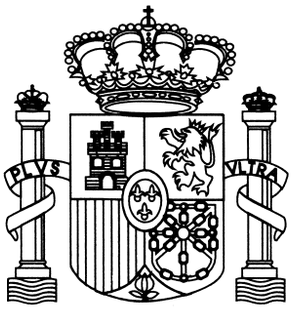

SPAIN

Convention on Nuclear Safety

Third National Report

September 2004

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c) General considerations in relation to nuclear safety

Introduction

Presentation of the Report

The present document is the Third Spanish National Report issued in compliance with the obligations deriving from the Convention on Nuclear Safety, done in Vienna on 20th September 1994.

The Convention entered into force on 24th October 1996 following ratification by a minimum number of countries, in accordance with the requirements of articles 30, 31 and 32. It was signed by Spain on 15th October 1994 and ratified by means of an instrument issued by the Ministry of Foreign Affairs, signed by H.M. The King on 19th June 1995.

Articles 5, 20, 21 and 22 establish the periodic submittal by each Contracting Party to all the other such Parties of a report on the measures adopted during the period in compliance with the obligations of the Convention, which shall be submitted and subjected to examination during the subsequent Review Meeting.

The first such meeting was held in Vienna in 1999 and the second in 2001. On both occasions, the Consejo de Seguridad Nuclear (Spanish Nuclear Safety Council, CSN) represented Spain both by drawing up the report and by participating in the meetings between the Parties. On this occasion, and in keeping with the commitments adopted during the second meeting, the electricity industry will participate fully in all the review phases.

This Third Report is an update of the second and, in accordance with the resolution approved during the second review meeting, is to be submitted by 8th September 2004. As a result, its contents cover the data and circumstances existing and occurring during the period from October 2001 to June 2004.

This report will be subject to revision by the countries interested, which will submit their comments and questions. In April 2005, the Spanish report and the replies to the questions received will be subject to the process of review contemplated in the Convention, along with the reports submitted by the other countries.

Drawing up of the Third Report on the Convention on Nuclear Safety

The report has been drawn up by the Nuclear Safety Council, the only organisation responsible for nuclear safety and radiation protection in Spain, an organisation that is independent from the Government and that reports exclusively to Parliament. The licensees of the Spanish Nuclear Power Plants have also contributed to the report, coordinated by the Spanish Electricity Industry Association (Unesa).

The report has been drawn up following the same structure as the articles of chapter 2 "Obligations" of the Convention, beginning with chapter 6. In each article, relevant information has been included on the content of each obligation, a distinction being made in separate articles between the activities of the licensee and the regulatory body, as well as a brief evaluation of the degree of compliance in Spain with the requirements established therein.

A chapter on conclusions has been added, with a view to dealing with the commitments of the second review meeting, as requested in the guidelines, and to underlining the challenges of the future and the initiatives mapped out for implementation in the near future.

The Report has several appendixes, the aim of which is to enlarge upon the information provided in the articles.

The process of drawing up the Report has been based on an initial draft submitted for comments that, once complete, was sent to the Plenary Meeting of the Nuclear Safety Council for definitive approval, in Spanish and English versions. The document is submitted to the International Atomic Energy Agency (IAEA), as trustee of the Convention, and is incorporated in the CSN website along with the first and second reports and related questions and answers. The IAEA will be requested to include these documents in its website for them to be generally accessible.

Unesa, in representation of the licensees, has been an integral part of the group in charge of drawing up the report, providing the necessary texts and data and participating in the comments and decisions relating to its creation. The initial draft has also been submitted for comments within its organisation, these having been included in this report preserving the independence of the criteria and opinions of the Association.

The report was submitted to the Ministry of Industry, Tourism and Commerce for comments, and to the Ministry of Foreign Affairs for its delivery to the IAEA.

The content and scope of the third report on the Convention are based mainly on the Convention on Nuclear Safety itself, taking as the starting text the Second National Report and the "Guidelines regarding national reports under the convention on nuclear safety"[1], established by the Contracting Parties in compliance with article 22, taking into consideration other documents such as the "Summary Report of the Second Review Meeting", the Remarks made by the Director General of the IAEA, on 26th April 2002, and the conclusions for Spain in the Second Review Meeting, as well as the comments and questions received from other countries on previous occasions.

Generally speaking and in accordance with the requirements of the guidelines relating to the national reports, the objective of the third report is to allow for the efficient assessment of compliance with the Convention by Spain. Both the first and second reports submitted by Spain in 1998 and 2001, respectively, are understood still to be valid as general information on regulatory practices, this third report serving as an update on the changes that have occurred during the last three years. The previous report remains valid as regards those issues that have not undergone modification.

The report includes the data and analyses required to show the evolution of nuclear safety in Spain from October 2001 to June 2004, and takes into account the general issues included in the summary of the second review meeting, avoiding repetition as regards the generic information included in the first national report.

[1] INFCIRC/572/Rev.2, 2nd September 2002.

Chapter 2. Obligations

a) General provisions

Article 6. Existing nuclear facilities

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

6.1 Nuclear safety issues of greatest significance for each plant during the period

The most significant safety issues that have occurred at each of the Spanish nuclear power plants during the period considered are detailed below.

José Cabrera Nuclear Power Plant

During the period covered by this report, the José Cabrera nuclear power plant has operated with an operating permit that has been in force from 15th October 1999 to 14th October 2002 and another covering from 15th October 2002 to 30th April 2006.

The authorisation dating from October 1999 had been awarded for a period of three years for the licensee to undertake a Safety Improvement Programme.

In January 2002, the Nuclear Safety Council detected flow deficiencies in the essential services water system that affected other safety-related systems. The licensee implemented an action plan contemplating the following measures:

- Revision of the coherence of the design basis and licensing of the safety-related systems with respect to the operating technical specifications.
- Event root cause analysis.
- Improvement to the equipment and components of the essential services water system.
- Increased system flow surveillance and balancing tests.
- Organisational changes and safety culture improvements.

These events were classified at level 1 on the International Nuclear Events Scale (INES).

In October 2001 the licensee requested renewal of the operating permit from October 2002 (the expiry date of the previous permit) to October 2008, when the plant would have reached 40 years of operation. However, the Ministry of Economy[2], following a binding

[2] Royal Decree 1554/2004, of 25th June, which develops the basic organisational structure of the Ministry of Industry, Tourism and Commerce, establishes that areas of competence corresponding at that time to the Ministry of Economy are now transferred to Industry.

report from the Nuclear Safety Council, granted authorisation only until 30th April 2006, based mainly on the problems relating to the safety culture that had been underlined by the events affecting the essential services water system and on other aspects relating to the peculiarities of the design of José Cabrera NPP and to ageing of the equipment.

Along with the authorisation granted in October 2002, the licensee was required to implement a series of complementary technical instructions, some of which related to improvements to the plant equipment and components (see section 14.4). Others related to improvements to the "safety culture", the establishment of a systematic approach to investments management and the overall management of safety, the self-assessment programme, etc. Throughout 2003 the licensee has carried out a number of activities to comply with these complementary technical instructions (see point 6.3.4).

The operating permit granted on 14th October 2002 established that the date of definitive shutdown of the plant would be 30th April 2006. Taking into account the international experience of other plants in a similar situation and with a given end of operating lifetime date, the Nuclear Safety Council developed a specific monitoring plan for the plant covering both activities to be taken by the CSN and those to be implemented by the licensee, the objective being to avoid a degradation in plant safety during its last years of operation as a result of possible loss of personnel motivation, the absence of investments in safety and the loss of qualified personnel, among other things.

Among the most important events that have taken place during the period covered by this report, and in addition to those relating to deficiencies in essential services water system flow that occurred at the beginning of 2002, mention should be made of the one that occurred on 25th April 2002, when 6 activists belonging to the environmental organisation Greenpeace entered the plant site and managed to get onto the dome of the containment building. As a result of this event, the plant shut down until 7th May 2002 in order to implement a series of actions aimed at improving the site physical protection system.

Finally, during the last refuelling outage, which started on 15th November 2003 and finished in mid January 2004, the licensee notified the Nuclear Safety Council that the flow in the safety injection system was 10% lower than that considered in the accident analysis, due to deficiencies in compliance with the single failure criterion for certain of the system components, this being classified at level 1 on the INES Scale. The conclusion drawn from analysis of the impact of this problem in safety assessment demonstrates that there was only a minor reduction in the safety margin. As a result of this event, a review process of other systems that might give rise to similar problems regarding compliance with the single failure criterion has been initiated.

Santa María de Garoña Nuclear Power Plant

During this period the plant has implemented various improvements in safety-related systems, as required in renewal of its operating permit, among others those relating to ventilation systems (control room, electrical systems building, etc.) and a full-scope simulator for the training of the operating personnel (see point 6.3.4).

The licensee is acting in order to counteract the ageing and possible obsolescence of the plant equipment, within the framework of the plant lifetime management plan. For example, during the period the power range neutron flux monitoring instrumentation has been replaced with digital instruments, this being accomplished during the 2003 refuelling outage.

As regards relevant events, mention should be made of the fact that in February 2004 different pieces of scrap with non-removable surface contamination were inadvertently sent to a recycling facility, this having been classified at level 1 on the International Nuclear Events Scale (INES). The contamination, whose contact radiation rate reached up to 40 μSv/h in one case, was detected by the gate monitor installed for this purpose at the entrance to the facility.

The contaminated parts originated from the chopping of a shielding support structure used years before during the performance of maintenance work on the reactor vessel, and were mixed with relatively clean materials due to a supervision error. Three days after the contamination was identified, the plant recovered the parts and returned them to their point of origin by radiologically controlled transport. The event had no consequences for the personnel or the environment.

During the period the plant has begun preventive maintenance on safety-related equipment in operation, for example on the Isolation Condenser.

From 18th February to 7th March 2002 the IAEA carried out an OSART (*Operational Safety Review Team*) Mission at the plant, during which experts from different countries and from the Agency itself reviewed the operational safety of the plant. The main conclusion of this mission was that the plant is in excellent conditions and that both the management and the personnel are committed to an intensive programme of reliability and operating safety.

From 24th to 28th November 2003, the IAEA carried out a follow-up visit to the plant, this being habitual in the OSART Mission methodology, in order to check the status of the actions associated with the suggestions and recommendations made during the mission performed in 2002. This follow-up visit concluded that the resolution of the suggestions and recommendations had progressed satisfactorily.

Almaraz Nuclear Power Plant

Since 6th November 2003, in the case of Unit I, and since 11th December 2003, in the case of Unit II, both have been operating at an authorised nuclear power of 2,739 MWt, following authorisation for a 1.6% increase in nuclear power. This has required the implementation of a design modification consisting of installing a new ultrasonic feedwater flow measuring system, accompanied by a more accurate feedwater temperature measurement system.

On 3rd May 2003, during the performance of reload tests prior to declaring the operability of an emergency diesel generator, in the refuelling outage of Unit II, one of the engines suffered a major breakdown that required modification of the refuelling schedule for its repair. In response to a request from the licensee, the CSN granted an exemption for the refuelling to proceed and the plant to start up with compensatory measures, consisting fundamentally of installing a group of 6 portable diesel generators having the same capacity as the faulty emergency generator. The exemption was granted by the CSN for a period of 30 days.

Ascó Nuclear Power Plant

The operating permit for both units of the Ascó nuclear power plant was extended for ten years in October 2001. A power increase of 1.4% has been authorised as a result of

the reduction of uncertainties in feedwater flow measurement in both plant units following the 2003 and 2004 outages.

The main modifications carried out at the two plant units have been the replacement of the reactor pressure vessel head and a configuration change to cold head, replacement of the Radiation Surveillance System with a new digital technology system and modifications to the fire-fighting system in order to comply with Appendix R of 10CFR50 of the USNRC.

The modifications required for the injection of zinc into the primary are currently in the preparation phase. The objective of this injection is to minimise stress corrosion phenomena in components susceptible to such degradation.

Cofrentes Nuclear Power Plant

Throughout the 2002 refuelling outage (February-March 2002) and during the subsequent start-up process, various events having a potential impact on safety occurred. There were 9 reportable events, among them four reactor scrams during the process of start-up following the refuelling outage, and others, many of which were caused by human factors. However, although overall these were considered significant, none of the events had any high level of impact on the safety of the facility (all the reportable events were classified at level 0 on the INES scale).

Both the licensee and the CSN considered it necessary to initiate a quick and effective action plan in view of the results of the refuelling outage. Accordingly, the licensee decided to develop a Self-Assessment Programme (described in point 6.3.4). The programme was undertaken between May and July 2002 and implementation of the results will conclude in September 2004. The CSN is closely monitoring the implementation of the programme.

Since that refuelling outage no negative symptoms have been observed as regards the operating safety of the plant, either during power operation or during short or refuelling outages.

In June 2002 the plant was authorised to operate at 3,184 MWt (110.00% of the original thermal power level). The power previously authorised was 3,015 MWt (104.20% of the original thermal power).

The basis for this increase in power was operation with a changed control rod configuration, along with the use of fuel with a more advanced design, this translating into a higher steam generating capacity in the core. In addition, certain design modifications were required in safety-related and energy conversion systems.

In October 2003 the plant was authorised to operate at 3,237 MWt (111.85% of the original thermal power level). The power previously authorised was 3,184 MWt (110.00% of the original thermal power).

The reason for this minor increase in power was the installation of feedwater flow and temperature measuring instrumentation providing a lower degree of uncertainty than that originally installed. The measuring principle of the new instrumentation is ultrasonic, the original instrumentation operating by the venturi effect.

Vandellós II Nuclear Power Plant

In 2002 the plant increased its thermal nuclear power by 1.4%, reaching a rated value of 2,940.6 MWt. The basis for this increase in power was the installation of feedwater flow and temperature measuring instrumentation providing a lower degree of uncertainty than that originally installed. The measuring principle of the new instrumentation is ultrasonic, the original instrumentation operating by the venturi effect.

The modifications required for the injection of zinc into the primary are currently in the preparation phase. The objective of this injection is to minimise stress corrosion phenomena in components susceptible to such degradation. Application of this technique is scheduled to start in 2005.

Trillo Nuclear Power Plant

During 2002 the Temporary Spent Fuel Dry Storage Facility was authorised, and as of May 2004 six casks had been stored in this installation, each containing 21 fuel assemblies.

The licensee has initiated an at power maintenance programme that has allowed refuelling outage times to be reduced.

In October 2003 the licensee submitted to the CSN its Periodic Safety Review in support of the request for a ten-year extension to the Operating Permit in force, which expires in November 2004.

6.2 Generic nuclear safety issues and regulatory practices initiated or completed during the period

The most significant novelties that have occurred since October 2001 as regards regulatory practices are as follows:

a) Refuelling activities

In July 2002 the CSN published its Safety Instruction IS-02 on refuelling activities, by means of which the requirements formerly established in the operating permits and referring to the submittal to the CSN of the reports listed below were generally formalised for all the Spanish nuclear power plants.

- Refuelling safety report. This is required to include an analysis of the safety of the new core and is submitted two months before the refuelling outage.
- General refuelling activities schedule. Which will include a detailed and sequential programme of activities, the in-service inspection programme, maintenance activities, design modifications, fuel inspection, surveillance and special tests, start-up nuclear tests, foreseen doses and actions adopted to reduce them. This is to be submitted one month prior to the refuelling outage.
- Weekly report on the progress of activities.
- Refuelling outage final report. This confirms that the outage has been performed as established, explains any possible deviations and reflects the most important data, such as the nuclear parameters measured, the results of important tests, the doses received by the workers, etc. This is submitted three months after completion of the refuelling outage.

In addition, in response to a request from the Spanish Parliament and in view of the trend to reducing refuelling times and the incidents that were occurring, in January 2003 the CSN issued a Complementary Technical Instruction requiring each nuclear power plant to submit to the CSN, four months before the refuelling outage, a report describing the general criteria applied in planning the outage and the overall nuclear safety and radiation protection objectives, a justification that the organisation and resources foreseen were sufficient for compliance with the objectives, an identification and justification of important changes made in the refuelling with respect to previous outages, including reductions in the scope and duration of activities, and finally the controls established to ensure that the programme is not modified without first performing an adequate analysis of the impact of such modifications.

The CSN has begun to systematically evaluate the plant refuelling schedules and has intensified efforts in the tracking of activity performance during refuelling outages.

b) Physical protection of nuclear facilities

Following the attacks on New York and Washington on 11th September 2001, the Nuclear Safety Council requested the Spanish nuclear power plant licensees to reinforce their security systems. Furthermore, all the authorities and organisations involved in the national security system: Ministry of Economy, Ministry of the Interior, Nuclear Safety Council, licensees of facilities, etc., reviewed the safety and security measures to be applied at nuclear and radioactive facilities.

On 19th June 2002, the Nuclear Safety Council approved the integrated security model for nuclear and radioactive facilities and materials, which conceptually is made up of the following: a) the internal facilities and practices security system, under the responsibility of the licensee, b) the off-site action and response plans, under the responsibility of the security forces and corps of the Spanish State, and c) the intelligence plans, under the responsibility of the Ministry of the Interior.

Since that time a security improvement plan has been carried out with respect to nuclear facilities and materials, in order to adapt it to the integrated model, this including: clear identification, distribution and assignment of responsibilities among the different authorities and organisations participating in the national security system, a review of the existing standards and regulatory framework for the security of nuclear facilities and materials, improvement of the facilities' security systems, equipment, procedures and initial and on-going training for all the organisations involved.

The degree of security of nuclear facilities and materials has now been significantly improved through the reinforcing of the security systems, in accordance with the updating performed on the design basis threat. The improvement plan continues to be developed with the review of the regulations and standards and the development of initial and on-going training plans for the personnel of all the organisations involved.

c) Approval of the Waste Management Plan of each nuclear facility

The Regulation on Nuclear and Radioactive Facilities of 1999 introduced the requirement that each nuclear power plant include in a single document, the Waste Management Plan, their radioactive waste management organisation, a description of this management and a detailed inventory of both low and intermediate and high level wastes. For further details, refer to section 19.4 of this report.

During the period covered by this report, the Waste Management Plans of all the Spanish nuclear facilities have been evaluated and approved.

d) Clearance of waste materials containing very low levels of activity

As has been mentioned in the previous national reports, since 1995 the Association of the Spanish Electricity Industry (Unesa) has been drawing up and submitting to the Nuclear Safety Council common projects for the clearance of different waste materials generated at the nuclear power plants.

In 1999 the CSN addressed Complementary Technical Instructions to the nuclear power plants establishing the technical and administrative actions to be taken by the licensees in relation to the clearance of very low level radioactive wastes.

To date, the CSN has favourably assessed clearance in the case of used oils, metallic materials, used activated carbon and spent ion exchange resins and has determined the conditions under which such declassification should be carried out.

Furthermore, the Ministry of Economy, following a report by the CSN, has specifically authorised the clearance of the used oils with very low levels of activity generated at the Trillo, Cofrentes, Almaraz and Santa María de Garoña nuclear power plants, the clearance of metallic materials at the José Cabrera plant and the clearance of activated carbon and spent resins at Trillo and Almaraz.

Since February 2001, Cofrentes nuclear power plant has been authorised specifically, and depending on certain conditions, to declassify inert wastes (sludges) with very low levels of activity.

In short, the Complementary Technical Instructions issued by the CSN to the Spanish nuclear power plants in 1999 established a route for the implementation of a clearance system for very low level radioactive wastes at these facilities.

The Spanish nuclear power plants responded to the Complementary Instructions with programmes for joint action through Unesa and specific actions depending on their needs, determined by the inventories and types of very low level radioactive wastes stored at each plant.

The experience acquired in implementing clearance action programmes has shown that characterisation of the wastes, in order to guarantee with a high level of confidence that their levels of activity are lower than those established, is one of the most relevant aspects of the process and may occasionally be the factor determining its feasibility.

Practically all the Common Projects for clearance having been favourably assessed by the CSN, regulatory efforts will focus on improving the characterisation processes and on implementing methodologies allowing the resources required for their implementation to be optimised without this implying an impact on quality.

6.3 Safety improvement programmes implemented at the Spanish nuclear power plants on the initiative of the regulator and/or licensee

6.3.1 Integrated Probabilistic Safety Assessment (PSA) programme

The majority of the PSA's have been updated since the last report. The overall quantitative results obtained for internal events at level 1 in the latest versions of the PSA's, expressed in terms of core damage frequency and once evaluated by the CSN and updated accordingly by the licensees, are as follows:

Core damage frequency (reactor/year)

José Cabrera NPP	2.16 E-5
Santa María de Garoña NPP	1.97 E-6
Almaraz NPP	5.89 E-6
Ascó NPP	2.92 E-5
Cofrentes NPP	1.18 E-6
Vandellós II NPP	3.51 E-5
Trillo NPP	3.26 E-6

In compliance with the scope established in the second edition of the integrated PSA performance plan, the level 2 PSA's for all the Spanish nuclear power plants have been performed and subsequently assessed by the CSN.

At present the Spanish nuclear plants are carrying out their level 1 PSA's for operating modes other than full power (OMPSA).

As regards the application of PSA's, an objective underlined in the current edition of the integrated plan, methodologies have been tested in different pilot projects and these tests have led to official requests for the use of PSA's in cases for changes to the Operating Technical Specifications, the In-Service Inspection Manual for piping or the In-Service Inspection Manual for valve and pump testing at various plants. Various specific applications of this type have been assessed by the CSN and others are currently in the assessment process.

Work is also being performed in the application of PSA to the processes of categorising plant structures, systems and components, with use being made of the safety significance estimated by the PSA's, similar to Option 2 of the USNRC's risk-informed regulation.

Finally, mention should be made of the fact that the CSN has also decided to use information on risk for its own internal processes. The inspection process has been the first one selected, and it is here that greatest progress has been made towards the ultimate objective of having a Basic Inspection Plan that be risk-informed in itself and in its corresponding inspection procedures.

More detailed information on PSA and its applications is included in section 14.3.

6.3.2 Design basis review programme

Since the end of the nineteen-nineties, the Spanish nuclear power plants have carried out a review of the design basis of their facilities, in order to check that the requirements are perfectly established and that there is coherence between the licensing basis and operating practices and between these and the requirements, as well as with the content of the Safety Analysis. As a result of the design basis review, the licensees submitted to the CSN a report containing the results obtained and, where applicable, an update of the Operating Technical Specifications and Safety Analysis.

The CSN has carried out a detailed assessment of the design basis review programmes and has accepted both the process used in their performance and the corresponding conclusions in the case of the Almaraz and Santa María de Garoña plants. In the case of the José Cabrera, Cofrentes, Ascó and Vandellós II plants, an extension of the scope of the programmes has been requested, along with specific modifications to the performance process, these being under way as of the date of closure of this report. At the Trillo plant, a wider scope review had already been performed for other purposes, as a result of which this design basis review process has not been carried out.

The Design Basis Review was carried out in accordance with criteria agreed on between the CSN and the Spanish nuclear sector in 1998, updated by way of the guidelines being used in the USA in this area.

Among the most important findings of this review, mention may be made of the fact that at the Almaraz nuclear power plant it was determined that in certain accident scenarios the final heat sink might exceed the required temperature. With a view to correcting this situation, a system of sprays has been installed to cool the water discharged prior to its falling to the sump. In addition, certain minor design changes have been made and calculations have been revised due to the cases of incoherence discovered in certain data that, required to be the same, appeared with slightly different values in different documents.

In all cases, this review is serving to ensure the traceability and coherence of the design bases, the data and the operating practices of the Spanish plants.

6.3.3 Other generic nuclear safety improvement programmes

This section describes the generic issues that have given rise to actions by the licensees of the Spanish nuclear power plants during the period considered.

a) Degradation of reactor pressure boundary integrity

The Spanish PWR technology nuclear power plants have analysed the applicability to their installations of the USNRC bulletins issued in the wake of the degradation discovered in the vessel closure head of the American Davis-Besse plant, caused by leakage in the pressure envelope of the primary system across cracks in certain zones (control rod penetration tubes made of Inconel 600, a material susceptible to stress corrosion cracking). These bulletins were as follows:

- NRC Bulletin 2002-01: *Reactor pressure vessel head degradation and reactor coolant pressure boundary integrity.*

- NRC Bulletin 2002-02: *Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs*.
- Bulletin 2003-02: *Leakage from reactor pressure vessel lower head penetrations and reactor coolant pressure boundary integrity*.

An analysis has been made also of the applicability of the USNRC Order issued on 11.02.03 in relation to reactor vessel head inspections.

As a result of the analysis of the applicability of these documents, the operators of PWR plants have carried out a series of activities, for example the following:

- Submittal to the CSN of the detailed scope of the latest inspections performed.
- Analysis of possible primary coolant leaks that might affect the vessel, as well as the study of materials from the point of view of their susceptibility to the phenomenon of stress corrosion.
- Search for indications of leakage by means of the detection of boric acid deposits.
- Additional reactor vessel head inspections, for example the visual inspection of reactor head metal not covered by lagging.
- Drawing up of the inventory of primary areas containing Inconel 600 and other nickel-based alloys, with an estimate of operating temperatures, operating times at these temperatures and levels of stress.
- Drawing up of proposals for actions to be adopted to prevent or detect potential degradations.
- Inspections of the lower vessel penetrations, these to be carried out during the refuelling outages in 2004 and continued in 2005.

b) Blockage of containment sumps

This generic issue continues to be the subject of study. The CSN requested that the Spanish PWR nuclear power plants perform an analysis of the applicability of USNRC Bulletin 2003-01: *Potential impact of debris blockage on emergency sump recirculation at pressurized-water reactors*, which warns of the possible adverse effects of blocking of the sump recirculation pump filters in high energy line break events requiring recirculation with the emergency core cooling system or the containment spray system.

The following may be singled out from among the compensatory measures proposed by the licensees:

- Training of operators and plant personnel on indications of sump blockage and on the responses to be adopted.
- Procedural human actions to delay switchover to recirculation from the sumps.
- Procedural human actions to reduce loss of inventory from the refuelling water storage tank.
- Alternative sources for refilling of the refuelling water storage tank.
- Alternative sources for primary injection.
- Set of good practices to be applied during refuelling outages to prevent sump blockage.

- Set of specific actions to be performed during forthcoming refuelling outages.

Meetings have also been held between the CSN and all the Spanish nuclear power plants in order to analyse the short and medium-term working plan and to closely track international activities in this area.

6.3.4 Plant specific safety improvement programmes

In addition to what has been said above, which is applicable to all the plants, there are also improvement programmes and activities specific to each. In certain cases the improvement initiative has sprung from the licensee of the plant, although in the majority of cases the improvement itself or its scope has been requested by the CSN.

José Cabrera Nuclear Power Plant

In renovating the operating permit for this plant in 2002, up to its definitive shutdown on 30th April 2006, the Ministry of Economy[3], in response to a proposal by the CSN, required that, among other nuclear safety and radiation protection limits and conditions, the plant complete the implementation of the improvements relating to the safety culture included in the action plan proposed as a result of the deficiencies encountered in the essential services water system at the beginning of 2002, also establishing the following condition: "The licensee shall implement an Integrated Safety Management System to guarantee that it have available the duly qualified and motivated personnel necessary for the safe operation of the facility to the date of its definitive shutdown".

For the development of these conditions the CSN issued several Complementary Technical Instructions, including the following: "The licensee shall undertake a working plan contemplating diagnosis of the status of the *safety culture* and implementation of the improvements identified, which shall take into account the verification of the final status. The diagnosis and implementation phases shall receive support from an external organisation with experience in the improvement of the safety culture at nuclear power plants, which shall have the independence required for the adequate performance of its function." The Council also established directives on the integrated safety management system and the system for the management of investments in safety-related aspects.

The licensee has developed an Integrated Safety Management System aimed at guaranteeing that all the human and organisational aspects having an impact on safety are adequately managed, in keeping with international practices, with adequately ordered processes and with indicators allowing for overall tracking.

The Integrated Safety Management System of the José Cabrera nuclear power plant has three fundamental objectives: a) to maintain and improve safety, b) to establish and maintain a strong safety culture, strengthening suitable attitudes and behaviour patterns, and c) to facilitate a framework allowing improvement actions to be prioritised and establish a system of safety indicators.

The main parts of the system are the Declaration of Safety Policies, the Internal Communications Plan, the Professional Future Plan and Organisation and Human Factors Programme, Safety Improvement Activities and Safety Maintenance Activities.

[3] Royal Decree 1554/2004, of 25th June, which develops the basic organisational structure of the Ministry of Industry, Tourism and Commerce, establishes that areas of competence corresponding at that time to the Ministry of Economy are now transferred to Industry.

Evolution towards the safety objectives is evaluated via the Performance Indicators Programme, an important part of which is the interviews held to measure the evolution of the attributes of the Safety Culture Plan, performed with the supervision of an external consultant and with the participation of all the personnel working at the Plant.

Santa María de Garoña Nuclear Power Plant

As a result of the Periodic Safety Review performed in 1999, the plant has continued with its policy of safety improvements, undertaking a series of specific Safety Improvement Programmes. Information on these programmes has been included in previous reports and, in certain cases, their performance has been completed during the period covered by the present report.

The Safety Improvement Programmes carried out and completed during this period have focussed on the following aspects:

- *New Operating Technical Specifications.* In April 2004, Improved Operating Specifications were implemented, based on the model of USNRC NUREG-1433, applicable to GE type BWR-4 design plants. This was accomplished following a period of personnel training and adaptation to the new model, including the overlapping of surveillances performed in accordance with the original Operating Technical Specifications (OTS's) and with the Improved Operating Technical Specifications (IOTS's). The requirements removed from the IOTS's and originally included in the former OTS's, are contained in the Operating Requirements Manual, the structure, content and usage standards of which are analogous to those of the IOTS's.
- *Personnel Dose Reduction Programme.* The performance in recent years of the different actions contemplated in the programme has resulted in a significant reduction in operational doses, especially those associated with refuelling outages. In this respect, the refuelling outage corresponding to 2003 saw the greatest dose optimisation achieved in recent years.
- *Ventilation Systems Improvement Programme.* This has consisted of installing an air-conditioning system in rooms containing electrical equipment having a safety function and located in the Turbine Building and of replacing the existing Control Room Habitability System with a new system. The programme has also included the installation of a new Essential Cold Water System for the cooling of the aforementioned ventilation systems. Installation of these systems was completed during the 2003 refuelling outage.
- *Electrical and Instrumentation and Control Systems Improvement Programme.* This has consisted of improving the protection of safety-related electrical systems in the event of failure of non safety-related electrical systems and of improving the independence of redundant electrical systems. The corresponding design modifications were completed during the 2003 refuelling outage.
- *New Full-Scope Training Simulator.* The programme has consisted of installing and validating a simulator replicating the control room of Santa María de Garoña nuclear plant, replacing the previous training system that was based on a simulator replicating an American plant similar to Santa María de Garoña. The new simulator entered service in April 2004.

Almaraz Nuclear Power Plant

The improvements made have arisen within the framework of the Periodic Safety Review and the Design Basis Review and have already been described in the previous report for 2001, where it was established that the conclusion of these improvements was scheduled for 2004. The implementation of all these improvements has now been completed. The following are among the most significant:

- Modification of the final heat sink through the installation of sprays in the water discharge to the sump pool.
- Improvement of the physical separation between groups of the off-site electrical feed circuits.
- Installation of improvements in the fuel building ventilation system.
- Installation of improvements in the control room ventilation system.

Ascó Nuclear Power Plant

The implementation of the improvements to the fire-fighting systems, derived from the probabilistic fire assessments and in compliance with Appendix R of 10CFR50 was completed in 2003.

Likewise, during 2003 the Ascó nuclear power plant was provided with a full-scope simulator replicating the control room of Unit I.

Cofrentes Nuclear Power Plant

The Nuclear Production Division of Iberdrola decided to carry out a *Self-Assessment* process at Cofrentes NPP during the months of May, June and July 2002 as a result of the number of incidents that had occurred during the two previous refuelling outages, although these were known not to constitute events of significance from the point of view of safety.

This was a proactive process aimed at learning from the errors made with a view to achieving improvement through the application of the self-assessment results.

The self-assessment plan rested on three basic pillars:

a) Detailed assessment using different methodologies of the events of greatest importance occurring during the last two refuelling outages and respective shutdown and start-up processes.

b) Analysis of Areas in which weak points were identified in the performance of the Organisation and consequently in the occurrence of events.

c) Study of the Organisation's learning process and feedback, in order to identify shortcomings in the assimilation of the results of previous specific self-assessments performed.

The self-assessment process was basically the same for all the organisations participating, based on the work performed in the analysis of processes, the study of documentation and interviews with the personnel directly involved in the processes under study.

As a result of this self-assessment eight fields for improvement were identified with actions proposed for consideration, their scheduling in order of relative importance, the assignment of those responsible for performance and measures for tracking and control.

For each field of improvement actions classified as being of top priority for the plant were established *(recommendations)*, along with others of lower priority but also requiring consideration *(suggestions)*.

Listed below are the improvement fields identified in which recommendations have been defined for priority action:

- Working practices
- Supervision methods
- Management methods
- Process improvement
- Organisation and planning
- Safety culture
- Training
- Communication

The programme has now been performed practically in full, with the actions implemented or under way being monitored continuously by the Operator's Nuclear Safety Committee.

Another programme that has been completed during the period covered by this report is the implementation of the Improved Operating Technical Specifications (IOTS's) based on the USNRC NUREG-1434 model, applicable to GE type BWR-6 design plants. These specifications entered into force in June 2003, following a period of personnel training and adaptation to the new model, including the overlapping of surveillances performed in accordance with the original Operating Technical Specifications (OTS's) and with the IOTS's. The requirements removed from the IOTS's and originally included in the former OTS's, are contained in the Operating Requirements Manual, the structure, content and usage standards of which are analogous to those of the IOTS's.

Vandellós II Nuclear Power Plant

Since 2003 the Vandellós II nuclear power plant has had a full-scope simulator replicating the control room.

Trillo Nuclear Power Plant

During the 2002 refuelling outage, design modifications were implemented to address severe accidents relating to secondary feed and bleed, hydrogen recombiners were installed inside containment and a third off-site power supply line was placed in service.

Following the refuelling outage in 2002, the Maintenance Rule, which was already in place at the other Spanish nuclear power plants, was implemented, along with the Severe Accidents Manual (SAM).

Implementation of the full-scope replica simulator and of the Interactive Graphic Simulator (IGS) was completed in 2003, these now having entered into service for plant personnel training.

6.4 Generic evaluation of continued operation based on the level of safety of the Spanish nuclear power plants

The Spanish nuclear power plants are subjected to a continuous safety review process that translates into the establishment of specific programmes aimed at improving safety in different areas. In addition, a Periodic Safety Review is carried out once every ten years.

The generic assessment of the level of safety of the Spanish nuclear power plants is based on the following aspects:

- Compliance with standards and regulations. The Spanish plants meet the requirements of the design standards of the country of origin of their technology in force at the time of their construction and the current Spanish regulations.
- During the 1980's the first generation plants, José Cabrera and Santa María de Garoña, underwent a Systematic Evaluation Programme, as a result of which they experienced a series of safety improvements, as detailed in section 1 of Article 6 of the First Spanish National Report on the Convention on Nuclear Safety.
- Both these and all the other plants are required to analyse the new standards generated in the country of origin of their technologies, which are the USA for most of the plants and Germany in the case of Trillo, and to take whatever actions might be applicable to them.
- The Periodic Safety Reviews are a platform for a new look at safety and have led to the application of new improvement programmes, as indicated in section 6.3.
- All the Spanish plants have carried out specific PSA's, which have been evaluated by the CSN. Chapter 14.3 reflects the status of the PSA studies for each plant, Level 1 for on-site events, off-site events and fires, Level 2, etc.
- The levels of safety achieved adequately meet the requirements of this article. Consequently, it is not considered that there is any need for new safety examinations or urgent modifications for reasons of safety.

6.5 Degree of compliance with the obligations of the Convention

In view of the levels of safety achieved as a result of the analyses and modifications performed, as well as of the continuous process of review to which the Spanish plants are subjected, these plants are considered to adequately fulfil the requirements of this article. Consequently, it is not considered that there is any need for new safety examinations or urgent modifications for reasons of safety.

APPENDIX 6.A

Basic characteristics of the Spanish nuclear power plants

	José Cabrera	Almaraz	Ascó	Vandellós II	Trillo	Garoña	Cofrentes
Type	PWR	PWR	PWR	PWR	PWR	BWR	BWR
Thermal power (MW)	510	2 × 2,729	2 × 2,940	2,940	3,010	1,381	3,237
Electrical power (MW)	160	U-1: 980 U-2: 984	U-1: 1,032 U-2: 1,027	1,087	1,066	466	1,096
Supplier	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Siemens-KWU	General Electric	General Electric
Cooling	Mixed, river Tajo towers	Open, Arrocampo reservoir	Mixed, river Ebro towers	Open, Mediterranean	Closed, towers with make-up from river Tajo	Mixed, river Ebro	Closed, towers with make-up from river Júcar
Number of groups	1	2	2	1	1	1	1
Preliminary authorisations, groups I/II	27-03-63	29-10-71 23-05-72	21-04-72 21-04-72	27-02-76	04-09-75	08-08-63	13-11-72
Construction permit groups I/II	24-06-64	02-07-73 02-07-73	16-05-74 07-03-75	29-12-80	17-08-79	02-05-66	09-09-75
Authorisation for start-up, groups I/II	11-10-68	13-10-80 15-06-83	22-07-82 22-04-85	17-08-87	04-12-87	30-10-70	23-07-84
Year of saturation of fuel pools, groups I/II	2015	2021 2023	2013 2015	2020	2043*	2015	2009
Latest operating permit	14-10-02	08-06-00	02-10-01	26-07-00	17-11-99	05-07-99	20-03-01

* Availability of cask dry storage facility for irradiated fuel

b) Legislation and regulation

Article 7. Legal and regulatory framework

7.1 Main modifications to the legal framework

Included in this section are references to the legal and regulatory standards, with the novelties that have occurred during the period of this Third National Report on the Convention on Nuclear Safety.

7.1.1 International standards

The following are the most significant standards that have entered into force during the period in the area of the European Community:

- Council Resolution on the establishment of national systems for surveillance and control of the presence of radioactive materials in the recycling of metallic materials in the Member States (DOCE, C-119, of 22nd May 2002).
- Directive 2003/122/EURATOM of the Council, of 22nd December 2003, on the control of high activity sealed radioactive sources and orphan sources (DOUE, L-346, of 31st December 2003).

7.1.2 Legal standards

The Standards of legal rank referred to here arise as a result of modification of the Nuclear Energy Act regarding nuclear devices and facilities aimed at developing new energy sources, establishing the system of authorisations for such nuclear facilities, and the Law Creating the Nuclear Safety Council regarding the filing and custody of the documentation to be submitted to the Nuclear Safety Council by the licensees of nuclear power plant operating permits at such time as their operating practices definitively cease, prior to the transfer of ownership and to the authorisation for their dismantling.

- Law 62/2003, of 31st December, on Fiscal, Administrative and Social Measures, in article 93 on the modification of the Nuclear Energy Act, Law 25/1964, of 29th April.

  Article 93. Modification of the Nuclear Energy Act, Law 25/1964.

  The following precepts of the Nuclear Energy Act, Law 25/1964, of 29th April, are modified:

– One. A new section, twelve B, is added to article 12 of the Nuclear Energy Act, Law 25/1964, this being worded as follows:

  "Twelve B. Other experimental devices and facilities.

  Experimental devices and facilities are defined as being those that use radioactive materials with a view to developing new energy sources. These devices and facilities shall be subject to the same system of authorisations as established in the regulations for nuclear facilities".

The rest of the article remains as previously worded.

– Two. A new additional provision, the first, is incorporated into Law 25/1964, of 29th April, this being worded as follows:

"First additional provision. Other experimental devices and facilities. 1. When referring in common to nuclear and radioactive facilities, the regulation contained in this Law shall be understood as referring also to the experimental devices and facilities defined in section 12B of article 2 of the Law, unless a different system were legally established for them.

2. The insurance coverage demanded of the aforementioned experimental devices and facilities shall be as established for nuclear facilities in article 57 of this Law".

- Law 62/2003, of 31st December, on Fiscal, Administrative and Social Measures, in article 74 on modification of Law 15/1980, of 22nd April, Creating the Nuclear Safety Council.

Article 74. Modification of Law 15/1980, of 22nd April, Creating the Nuclear Safety Council.

The following precepts of Law 15/1980, of 22nd April, Creating the Nuclear Safety Council, are modified:

– One. Article 2 of Law 15/1980, Creating the Nuclear Safety Council, is modified, paragraph "q" being reworded and the current paragraph «q» being incorporated into the new paragraph "r", as follows:

"q) File and take custody of the documentation to be submitted to the Nuclear Safety Council by the licensees of nuclear power plant operating permits at such time as their operating practices definitively cease, prior to the transfer of ownership and to the authorisation for their dismantling.

r) Any other that be legally attributable to it in relation to nuclear safety and radiation protection".

The rest of the article remains unchanged in its wording.

– Two. A new additional provision, the fourth, is added to Law 15/1980, Creating the Nuclear Safety Council, this being worded as follows:

"Fourth additional provision. Experimental devices and facilities. The functions and faculties attributed to the Nuclear Safety Council by this Law, in reference to nuclear and radioactive facilities, shall be carried out in the same terms with respect to the experimental devices and facilities defined in article 2 of the Nuclear Energy Act, Law 25/1964, of 29th April, unless a more specific regulation were legally established for such experimental devices and facilities".

7.1.3 Regulatory standards

The CSN technical instructions are general or regulatory provisions dictated by the CSN by virtue of the legal powers attributed directly to it, are binding and are addressed to groups or indeterminate numbers of individuals in relation to technical matters relating to the exercising of the Council's own realms of competence regarding nuclear safety and radiation protection. The legal basis for such technical instructions is to be found in art. 2.a) of Law 15/1980, in the wording established by Law 14/1999, of 4th May.

This item includes: firstly, the technical standards that may be dictated by the CSN on its own initiative, this implying by determination of Law a step forward in the regulatory capacity of the Body; secondly, the previously existing possibility of drawing up general technical standards through the previous qualification of the Government Regulations. As regards their nature, they are true regulations that purport to become permanent and integrated into the legal system, being open to litigious administrative review like any general standard.

Non-compliance with these instructions would be legally typified as an administrative infringement.

The CSN has issued five technical instructions, as indicated below. One of these refers to the nuclear power plants and the other four to various aspects of radiation protection. The total number of technical instructions is actually six, since those listed below are complemented with the first instruction issued, relating to the personal radiological licence.

- CSN Instruction IS-02, of 10th April 2002 (Official State Gazette - BOE 4.7.02) regulating documentation on *Refuelling activities* at Light Water Reactor Nuclear Power Plants.
- CSN Instruction IS-03, of 6th November 2002 (BOE 12.12.02) on the qualifications required to obtain recognition as *Expert in protection against ionising radiations.*
- CSN Instruction IS-04, of 5th February 2003 (BOE 28.02.03) regulating the transfer, *Filing and custody of the documents* corresponding to the radiation protection of the workers, the public and the environment prior to the transfer of ownership of nuclear power plant practices for dismantling and decommissioning.
- CSN Instruction IS-05, of 26th February 2003 (BOE 10.04.03) defining the *Values of exemption for nuclides,* as established in tables A and B of annex I of Royal Decree 1836/1999.
- CSN Instruction IS-06, of 9th April 2003 (BOE 03.06.03) defining the *Training programmes on basic and specific radiation protection,* regulated by Royal Decree 413/1997, of 21st March, in relation to fuel cycle nuclear and radioactive facilities.

7.1.4 Main issues addressed by the CSN guides published during the period

The Nuclear Safety Council Guides are documents containing recommendations, unless a standard provides them with a coercive nature, not so much because of their contents but rather because this is required by provision. The objective of the Guides is to achieve better compliance with the regulatory requirements and precepts by orienting the administrated party towards the most adequate decision-making, rather than through imposition.

The new issues addressed by the Nuclear Safety Council Guides published during the period corresponding to this report refer to probabilistic safety assessment, the transport of radioactive materials and the dismantling and decommissioning of nuclear facilities, and are identified as GS-1.15, GS-6.1, GS-6.2 and GS-10.13, the titles of which are included below in the list of guides published during the period covered by this report. The remaining issues are dealt with in other guides that were indicated in the previous report but which at that time were in the preparation phase or in print. Appendix 7.A includes a list of all the CSN safety guides, reflecting their status.

- Section 1: Power reactors and nuclear power plants.
  - GS-1.15. Updating and maintenance of probabilistic safety assessments (PSA's).
- Section 5: Radioactive facilities and apparatus.
  - GS-5.15. Technical documentation for radioactive apparatus type approval requests.
  - GS-5.16. Technical documentation for requests for authorisation for the operation of radioactive facilities constituted by equipment for the control of industrial processes.
- Section 6: Transport of radioactive materials.
  - GS-6.1. Quality assurance in the transport of radioactive substances.
  - GS-6.2. Radiation protection programme applicable to the transport of radioactive materials.
- Section 9: Waste management.
  - GS-9.2. Management of solid waste materials with radioactive contents generated at radioactive facilities.
- Section 10: Miscellaneous.
  - GS-10.12. Radiological control of scrap recovery and recycling activities.
  - GS-10.13. Quality assurance for the dismantling and decommissioning of nuclear facilities.

In addition to the work performed in drawing up Instructions and Safety Guides, mention should be made also, as regards regulatory aspects, of the work performed within the CSN on the technical review of the Nuclear Energy Act, as well as the Regulations Governing Nuclear and Radioactive Facilities, with a view to a future update.

7.2 Significant modifications to the licensing system introduced during the period

The Regulation Governing Nuclear and Radioactive Facilities establishes that nuclear power plant operating permits are granted for a period that is determined in the authorisation itself. In keeping with the directives established in the CSN's Strategic Orientation Plan, authorisations are generally being awarded for periods of ten years, coinciding with the performance of the Periodic Safety Reviews.

In relation to the authorisations, the need for the Safety Analysis reviews performed after each refuelling outage in order to incorporate the modifications made at the facility and update the contents being approved by the Ministry of Industry, Tourism and Commerce[4], following a favourable report from the CSN, has now been removed. Only revisions

[4] Royal Decree 1554/2004, of 25th June, which develops the basic organisational structure of the Ministry of Industry, Tourism and Commerce, establishes that areas of competence corresponding at that time to the Ministry of Economy are now transferred to Industry.

deriving from design modifications requiring authorisation prior to implementation now need to be approved. In these cases, the Safety Analysis Review is approved simultaneously with the design modification and other official operating documents affected, such as the Operating Technical Specifications.

Likewise, the Regulation Governing Nuclear and Radioactive Facilities covers the system of licensing for design modifications, establishing the obligation that the licensee analyse modifications prior to their being implemented and specifying that approval will be required for those that alter the criteria, standards or conditions on which authorisation for the facility is based. These concepts are developed in the CSN's Complementary Technical Instructions and in the CSN Safety Guide GS-1.11 *(Design modifications at nuclear power plants),* which was approved by the CSN in July 2002, following a period of application of a preliminary version in 1998. The new Instructions and the new version of the guide have taken into account the modifications introduced in the USNRC's 10 CFR 50.59. In addition, the Regulation Governing Nuclear and Radioactive Facilities contemplates a construction and erection permit for modifications of major scope or implying significant construction and erection works.

7.3 Significant modifications to the inspection and evaluation system during the period

During the period covered by this report, the basic lines of the CSN Inspection Model drawn up in 1998 and revised in October 2000 have been maintained.

The three types of inspections included in the model: licensing inspections, systematic and case-specific control inspections and special inspections, are maintained.

However, at the end of 2002, and in view of the experience of the systematic control inspections programme for the period 2001-2002, certain modifications were made as regards the areas of the programme open to inspection during the period 2003-2004.

The 25 areas open to inspection initially identified have been restructured, some have been removed and other new areas have been added, such that the programme currently comprises 29 areas open to inspection, these being detailed in section 19.3 of this report. Particularly significant among the new areas incorporated in the programme are the unannounced inspections outside the working day, the checks on the surveillance requirements of the operating technical specifications, the verification of maintenance and updating of Environmental Radiological Protection studies and the safety-related systems risk-informed functional inspections.

In addition to what is established in the Inspection Model, since 2002 the CSN has been working on the development of the tools required for the implementation of a new risk-informed inspection programme based on results, such that inspection efforts be focussed on the aspects of plant operation that are most significant as regards the risk of the facility. The objective also is to make available tools allowing the safety significance of inspection findings and of the response provided by the CSN and by the licensees to correct detected deficiencies to be assessed in the most objective manner possible.

Furthermore, the decision has been taken not to continue using the systematic plant operation control programme (the ESFUC programme) which had been carried out until this year, the evaluations of which were performed on the basis of the results obtained from inspection programmes over a given period of time, normally 18 months.

The CSN has considered it advisable to move towards new plant operation supervision and control systems allowing more licensee information to be integrated than the results of inspections and making it possible to evaluate plant operations in an objective and predictable manner and in a shorter time than the current 18 moths.

Among the different supervision models analysed, of those existing in other countries, is the USNRC *Reactor Oversight Process*, which in any case would need to be revised and adapted to the legislation and situation of the Spanish plants. During 2003 and 2004 the CSN is analysing these possible adaptations, although there will not be any change in the current situation during the period of time considered in this report.

During this period, an in-depth analysis has been performed of the systematic approach to evaluation used in the CSN. As a result, internal procedures have been developed for evaluation and for the categorisation of the corresponding findings.

The objective of the evaluation procedure is to establish a common framework for the treatment of assessments concerning nuclear facilities. For this purpose a process is defined for the internal handling of assessment documentation, the documentation provided by the licensee having to first successfully pass a quality check before the evaluation itself is performed. A system contemplating the responsibilities of the different CSN organisational units has been set up and the associated activities have been defined. The system established for performance of the evaluation is open and, depending on the background, complexity and impact on safety, among other things, different evaluation techniques are postulated and resources are assigned. The assignment of resources and the disciplines to be incorporated are analysed depending on the multidisciplinary nature and the scope of the evaluation. Requests for information from the licensee are reduced a bare minimum and are distinguished from mere clarifications. A critical point of the process is the need to determine the applicable standards and acceptance criteria.

An evaluation findings categorisation procedure has been developed in parallel with the evaluation procedure. Its objective is to identify the findings of the evaluation and characterise them on the basis of three attributes: i) compliance with the standards; ii) impact on safety and iii) the quality of the licensee's work. A detailed analysis of compliance with these attributes is performed, resulting in a declaration of compliance or non-compliance. Depending on the different combinations, a set of categories is established and the different actions to be considered are derived for each: i) correction of the documentary deficiency identified; ii) impact on the current operation of the facility; iii) standards validity analysis; iv) direct impact on licensee processes and v) accumulative impact on licensee processes.

The process of categorisation makes it possible to identify findings and modulate the response of the regulatory body to them, assigning the highest intensity to those that most compromise the safety of the facility. The categorisation process allows very useful information to be acquired on the competence of the licensee, by making it possible to

generate a historic record of findings by disciplines, as a result of which the regulatory body may impinge directly on specific aspects of the licensee's processes without unduly compromising his entire organisation. Likewise, it allows a sufficiently objective system to be established for the comparison of competences between licensees.

7.4 Degree of compliance with the obligations of the Convention

With the legal and regulatory modifications performed, and following their implementation by the Organisation during the period, Spain may be said to have improved its degree of compliance with the requirements of this article in relation to the establishment and maintenance of a legal framework applicable to nuclear facilities.

APPENDIX 7.A

Safety guides approved by the CSN, updated status

	Guides approved	Date of approval	Technical revision
GS-1.1	Qualifications for the acquisition and use of nuclear power plant operating personnel licences.	March-86	Revision 1 expected 2004
GS-1.2	Nuclear emergency dosimetry model.	October-1990	
GS-1.3	Nuclear power plant emergency plan.	May-1987	Revision 1 expected 2004
GS-1.4	Radiological control and surveillance of liquid and gaseous radioactive effluents released by nuclear power plants.	December-1988	Revision 1 expected 2004
GS-1.5	Documentation on refuelling activities at light water reactor nuclear power plants.	December-1990	Cancelled, but will reappear as a SG as a result of Rev-1 of IS-2.
GS-1.6	Reportable events at operating nuclear power plants.	January-1990	Revision 1 expected 2004
GS-1.7	Information on nuclear power plant operation to be submitted to the CSN by the licensees.	April-2004	
GS-1.9	Emergency drills and exercises at nuclear power plants.	January-1996	Revision 1 expected 2004
GS-1.10	Periodic safety reviews at nuclear power plants.	December-1995	Revision 1 expected 2004
GS-1.11	Design modifications at nuclear power plants.	July-2002	
GS-1.12	Practical application of the optimisation of radiation protection in nuclear power plant operation.	February-1999	
GS-1.13	Contents of nuclear power plant operating regulations.	March-2000	
GS-1.14	Criteria for the performance of Probabilistic Safety Assessment applications.	January-2001	
GS-1.15	PSA updating and maintenance.	March-2004	
GS-4.1	Design and development of the Environmental Radiological Surveillance programme for nuclear power plants.	June-1993	

	Guides approved	Date of approval	Technical revision
GS-5.1	Technical documentation for requests for construction and start-up permits for facilities handling and storing non-encapsulated radioactive isotopes (2nd and 3rd category).	June-1986	Revision 1 expected 2004
GS-5.2	Technical documentation for requests for construction and start-up permits for facilities handling and storing encapsulated sources (2nd and 3rd category).	October 1986	Revision 1 expected 2004
GS-5.3	Control of the hermetic sealing of encapsulated radioactive sources.	June-1987	
GS-5.5	Technical documentation for requests for construction and start-up permits for radiotherapy facilities.	June-1988	Revision 1 expected 2004
GS-5.6	Qualifications for the acquisition and use of radioactive facility operating personnel licences.	June-1988	Revision 1 expected 2004
GS-5.7	Technical documentation for requests for construction and start-up permits for X-ray facilities for radiodiagnosis (Replaced by R. D. 1891/1991).	January-1988	Cancelled. Arrangements for declaration and non-authorisation, Royal Decree 1981/1991
GS-5.8	Basis for the preparation of information relating to the operation of radioactive facilities.	November-1988	
GS-5.9	Documentation for requests for the authorisation and entry of X-ray equipment sales and technical assistance companies.	March-1998	
GS.5.10	Technical documentation for requests for the authorisation of X-ray facilities for industrial purposes.	October-1988	Revision 1 expected 2004
GS-5.11	Technical aspects of safety and radiation protection at X-ray facilities for medical diagnosis.	October-1990	
GS-5.12	Homologation of training courses for the supervisors and operators of radioactive facilities.	March-1998	
GS-5.14	Safety and radiation protection at industrial gammagraphy radioactive facilities.	October-1998	

	Guides approved	Date of approval	Technical revision
GS-5.15	Technical documentation for the request of type approval for radioactive apparatus.	November-2001	
GS-5.16	Technical documentation for the request of operating permits for radioactive facilities containing industrial process control equipment.	January-2001	
GS-6.1	Quality assurance in the transport of radioactive substances radiactivas.	July-2002	
GS-6.2	Radiation protection programme applicable to the transport of radioactive materials.	December 2002	
GS-6.3	Instructions on emergencies in the transport of radioactive substances	July-2004	
GS-7.1	Technical-administrative requirements for Individual Personnel Dosimetry Services.	November-1985	Revision 1 expected 2004
GS-7.2	Qualifications for recognition as an expert in protection against ionising radiations for the undertaking of responsibility for the corresponding Service or Technical Unit.	October-1986	Cancelled, on being replaced by IS-03 (BOE 12-12-03)
GS-7.3	Basis for the establishment of Services or Technical Units for Protection against Ionising Radiations.	June-1998	
GS-7.4	Basis for the medical surveillance of workers exposed to ionising radiations.	June-1998	Cancelled on approval of the Protocol of the Min. of Health for the medical surveillance of exposed workers
GS-7.5	Actions to be implemented in the case of persons affected by radiological accidents.	April-1989	Revision 1 expected 2004
GS-7.6	Contents of radiation protection manuals for nuclear facilities and radioactive facilities pertaining to the nuclear fuel cycle.	September-1992	
GS-7.7	Radiological control of drinking water.	January-1994	Revision 2 expected 2004
GS-8.1	Physical protection of nuclear materials at nuclear and radioactive facilities.	March-2000	

	Guides approved	Date of approval	Technical revision
GS-9.1	Control of the low and intermediate level radioactive waste solidification process.	July-1991	
GS-9.2	Management of solid radioactive waste materials generated at radioactive facilities.	December-2001	
GS-10.1	Basic guide on quality assurance at nuclear facilities.	February-1999	
GS-10.2	System of documentation subject to quality assurance programmes at nuclear facilities.	July-2002	
GS-10.3	Quality assurance audits.	November-2001	
GS-10.4	Quality assurance for the start-up of nuclear facilities.	September-1987	
GS-10.5	Quality assurance for processes, testing and inspections at nuclear facilities.	July-1999	
GS-10.6	Quality assurance in the design of nuclear power plants.	April-2002	
GS-10.7	Quality assurance at operating nuclear facilities.	April-2000	
GS-10.8	Quality assurance for the management of elements and services for nuclear facilities.	January-2001	
GS-10.9	Quality assurance for computer applications relating to the safety of nuclear facilities.	October-1998	
GS-10.10	Qualification and certification of personnel performing non-destructive tests.	February-2000	
GS-10.11	Quality assurance at first category radioactive facilities.	November-2000	
GS-10.12	Radiological control of scrap recovery and recycling activities.	February-2003	
GS-10.13	Quality assurance for the dismantling and decommissioning of nuclear facilities	May-2004	

Article 8. Regulatory body

As has been pointed out in previous reports, in Spain the regulatory function in relation to nuclear safety and radiation protection is undertaken by various authorities.

The Government takes charge of energy policy and of issuing mandatory regulatory standards.

The Ministry of Industry, Tourism and Commerce[5] adopts agreements and binding decisions in relation to the issuing, modification, suspension or revocation of authorisations for nuclear facilities and has powers to impose sanctions against those infringing the legally established requirements. Subject to the necessary and, where appropriate, binding report from the CSN, it grants the different authorisations and permits for nuclear facilities. Significant among its functions is the regulatory capacity to adopt Provisions in the development of parliamentary Laws and Government Regulations.

The Nuclear Safety Council is the organisation solely responsible in Spain for nuclear safety and Radiation Protection. It is independent from the Government and reports on its activities to Parliament.

8.1 Functions and responsibilities of the CSN

The functions and responsibilities of the CSN have not been modified substantially since the last Report. Consequently, work continues in accordance with the legislative changes that have occurred in recent years, which significantly altered the realm of competence and functions of the CSN. As regards environmental radiological protection, the CSN controls and monitors radiological quality throughout the Spanish territory, and not only in the areas surrounding the facilities. In relation to radioactive wastes, the CSN intervenes in controlling their management and may even, in certain circumstances, propose the declassification of low and intermediate level wastes. In emergency situations the CSN coordinates whatever resources might be required for compliance with those functions for which it is responsible. Furthermore, the CSN approves technical standards and has the powers to issue favourable reports on new designs and methodologies and to issue warnings to the licensees, propose corrective measures and, where appropriate, to impose coercive fines. Finally, the CSN is in charge of regulating companies in matters relating to radiation protection.

The Regulations Governing Nuclear and Radioactive Facilities unified the general content of the authorisations and brought their provisions into harmony with those of other general standards. These Regulations contemplate a series of functions for the CSN, such as participation on the Information Committees, which comprise representatives of the Government, the appropriate Autonomous Community, the municipal areas in which the plants are located and the plants themselves. The function of these committees is to inform different organisations on the development of the activities regulated.

[5] Royal Decree 1554/2004, of 25th June, which develops the basic organisational structure of the Ministry of Industry, Tourism and Commerce, establishes that areas of competence corresponding at that time to the Ministry of Economy are now transferred to Industry.

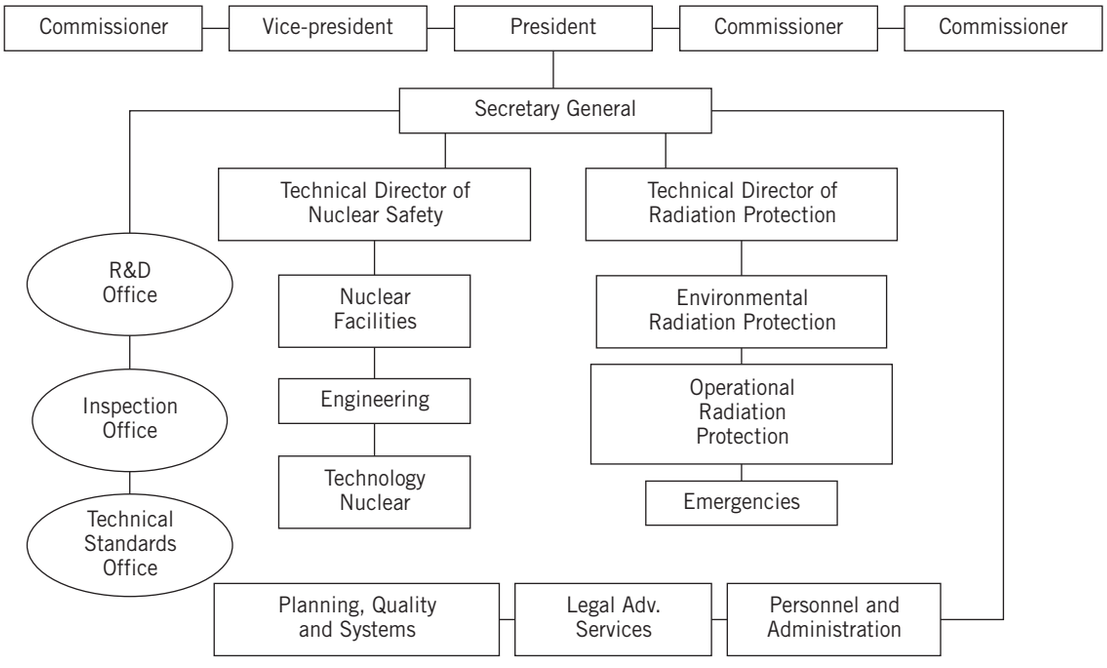
Other particularly significant issues that have affected the missions and responsibilities of the CSN refer to the creation of a register of haulage companies transporting nuclear substances and radioactive materials and to the regulation of the approval of new designs and methodologies. Furthermore, the CSN has been given missions relating to public information and emergency response.

The strengthening of certain areas of CSN activity and the need to address the new attributes, especially those relating to environmental radiological surveillance and coordination and response in the event of radiological emergency situations, has gone hand in hand with the need to introduce certain changes in the organisational structure. The objective of these changes is to achieve a better fit between the existing resources and the new needs requiring specific attention, separating the organisation of issues relating to the safety of nuclear facilities from that of others relating to radiation protection.

8.1.1 Structure of the CSN

The organisational structure of the CSN is currently as shown below (figure 8.1):

Figure 8.1 CSN Organisational Flowchart



Units reporting directly to the Secretariat General

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

- Sub-Directorate General of Planning, Information Systems and Quality.
- Sub-Directorate General of Personnel and Administration.

- Sub-Directorate General of Legal Advisory Services.
- Inspection Office.
- R&D Office.
- Technical Standards Office.

Technical Directorate of Nuclear Safety

Under this Technical Directorate are grouped all functions relating to the safety of nuclear facilities, except the disposal of low and intermediate level radioactive wastes, which is the responsibility of the Technical Directorate of Radiation Protection. The Directorate is responsible also for safety in the transport of nuclear substances and radioactive materials.

This grouping of areas of competence under a single, highly specialised management centre will allow for the optimisation of inspections, regulatory efficiency and the control of nuclear facilities.

Three Sub-Directorates General report to the Technical Directorate of Nuclear Safety:

- Sub-Directorate General of Nuclear Facilities.
- Sub-Directorate General of Nuclear Technology.
- Sub-Directorate General of Engineering.

Technical Directorate of Radiation Protection

In addition to the inspection and control of radioactive facilities, of the radiation protection of the workers and of the management of low and intermediate level radioactive wastes, this Technical Directorate is in charge of the new areas of competence relating to the radiation protection of the public and the environment and to radiological emergencies.

Three Sub-Directorates General report to the Technical Directorate of Radiation Protection:

- Sub-Directorate General of Environmental Radiation Protection.
- Sub-Directorate General of Operational Radiation Protection.
- Sub-Directorate General of Emergencies.

8.1.2 Review of the Strategic Orientation Plan

During 2002 the CSN drew up an *Action plan* for the modernisation of its operations. The objective of this plan is to serve as an instrument for the improvement of the administrative and technical procedures, the optimisation of resources management and the adequate use of information technologies, and to favour communications between the different units of the Council in the performance of their functions.

In this respect, the following aspects, among others, were studied and analysed: functions, organisation, management macro-processes, information systems, interactions with the clients, relations with other entities and the best practices of other similar organisations.

The *Action plan* is built around five *strategic axes* relating to the strengthening and definition of the mission, the vision and the strategic objectives of the Organisation, the

definition of a transparent and efficient internal management model, the streamlining and adaptation of the organisational structure to the new needs imposed by the environment, the optimisation of the efficiency and effectiveness of internal processes and, finally, an increased sense of mutual trust between the stakeholders, the CSN and the general public.

Subsequently, a series of strategic objectives were defined and a proposal for specific actions for the development of each, contemplating strategic, operational, technological, communications and motivation aspects.

These actions, duly prioritised, have given rise to a proposal that includes a series of short and medium-term projects for the modernisation of the operations of the Nuclear Safety Council. The first of these projects is the drawing up of a new CSN Strategic Plan.

During 2003 great efforts have been made in drawing up the CSN Mission, Vision, Values and Strategic Plan. More than 95 people have participated, 28 personal interviews have been carried out and 18 working meetings have been held. On 15th October 2003, following a period of compilation and analysis of the comments made by the organisation, the Council approved the CSN Mission and Vision, and its characterisation. The definitive wording approved is as follows:

- MISSION: "The Mission of the CSN is to protect the workers the population and the environment against the harmful effects of ionising radiations, ensuring that nuclear and radioactive facilities are operated safely by the licensees and establishing prevention and correction measures to respond to radiological emergencies, irrespective of their origin".
- VISION: "An organisation independent from the Public Administrations and the Licensees of the facilities that reports to the Parliament of the Nation. It is technically qualified for its proposals and decisions to be rigorous and for its activities to be performed efficiently and transparently, such that it warrant the trust of Spanish society and constitute a point of reference at international level".

A document proposing the three strategic lines of the organisation: effectiveness (safety of facilities and activities), efficiency and credibility, was issued during the second half of the year. Also proposed were the strategic objectives and the projects that will allow them to be achieved during the period of validity of the plan.

8.1.3 CSN Internal Quality Plan

Since 2001, the CSN has been dedicating an average number of 8,370 hours per year to internal quality, this equating to 1.4% of the hours available.

As of 15th April there were 85 procedures approved, 25 management-related, 11 administrative and 49 technical. Appendix 8.A includes a list of these procedures.

The second of the projects contemplated in the Action plan referred to in point 8.1.2, Process Re-engineering, was initiated in December 2003. Improving the effectiveness and efficiency of the CSN makes it necessary to focus on the key processes of the organisation, this implying the need to establish a dynamic of optimisation, review, modification and updating of the processes, bringing them into line with the strategic objectives, maximising opportunities for improvement and eliminating unnecessary costs. For this purpose it is necessary to incorporate into these processes both the best practices in place inside the Organisation and those implemented by other similar regulatory organisations.

The Re-engineering project is in line with the current trends being followed by the Public Administrations, which recognise the need to change the way in which interactions with stakeholder groups are handled, increasing the quality of the services rendered and reducing response times. Through this project the CSN plans to optimise the rendering of its services, reducing response times and increasing flexibility.

The redesign and optimisation of processes should make it possible to identify the processes or circuits that are basic to the activity of the CSN and determine how they are conceived and how they might be modified in order to increase their efficiency. The project should offer the opportunity of re-examining the fundamentals of the Regulatory Body's operations, focussing on results and eliminating everything that does not add value.

8.1.4 Review of CSN financing/CSN resources and personnel

The Nuclear Safety Council has its own estate and budget, independent from those of the Government. The budget is integrated into the General State Budget and is subject to approval by the Parliament.

Until the beginning of the year 2000, the organisation was fully self-financing, with revenues coming from the fees charged for services rendered.

Law 14/1999 on Public Tariffs and Prices for services rendered by the Nuclear Safety Council attributed new functions to the CSN. The performance of certain of these functions does not carry with it the possibility of applying a tariff, for which reason the Government was urged by two Resolutions of the Congressional Industry, Energy and Tourism Commission, both issued in 1999, to provide financing for the CSN, charged against the General State Budget, for the performance of Environmental Radiological Surveillance (ERS) throughout the entire country.

This financing, complementary to that received by the CSN through fees, amounted to 1,673,270 euros in 2002 and to 1,706,740 euros in 2003, representing 3.98% of the total budget.

The functions of the CSN, differentiated by financing methods, are currently as follows:

Financed through fees:

- Inspection and control of nuclear and radioactive facilities and related activities.
- Performance of studies and issuing of reports previous to the authorisations granted to these facilities by the Ministry of Economy, or the Ministry of Industry, Tourism and Commerce as from April 2004.
- Granting of licenses to the personnel in charge of operating and supervising the operation of the facilities in question and the homologation of courses.

Financed partly against the General State Budget:

- Control of measures for the radiation protection of the general public and the environment.

Financed via public tariffs:

- Approval of methodologies, simulation models or protocols in response to requests.

- Drawing up of reports, tests or studies relating to the radiation protection of the public or the environment in response to requests.

The total budget of the CSN for the 2003 financial year amounts to 42,924,100 euros. As regards expenses, somewhat more than half corresponds to the personnel and a quarter to operating costs.

As of 31st December 2003, and including the eight top management posts (President, four Board Members, Secretary General and two Technical Directors), the CSN personnel numbered 446, of which 191 are civil servants belonging to the Nuclear Safety and Radiation Protection Technical Unit, dedicated to the inspection, control and monitoring of the operation of nuclear and radioactive facilities, another 111 are civil servants belonging to other public administrations, 29 are part-time office personnel and 107 have full-time work contracts (see table 8.1)

Table 8.1 Distribution of the Nuclear Safety Council personnel as of 31st December 2003

	Board	Secretariat General	Technical Directorates	Total
Top Management	5	1	2	8
Civil Servants belonging to the NS and RP Technical Directorates	3	17	171	191
Civil Servants belonging to other Public Administrations	4	82	25	111
Part-time Personnel	28	1	–	29
Contract Personnel	5	74	28	107
Totals	45	175	226	446

8.1.5 CSN personnel training plan

The CSN Strategic Orientation Plan includes an Annual Training Plan, the objective of which is to achieve the highest levels of qualification of the personnel and cover the needs for adaptation to the new working methods demanded.

All the training activities were re-grouped into five areas, which have been developed throughout the four-year period (table 8.2):

- Nuclear Safety and Radiation Protection.
- Development of management, organisational and communications skills.
- Administration and management.
- Information systems.
- Languages.

The objectives established were aimed at achieving training on three major levels: general, specialist and informative.

The strategic plan determined the way in which these would be financed and who would be responsible for their management. The Plan has been evaluated annually and different measures have been adopted to adapt it to the specific needs of the units depending on the demands made.

Overall, the balance for the three-year period 2001-2003 may be considered positive. The amount corresponding to expenses in training activities was 1,240,818.45 euros, representing an annual average of some 413,606.00 euros. Furthermore, the training programme for a group of people such as that constituted by the CSN, which has remained practically constant in number, has made it possible to cover most of the general and specialist training objectives.

Likewise, the presence of the Council in national and international forums (congresses, meetings, seminars, etc.) relating to its functions and areas of competence continue to be promoted.

Table 8.2 shows the evolution of the number of people attending the courses, the hours of attendance and the budget executed by the different areas of the training Plan. As may be observed, the training in the technical area of nuclear safety and radiation protection is the largest budget item.

Table 8.2 Evolution of the number of peopel attending training courses

Area	Year	Number of attendees	Total hours	Budget executed (euros)
Nuclear Safety	2001	206	6,168	172,060.25
	2002	224	6,020	233,085.18
	2003	149	4,991	182,595.70
Radiation Protection	2001	158	2,740	58,002.30
	2002	273	5,324	104,505.45
	2003	144	3,028	93,821.81
Development of management	2001	136	602	8,053.56
organisational and	2002	72	407	7,343.36
communications skills	2003	17	886	32,090.50
Administration and management	2001	115	1,801	12,669.94
	2002	171	3,369	28,945.49
	2003	272	3,502	18,790.09
Information systems	2001	156	1,647	43,141.21
	2002	186	3,433	43,266.31
	2003	24	144	7,026.94
Languages	2001	56	n.d.	40,105.96
	2002	76	n.d.	49,224.08
	2003	390	12,376	106,090.32

8.1.6 Evolution of CSN international relations

The international relations maintained by the CSN are developed both through bilateral contacts with organisation in other countries and through international forums and organisations, the main aim being to exchange experiences, information and training with peer regulatory bodies and to provide expert advice in the Council's areas of competence.

In this context, the CSN participates actively in the IAEA, the NEA, the Ibero-American Forum, the working groups of the European Union, WENRA and INRA and in six International Conventions.

IAEA

Particularly noteworthy as regards relations with the IAEA during this period has been the contribution of a sum outside the budget for the setting up of the Ibero-American Nuclear and Radiological Safety Network.

The CSN continued to participate in working groups such as the International Nuclear Safety Advisory Group (INSAG), the Commission on Safety Standards (CSS) and its groups: the Nuclear Safety Standards Committee (NUSSC), the Radiation Protection Standards Committee (RASS), the Committee on Standards for safety in Transport (TRANSS) and the Waste Management Standards Committee (WASS). During 2003, Spain has chaired the Board of Governors.

Conventions

Likewise, and under the auspices of the agency, the CSN has participated, along with the Ministry of Economy, the National Radioactive Waste Management Agency (Empresa Nacional de Residuos Radiactivos - ENRESA) and the Spanish Electricity Industry Association (Unesa), in the drawing up and defence of the First National Report on the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the first review meeting of which was held in Vienna in November 2003.

During this period the CSN has also participated in the group of technical and legal experts set up to modify the Convention on the Security of Nuclear Materials. In the OSPAR Convention, the CSN is a member of the Radioactive Substances Committee and has drawn up the 2002 report on releases from nuclear facilities, as required by the Convention. Likewise, it fulfils the obligations included in other conventions to which Spain is party, such as the following:

- Convention on the Prompt Notification of Nuclear Accidents.
- Convention on Mutual Assistance in the event of Nuclear Accidents or Radiological Emergencies.
- Convention for the protection of the Marine Environment of the North-East Atlantic.

European Union

Within the European Union, there has been increased participation in the groups of the Commission and of the Council, with experts being provided for the tasks of the Regulatory Assistance Management Group (RAMG), the European Concertation Group

(CONCERT) and the Atomic Questions Group, to which the Working Parties on Nuclear Safety (WPNS) reports. These have worked on the creation of the Community directive on high activity sealed sources, the project for the directive on the nuclear safety of nuclear facilities and on the safe management of radioactive wastes and on peer reviews to Bulgaria. Within this forum Spain proposed and provided impetus for the development of the Council Resolution on the creation within the Member States of national systems for the surveillance and control of radioactive materials in the recycling of metallic materials (DOCE, C-119, of 22nd May 2002).

Mention may be made of the CSN's participation in various projects for assistance to the Ukrainian regulatory body, financed by the European Commission using TACIS funds, and in the TAREG 01/01 project for assistance to the Commission itself in reviewing the work performed to date and identifying future assistance projects for the beneficiary nations.

As a result of Spain's chairing the Council during the first half of 2002, one of the priorities of which was to provide impetus for the process of extending the European Union, a working group on Nuclear Safety was set up, presided over by the CSN. This group undertook a peer review that resulted in a document on the candidate nations agreed to by all the Member States of the EU, the "Peer review status report" (Doc. 9601/02 ATO ELARG 197 of 5th June 2002). This was a technical report that included the commitments of the candidate nations as a result of the recommendations up to the moment of their joining, one of which was the closure of various nuclear power plants.

NEA

Within the NEA/OECD the CSN has continued to participate on the 5 technical committees to which it belongs. Furthermore, in 2002 Spain was admitted to the Nuclear Law Committee.

Particularly noteworthy during this period has been the CSN's active participation in initiatives relating to decision-making and its role in developing mutual trust between the authorities and the public, as well as in the interrelations between communication, transparency and the independence of regulatory authorities.

In this respect, the CSN is carrying out a review programme on improved efficiency in its actions, taking the operating indicators as a point of reference.

In 2003 the CSN organised the NEA forum held in Lanzarote, in collaboration with the *International Committee on Radiological Protection* (ICRP), during which future recommendations policies were discussed.

Ibero-American Nuclear Regulators Forum

This association of regulators promotes the exchange of information and experiences on nuclear safety and radiation protection and legal and organisational issues of mutual interest.

Particularly significant during this period has been the start-up of a project for the development of an information and know-how network relating to initial and on-going training, as a possible model for the creation of an Ibero-American network on nuclear safety.

Bilateral

The CSN has bilateral agreements with organisations in 19 countries. Throughout this period bilateral contacts have been increased by way of high level meetings held annually with these organisations to establish the basis for work and technical exchange during the year. In this respect, meetings have been held with the regulatory body of the United States (NRC) and the French regulatory body (DGSNR). Within the framework of the latter agreement, specific working groups have been set up to deal with dismantling issues, a scale for the assessment of incidents at radioactive facilities and communications, which with the exchange of experts and participation in inspections and emergency drills allow for the increased exchange of working practices.

Likewise, in 2002 bilateral agreements with Sweden (*Swedish Radiation Protection Authority*, SSI) and Great Britain (*National Radiological Protection Board*, NRPB) were renewed.

INRA and WENRA

Along with the Ibero-American Regulatory Forum, these two associations constitute important forums in which the maximum representatives of the regulatory bodies can identify ways to improve nuclear regulation and exchange points of view on global regulatory policy issues.

While the International Nuclear Regulators Association, INRA, continues to place emphasis on open dialogue for the exchange of general information, the European Nuclear Regulators Association, WENRA, which since 2003 also includes all the new Member States and countries aspiring to join the extended European Union and possessing nuclear power plants, dedicates much of its effort to bringing about harmony between standards and working practices. In this respect, each working group is drawing up a report in which the national practices are compared to the IAEA standards.

8.1.7 Evolution of R&D activities and results obtained

During 2002 R&D activities led to 43 projects and the management of a budget amounting to 3,306,000 euros, with 13 projects being completed. In 2003 there have been 40 projects and a budget of 3,104,000 euros, with 10 being completed during the year.

In accordance with the guidelines established in the CSN research plan, a large part of the research projects are undertaken in collaboration with other institutions, the collaboration with UNESA in the coordinated research plan and with Ciemat, Enresa and Enusa being particularly noteworthy. Also relevant is the CSN's participation on the Strategic Nuclear R&D Committee (Ceiden), created by the Ministry of Economy for the establishment of plans of national scope.

The research projects carried out contributed to improving knowledge and the methods and tools used by the CSN personnel in performing their functions, helping to make their interventions more efficient and effective. They also allowed the competence of the organisations that are the licensees of regulated facilities or activities and of those providing support to the CSN or the licensees, such as research centres or universities, to be increased.

It is important to point out that in 2003 the strategic orientations of the research plan currently in force were revised and that for this purpose the CSN set up an internal

working group that prepared a document containing these new strategies and serving as a basis for the drawing up of a new research plan orienting future R&D activities and projects. These strategic lines are as follows:

- Programme 1: Fuel.
- Programme 2: Primary coolant pressure boundary.
- Programme 3: Containment and severe accidents.
- Programme 4: Probabilistic safety assessment and human factors.
- Programme 5: Personnel radiation protection.
- Programme 6: Assessment of radiological impact.
- Programme 7: Reduction of radiological impact.
- Programme 8: Spent fuel and high level wastes.
- Programme 9: Advanced plants.

It is also worth underlining that in 2004 the CSN has initiated a new R&D management model through the awarding of grants to projects in keeping with the functions of the organisation, by means of public calls for bids. This allows all types of organisations and entities to apply for R&D aids and also makes it possible for interest in studies and research on nuclear safety to be maintained, in relation to the aforementioned strategic lines.

Finally, it should be pointed out that the CSN periodically reviews the "CSN Research Plan", which in 2004 has been updated for a period of 4 years. It also publishes annually a "Report on the products and benefits of completed research projects".

Through publications and working sessions the CSN informs on the progress and results of the most relevant on-going research projects.

Appendix 8.B contains the R&D projects completed in 2001, 2002 and 2003.

8.1.8 CSN public information policy

As established by the Law creating the CSN, one of the functions of the Council is to "inform the general public on issues within its realm of competence". Over the years a programme has been carried out with a view to fulfilling this obligation, attempting to align the activities performed with the concepts of agility and rigour.

The general objective of the activities performed in this area has been to keep the general public informed as directly as possible, promptly providing relevant information. The actions have centred on the following:

- The adoption of a proactive approach, promoting the performance of communication and information activities quickly and with sufficient time prior to such activities being demanded.
- The homogeneity of the contents: criteria have been established regarding what needs to be communicated, in order to speed up the process.
- The broadcasting of information to the population directly and indirectly, using the information channels available to the CSN.

- Participation as a reference source in all information relating to the realm of competence of the CSN, promoting the credibility of the organisation.
- Availability of information for the population, the media or opinion leaders when demanded.
- Spreading and provision of information to the population, the authorities with responsibilities for issues relating to the CSN and opinion leaders, with the subsequent optimisation of the informative resources of the CSN.

The study of the indicators corresponding to the different information-related activities of the CSN has led to a scenario in which society demands information with varying levels of interest, detail and immediacy, depending on the field of ionising radiation usage in question.

For this reason, the CSN's information and communications area has attempted to orient the different communications tools towards satisfying the different needs. The following information channels are available to the Nuclear Safety Council:

- Attention to the media, opinion leaders and authorities in relation to information: the activities performed in this area are made up of three steps. Firstly, the internal preparation of the information, with the intervention of the technical services and the information and communications area, applying criteria of the greatest rigour and undertaking the preparation in the shortest time possible. Following this, the information is widely distributed among the authorities and institutions concerned, associations, stakeholders and the media. This distribution is accomplished simultaneously via different channels in order to ensure the lowest possible levels of incidents. Finally, there are direct contacts with the media via telephone, fax or e-mail. Such contacts are carried out in response to requests from the interested parties, with a view to extending or further clarifying the information issued.
- Conferences, seminars and training activities: the CSN participates actively in the organisation of these events or in collaboration with other public and private institutions, the aim being to get as close as possible to the general public without the need for information intermediaries. With this same objective in mind, the organisation participates in different fairs and congresses, with informative and educational stands.
- Institutional website: the CSN activity on the internet, initiated in 1996, has undergone change in 2003. The contents, structure and image have been renewed. New tools have been included promoting interactivity between the users of the site and its managers. The site contains both stationary and updated information on all the relevant activities of the CSN.
- Information Centre: this is a 350 square meter exhibit at which interactive museum techniques are used. The centre is aimed at audiences of all types, since the visits may be adapted, but focuses essentially on young people of school age. In recent years the average number of visitors has exceeded 5,000 per year.
- Publications: the CSN is very active in the issuing of a wide range of technical and informative publications. The publications plan includes the yearly Report to Congress and the Senate, the quarterly journal "Seguridad nuclear" (Nuclear Safety), safety guides and other technical documentation, collections on different subjects relating to nuclear safety or radiation protection, specific publications on various issues and corporate information.

8.2 Effective separation between the functions of the regulatory body and the promotion of nuclear energy

The CSN reports on its performance to the Parliament (Congress and Senate) and is obliged to submit an annual report on its activities.

As a result of the ministerial restructuring that occurred in April 2004, the mandatory reports that the CSN formerly submitted for the awarding of authorisations or in relation to regulation proposals to the Ministry of Economy are now sent to the Ministry of Industry, Tourism and Commerce.

The Nuclear Safety Council has Collaboration Agreements with the Ministry of Education and Science, the Ministry of the Interior (in relation to emergencies) and the Ministry of Public Health and Consumption. It also participates in *ad hoc* Working Commissions with the Ministries of Defence, Pubic Works and Public Health and Consumption.

8.3 Regulatory efficiency improvement programmes

8.3.1 Improvement of the efficiency of regulatory body processes

The entry into force of the Electricity Industry Act, Law 54/1997, of 27th November, modified the legislative framework within which electricity-related activities had previously been carried out. Like other agents involved in the electricity business, the licensees of the Spanish nuclear power plants face new challenges requiring improvement in the efficiency of their processes. This in turn implies new improvement challenges for the Regulatory Body, in relation to its operating safety supervision and surveillance functions concerning the plants operated by these licensees. The improvement of safety through the operational improvement of the nuclear regulatory authorities is also perceived internationally as being one way to strengthen public confidence in the regulatory system. As the Spanish regulatory body, the CSN is not unaffected by this perception.

With a view to identifying the relevant aspects that needed to be improved in the regulatory process, a joint working group was set up including the technical personnel of the CSN and the licensees, with the following objectives: (1) to make a brief compilation of the activities being performed by the CSN and the licensees to improve the efficiency of the regulatory process, (2) to select a few representative countries, including in all cases those that are suppliers of Spanish plant designs (USA and Germany), and undertake an analysis of their regulatory frameworks from the point of view of regulatory efficiency, (3) to perform a brief analysis of the proposals for improvement drawn up by the NEA and the IAEA and (4) on the basis of the above, to identify actions for improvement of the regulatory process in Spain, in order of priority and including a summary of their scope.

Given the amplitude of the issues to be considered, it was considered appropriate to limit the scope of the analysis to fundamental regulatory activities: (1) the issuing of regulations, standards and guides, (2) assessment, (3) inspection and control and (4) corrective actions, analysing the activities carried out by the regulatory body, the licensees and support organisations performing safety-related functions[6] and paying special attention to the improvement of the efficiency of communications between the licensees and the CSN.

[6] Throughout this section, the term "safety" is used in a general sense, referring both to nuclear safety and to radiation protection.

The joint working group was made up of five CSN technicians and another five from Unesa and held 12 working meetings. Its activities began with the drawing up of a questionnaire on each of the areas selected, allowing the details of the analysis to be performed to be focussed. The group then followed up this task, applied to the Spanish case, by identifying aspects open to improvement, selected the countries to be studied, analysed the available documentation, completing and clarifying the information via meetings with the licensees and regulatory authorities of these countries, extracted useful practices and lessons and, finally, drew up an action proposal.

The members of the Group considered it advisable to improve the efficiency of the regulatory process by orienting it towards an approach based more on performance and risk significance and aimed at surveillance of the processes. It also considered that a fundamental element was to improve communications and mutual trust between the regulator and the parties regulated. In this respect, the very working dynamic of the group helped to bring the positions of the two sides closer and to implement a working philosophy based on collaboration, this being considered highly appropriate for any future process of improvement associated with the regulatory framework and to address proposals for implementation.

The action plan developed has been structured around the following tasks:

- **Drawing up of CSN and licensee policy documents** containing the basic criteria and lines of action of each organisation regarding the four elements of the regulatory process that have been the subject of the work performed, i.e., regulation, assessment, inspection and corrective actions.
- **Establishment of a "pyramid" reflecting Spanish nuclear regulation** with the standards and regulations arranged in hierarchical fashion depending on their legal rank or importance and clarification of the legal standing with which the standards of the country of origin of the design are applied to Spanish facilities. Likewise, compilation of the licensing basis of each facility, facilitating consultation by both the licensee and the CSN.
- **Definition of an operations-based, risk-informed supervision system inspired by the NRC's *Reactor Oversight Process* (ROP)**. The aim here is not simply to translate the ROP to the Spanish case but rather to analyse it and introduce whatever adaptations are required in keeping with the Spanish regulatory system and the experiences acquired in this country. Consequently, it is first necessary to carry out the aforementioned analysis and adaptation tasks.
- **Improvement of licensee Self-assessment and Corrective Actions programmes**, in keeping with a supervision system similar to the *Reactor Oversight Process* (ROP), adapted to the Spanish case, increasing the accessibility of information within the organisation of the licensees and the CSN.
- **Classification of documentation submitted by the licensees to the CSN**, in order to separate the documentation requiring supervision via the habitual control processes from that requiring evaluation, assigning to the latter levels of importance, priority and term with a view to optimising the resources available for assessment.
- **Development of a systematic approach for the use of PSA within the framework of "risk-informed regulation" (RIR).** The objective here is to establish rational processes agreed to by the licensees and the CSN in order to take advantage of the potential

offered by RIR, the starting point being one in which both Spanish industry and the CSN have wide experience of the development of "risk-informed" processes.

- **Improved efficiency of assessment processes** regarding the development of criteria for the determination of the safety significance of the issues to be assessed and of the findings of the assessments, the improvement of the planning of activities and the optimisation of licensee/CSN interfaces and the levels and means of communication between the CSN technical staff and the licensees (reduction of paper work).
- **Analysis of the suitability of the Periodic Information submitted to the CSN by the Licensees**, as regards both volume and content, in order to prevent the issuing of superfluous or repeated information. *Reduction of Bureaucratic Arrangements* in order to eliminate actions not providing added value and *Modification of the Sanctions System* in order to improve the treatment of the cases of non-compliance and deficiencies detected, establishing measures proportionate to the impact on risk and safety.
- **Improved quality of the requests and supporting technical documentation submitted by the licensees and establishment of a suitable and agile procedure for the awarding of justified exemptions relating to the official operating documents.** The establishment of precise acceptance criteria to be used by both the licensee and the CSN is considered to be especially important.

The performance of these tasks has been undertaken by joint CSN and licensee groups, in a manner similar to that applied to initial analysis, although whenever the aim is to implement specific actions within an organisation, these activities will be the exclusive responsibility of this organisation. In all cases fluid communications are maintained on the progress of the entire process.

Certain of these tasks have now been completed and others are in a very advanced stage of development. Work continues on those that require longer performance periods, such as the adaptation of a system similar to the NRC's *Reactor Oversight Process* (ROP). Certain pilot inspections have been performed within the "risk-informed inspection" programme and, as regards the working plan currently being prepared, definition of the set of indicators and their action thresholds and preparation of the inspection procedures and of the processes for determining the significance of the findings are expected to be completed by July 2005, as a result of which overall implementation could start as from that date.

8.3.2 Improvement of the efficiency of licensee processes interacting with those of the regulatory body

The liberalisation of the electricity market in Spain requires the licensees of electricity generating plants to carry out their activities on a competitive market, this in turn implying the need for them to optimise their operations, and consequently resources. The nuclear power plants are required to perform their activities simultaneously within a deregulated framework, as electricity generating facilities, and within a framework of regulation, as nuclear facilities. As a result, the efficiency of the processes affected by interaction between the licensees and the nuclear regulatory body (CSN) become one of the significant aspects to be considered in the management of nuclear facilities.

The efficiency of these processes does not depend on each of the parties independently. The processes of both parties have to be coherent and efficient in order to guarantee the

maintenance and improvement of the nuclear safety and radiation protection conditions under which the plants operate, this constituting the ultimate objective of any regulatory process.

For this reason, the licensees of the plants are interested in the efficiency improvement programmes of the regulatory body, collaborating with the latter to the extent necessary and promoting the improvement of their own equivalent processes in a coherent manner. The common goal is to achieve a stable and predictable regulatory framework that ensures that the available resources are dedicated to issues truly significant from the point of view of safety.

During the period covered by this report the nuclear power plant licensees have collaborated with the CSN in the search for new practices and measures for implementation by both parties and improving the efficiency of the processes of generating and applying standards, assessment, inspection and control of the facilities and corrective measures. All the above is oriented also towards achieving improved communications and mutual trust.

Certain of the measures identified are being implemented by the licensees as pilot experiences, within the integrated safety management system (see section 10.1), such as the self-assessment programmes and those integrating corrective measures. These last programmes consider the safety significance of the measures to be taken in order to ensure that they are all satisfactorily attended to. Likewise, new methods are being tested for the selection of newly issued standards whose applicability is to be analysed, and where appropriate implemented, in order to ensure that the plants maintain and improve their operational safety levels to a reasonable extent, thus contributing to the on-going improvement programmes implemented.

Other measures identified are being subjected for approval prior to being implemented. Among these mention may be made of the definition of a new supervision model using a set of plant operating indicators and a risk-based inspection model inspired by the NRC's ROP.

8.4 Degree of compliance with the obligations of the Convention

Spain meets the requirements of the Convention as regards the resources and independence of the Regulatory Body and has achieved important progress in compliance with the requirements of the Convention in relation to the changes mentioned in this article and referring to regulatory efficiency improvement programmes.

APPENDIX 8.A

Procedures approved as of 15th April 2004

Management procedures

PG.II.01. Institutional relations.

PG.II.02. International relations.

PG.II.03. Public information.

PG.II.04. Assignment agreements.

PG.II.05. Relations with the Administration and with stakeholder individuals and entities.

PG.IV.01. Mandatory CSN reports to the Administration. Nuclear facilities.

PG.IV.02. Mandatory CSN reports to the Administration. Radioactive facilities.

PG.IV.03. Inspection and control of nuclear facilities.

PG.IV.04. Inspection of radioactive facilities, transport and other regulated activities.

PG.IV.05. CSN interventions in sanctions proceedings relating to NS and RP.

PG.IV.06. Control of radioactive facilities and other related regulated activities.

PG.V.01. Planning, scheduling, tracking and control of activities.

PG.V.02. Project management.

PG.V.03. Management of external supplies and services.

PG.V.04. Annual budget.

PG.V.05. Fees and other revenues.

PG.VI.01. Collaboration with the Administration in emergency plans.

PG.VII.01. Control and surveillance of radiation levels. Professionally exposed workers.

PG.VII.02. Control and surveillance of radiation levels. The public and the environment.

PG.VIII.01. Nuclear facility personnel licences.

PG.VIII.02. Radioactive facility personnel licences.

PG.IX.01. Research activities.

PG.XI.01. Documentary management.

PG.XI.02. Quality management.

PG.XI.03. Information systems

Administrative procedures

PA.II.01. Classification of events using the INES scale.

PA.II.02. Communication to the institutions and the public of events at nuclear facilities.

PA.II.04. Updating and maintenance of the corporate website.

PA.IV.01. Basic nuclear facility inspection programme.

PA.IV.02. Systematic assessment of NPP operations. ESFUC Programme.

PA.X.02. Radiation protection of CSN professionally exposed workers.

PA.XI.01. Internal Audits.

PA.XI.03. Computer Support.

PA.XI.05. Maintenance of Information Systems.

PA.XI.07. Security measures for files containing personal data.

PA.XI.08. Treatment, custody and access to confidential documentation relating to the security of nuclear facilities and materials.

Technical procedures

PT.IV.02. Evaluation of operating NPP final safety analysis report revisions.

PT.IV.03. Tracking of NPP design modification management.

PT.IV.04. Inspection of surveillance requirements by the resident inspector.

PT.IV.05. Inspection of maintenance activities to be performed by the resident inspector.

PT.IV.06. Evaluation and inspection of nuclear and radioactive facility quality assurance programmes.

PT.IV.07. Evaluation and inspection of the quality assurance programmes of the suppliers of equipment and services for nuclear facilities.

PT.IV.08. Evaluation of Q lists.

PT.IV.09. Resident Inspector's Manual.

PT.IV.10. Evaluation of NPP refuelling outage planning.

PT.IV.11. Evaluation of periodic nuclear facility and fuel cycle radioactive facility dismantling reports.

PT.IV.15. Inspection for control of the low and intermediate level waste acceptance process for disposal at El Cabril.

PT.IV.16. Evaluation of the structural integrity of post-stressed containments.

PT.IV.17. Evaluation of the chemical parameters of the reactor coolant system and main systems of Spanish NPP's.

PT.IV.19. Inspection of the structural integrity of post-stressed containments.

PT.IV.20. Inspection of periodic class 1E battery tests.

PT.IV.21. Inspection of emergency diesel generator reliability maintenance.

PT.IV.22. Evaluation and inspection of auxiliary cooling water systems.

PT.IV.23. Evaluation and inspection of ventilation systems.

PT.IV.24. Inspection for the maintenance rule.

PT.IV.26. Evaluation and tracking of periodic ground movement controls at nuclear facilities

PT.IV.28. Evaluation for the approval and validation of transport packages.

PT.IV.29. Control of source supplies.

PT.IV.30. Inspection in the transport of nuclear substances and radioactive materials.

PT.IV.31. Inspection of radioactive facilities.

PT.IV.33. Evaluation of radiation protection services and technical units.

PT.IV.34. Evaluation of medical diagnosis X-ray equipment sales and technical assistance companies.

PT.IV.36. Performance of inspections of RPTU's rendering services to medical diagnosis X-ray facilities.

PT.IV.37. Evaluation of precursors by PSA.

PT.IV.40. Evaluation of probabilistic safety assessment (PSA) application proposals.

PT.IV.41. Evaluation of requests for authorisation for the transport of radioactive material.

PT.IV.42. Inspection of nuclear facility Site Emergency Plans.

PT.IV.43. Nuclear facility inspection report preparation, administration and formalities.

PT.IV.44. Processing of deviations detected during CSN inspections at nuclear facilities.

PT.IV.45. Preparation and performance of nuclear facility inspections.

PT.IV.48. Evaluation and inspection of NPP equipment environmental qualification programmes.

PT.IV.51. General processing of nuclear facility documentation by the CSN.

PT.IV.57. Evaluation of nuclear medicine radioactive facilities.

PT.IV.59. Evaluation of the radioactive facilities of medical and research laboratories.

PT.IV.60. Evaluation of soil humidity and density measuring facilities.

PT.IV.61. Evaluation of process control radioactive facilities.

PT.IV.62. Evaluation of PSA level 2 and its application to severe accident management.

PT.IV.63. Evaluation of nuclear facility seismic surveillance programmes.

PT.IV.67. Process of evaluation of issues relating to NPP's.

PT.IV.68. Categorisation of findings.

PT.VI.03. Automatic stations network (ASN) operating manual.

PT.VI.04. Intervention of the Operations Analysis Group in the event of emergency situations at NPP's.

PT.VI.05. Coordination of CSN interventions for the control and removal of stray radioactive sources or materials.

PT.VI.06. CSN intervention in the event of the detection of radioactive material in metals for recycling.

PT.VIII.01. Evaluation and inspection of nuclear power plant personnel training programmes.

APPENDIX 8.B

R&D projects completed

Year 2001

Project Title	Subject
Improvement of simulation tools for support in severe accident management.	The MAAP code is prepared for the integral simulation of the plant, including both the nuclear system and its safeguards systems and the performance of the different plant auxiliary buildings and equipment.
Failure of nuclear reactor pressure vessel lower head.	Reduction of current uncertainties regarding the performance of the bottom of the reactor vessel during possible severe accidents and development of a calculation model allowing for the prediction of when and how failure will occur.
Development of a methodology for the application of digital instrumentation at nuclear power plants.	Development of a methodology for the implementation of a digital instrumentation and control system for safety applications and to contrast the methodology and gain experience, applying this to several practical cases.
Development and application of expert judgement techniques to analysis of the location of hydrogen recombiners.	Analysis of the need to implement hydrogen recombiners at a pilot PWR type plant in sequences representative of severe accidents, and study of their possible location inside the containment of this plant.
Methodology for the assessment of containment failure at PWR plants due to hydrogen combustion, applied to PSA Level II studies.	Provision of the technical basis for quantification of the probability of local accumulations of hydrogen in the cubicles of the containment, capable of producing accelerated flame or local detonation at the Spanish PWR plants.
Analysis and modelling of human errors of commission in nuclear power plant PSA's.	Development of a suitable methodology for the identification and modelling of human errors of commission, their inclusion in the PSA's and estimation of the importance that the consequences of such errors might have as regards the evolution of an incident.
Performance of cost-benefit analysis on the basis of PSA.	Development of a guideline for the performance of cost-benefit analysis based on Probabilistic Safety Assessment (PSA), for analysis of the suitability and impact of modifications proposed at nuclear power plants.
Application of PSA to other sources of risk at nuclear power plants.	Application of the PSA methodology to analysis of the risks arising from the sources of radioactive products other than the reactor core at nuclear power plants, allowing conclusions to be drawn regarding the need or otherwise for the general performance of such analyses.

Project Title	Subject
Modelling of radionuclide transport processes in natural media (PETRA Project).	Development, adaptation and verification of numerical models on the reactive transport of radioactive isotopes in natural media, at various working scales.
Safety assessment of the surface disposal of low and intermediate level radioactive wastes.	Selection and development of an updated methodology for the safety assessment of the surface disposal of low and intermediate level radioactive wastes.
Characterisation of metallic waste materials with insignificant levels of activity and susceptible to declassification.	Determination of a methodology and a generic procedure for the radiological characterisation of metallic waste materials with radioactive contents generated at the Spanish nuclear power plants, in order to decide whether they might be declassified due to their activity content being lower than the established declassification levels.
Assessment of the natural radiation doses received by the population in areas surrounding Spanish nuclear power plants. Specific study at Campo Arañuelo (Cáceres).	Estimation of the natural radiation doses that would be received by the population living in the areas surrounding the Almaraz nuclear power plant.
Study of the transfer of radioactivity to fungi. Interactions and consequences (2^{nd} Phase).	Analysis of the behaviour of Cs and Sr as regards incorporation in fungi, considering the influence of various factors, and comparative study of transfer dynamics in each major type of fungus.
Quantification of the biological effects of ionising radiations (Standardisation of the technique for its application in retrospective biological dosimetry).	Standardisation of the technique for retrospective biological dosimetry and extrapolation of the data obtained to total genome data.
Development of a new technique for the "in situ" detection and evaluation of radio-induced breaks at the level of specific DNA sequences.	Detection and quantification of the set of DNA breaks, including labile alkaline positions, caused by ionising radiations and their repair.
Development and adaptation of the new gastrointestinal model for the determination of internal dose.	Analysis and development of the model for the estimation of doses due to the incorporation of radionuclides, derived from the new gastrointestinal model proposed by the human alimentary tract working group of the International Commission on Radiation Protection, through its mathematical formulation.
Year 2002	
Analysis of severe accidents in containment: containment thermohydraulics, iodine chemistry, behaviour of hydrogen and behaviour and retention of aerosols.	Increased capacity of existing calculation codes, development of new models where necessary and application of the resulting analysis methodology to a real plant where appropriate.

Project Title	Subject
Assessment and modelling of the impact of organisation and management on nuclear power plant safety (1998-2002).	Contribution to increasing the safety of nuclear power plants through the assimilation or development of methodologies for the assessment of the impact of organisation and management on nuclear power plant safety, including preventive, corrective and predictive methodologies.
Application of the methodology for the validation of non-destructive testing systems used in the in-service inspection of the Spanish nuclear power plants (VENDE Project).	Demonstration that the validation methodology for the non-destructive testing systems used for in-service inspections is appropriate and allows for the correct determination of the technical capacities of the systems applied in the inspection of components at the Spanish nuclear power plants.
ICDE Project / Updating.	Qualitative determination of which FCC event root causes may be used to identify preventive measures mitigating their consequences, if they occur, or preventing them, establishing an international working group compiling and analysing FCC events.
HALDEN Project (2000 – 2002).	Contribution to resolving operating or licensing problems affecting both current and novelty nuclear power plants and improving plant safety and availability through the use of systems helping the operating shifts in the performance of their functions.
Hydrogeology in low permeability media – 2nd Phase (HIDROBAP II Project).	Application of the multidisciplinary methodology developed in HIDROBAP to a new zone in order to contrast its efficiency, serving as support for traditional methodologies for hydrogeological research in fractured rocks.
Natural analogues.	Increased knowledge of natural and archaeological analogues in order to identify their contribution to the safety assessment of Deep Geological Disposal and communicate to non-technical audiences, in order to increase the CSN's technical assessment capacity in relation to DGD systems and define future lines of action in this area.
Modelling.	Analysis of the state of the art of modelling applicable to the performance and safety assessment of the permanent disposal of high level wastes, serving as a basis for the definition of future lines of action in this field.
Study of the long-term genetic effects of ionising radiations using an experimental model.	Gaining insight into the behaviour of radiation-induced chromosome alterations with time following irradiation.

Project Title	Subject
Study of internal dose using "in vivo" and "in vitro" radioisotopic techniques in cellular and molecular biology studies.	Development of procedures for the reliable dosimetric characterisation of internal contamination.
Adaptation of the radon chamber of the Polytechnic University of Catalonia to the ISO 13466 standard and inter-comparison of measuring systems.	Achieve the adaptation of the radon chamber located at the Polytechnic University of Catalonia to the requirements of the ISO 13466 standard and compare the measuring systems.
Characterisation of matrixes for the optimum management of low and intermediate level radioactive wastes (Vitreous Matrixes).	Definition and characterisation of new vitreous material matrixes as an alternative to concrete matrixes, on the basis of the current regulatory conditions and the knowledge available internationally.
Year 2003	
Acquisition and assimilation of the consolidated thermohydraulic code.	Guarantee and maintenance of the current accident analysis capacity, in relation to thermohydraulics and neutronics, of all the Spanish nuclear power plants, accessing those codes that in the future will replace those currently in use.
Hardening effect in IGSCC of austenitic stainless steels. Implications for IASCC processes. (ENDURO Project).	Establishment of the influence of the hardening of austenitic stainless steels on their susceptibility to stress corrosion cracking and contribution to the understanding of its implications for irradiation assisted stress corrosion cracking (IASCC).
Extension of the VENUS Project (VENUS II).	Make available and validate predictive methodologies and tools based on multi-scale numeric simulation for assessment and quantification of the effects or irradiation on vessel steels and gain insight into the damage processes that give rise to the embrittlement of these steels.
Determination of first-order faults through the integrated analysis of geological data (PRIOR Project)	Cartography of regional faults capable of producing important earthquakes.
Extension of the MACE programme.	Maintenance and increasing of the knowledge obtained through Spanish participation in the MACE programme and provision of technical support for the Spanish participants.
Surveillance of the ageing of electrical cables in nuclear power plants.	Evaluation of the status of knowledge of electrical cables and definition of practical interventions applicable in the Spanish context.
Neutron dosimetry.	Promotion of lines of research for development of the neutron dose measuring capacity, including the study of active and passive detection and measuring systems for this type of radiation, available on the market or in the prototype phase.

Project Title	Subject
Effects of ionising radiations on haematopoietic mother cells.	Development of new methods capable of predicting the content of haematopoietic mother cells (HMC's) surviving in victims exposed to irradiation and study of the susceptibility to radiation of human parents and HMC's.
New developments in the field of electronic dosimetry.	This complements the previous project performed in 1998-1999 and contemplates the experimental verification of the technical characteristics of four electronic dosimetry systems recently presented (1999-2000) on the European market.
TRACER II Project.	Completion of the adaptation and calibration of the CORVEL code in hydrological systems that might be affected by releases in the hydrological systems influence by nuclear power plants.
Dosimetric characterisation of sites by means of "in situ" gamma spectrometry systems (SEGIS 2 Project)	Demonstration of the capacities and advantages of the "in situ" gamma spectrometry (EGIS) technique and identification of the limitations that it might present under practical conditions and situations.

Article 9. Responsibilities of the licensee

9.1 Legal and organisational changes during the period

During the period considered there has been no legislative or regulatory modification affecting the requirements to be met by the licensee organisations.

Neither has there been any new process of consolidation in the nuclear industry or any significant change in ownership.

9.2 CSN regulatory strategy in relation to the licensee's organisation

The main criterion applied by the CSN as regards aspects relating to licensee organisation and management is that the licensees themselves are primarily responsible for the nuclear safety of their facilities. For this reason, the main emphasis in this area has been placed on achieving a situation in which the licensees develop and implement all the processes required to maintain adequate safety management systems, and where these systems are developed by experts in these new disciplines and with consideration given to the internationally accepted standards. In this respect, the CSN is mainly applying a process-based regulatory approach, although obviously without ignoring the monitoring of the results.

The Operating Regulation of the facility is the legally required official operating document. This document contains a definition of the job posts and their associated responsibilities, the organisation of the personnel of the installation, the training programmes for licensed and non-licensed personnel and the operations and radiation protection standards for normal operation and accident conditions. The fact that changes to this document are subject to a formal process of approval facilitates tracking and control by the CSN of certain changes in the organisation and in the management of the organisation that might negatively affect its safety.

Furthermore, in view of the almost complete absence of criteria on the design of organisational structures and the aforementioned process-based regulatory approach, in 2000 all the Spanish nuclear power plants were required to develop their own procedures for the analysis of organisational changes implying a reduction in human resources. Also requested was a report on minimum staffing and technical capacities. A CSN multidisciplinary working group revised these reports, comparing them between plants, attempting to identify especially relevant aspects. The aspects identified were communicated to the nuclear plant licensees for their justification or for proposals regarding appropriate corrective actions. In all cases, the CSN attempted to place the emphasis on guaranteeing that the licensees had systematic organisational change management processes. As a result, in 2002 all the nuclear power plants were requested to increase the scope of their procedures to include all types of organisational changes, regardless of whether or not they implied a reduction in human resources. Thus, in order to meet the expectations of the CSN, organisational change management must be a systematic and procedures-based process at all the Spanish nuclear facilities, covering from the initial stage of conception of the change in response to identified needs to the detailed design, implementation and monitoring of

the effects of the organisational change, and possible feedback or the implementation of corrective actions if it does not live up to expectations. The procedures already developed are based on standards and good practices, mainly from the IAEA and NEA.

Finally, as a novelty during this period, the CSN has included in its basic inspection plan the systematic inspection of the safety assessment and improvement programmes of each facility in relation to human and organisational factors. One of the aspects inspected is that relating to the management of organisational changes.

9.3 Liability for nuclear damage

In accordance with the Nuclear Energy Act of 1964, the operator of a nuclear facility or any other installation producing or working with radioactive materials or having devices capable of producing ionising radiations shall be liable for any nuclear damage. This liability shall be objective and limited in its amount to the limit of coverage established in the Law.

Indeed, article 55 of the Nuclear Energy Act provides that, in addition to obtaining prior authorisation, all nuclear facility operators shall establish coverage for the risks that might occur in relation to the liability deriving from nuclear accidents. Article 57 of the Law, which establishes the coverage required, was updated by the Electricity Industry Act of 1997, which establishes a coverage of 25,000 million pesetas (150,253,026.10 euros)

9.4 Degree of compliance with the obligations of the Convention

As indicated in the previous national reports, Spain meets the requirements of the Convention as regards the regulation and practices applied in relation to the responsibility of the licensees for the nuclear safety of their facilities.

With the improvements introduced during this period, as described above, Spain may be said to have improved its degree of compliance with the requirements established in this article in relation to the responsibility of the licensees.

c) General considerations in relation to nuclear safety

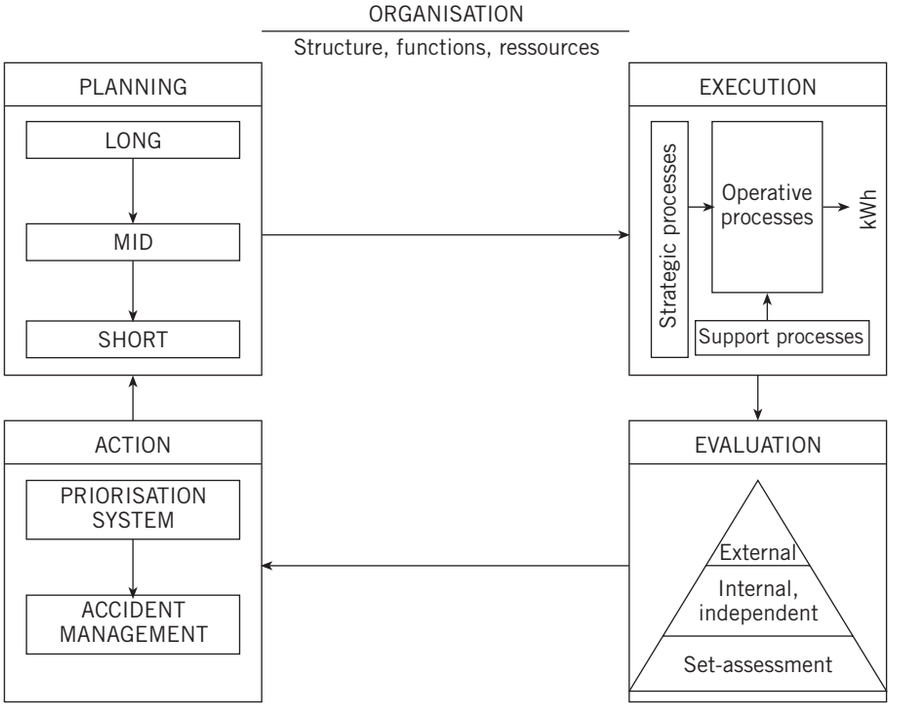
Article 10. Safety priority

10.1 Main activities performed during the period by the licensee in relation to the safety culture

During the period corresponding to this report the licensees have, on their own initiative, undertaken a number of activities relating to improvement of the safety culture at their facilities, including training for the promotion of the safety culture, assessments of the level of this culture and action plans for its improvement.

The licenses have worked also on developing an Integrated Management System Guideline, including Safety Management, the structure of which is shown in figure 10.1

Figure 10.1 Integrated Management System



The guideline describes the following:

- The characteristics of the organisation, functions and resources of the licensees.
- Their general planning system.
- The processes used for the performance of their activities.

- Their assessment system, including External Assessments, Independent Internal Assessments and Self-assessments.

  During the period the licensees have also initiated the performance, by way of a pilot phase, of an organisational dimensions diagnosis and assessment tool. The intention is for this to be applied in the future if the results of this phase are satisfactory.

- Their corrective and improvement actions management system.

In relation to the aforementioned External Assessments, table 10.1 shows those performed during the period by OSART missions and WANO peer reviews.

Table 10.1 External assessments at Spanish nuclear power plants

Plant	Assessment	Date
Almaraz	OSART (IAEA)	1987
Cofrentes	OSART (IAEA)	1990
Garoña	Peer Review (WANO)	1996
Ascó	OSART (IAEA)	1998
Vandellós II	Peer Review (WANO)	2001
Trillo	Peer Review (WANO)	2001
Almaraz	Peer Review (WANO)	2002
Garoña	OSART (IAEA)	2002
Cofrentes	Peer Review (WANO)	2003

The Vandellós II Peer Review took place in November 2001 and resulted in the identification of a series of areas for improvement grouped into three action blocks: 1) Improvement in the establishment, communication and checking of compliance with expectations by the Management; 2) Extension of the Internal Operating Experience analysis through the performance of human factors analyses and the analysis of minor events; and 3) Increased presence of Management in the plant and at the training sessions aimed at promoting the desired behaviour patterns and attitudes. A series of strong points was identified in the area of Chemistry, Operating Experience and Radiation Protection. The WANO follow-up visit took place in May 2003 and underlined substantial improvements in a number of areas, achieved basically through the activities carried out in Self-Assessment and On-going Improvement and in Internal Communications.

A peer review was carried out at Trillo in December 2001, resulting in the identification of a series of areas for improvement and strong points to be published by WANO as good practices. In September 2003 there was a WANO follow-up visit, which identified significant improvement in documentary control, the design modification and temporary modifications process, the radiological surveillance of equipment/personnel, training on industrial safety, calibration, the sampling and storage of chemical products an improvement of the plant condition. Additional efforts were recommended in relation to leadership,

behaviour, cultural issues and others. In 2004, Trillo has launched an action plan to improve these aspects.

The Almaraz peer review took place in 2002. As a result of this review, a series of actions was initiated in the areas for improvement identified.

The year 2002 also saw the IAEA OSART Mission at Santa María de Garoña, which resulted in a series of recommendations and suggestions and the identification of a significant number of good practices. In November 2003 the OSART Mission follow-up visit took place. The Mission report underlined the satisfactory tracking by Garoña of the recommendations and suggestions made (65% of which were considered to have been definitively resolved) and pointed to the excellent conditions of the facility, the commitment of the personnel to its safety and reliability and the implementation of the safety culture throughout the organisation.

More recently, in December 2003, there was a peer review at Cofrentes, this resulting in the identification of a number of areas for improvement and a series of strong points to be published by WANO as good practices.

A peer review is scheduled for performance at Ascó in 2005.

10.2 Regulatory control of licensee activities

Among the expectations of the CSN is the development by the nuclear power plant licensees of integrated management systems, including safety management. In the case of one nuclear plant that presented certain safety aspects open to improvement, these expectations became a requirement. The development by the licensees of the Spanish nuclear power plants of integrated management systems, as described in the previous section, is being monitored by the CSN and will be supervised during the implementation phase. The CSN is informed at all times of the initiatives of the licensees regarding the maintenance and improvement of the safety culture within their organisations, as well as of the self-assessment activities performed. During this period the CSN has intensified the tracking of these issues through Basic Inspection Programme inspections and meetings with the licensees in relation to both technical and management issues. Refer to section 9.2 for more details.

Furthermore, the CSN is considering the implementation of new supervision methods as regards the approach to both its assessments and inspections. The findings in both areas are subjected to a process of categorisation that takes into account their impact on safety and, to a large extent, the regulatory action is modulated depending on this category.

A new type of functional inspections of systems has been implemented, this being multidisciplinary in nature and rigorously applying the findings categorisation process. Following a pilot application, this type of inspections is being refined for systematic performance.

10.3 Degree of compliance with the obligations of the Convention

As was indicated in the two previous national reports, Spain meets the requirements of the Convention inasmuch as all the actions taken by the licensees are based on the principle of giving priority to nuclear safety. Furthermore, the CSN continuously and systematically analyses the activities of the licensees, this making it possible to verify compliance with the aforementioned principle. With the modifications made during this period and described in the previous paragraphs, Spain may be said to have improved its degree of compliance with the requirements of this article.

Article 11. Financial and human resources

11.1 Significant changes during the period as regards the licensee's financial and human resources. The effect of deregulation of the electricity market on the policy of the licensees.

The situation of competition on the electricity market has required actions aimed at optimising plant operations and maintenance costs, based on the optimisation of processes and the more efficient use of resources, as well as on synergies in management such as the joint operation of various plants, leading to a reduction fundamentally in in-house or contracted operations personnel, corporate personnel and support services (general and economic/financial services, etc.).

On the basis of the document «Studies on the technical capacity and minimum staffing of the organisation", the plants have established the demands as regards technical capacity and minimum staffing that each department of the organisation should have in order to guarantee effective control over the safe operation of the plant and for the organisation to maintain its basic technological know-how, from the general and safety-related points of view, with the dual objective of not depending on third parties for planning, assessment and decision-making regarding key operational issues and the design of modifications and of efficiently contracting external products or services.

The corresponding generational changes have been carried out in view of these studies, defining the initial training required for each job post and the necessary overlapping with personnel retiring through the early retirement system.

As regards investments in safety by the operators, Unesa has drawn up a document, "Guideline for the Planning of Safety-Related Investments", and the corresponding procedures. The purpose of this guideline is to define a process, common to all the Spanish nuclear power plants, for the prioritising of investments relating to nuclear safety and radiation protection, within the general framework of investments planning.

The planning of these investments is an important part of the "Integrated Safety Management System" that is mapped out for implementation at all the Spanish nuclear plants, in accordance with the Strategic Plans of each such facility. For their prioritisation, the investments are classified as follows: a) Requirements by the Authorities, b) Improvement of nuclear safety, radiation protection and the prevention of risks and protection of the environment, c) Technological updating or improvement of the plant and d) Profitability.

The detection of new investment requirements, to keep the plant updated in terms of safety, regulations and technology, arises from the regulatory requirements, the programme of corrective and improvement actions identified as a result of the analysis of in-house and industry operating experience, external assessments, obsolescences and strategic long-term assets management plans.

11.2 Significant changes during the period in the licensee's personnel training programmes

In the wake of the CSN's decision to require training simulators for the operating personnel of all the nuclear power plants, these facilities have made important efforts to adapt to the new framework established. All the plants now have full-scope simulators and this period has seen the entry into service of those of the Santa María de Garoña, Ascó, Vandellós II and Trillo plants. In view of the limit date on operation of the José Cabrera plant, a full-scale interactive touch screen simulator has been placed in service for this facility, in accordance with CSN requirements. All these simulators are being used for the initial training of new licensed personnel and for the on-going training of personnel with a license in force. They are also being used occasionally for the validation of operating procedures, the analysis of certain events and training prior to the performance of certain tests and manoeuvres.

As regards the training of licensed operations personnel, the CSN has drawn up a regulatory Instruction, currently in the comments phase, which establishes the requirements applicable to personnel holding a nuclear power plant operator or supervisor license and in parallel has revised Safety Guide 1.1. on "Qualification for the acquisition and use of Nuclear Power Plant operating personnel licenses". This is expected to be approved before the end of 2004.

In relation to the training of the rest of the personnel, the CSN has initiated the development of a new Instruction during the period, this currently being in the comments phase, establishing the qualification and training requirements for the non-licensed personnel of nuclear power plants, including the personnel of external companies. For their part, the plants have consolidated the development and application of Guideline CEX-37 Rev. 8, "Guideline on the qualification, initial and on-going training and experience of nuclear power plant non-licensed personnel", delivering their personnel initial and on-going training programmes. This Guideline was developed by the electricity industry and accepted by the CSN after a period of discussion.

The nuclear industry has made efforts in integrating on-the-job training and achieving increased involvement by line management, this possibly helping to detect training needs and improve the transfer of knowledge, in particular when there are changes in the personnel. Certain improvements have been made in the training procedures, with a view to ensuring the achievement of the learning objectives, among them the following:

- The development of new procedures regulating licensee activities in the training area.
- The incorporation of actions and feedback in certain phases of the training process (analysis, design, development, delivery).
- The introduction, in certain cases, of assessment tests in the classroom and on the simulator; in this case group evaluation is also included.
- The adoption of corrective actions in the event of problems or inadequate training being identified.
- The review of certain aspects of the personnel initial and on-going training programmes and the incorporation in these programmes of courses on the Safety Culture, the Environment and Human Factors.

On 3rd June 2003, the CSN published Instruction number IS-06, in development of Royal Decree 413/97. This Instruction defines training programmes on basic and specific radiation protection for off-site workers running the risk of exposure to ionising radiations due to their intervening in the controlled zone. This Royal Decree also establishes the responsibilities of the external companies and the obligations of nuclear facility licensees in relation to radiation protection. The electricity industry has drawn up a "Basic Radiation Protection Course" in compliance with the aforementioned Instruction, which has been favourably judged by the CSN. This course is delivered by the contractor companies. In addition, each nuclear power plant has drawn up the "Specific Radiation Protection Course" for its installation, delivery of which is undertaken by the plant itself.

The CSN has set up a working group, whose activities are now under way, whose mission is to analyse the management of external companies in relation to the rendering of services to the nuclear industry. A part of the scope of this group is study of the selection, qualification and training of contractor companies and their workers.

The CSN continues with its programme of two-yearly Inspections of the training courses for licensee or external company licensed and non-licensed personnel rendering services to nuclear facilities. The performance of this Inspection programme allows a high degree of confidence to be maintained as regards the activities of the licensees in relation to training.

11.3 Regulatory supervision of the licensee's financial and human aspects

As has been indicated in sections 9 and 10 of this report, the nuclear power plants are currently involved in a process of development and implementation of integrated management systems that include safety as one of their essential components. On the initiative of the licensees, and with impetus provided from the CSN, the aim is for these systems, necessary but insufficient in themselves to achieve high levels of safety, to contribute to the maintenance and improvement of safety, also providing a significant drive for improvement in relation to the non-technological dimensions of the plants.

Both the management of human resources and investments in safety are fundamental processes within the integrated management system. Consequently, the regulatory control from the CSN in both areas follows a strategy based on guaranteeing that these processes indeed exist and are integrated in the management system and, secondly, that they are systematically developed by specialists in accordance with internationally accepted standards. To ensure this strategy, the CSN has applied practices of meetings and discussions with the licensees at all levels, of evaluating their technical proposals, of inspections and, in one particular case, of requirements associated with the operating permit. Likewise, in order to address these issues with a greater guarantee of success, attempts are being made to provide the licensee and CSN organisations with specialists in disciplines that to date were not part of the classical knowledge available in the organisations.

11.4 Degree of compliance with the obligations of the Convention

As has been indicated in the previous national reports, there are no measures of legal standing in Spain that oblige the licensees to maintain previously established financial

resources during the operation of the plant in order to guarantee safety. However, the actions taken by the licensees under the principle of the responsibility of the operator, and by the CSN in its function of surveillance and control, ensure the permanent availability of funds and resources to guarantee the safe operation of the facilities.

With the modifications made during this period, Spain may be said to have improved its degree of compliance with the requirements established in this article in relation to the financial and human resources applicable to nuclear facilities.

Article 12. Human factors

12.1 Significant licensee activities during the period

Within the framework of safety improvements in organisation and human factors, and as indicated in the previous report, the CSN sent to the licensees a detailed document on the considerations to be taken into account in preparing an Organisation and Human Factors programme. Using this as a basis, the Spanish nuclear power plants have edited their programmes and adapted their organisations for their development.

During the period covered by this report, the CSN has made inspection visits to all the plants in order to check the degree of detail to which the Organisation and Human Factors programmes have been implemented.

Furthermore, the meetings of the Mixed Working Group have continued. This group is made up of representatives of the CSN and of the Spanish nuclear power plants and was set up to promote and facilitate the coordinated development of the Spanish plants' Organisation and Human Factors programmes, as well as to maintain a forum for the exchange of experiences between specialists in this discipline.

The Mixed Group has agreed that the following projects should be carried out:

- Database on operating incidents relating to Organisation and Human Factors.
- Initial training plan for specialists in Organisation and Human Factors.
- Delivery of the course defined in the previous point for the specialists at the Spanish plants, with attendance by CSN specialists.
- Guideline for self-assessment of the plant Organisation and Human Factors programmes.

Furthermore, the process of integrating the nuclear power plants, initiated following the deregulation of the Spanish electricity industry, has continued. This process has significant implications for organisational aspects: the establishment of common policies and strategies, modifications to the organisational structures, the exchange of experiences, the unification of practices and procedures, the optimisation of workforces, the contracting of new personnel and the management of knowledge, etc.

12.2 Regulatory control of licensee activities

As regards organisational aspects, since 1990 the CSN has had a specific group of technicians in charge of issues relating to human factors. The role of the regulatory body is similar in this area to its role in other specialities. The CSN monitors the requirements and standards relating to human and organisational factors issued in the country of origin of the design, and international practices; the operator is responsible for performance of the actions required to meet the applicable requirements, and the function of the CSN is to evaluate these actions in order to ensure that they are adequate. In this respect, the CSN has continued its evaluation and inspection tasks throughout this period.

In addition, in these disciplines the CSN is promoting the organisation, capability and initiative of the licensees themselves in relation to the performance of safety improvement projects. In other words, in addition to the conventional regulatory control of the results of specific human and organisational factors projects, the CSN is promoting the licensee initiatives required for the latter to identify improvement projects in these disciplines within the framework of a systematic programme, improvements that may relate to organisational efficiency, human behaviour, self-assessment and knowledge management, the management of work and tasks, etc. In short, the tracking of this licensee programme, in other words regulatory control oriented towards licensee processes, is becoming an additional or complementary approach that the CSN considers to be highly adequate in the field of human and organisational factors.

It is significant that the CSN should have included in its basic inspection plan the inspection of the implementation status of the safety assessment and improvement programmes relating to Organisation and Human Factors that were required of the nuclear power plants in December 1999.

Likewise, during the period and in collaboration with the licensees of the Spanish nuclear power plants, the CSN has continued to promote and lead R&D projects of interest to both organisations. Especially relevant in this respect is the project for the identification and application of methodologies for analysis of the impact on safety of organisational factors.

12.3 Degree of compliance with the obligations of the Convention

Both the nuclear power plants and the CSN have provided keen backing for the development and full implementation of safety assessment and improvement programmes relating to organisation and human factors at the nuclear facilities. The licensees themselves should be the protagonists and the parties responsible for achieving the objectives of these programmes, and a proactive attitude towards the improvement of safety in these disciplines is ought at all times. In this respect, the consideration is that a satisfactory response is being provided as regards the obligations of the Convention.

Article 13. Quality assurance

13.1 Significant licensee activities during the period in relation to quality systems

Among the activities carried out in relation to Quality Management during the period under analysis, mention should be made of the work performed in the area of self-assessment and the management of corrective actions, resulting from the tasks defined by the CSN-Unesa Mixed Group for "Improvement of the efficiency of the regulatory process". Among other things, this group established task No 4, "Acceptance by the licensee of a solid system for the identification of deficiencies and for the establishment, control and tracking of corrective actions".

In order to comply with this mandate, two sector guidelines have been developed in relation to self-assessment programmes and the management of the actions to be implemented by the licensees of nuclear power plants.

The "Guideline for the self-assessment programme" establishes the criteria for the structuring of these programmes such that there be assurance of the consistent identification of deficiencies and improvements by various means, defining criteria for the following:

- The establishment of expectations.
- The planning of self-assessments.
- The preparation and performance of self-assessments.
- The management of actions arising from self-assessments.
- Evaluation of the efficiency and effectiveness of the programme.

Intimately linked to the previous guideline, the "Guideline for the actions management programme" also establishes criteria for systematic management, depending on the safety significance of the actions identified by the different types of assessments, that is to say external assessments, independent internal assessments and self-assessments. Thus, the guideline describes criteria for the following:

- The management of the Actions Programme.
- The prioritisation of actions.
- The development of indicators.
- The performance of trends and recurrences studies.
- Evaluation of the efficiency and effectiveness of the Actions Programme.

These guidelines have been accepted by the CSN and, in accordance with the aforementioned objectives and criteria, the plants have adapted their procedures accordingly, establishing a test period of one year to acquire experience of these programmes. On the basis of analysis of this experience, the guidelines and specific procedures will be revised, where necessary, prior to their definitive implementation.

These new Self-Assessment and Corrective Actions programmes imply a new impetus for the organisational learning of the nuclear power plant operating organisations,

strengthening on-going improvement and the commitment of the organisations to the quality of their work.

Furthermore, in the last year the companies have initiated and are promoting the development and implementation of process-based management practices in accordance with the *Standard Nuclear Performance Model* of the US *Nuclear Energy Institute* (NEI), as a future operating standard in the context of the systematic approach to Integrated Management, this constituting a new step in the process of on-going improvement of the safety management of nuclear facilities.

13.2 Regulatory control of licensee activities

Changes in the regulatory provisions

In the last three years there have been no changes in the regulatory provisions affecting quality assurance requirements.

The CSN has continued to draw up or review its Safety Guides with a view to adapting the Safety Guides to new international trends in this area, the aim being to propose standards and criteria acceptable to the CSN for the implementation of Quality Assurance Programmes in activities relating to nuclear safety and radiation protection. The new guides drawn up have been: GS 6.1 "Quality assurance in the transport of radioactive substances", and GS 10.13 "Quality assurance in the dismantling and decommissioning of nuclear facilities".

Changes in operating permits

During the last three years there have been no changes to the operating permits for nuclear facilities modifying the fact that the Quality assurance manuals shall be considered official and mandatory operating documents.

Control activities

The assessment and inspection activities performed by the CSN follow the same systematic approach as and pursue similar objectives to those of previous years, the aim being to make the application of the necessary quality requirements and the efficiency of the organisations compatible. Special emphasis continues to be placed on the monitoring of the results of changes to the licensees' organisations, especially those relating to quality assurance and management.

The CSN is also placing emphasis on activities relating to the control of nuclear power plant suppliers, including the sub-contracting of services, such that through inspection and assessment activities the following may be assured:

- In-depth knowledge of the plant processes for the evaluation of suppliers, the awarding of contracts and the acceptance of items and services supplied.
- Analysis of whether the plants have efficient mechanisms for the identification and correction of deviations in processes that might give rise to deficiencies in the quality of the items and services supplied by contractors.
- Analysis of whether the plant personnel intervening in any stage of supply have ideal initial and on-going training for selection of the most suitable suppliers and for control of he items and services supplied.

13.3 Degree of compliance with the obligations of the Convention

Spain is considered to meet the requirements of article 13 of the Convention for the following reasons:

- The Spanish legislation, through the Regulations governing Nuclear and Radioactive Facilities of 31st December 1999, requires that quality assurance programmes applicable to all activities of importance from the point of view of the nuclear safety of such facilities be established throughout their lifetime and for any modification.
- Through its assessment and inspection activities the CSN verifies the compliance of the programmes with the applicable standards and checks their implementation and efficiency.
- In order to facilitate the implementation of the quality assurance programmes, the CSN draws up safety guides and updates them in keeping with new international trends in this area.
- The CSN undertakes the monitoring of new trends in quality assurance, in order to assess and control their application at the Spanish nuclear facilities.
- The licensees are actively developing self-assessment and corrective actions involving the entire organisation and aimed at significantly improving the quality management and safety of the facilities.

Article 14. Safety assessment and supervision

14.1 Introduction

As indicated in article 7.2 of this report, Operating Permits are granted by the competent Ministry (currently the Ministry of Industry, Tourism and Commerce), following a mandatory and binding report by the CSN in relation to nuclear safety and radiation protection. In keeping with current practice, the operating permits are renewed for periods of validity of ten years, coinciding with the Periodic Safety Review. A current exception to the above is José Cabrera NPP, whose Operating Permit expires on 30th April 2006, the date on which the plant will be definitively shut down.

The operating permits awarded to the nuclear power plants are all of the same model and contain as an Annex the limits and conditions that the plant is obliged to fulfil (see Appendix 19.A). Some of these conditions are to be met immediately, while others have a fixed term for compliance. The permits identify the revision in force of the official operating documents (Safety Analysis, Operating Regulations, Operating Technical Specifications, Emergency Plan, Quality Assurance Manual, Radiation Protection Manual and Radioactive Waste Management Plan). Modifications to the Safety Analysis require approval only if associated with a design modification requiring approval. Any change to the Operating Regulations, the Technical Specifications or the Emergency Plan must, however, be approved by the Ministry, following a report by the CSN.

Design modifications or modifications to the operating conditions affecting nuclear safety or radiation protection, and the performance of tests, may require express authorisation. The Regulations in force include the need to first perform an analysis to ensure that, following incorporation of the change, the criteria, standards and conditions on which the original permit was based continue to be met. If these requirements are not affected by the design modification, the licensee may proceed with it, periodically reporting on its status. Otherwise, the licensee must request authorisation for the modification prior to its entry into service. The CSN Safety Guide 1.11, "Design modifications at nuclear power plants", published in July 2002 following its application in a pilot phase, establishes in detail the criteria to be applied in deciding whether or not a modification affects safety. As a result of its application, the overall management of modifications and the associated documentation are much more complete and involved all the affected departments.

Each permit also establishes the reports (periodic or otherwise) that are to be submitted to the CSN. These reports are evaluated or supervised, depending on each case, by the CSN and may give rise to meetings, inspections and audits of the licensee of the facility, as applicable. A condition of each permit develops the faculty conferred by law to the CSN to directly issue complementary instructions to the licensee in order to guarantee the maintenance of the safety requirements and conditions of the facility and better compliance with the requirements established in each permit.

Before the permit is renewed, the licensee is required to demonstrate compliance with all the requirements of the previous authorisation. For its part, the CSN carries out a detailed assessment of the status of the plant and of compliance with the conditions, this being

reflected in the draft technical statement that serves as a basis for awarding of the corresponding permit.

14.2 Modifications to the safety assessment and supervision system performed by the licensee during the period

As is indicated in section 13.1, the nuclear power plant licensees have developed a set of common criteria regarding the processes of self-assessment to be used by their organisations. These criteria, accepted by the CSN, have been used to review the specific procedures of each plant and subject their application to a test period, following which they will be reviewed on the basis of the lessons learned. This activity is complemented with the adoption of a set of common criteria serving as a basis for the programmes for the implementation of corrective actions, prioritised depending on their safety significance.

During the period covered by this report, the Trillo nuclear power plant has completed its Periodic Safety Review (PSR) and has submitted it to the CSN. The rest of the Spanish plants had already done this. The PSR is carried out every ten years and must be submitted to the Administration as part of the documentation supporting the request for renewal of the Operating Permit. Such requests must be issued one year before the expiry of the permit, which in the case of Trillo NPP will occur in November 2004. The latest renewal for a period of 10 years for the other plants, on the basis of the PSR carried out, was that awarded to the two groups of the Ascó plant at the end of 2001. The José Cabrera plant received an extension to its Permit in November 2002, for which it submitted the corresponding PSR, although in this case the period of validity granted extended only to 30th April 2006, the date on which the plant will definitively cease its operations.

The PSR does not intend to replace the practices of analysis, control and surveillance continuously carried out at the plants, but rather to reflect on the process applied and assess the results and the corresponding safety improvements made at the plant throughout the period, taking into account the latest status of the plant and its equipment and components and the new safety requirements that would be applicable to it, national and of the country of origin of the technology, depending on its design and the date of its original operating permit.

As regards Probabilistic Safety Assessment (PSA), the Integrated Programme published by the CSN in 1986 and revised in 1998 continues to be applied. In accordance with the contents of the programme, a pilot project has been performed to assess the risks associated with radioactive sources other than the reactor core, using Cofrentes NPP as the pilot plant. The results have demonstrated that the only radioactive source worthy of being analysed at each plant, in view of its contribution to risk, is the spent fuel pool, as a result of which the plants will limit PSA to this pool. During the period corresponding to this report, the plants have maintained and updated their PSA's in accordance with criteria and a procedure agreed on with the CSN in 2000 and that, following application for a period, have been published as a CSN Safety Guide (GS 1.15).

Likewise, throughout the period the nuclear plant licensees have continued to perform different Probabilistic Safety Assessment (PSA) applications in support of licensing and safety improvement processes. These have consisted of the performance and presentation of various risk-informed modifications, among which mention might be made of those relating to the Risk Monitor, extension of the inoperability times of certain components required in the Operating Specifications or in the In-Service Inspection and Testing

practices, and the prioritisation of valves (MOV and AOV). This type of requests was initiated during the years 2000 and 2001 following the adaptation in each case of an analysis and application methodology derived from that applied by the NRC. The preliminary validation of this methodology has been performed by means of a pilot experience.

The plants have completed the updating of their design bases and of the licensing documents of each licensee. The objective of this activity has been to compile the design bases and licensing basis for each safety-related system. The updating of the design bases requires verification of the hypotheses, data and results of accident analyses included in the Safety Analysis, the identification of the design bases of support components required to perform the safety functions and the design modifications incorporated in the safety systems. Also included has been the review of the current physical status of each of the systems and operating procedures, with a view to reconciling the operating practices and the design of the systems. The final result of this process has been a Safety Analysis whose contents are updated and sufficiently contrasted and reconciled with the design basis documents.

Article 81 of the Regulations Governing Nuclear and Radioactive Facilities, approved in 1999, introduced the possibility of requesting from the CSN a favourable appreciation of new designs, methodologies and protocols, etc., the awarding of which may be included as a reference in subsequent authorisation processes. Pursuant to this article, the licensees of the Spanish nuclear power plants, through the Spanish Electricity Industry Association (Unesa), have developed generic models and procedures that have been submitted to the CSN by Unesa for approval. The objective of this process is to speed up the process of awarding of the authorisations that the individual plants might require and to optimise the resources required for this process. The use of this licensing process has led to Unesa's obtaining various favourable appreciations from the CSN, such as the following:

- Procedures for the radiological clearance of various materials of low radioactive content, such as scrap, used oils, resins and activated carbon.
- Non-Destructive Testing (NDT) validation methodology.
- Guideline for the implementation of digital systems at nuclear power plants.

The control of ageing as a fundamental element of Lifetime Management is reflected in the regulatory requirements imposed on plant operation through the establishment, as a condition for the Operating Permit, of the need for the licensee to submit annually to the Directorate General for Energy Policy and Mines of the Ministry of Industry, Tourism and Commerce and to the CSN a report on surveillance of the ageing and degradation mechanisms of safety-related structures, systems and components and on their status, identifying the new inspection, surveillance and maintenance activities incorporated to detect these mechanisms and control their effects. These plant Lifetime Management plans are based on the LWR Nuclear Power Plant Remaining Lifetime Assessment System developed by the Spanish nuclear plants associated under Unesa.

Finally, it should be pointed out that the licensees have been making great efforts to clarify the licensing process that will govern the renewal of operating permits when such awards imply their operating beyond the period contemplated in the original design. In Spain there is no legal or administrative limitation for the establishment of the service lifetime of nuclear power plants, which do not currently have any fixed period established. The period of validity of their Operating Permits is renewed periodically through on-going assessment and Periodic Safety Reviews (PSR). The operation of the Spanish nuclear power

plants beyond the period foreseen in their design is compatible with the nuclear legislation in force in the country.

It is considered that the Periodic Safety Review should be the basic tool for the awarding of long-term operating permits. The process of renewing the permits following PSR performance, in which the performance of the facility in previous years is analysed as a reasonable guarantee that the safety conditions will be maintained during the following period, would also appear to be appropriate for application when operation is requested in the long term. However, in this case the documentation associated with the request should be completed with additional documents necessary to demonstrate the safe operation of the plant in the long term. The licensees have been performing these activities in collaboration with the CSN, although no decision has yet been taken regarding the implementation of the process proposed.

14.3 CSN supervision activities and results obtained

It has already been indicated in the first National Report that, in view of the characteristics of the system used in Spain to grant permits and authorisations, since the beginning of the operation of the plants the regulatory body has undertaken direct monitoring and continuous assessment of such operation.

Another supervision instrument is the Basic Inspection Programme which, as described in Article 19.4, has a validity of two years and is applied equally to all the facilities. The performance of the Inspections included in this programme includes the intervention of both specialists from the head offices and the CSN inspectors resident at the sites (two inspectors per site), who perform daily tracking of the operation of the plant and incidents, controlling how operating incidents are solved and compliance with the OTS's or with CSN requirements. The Basic Inspection Programme includes functional Inspections of selected systems based on their significance for the risk of the facility and including the participation of specialists in various disciplines.

During this period the CSN has dedicated significant effort to this programme, as regards both inspection and the evaluation of the results and categorisation of the findings of these Inspections depending on their impact on risk, in which respect during the period corresponding to this report the steps and programming required to adapt an integral and systematic supervision programme similar to that applied by the USNCR have been initiated. This supervision programme has included the development of the analysis methodology and determination of the importance of the findings of the inspections.

As regards the review of the safety system design bases, each plant established a programme for performance and presented its results to the CSN, along with a review of the corresponding Safety Analysis (FSAR) reflecting these Design Bases. The CSN has evaluated the design basis review programmes in detail and has accepted both the process for their performance and their conclusions for the Almaraz and Santa María de Garoña nuclear power plants, requiring an extension to their scope and certain specific modifications in the preparation process in the case of the José Cabrera, Cofrentes, Ascó and Vandellós II plants, these being under way as of the date of closure of this report. The current scheduling of these activities foresees completion at the end of 2005. A wider scope review had already been performed at the Trillo plant for other purposes, as a result of which this design basis review process has not been performed in this case.

14.4 Situation of Probabilistic Safety Assessments during the period

In 1986 the CSN approved an Integrated Probabilistic Safety Assessment Plan that required all the Spanish plants to perform a level 1 PSA. The objective was a dual one: on the one hand to perform PSA's at each of the Spanish plants in accordance with a set of basic ideas regarding their scheduling. In other words, the PSA's were to be performed stepwise in time and scope, such that with a view to achieving a common scope at all the plants in the future, at least the first PSA's would need to be updated to the scope of the last. The aim was to favour the use of Spanish resources and acquire and assimilate technology. Consequently, the emphasis in the text of that first edition was placed especially on the performance of PSA's. The second objective related to the use of PSA. For this reason, the applications foreseen for the PSA models once developed were described. The foreseen applications were to be based on the great capacity of these risk assessments for the discrimination of the importance for, or contribution to, risk of different aspects of facility design and operation.

The following table shows the overall quantitative results obtained from the level 1 internal events assessments of the latest versions of the PSA's, expressed in terms of core damage frequency, evaluated by the CSN and subsequently updated by the licensees.

Core damage frequency (reactor/year)	
José Cabrera NPP	2.16 E-5
Santa María de Garoña NPP	1.97 E-6
Almaraz NPP	5.89 E-6
Ascó NPP	2.92 E-5
Cofrentes NPP	1.18 E-6
Vandellós II NPP	3.51 E-5
Trillo NPP	3.26 E-6

Since the last report the majority of the PSA's have been updated, as a result of which the data indicated above correspond to the latest versions.

The new revision of the Integrated Plan, issued in 1998, places emphasis on the aspect of applications. As regards the performance of the PSA's, it establishes a common scope that the PSA's of all the plants should have in the medium term. These will need to be level 1 and level 2 assessments and cover all reactor operating modes, not only full power, and will need to consider all possible risks arising from off-site events and all other sources of radioactive products at the plant.

As a highly detailed tool for the assessment of the design and operation of each nuclear power plant, the PSA's are updated with some frequency in order to incorporate design and procedural modifications. The application of PSA in different fields requires a process of permanent maintenance and updating, known as "Live PSA".

As regards the results, the performance of the level 1 PSA's implied greater understanding of the plants by both the operator and the CSN. Certain design modifications relating to very specific issues have been undertaken as a result of their performance.

In accordance with the scope established in the second edition of the integrated plan, the level 2 PSA's for all the Spanish plants have now been performed and evaluated by the CSN.

The level 1 PSA's are currently being performed by the Spanish plants for operating modes other than full power (OMPSA). This situation comes about following joint assessment by a mixed CSN and plant working group and the performance of two pilot projects, one for a PWR plant (Ascó) and the other for a BWR (Santa María de Garoña). These projects were evaluated by the CSN and their working technical procedures, once revised following the evaluation, are being used in the OMPSA's of the other PWR and BWR plants. In addition to the two previous assessments, the OMPSA for José Cabrera NPP has been performed and during 2004 the OMPSA's for Almaraz and Cofrentes are expected to be completed. In 2005 the Trillo NPP OMPSA will be completed. The date for the Vandellós assessment, the revision of a previous and incomplete OMPSA, remains to be decided.

Within the framework of this mixed working group, pilot projects on the rest of the aspects established in the integrated plan are also being launched, with a view to testing methodologies. In this respect, an assessment has been carried out on other sources at the Cofrentes plant. As a result of this pilot study, the decision was taken to limit the assessments to be performed at the other plants to PSA of the spent fuel pools. This assessment will be carried out within the OMPSA studies. Likewise, level 2 assessments of off-site events are being performed and the performance of OMPSA off-site events and level 2 assessments for other operating modes are expected.

In the evaluation of Level 2 studies, emphasis is given to certain aspects of severe accident progression for which the current level of knowledge is still limited, this not invalidating the implementation of safety guides for these accidents. These limitations as regards understanding of certain aspects of the phenomenology are not exclusive to a given plant, but are in general the same as those identified in other countries. This does not imply that the vulnerabilities are the same, since the specific characteristics of each plant may give rise to different responses to severe accident phenomena.

As regards the applications of PSA, an objective emphasised by the current edition of the integrated plan and having a working approach similar to that indicated above in relation to the mixed CSN and plants working group, methodologies have been tested through pilot projects and these tests have given rise to official requests for the use of PSA in the arguments submitted for changes to the Operating Technical Specifications, the In-Service Inspection Manual in relation to piping or the In-Service Inspection Manual for the testing of valves and pumps at various plants. Various applications of this type have been evaluated by the CSN and others are currently in the evaluation phase.

In addition to these specific applications, the CSN has initiated working plans for the information risk provided by PSA to be used more systematically in the regulatory process. Thus, there is currently a joint CSN/plants working group exploring the so-called Risk Informed Regulation (RIR). The task of this group is part of the Regulatory Process Efficiency Improvement activities jointly addressed by the CSN and the electricity industry. This includes the processes of categorisation of plant structures, systems and components, making use of the safety significance estimated by the PSA's – RIR Option 2 according to the terminology used by the USNRC – which will be the subject of an official licensing process once the use of the results of this pilot project is officially requested. Also foreseen is the application of the aforementioned Option 2 to the

Maintenance Rule, a standard that has been in force in Spain for many years and that was the first (formally) risk informed standard adopted. Another line of work relates to the application of PSA information to modifications to the Operating Technical Specifications (OTS's). Likewise, an assessment is being performed on the initiatives of the US industry in this area and of the possibility of reconsidering the so-called "maximum inoperability times" included in the OTS's if an adequate risk management system is in place, of which the "risk monitors" would be a tool. All the Spanish nuclear power plants either have risk monitors or will have them in the near future (the case of Trillo NPP), although a global risk management system entails more (in terms of organisation and culture) than the mere availability of this tool.

Finally, mention should be made of the fact that the CSN has decided that information on risk should also be used for its own internal processes. The inspection process is the first selected in this respect and the one where the greatest progress has been made towards the ultimate objective of having a risk informed Basic Inspection Plan and corresponding inspection procedures. The working plan for the implementation of this Risk Informed Inspection extends to mid 2005 and implies training activities on PSA and on the use of the information provided by the CSN inspectors, in a task that relates fundamentally to a cultural and working methods change that is necessarily slow. Another CSN process for which the possibility of including PSA information is being explored is the monitoring of emergencies.

14.5 Results obtained from Periodic Safety Reviews

Once of the conditions included in each operating permit obliges the licensees to perform a Periodic Safety Review (PSR), the results of which are to be submitted along with the documentation corresponding to the request for operating permit renewal. These periodic reviews do not aim to replace the analysis, control and surveillance practices continuously carried out at the plants, but rather purport to be an overall assessment of the safety of each plant and of the possible improvements to be made taking into account their current status.

The following are among the objectives of these assessments:

- Assurance that the analysis deriving from operating experience has been applied correctly, including overall revision of the modifications carried out as a result of generic studies.
- Analysis of overall plant performance over long periods of operation, including the results of equipment surveillance and maintenance requirements, with the idea of verifying that plant safety levels have not decreased over these periods and of guaranteeing safe operation during subsequent such periods.
- Assessment of plant safety with respect to the new requirements demanded of plants of a similar design by the national standards, the international recommendations and the standards in force in the country of origin of the design, national application of which has been generically or specifically established by the CSN.
- Updating of the status of the different assessment programmes and establishment of adequate improvement programmes.
- Updating of PSA assessments to reflect design modifications, new operating practices implemented, new modelling and analysis techniques and methodologies, the updating of data, etc.

The second national report described the results of the Periodic Safety Reviews performed during the period covered by it, the contents of the present report being an update of that information. The period covered by this report has seen the completion of the evaluation of the results of the Periodic Safety Review for Ascó NPP (whose operating permit was renewed in October 2001), the submittal for evaluation at the end of 2003 of the Periodic Safety Review for Trillo NPP, as support documentation for the request for extension of the plant operating permit, and the continued tracking of safety improvement programmes at the other plants as a result of the corresponding Periodic Safety Reviews. Given the specific nature of the José Cabrera nuclear power plant, a summary of the action plan foreseen for monitoring of its last years of operation is also included. The most significant aspects are described below:

- The PSR period for the José Cabrera NPP, a PWR design that went into commercial operation in 1968, was from 25th October 1986 (when the far-reaching plant design and operating modifications resulting from the safety re-assessment programme performed at the beginning of the 1980's were completed, as explain in the first Spanish National Report) to 31st December 1997. In this case the review process identified the need to specifically monitor certain issues that at other plants were addressed generically, such as cracking of the core barrel defector plate bolts, the performance of tests for the qualification of certain electrical containment penetrations, the incorporation of improvements in certain emergency operating procedures and improvements to the simulator used for operating personnel training. Particularly important were the improvements to be incorporated in the plant control room, in order to facilitate the man-machine interface, that arose following a very detailed review and that included the motor-driven actuation capacity of certain safety injection system valves, to improve their reliability, and the installation of a panel for the temporary abandoning of the main control room. In the case of this plant, which is scheduled to shut down definitively on 30th April 2006, a specific plan has been drawn up for CSN monitoring during the last years of operation. This plan contemplates the following aspects:

  – Reinforcing of the most important plant processes (operation, maintenance, training and technical support) and the use of root cause analysis methodologies relating to the most significant events. Another objective is to improve relations with other plants in a similar situation.

  – Intensification of the processes of assessment and inspection of licensee activities (strengthening the inspection of relevant incidents, special monitoring of organisational issues by the resident inspectors). Furthermore, the aim is to improve the training of CSN technicians in the management of investments and safety (see section 6.3.4).

  – A series of modifications, such as the environmental qualification of the charging pump motors, seismic verification of the Zorita Hydroelectric Station (a source of emergency electricity supply), modifications to the safety injection line, etc.

  – In addition, and due to the specific design of this plant (single-loop PWR) and its importance from the point of view of plant risk, an improvement plan was established incorporating preventive measures for steam generator tube rupture, including improved tube inspection techniques, improvements in the control programmes to prevent the appearance of loose parts in the steam generator and improved steam generator operating experience analysis.

- At the two-group Ascó nuclear power plant, the period contemplated in the Periodic Safety Review covers from 22nd July 1982 for unit 1 and from 22nd April 1985 for unit 2 to 31st December 1999 in both units. This periodic review identified the advisability of incorporating an improvement programme in relation to organisation and human factors, as well as the incorporation of a full-scope simulator replicating the control room for use in the training of licensed operations personnel. Furthermore, the need to incorporate improvements in the plant fire-fighting systems became evident (both in the active detection and extinguishing systems and in modifications to the passive cable and cable tray protections).
- At the end of 2003 and in support of its request for an extension to its operating permit, Trillo NPP submitted its Periodic Safety Review, which covers the period from December 1988 to December 2001. Given that at this plant an operating experience and systems analysis revision programme (AEOS) was carried out that, as described in the previous report implied the complete revision of the safety systems, it is reasonable to assume that no results of great significance will appear in this Periodic Safety Review. Albeit it in a preliminary fashion, the results of the evaluation of this documentation underline the advisability of incorporating improvements in the plant integrated safety management system and in the surveillance of aspects relating to the site (such as seismic and hydrogeological data surveillance).

In general it may be said that the experience of relating the performance of a Periodic Safety Review at a nuclear facility and its submittal prior to the awarding of the renewal of an Operating Permit has positive aspects of undoubted value as regards the safety of the facility. The overall review of a facility over long time periods makes it possible to evaluate operation with the complementary view of daily monitoring. The results of the Periodic Safety Review may be used to improve operation during the following period. As a result of the performance of Periodic Safety Reviews there has been an updating of the documentation associated with each facility, in certain cases discrepancies have been detected between documents and even design modifications of some importance have been performed. At each plant a set of programmes has been established to improve aspects having a significant impact on the safety of the facility. Among these, the programmes for the improvement of organisational and human factors aspects have been given special impetus in all cases.

This same systematic approach is considered to be equally valid for those cases in which the renewal of the Operating Permit exceeds the lifetime considered originally in the initial design of the facility. It is understood that in this case special considerations must be included, both administrative and relative to management of the ageing of the facility, such that plant operation may be prolonged beyond the initial design lifetime. To address this circumstance it will be necessary to revise Safety Guide 1.10, which recommends the actions to be performed to undertake Periodic Safety Reviews.

14.6 Degree of compliance with the obligations of the Convention

In view of all that has been set out above, it is considered that Spain continues to meet the requirements of this article. Suitable measures have been adopted for the periodic performance of detailed and systematic safety assessments throughout the lifetime of the Spanish plants. The inspection model applied, the supervision of the periodic reports submitted by the licensees and the evaluation of the requests of each plant provide a mechanism for the continuous review of the safety conditions of each facility.

Article 15. Radiation protection

15.1 Summary of Laws, regulations and requirements referring to radiation protection at nuclear power plants

The provisions of the Spanish regulations that deal with radiation protection are included fundamentally in Law 15/1980, of 22nd April, Creating the CSN and in the Regulations on Protection against Ionising Radiations of 6th July 2001. These provisions have not undergone any modification during the period considered in this report.

15.1.1 Law Creating the Nuclear Safety Council (CSN)

This Law assigns to this body the functions of monitoring and controlling the levels of radioactivity inside and outside nuclear power plants and their particular or accumulative incidence in the areas in which such facilities are located, of controlling the doses received by the operating personnel and of informing and advising the Government with respect to the commitments of other countries or international organisations in relation to nuclear safety and radiation protection.

15.1.2 Regulation on Protection against Ionising Radiations

The basic standards for the radiation protection of professionally exposed workers and the members of the public against the risks resulting from exposure to ionising radiations are established in Royal Decree 783/2001, which approves the Regulation on Protection against Ionising Radiations.

This Regulation transposes to the Spanish legislation the provisions of the European Union Directive 96/29 EURATOM and implements the basic recommendations of ICRP-60. Detailed information on its contents and scope was presented in the 2nd Report of the Convention on Nuclear Safety.

As an additional development of the provisions of this Regulation, the Nuclear Safety Council has published various binding legal provisions (Instructions) that advise the licensees of the nuclear power plants regarding the procedures to be adhered to in order to comply with certain of these provisions:

- In Instruction IS-02, of 10th April 2002, regulating the documentation on refuelling activities at nuclear power plants, the licensees are required to proceed as follows:
  - Prior to initiating the refuelling outage, they shall submit a report to the CSN including a detailed estimate of the occupational doses expected during the outage and detailed information on the dose reduction techniques to be applied with a view to fulfilling the ALARA criterion.
  - With a period of three months following the refuelling outage they shall submit a report to the CSN including information on the occupational doses resulting from the outage, using a dose-task approach in accordance with format NEA1 of the ISOE *(International System of Occupational Exposure).*

- Instruction IS-03, of 6th November 2002, on the qualifications required to obtain recognition as an expert in radiation protection, establishes the qualification and initial and on-going training requirements to be met by the personnel of Radiation Protection Services, both the Head of this Service and its qualified experts.
- Instruction IS-04, of 5th February 2003, which regulates the filing and custody of documentation relating to the radiation protection of workers and the public, establishes mechanisms for the nuclear power plants to transfer these documents to the CSN following the definitive interruption of their activities.

15.2 Control activities for the radiation protection of professionally exposed workers

15.2.1 Dose limits

The Regulation on Protection against Ionising Radiations establishes the following dose limits for professionally exposed workers at nuclear power plants:

- Effective dose limit: 100 mSv in five consecutive calendar years with a maximum effective dose of 50 mSv in any one calendar year.
- Dose limit to skin (averaged over 1 cm^2): 500 mSv per calendar year.
- Dose limit to lens: 150 mSv per calendar year.
- Dose limit to hands, forearms, skin and ankles: 500 mSv per calendar year.

15.2.2 Surveillance and control of occupational exposure

For the surveillance and control of occupational doses the nuclear power plants have their own official dosimetry services, which are specifically authorised by the CSN for the performance of this task, in accordance with article 25 of EURATOM Directive 96/29. Furthermore, these dosimetry services are subject to a system of regulatory control by the CSN, based on the performance of inspections and audits and on intercomparison campaigns.

The regulatory framework for the authorisation of personal dosimetry services is defined in CSN Safety Guide 7.1 (Technical and administrative requirements for personal dosimetry services).

The control of external doses is based on the use of thermoluminescent dosimetry systems. In addition to this official dosimetry, for the tracking of external doses received during work inside the controlled zone the nuclear power plants have electronic direct reading dosimeters fitted with optical and acoustic alarms, which provide a warning when the dose or dose rate exceeds a pre-established value.

The nuclear power plants have implemented a systematic working approach by means of which when a direct reading dosimeter is assigned to a worker, he is also assigned a code identifying the type of work to be performed (inspection, maintenance, etc.). This makes it possible to gain insight into the collective dose resulting from the different types of work performed at the plant and, therefore, to identify those that have the highest radiological burden (which will be priority tasks when applying dose reduction techniques with a view to complying with the ALARA criterion).

The control of internal doses is based on the use of whole body radioactivity counters, although it should be pointed out that the Spanish nuclear power plants have implemented a very strict policy as regards the control of contamination in the working environment, as a result of which events implying internal contamination in excess of the established recording level (1 mSv/y) are extremely rare.

Every month the nuclear power plants submit to the CSN individualised information on the doses received by each of the workers (in-house and contracted) that have carried out their occupational activity at the plant during that period. This information is incorporated in the National Dosimetry Bank (NDB), a large database managed by the CSN and storing the official individual dosimetry history of all the professionally exposed workers in Spain. As of the end of 2003, the NDB contained the dosimetry histories of 38,418 nuclear industry workers.

15.2.3 Radiation work permits

The Spanish regulation requires that any professionally exposed worker accessing the controlled zone of a nuclear power plant must have received specific instructions on the performance of his work, which must be in keeping with the radiological risk existing in this zone. In order to comply with these provisions, the nuclear power plants use what are known as "Radiation Work Permits" (RWP's), which are work orders containing the following:

- Description of the work to be performed and identification and limitation of the work area.
- Information on the radiological conditions in the work area.
- Indication of the estimated duration of the work.
- Maximum acceptable dose for the work.
- Personal dosimetry requirements.
- Protective clothing requirements.
- Breathing equipment requirements.
- Information on the precautions to be taken during the performance of the work.

These RWP's must be authorised by the person responsible for the plant's Radiation Protection Service and, in order to ensure suitable implementation, the person responsible for performing the work covered by the RWP must sign it to accredit his awareness and understanding of the requirements established therein.

15.2.4 Specific measures adopted for contractor company personnel

Aspects relating to the radiation protection of contractor company personnel at nuclear power plants receive special attention by the CSN, since experience shows that more than 80% of the occupational doses recorded at the Spanish plants are received by such workers.

Royal Decree 413/97, of 21st March 1997, which transposes to the Spanish regulations the provisions of EURATOM Directive 90/641, specifically addresses the radiation protection of contractor workers, providing as follows:

- That contractor companies:
  - Must be entered on an Official Register managed by the CSN.
  - Must provide their workers with basic training on radiation protection and control the doses received by them, keeping dosimetry records.
  - Must provide their workers with a radiological passbook and ensure that this is suitably updated.
  - Must manage the medical surveillance of their workers.
- That the nuclear power plants:
  - Must ensure that any eternal company contracted is entered on the Official Register of the CSN.
  - Must ensure that all contractor workers have a radiological passbook accrediting their medical suitability for the work, their having received basic training on radiation protection and their having an updated dosimetry history.
  - Must provide contractor workers with the specific training required for the work to be performed and supply them with protective clothing and dosimetry surveillance appropriate for this work.
  - Must record the doses resulting from the activities performed in the passbook on completion of the work.

In additionally enacting the provisions of the aforementioned Royal Decree, the CSN has issued two mandatory Instructions:

- Instruction IS-01, of 31st May 2001, establishes the format and content of the radiological passbook, adapting them to the new dose limit (accumulated over five years) established in the Regulation on Protection against Ionising Radiations.
- Instruction IS-06, of 9th April 2002, defines the content and scope of the requirements to be met by the instructors delivering basic and specific training courses for contractor company workers.

15.2.5 Measures adopted to guarantee that occupational exposure to radiations is maintained within ALARA levels

The implementation of the ALARA principle is a basic objective to be achieved during nuclear power plant operation. Since the early 1990's the plants have been modifying their operating organisations in order to ensure that all their members are seriously and formally committed to compliance with this principle.

This process, which was based on the premise that the ALARA principle is a way of thinking that should be shared by the entire organisation, from upper management to those performing work, was completed at the end of the 1990's and is now fully consolidated.

In 1999 the CSN approved Safety Guide GS-1.12 (Practical application of the optimisation of radiation protection in nuclear power plant operation), which establishes the general framework (criteria, administrative system, responsibilities) to

be considered by the nuclear power plant organisations in order to comply with the ALARA principle[7]. This Guide establishes the following criteria, among others:

- Compliance with the ALARA principle should be one of the objectives to be achieved during plant operation and in the planning of all its activities, and should be part of the plant modification and modernisation plans.
- The Management of the plant should be committed to the implementation of the ALARA principle throughout the entire lifetime of the facility, from design to decommissioning, as part of the safety culture.
- The commitment of the Management should be transferred to all the elements of the plant organisation and extend formally to external companies involved in the performance of the most radiologically significant work.
- Adequate measures should be established to inform, train and motivate the plant workers regarding compliance with the ALARA principle.

Safety Guide GS-1.12 also establishes that the commitment of the plant organisation to the ALARA principle should materialise through the implementation of an ALARA programme including the following:

- Definition of the radiological indicators to be used to verify the degree of efficiency of the implementation of the ALARA principle.
- A systematic approach for the revision, from the point of view of ALARA, of the most radiologically significant tasks.
- Definition of the plant policy in relation to source term reduction (decontamination, reduction of cobalt, etc.).
- A systematic approach to the revision of design modifications, from the point of view of ALARA.
- Initial and on-going training programmes specifically oriented towards implementation of the ALARA principle.
- Definition of the content and scope of the programme of internal audits to be implemented to verify the degree of implementation of the ALARA Programme.

Appendix 15. A includes a summary of the occupational doses recorded at each of the Spanish nuclear power plants during 2003.

Figures 15.A.1 and 15.A.2 of Appendix 15.A show the evolution of collective doses at the Spanish nuclear power plants, compared to those registered at the plants of the different regions considered in the ISOE. This analysis underlines the fact that the situation of the Spanish nuclear power plants is comparable to that of plants of a similar design in other countries.

15.3 Control activities for the radiation protection of the population

The regulatory control of the radiation protection of the population is implemented through the programmes for the limitation, surveillance and control of releases from the

[7] This Safety Guide simply reflects what was already a reality in the licensee organisations at the time of publishing.

nuclear power plants and through the environmental radiological surveillance programmes performed in their areas of influence. The Nuclear Safety Council defines the scope and content of the releases surveillance and control programme and of the environmental radiological surveillance programme of each nuclear power plant, systematically inspecting their implementation, evaluating their results and reporting to Parliament and to the Commission of the European Union via annual reports.

15.3.1 Compliance with the conditions on the release of radioactive substances

The system for the limitation, surveillance and control of releases from nuclear power plants is based on the same principles, criteria and practices as described in the previous reports, and has led to actual release values far lower than the authorised limits, standardised at international level.

Table 15.B.2 indicates the activity released by the nuclear power plants during 2003. The radiological impact associated with the releases is insignificant, the activities released representing only a minor fraction of the authorised limits.

The effective doses, calculated for the most exposed individual and considering highly conservative hypotheses, have in no case exceeded the limit of 100 microSievert authorised for radioactive effluents and are in all cases lower than 10 microSievert.

Table 15.B.3 shows the standardised activity of liquid and gaseous radioactive effluents from the Spanish nuclear power plants, compared to those of the European Union countries and the United States.

15.3.2 Environmental radiological surveillance

As described in previous reports, each nuclear power plant has an Environmental Radiological Surveillance Programme, drawn up in accordance with the directives of the Nuclear Safety Council, the annual schedule and results of which are evaluated by the CSN. Furthermore, the CSN carries out an annual sampling and analysis campaign around each plant, allowing the licensee's programme to be contrasted against the results. Appendix 15.C describes the content of the environmental radiological surveillance programmes and shows the most significant results during 2002.

From the evaluation of these results it may be appreciated that the radiological impact on the surroundings of the Spanish plants continues to be far below the limits established and that the quality of the environment in the areas surrounding the plants is maintained under acceptable conditions from the radiological point of view, without there being any risk for people as a result of their operation.

15.4 Degree of compliance with the obligations of the Convention

In Spain, adequate measures are in place to ensure that the exposure of the workers and the public to radiations caused by nuclear facilities under all operational situations is kept as low as is reasonably achievable and that no person is exposed to radiation doses in excess of the dose limits established.

During the period that has elapsed since the previous report, the following activities have been performed with a view to improving radiation protection at the nuclear power plants:

- Modification of the regulation on radiation protection with the publishing of the new Regulation on Protection against Ionising Radiations, to adapt it to the provisions of Directive 96/29/EURATOM, incorporating the recommendations issued by the ICRP in its publication number 60.
- Adaptation of the plant owner company organisations in accordance with the latest doctrines relating to application of the ALARA criterion (work management).
- Implementation of the new framework for the distribution of responsibilities in relation to radiation protection among the licensees of the facilities and external companies rendering services at the plants.
- Definition and establishment of requirements for the training of external company workers on radiation protection.
- Implementation of the new Individual Radiological Monitoring Document.
- Establishment of new warning levels suitable for the release limits established in terms of effective equivalent dose.

In compliance with the Regulation on Protection against Ionising Radiations, a realistic estimate of the dose received by the population as a result of nuclear power plant operation is under way.

In relation to this activity, the criteria to be applied to undertake a realistic dose estimate have been defined and, in keeping with these criteria, an estimate has been made of the effective dose for 2002 and 2003, this currently being evaluated in detail.

As regards environmental radiological surveillance programmes, work continues on the analytical comparison exercises among laboratories performing environmental radioactivity measures, the objective being to guarantee the homogeneity and reliability of the results obtained from these programmes, and standardised procedures are being developed for the different stages of the measuring process.

APPENDIX 15.A

Information on personal dosimetry included in the CSN report submitted to Parliament for 2003

A. External exposure

The statistical results for accumulated dose during the year for the nuclear power plants overall are as follows:

Joint operation (normal and refuelling)

A.1 In-house personnel

A total 2,094 workers have been controlled.

1. 100% of the workers controlled received doses lower than 3/10 of the annual limit.
2. 98.62% of the workers controlled received doses lower than 1/10 of the annual limit.
3. 65.19% of the workers controlled did not receive any measurable dose.

If consideration is given only to workers with readings higher than the background of the dosimetry system used, the average individual dose for this group of workers amounts to 1.26 mSv.

A.2 Contracted personnel

A total 5,264 workers have been controlled.

1. 100% of the workers controlled received doses lower than the annual limit.
2. 99.51% of the workers controlled received doses lower than 3/10 of the annual limit.
3. 93.24% of the workers controlled received doses lower than 1/10 of the annual limit.
4. 41.69% of the workers controlled did not receive any measurable dose.

If consideration is given only to workers with readings higher than the background of the dosimetry system used, the average individual dose for this group of workers during this six-month period amounts to 2.09 mSv.

A.3 Collective doses

By way of a summary, the following table shows the annual overall collective doses for each of the nuclear power plants:

José Cabrera	652	mSv.person (*)
Santa María de Garoña	1,239	mSv.person (*)
Almaraz I y II	817	mSv.person (*)
Ascó I y II	708	mSv.person (* Ascó I)
Cofrentes	3,085	mSv.person (*)
Vandellós II	584	mSv.person (*)
Trillo	249	mSv.person (*)

(*) Refuelling outage.

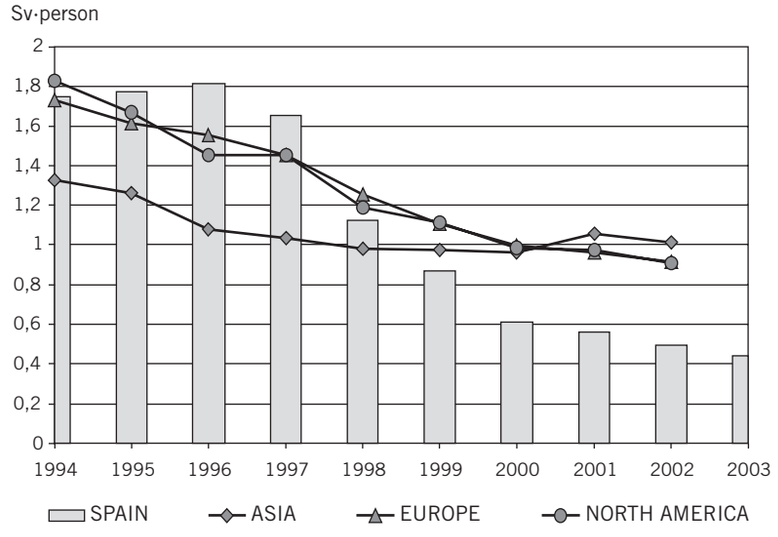
These data mean that the average collective dose per reactor throughout the year amounts to 814 mSv.person. By type of reactor this parameter amounts to 2,162.35 mSv.person for BWR plants and 429.95 mSv.person for PWR's.

As reference data, figures 15.A.1 and 15.A.2 include comparative graphs showing the evolution of the average collective dose in Spain, Europe, Asia and North America.

B. Internal exposure

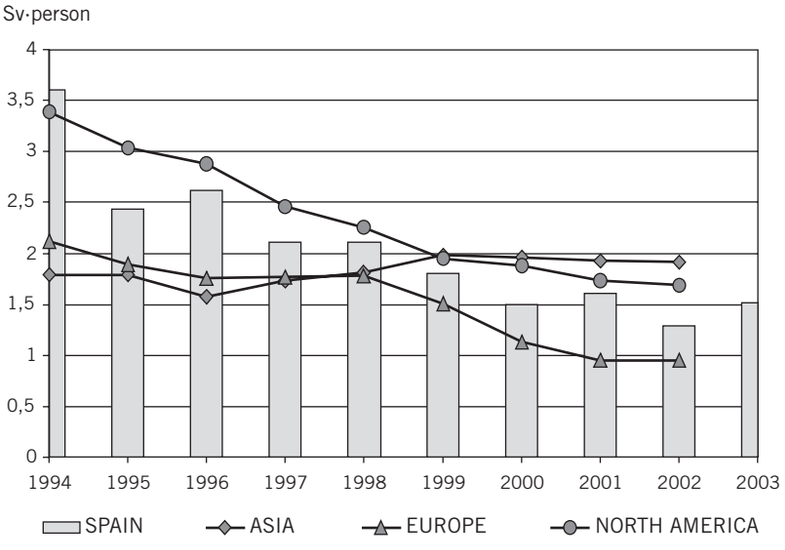
Direct corporal radioactivity measures have been carried out on 10,118 people. In no case was any internal contamination in excess of the recording level (1 mSv/year) detected.

Figure 15.A.1 Average collective dose (Sv.person) for PWR type plants. International comparison



NOTE: In the production of this figure, the triennial average collective dose for PWR reactors have been considered for each compared region.

Figure 15.A.2 Average collective dose (Sv.person) for BWR type plants. International comparison



NOTE: In the production of this figure, the triennial average collective dose for BWR reactors have been considered for each compared region.

APPENDIX 15.B

Limitation, surveillance and control of releases of radioactive substances at 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. However, in January 2002 new limits applicable to radioactive effluents came into force as a result of approval in 2001 of the Regulation on Protection against Ionising Radiations (RPIR), by way of Royal Decree 783/2001, which establishes an effective dose limit of 1 mSv/y for the public. The new release limits for nuclear power plants have been established at an effective dose of 0.1 mSv/y for liquid and gaseous effluents overall.

These limits guarantee, with a very wide safety margin, that the doses that might be received by the members of the public as a result of the emission of radioactive effluents during the normal operation of nuclear power plants will not be significant, and in any case clearly lower than the public dose limits established by the RPIR: 1mSv/y effective dose and 50 mSv/y equivalent skin dose.

As a result of the application of this system of limits on releases, the actual values of the releases continue to be far lower than the authorised limits and completely comparable to others at international level. Table 15.B.1 shows the effluents released from the Spanish nuclear power plants during 2003. The doses received by the public as a result of these releases are below 1% of the integrated limit authorised for radioactive effluents.

Table 15.B.2 shows a comparison between the releases from the Spanish nuclear power plants and their US and European counterparts. The comparison is made in terms of standardised activity per unit of energy produced (GBq/GWh).

Table 15.B.1 Radioactive effluents from nuclear power plants. Activity released in 2003 (Bq)

	PWR Plants					
	José Cabrera	Almaraz I and II	Ascó I	Ascó II	Vandellós II	Trillo
Liquid effluents						
Total except for Tritium and Dissolved Gases	$4.72\ 10^{7}$	$4.17\ 10^{9}$	$5.78\ 10^{9}$	$2.43\ 10^{9}$	$2.55\ 10^{10}$	$7.67\ 10^{8}$
Tritium	$9.53\ 10^{12}$	$4.51\ 10^{13}$	$9.38\ 10^{12}$	$3.72\ 10^{13}$	$3.23\ 10^{13}$	$1.76\ 10^{13}$
Dissolved Gases	LDL(2)	LDL(2)	$1.08\ 10^{9}$	$2.13\ 10^{8}$	$5.31\ 10^{8}$	(1)
Gaseous effluents						
Noble Gases	$9.35\ 10^{12}$	$3.04\ 10^{11}$	$8.21\ 10^{12}$	$2.91\ 10^{11}$	$1.78\ 10^{12}$	$3.45\ 10^{11}$
Halogens	$1.55\ 10^{5}$	$2.31\ 10^{4}$	$2.73\ 10^{6}$	LDL(2)	$4.81\ 10^{8}$	$1.63\ 10^{6}$
Particles	$2.15\ 10^{4}$	$3.40\ 10^{6}$	$5.15\ 10^{6}$	$1.94\ 10^{6}$	$6.85\ 10^{7}$	$1.82\ 10^{5}$
Tritium	$4.25\ 10^{10}$	$3.32\ 10^{12}$	$6.16\ 10^{11}$	$1.40\ 10^{12}$	$1.98\ 10^{11}$	$6.75\ 10^{11}$

Table 15.B.1 Radioactive effluents from nuclear power plants. Activity released in 2003 (Bq) *(cont.)*

BWR Plants

	Santa María de Garoña	Cofrentes
Liquid effluents		
Total except for Tritium and Dissolved Gases	$8.36\ 10^{8}$	$1.80\ 10^{8}$
Tritium	$3.81\ 10^{11}$	$1.02\ 10^{12}$
Dissolved Gases	LDL(2)	$4.90\ 10^{8}$
Gaseous effluents		
Noble Gases	LDL(2)	$1.41\ 10^{13}$
Halogens	$6.26\ 10^{7}$	$6.72\ 10^{9}$
Particles	$1.55\ 10^{7}$	$5.09\ 10^{7}$
Tritium	$4.00\ 10^{11}$	$2.00\ 10^{12}$

(1) The liquid releases do not carry entrained dissolved gases since these are eliminated in the treatment process.
(2) LDL: Lower Detection Limit.

Table 15.B.2 Standardised activity of radioactive effluents (GBq/GWh)*

Gaseous radioactive effluents

	Spain		EU Countries		USA	
Components	PWR	BWR	PWR	BWR	PWR	BWR
Noble Gases	$9.64\ 10^{0}$	$2.20\ 10^{1}$	$4.89\ 10^{0}$	$7.36\ 10^{1}$	$1.45\ 10^{1}$	$1.26\ 10^{2}$
I-131	$2.23\ 10^{-5}$	$6.21\ 10^{-5}$	$2.52\ 10^{-5}$	$2.75\ 10^{-4}$	$9.43\ 10^{-5}$	$4.99\ 10^{-4}$
Particles	$2.64\ 10^{-5}$	$7.07\ 10^{-5}$	$4.22\ 10^{-5}$	$6.19\ 10^{-2}$	$3.72\ 10^{-4}$	$1.32\ 10^{-3}$
Tritium	$1.86\ 10^{-1}$	$1.27\ 10^{-1}$	$2.79\ 10^{-2}$	$3.21\ 10^{-2}$	$4.62\ 10^{-1}$	$2.80\ 10^{-1}$

Liquid radioactive effluents

	Spain		EU Countries		USA	
Components	PWR	BWR	PWR	BWR	PWR	BWR
Total except Tritium	$3.89\ 10^{-3}$	$5.35\ 10^{-4}$	$3.97\ 10^{-3}$	$4.96\ 10^{-3}$	$7.99\ 10^{-3}$	$7.08\ 10^{-3}$
Tritium	$3.17\ 10^{0}$	$7.96\ 10^{-2}$	$3.23\ 10^{0}$	$2.50\ 10^{-1}$	$3.02\ 10^{0}$	$1.09\ 10^{-1}$

(*) Average values: Spain: 1981-2003, EU: 1981-1997 and USA: 1981-1997.

APPENDIX 15.C

Environmental radiological surveillance programmes in the areas of influence of Spanish nuclear power plants

Radiological surveillance in the areas surrounding the Spanish nuclear power plants is carried out through two independent programmes.

The first of these, established in accordance with the directives of the Nuclear Safety Council, is carried out by the licensee of the facility in application of regulatory provisions and the conditions of the corresponding authorisation and is subject to regulatory control by the CSN.

The second is performed by the Nuclear Safety Council itself, in certain cases through the assignment of functions to the regional governments of the Autonomous Communities, in collaboration with national laboratories or the laboratories of universities in the region in which the facility is located. This programme is completely independent from that performed by the licensee and is aimed at complementing the control provided by the latter. The sampling points, types of samples and analyses performed coincide with those of the licensees. The scope is around 5% of the programme developed at each facility.

Both programmes have continued since the publication of the previous report.

At present, eight environmental radiological surveillance programmes are implemented around the different nuclear power plants, seven in the operating phase and one in the phase of dismantling and decommissioning. Some 10,000 samples per year are taken within these programmes and some 12,000 analytical determinations are made.

Table 15.C.1 includes a summary of these programmes.

Table 15.C.2 includes, for illustrative purposes, the average values of the results obtained from analysis of the samples of air taken in the environmental radiological surveillance programmes during 2002.

Table 15.C.1. ERSP's performed by nuclear power plant licensees

Type of sample	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 following a maximum exposure period of three months	Integrated dose rate
Drinking water	Fortnightly sampling or more frequent	Total beta activity, rest of beta Sr-90, Tritium, γ spectrometry
Rainwater	Continuous sampling with monthly sample collection	Sr-90, γ spectrometry

Table 15.C.1. ERSP's performed by nuclear power plant licensees *(cont.)*

Type of sample	Sampling frequency	Analyses performed
Surface and groundwaters	Monthly or more frequently for surface waters and quarterly or more often for groundwaters	Total beta activity, rest of beta Sr-90, Tritium, γ spectrometry
Soil, sediments and indicator organisms	Annual for soil and six-monthly for sediments and indicator organisms	Sr-90, γ spectrometry
Milk and crops	Fortnightly for milk in grazing period and monthly for the rest of the year; crops in the harvest period	Sr-90, γ spectrometry I-131
Meat, eggs, fish, seafood and honey	Six-monthly	γ spectrometry

Table 15.C.2 Nuclear power plant ERSP's. Year 2002

	Air Bq/m^3			
Nuclear plant	β-Total	I-131	Sr-90	Cs-137
José Cabrera	4.24E-04	LDL	5.92E-06	LDL
Santa María de Garoña	3.78E-04	LDL	LDL	LDL
Vandellós I	5.42E-04	NA	3.48E-06	LDL
Almaraz	8.12E-04	LDL	3.84E-06	LDL
Ascó	5.90E-04	LDL	LDL	LDL
Cofrentes	7.54E-04	2.68E-04	LDL	LDL
Vandellós II	5.30E-04	LDL	LDL	LDL
Trillo	5.33E-04	LDL	LDL	LDL

LDL: Lower Detection Limit.

NA: Not applicable.

Article 16. Emergency preparedness

16.1 Modification of laws, regulations and requirements referring to planning and preparation for emergency situations

In Spain the planning and preparation for situations of nuclear emergency are governed by the Basic Nuclear Emergency Plan (Plaben) and by the Regulations governing Nuclear and Radioactive Facilities. In addition, there are general provisions on nuclear emergencies in the Law Creating the CSN (modified by the law on public prices and tariffs for services rendered by the CSN), in the Regulation on Protection against Ionising Radiations, in the Agreement of the Cabinet of Ministers on public information on healthcare measures and actions in the event of radiological emergency and in the Basic Civil Defence Standard.

The most significant aspects of the modifications introduced in the legal and regulatory framework during this period are summarised below:

16.1.1 Basic Civil Defence Standard

This has not been modified.

16.1.2 Basic Nuclear Emergency Plan (Plaben)

On 25th June 2004, the Cabinet approved the new Basic Nuclear Emergency Plan which constitutes a revision of the Plan previously in force, approved in March 1989, and incorporates into the Spanish standards the latest Community Directive developed in this area.

The new PLABEN has been drawn up since 2001 by the Directorate General for Civil Defence and Emergencies, in accordance with the Nuclear Safety Council, the Ministerial Departments and different bodies of the Administration concerned and the Autonomous Communities.

Objectives

The revision of the Basic Nuclear Emergency Plan pursues three basic objectives. The first of these consists of taking advantage of the experience acquired from the practical application of the Plan over the last twelve years, undertaken through public information programmes, the training of those required to intervene in emergency situations and exercises and drills, as well as the incidents that have occurred during the period.

Furthermore, the new Plaben aims to assign responsibilities to the Autonomous Communities and Town Councils concerned through the effective incorporation of their services, means and resources into the Nuclear Emergency Plans. Consideration has been given also to their capabilities in areas such as medical care, fire-extinguishing and rescue services and even to the integral intervention of the local police in certain cases.

Thirdly, the revision aims to make the Plan a real Master Plan, this meaning that it will be developed and implemented materially throughout the country via the Nuclear Emergency Plans external to the nuclear power plants.

Main novelties

The new Basic Emergency Plan contains a series of significant novelties, one of which is the inclusion of an explicit declaration of its being a guideline for the planning of nuclear emergencies and to guarantee the efficiency of the plans deriving from it and establish a clear differentiation between aspects relating to preparation and to emergency response.

This document incorporates the current international standards and recommendations for the management of nuclear emergencies, among them the EU 96/29/EURATOM Directive and those issued by organisations such as the IAEA and the ICRP. As regards other aspects, the radiological criteria defined at international level have been introduced.

The Plan also explicitly establishes responsibilities and functions for both emergency and normal situations, with a view to keeping the corresponding emergency plans continuously operative. In this respect also, the Autonomous Communities are integrated and assigned responsibilities both at operational level and in decision-making, and the essential role of the Nuclear Safety Council as the organisation solely responsible for nuclear safety and radiation protection is explicitly established.

The new text, which has undergone a process of rationalisation and simplification and which includes the regulatory requirement that operating procedures be drawn up, contains the effective material development of the so-called Central Level of Response and Support for the Nuclear Emergency Plans external to each plant.

Furthermore, the Nuclear Safety Council is working with the Directorate General for Civil Defence on the preparation of a Directive on civil defence against general radiological risk, which among other issues would contemplate accidents occurring at nuclear power plants in other countries. The basic planning elements of this directive were approved by the CSN in June 2000.

16.1.3 Law Creating the CSN and Law on CSN Fees

A was described in the previous report, Law 15/1980, of 22nd April 1980, by which the CSN was created, assigned a series of functions to this body, among them that of collaborating with the competent authorities in the establishment of the criteria to be met by the emergency plans of nuclear facilities and, on the completion of such plans, of participating in their approval.

Subsequently, Law 14/1999, of 4th May 1999, on the public prices and tariffs for services rendered by the CSN, partially modified the functions assigned to the body by Law 15/1980, including those relating to emergencies. The functions assigned to the CSN in the event of a nuclear emergency include the following:

- Collaboration with the competent authorities the establishment of the criteria to be met by the emergency plans of nuclear and radioactive facilities and for transport and, on the completion of such plans, participation in their approval.
- Coordination, for all aspects relating to nuclear safety and radiation protection, of support and response measures for emergency situations, integrating and coordinating the different organisations and private or public companies whose intervention is required for compliance with the functions assigned to this organisation.

- Likewise, performance of whatever other activities might be assigned to it by the applicable regulations in relation to emergencies.

The aforementioned functions refer to the participation of the CSN in responding to emergencies that might arise as a result of practices subject to regulatory control, such as nuclear and radioactive facilities and transport. Furthermore, Law 14/1999 assigns to the organisation other functions relating to the response to emergencies arising in activities not subject to the system of authorisations included in the nuclear legislation.

16.1.4 Regulation on Nuclear and Radioactive Facilities

The Regulation on Nuclear and Radioactive Facilities continues to require that the licensees of nuclear installations draw up a site emergency plan as a pre-requisite for awarding of the corresponding Operating Permit.

All the nuclear facilities submit a proposal for their site emergency plan, which is approved by the Ministry of Industry, Tourism and Commerce[8] following a report by the CSN, which evaluates such proposals taking into account specific national and international standards.

As is established in the aforementioned Regulation, the site emergency plans of the facilities are required to detail the measures foreseen by the licensee to respond to accident conditions, in order to mitigate their consequences and protect the site personnel, and to notify the competent bodies of their occurrence, including initial assessment of the circumstances and consequences of the situation. Furthermore, the licensee is explicitly required to collaborate with the competent bodies in protection activities performed offsite.

16.1.5 Agreement of the Cabinet of Ministers on public information regarding health protection measures and radiological emergency response activities

This Cabinet Agreement was published in October 1999 and replaced the previous Agreement of 1993. The new version was undertaken in order to widen the scope of the information in relation to facilities other than nuclear power plants, as established in the EU Council Directive 89/618/EURATOM. The scope of this Agreement of the Cabinet of Ministers now includes radioactive facilities and activities not subject to the system of authorisations contemplated in the nuclear and radiological legislation, and does not modify what was established in the previous Agreement regarding programmes for information for the population in areas surrounding nuclear power plants, both prior to and during an emergency, and the training of people required to intervene in nuclear emergency situations. This agreement increases the responsibilities assigned to the CSN in relation to public information on emergencies.

In addition to the above, the Regulations on Protection against Ionising Radiations, of 6th July 2001, approved pursuant to Directive 96/29/EURATOM, include the general radiation protection principles to be considered in interventions, including those relating to nuclear or radiological emergencies in general.

[8] Royal Decree 1554/2004, of 25th June, which develops the basic organisational structure of the Ministry of Industry, Tourism and Commerce, establishes that areas of competence corresponding at that time to the Ministry of Economy are now transferred to Industry.

16.2 Application of emergency preparedness measures, including the role of the regulatory body and other organisations

16.2.1 Nuclear facility plans for on and off-site emergencies, including support organisations and systems

Site Emergency Plans

There have been no significant changes in this respect since the previous report, although a complete review of all the emergency plans has been carried out to include new initiating events relating to fire-fighting and security.

Central Level of Response and Support

The following initiatives have been carried out, in addition to the measures reinforcing the capacity to intervene in affected areas and described in the previous report:

- Contracting of a maintenance and management service for the equipment of the Provincial Radiological Groups.
- Initiation of a dosimetry equipment replacement programme to improve equipment efficiency.

16.2.2 CSN emergency preparedness and response

As was described in the previous report, the essential responsibilities of the CSN in the event of a nuclear accident are established in the Law by which the Council was created, modified by Law 14/1999, and are as indicated in section 16.1.3.

In order to comply with these responsibilities, the CSN must essentially perform the following functions:

- awareness and estimation of the evolution of the initiating event,
- measurement and analysis of levels of radiation and contamination,
- estimation of the radiological effects of the accident,
- determination of the most adequate measures to protect the population.

In addition, the CSN appoints the Heads of the provincial radiological groups, through whom the management of these groups and the coordination of the radiological intervention teams are accomplished. As a component of the central level of response and support, the CSN coordinates all the agents of the Spanish State whose intervention is necessary for the performance of its functions, including the interventions assigned to the provincial radiological groups.

With a view fulfilling these functions, accommodating the reconfiguration of the basic organisational structure, and in order to rationalise the response to the different types of radiological emergencies that might arise, the CSN has addressed the re-engineering of its processes through revision of the document "Nuclear Safety Council Action Plan for Radiological Emergencies". This new revision has modified the Council's emergency response organisation and has introduced different modes of response making it possible to determine a response proportional to the severity of each emergency situation and to the degree of uncertainty associated with its evolution.

The plan includes the processes of incorporating components belonging to the basic organisational structure of the CSN into the organisation for emergency response and the critical emergency tasks to be performed in each situation, with a view to adequately covering the responsibilities assigned to the Council within the national emergency response system. In addition, the Plan considers the activation and activities of a series of services for intervention in affected areas, in relation to the central response and support level.

The Emergency Room (Salem) is the location from which the CSN Emergency Organisation performs its function and which houses the tools required for it to perform its responsibilities. This Room is permanently manned by technical and support personnel.

Appendix 16.A describes the CSN Action Plan for situations of radiological emergency, including the Emergency Response Organisation and the available facilities and resources.

The CSN is preparing a modernisation plan for its emergencies room that consists of modifying and extending its facilities and of technologically updating the computer and telecommunications systems required for the operation of the Council's emergency services.

The objective of the architectural modifications is to improve the location of the emergency management and the permanent response service of the centre and the traffic of people and documentation between the different facilities. As regards the technological renovation of the Salem computer and telecommunications systems, a Systems Plan, described in Appendix 16.A, has been drawn up and its implementation has begun, through a programme that will run through to 2006.

16.2.3 Measures for public information on emergency preparedness in areas surrounding nuclear facilities

The content of this section has not been modified with respect to what was described in previous reports, and the Agreement of the Cabinet of Ministers regulating the issue of public information on nuclear and radiological emergencies continues to be applied.

The Cabinet Agreement of October 1999 increases the scope as regards the population that is to receive training and information on radiological emergencies. As regards nuclear emergencies, the Agreement does not pose any significant changes, as a result of which the systematic approach established by the Directorate General for Civil Defence is maintained.

For its part, the Nuclear Safety Council collaborates closely with the Directorate General for Civil Defence in providing information for the population of nuclear emergency planning zones in areas such as the following: preparation of information plans and programmes, design and publishing of informative brochures on emergency plans and delivery of direct public information sessions.

At present, and in application of this Agreement, training courses are being delivered to the local populations and to the intervention teams.

16.3 Initial and on-going training: drills and exercises

Since the last report, the programmes of exercises and drills included in the nuclear facility site emergency plans have continued, these including an evacuation drill at each nuclear

facility every year. These programmes are prepared and performed in accordance with CSN Safety Guide GS-01.09 on emergency drills and exercises at nuclear power plants. Wide experience has been acquired in relation to the performance and tracking of nuclear power plant site emergency plan drills and exercises, the following results being particularly significant:

- Checks are made on the correct preparation of the site emergency plan resources and procedures. The analysis of each exercise has made it possible to identify certain aspects open to improvement in relation to the nuclear power plant response procedures and resources, these being of minor importance in all cases.
- The participation of the CSN in these drills, for which the emergency organisation at the Salem is systematically activated, has allowed certain aspects to be identified for improvement of its analytical resources and for the acquisition of data on and off the plant site. The above is leading to the on-going improvement of the CSN's capacity to respond to nuclear emergencies, channelled through two complementary instruments: the new CSN action plan for nuclear or radiological emergencies and the Salem computer and telecommunications systems plan.

An aspect additional to what was established in the First National Report in this area refers to the systematisation of the general exercises and drills of the off-site emergency plans (provincial plans) undertaken in recent years by the Directorate General for Civil Defence (DGCD).

The programme of general drills corresponding to the off-site plans is complemented with a programme of partial exercises in all the plans, including local, provincial and national emergency coordination centres, classification and decontamination stations and access controls.

In both the partial exercises and the general drills a team of observers made up of technicians from the different organisations involved is set up; after every exercise this team holds a meeting analyse and report on performance. The conclusions of the corresponding reports are incorporated into the documentation of the plans and constitute proposals for improvement of the response resources. A general conclusion springing from these drills and exercises is that the off-site plans for nuclear emergency response reflect an adequate degree of preparedness, although areas for improvement are identified in the processes of response and the deployment of resources.

16.4 International agreements

The CSN and the Directorate General for Civil Defence, as the national authorities identified in the IAEA Conventions on prompt notification and mutual assistance in the event of nuclear accident, respectively, have incorporated in their nuclear emergency management systems the provisions of the document EPR–ENATOM–2000 "Notification and assistance in emergencies. Operations technical manual".

The Nuclear Safety Council emergency room (Salem) is the Spanish point of contact and alert, as established in the aforementioned manual.

16.5 Degree of compliance with the obligations of the Convention

Since the Second National Report on compliance with the Convention, a series of complementary activities have been carried out with a view to improving the general

capacity to respond to nuclear emergencies in Spain. The most significant of these refer to the following:

- Approval of the Basic Nuclear Emergency Plan, which includes the new radiological criteria defined at international level.
- Maintenance of plans for improvement and updating of the resources and capacities of the Provincial Plans.
- Frequency and systematisation of the performance of on and off-site drills.

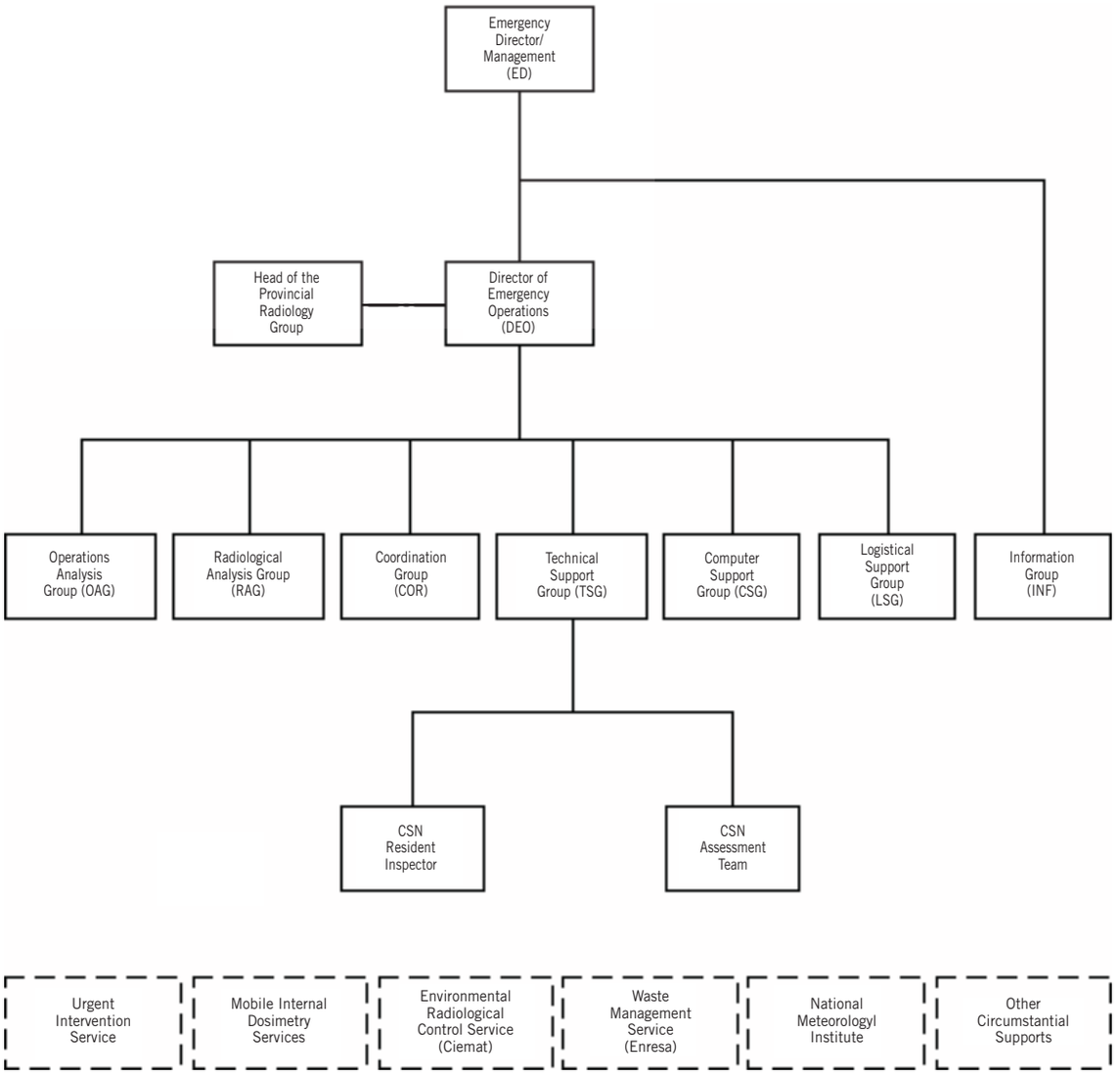
As a result, the general conclusions drawn in the previous report continue to be valid, according to which the planning for and capacity to respond to nuclear emergencies in Spain meet the requirements of Article 16 of the Convention.

APPENDIX 16.A

CSN Emergency Response Organisation

The Organisation set up by the CSN for emergency situations extends to all the Council's levels of authority and draws upon staff members involved in the performance of it functions as the Regulatory Body, following their preparation and training for the functions assigned to them specifically for cases of nuclear emergency (Figure 16.1).

Figure 16.1



Emergency management

The Chairperson of the CSN is the Director of the CSN emergency response organisation during the immediate and urgent phases of an emergency and acts as the sole authority on behalf of the Nuclear Safety Council during these phases. Mechanisms are in place for the delegation and performance of this function by the Vice-Chairman or other Board Members for cases of scheduled or non-scheduled unavailability of the Chairperson in an emergency situation. As a professional body, the Nuclear Safety Council is in charge of emergency response management during the third phase of radiological emergencies.

Emergency operations director

One of the two technical directors of the Nuclear Safety Council carries out the functions of director of emergency operations, taking into account the practice, activity or source of origin of the emergency. The emergency operations director directs the operations of the CSN emergency organisation operating groups.

Information group

This group is in charge of all activities relating to public information during the response to an emergency situation and of organising and carrying out contacts with the representatives of the press during such situations, with the support of whatever technical personnel are considered necessary in each case. The information group reports directly to the Emergency Director.

The Emergency Room is where the CSN emergency organisation carries out the majority of its functions, centred on the activity of the personnel assigned to the different operating groups: management and coordination, radiological analysis, operational analysis, computer support and logistics.

Coordination group

The coordination group is in charge of overseeing the correct application of all the CSN emergency planning instruments at local, national and international level, of the coordination and operational interface between the CSN emergency response organisation and the response organisations of other national and international agents and organisations and of coordinating the operations of the different groups of the organisation in accordance with the directives and priorities established by the emergency operations director. This group is also in charge of permanent Emergency Room preparedness and of the maintenance and updating of the Action Plan and its procedures.

Radiological analysis group

The radiological analysis group is in charge of tasks relating to the tracking and assessment of the radiological consequences of the emergency situation and of proposing the protection measures to be adopted to the CSN emergency director. For this task the group uses the assistance tools located in the Salem and received assistance from the National Meteorology Institute.

Operations analysis group

The operations analysis group is responsible for the monitoring and assessment of the emergency from the point of view of the nuclear safety of the facility, and consequently for knowledge of the initial cause of the event, its evolution, the systems and equipment affected, the emergency operating procedures used and, in general, the operational status of the facility and characterisation of the source term.

Support group

The support group is responsible for providing the support required to the different CSN emergency organisation operating groups and the information office, especially in relation to contacts with the national and international organisations that might collaborate in an emergency and with the external agents supporting the operation of the facility. The resident inspectors and deputy resident inspectors at the Spanish nuclear power plants, who are not responsible for the provincial radiological group and who remain on site during the emergency, report to this group. Also reporting to this group are the analysis, studies and research teams set up by the CSN using its in-house personnel and sent to the accident site.

There is a system of stand-by shifts affecting the CSN emergency response personnel that guarantees the presence of a sufficient team of people within one hour of the organisation being activated. Furthermore, the CSN emergency centre, described below, is permanently manned by personnel working shifts, incorporated in the Coordination Group.

The CSN emergency response organisation is aided by a series of support and assistance services that increase the organisation's capacity to respond at the site or place of the accident. These services are as follows:

- Urgent intervention service.
- Radiological characterisation service.
- Waste management service.
- Mobile internal contamination measuring service.

Nuclear Safety Council Emergencies Room (Salem)

In order to ensure that the different elements of the CSN emergency organisation, described above, may perform the functions assigned to them efficiently and in a coordinated manner, the CSN has an Emergency Centre known as the Salem. Salem is an abbreviation of "Sala de Emergencias" (Emergency Room).

The Salem is a national nerve centre for the notification, information, tracking, analysis and assessment of all nuclear accident or radiological emergency situations that might occur within Spain or beyond the country's frontiers but implying actual or potential repercussions for the national territory.

The Centre and the information, calculation and estimation systems available are briefly described below.

The central core of the Salem consists of four more less equally sized rooms located adjacent one to the next such that they form a cube, with intermediate partitions of glass. This centre is located in the basement of the headquarters of the Organisation and is defined as being a restricted and controlled access zone.

The Salem is fitted with a series of surveillance, calculation and estimation systems that together constitute a set of specialised tools that is used by the emergency organisation experts for the performance of their functions.

The most important of the rooms is known as the *Emergency management room* and is the working area for the Emergency Director, the Director of Emergency Operations and the Coordination Group. The three other rooms are the working areas for three of the operational groups defined in the CSN Action Plan: radiological analysis, operations analysis and technical support. The Information Group is also set up in this last room.

The Salem is complemented with a communications room, annexed to the emergency management room, and a set of auxiliary facilities for extended stays by the emergency organisation personnel. The communications room houses the fax and telex terminals, a telephone concentrator, a device for recording telephone conversations, a photocopier, etc.

The Salem is manned 24 hours a day, 365 days a year by an on-duty technician qualified in nuclear safety and radiological protection and by a communications officer.

The *radiological analysis group room* is equipped with the environmental radiological surveillance networks. These networks allow the CSN to address it responsibilities in relation to the measurement and control of levels of radiation and contamination outside the nuclear and radioactive facilities. The CSN has its own automatic network of environmental radiological surveillance stations, known as the REA, made up of 25 stations distributed across the country, each of which consists of an automatic radiological station measuring the radiation rate and concentration of radon, radio-iodines and alpha and beta radioactivity emitters in the air, and of a meteorological station (belonging to the National Meteorology Institute) that measures the main meteorological parameters. The Salem's REVIRA network control centre also receives data from the networks of automatic stations implemented by the Governments of certain of the Autonomous Communities of the Spanish State. Installed in the Salem is a consultations terminal (associated centre) pertaining to the radioactivity alert network belonging to the Directorate General for Civil Defence of the Ministry of the Interior, which is made up of 907 automatic radiation rate measuring stations distributed across the country.

The CSN currently possesses various calculation codes for the estimation of doses during emergencies, which take into account atmospheric dispersion, a factor of fundamental importance in determining the radiological risk associated with the releases of radioactive material that might occur in the event of a nuclear emergency. Most of these codes come originally from the NRC and have been adapted to the Spanish nuclear power plants: IRDAM, RASCAL and MESORAD.

The Salem is also equipped with the generic application of the RODOS decision-making aid system, which is currently being adapted to the conditions of the Spanish emergency plans via a specific CSN project.

In order to function properly, these emergency dose estimation codes require the values of different meteorological parameters as inputs, the objective being to estimate or calculate the prevailing conditions of atmospheric dispersion. Accordingly, the CSN has a system that links the Salem to the meteorological towers of the different nuclear sites. Furthermore, there is a direct connection to the National Meteorology Institute via a data transmission line, for the reception of the parameters required to estimate wide range doses and of weather forecasts.

The *operations analysis group room* houses a safety parameter transmission system, necessary to help the CSN personnel in gaining insight into the operational situation of the plant and in reliably assessing the degree of safety of the facility in emergency situations. The main function of this system is to identify abnormal operating conditions, providing a continuous indication of safety-related parameters or other variables representative of the operational status of the plant.

This room is also fitted with a real-time plant analysis system incorporating the MAAP code, specifically adapted to each nuclear power plant. This is connected to the safety parameter reception system of each plant. This system allows the evolution of severe accidents to be assessed and predicted. It is also used as a training tool for the CSN staff on severe accidents, through the simulation of this type of events.

In the *technical support group room,* and with a view to this group's being able to perform its function of providing the other operational groups with technical documentation on a given facility,

there is an archive housing documentation on emergency situations fir each of the nuclear groups, general and emergency operations plans and procedures, radiological surveillance plans, technical specifications, etc.

Since 2003 the CSN has been undertaking the implementation of the Salem Systems Plan.

The Salem hardware has been renewed and the local area network has been replaced, and in addition the e-mail and fax systems have been improved.

The communications with the points integrated in the Plaben are also being replaced. An emergency communications network has been created, linking the nuclear power plants and Operation Coordination Centres (CECOPS) with the CSN and allowing for voice, data and video-conferencing communications for all the points. This network has been designed with a high degree of physical and logical redundancy in order to guarantee the reliability required of an emergency network.

The modernisation of the data transfer systems between the nuclear power plants and the CSN for emergency situations has been initiated with the creation of the core of the emergency information database, which will allow for the integration of all the necessary information.

d) Safety of facilities

Article 17. Site

17.1 Significant licensee activities in relation to the safety of nuclear power plant sites

The Spanish nuclear power plants have in operation the necessary site parameter surveillance systems: seismology (seismic instrumentation and transmission of the information recorded), meteorology (meteorology instrumentation and transmission of the information recorded) and hydrogeology (networks of surveillance and data acquisition posts). Furthermore, at the Ascó, Vandellós and Trillo plants, earth movements surveillance programmes are in force for the auscultation of global and differential movements, the ground being in a process of stabilisation due to an evolution with time that is clearly of damping.

The Spanish nuclear power plants have completed the adaptation, or implementation where appropriate, of seismic instrumentation systems adapted to the recommendations of the USNRC regulatory guides R.G. 1.12, *Nuclear Power Plant Instrumentation for Earthquakes,* rev.2, 1.166 *Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions* and 1.167 *Restart of a Nuclear Power Plant Shut Down by a Seismic Event*. As a result, the Operating Specifications have had to be adapted and procedures implemented making it possible, in the event of seismic movements at the site, to verify whether the level of the Operating Basis Earthquake (OBE) has been exceeded and to perform the inspection required if such an occurrence were confirmed.

In accordance with their programmes, certain plants have carried out the revision and/or maintenance of PSA-Off-site events studies (level 1), performed in accordance with the "Integrated Programme for the Performance and Use of Probabilistic Safety Assessments in Spain" and with the methodology described in NUREG-1407 of the USNRC.

In general, the activities of the licensees as regards the surveillance of site parameters and the performance of studies and analyses relating to site safety, in accordance with the previously established and scheduled plans, are in keeping with the forecasts made and satisfactorily fulfil the principle of continuous site surveillance and of progress in the reasonable improvement of nuclear power plant safety.

17.2 Regulatory control of licensee activities

The regulatory body has revised the studies prepared by the licensees and included within the framework of Periodic Safety Review activities. These activities have led to the updating of the seismic surveillance systems at all the nuclear power plants, including the installation of digital accelerometers in the field and inside the buildings, and to the improvement of the hydrogeological surveillance programmes.

In the Off-site Events PSA's, special consideration has been given to earthquakes, floods, strong winds, transport routes and nearby industries. These studies include the analysis

of the performance of the facilities with respect to events beyond the design basis (discarding those that have a frequency of recurrence of less than 10^{-6}), with a view to detecting specific vulnerabilities at each plant that might be solved at a low cost, through reasonable improvements providing a good cost-benefit ratio.

The periodic results of the "surveillance programmes" have also been reviewed and continuous supervision has been maintained through the appropriate inspections. A specific periodic inspection plan has been implemented at each nuclear power plant (Basic Inspection Plan) and, within this, a procedure has been established for the detailed revision of the site and extreme meteorological conditions.

The results of the evaluation of the plant Periodic Safety Review and Off-site Events PSA by the regulatory body, and in particular the consideration of aircraft accidents, have led to the modification of the Spanish standards on flight prohibition and restriction zones. The purpose of these changes is to increase the protection of the installations and of the areas surrounding the Spanish nuclear power plants against overflying aircraft, clearly establishing prohibited zones with specific lateral and vertical limits around each nuclear power plants.

Also in relation to the consideration and assessment of off-site events, special attention has been paid within the review processes to the adequate use of databases as input information and to the homogenisation of return periods in calculating site parameters. Likewise, specific efforts have been dedicated to due consideration of the evolution of nearby industries and of land transport routes around nuclear power plants.

17.3 Degree of compliance with the obligations of the Convention

From what has been established above, it may be concluded that the Spanish nuclear power plants continue to comply with the requirements of Article 17 of the Convention.

Article 18. Design and construction

18.1 Significant licensee activities in relation to nuclear power plant design safety review

As regards both the design and construction of nuclear power plants and the licensing practice applied in Spain, the concept of defence in depth has always been present. This concept has been applied both to the physical barriers included to prevent the negative effects of the fission products (i.e., the fuel cladding, pressure boundary and containment building) and to the engineered safeguards, the function of which is to protect the physical integrity of these barriers. The administrative requirements relating to licensing, inspection and quality assurance attempt in turn to ensure the correct design of the barriers and the correct operation of the engineered safeguards protecting them.

The pressure boundary designed in accordance with the code requirements (US ASME III code and the requirements of the AD *Merkbläter* in the case of Trillo) has performed reasonably well, although there have also been certain incidents. Tracking of the performance of the pressure boundary is accomplished not only by means of inspection techniques but also through the surveillance of coolant leakage, identified or otherwise. Surveillance criteria are established also with respect to the effect of the neutron irradiation experienced by the pressure vessel and monitoring of transition temperature displacement.

The analysis of the operating experience of plants throughout the world with Inconel 600 alloy in the primary have underlined the fact that this material is susceptible to Primary Water Stress Corrosion Cracking (PWSCC). The sensitivity of Inconel 600 was first detected in steam generator tubes, first on the secondary side and later on the primary side. This situation led to the replacement of the steam generators at several Spanish plants (Ascó I undertook such replacement in 1995, Ascó II and Almaraz I in 1996 and Almaraz II in 1997, using tubes of Incoloy 800), as indicated in previous reports. In addition, at the same time and taking advantage of the steam generator replacement, Almaraz replaced the vessel heads in both units for units with I-690 penetrations. As regards the pressure boundary, the licensees of Ascó and Vandellós, and of the two units at Almaraz, have prepared a joint strategy for preservation of the primary from the degradation phenomena that have occurred in recent years at plants with Inconel 600 components.

The incident that occurred at the Davis-Besse plant in 2002 has led to the adoption of a proactive policy aimed at preserving the primary pressure boundary and reducing to the extent possible, or delaying, the appearance of potential problems associated with this phenomenon (PWSCC). In this respect, the most significant activities performed to date at Ascó I NPP have been the replacement of the vessel closure head in March 2003, for a new head with I-690 penetrations, along with cold head conversion of the primary. The licensing analyses were performed alongside the minor increase in power. This is considered fundamental, since high temperature is one of the elements contributing to the speeding up of PWSCC.

Analogous to the above, Ascó II NPP replaced its vessel head in March 2004 for a new unit with I-690 penetrations, along with cold head conversion of the primary, the licensing analyses being performed alongside the corresponding minor increase in power.

In the case of Vandellós II, and given that the plant has operated under cold head conditions practically since its entry into commercial operation, the degree of susceptibility is lower. Nevertheless, considering that Vandellós II did not replace its steam generators, which are Model F with Inconel 600 T.T. tubes, which are less susceptible than those of Inconel 600, other actions have been initiated to correct or mitigate the problem, such as the addition of Zn to the primary.

Also being carried out at both Ascó and Vandellós are programmes for the inspection of the bottom of the vessel during refuelling outages, and analyses to determine the actions to be performed in the future for other primary components containing Inconel 600 (MSIP, Injection of Zn, etc.).

Intergranular stress corrosion appeared at the Santa María de Garoña plant, affecting different parts of the pressure boundary, especially the control rod rive mechanism penetrations. In this case a repair method was designed, consisting of incorporating a sleeve, which has proven to be adequate. However, work has continued on the development of a definitive solution by expanding these penetrations or by welding to the vessel, both such methods currently being in the evaluation stage with a view to possible future application.

The performance of the containment buildings of all the Spanish plants has been re-evaluated, with realistic criteria being used to determine their static breaking strain. In general, values from two to five times higher than the design values have been obtained, this revealing their actual capacity. The Spanish industry analysed the appropriateness of introducing filtered containment venting systems in the designs; this was not found to be justified and the CSN conditioned such incorporation on the results of probabilistic safety assessments. Nevertheless, the licensees of the BWR reactors, Garoña and Cofrentes, considered it appropriate to install wet well venting systems, this being accepted by the CSN.

As regards the design of the plant systems, each periodic safety review includes a section on the analysis and overall documentation of design modifications corresponding to the review period, the aim being to verify that the design modifications performed have not altered the original design basis. Over the years, the tracking and management of the design modifications carried out at the plants has undergone a process of progressive adaptation to current requirements, the objective being to identify whether a modification does or does not require approval by the regulator prior to its incorporation.

During the period corresponding to this report, the in-service inspections and component tests established by the surveillance requirements have continued, this making it possible to verify the performance of the equipment and systems. In some plants, as described in Article 14, these in-service inspection programmes have been revised with risk-informed applications. During the period considered by this report the updating of the pressure-temperature curves limiting the operation of the vessel, as has the revision of the reference temperature values for transition to nil ductility, as a result of the neutron flux surveillance programmes and the removal of capsules exposed to irradiation. Likewise, work has continued on the containment testing programme (local and integral leakage testing, with consideration given to behaviour analysis), in order to verify the maintenance of containment integrity and compliance with the limiting operating conditions and the hypotheses of accident analysis. For its part, the application of the maintenance rule at the plants has meant better management of resources for both preventive and corrective maintenance practices. At one plant, where consideration has been given to the

performance of preventive maintenance at power, the application of this maintenance rule has made it possible to identify and analyse configurations of risk, establishing the applicable contingencies.

In Spain, the plant licensees jointly initiated Lifetime Management Programmes, developing a methodology that was applied at two pilot plants. This development was based on pilot plans promoted in the United States. The application of this methodology includes the selection of systems, components and structures, the study of degradation mechanisms, the evaluation of maintenance practices versus ageing mechanisms and the establishment of improvements in maintenance practices.

For the selection of plant system components, safety, availability, replacement and cost criteria are applied, including systems classified as safety-related and others with a significant impact on availability, replacement and cost. Compliance with one of these criteria implies that the component is important from the point of view of lifetime management. Once the systems are defined, the equipment and components are selected via the application of certain selection criteria, this leading to a list of components ordered depending on their significance for lifetime management.

Within this methodology an analysis is made of the degradation mechanisms that might affect the components, these being grouped in different categories due to their being singular components (vessel, steam generators, turbine-generator set, containment, structures) or depending on their typology (tanks, pumps, piping, heat exchangers, valves, motors, instrumentation and control). In accordance with this, all the safety systems and components selected will be evaluated with respect to the ageing processes to which they are subjected and classified as high, medium or low in terms of the risk of degradation, the maintenance practices then being assessed in the cases of high or high-medium risk of degradation.

Finally, for the evaluation of maintenance practices, the characteristics of each component are compared in terms of component degradation and maintenance history. The contrast between the two allows maintenance to be evaluated, identifying shortcomings and those components for which the maintenance is considered sufficient. The analysis of these practices includes equipment maintenance (predictive, preventive and corrective), the application of the maintenance rule, in-service inspection programmes, valve testing, environmental qualification programmes, periodic and surveillance OTS testing, design modification programmes and erosion-corrosion programmes. All the above is complemented with periodic tracking and surveillance of these maintenance practices with a view to identifying the necessary improvements.

The Ascó and Vandellós plants jointly and in addition to the reports submitted to the CSN, have drawn up Strategic Mechanical, Electrical, Instrumentation and Computer Systems Development Plans to complement and anticipate the potential ageing or obsolescence of equipment and systems. These plans contain the definition and planning of the modifications, improvements, studies and/or inspections to be carried out over five-year periods. In the case of the Almaraz and Trillo plants, and in accordance with the conditions of the Operating Permits in force, the licensees initiated in 1997 and 200 respectively the implementation of a Lifetime Management Plan, based generally on the systematic approach, methods and conclusions of the first phase of the Unesa project "Remaining Lifetime Management System for Light Water Reactor NPP's". This documentary phase, which consists of the performance of phenomenological and degradation studies in the evaluation of ageing control and mitigation activities, is expected to be completed during 2005 at Almaraz and in 2007 at Trillo.

18.2 Regulatory control of licensee activities

The CSN has resident inspectors at each site. Added to the performance of the Inspections contemplated in the Basic Inspection Programme common to all the plants, as described in Article 19, this fact allows the CSN to accomplish adequate regulatory control of licensee activities. The Council also has the set of reports that each licensee is required to submit. The issuing of these reports is required for each authorisation and may be periodic or otherwise. During the period corresponding to this report, there has been a process of classifying and identifying which of these reports are subject to evaluation and which, being subject to a process of supervision, are elements to be taken into account in the inspection programme of each plant.

The following are among the reports expected to be submitted:

- Reports specifically required in authorisations, of annual frequency:
  - On the in-house and industry operating experience applicable to the facility, describing the actions taken to improve its operation.
  - On design modifications foreseen, implemented or in the implementation phase.
  - Measures taken to adapt the operation of the plant to the new national requirements on nuclear safety and radiation protection, the standards of the international organisations of which Spain is a member or the standards of the country of origin of the project.
  - Initial and on-going training programme activities for all the plant personnel and having an impact on nuclear safety or radiation protection.
  - Results of the environmental radiological surveillance programme.
  - Results of personnel dosimetry controls.
  - Radioactive waste management plan activities.
  - Plant lifetime management activities, including the surveillance of ageing and degradation mechanisms affecting safety-related structures, systems and components.
- Periodic reports required by other official operating documents:
  - Daily, monthly, six-monthly and annual operating reports, including data on activity, operations, etc.
  - Reports arising as a result of other periodic activities, such as the results of in-service inspections, containment leak testing, environmental qualification and application of the maintenance rule.
- Reports not subject to any given frequency:
  - Those referring to the authorisations themselves, such as the reports to be submitted as a result of the conditions of the permit or complementary instructions.
  - Reports deriving from the application of the operating technical specifications, i.e., on reportable events or special reports.

In order to verify that the nuclear power plants are operating in accordance with the established standards and that the actions required in the different authorisations and approvals are being adequately implemented, the CSN carries out a two-yearly Basic Inspections Programme. Furthermore, at each site there are two resident inspectors who

participate in the performance of this inspection programme. Article 19 provides fuller details of this Inspection programme.

Along with the inspections programme described, a Programme for the Systematic Assessment of Nuclear Power Plant Operations (ESFUC) has been performed, which includes assessment of the performance of the operator's organisation in relation to five functional areas: operation, radiological controls, maintenance and surveillance, engineering, technical support and emergency preparedness, security and fires. The assessments are based on reports from the inspectors themselves, in which qualifications are assigned to aspects relating to the functional areas considered during the inspection.

The set of ESFUC reports obtained in this manner over a period of 18 months of operation is used to draw up a global report for each functional area. The results obtained allow consequences to be drawn regarding the degree of permeation of the operator organisation's safety culture and the control and inspection efforts of the Regulatory Body to be directed more efficiently towards areas so requiring. The latest ESFUC programme finished in June 2002, and certain activities have been initiated which will allow this ESFUC programme to be replaced with another of systematic supervision inspired by the process that the USNRC has been applying since 2000 *(Reactor Oversight Process).*

Lifetime Management

As regards the activities undertaken by the licensees for lifetime management, the CSN intervened from the beginning, carrying out a generic evaluation of the methodology proposed by the electricity industry. As has already been mentioned, the authorisation of each plant includes a condition that requires the periodic (annual) issuing of a report on the plant lifetime management activities, this including surveillance of the ageing and degradation mechanisms affecting safety-related structures, systems and components. The implementation of the lifetime management plans at each plant is monitored via the specific Inspections included in the corresponding basic inspection programme. The information contained in the periodic report to be submitted by each plant is taken into account in the aforementioned inspections.

In addition, Safety Guide 1.10, which indicates the activities to be taken into account in each Periodic Safety Review (PSR), includes an overall review of processes of deterioration and ageing and the corrective measures applied or contemplated during the period of each Periodic Safety Review. Like all other issues relating to PSR, the information applicable to lifetime management is subjected to a process of evaluation.

This same systematic approach, with a PSR being carried out prior to the granting of a new permit, is considered to be equally valid when the period of validity of the new Operating Permit exceeds the lifetime originally considered in the initial design of the facility. The process of renewing permits following the performance of a PSR, analysing the performance of the facility during previous years, constitutes a reasonable guarantee that safety conditions will be maintained throughout the next period, which would appear to be adequate.

It is understood that in this case consideration should be given to special conditions relating to the management of ageing necessary for the review of analyses performed using hypotheses of a defined lifetime, thus guaranteeing that plant operation may extend beyond the initial lifetime and administrative issues (submittal of documentation with sufficient time for its evaluation, supplements of official operating documents, etc.). A

review of Safety Guide 1.10 is scheduled to start this year, in order to address this circumstance and incorporate the modifications necessary for this possibility.

In May 2001, the CSN set up an internal working group to undertake analysis of the conditions that would be required for the long-term operation of the nuclear power plants (beyond design lifetime) and to define criteria for their safe operation, identify the studies and analyses to be performed to fulfil these criteria and establish the regulatory documents necessary. The result of this work has been included in a document whose approval by the CSN will address these objectives. As regards the standards to be analysed by the licensee, the document in question not only modifies the practice applied to date regarding the on-going revision of the standards in force in the country of origin of the project, but also proposes the incorporation of other standards that, while not being directly applicable in the country of origin for similar plants, may lead to significant improvements in safety. The decision on what standards should be considered in each case would be taken by the CSN itself. This document and its associated proposals are currently in the CSN approval process and will be used as a basis for the incorporation of the necessary regulatory modifications.

18.3 Evolution of the policy on severe accidents and modifications performed at nuclear power plants

As was underlined in the previous report, the policy applied in Spain regarding severe accidents has taken the following into account:

- According to the policy initially adopted in Spain, based on the country's technological circumstances and industrial development and the magnitude of its nuclear programme, the licensing processes and requirements demanded of nuclear facilities were based fundamentally on the standards and references developed by the regulatory body of the country of origin of the design, either the United States or Germany. In view of the fact that only Trillo NPP is of German design, the greatest emphasis has been on the standards developed by the US NRC. Except in specific and justified cases, this approach has been adopted in Spain since the beginnings of the use of nuclear energy and has been applied to severe accidents. Consequently, the CSN requirements as regards severe accidents have been an adaptation of the NRC's activities in this area.
- The most important NRC requirement in relation to severe accidents was the one referring to the performance of Individual Plant Evaluations (IPE), which in practice has translated into the so-called level 2 Probabilistic Risk Assessments for severe accidents. In this respect, the CSN, in accordance with the integrated PSA programme, requested that the Spanish plants perform a level 2 PSA, this being used as a basic element to gain insight into the risks associated with the different severe accident sequences and to apply adequate management measures, or where appropriate perform the necessary modifications to the plant systems. The methodology applied in performing these IPE's is in keeping with the reference options used in the United States.
- The CSN, the Spanish nuclear industry, the Universities and research organisations have participated, to a reasonable degree and in keeping with their technological development, in international research and development programmes, with a view to achieving the necessary understanding of the phenomenology associated with severe accidents. Such knowledge is essential for the performance of the aforementioned IPE's. Likewise, they have participated in the working groups of different international organisations dedicated to this subject.

- For the performance of the aforementioned IPE's, the Spanish nuclear industry has acquired and used the most important severe accidents simulation codes, especially those of the country of origin of the design of its facilities (USA). The CSN has also installed and used these codes to increase knowledge of them among its personnel. Both the Spanish nuclear industry and the CSN and the research organisations have participated in different ways in validating the most important severe accidents codes.

It should be pointed out that in the past important modifications were made, aimed more at preventing core damage than at mitigating its consequences. Modifications were incorporated in BWR and PWR reactors to address transients without reactor scrams (*Anticipated Transients without Scram* reflected in 10 CFR 50.62, or the ATWS Rule). Likewise, modifications were made to address the complete loss of power (*Station Blackout*, reflected in 10 CFR 50.63 SBO Rule). The availability of alternative sources of electricity supply and the possibility of using the hydrostatic test pump as a supply of water to the main pump seals are prevention measures for this situation of loss of power. The implementation of design modifications in containment for the mitigation of severe accidents, such as filtered venting systems as a mitigation measure to prevent possible containment failure, are conditioned to the results of the PSA's.

The presence of hydrogen, generated as a result of an accident, poses a potential threat to containment integrity. In order to address this possibility, hydrogen analysers, hydrogen mixing systems and even hydrogen burners (ignitors) have been installed in the containments of certain plants, based on specific studies. In the case of the Trillo plant, a KWU PWR design, although the objective is the same as in the previous cases —i.e., to implement a programme of improvements addressing accidents beyond the design basis— the measures are based on the specific characteristics of its design, which is much more automated. This means that in order to be able to adopt measures beyond the design envelope, it is necessary to incorporate changes in the design itself, allowing the operator to perform manual actions. Consequently, it is not possible to develop the corresponding instructions until such time as these changes have been incorporated. A significant fact that should be underlined is that during the refuelling outage performed in 2002 the Trillo plant carried out certain design modifications deriving from the implementation of the Severe Accidents Guidelines (SAG). These consisted of installing hydrogen recombiners inside containment and a third off-site power supply line, along with the implementation of the measures required for secondary circuit feed and bleed operations. A third off-site supply line (connected to the 220 kV system) was incorporated as an additional off-site power source. Modifications were also made for performance of the primary circuit feed and bleed strategy, as a final strategy to avoid core damage in the event of loss of the capacity to remove heat via the secondary. This is pending a definitive decision, the licensee having submitted additional documentation to justify that this strategy is not necessary in this design as long as the secondary feed and bleed strategy is successful.

Throughout the period covered by this report, the plant licensees have initiated a Severe Accidents Management Implementation plan. This has contemplated the development of specific guidelines taking into account the design and operation of the plants, improvements have been made in organisational aspects and the modifications to the Emergency Plan required to address this new need have been carried out.

In order to address the SAG's with greater confidence, the staffing of the Plant Technical Support centre (TSC) evaluation group has been reviewed, and in certain cases this group has been increased by one member more.

As regards training, exhaustive training on the Guidelines has been delivered to the members of the TSC evaluation group, the operating shifts and the Emergency Directors prior to their official date of implementation. Maintenance of this training is achieved through on-going training courses and the performance of training exercises, both annually.

The plant Site Emergency Plans have been modified to introduce a new category 4 event that contemplates entry into a severe accident condition. The emergency drills carried out at various plants in recent years have considered an assumed scenario in which a situation requiring the use of the SAG's was reached. This type of drill will be extended to all the plants.

18.4 Degree of compliance with the obligations of the Convention

In summarising what has been said above, it may be said that appropriate measures have been taken for nuclear power plant design and construction to be carried out with several reliable levels and methods of protection against the emission of radioactive materials and to prevent accidents and mitigate their radiological consequences were they to occur. As a result, Spain is considered to meet the requirements of this article.

Article 19. Operation

19.1 Significant licensee activities in relation to nuclear power plant operation safety review

Since 1990 the Spanish nuclear power plants have been involved in a power upgrading programme that has led to a 574 MWe increase in gross installed power, 98 MWe of which have been achieved during the period covered by this report. Most of the increases obtained during the period are due to improvement of the authorised thermal power through the use of new feedwater flow measuring systems (mini-increases), allowing the plant to operate at a higher power level due to greater reliability in measurement and without the required safety limits being exceeded. These increases have required evaluation and authorisation by the CSN.

At the same time as they performed this minor increase in thermal power, the two units of the Ascó nuclear power plant replaced the closure heads of their reactor vessels with heads guaranteeing lower susceptibility to stress corrosion than that affecting the alloy Inconel 600 (see section 18.1). The two units of the Ascó plant have also replaced their Radiation Surveillance System with a digital system, this having required CSN evaluation and authorisation.

Throughout recent years the licensees have made important efforts in searching for a methodology for establishment of the philosophy, principles and requirements for validation of the in-service inspection (ISI) systems applied to the components of the Spanish nuclear power plants, validation being understood as systematic evaluation using the methods required to obtain reliable confirmation of the capability of a non-destructive testing (NDT) method to guarantee the performance required under actual inspection conditions, as defined in the *European Methodology for Qualification (second issue)*, (ENIQ Report no. 2: EUR 17299 EN, 1997) and in the *Common position of European Regulators on Qualification of NDT systems for pre-and-in-service inspection of light water reactor components*, *Revision 1* (EUR 16802 EN, 1997). This defines a position common to all the Spanish plants and accepted by the CSN regarding in-service inspection system validation requirements. This methodology covers the technical and administrative scope of, and the responsibilities associated with, the preparation, performance and certification of in-service inspection system validations. As has been indicated in section 14.1, this methodology has been generically approved by the CSN, in response to a request from UNESA, which will simplify the process of specifically approving its use by each requesting plant.

In the second half of the 1990's, the Spanish plants carried out a research project for the application of Probabilistic Safety Assessment to In-Service Inspections. The ultimate objective of this project was to make available an application guideline, agreed to and validated by the CSN and the Spanish plants, including both the methodology to be used and the minimum requirements regarding the documentation and submittal of the new risk-informed in-service piping inspection programme by the Spanish nuclear power plants so desiring, and the basic aspects of the assessment to be performed by the CSN, in order to allow for immediate implementation. The completion of this project in 1999

led to the Garoña, Almaraz, Ascó, Vandellós and Cofrentes plants having the results implemented, or in the implementation process, following granting by the CSN of the corresponding authorisations, applied to class 1 piping.

Likewise, during this period the Ascó and Vandellós plants have developed and implemented Risk Monitors, as PSA applications, for the management of risk during maintenance operations. Also, PSA applications have been carried out for the prioritisation of motor-operated valves (MOV). The Ascó plant has also requested CSN approval for the containment integrated leakage rate test (ILRT) performance period to be changed (once) from 10 years to 15 years, based on information from PSA.

In February 1996 the BWR plants (Garoña and Cofrentes) addressed a programme for the improvement of their Operating Technical Specifications (OTS) through their adaptation to the content of the US NRC documents NUREG 1433 and 1434. This programme culminated recently with the entry into force at both plants of the revision of the Improved OTS's. Among other advantages, this new OTS model facilitates the use and interpretation of the specifications, thus providing a greater guarantee that plant operation will be performed in compliance with their contents, this implying an obvious improvement in operating safety.

As regards maintenance, the Trillo plant has initiated implementation of the Maintenance Rule during this period.

For its part, Cofrentes has implemented "Reliability Centered Maintenance". This programme, initiated in 1984 by the *Electric Power Research Institute* (EPRI) with the participation of the *Institute of Nuclear Power Operations* (INPO), both US institutions, may be defined as a rational and documented analysis process for the definition or improvement of system maintenance plans, based on the reliability required of the systems and the use of a logic decision tree to identify maintenance requirements.

Among the fundamental characteristics that differentiate this from traditional Preventive Maintenance is the fact that it reduces or distributes maintenance costs, dedicating larger amounts of resources to systems on the basis of their importance for production and safety, and that it is based on the operation of complex systems rather than isolated components.

Two methods for its implementation have been developed at Cofrentes NPP. On the one hand, the systems included within the scope of the Maintenance Rule were studied by means of the *Detailed Analysis Method*. For the other systems the *Simplified Analysis Method* was used. The first consists of a stage of identification of the physical limits of the system, followed by two stages of analysis of each component and documentation of the system analysis. The second has six stages: a) Identification of the characteristics of the system, b) Functional analysis, c) Component criticality analysis, d) Selection of maintenance tasks, e) Summary of final recommendations, and f) Documentation of system analysis.

During this period the *Reliability Centered Maintenance* methodology has been used at the Santa María de Garoña plant for the definition, updating and improvement of the plant maintenance plans, extending its application to systems initially outside the scope established in the "Maintenance Rule".

The theoretical methodology includes a programme known as "live RCM" by means of which the changes performed on the systems under study and the components included may be updated. The practical application of this feedback consists of taking note of the

changes made to the maintenance plans for items of equipment included in the initial analysis, such that for each system a list of modifications to be made is generated.

In summing up on the experience of implementation, this technique may be said to be in a mature phase and is making it possible to reap the benefits that were the reason for its implementation, i.e., the optimisation of resources assignment in the interests of safety and availability.

19.2 Regulatory control of licensee activities

Power upgrading

The CSN has authorised the increases in power requested during this period, and described in section 6.1. All the plants that have increased their power during this period have based this on greater accuracy in measuring thermal power, thanks to new feedwater flow measuring instrumentation, as a result of which it has not been necessary to revise the LOCA analyses; in other words, the increases have been minor and around 1.5% of power. The assessment has considered the impact on safety of the new authorised power level, with special attention given to the following:

- Increased source term.
- Re-analysis of the reactor protection system setpoints.
- Analysis of the new feedwater flow measuring instrumentation, the greater accuracy of which is the basis for the reduction of thermal power measurement margins.
- Analysis of the new fuel used, which is required to withstand higher power density and burnup.
- Revision of the capacity of the spent fuel cooling systems.

During the period covered by this report, Cofrentes NPP has performed two increases in power. The first was to 110% of the initial nominal power level (approximately 5.8% with respect to the last increase formerly authorised). Apart from the aspects indicated in the previous paragraph, it was necessary to re-analyse almost all accidents and the capacity of the safety systems, both the main systems, for example emergency core cooling, and the support systems, for example essential services cooling water. The second increase during the period was a mini-increase due to the installation of new feedwater flow measuring instrumentation.

Maintenance Rule

In November 1993 a process was initiated in Spain for implementation of the maintenance rule, a methodology being defined for compliance with the USNRC's 10 CFR 50.65, which was approved by the CSN in October 1996. This methodology was subjected to a process of verification and validation at two pilot plants (Vandellós II and Cofrentes), completed in December 1998, which included the determination of the structures, systems and components to be considered, aspects of significance for risk, performance criteria, periodic assessment reports and the safety assessment to be performed in the event of equipment tag-outs for maintenance activities at the two pilot plants. When this process of implementation was completed at the two pilot plants, the process was initiated for the rest of the facilities, except for Trillo, where it was delayed until 2002 because of the specific nature of the plant.

The CSN receives a report from each plant on the application of the Maintenance Rule in each cycle, and inspections are performed in this area every two years within the framework of the Basic Inspection Programme.

In-service inspection

As regards in-service inspection (ISI), prior to each interval, which covers a period of 10 years during which the inspection must be completed in all corresponding areas, the licensees are required to submit to the CSN a general revision of the "In-Service Inspection Manual", including the areas to be inspected and the non-destructive testing method to be applied in each inspection area, in accordance with the applicable edition of the ASME Code Section XI. Furthermore, prior to each refuelling outage and in accordance with the terms of the Council Instruction IS-02, which regulates the documentation of refuelling activities at light water reactor plants, each plant is required to submit its inspection programme, including the percentages of inspection, the areas to be inspected, the non-destructive testing techniques to be used, the supports and snubbers inspection programme and the scope of steam generator tube inspections (for PWR plants), including the methods and techniques expected to be used, special inspections and tests and the functional tests on valves and pumps or pressure tests scheduled for performance and meeting specific surveillance requirements.

On completion of each refuelling outage, and as is also included in Instruction IS-02, each plant is required to include in its final report the degree of compliance with the inspection programme mapped out, clearly identifying any deviations that have occurred and areas with interferences of more than 10% of the inspection volume, for each inspection or testing programme individually, as well as the participating personnel and equipment used. This report should explicitly reflect areas in which reportable indications or anomalies have been detected.

All this information is supervised by the CSN through the basic inspection programme that the Council performs for each plant. When the licensees have proposed a modification in the In-Service Inspection programme using risk-informed criteria, this change in the methodology has been evaluated by the CSN. Also, in certain cases a formal evaluation has been carried out, where considered necessary and depending on the results obtained.

As has been pointed out above, the CSN has participated in recent years, along with the licensees, in a methodology for the validation of in-service inspection (ISI) systems for Spanish nuclear power plant components, as defined in the *European Methodology for Qualification (second issue)* (ENIQ Report no. 2: EUR 17299 EN, 1997) and in *Common position of European Regulators on Qualification of NDT systems for pre-and-in-service inspection of light water reactor components*, *Revision* 1 (EUR 16802 EN, 1997), mentioned in section 19.1. This methodology has been favourably judged by the CSN, in response to a request by Unesa, for use at requesting plants.

19.3 Nuclear power plant operating experience review programme and results obtained

The regulatory control of licensee activities is accomplished by evaluating the documentation that is required to be submitted to the CSN and through inspection activities, including those of the resident inspectors.

Especially relevant among the documentation that the licensees have to submit to the CSN, in compliance with the legal provisions, is that relating to operating experience, in relation to which the CSN continues to perform the activities described in the first national report. In addition, the periodic safety reviews have implied an exhaustive review of the in-house and industry operating experience, among other things. Although the period established for the reviews is ten years, the first reviews have uniquely included the analysis of the operating experience since plant start-up. These reviews have covered the scope of the events analysed, their applicability to the plant, the set of corrective actions arising from the analysis and, finally, their implementation status.

Apart from its programme of routine evaluations and inspections, performed to verify correct analysis of the operating experience, the CSN has undertaken a detailed revision of the documentation provided by the licensee in relation to the periodic safety reviews, this having in fact represented a second control of the regulator's activities in this area, due to its having been contemplated largely in the area of routine control.

In this respect, the results obtained from this review of the operating experience management programme have corroborated the effectiveness of the normal control system established by the CSN, since it has been necessary to correct only aspects of minor importance or evaluate certain issues that were beyond the scope of the routine programme or that were not treated with suitable depth and rigour. As a final result it should be pointed out that thanks to the periodic safety reviews the licensees have made the results of their systematic analyses uniform in all respects, and the CSN has obtained a high degree of confidence in the work performed having been complete and consistent.

Since 1994 the CSN has applied a programme of operating indicators that has served to compare the rate of frequency of certain types of events with those of similar plants in the USA, and to track the historic evolution of each indicator at the Spanish plants, overall or individually. As from 2001, and due to the unavailability of data on the US plants, the indicators report has covered only the second of these objectives.

The indicators taken into account in the programme are:

- Average automatic scrams with the reactor critical.
- Average safety system actuations.
- Average significant events.
- Average safety system failures.
- Average rate of forced outages.
- Average forced outages due to equipment failure per 1,000 hours of commercial operation.
- Average collective exposure to radiation.

The following are among the main findings of the programme:

- In the long term all the indicators, with the exception of the *Average automatic scrams with the reactor critical* and *Average significant events*, show a downward trend over the last 10 years analysed. As regards analysis during the last 3 years, the trend is downward also for almost all the indicators, a slight increase being observed in two cases: *Average rate of forced outages* and *Average collective exposure to radiation:*

– *Average automatic scrams with the reactor critical*: this indicator shows an unfavourable trend in the long term, caused by the values for 1999 and 2002, which turn the slope upwards on the graph as from this year. In the last three-year period, however, the trend has changed to a slightly decreasing configuration, a favourable fact that allows the recent evolution of this indicator to be considered satisfactory.

– *Average safety system actuations*: this indicator shows a favourable downward trend in the long term and has also decreased slightly in the last three years, as a result of which its long and short-term evolution may be considered satisfactory. However, an upward trend is observed in the last three years in the contribution of this indicator at power, this being strongly counteracted by the downward trend during outages. This trend at power should be monitored in case it were to continue in the coming years. The number of spurious actuations in 2003 has been particularly high, which reduces the importance of the data obtained.

– *Average significant events*: the long-term trend of this indicator remains unchanged, and is still slightly upward due to the unfavourable contribution made in 1999 and 2002, albeit with a clear evolution towards stabilisation. A symptom of this is the behaviour of the indicator in the short term, which improves significantly with a change towards a downward trend. The contributions of this indicator at power and during outages are also on the decrease, as a result of which its overall evolution may be considered satisfactory.

– *Average safety system failures*: this indicator shows a strong downward trend in the long term, which is observed also over the last 3 years. These trends remain as regards the contributions at power and during outages, as a result of which the evolution of the indicator is considered highly favourable in both the short and long term.

– *Average rate of forced outages*: although this indicator maintains a strongly decreasing trend in the long term, its short-term evolution has varied and is now on the increase. The reason for this is the extension of the refuelling outages, fundamentally at the Almaraz II, Cofrentes and José Cabrera plants, caused respectively by the failure of a diesel generator, the new flow measures required for the component cooling and essential services water systems and the incidents that occurred during the refuelling of José Cabrera. For the time being no specific monitoring of the evolution of this indicator is considered necessary.

– *Average forced outages due to equipment failures per 1,000 hours of commercial operation*: this indicator maintains its decreasing trend in both the short and long term, this being considered favourable.

– *Average collective exposure to radiation*: although maintaining a downward trend in the long term, this indicator has changed unfavourably in the last 3 years. The cause for this lies mainly in the high values provided by Cofrentes nuclear power plant, although individual analysis allows a slight but continuous increase to be detected throughout the entire group of Spanish nuclear plants. This indicator is being specifically tracked by the CSN.

As regards the causal factors contributing to the events reported to the CSN over the last three years, broken down also by nuclear plant operating mode, the following may be underlined:

• The *Administrative Causes* show a favourable downward trend, both at power and during outages.

- A slight upward trend may be observed for the *Licensed personnel errors* indicator at power, this not being the situation observed during outages, when the indicator becomes strongly downward in its trend. The events at Cofrentes during the first quarter of 2002 had a strong influence in this respect.
- The *Other personnel errors* indicator shows a favourable downward trend at power and during outages.
- The *Maintenance Causes* indicator shows a favourable downward trend at power and during outages.
- A favourable trend is observed also for the indicator *Design Causes*, which becomes slightly downward at power and strongly downward during outages.
- An increase is observed in *Miscellaneous Causes* both at power and during outages. This is due fundamentally to atmospheric disturbances, the spurious failure of electrical components and the transients at Ascó due to avalanches of algae in the River Ebro.

19.4 Regulatory control of licensee activities. Nuclear power plant operation inspection and tracking programme

As regards the Basic Inspection Programme comprising systematic control inspections, minor modifications were made at the end of 2002 as a result of the experience acquired during the period 2001-2002. Some areas of inspection have been removed, other new areas have been included and others have been redefined, such that the basic programme being applied during the period 2003-2004 is as included below. Of the new areas of inspection included in the programme, mention may be made of the unannounced inspections performed outside the working day, the checks on the surveillance requirements of the operating technical specifications, the verifications of maintenance and the updating of the PSA reports of the plants and the risk-informed functional inspections of safety systems.

The 29 areas of the revised basic inspection system are as follows:

Operations functional area

1.1 Tracking of general operating activities.

1.2 Initial and on-going training of operating personnel.

1.3 Unannounced inspections outside normal working hours.

Radiological Control functional area

2.1 Operational radiation protection programme.

2.2 Control of liquid and gaseous radioactive effluents.

2.3 Environmental radiological surveillance programme.

2.4 Tracking of chemistry and erosion-corrosion.

2.5 Management of low and intermediate level solid radioactive wastes.

Equipment Maintenance and Surveillance functional area

3.1 Integral maintenance management.

3.2.1 Surveillance requirements: general process.

3.2.2 Electrical and instrumentation and control systems surveillance requirements.

3.2.3 Engineered safeguards surveillance requirements.

3.3.1 In-service inspection programme: general process for performance outside refuelling.

3.3.2 In-service inspection programme: attendance at checks and tests during refuelling.

3.4 Equipment environmental qualification.

3.5 Lifetime management.

Engineering and Technical Support functional area

4.1 Design modifications.

4.2 Management of licensing and technical support for operations.

4.3 Development of the quality assurance programme.

4.4 Operating experience and new regulatory requirements.

4.5.1 Design of refuelling outages, operating cycle, fuel modifications and aspects of criticality.

4.5.2 Attendance at nuclear tests during start-up.

4.6 Human and organisational factors.

4.7 Site and extreme meteorological conditions.

4.8 PSA maintenance and updating.

4.9 Functional inspection of safety systems.

Preparedness for emergencies, fires and sabotage

5.1 Emergency plans, exercises and drills.

5.2 Security plan.

5.3 Fire prevention and protection programme.

The minimum frequency for the performance of each of these inspections continues to be once every two years.

The activities of the inspectors resident at the nuclear power plants have not undergone modification during this period, neither as regards the number of inspectors assigned (2 per site) or the functions assigned to them.

In addition to what is established in the Inspection Model, the CSN has been working since 2002 on the development of the tools required for the implementation of a new risk-informed inspection programme based on results, such that inspection efforts are focussed on the most significant aspects of plant operation from the point of view of the risk of the facility. The aim is also to have tools allowing for the most objective possible evaluation of the safety significance of inspection findings and the response of the CSN and the licensees to correct deficiencies detected.

Among the different supervision models analysed, from those existing in other countries, is the USNRC's *Reactor Oversight Process*, which in any case would require revision and adaptation to be able to apply it to the Spanish legislation and the situation of the country's plants. Throughout 2003 and 2004, the CSN has been analysing these possible adaptations, although there will be no change to the current situation during the period covered by this report. It is estimated that the implementation of the new supervision system will be possible in 2005. These activities are being performed within the framework of the improvements to the efficiency of the regulatory process, carried out by the CSN and the licensees of the Spanish nuclear power plants.

19.5 Activities relating to the on-site management of radioactive waste and irradiated fuel at nuclear power plants

The General Radioactive Waste Plan currently in force is the 5th, approved by the Government in July 1999. The Plan contains the current and foreseen generation of radioactive waste in Spain, technical approaches and economic and financial aspects, and constitutes the reference framework for the strategies to be implemented by Enresa.

The current policy regarding the management of low and intermediate level waste focuses on the rationalisation and improvement of the different processes involved and their adequacy for future situations.

Within these actions, mention should be made of those aimed at optimising the capacities available, among them certain programmes already implemented, such as the reduction of the volume of wastes generated at the nuclear power plants, thanks to joint efforts by the operators and Enresa promoted by the CSN, which have already provided highly satisfactory results. Other measures currently under study include the specific management of very low level waste, including analysis of the foreseeable generation of this type of wastes. The clearance of waste materials with radioactive contents, among them those arising from dismantling, continues to be an important aspect in this respect.

Furthermore, article 20 of the Regulations on Nuclear and Radioactive Facilities, approved by Royal Decree 1836/1999, of 3rd December, and relating to the documentation to be submitted by the licensees of nuclear facilities in requesting the operating permit, establishes that these licensees should submit a Radioactive Waste Management Plan incorporating, where appropriate, the contracts subscribed with management companies and including, among other things, a system for possible clearance.

With a view to analysing the most convenient contents and scope of the Waste Management Plans, in 2001 the CSN promoted the creation of a working group made up of representatives of Unesa, Enresa and the company Enusa Industrias Avanzadas, S.A. The work of this group has made it possible to more accurately define the objectives and content of this regulatory document.

The Radioactive Waste Management Plan of each facility is part of the objective of improving the management of the wastes produced. In particular, the licensee of each facility should keep the waste inventory updated, minimise production, recycle and give value to the waste produced to the extent that this be technically and economically possible and condition the wastes for their definitive disposal. The Radioactive Waste Management Plan will also serve to guarantee that no radioactive wastes are disposed of via conventional routes.

The objective of the Radioactive Waste Management Plan is to bring together criteria and instructions ensuring that the management of the radioactive wastes generated at these facilities is safe and optimised, considering the progress made in the standards and technology and taking into account the following:

- The existing situation as regards the production, management and where appropriate removal of the waste.
- Identification of the origins of the waste.
- Study of alternatives to the management systems and processes and of improvements to them.
- Justification of the suitability of current management or of the need to implement improvements.
- Planning of studies for the implementation of the improvements identified.

A pilot application is currently being undertaken in relation to the document drawn up on the waste management plan at the José Cabrera nuclear power plant, the objective being to draw conclusions and lessons learned that might contribute to improving and facilitating subsequent implementation at the facilities. The existing forecasts indicate that this pilot process will conclude at the end of 2004 and that the new Waste Management Plans will be drawn up at all the Spanish nuclear facilities during 2005, such that definitive implementation should occur as from 2006.

As regards irradiated fuel, the most significant activity during this period has been the licensing of a Temporary Spent Fuel Dry Storage Facility at Trillo NPP, this consisting of a new building that houses the dual purpose casks manufactured by Equipos Nucleares S.A., where six casks are already installed containing 21 fuel assemblies each.

The José Cabrera nuclear power plant plans to request a licence for an Individual Temporary Storage Facility for the storage on site of its fuel, in ventilated metallic and concrete containers on a concrete platform.

For further details on irradiated fuel, refer to the First National Report on the Joint Convention on Safety in the Management of Spent Fuel and in the Management of Radioactive Waste, of May 2003.

19.6 Degree of compliance with the obligations of the Convention

As indicated in the previous national reports, Spain meets the requirements of the Convention as regards the operation of nuclear facilities. With the modifications carried out during this period and described in the previous paragraphs, Spain may be said to have improved its degree of compliance with the requirements established in this article.

APPENDIX 19.A

Standardised operating permit model

A. Letter to the Minister of Industry, Tourism and Commerce

SUBJECT: RENEWAL OF THE OPERATING PERMIT FOR THE _____ NUCLEAR POWER PLANT

On _____ (date) the CSN received from the Directorate General for Energy Policy and Mines of the Ministry of Industry, Tourism and Commerce, via its letter dated ..... (entry registration No.....), the request for renewal for ten years of the operating permit for the _____ nuclear power plant, referred to in chapter IV of the Regulation on Nuclear and Radioactive Facilities. One year prior to expiry of the permit in force and in compliance with condition ___ of Annex I of the Ministerial Order of _____ of _____ of the year _____, the licensee submitted a re-evaluation of the safety and radiation protection of the plant, known as the Periodic Safety Review.

The CSN has continuously monitored and supervised the operation of the aforementioned plant throughout the period of validity of the current Permit and its compliance with the applicable conditions regarding nuclear safety and radiation protection. Likewise, the Periodic Safety Review for the latest period, from _____ to _____, submitted by the licensee has been evaluated, this including an analysis of the operating experience of the plant, analysis of the performance of the equipment, analysis of the impact of the new applicable standards, the results of probabilistic safety assessment and the safety improvement plans initiated by the licensee.

During its meeting of _____ of _____ of the year _____. the Nuclear Safety Council studied the request submitted by (Licensee) and the report drawn up by the Technical Directorate for Nuclear Safety on the basis of the evaluations performed and has agreed to issue its favourable determination regarding the renewal of the operating permit for a period of _____ years, as long as operation is performed in accordance with the limits and conditions included in the Annex. This agreement has been reached in compliance with section b) of article 2 of Law 15/1980, modified by the first additional provision of Law 14/1999, and is submitted to the Ministry for the appropriate purposes.

Madrid, _____

THE PRESIDENT

B. Limits and conditions regarding nuclear safety and radiation protection associated with the operating permit

1. To the intents and purposes contemplated in the legislation in force, the company _____ is considered to be the licensee of this permit and the responsible operator of the _____ Nuclear Power Plant.
2. The present Operating Permit allows the licensee to:
   2.1. Possess and store fuel assemblies of slightly enriched uranium, in accordance with the technical limits and conditions contained in the Refuelling Safety Assessment for each cycle and with the limits and conditions associated with the specific Authorisation for the storage of fresh and irradiated fuel.
   2.2. Operate the plant to a thermal power of _____ MWt.
   2.3. Possess, store and use radioactive materials, nuclear substances and radiation sources as required for the operation of the facility.
3. The permit is granted on the basis of the following documents:
   a) Safety Analysis Report, Rev. _____.
   b) Operating Regulation, Rev. _____.
   c) Operating Technical Specifications, Rev. ____.
   d) Site Emergency Plan, Rev. ___.
   e) Quality Assurance Manual, Rev. ____.
   f) Radiation Protection Manual, Rev. ____.
   g) Radioactive Waste Management Plan, Rev. ____.

   The operation of the plant shall be carried out in accordance with the revision in force of the aforementioned documents, subject to the process of updating indicated below.

   3.1. Subsequent modifications or changes to the Operating Regulation, the Operating Technical Specifications and the Site Emergency Plan must be approved by the Directorate General for Energy Policy and Mines, following a report from the Nuclear Safety Council, prior to their entering into force. The Nuclear Safety Council may issue temporary exemptions from compliance with certain sections of the documents mentioned in the previous paragraph, informing the Directorate General for Energy Policy and Mines of the dates of initiation and end of the exemption period.

   3.2. Six months after start-up following each refuelling outage, the licensee shall undertake a review of the Safety Analysis Report incorporating the modifications included in the plant between the beginning of the previous cycle and the end of the refuelling outage in question and not requiring authorisation pursuant to condition 4.1 and the new safety assessments performed. This new revision shall be submitted during the month following its entry into force to the Directorate General for Energy Policy and Mines and to the Nuclear Safety Council.

   Revisions of the Safety Analysis Report corresponding to modifications that require authorisation by the Directorate General for Energy Policy and Mines, pursuant to condition 4.1, shall be authorised simultaneously with the modifications in question.

   3.3. Modifications of the Quality Assurance Manual may be performed under the responsibility of the licensee as long as the change does not reduce the commitments

included in the Quality Assurance Programme in force. Any changes reducing this commitment shall require the approval of the Nuclear Safety Council prior to their entering into force. Commitments are understood as being those included in the Quality Assurance Manual in force in the form of applicable standards and guidelines, as well as the description of the programme reflected in the contents of the Manual, as specified in the complementary technical instructions issued in this respect 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.

3.4. Modifications to the Radiation Protection Manual may be carried out under the responsibility of the licensee, except in those cases that affect basic radiation protection standards or criteria, as specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council. In these cases, the approval of the Nuclear Safety Council shall be required prior to their entering into force.

Revisions of the Radiation 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.

3.5. Modifications to the Radioactive Waste Management Plan may be carried out under the responsibility of the licensee, except in those cases identified in the complementary technical instructions issued by the Nuclear Safety Council. In these cases, the approval of the Nuclear Safety Council shall be required prior to their entering into force.

4. As regards modifications to the design or the operating conditions and tests to be performed at the plant, the following shall be required:

4.1. Modifications to the design or operating conditions affecting the nuclear safety or radiation protection of the facility, and the performance of tests at the facility, shall be previously analysed by the licensee in order to verify continued compliance with the criteria, standards and conditions on which the present permit is based, as specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council.

If the analysis performed by the licensee concludes that the requirements listed in the previous paragraph continue to be met, the licensee may perform the modification or test, informing the Directorate General for Energy Policy and Mines and the Nuclear Safety Council of such performance, as established in condition 5.

If the design modifications, operating conditions or performance of tests imply any modification of the criteria, standards and conditions on which the Operating Permit is based, the licensee shall request from the Ministry of Industry, Tourism and Commerce an authorisation for the modification or test, which shall be required to be effective prior to the entry into service of the modification or the performance of the test. The request shall be accompanied by the documentation specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council.

4.2. Design modifications whose implementation implies a significant interference with the operation of the facility or whose associated tasks are estimated to imply collective doses in excess of 1 Sv.person, shall require the approval of the Nuclear Safety Council

prior to their performance, and shall require also the submittal of documentation similar to that indicated in previous point 4.1. Significant interferences with operation are understood as being those cases in which the work required for the installation or verification of the modification may cause plant transients or damage to safety-related equipment, or imply a reduction in the capacity of the personnel to operate the plant safely.

5. During the first quarter of each calendar year the licensee shall submit to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council reports on the following aspects, with the scope and content specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council:

   5.1. In-house and industry experience applicable to the facility, describing the actions adopted to improve its performance or prevent similar events.

   5.2. Design modifications foreseen, implemented or in the implementation phase at the plant. Whenever a design modification not included in the last annual modifications report is expected to be implemented during refuelling, a report including such modifications and having the same scope and content as the annual report shall be submitted to the CSN three months prior to the date foreseen for initiation of the corresponding outage activities.

   5.3. Measures taken to adapt the operation of the plant to the new national requirements regarding nuclear safety and radiation protection and to the standards of the country of origin of the project. In this last case, an analysis of the applicability to the plant of the new requirements issued by the regulatory body of the country of origin of the project for plant of a similar design shall be included.

   5.4. Activities included in the programme of initial and on-going training for all the plant personnel whose work might have an impact on nuclear safety or radiation protection.

   5.5. Results of the environmental radiological surveillance programme. The information included shall be adequate for the detection of possible increases in activity with respect to the radiological background and for determination of whether any such additional activity is the result of plant operation.

   5.6. Results of operating personnel dosimetry controls, including an analysis of the trends in individual and collective doses received by the personnel during the previous year.

   5.7. Activities of the radioactive waste management plan, including activities referring to very low level wastes open to management as conventional wastes, low and intermediate level wastes, high level waste and irradiated fuel.

6. The exit of packages of radioactive waste and fissionable materials from the plant site shall be communicated to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council with at least seven days notice prior to the exit date. The exit of other radioactive packages shall be communicated within 24 hours of the transport decision and in all cases prior to its performance. The removal of radioactive packages from the plant site shall be subject to the system of authorisations established in the standards in force.

   When the licensee is responsible for the transport of fissionable materials in which the plant is the point of origin or destination and no authorisation is required due to the sum of the transport indexes of all the packages being lower than 50, the Directorate General for Energy Policy and Mines and the Nuclear Safety Council shall be notified of the transport three months prior to the date scheduled.

7. Within the first six months of every calendar year, the licensee shall submit to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council a report on plant lifetime management activities, including the surveillance of ageing and degradation mechanisms affecting safety-related structures, systems and components and their status and identifying the new inspection, surveillance and maintenance activities incorporated in order to detect such mechanisms and control their effects.

   The scope and content of lifetime management activities shall be in accordance with the specifications of the complementary technical instructions issued in this respect by the Nuclear Safety Council.

8. Within a minimum _____ years prior to the expiry of the present operating permit, the licensee may request from the Ministry of Industry, Tourism and Commerce a new permit for a period not exceeding ten years. The request shall be accompanied by: (a) the latest revision of the documents referred to in condition 3; (b) a plant Periodic Safety Review in accordance with the complementary technical instructions established by the Nuclear Safety Council; (c) a revision of the probabilistic safety assessment; (d) an analysis of the ageing experienced by the plant safety-related components, systems and structures, and (e) an analysis of the accumulated operating experience during the period of validity of the permit that is to be renewed.

9. If during the period of validity of this permit the licensee decided to cease the operation of the plant, he shall communicate this decision to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council at least one year prior to the date foreseen for such action, unless the shutdown were due to unforeseen causes or to a resolution by the Ministry of Industry, Tourism and Commerce. The licensee shall be required to justify the nuclear safety of the facility and the radiation protection of the personnel during the operations to be performed at the facility from the date of shutdown to granting of the dismantling authorisation, as specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council.

10. The licensee shall measure the efficiency of the maintenance practices carried out at the plant with respect to previously established objectives, such that there be assurance that the plant structures, systems and components are capable of performing their foreseen functions, in accordance with the complementary technical instructions issued by the Nuclear Safety Council on 15th February 1999 *(In the case of Trillo, this was requested in 2002).*

11. Before each refuelling outage the licensee shall submit to the Directorate General for Energy Policy and Mines and the Nuclear Safety Council a refuelling safety assessment and a report on the activities to be performed during the outage, in accordance with the complementary technical instructions issued in this respect by the Nuclear Safety Council.

12. During the period of validity of this permit, the licensee shall carry out the plant Safety Improvement Programmes identified in the Periodic Safety Review performed by the licensee in support of the request for the present permit, in the terms defined for each case in the report submitted and as specified in the complementary technical instructions issued in this respect by the Nuclear Safety Council.

13. The Nuclear Safety Council may issue complementary technical instructions directly to the licensee in order to guarantee the maintenance of the safety conditions and requirements of the facility and better compliance with the requirements established in the present permit.

Conclusions

Of the Nuclear Safety Council

With a view to underlining the most significant aspects of the period, providing an overall view of our efforts to ensure safety and responding to the objective of self-assessment that this report implies, the Nuclear Safety Council, as the only organisation responsible for nuclear safety and radiation protection in Spain, presents in this section its conclusions regarding the period October 2001 to June 2004 and outlines certain future challenges.

Throughout this period, since the last revision of the Convention, the Regulatory Authority has carried out a project for the development of a Strategic Working Plan, the first milestone of which has been the definition of the following:

- The mission of the organisation, in terms of nuclear safety and radiation protection, achievement of which is linked to the intervention of the licensees and personnel of the facilities.
- The vision embodying the independence, technical qualification, rigour, efficiency and transparency required to obtain the confidence of society and become a point of reference.
- The strategic lines of action: safety, efficiency and credibility, which, supported by the mission and vision, have made it possible to identify strategic objectives for action such as development of the regulatory framework, development of the safety management model, the improvement of the efficiency and effectiveness of internal processes, increased confidence between the CSN and its clients, improved emergency organisation and planning and improved communications.

In this respect —and as the second phase of development of the Strategic Plan— since the end of 2003 the regulatory authority has been carrying out a project for the re-engineering of certain of the aforementioned processes: improvement of the safety management model, speeding up of the administrative arrangements and authorisation of radioactive facilities, definition of the CSN emergencies plan and improved management of the information to be submitted to the Plenary Meeting of the CSN for decision-making and the management of communications, with a view to bringing them into line with the strategic objectives, identifying opportunities for improvement and updating the processes in order to achieve maximum efficiency.

Furthermore, during the second review meeting of the Convention on Nuclear Safety, Spain collected the opinions of the other contracting parties on the second Spanish report, in order to propose tasks for the future to be embodied in this third report. The progress made in this respect has been described throughout this report, along with the improvement of the degree of compliance with the obligations of the Convention. This section summarises the initiatives and activities performed in response to the commitments adopted.

As regards development of the regulatory framework, work has been performed in various areas:

- Operation of the facilities beyond the initial design basis. The control of ageing is accomplished via a report on the surveillance of ageing and degradation mechanisms affecting safety-related structures, systems and components and their status, identifying the new inspection, surveillance and maintenance activities incorporated to detect these mechanisms and control their effects. This report, required by a condition of the operating permit, is submitted annually by the licensee to the Directorate General for Energy Policy and Mines of the Ministry of Industry, Tourism and Commerce and to the CSN.

  Operation of the Spanish nuclear power plants beyond the period foreseen in their design is compatible with the Spanish nuclear legislation in force, and the current systematic approach is considered to be equally valid for cases in which the renewal of the operating permit exceeds the period of operation originally estimated in the initial design of the facility. In this respect, it has been considered necessary to revise the CSN Safety Guide 1.10, during 2004, which recommends the actions to be taken to address the Periodic Safety Reviews.

- Risk-informed regulation. Following a period of application, the CSN Safety Guide 1.15, "Guideline on PSA updating and maintenance", has been published. This contains criteria and procedures agreed to by the CSN in 2000, in accordance with which the plants have been maintaining and updating their PSA's.

- Waste management. At present a pilot application of the document drawn up on the *Waste Management Plan* is being carried out at the José Cabrera nuclear power plant, the objective being to draw conclusions and lessons learned that might contribute to improving and facilitating subsequent implementation at the facilities. The forecasts indicate that this pilot process will conclude at the end of 2004.

  As regards irradiated fuel, the most significant activity during the period has been the licensing of the Temporary Spent Fuel Dry Storage Facility at Trillo NPP. This is a new building that houses the dual purpose casks manufactured by Equipos Nucleares S.A., which already contains six casks with 21 fuel assemblies each.

  With a view to analysing the most appropriate content and scope of the Waste Management Plans, a working group was set up in 2002, made up of representatives of Unesa, Enresa and the company Enusa Industrias Avanzadas, S.A. The work of this group has made it possible to accurately define the objectives and content of this regulatory document.

- CSN Instructions. The CSN has published five instructions, the following being particularly significant for their contents:

  – **CSN Instruction IS-02,** of 10th April 2002 (BOE 4.7.2002) regulating the documentation on *Refuelling Activities at Light Water Reactor Nuclear Power Plants.*

  – **CSN Instruction IS-03,** of 6th November 2002 (BOE 12.12.2002) on the qualifications required to obtain recognition as an *expert on protection against ionising radiations.*

  – **CSN Instruction IS-06,** of 9th April 2003 (BOE 03.06.2003), defining the *training programmes on basic and specific radiation protection,* regulated by Royal Decree 413/1997, of 21st March, in the area of fuel cycle nuclear and radioactive facilities.

- At international level, Spain proposed and promoted within the framework of the Council of the European Union the development of the Council Resolution on the creation in the Member States of national surveillance and control systems relating to the presence of radioactive materials in the recycling of metallic materials (DOCE, C-119, of 22nd May 2002). There has also been participation in the groups of the Commission and the Council of the Union for the development of Community standards in the area of nuclear safety, such as the Directive on High Activity Sealed Sources. The increase in the number of CSN experts in these groups has been significant.

  In the field of radioactive wastes, the CSN has participated, along with the Ministry of Economy, Enresa and Unesa, in the creation and justification, in November 2003, of First National Report on the Joint Convention on Safety in the Management of Spent Fuel and Radioactive Wastes.

- Also worthy of special mention, as regards regulatory aspects, is the work performed by the CSN on the technical review of the Nuclear Energy Act and the Regulations on Nuclear and Radioactive Facilities, with a view to a future updating.

With the objective of improving the efficiency of the regulatory process, a CSN/Unesa group was set up. The basic consideration of this group was the recommendation that the efficiency of the regulatory process be improved, orienting it more towards a process based on performance and on importance for risk, and at surveillance of the processes. It was also considered that a fundamental element was the improvement of communications and mutual trust between the regulator and the regulated party, in which respect an action plan was established. The following aspects of this plan are underlined:

1. **Establishment of a "pyramid" including Spanish nuclear regulation** in which the standards and regulations are classified in a hierarchy depending on their legal rank and importance and including a clarification of the legal rank with which the standards of the country of origin of the project are applied to the Spanish facilities. This also includes the compilation of the licensing basis for each facility, facilitating consultation by both the licensee and the CSN.
2. **Definition of an operation-based risk-informed supervision system** inspired by the NRC's *Reactor Oversight Process* (ROP), and adaptation to the Spanish case.
3. **Improvement of the licensees' self-assessment and corrective actions programmes** this having led to the drawing up of two sector guidelines on the self-assessment and corrective actions programmes to be implemented by the licensees of nuclear power plants.
4. **Improvement of the efficiency of assessment processes in relation to the development** of criteria for determination of the safety significance of issues to be evaluated and of the findings of assessments, improved planning of activities and optimisation of the licensee/CSN interface and levels and means of communication between the CSN technical staff and the licensees (reduction of *paper work*).

The actions referred to are being implemented on the basis of the measures taken to improve regulation, in the area of supervision and control.

With a view to improving the scope of the periodic safety reviews, in 2001 the CSN set up another Joint Working Group with the Spanish nuclear industry, this being commissioned with the task of analysing the requirements to be met by a nuclear power plant for its lifetime to be extended beyond forty years. The results of this work are included in a document (pending CSN approval) that addresses two aspects:

1. As regards the standards to be analysed by the licensee, the document endorses the established practice of on-going review of the standards of the country of origin of the project and also proposes the incorporation of other standards that, while not being directly applicable to similar plants in the country of origin, might serve to bring about significant safety improvements. The decision regarding what standards should be considered in each case will be taken by the CSN. This will be used as a basis for the proposal of whatever regulatory modifications might be necessary.
2. As regards long-term operating conditions, it is proposed that the focus should be on the surveillance and prevention of ageing effects and, more specifically, on the review of all safety assessments in which operating time has been a factor considered.

Other significant improvements to nuclear safety during the period covered by this report have been as follows:

1. Extension of Level 1 Probabilistic Safety Assessment (PSA) to Other Operating Modes (OMPSA) different from power operation. The OMPSA's have been completed at three plants and two more are scheduled for completion during 2004, and the rest in the coming years.
2. Approval of requests for modification of the scope of risk-informed in-service inspection.
3. All the plants now have an initial programme for self-assessment of deficiencies and the tracking and activation of corrective actions in place, which is being evaluated by the CSN.
4. The nuclear sector has drawn up a guideline on investments in safety, approved by the CSN in April 2003. The plants will use this for the preparation of their budgets for 2005 and the CSN will evaluate its correct application.
5. In 2003 the nuclear sector proposed to the CSN a safety management system integrated into the process-based management model of the US Nuclear Energy Institute (NEI), which is being evaluated by the CSN.
6. In view of the trend towards reducing refuelling times and the occurrence of various incidents during the outages, the CSN has issued a generic Complementary Technical Instruction to all the plants on refuelling outage planning and information requirements, the aim being to guarantee that each licensee suitably analyses the refuelling programme and activities. In addition, the CSN's Resident Inspectors have been drawing up programme evaluation reports on each refuelling outage since early 2003.
7. In recent years important efforts have been made to reinforce inspection activities. This has meant a highly significant increase in the number of hours dedicated by the CSN to the inspection of nuclear power plants during the period covered by this report. The basic programme established for all the plants has been completely accomplished.

In the field of radiation protection, the implementation of the ALARA principle as a basic objective to be accomplished during the operation of nuclear power plants was initiated in Spain at the beginning of the 1990's, and is now fully consolidated.

Analysis of the evolution of collective doses at the Spanish nuclear power plants, and its comparison with the trends recorded at the plants in the different regions considered in the ISOE, underlines the fact that the situation of the Spanish plants is comparable to that of plants of a similar design in other countries.

As regards emergencies, a process of review of the Basic Nuclear Emergency Plan has been carried out, with a view to incorporating current international standards and recommendations on the management of nuclear emergencies. This includes the radiological criteria for intervention contained in the EU Directive 96/29/EURATOM, in keeping with those of organisations such as the IAEA and the ICRP. This Basic Plan was approved by the Cabinet of Ministers on 25th June 2004.

The training programmes have been improved and promoted thanks to an increase in the budget assigned to this activity and to analysis of the monitoring of training following its delivery, the objective being to complete the traditional technical training on safety, nuclear engineering and radiation protection with the development of managerial, organisational and communications skills. Specific analyses have also been performed on the training required by people occupying certain key posts, for example all the resident inspectors who have occupied their posts or been transferred to a new plant since 2002.

In accordance with the guideline mapped out in the CSN Research Plan, a large part of the research projects are carried out in collaboration with other institutions. In this respect, the collaboration with Unesa in the coordinated research plan and with Ciemat, Enresa and Enusa are particularly significant. Also relevant has been the CSN participation on the Strategic Nuclear R&D Committee (Ceiden), created by the Ministry of Economy for the establishment of plans of national scope.

It is important to underline the fact that during 2003 the strategic orientations of the research plan currently in force were revised. For this purpose, the CSN set up a working group that drew up a document including these new strategies, which are as follows:

- Programme 1: Fuel.
- Programme 2: Primary coolant pressure boundary.
- Programme 3: Containment and severe accidents.
- Programme 4: Probabilistic Safety Assessment and human factors.
- Programme 5: Radiation protection of persons.
- Programme 6: Radiological impact assessment.
- Programme 7: Reduction of radiological impact.
- Programme 8: Spent fuel and high level wastes.
- Programme 9: Advanced plants.

It should also be pointed out that in 2004 the CSN has initiated a new R&D management model through the awarding of subsidies to projects in keeping with functions of the organisation, via public calls for bids, this having allowed all types of organisations and entities to access R&D funding and interest to be maintained in studies and research into nuclear safety, in relation to the strategic lines referred to above. The budget assigned in 2004 for this activity has been completely assigned and amounts to more than 3,900,000 euros.

As regards public information and communications, the following may be singled out as improvements achieved since the previous period:

- Transparency has been increased in the communication of reportable events. All reportable events received by the CSN are published, with communications to the media, institutions and the general public exceeding one press release per week.
- The website has been renewed, with more information on current affairs and more tools promoting feedback and interaction with the users.
- A system of permanent attention to the media and to private individuals has been set up, the efficiency of which is measured through the number of consultations made, which currently stands at more than one thousand a year, and through the growing presence of the CSN in the media as a reference source.
- The CSN has participated in and promoted different forums aimed at approximating to the population, improving understanding of the CSN's activities and responsibilities. Samples relating to public perceptions have been obtained, which will allow for better adaptation to the information needs of the population.
- A self-assessment system has been set up to allow tendencies to be corrected in the field of communication.
- Training activities are carried out in relation to communications, aimed at the technical personnel, in order to improve their skills and allow them to act as spokespersons where required.

Finally, certain objectives of special interest for the future are underlined:

- Implementation of improvements deriving from the different re-engineering processes undertaken by the CSN.
- Continuation of the safety improvement programmes, fundamentally in relation to human resources and reinforcement of nuclear facility inspection activities.
- Monitoring of facility decommissioning, with emphasis of safety maintenance.
- Adaptation of the USNRC's *Reactor Oversight Process* to the Spanish case.
- Conclusion of the pilot application of the waste management plan at the José Cabrera nuclear power plant and subsequent drawing up of the new waste management plans for all the Spanish nuclear facilities during 2005, for definitive implementation as from 2006.
- Implementation of the new CSN Emergency Response Plan.
- Implementation of the new Basic Nuclear Emergency Plan.
- Development and implementation of a civil defence Directive on general radiological risks, which would contemplate, among other things, accidents at nuclear power plants beyond the Spanish frontiers.
- Completion of the realistic estimate of the dose received by the population as a result of nuclear power plant operation.
- Maintenance of technical capacities through:
  - Promotion of activities with Universities for the development of future specialists in nuclear safety and radiation protection and greater emphasis on the study of technical aspects, to address the reality of the nuclear sector.

– Strengthening of the CSN staff, through calls for posts in the technical divisions.

As a final conclusion, the nuclear and radioactive facilities may be said to have operated correctly from the point of view of safety, as indicated in the annual reports submitted to the Spanish Parliament by the CSN during the period.

Of the licensees

The most significant activities carried out by the licensees of the Spanish nuclear power plants in relation to nuclear safety and radiation protection since the last national report are indicated below:

- Plant PSA updating, maintenance and application activities.
- Cooperation with the CSN through different CSN/Unesa mixed groups, especially in activities relating to the improvement of the efficiency of the regulatory process, integrated management, organisation and human factors, long-term plant operation, etc.
- Development of an Integrated Management System Guideline including Safety Management and the Planning of safety-related Investments. Management by processes is being reinforced.
- As regards assessment, IAEA OSART missions and WANO Peer Reviews have been carried out at the Spanish nuclear power plants.
- Generational changes at certain plants in the wake of organisational modifications have been carried out taking into account the document "Studies on the technical capacity and minimum staffing of the organisation" prepared by each nuclear power plant.
- Start-up of full-scope training simulators at the Santa María de Garoña, Ascó, Vandellós II and Trillo plants.
- Promotion of Organisation and Human Factors programmes and specific training in this field.
- Preparation of two Guides common to all the plants: "Self-assessment programme guide" and "Corrective actions programme Guide". These are being implemented at the nuclear power plants through the application of specific procedures.
- Activities associated with control of the ageing of plant structures, systems and components and their improvement in order to allow for long-term operation. Important efforts have also been made in clarifying the licensing process for the renewal of operating permits in relation to the above.
- In association with the safety review of plant design and construction, numerous activities have been performed, especially in the areas of materials, inspection and maintenance practices.
- The activities performed in relation to aspects such as the awareness and commitment of the organisations regarding compliance with ALARA objectives, reduction of the source term and improvement of refuelling activities management and planning have made it possible for collective dose per reactor/year in Spain to continue a downward trend, occupying a favourable position at world level.

- The radioactive effluents from the nuclear facilities have also decreased, thanks to improvements to the waste treatment systems and efforts to reduce the source term, these now being at a level comparable to those of similar plants in other countries.
- Adaptation to the new Spanish standards on radiation protection, themselves an adaptation of European directives, has been accomplished without problems due to the measures adopted to reduce individual doses through the improvement of processes and the automation of tasks implying the highest radiological risk.
- Different projects have been launched to minimise low and intermediate level wastes and improve their management (declassification projects, waste management plans, incorporation of new systems and equipment at the plants).