRA through the reactor harmonisation working groups (RHWG) and the working groups on waste and decommissioning (WGWD). As has already been pointed out above, the process of alignment with the reference levels revised in the wake of Fukushima is being carried out in accordance with the programme and schedule established by the RHWG. Adhering to this schedule and performing the activities deriving from participation in WENRA poses a challenge for the CSN due to the Council's strong commitment to this association and the important deployment of resources that it requires.

- **Transposition to the Spanish legislation of the Directive on nuclear safety**

  The transposition of the directive is being accomplished by preparing a new Royal Decree on nuclear safety that will include not only the provisions of the directive applicable to the facilities but also the basic principles of nuclear safety. This is considered to constitute a challenge because the drawing up of this RD will in turn imply the revision of a large number of CSN Instructions.

  The implementation of this directive implies the periodic performance of peer reviews on nuclear safety issues. The first exercise of this type will be ageing management; in accordance with the terms of reference approved by ENSREG, the national report will be issued prior to the end of 2017 and the peer review will take place in the spring of 2018.

- **Transposition to the Spanish legislation of the Directive on basic safety standards for protection against the risks arising from exposure to ionising radiations**

  This directive brings together in a single document the five existing to date in relation to radiological protection, which were in their day incorporated in various documents within the

Spanish regulatory framework. This makes their transposition a complex task involving several Ministries. A coordinating group was set up to undertake this transposition, with the participation of the affected Ministries and the Nuclear Safety Council.

The directive implies important challenges in a number of areas, as a result of which, in addition to in-house analyses, meetings and workshops are being held in which the EU countries are sharing their approaches and experiences with a view to addressing the implementation of the requirements established.

The Directive is to be transposed to the national legislations of the Member States before February 6th 2018.

- **Emergencies**

  The requirements relating to emergencies contained in the new European standards and the incorporation of international trends and recommendations and the lessons learned in the wake of Fukushima constitute an important challenge, since they imply an ambitious process of review of the standards and criteria applicable to emergency management. This process will culminate with the publication and implementation of the new PLABEN, which is being drawn up in collaboration by the CSN and Directorate General for Civil Defence and Emergencies of the Ministry of the Interior.

- **Knowledge Management**

  As has already been pointed out, the CSN is developing a knowledge management model adapted specifically to its needs and based on IAEA recommendations that will be fully incorporated in its Management System and will use the elements characteristic of knowledge management that are already available.

  The CSN is currently involved in development of the know-how preservation programme, which is just one part of the knowledge management model, and the challenge is the integration of this model in the Management System.

- **Regulator's Safety Culture**

  The CSN considers the existence of an adequate safety culture at the regulatory body to be important, among other reasons because of the effect (both positive and negative) that it may have on decision-making in the industry and on those responsible for nuclear safety. The CSN has undertaken to implement the basic principles of the safety culture within the organisation and to provide suitable tools for its development at all levels. A working group has been set up for the above.

Spain considers that efficiency, competence, effective independence, transparency and communication are fundamental elements for the development of clear, consistent and effective nuclear safety regulations, and considers the objective of promoting their adequate application and reporting by the contracting parties to the Convention on Nuclear Safety to be essential.

Conclusions from the point of view of the licensees

The licensees of the Spanish nuclear power plants are responsible for producing electricity safely, reliably, economically and with respect for the environment. Throughout this report we have explained, following the structure of the provisions of the Convention, to what extent the activities performed and measures implemented by the licensees in living up to their responsibilities fulfil the obligations established by the Convention.

The most significant aspects are summarised below:

- During the period of the report, the entire Spanish nuclear fleet has performed safely and no incident having any impact for persons or the environment has been reported, as is demonstrated by the evolution of the SISC action matrix.

- The Santa Maria de Garoña plant has remained in the definitive shutdown situation throughout the period of the report, and in May 2014 requested renewal of its operating permit to 2031, the year in which it would reach 60 years of operating lifetime. In July 2014, in order to be able to report favourably on this new request, the CSN imposed conditions additional to those required with the previous application for renewal in 2009. Since then the plant has been developing the new improvements required and performing the new studies demanded.
- The Trillo plant obtained renewal of its operating permit, which will remain in force until 2024.
- The position of the licensees of the operating permits as regards the operation of the nuclear power plants is to continue applying for renewal of the said permits as long as operation remains economically viable, with safety guaranteed, taking into account both internal and external conditioning factors.
- The process of implementing the measures to increase the safety margin (post-Fukushima measures) at all the plants, as required by the Complementary Technical Instructions issued in this respect to these facilities by the CSN.

  Most of the "short and medium-term" measures have already been implemented, while those classified as "long term" will be implemented in the coming months. The latter refer fundamentally to the construction of the respective Alternative Emergency Management Centres (CAGE) at each site, to the assembly of the Filtered Containment Venting Systems (FCVS) for each reactor and to the installation of the Passive Autocatalytic hydrogen Recombiners (PAR) in each containment, as applicable.

  In addition to the measures already mentioned in the previous report and to the long-term measures described above, the following may be singled out:

  — Acquisition of portable equipment (diesel generators and pumps) and stores to house them and interfaces with the existing systems, availability of heliports and definition of a new emergency response organisation.

  — Checking of the recovery of power from nearby hydroelectric plants with nuclear power plant support protocols.

  — Drawing up of the new Extensive Damage Mitigation Guidelines (EDMG) and Extensive Damage Emergency Guidelines (EDEG).

  — Establishment and validation of mechanisms for collaboration between the NPP's, and the UME (Military Emergency Response Unit) to facilitate collaboration during emergencies.
- UNESA and the Spanish nuclear power plants actively promote the exchange of experiences with a view to establishing corrective actions leading to operating excellence. During the period of the report, the NPP's have participated in numerous operating experience exchange and analysis activities, both nationally and internationally. Particularly significant has been the hosting during this period of 8 WANO peer reviews, two of them Corporate Peer Reviews, and participation in 41 peer reviews and 26 technical missions.
- Several CSN Instructions (IS), from this period or before, have required the implementation of improvements to the facilities, this having implied considerable efforts in adaptation. Among these instructions, special mention may be made of IS-30 (protection against fires), IS-25 (performance of a full range of probabilistic safety assessments), IS-32 (on technical specifications), IS-36 (on POEs and SAMG's) or IS-37 (design basis accident analysis). Given their technical and scientific complexity and their volume, special mention may be made of the beginning of the work for the implementation of Complementary Technical Instructions requiring the seismic reassessment of the sites, which is expected to take until the year 2020.

- All the plants have implemented design modifications additional to the post-Fukushima modifications described above, based on the requirements imposed by the CSN when granting the latest operating permit renewals and described in the report. By way of an example, mention may be made of the installation of the alternative shutdown panels at groups I and II of the Almaraz plant to guarantee safe shutdown following a fire in the cable room or control room; the replacement of the SPDS (Safety Parameter Display System) of the process computer at Ascó; the set of actions aimed at reducing operational doses at Cofrentes; the replacement of the main transformers at Vandellós II; the effective implementation of the primary bleed and feed strategy at Trillo or the improvements in the separation of cables and components in redundant systems necessary for safe shutdown in the event of a fire at Garoña.
- Everything set out above places the Spanish nuclear fleet under suitable conditions to address long-term operation with reasonable guarantees, a period that they will enter at the beginning of the next decade.

APPENDIX I

Information on application of the principles of the Vienna Declaration

As a member State of the European Union, Spain is obliged to abide by the provisions of Council Directive 2014/87/EURATOM, of July 8th 2014, modifying Directive 2009/71/Euratom, which establishes a community framework for the nuclear safety of nuclear facilities. Article 8 of this Directive establishes safety objectives for nuclear facilities that are absolutely in keeping with the principles of the Vienna Declaration. The content of these provisions of the European legislative framework is as follows:

1. *Member States shall ensure that the national nuclear safety framework requires that nuclear installations are 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.*

2. *Member States shall ensure that the national framework requires that the objective set out in paragraph 1:*

   a) *applies to nuclear installations for which a construction licence is granted for the first time after 14 August 2014;*

   a) *is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the framework of the periodic safety reviews as defined in Article 8c(b).*

As a member State of the European Union, Spain is obliged to adopt the legal, regulatory and administrative provisions required to ensure compliance with what is set out in the said Directive before August 15th 2017, for which reason, as of the moment of drawing up of this report, it is in the process of transposing the said community standard, as pointed out in section 7.1.2. of this report.

Furthermore, it should be remembered that in September 2014 WENRA published its new reference levels, following their revision as a result of the accident at Fukushima nuclear power plant. The reference levels affected are consistent with the principles set out in the Vienna Declaration.

The process of alignment with the reference levels revised in the wake of Fukushima is being carried out in accordance with the programme and schedule established by the WENRA reactor harmonisation working group. This process is expected to end in December 2017.

Throughout the report, in parallel with the justification of compliance with the different articles of the Convention, the aspects impacting compliance by Spain with the principles of the Vienna Declaration are identified. These aspects are summarised below.

In the case of Spain, articles 14 and 18 are probably the most important as regards the justification of compliance with the commitments deriving from the Vienna Declaration, especially as regards the first principle:

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 fully 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. The other two principles are understood to reinforce the applicability of the first to the operating plants, from the dual perspective of safety assessments and consideration of the IAEA standards and international best practices, processes or aspects leading to proposals for plant design and operation improvements, in accordance with the first principle.

Section 6.1 of the report describes the safety significant incidents occurring at the Spanish nuclear power plants during the period of the report and the response measures taken by both the licensees

and, where necessary, the CSN. In general it is concluded that in all the incidents that occurred, the licensee identified the causes and initiated appropriate corrective actions. The safety significant events response processes established by both the licensees and the CSN are in themselves systematic mechanisms for safety assessment and review, leading to improvements in plant design and/or operation. Attention is also brought to the fact that all reportable events are classified in accordance with the INES scale.

Section 6.2 sets out the specific safety improvements implemented at each plant during the period of this report. Many of these actions contribute to the objective of improving the design, in order to prevent accidents and mitigate radioactivity emissions if an accident were to occur. Most of these improvements arise as a result of the PSR's and NAC, these being perfectly established and consolidated periodic, exhaustive and systematic processes carried out in accordance with IAEA standards and other good practices acquired through experience and exchange with industry peers.

Section 6.4 explains that justification of continued plant operation is based on the continuous and periodic safety review programmes established, with PSR and NAC being especially significant.

Section 9.1 mentions those legal provisions that establish the obligation of the licensees to study and, where appropriate, implement safety improvements based on state-of-the-art technologies and best practices, as well as the powers of the CSN to require safety improvements by the licensees (e.g., in plant design).

The periodic reports on different safety aspects described in 9.2 and 9.3, that the licensees are required to draw up and that the CSN supervises, are complementary mechanisms for periodic and systematic safety assessment, which may lead to proposals for improvement.

Section 9.5 describes the mechanisms that guarantee the adequate management of on-site accidents and the measures to reduce their consequences,basically off-site emissions of radioactivity.

Section 10.1 specifies the regulatory provisions that require the licensees to analyse best practices in relation to safety for their potential implementation. Section 10.2 explains that the Action Plans of each licensee identify and specify safety improvement activities and that the licensees' internal processes, such as the corrective actions management programmes, incorporate mechanisms for the prioritisation of improvement actions, based on safety significance.

These sections and point 10.3 describe a series of important licensees' programmes and activities relating to periodic and systematic assessments of safety aspects, such as self-assessment programmes; independent internal evaluations, including quality audits, independent supervisions and the evaluations of the nuclear safety committees, the ALARA committee and other licensee committees; external evaluations, most significantly those performed by WANO (peer reviews) and by the IAEA (OSART missions and others); in-house and industry operating experience evaluation programmes, and internal and external evaluations of the safety culture. Also underlined are the mechanisms established by the licensees to acquire and share best practices and lessons learned with organisations such as WANO, the BWROG and PWROG owners groups, EPRI and NEI.

In dealing with the measures implemented by the regulatory authority to guarantee priority for safety, section 10.4 mentions certain elements that contribute to achieving the principles of the Vienna Declaration, such as the processes in place to establish requirements in relation to the on-going improvement of the safety of the facilities (e.g., via the results of the PSR's). In this respect, special attention is paid to the specific process adhered to following the Fukushima accident, many of whose improvement actions are in line with the principles of the Vienna Declaration. Also underlined is the strategic CSN objective of having available regulatory practices comparable to those of the most advanced countries, for which appropriate mechanisms exist at regulatory level for the sharing and acquisition of best practices. Also stressed are the in-house processes of the CSN subject to independent audits; the CSN's audit programme constitutes a mechanism for periodic and systematic review.

Section 11.2 explains that the training and qualification requirements deriving from the improvements implemented at the nuclear power plants following the Fukushima accident have been incorporated into the initial and on-going training programmes, with an important component of practical training.

Section 12.3 describes the plans established to reinforce expectations regarding behaviour, the safety culture and organisation and human factors programmes at nuclear power plants. Also explained is the way in which these plans are periodically assessed.

As regards principle 3, sub-sections 14.2.1 and 14.3.1 explain in detail the regulatory framework that requires the plants to perform exhaustive and periodic safety assessments and implement reasonably feasible improvements, underlining CSN Instruction IS-21 in relation to the treatment of design modifications and IS-26 to the performance of periodic safety reviews. It should be pointed out that safety guide GS 1.10, which sets out guidelines for the performance of PSR's by the licensees, is currently being revised to adapt it to the IAEA guideline SSG-25 "Periodic Safety Review for Nuclear Power Plants". The CSN plans for the next plant to carry out a PSR to do so in accordance with the new guideline.

What is indicated in sub-sections 14.2.2 and 14.2.3 is clearly included within principle 2 of the Vienna Declaration, as regards the periodic and routine performance of exhaustive and systematic assessments and the implementation of reasonably feasible safety improvements.

As a result of the PSR's and the performance of stress tests and analyses of losses of major areas, the Spanish nuclear power plants have implemented safety improvements in different areas, as detailed in section 14.5.

Section 17.1 explains that in compliance with CSN Instruction IS-26, and pursuant to the recommendations included in CSN Safety Guide 1.10, NPP periodic safety reviews, the Spanish nuclear power plants carry out periodic safety reviews (PSR) every ten years, the scope and objectives of which include aspects relating to the site, in particular in the programmes for the on-going evaluation of the safety and applicability of the changes occurring in the standards during the corresponding ten-year period.

Sub-section 17.3.1 underlines the issuing in 2015 of a CSN ITC to all the nuclear power plant licensees for reassessment of the seismic characterisation of the sites in accordance with the National Post-Fukushima Action Plan. Section 17.4 describes the relations between Spain and other contracting parties with the fundamental objective of exchanging experiences and technical and regulatory know-how in relation to nuclear safety and radiological protection and promoting cooperation between regulatory authorities.

Section 18.1, dedicated to the application of the principles of defence in depth, contains the legal provisions referring to plant design, including the standards issued by the CSN during the period of the report. Particularly significant in this respect is Instruction IS-36 on procedures for emergency operation and severe accidents management, and Instruction IS-37 on the analysis of design basis accidents. Also analysed is the applicability to the Spanish plants of the principles of defence in depth included in Instruction IS-26 on basic nuclear safety requirements, explaining and justifying how these principles are guaranteed.

Particularly important from this perspective are sub-sections 18.1.4, detailing the measures applied in design to prevent beyond design basis accidents and mitigate the radiological consequences in the event of such an accident occurring, and 18.1.5, which deals with the measures in place to preserve containment integrity, in particular against situation involving extreme natural events. In the case of Spain, most of these measures are part of the response actions developed following the Fukushima accident and the programme for action in response to accidents involving the loss of major areas of the plant (both programmes have been developed in Spain simultaneously and in a coordinated manner). The main design modifications performed and under way at each plant with a view to improving plant safety are described.

The design improvements necessary for the development of the first principle of the Vienna Declaration frequently imply the implementation of new technologies and methodologies. Section 18.2 sets out the measures adopted to guarantee the suitably safe implementation of these technologies and methodologies at the Spanish nuclear power plants. Also listed are the most important modifications implemented at the Spanish plants during the period of the report.

A key aspect of the implementation of design modifications, especially those having a high impact on safety, such as those relating to development of the first principle of the Vienna Declaration, is the consideration of human factors and aspects associated with man-machine interaction in the development and implementation of the modifications and subsequent operation of the plant. The consideration of these aspects at the Spanish plants in order to guarantee safe and reliable operation is summarised in section 18.3.

Section 19.4 clearly identifies aspects relating to the Vienna Declaration, such as the development and maintenance of emergency operating procedures and severe accident management guidelines, revised and reinforced in the case of the Spanish plants as a result of the stress tests and analyses of situations involving the loss of major areas, with the incorporation of extensive damage mitigation guidelines and the implementation of design modifications to strengthen the instrumentation required under severe accident conditions, or the implementation of redundant structures, systems and components, or SSC's different from those existing, to address beyond design basis situations, including severe accidents.

In this respect the regulatory framework has been strengthened with the new CSN Instruction IS-36, on emergency operating procedures and severe accident management guidelines, in which has been incorporated an important part of the new WENRA reference levels of issue F (relating to design extension at existing plants) revised in the wake of Fukushima.

Another highly relevant aspect relating to the Vienna Declaration dealt with in section 19.7 is the treatment of operating experience, a process that is very widespread at the Spanish nuclear power plants and subject to regulatory control by the CSN, with an important international component involving the licensees, who participate in numerous forums and are periodically reviewed by their peers through their participation in organisations such as WANO. The aim of all the above is to identify potential problems and identify and implement the best national and international practices to the extent reasonably possible.

All the above is supported by a high level of engineering firms and technical support services qualification, an aspect that is dealt with in section 19.5. The correct design, assembly, implementation and subsequent maintenance of the design modifications carried out at the plants require the best engineering firms and technical support services to ensure suitable performance at all times.

APPENDIX II

List of acronyms

ALARA	As Low As Reasonably Achievable
AMR	Ageing Management Reviews
APS	Probabilístic safety analysis,
ATC	Centralised Temporary Storage
ATI	Individualised temporary storage
BOE	Official State Gazette
BWR	Boiling Water Reactor
CAGE	Alternative Emergency Management Centre
CAE	Emergency Support Centre
CEIDEN	Plataforma Tecnológica de Energía Nuclear de Fisión
CSN	Nuclear Safety Council
CRES	Sanction Proceedings review committee
DBE	Design Basis Earthquake
DOE	Official Operating document
ENSREG	European Nuclear Safety Regulators Group
END	Non Destructive testing
SSC	Structures, Systems and components,
ETF	Technical Specifications
ETFM	Improved Technical Specifications
SAMG	Severe accident procedures and guidelines
IPEEE	Individual Plant Examination for External Events
IRRS	Integrated Regulatory Review System
IS	CSN Instruction
ITC	Complementary Technical Instruction
MINETUR	Ministry of Industry, Energy and Tourism
NAC	Conditioned Application Standards
OP	Operating Permit
OBE	Operating Basis Earthquake
ORE	Emergency Response Organization
PAC	Corrective actions programmes
PAR	Passive Autocatalytic Recombiner
PAT	Annual Working Plan
PBI	Basic Inspection Programme
PCI	Fire Fighting
PEN	Nuclear Emergency Plan
PAE	Emergency Action Plan
PEI	On site Emergency Plan
PGR	Waste and spent fuel management plan
PGV	Lifetime Management Plan
PIEGE	Integrated Ageing Management Plan
PLABEN	Nuclear Emergency Basic Plan
POE	Emergency operating procedures
PRI	Incident review panel
PRIN	International incident review panel
PSE	Loss of off site power
PTR	Radiation working permit

PWR	Pressurized Water Reactors
REA	Environmental radiological Surveillance stations
RINR	Regulation on Nuclear and Radioactive Facilities
PSR	Periodic Safety Review,
RPS	Reactor Protection System
SAT	Systematic Approach to Training
SAMG	Severe accident management guidelines
SBO	Station Blackout
SISC	Integrated Plant Supervision System
FCVS	Filtered Containment Venting System,
UME	Military Emergency response unit
UNESA	Spanish Electricity Industry Association
WENRA	Western European Nuclear Regulators Association

Convention on Nuclear Safety

Seventh National Report

August, 2016

SPAIN