

Spanish Nuclear Safety  
Council report to the  
Parliament

Year 2006 Summary

# Spanish Nuclear Safety Council report to the Parliament

Year 2006 Summary





# Spanish Nuclear Safety Council report to the Parliament

Year 2006 Summary



## Summary

<b>Introduction</b>	5
<b>1. Supervision and control of installations and activities</b>	11
1.1. Nuclear power plants .....	11
1.2. Nuclear fuel cycle facilities, waste disposal facilities and research centres .....	21
1.3. Facilities in the definitive shutdown, dismantling and decommissioning phase .....	22
1.4. Radioactive facilities .....	23
1.5. Transport of nuclear and radioactive materials .....	25
1.6. Manufacturing of radioactive equipment and exemptions	26
1.7. Activities and facilities not regulated by the nuclear legislation .....	26
1.8. Service entities .....	26
1.9. Personnel licences .....	27
1.10. Other regulated activities .....	27
<b>2. Radiological protection of the workers, the public and     the environment</b>	28
2.1. Radiological protection of the workers .....	28
2.2. Control of releases and environmental radiological surveillance .....	29
2.3. Protection against natural radiation sources .....	31
2.4. Epidemiological study .....	32
2.5. Radioactive waste .....	32
2.6. Radiological emergencies and security .....	34
<b>3. Public information, institutional relations and international     relations</b>	36
3.1. Public information and communication .....	36
3.2. Institutional relations .....	36
3.3. International relations .....	38
<b>4. Regulations and standards</b>	41
<b>5. Management of resources</b>	42
5.1. Improvement of the CSN organisation and plans .....	42
5.2. Management of human and economic resources .....	44
<b>6. Restructuring of the Nuclear Safety Council</b>	46
<b>Anexo: list of abbreviations</b>	47



## Introduction

In compliance with article 11 of the Law by which it was created (Law 15/1980), the Nuclear Safety Council hereby submits to the Congress and Senate its eighth annual report, corresponding to the activities performed during 2006. This report is the first to be drawn up since the Board of the CSN was renewed on December 1<sup>st</sup> last, with the appointment of the President and of three new commissioners.

The report includes the activities undertaken by the Nuclear Safety Council during 2006, in compliance with its mission to protect the workers, the general public and the environment against the harmful effects of ionising radiations, ensuring that the nuclear and radioactive facilities are operated by the licensees safely and establishing the preventive and corrective measures required to respond to radiological emergencies, regardless of their origin.

The report specifies the advisory and control activities carried out by the organisation to provide the information necessary for the authorisations required by the regulations, watch over the operation of the nuclear and radioactive facilities and limit their radiological impact. The report also underlines the fact that during the year there have been no significant incidents affecting nuclear safety or events with any radiological impact worthy of mention affecting the professionally exposed workers, the public or the environment.

Application of the *CSN's Strategic Plan for 2005-2010*, the objectives of which are to increase the safety of the regulated facilities and activities, improve the council's management and organisation and increase its social credibility, is based on analysis of the performance of the organisation through external and internal assessments and feedback from stakeholder groups. In this context, special mention might be made of the great effort made during 2006 in the performance of the three following full-scope activities: the self-assessment carried out in preparation for the IRRS (Integrated Regulatory Review Service) mission requested by Spain from the International Atomic Energy Agency (IAEA), the effective implementation, during its first year, of the Integrated Plant Supervision System and the application to the other nuclear power plants of the lessons learned from the Vandellós II incident that occurred on August 25<sup>th</sup> 2004.

The nuclear power plants have operated correctly during 2006, with the definitive shutdown of the José Cabrera plant on April 30<sup>th</sup> and the refuelling outages of Almaraz I and II, Ascó I and Trillo plants being the only noteworthy events.

The CSN has fulfilled the Basic Inspection Programme, in compliance with the corresponding resolution by the Spanish Congress. A total 177 inspections were carried out, with 36 reports for authorisations, six favourable appreciations and two technical

instructions being issued. Worthy of special mention are the favourable report for the start-up of the 5<sup>th</sup> emergency diesel generator at the Almaraz plant as well as the preparatory work for the report corresponding to the renewal of the operating permit for the Santa María de Garoña plant.

As of December 31<sup>st</sup>, the only significant aspect still to be incorporated in the recently created and implemented Integrated Plant Supervision System (SISC) was the communication of results to the public. This system has kept the indicators for all the plants in *green* status throughout the year, with the exception of the *non-scheduled power changes per 7,000 hours of criticality* for the Ascó II plant, which changed to *white* during the third quarter.

During 2006 the plants reported 66 events, all classified as level 0 on the International Nuclear Events Scale (INES).

During the period it was proposed that sanctions proceedings be issued against the Ascó plant in relation to the formal non-compliance with its licensed personnel training programme.

The fuel cycle facilities operated correctly. The CSN carried out 41 inspections, issuing 14 decisions for authorisations, six favourable reports and one Technical Instruction. Outstanding in this respect has been the assessment work performed on the Periodic Safety Review submitted by the Juzbado facility within the framework of its application for renewal of its operating and manufacturing permit and on the Periodic Safety Review of the El Cabril disposal facility.

The CSN continues to supervise and control installations in the decommissioning and dismantling stage, which as of December 31<sup>st</sup> 2006 were the Vandellós I and José Cabrera nuclear power plants, the Elefante uranium concentrates plant, the Andújar uranium mill and the Lobo-G plant at La Haba. During the period three decisions were issued, along with one favourable report and one technical instruction, and 12 inspections were performed. Particularly significant, in view of their importance, were the report on the spent fuel dry storage system of the José Cabrera nuclear power plant and the complementary technical instructions issued in relation to this same plant and associated with the declaration of definitive shutdown.

The scientific, medical, agricultural, commercial and industrial radioactive facilities operated normally throughout 2006. During this period 351 decisions were issued, 1,638 inspections were carried out and 19 events and 20 denouncements were attended to, all in relation to the country's 1,307 authorised facilities and almost 26,000 registered X-ray diagnosis installations. The control activities performed led to the issuing of 98 warnings, one temporary suspension of activities and one fine.

As regards the rendering of regulated services for the facilities, including radiological protection technical units and services, companies selling and providing technical assistance for medical X-ray equipment and personal dosimetry services, the CSN issued 29 decisions and carried out 62 inspections.

In the field of the transport of nuclear and radioactive material, 2006 saw decisions on six authorisations for transport and 10 transport package homologations and the performance of 56 inspections, and the 6 events that occurred were attended to.

The CSN has continued to give particular attention to the training and accreditation of the personnel operating the facilities, a fundamental element as regards guaranteeing their safety. Sixty-four new licenses were issued for the operating personnel of nuclear and fuel cycle facilities and 1,195 for radioactive facilities, along with 15 licences for radiological protection service heads, and a total 1,629 licences of various types were renewed.

The storage of spent fuel and radioactive waste continues to be an issue that attracts maximum attention from the CSN, as regards the supervision of current facilities at both the sites themselves and El Cabril and its future configuration. Particularly noteworthy in this context is the fact that a generic design for a centralised temporary storage facility for spent fuel and high and intermediate level waste has been favourably assessed, this decision having been taken by the CSN in 2006 in response to a request from Enresa.

The CSN maintains strict control over the radiation doses received by workers professionally exposed to ionising radiations, supervising the dosimetric control systems available in Spain and recording their results. The number of workers controlled in 2006 amounted to 94,345, with a collective dose of 25,385 mSv/person. The average individual dose was 0.73 mSv/year. Of these workers, 99.52% received doses of less than 6 mSv/year and 99.98 % received doses lower than 20 mSv/year.

In 2006 there were only three cases of people exceeding the annual dose limit established in the legislation, to whom were applied the measures contemplated in the corresponding procedure.

During 2006, the radioactive releases from the facilities were kept within the habitual values, comparable to those of other European and American installations, and the calculated doses attributable to them were, as in previous years, far below the dose limits for the public, representing only a minor fraction of the release limits.

Reporting on the environmental quality of the areas surrounding the facilities is always accomplished with a delay of one year, because of the laborious process of acquiring and processing the necessary data, as a result of which the quality dealt with herein refers to the year 2005. According to the results of the environmental radiological surveillance programmes of the facilities and the CSN, this environmental quality continues to be

acceptable from the radiological point of view and similar to that reported on in previous years.

The CSN also controlled the environmental radiological quality of the entire national territory through its national networks, obtaining normal values similar to those for previous years.

Protection against natural radiation sources, which is assigned legally to various Administrations, continues to be led by the CSN. Especially noteworthy in this respect are the report issued for the environmental impact statement on the *Project for the removal of sludges accumulated in the Flix reservoir*, as a result of releases from the Erkros phosphates facility, and the report submitted to the Ministry of Housing for the incorporation in the *Technical Building Code* of requirements on protection against radon.

In 2006 the CSN and the Instituto de Salud Carlos III signed an agreement for the performance of an epidemiological study investigating the potential effects of exposure to radiations deriving from the operation of Spanish nuclear facilities and radioactive nuclear fuel cycle installations on the health of the population residing close by. The agreement foresees the completion of this study by the end of February 2009.

The CSN's efforts in promoting R&D in its specialist fields, as established in the organisation's *Research plan*, materialised in 2006 through the completion of 20 of the 55 projects currently on-going, with a budget of 1,800,000 euros. A large part of the research projects are undertaken in collaboration with other national and foreign institutions.

Throughout 2006, the CSN's obligation to report on its activities to the Congress and to inform, collaborate and coordinate with other Administrations has entailed a wide range of activities, particularly significant among which have been replies to 29 written questions from the Congress and 38 from the Senate and the issuing of 17 reports on various matters.

Mention should be made also of the continuation of the agreements assigning functions to the autonomous communities. In this respect there were eight in force, the development of which was considered satisfactory for all the parties involved, and on December 26<sup>th</sup> 2006 a new such agreement was signed with the Region of Murcia.

Throughout 2006 the CSN continued its efforts to increase transparency and improve its information and communication policy. In this respect special mention should be made of the decision to publish inspection reports on the institutional website, this coming into effect as from August 2006.

As in previous years, the CSN has continued to undertake important activities at international level, both through active participation in international organisations and

through its relations with the regulatory bodies of numerous countries. Especially noteworthy in 2006 has been the council's participation in the second review meeting of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, during which the Second Spanish National Report to the Convention was examined. Furthermore, mention may be made of the intensive exchange that has taken place with the IAEA for preparation of the scheduled IRSS mission to Spain.

The CSN has participated actively in promoting and driving various legislative projects of different legal standing, some particularly far-reaching such as the proposed amendment of the *Nuclear Energy Act*, in relation to the system of penalties, the revision of the *Regulation on Nuclear and Radioactive Facilities*, revision of the *Royal Decree on the Installation and Use of X-ray Apparatus for Medical Diagnosis* and the projected *Royal Decree on the Security of Nuclear Materials*. Likewise, the council has undertaken the tracking and analysis, from the legal standpoint, of the texts provided by the different parliamentary groups during the development of the proposed reform of the *Law Establishing the CSN* in the Congress.

Efforts have continued as regards the publication of technical standards and in 2006 two Council instructions were published relating to the security of nuclear installations and materials and to criteria for the notification of events at nuclear power plants.

As of December 31<sup>st</sup> 2006, the Organisation employed 442 people. In this respect it is interesting to note that the number of women employed amounted to 47.74% of the total work force.

Finally, it should be pointed out that the definitive budget of the CSN for 2006 amounted to 41,885 thousand euros, a decrease with respect to the previous year.



# 1. Supervision and control of installations and activities

## 1.1. Nuclear power plants

### Operation

The seven nuclear power plants continued to operate throughout 2006, the exception being the José Cabrera plant, which entered the phase of definitive shutdown on April 30<sup>th</sup>.

During the year there were refuelling outages at the Almaraz I and II, Ascó I and Trillo nuclear power plants.

All the plants operated correctly, as is underlined by the results of the supervision and control activities carried out by the CSN and confirmed by the indicators used to assess the functioning of these facilities.

The most important aspects underlined by the performance indicators during 2006 are as follows:

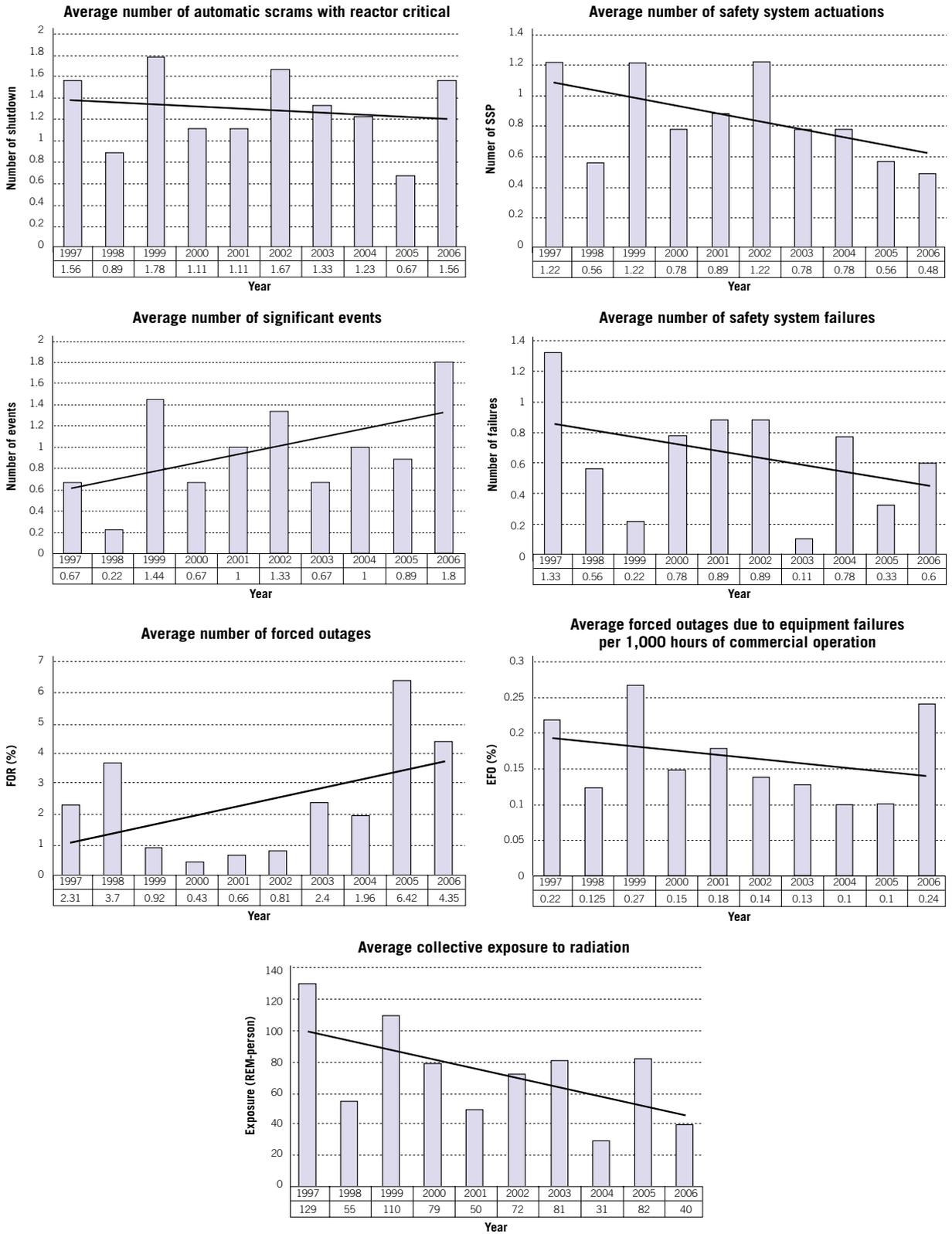
- *Average number of automatic scrams with the reactor critical:* the long-term downward trend shown by this indicator continued. The short-term results reflect a slight increase in 2006, the value being slightly higher than that recorded in 2005.
- *Average number of safety system actuations:* this indicator maintained its favourable long-term downward trend, a tendency that is manifested also in the medium term.
- *Average number of significant events:* this indicator shows an upward trend in both the short and long term. In 2006 a substantial increase may be observed, with a value that deviates significantly from the average, as a result of which this indicator and its contributing factors will be monitored especially. It should be pointed out, however, that none of these events was classified at a level higher than 0 on the INES scale.

**Table 1. Nuclear power plant characteristics**

	José Cabrera	Almaraz	Ascó	Vandellós II	Trillo	Garoña	Cofrentes
Type	PWR	PWR	PWR	PWR	PWR	BWR	BWR
Thermal power (MWt)	510	U-I: 2,729 U-II: 2,729	U-I: 2,952.3 U-II: 2,952.3	2,940.6	3,010	1,381	3,237
Electrical power (MWe)	160	U-I: 980 U-II: 984	U-I: 1,032.5 U-II: 1,026.2	1,087.1	1,066	466	1,096
Number of groups	1	2	2	1	1	1	1
Permit in force	14-10-02	08-06-00 08-06-00	02-10-01 02-10-01	26-07-00	16-11-04	05-07-99	19-03-01
Validity (years)	Definitively shutdown	10/10	10/10	10	10	10	10
Number of inspections	11	38	30	26	27	21	24
Emergency drill	19-10-06	23-11-06	29-06-06	26-10-06	30-03-06	27-04-06	18-05-06
Year of saturation of fuel pools Group I/II	2015 (**)	2021 2022	2013 2015	2020	2043 (*)	2015	2009

(\*) With dry storage facility for spent fuel. (\*\*) Hypothetical year of saturation.

**Figure 1. Nuclear power plant operating indicators**



- *Average number of safety system failures*: this indicator shows a clear long-term downward trend, a tendency that is observed also in the short term.
- *Average rate of forced outages*: the tendency shown by this indicator continues to grow. The value for 2005 increased significantly due to the long forced outage experienced by the Vandellós II plant as a result of the rupturing of a manhole in the essential services water system (ESWS). The outages at this plant in April and September represented the highest contribution in 2006.
- *Average forced outages due to equipment failures per 1,000 hours of commercial operation*: this indicator maintains its long-term downward trend. In 2006 there was an increase as a result of the outages referred to in the previous point.
- *Average collective exposure to radiation*: this indicator continues to show a decrease in the long term.

In 2006, the nuclear power plants reported 66 events, in application of the requirements included in their operating technical specifications. All of these were classified at *level 0* on the International Nuclear Events Scale (INES), in other words they were off-scale and of no safety significance.

During 2006, the CSN proposed to the Ministry of Industry, Tourism and Commerce that sanctions proceedings be initiated against the Ascó nuclear power plant in relation to its licensed personnel training programme.

### Licensing and control

In 2006 the Nuclear Safety Council carried out 177 inspections and issued 36 decisions on authorisations, six favourable reports and two technical instructions.

The following were particularly significant among the most important licensing record:

- Limits and conditions associated with the declaration of definitive shutdown of the José Cabrera nuclear power plant and modification of the official operating documents.
- Applicability of the regulations of the country of origin of the design and conditional standards of the Santa María de Garoña nuclear power plant, in preparation for work relating to the request for renewal of the operating permit from Nuclenor on June 7<sup>th</sup> 2006.
- Start-up of the fifth emergency diesel generator and gas oil tanks at Almaraz nuclear power plant.

In addition, information has been provided within the framework of revisions of the site emergency plans, operating regulations, operating technical specifications and safety analyses of several nuclear power plants.

The number of inspections performed during 2006 at the six operating plants, in other words without counting José Cabrera, amounted to 166. Of these, 103 corresponded to the *Basic Inspection Programme* and the remaining 63 were additional to the inspections contemplated in this programme. This has meant the performance of 100% of the inspections scheduled in the Basic Inspection Programme for 2006, as well as those forecasted for the period 2005-2006 to cover different significant areas of plant operation at least once every two years.

This figure includes inspections in reaction to operating incidents, generic inspections as a result of new standards and in-house and external operating experience and inspections of licensing issues, such as authorisation for the incorporation of a fifth emergency diesel generator at Almaraz nuclear power plant.

Particularly significant among the generic issues inspected during 2006 have been those relating to control room habitability, the operability of the containment sumps, safety culture issues and the applicability to each plant of the lessons learned from the essential services water system event that occurred at Vandellós II in August 2004.

### 1.1.1. Safety improvement programmes

The following sections describe the safety improvement programmes in which significant progress was achieved during 2006:

#### 1.1.1.1. Systematic operating assessment: Integrated Plant Supervision System (SISC) and CSN inspections programme

The *Integrated Plant Supervision System* (SISC) is a new programme of systematic plant assessment that incorporates new supervision methods focussing on the observation of operating nuclear power plant performance and evaluation of the results of the inspections carried out by the CSN, the aim being to optimise and systematise nuclear plant supervision, increase the transparency of the supervision process and provide a response covering the strategic objectives of the CSN.

The SISC evaluates the safety of the plants from the point of view of three strategic areas: nuclear safety, radiological protection and security, these resting on seven priority areas or safety pillars.

In addition, three areas common to all of these strategic objectives are analysed: human behaviour, the safety culture and the programme of corrective actions.

The information provided by the SISC operating indicators and the findings of the inspection programmes is colour coded to facilitate general understanding of the results, depending on its

safety significance: *very low* (green), *low to moderate* (white), *substantial* (yellow) and *high* (red).

Following a pilot phase, effective application of the SISC began on January 1<sup>st</sup> 2006.

Throughout the year certain pending aspects have been defined, along with others that are being modified within the framework of the *Reactor Oversight Process* (ROP) in the United States, since the supervision programme is designed as a living process subject to continuous evaluation and revision.

As of December 31<sup>st</sup> 2006, it may be said that the only significant aspect of the SISC that has not been addressed yet, apart from the effective incorporation of the security of the facilities, is public communication of the results of the programmes of supervision of each plant.

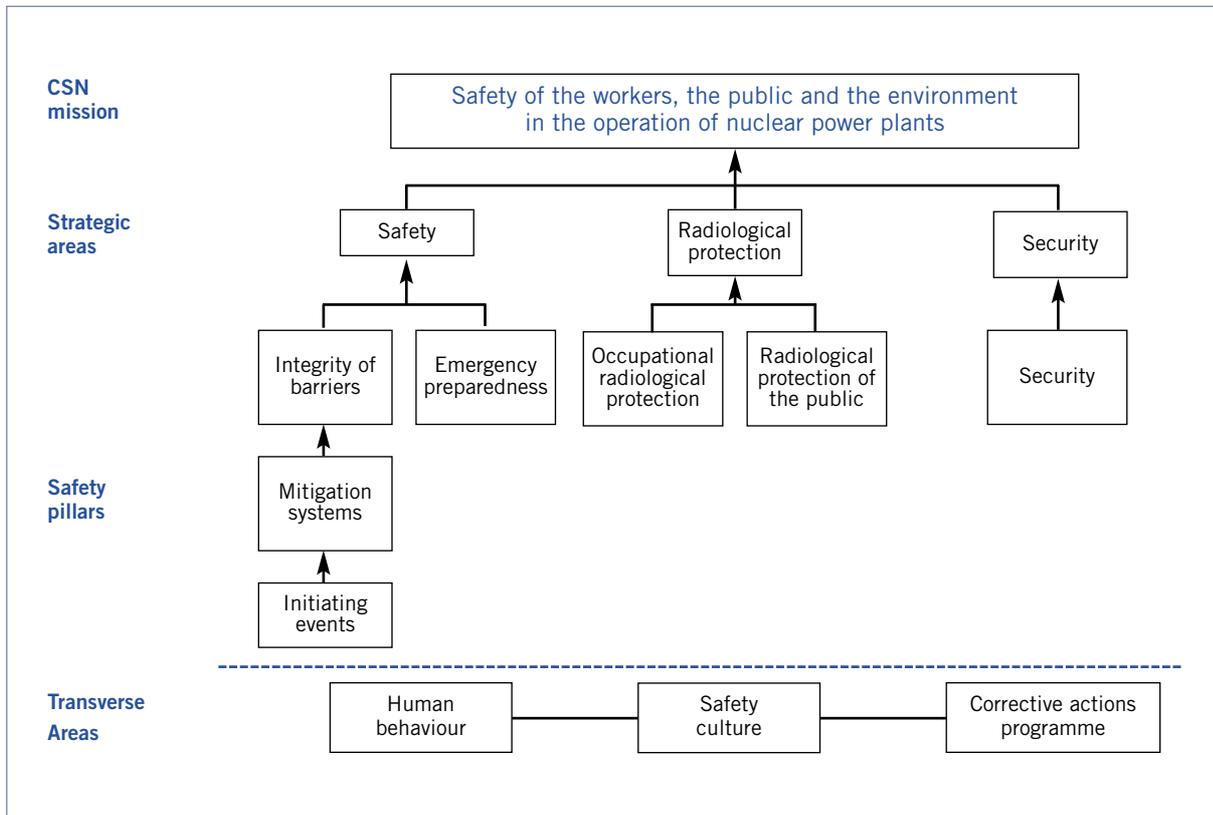
As regards the administrative procedures relating to the SISC, the beginning of 2006 saw the revision of the three procedures corresponding to the screening of the findings of the inspections, their documentation and the operation of the committee in charge of their assessment and categorisation, in view of the experience acquired during the pilot phase.

In addition, the three procedures detailing the supplementary plant inspections to be performed by the CSN when an inspection finding is categorised as white, yellow or red were approved.

All the technical procedures foreseen in the supervision programme (52) have now been drawn up and approved, with the exception of the one corresponding to the process to determine the safety significance of public radiological protection, which is pending final approval.

As regards development of the safety performance indicators, by January 2006 all were operative

**Figure 2. Integrated Plant Supervision System (SISC)**



except for the one corresponding to the mitigation systems performance index (IFSM). This indicator, which affects five systems of importance for the safety of each plant, has undergone profound modification in the United States, and in Spain this evolution has been mirrored, up to its precise definition and definitive incorporation in the SISC as from July 2006.

Although the SISC has been effectively applied since January 1<sup>st</sup> 2006, there have been certain aspects of it that have developed throughout the year differently from the way the system will be as from January 2007.

Firstly, all the findings classified as *major* have been analysed by the CSN Findings Categorisation Committee, regardless of their safety significance

proposed by the inspector, prior to being referred to the licensees for their allegations.

Secondly, the licensees have had the opportunity to present allegations with respect to all *major* findings, including those categorised as being of very little safety significance (*green*).

As from January 2007, the findings of very little importance (*green*) will not be revised by the Findings Categorisation Committee and the licensees will incorporate them directly in the database of the corrective actions programme without submitting allegations, except for those established in the inspection reports proceedings.

Evaluation of the quarterly results of the SISC is closed at the end of the following quarter.

The results obtained from application of the SISC during the first three quarters of 2006 were as follows:

**a) SISC performance indicators**

Since the application was initiated, all the performance indicators have remained *green*, except for the one corresponding to the Ascó plant and relating to non-scheduled power changes per 7,000 hours with the reactor critical, which changed to *white* during the third quarter due to the number six having been exceeded. Contributors to this condition have been power reductions due to avalanches of algae in the river Ebro and those due to pressure boundary leaks across the pressurizer sprays vent line.

In accordance with the requirements of the SISC procedures, in November 2006 a supplementary inspection was performed in order to gain insight into the actions taken by the licensee to analyse the root causes of the different power reductions and initiate actions to avoid their repetition.

**b) Inspections**

The total number of inspections carried out at the six operating plants during the first three quarters of 2006 has been 85, although it should be remembered that the resident inspectors include in a single quarterly inspection report all the inspection activities performed during the quarter, including various SISC procedures.

The total number of findings encountered during these inspections was 52, of which 41 were categorised as *green*, except for one at the Ascó II plant that was categorised as *white*. Ten remain to be categorised, pending additional information or comments from the licensees.

The white finding at Ascó II was due to the dose level authorised on the work permit of one worker being exceeded, along with the dose levels for investigation and intervention of one same worker

in two consecutive outages, without the regulatory dose limits being exceeded. In accordance with the SISC procedures, a supplementary inspection was performed at the Ascó plant in order to learn of the analysis performed by the licensee to determine the root cause and corrective actions implemented to guarantee that this event does not occur again in the future.

**1.1.1.2. Vandellós II safety management improvement plan**

This plan came about as a result of the event that occurred at the plant in 2004 and of the resolutions of the Commission for Industry, Tourism and Commerce from the Deputy Congress in relation to it, and aims to resolve, within a period of three years as from its favourable appreciation by the CSN, the causes of the organisational and technical problems identified following the actions taken by the licensee during the incident affecting the essential services water system on August 25<sup>th</sup> 2004, through the performance of 36 different actions distributed in five programmes: management and leadership, organisation, management systems, communications and design improvements and inspections and surveillance.

The Asociación Nuclear Ascó Vandellós (ANAV) has undertaken, through its General Management and governance bodies, the function of promoting, coordinating and supervising actions relating to safety management. During the three-year period from acceptance of the plan by the CSN to mid 2008 this will centre fundamentally on the activities included in the *Action plan*. Consequently, the objectives mapped out for this period by the licensee are the implementation of all the actions included in the said plan and verification of their effectiveness through the establishment of the supervision mechanisms necessary to ensure an adequate level of plant safety management.

In response to a request by the CSN, the licensee incorporated in his *Action plan to improve safety management* processes of supervision and self-assessment, as mechanisms for measurement of the effectiveness of the plan in relation to the progress made by the organisation in improving the management of the safety of the plant.

One element of supervision was the external assessments performed by international groups or organisations, the International Atomic Energy Agency (IAEA) and an External Advisory Group that drew up the recommendations serving as a support for the basic development of the *Action plan*. The supervisory elements of the Plan have been completed with a system of ANAV operational indicators that allows the licensee to undertake adequate tracking of the corresponding actions.

The objective of the management and leadership programme is to establish within the organisation a division capable of motivating the rest of the organisation's personnel in safety management. In this respect, the General Management of the licensee is placing emphasis on the establishment of new personnel behaviour patterns and the adoption of new evaluation models for the performance of the personnel in carrying out their activities as two basic starting points for safety management improvement.

The *organisation programme* has led the licensee to undertake an organisations restructuring to consolidate the correction of the organisational weaknesses identified in the wake of the essential services water system event and other relevant situations, through modification of the structure and the reassignment of the functions and responsibilities of important organisational units, such as the ANAV governance bodies, General Management, advisory bodies such as the organisation's safety committees and departments of major importance such as engineering, maintenance and the quality group.

The *management systems programme* provides the licensee with tools and resources for the reinforcement of the management systems established within the organisation, while setting up other new systems ensuring adequate treatment of safety in operations activities. Some of the resources or tools are very wide in their scope, such as the programme aimed at achieving suitable acceptance of the safety culture in ANAV, the prioritisation of design modifications on the basis of safety criteria or the *Corrective actions programme*.

Within the framework of the *Communications programme* the licensee has established a programme for internal communications based on the strategic lines mapped out by the new management of ANAV, the aim being to re-establish an adequate level of internal communications within the Association and inter-relationships between departments as a means to ensure suitable performance by all the personnel of the organisation. An important milestone in the communications programme is improvement of the process for the notification and communication of incidents and anomalies.

Finally, within the systems *Design, inspection and surveillance improvement programme*, the actions taken to solve the problems affecting the essential services water system and the systems cooled by it (component cooling water system (EG system), essential cooling water system (GJ system) and emergency diesel generator motor cooling water system (KJ system)) are the most important activities in the programme.

The final solution adopted by the licensee contemplates the implementation of a new essential services water system (EJ) to replace the current system. This will be safety class, twin train system (double line of piping and equipment), each train having its own forced draught cooling tower and a circuit including a fresh water pool with a capacity such that it provides for the

operation of the system for sufficient time to respond to the most unfavourable operating conditions considered in the licensing basis. This system will dissipate the heat removed to the atmosphere instead of to the sea, as is the case for the current essential services water system. The design of the new system, conceived on the basis of the solution described above, will allow the current essential services system to be declassified as safety class.

#### 1.1.1.3. Lessons learned by the test of the plants as a result of the Vandellós II nuclear power plant event

In September 2005 the CSN issued five complementary technical instructions (ITC) resulting from analysis of this event and the resolutions of the Commission for Industry, Tourism and Commerce of the Congress. This was sent to all the other plants with the exception of José Cabrera, the definitive shutdown of which was scheduled for April 30<sup>th</sup> 2006.

- ITC-1. Analysis of the applicability of the Vandellós II nuclear power plant event.
- ITC-2. Analysis of the safety culture.
- ITC-3. Revision of degradation mechanisms affecting structures, systems and components.
- ITC-4. Revision of issues implying important design modifications.
- ITC-5. Revision of the applicable standards and comparison with the basic standards.

The licensees submitted their compliance reports within the proposed deadlines. During 2006 the CSN completed its evaluation of the first two instructions, and subsequently the fourth. The main conclusions drawn are summarised below.

#### ITC-1. Analysis of applicability

The evaluation of the information provided by the plants showed that in general the analyses submitted were acceptable and that the event that occurred at Vandellós II was not directly applicable to the rest of the Spanish plants, both due to their not having *bonna* type piping in their essential services water systems and to the design of this system at the rest of the plants, which is considered adequate to prevent generalised exterior corrosion. As a result, no need for immediate action was identified at any of the plants. However, since the information provided by the plants did not allow a complete verification to be performed, an inspections campaign was initiated between February and June 2006 in order to verify the measures adopted.

The following conclusions were drawn from this inspections campaign:

- No significant problems of corrosion were detected in the surface or underground piping of fluid systems relating to safety or significant for the risk of the plants inspected.
- The plants have developed, or are currently developing, inspection programmes additionally to the existing ones in order to maintain periodic surveillance of these systems. These programmes will be included in manuals or other documents.
- Different corrective actions have been established to eliminate or reduce problems of accessibility for the inspection of certain sections of underground piping.
- Most of the plants do not have cathodic protection systems for their underground piping or have ceased to use them. Those plants that still use such systems consider them to be additional safeguards to the passive protection provided by other coatings. Nevertheless, it is

estimated that the plants that have these systems in service should improve knowledge of them and the evaluation of their effectiveness.

- The documentation relating to element cleaning and painting processes should be improved, when this constitutes the protection against corrosion by the environment. In particular, the specifications and procedures should be updated and the documentary control process should be improved, such that the control and supervision of painting works may be verified.

#### ITC-2. Analysis of safety culture

The replies provided by the licensees to this ITC referred basically to the following aspects:

- The safety culture evaluation and improvement programmes recently implemented at each plant.
- The independent external safety culture evaluations were carried out between 2000 and 2006 and were performed in accordance with a methodology developed by the US Nuclear Regulatory Commission (NRC).
- The internal safety culture assessments foreseen at each plant.
- The improvement plans derived at each plant from the external assessments.
- The schedules for future safety culture assessments, externally every five years and internally every two.

In 2006 the CSN planned and performed inspections at the Santa María de Garoña, Cofrentes, Trillo and Almaraz plants with a view to revising the supporting documentation referred to by the licensees, and more specifically the documentation on the external safety culture reviews and associated action plans.

#### ITC-4. Design modifications

Following evaluation of the replies and the performance of a plant-specific inspection at each facility, the following conclusions were drawn:

- The plants possess a systematic approach that is adequate for the identification, prioritisation and performance of safety significant design modifications and have multidisciplinary committees in charge of deciding whether a proposal is to be converted into a design modification, its priority and its planning.
- The licensees have revised all important safety significant design modifications and there are reasonable guarantees that all have been suitably prioritised and that their implementation is justified. The exception to this would be seven of the 10 *priority 2* modifications at Trillo, for which the licensee does not commit to any date. The licensee will be requested to revise his report.
- The CSN will revise its current procedure PT.IV.215 *Permanent design modifications*, to include a check that the systematic approach to the assignment of priorities for the implementation of design modifications is applied correctly.

##### 1.1.1.4. Troubleshooting programme.

###### Corrective actions programme

The plant corrective actions programmes are an efficient and transparent tool for the identification and resolution of actual or potential problems that might affect plant safety.

At the beginning of 2006 all the nuclear power plants had corrective actions programmes implemented. During the year specific inspections have been performed on the Corrective Action Programmes of Ascó, Vandellós II and Cofrentes plants. Furthermore, the systematic checks

performed by the resident inspectors have included checks on the application of these programmes at all the plants. As a result of this tracking it has been determined that the licensees have made important efforts in implementation, and the level of assimilation and application of the Corrective Action Programmes has improved significantly, although not all the plants have achieved the same level of application. Nevertheless, there are aspects that need to be improved in order to reach the efficiency expected from the Corrective Action Programmes, among others the following:

- Involvement of all the plant personnel in application of the Corrective Action Plan.
- Improvement of the quality of the information incorporated in the Corrective Action Plan, to facilitate evaluation, tracking and analysis.
- Improvement of the categorisation of non-conformities, the performance of root cause analyses and the prioritisation of actions.
- Prompt incorporation of issues in the Corrective Action Plan.
- Verification of the effectiveness of actions.
- Non-conformity trend analysis.

In addition, a mixed CSN-sector group has been set up to track application of the Corrective Action Programmes and to draw up proposals for improvement.

#### 1.1.1.5. Human and organisational factors at nuclear facilities

One of the areas of action that has required the greatest effort by the CSN, in the area of human and organisational factors, during 2006, has related to the evaluation, inspection and tracking of the ANAV *Safety management improvement plan*.

This plan is being implemented by the licensee to solve the organisational and management deficiencies identified in the wake of the event that occurred in August 2004.

Furthermore, for some time the CSN has been carrying out specific actions to verify that the processes used by the licensees to maintain their staffing and the competence and motivation of both their in-house and contracted human resources guarantee the maintenance and improvement of the safety of nuclear facilities under all circumstances, in compliance with the eighteenth Resolution of the Commission for Economy and Finances of December 17<sup>th</sup> 2003, and to promote the implementation and maintenance of these processes, in compliance with the twenty-eight Resolution of the Commission for Industry, Tourism and Commerce of December 14<sup>th</sup> 2004.

Attempts are being made from the CSN to drive improvements in this field through inspections of the status of implementation of the programmes of the licensees, and in 2006 the procedure regulating these inspections was approved. During the year the implementation status of the programmes for the Almaraz, Trillo, Ascó and Vandellós II nuclear plants was inspected.

In the case of the Almaraz and Trillo plants emphasis was laid on the degree of development of the programme itself, with special attention given to projects and activities relating to supervision in the field, human factors in design modifications and the development of human resources.

In the case of the Ascó and Vandellós II plants, the status of development of the programme was also supervised, along with the on-going projects. It is noteworthy that at the Asociación Nuclear Ascó-Vandellós II (ANAV) there are a large number of improvement actions under way in relation to organisational and human factors aspects,

additional to the programme projects included in the *Safety management improvement plan* currently being implemented (developed following the ESW system event at Vandellós II).

These inspections of the organisational and human factors programmes, which are part of the basic CSN inspections plan, are encompassed within the CSN's Integrated Plant Supervision System (SISC), and bring an element of novelty in the tracking of transversal issues to the NRC's Reactor Oversight Program (ROP).

In addition, all the Spanish nuclear power plants currently have organisational change management procedures establishing the process to be used to propose, design, plan, implement and revise organisational changes at the facility, such that they do not have a negative impact on functions relating to the safety and radiological protection of the facility. These procedures have been applied to the proposals for changes to the operating regulations that have arisen during 2006 at the Cofrentes, Ascó and Vandellós II plants. This constitutes a significant qualitative step forward in the safety assessments of organisational changes performed by the licensees, although there is still room for case-by-case improvement in the practical application of the procedures, as is underlined by the evaluations performed by the CSN.

## 1.2. Nuclear fuel cycle facilities, waste disposal facilities and research centres

This type of installations operated correctly during 2006, including the Juzbado fuel assembly manufacturing facility, the El Cabril waste disposal facility, the Centre for Energy-Related, Environmental and Technological Research (Ciemat) and the Quercus uranium concentrates plant.

This year the CSN has carried out 41 inspections and issued 14 decisions regarding authorisations,

six favourable reports and one technical instruction relating to these installations.

The following are among the most important proceedings:

- Juzbado fuel assembly manufacturing facility: modifications to storage in the solid radioactive waste temporary storage facility.
- Juzbado fuel assembly manufacturing facility: modification of the requirements of the *Integrated Safety Assessment development programme (ISA)*.
- Juzbado fuel assembly manufacturing facility: renewal of the operating and manufacturing permit and Periodic Safety Review.
- El Cabril: revision of the *Safety analysis*, in compliance with condition 6 of the operating permit.
- El Cabril: *Periodic safety review* and new revision of the *Manual on the calculation of off-site doses due to gaseous emissions*.
- Ciemat: operation of the new radioactive facility IR-32 *Sample preparation laboratory*, modification of IR-15 *Radioactive waste and materials laboratory* and modification of IR-09 *Metallurgical laboratories*.
- Ciemat: revision 5 of the *Site emergency plan*.
- Ciemat: Reuse of building 55 and annex 11 as temporary radioactive waste storage facilities.

As regards the evaluation of the Juzbado manufacturing facility's Periodic Safety Review, it was generally concluded that the results were acceptable, although it was considered necessary to request additional information, clarifications and various modifications, which were to give rise to a

formal updating of the Periodic Safety Review through a complementary technical instruction to the facility's operating and manufacturing permit.

Since January 2003 the Quercus plant has been in a condition of definitive shutdown of production activities. During 2006 the CSN has continued its evaluations of the documentation submitted in support of the application for a dismantling permit.

In July 2006 Enusa requested that the Ministry of Industry, Tourism and Commerce delayed its decision to dismantle the plant, in view of the possibility of its operations being restarted. The CSN did not object to the possibility of prolonging the current situation of definitive shutdown of the facility, as long as compliance with the conditions included in the definitive shutdown permit was maintained.

At the end of the year the area included in the integrated project for improvement of the Ciemat Pimic facilities was transferred to Enresa for the initiation of dismantling tasks.

### 1.3. Facilities in the definitive shutdown, dismantling and decommissioning phase

In 2006 there has been no significant change at these installations, which include the Vandellós I and José Cabrera nuclear power plants, the Elefante uranium concentrates plant, the Andújar uranium mill and the Lobo-G plant at La Haba.

The definitive shutdown of the José Cabrera nuclear power plant took place on April 30<sup>th</sup> 2006 (Ministerial Order ECO/2757 of October 14<sup>th</sup> 2002).

In 2006 the Nuclear Safety Council carried out 12 inspections and issued three decisions, one

favourable report and one technical instruction in relation to this type of installations, which are subject to specific surveillance and control programmes.

The following were among the most important:

- Vandellós I: revision 1 of the *Technical specifications for the dormancy phase*.
- José Cabrera: complementary technical instructions to the declaration of definitive shutdown of the facility.
- José Cabrera: HI-STORM 100 dry storage system for storage of the spent fuel from the José Cabrera nuclear power plant.
- José Cabrera: design modification of the spent fuel storage system and study on the environmental impact of this modification.

The activities performed by the CSN during 2006 at the Vandellós I facility focussed on the checking and verification of the different control systems installed for the new situation of dormancy. The inspections centred on the following:

- General control of the Project and of compliance with the facility's *Surveillance plan*.
- Control of performance of the surveillance procedures and maintenance of the active control systems during dormancy.
- The *Programme for the surveillance and control of groundwaters*.
- The *Environmental radiological surveillance programme*.

From the evaluation of the results it may be concluded that the environmental quality continues to be adequate from the radiological

point of view, with no risk for persons as a result of the activities undertaken at the facility.

The process of dismantling the José Cabrera nuclear power plant will be carried out once the corresponding authorisation is granted, in accordance with chapter VI of the *Regulation on Nuclear and Radioactive Facilities*. Until such time as this authorisation is granted, the facility will be governed by article 28 of the aforementioned regulation, which requires that the licensee carry out a series of activities prior to dismantling, aimed at adequately managing the existing spent fuel and completing the conditioning of the operating wastes generated during operation.

In accordance with the Complementary Technical Instructions to the declaration of definitive shutdown, the licensee of the facility must carry out the so-called preparatory activities for dismantling and submit a series of documents in this respect:

- Plan for the definitive tagging out of systems, protection against fires, the treatment of radioactive waste and sampling and environmental radiological surveillance.
- Radiological characterisation plan of the facility.
- Primary decontamination control programme (reactor coolant system, residual heat removal system and chemical and volumetric control system).

Unión Fenosa Generación (UFG) will continue to be the owner of the facility during the activities for preparation for dismantling. Subsequently, and simultaneously with the authorisation for dismantling, the ownership will be transferred to Enresa for the performance of dismantling, as contemplated in the *General radioactive waste plan* currently in force.

Initiation of the initial stage of characterisation is scheduled for the second quarter of 2007.

At the Elefante plant, two inspections were performed in 2006 with a view to gaining insight into the condition of the restored tailings areas and verifying the implementation of the surveillance programme and its compliance in relation to the characteristic parameters of the site.

Three inspections were carried out at the Andújar uranium mill in 2006 to verify the general, hydrological and geological conditions imposed in the surveillance and maintenance plan for the site compliance period.

Two inspections were performed in 2006 at the Lobo-G plant at La Haba to verify the conditions imposed in the Declaration of decommissioning.

#### 1.4. Radioactive facilities

During 2006 the operation of the scientific, medical, agricultural and industrial radioactive facilities was in accordance with the safety standards established, with the measures required for the radiological protection of persons and the environment being adhered to and, therefore, with no situations of undue risk.

The CSN undertakes the control of these facilities directly and through the autonomous communities with which it has agreements on the assignment of functions.

In 2006, 351 decisions were issued in relation to the authorisation of radioactive facilities:

- 63 for operating permits.
- 42 for decommissioning declarations.
- 246 for authorisations for various modifications.

**Table 2. Evolution of number of radioactive facilities**

Category	Field of Application	2002	2003	2004	2005	2006
1 <sup>a</sup>	Irradiation	1	1	1	1	1
	Sub-total	1	1	1	1	1
2 <sup>a</sup>	Commercialisation	55	55	55	49	46
	Research and teaching	78	80	82	84	80
	Industry	573	572	587	600	582
	Medicine	258	262	270	276	287
	Sub-total	964	969	994	1.009	995
3 <sup>a</sup>	Commercialisation	18	24	16	12	13
	Research and teaching	86	94	88	90	89
	Industry	166	168	161	145	152
	Medicine	80	98	70	66	57
	Sub-total	350	384	335	313	311
	Medical X-rays	21,884	22,947	24,069	25,222	25,902
	<b>Total</b>	<b>23,199</b>	<b>24,301</b>	<b>25,399</b>	<b>26,545</b>	<b>27,209</b>

During 2006, 1,638 inspections were performed at radioactive facilities. Their distribution by types was as follows:

- 124 licensing inspections.
- 1,240 control inspections at radioactive facilities.
- 244 control inspections at radio-diagnosis facilities.
- 30 inspections relating to incidents, denouncements or irregularities.

In addition to the inspections, a basis element for control of the facilities is revision of the annual reports. In 2006 the CSN received 1,143 annual reports from radioactive facilities, around 19,000 from X-ray diagnosis installations and 255 quarterly commercialisation reports.

The analysis of the reports issued during the inspections, the annual reports from the facilities, the information on radioactive materials and equipment supplied by the commercialisation

installations and the waste management data provided by Enresa led to the issuing of 281 control letters.

Likewise, the evaluation activities and control inspections carried out with respect to the facilities gave rise to the issuing of 98 warnings by the CSN. The deviations were identified and their correction was requested.

A temporary suspension of activity was imposed upon one industrial radioactive facility as a result of non-compliance with the corrective actions required by the CSN in its corresponding warnings. Also, a fine was levied against one non-authorized radio-diagnosis installation.

Mention should be made in relation to control of the attention given to denouncements, of which there were 20 in 2006: one referring to industrial installations, 10 to radio-diagnosis installations and nine miscellaneous complaints. When considered necessary, an inspection visit was made, the denouncing parties were subsequently informed on the condition of the installation and,

where appropriate, a control letter was sent to the licensee.

The CSN responded to 19 reports on incidents at 2<sup>nd</sup> and 3<sup>rd</sup> category facilities in 2006. In no case there were any significant radiological consequences.

The INES scale continued to be applied in 2006 as a test for the classification of events at Spanish radioactive facilities. In 2006 the IAEA approved the *Additional INES Scale Guideline on events in transport and at radioactive facilities*, its preparation including the participation of CSN experts in the corresponding working groups. The revision of the *INES Scale Manual* is expected to be completed by 2008. The CSN has initiated the actions required to begin the official application of the INES Scale in 2007, in order to inform the public of events at radioactive facilities and in transport.

The generic activities carried out by the CSN in 2006 were as follows:

- Complementary Technical Instructions to the authorisation of gammagraphy facilities for updating of mobile gammagraphy equipment, for compliance with the design requirements established in Standard ISO 3999, 1977 or later edition.
- Circular to the licensees of radioactive facilities fitted with remote cobalt therapy equipment on the definitive management of such equipment at the end of its service lifetime.
- Circular to the licensees of radioactive facilities in relation to the requirements included in the new Royal Decree 229/2006 on the *Control of high-activity sealed radioactive sources and orphan sources*.

## 1.5. Transport of nuclear and radioactive material

In 2006 the CSN issued five rulings regarding authorisations for transport: one for the transport of non-irradiated fuel assemblies from the Juzbado manufacturing facility to a Finnish nuclear power plant, two for the transport of uranium oxide from Great Britain and the United States to the aforementioned Juzbado facility, the latter by virtue of special arrangements, and one negative decision regarding a request from Enresa for the transport under special conditions of radioactive lightning rods in package model 3673A.

Likewise, as part of the control activities, a total 56 inspections were carried out in 2006 specifically in relation to transport.

Control by inspection is completed with the reception and analysis of the notifications required by the CSN for the transport of fissile materials, high activity radioactive sources and wastes, as well as the subsequent performance reports in the case of fissile materials.

In view of their special significance, the CSN revised the notifications corresponding to 51 dispatches of fissile material and 192 of wastes from nuclear and radioactive facilities transported by Enresa to the El Cabril disposal facility.

In 2006 the CSN reported on 10 requests for the homologation of approval certificates for packages from overseas or for the approval of packages of Spanish origin.

As regards the events that have occurred, there were six such events in the transport of radioactive material in 2006, none of which had any radiological consequences for persons or the environment.

## 1.6. Manufacturing of radioactive equipment and exemptions

During 2006 the CSN issued four rulings regarding authorisations relating to the manufacturing of radioactive equipment and 27 on type approval for radioactive equipment.

## 1.7. Activities and facilities not regulated by the nuclear legislation

### Transfers to Enresa

During 2006, the CSN drew up reports on 21 transfers to Enresa of various radioactive sources and materials. In 12 of these cases the requesting company or entity did not have a radioactive facility and the rest of the applicants were the licensees of installations relating to non-authorised material.

### Removals of radioactive material detected in metallic materials

As a result of the application of the *Protocol on collaboration in the radiological surveillance of metallic materials*, the CSN was informed of the detection of radioactivity in metallic materials on 203 occasions during 2006. The radioactive sources detected, indicators with radioluminescent paint, ion smoke detectors, radioactive lightning rods, pieces of uranium, products containing radium and thorium and parts with artificial contamination, were transferred to Enresa for management as radioactive wastes.

As of the end of 2006, there were 120 metallurgical installations adhered to the protocol.

## 1.8. Service entities

In 2006, the CSN carried out the following activities in relation to radiological protection services, radiological protection technical units, companies selling medical X-ray equipment and

providing technical assistance, personal external dosimetry services and external companies:

- Three radiological protection services requests were approved and 25 inspections were performed on such services.
- One radiological protection technical unit was authorised, one was decommissioned and one request was filed. 22 inspections were carried out.
- Reports were issued in response to requests for authorisation from 22 medical X-ray equipment sales and technical assistance companies, 12 of them being favourable reports on newly constituted companies. Six decisions on the modification of existing entries were issued and four decommissioning processes were performed. Nine inspections were carried out.
- The Defence Personal External Dosimetry Service was authorised, as were the extension of the Personal Internal Dosimetry Service of the Santa María de Garoña nuclear power plant and modification of the Personal Internal Dosimetry Services of the Spanish nuclear plants in relation to the use of whole body counters. Six control inspections were carried out.
- During 2006, the fourth comparative campaign between personal external dosimetry services was carried out, the results of which are being evaluated for the subsequent requirements for action depending on the results.
- As regards the control of external companies, as of December 31<sup>st</sup> 2006 a total 872 companies were included on the register of external companies, the vast majority undertaking activities in relation to the nuclear power plants.

## 1.9. Personnel licences

As of December 31<sup>st</sup> 2006 there were 8,147 workers holding licences or diplomas. Furthermore, 36,497 workers had CSN accreditation for the management of medical radio-diagnosis installations and 50,950 for the operation of such facilities.

The CSN awarded the following during 2006:

- Nuclear power plants: six supervisor licences, 28 operator licences, two licences for radiological protection service heads, the extension of 64 operator licences and the extension of 47 supervisor licences.
- Fuel cycle, storage and dismantling installations: 16 supervisor licences, 14 operator licences and the extension of 39 operator licences and 19 supervisor licences.
- Radioactive facilities: 339 new supervisor licences, 856 operator licences and 13 licences for radiological protection service heads, plus the extension of 474 supervisor and 986 operator licences.
- Medical radio-diagnosis facilities: 1,229 accreditations for management and 2,234 for the operation of such installations.

As regards the homologation of courses to obtain licences and accreditations, the CSN has authorised the modification of four homologation of courses for radioactive facilities and four homologation of courses for X-ray installations, and inspected a total 103 examinations.

## 1.10. Other regulated activities

As of December 31<sup>st</sup>, 20 companies were authorised to carry out the activities included under title VII of the *Regulation on Nuclear and Radioactive Facilities*, in relation to the following:

- Deliberate addition of radioactive substances in the production of consumer goods.
- Importing, exporting, commercialisation and shipping of radioactive materials, radiation-generating equipment and consumer goods incorporating radioactive substances.
- Technical assistance for radioactive apparatus and radiation-generating equipment, as long as these do not need to be authorised as radioactive facilities.

During 2006 13 reports have been drawn up on the authorisation of these regulated activities.

## 2. Radiological protection of the workers, the public and the environment

### 2.1. Radiological protection of the workers

The number of workers professionally exposed to ionising radiations and dosimetrically controlled in Spain in 2006 amounted to 94,345, these giving a collective dose of 25,385 mSv.person. The average individual dose was 0.73 mSv/year.

The National Dosimetry Bank centralises the dosimetry histories of the professionally exposed workers of the Spanish nuclear and radioactive facilities. As of the end of 2006 a total 12,550,000 dosimetry measurements were on record, corresponding to some 249,000 workers and 42,500 installations.

Throughout 2006 the CSN has distributed a total 3,393 radiation work permits to the workers of a total 151 companies.

Of the dosimetrically controlled workers, 99.52% received doses lower than 6 mSv/year and 99.98 % received doses below 20 mSv/year.

Analysing the results of the nuclear power plants, in comparison to previous years, the following may be deduced:

- There is a decreasing trend for three-yearly average collective doses per PWR type reactor. The occupational doses are lower than those of other plants in our technological sphere.
- There is an increasing trend for three-yearly average collective doses per BWR type reactor. The occupational doses are higher than the European values and lower than those recorded in the United States, the country of origin of the BWR technology plants.

Particularly significant in the transport sector is the average individual dose of 2.72 mSv/year. This value is similar to the one registered the previous year and is concentrated on the transport of radio-pharmaceutical products. Given that these materials are transported in small packages and are

**Table 3. Doses received by workers in each sector considered in the annual report**

<b>Installations</b>	<b>No of Workers</b>	<b>Collective Dose (mSv.person)</b>	<b>Average Individual Dose (mSv/year)</b>
Nuclear power plants	6,449	3,457	1.26
Fuel cycle facilities, waste storage facilities and research centres (Ciemat)	1,182	52	0.38
<b>Radioactive facilities</b>			
Medical	75,458	18,574	0.66
Industrial	6,858	2,684	0.94
Research	4,734	444	0.35
Installations in the dismantling and decommissioning phase	5	0	0
Transport	82	174	2.72

loaded and unloaded manually, and in view of the fact that very few companies carry out such transport activities, the average individual dose of the sector is normally higher, although the collective dose is very small compared to others. The CSN has evaluated the radiological protection programmes of the companies that transport the largest numbers of radioactive packages.

During 2006 there were three cases of workers exceeding the annual dose limit established in the legislation, one at an industrial installation and two at medical facilities. In addition, a total 82 workers were assigned administrative doses higher than certain of the limits established in the current legislation, these cases being attributed to deficient dosimetry management. The CSN has requested the licensees of the installations affected to take the measures required to correct this type of incidents.

## 2.2. Control of releases and environmental radiological surveillance

This chapter describes the activities performed during 2006 and presents the results of the environmental radiological surveillance programmes for 2005. This delay is due to the fact that the processing and analysis of the results does not allow the results of the annual campaigns to become available until the second quarter of the following year.

The radioactive releases from the facilities in 2006 remained within the usual range and are comparable to those of other European and American installations. As in previous years, the doses calculated in 2006 are far below the dose limits for the public and represent only a minor fraction of the release limits.

The authorised limits for radioactive effluents from the Juzbado fuel manufacturing facility were revised in 2006, the limitation established being

equivalent to that of the nuclear power plants in terms of dose.

As regards the results of the environmental radiological surveillance programmes included in the 2005 campaign, these have been similar to those of previous years, and the quality of the environment around the installations continues to be acceptable from the radiological point of view.

The CSN's independent environmental radiological surveillance programmes (PVRAIN) showed results that were generally equivalent to those obtained from the environmental radiological surveillance programmes of the different facilities, with no significant deviations.

The CSN also controlled the environmental radiological quality of the entire national territory through its metering networks. Both the values provided by the Network of Automatic Monitoring Stations, which continuously measures the presence of radiation in the atmosphere, and those from the network of sampling stations (spaced network and dense network), which is made up of various laboratories analysing water samples from rivers and coastlines, samples from the atmosphere and samples of the terrestrial medium, were seen to be similar to those acquired in previous years.

### Campaigns for comparison of analytical laboratory results from low activity measurements

During the period 2005-2006 a comparative campaign was carried out on the results obtained by different laboratories from a prepared sample of vegetable ash with levels of environmental radioactivity. The results obtained and conclusions drawn were as follows:

- The study showed overall homogenous performance by the different laboratories, their results being comparable.

**Table 4. Exposure routes considered in the system of environmental radiological surveillance networks**

Types of routes	Types of samples		
	ERSP	MSN	ASN
<b>Transitory</b>	Air: Dust particles Iodine in air H-3 in water vapour C-14 Rainwater: Humid and/or dry deposits Surface waters Drinking water (origin on surface) Direct radiation: Dose rate	Air: Dust particles Iodine in air  Surface waters Drinking water (origin on surface)	Air: Dust particles Iodine in air Radon   Direct radiation: Dose rate
<b>Integrators</b>	Soil Bottom sediments and beach sand Drinking water (origin underground) Foodstuffs: Vegetables Milk Meat	Soil  Drinking water (origin underground)  Foodstuffs: Milk Type diet	
<b>Integrators and accumulators</b>	Indicator organisms Fish, seafood		

- It may be concluded that the participating laboratories have sufficient capacity to carry out radiological determinations on environmental samples of vegetable ashes.

**Specific surveillance programme in the area of Palomares**

The entity responsible for this programme is Ciemat, which reports to the Nuclear Safety Council. The results of the surveillance programme performed on people indicate that the accident has had no effect on the health of the inhabitants in the Palomares area.

The results of the environmental surveillance programme show that there is residual contamination in the area and that the inventory of

plutonium remaining in the area of maximum residual contamination is higher than was initially estimated.

During 2005 the affected land was expropriated and during the months of May and June the Ciemat occupied the fourteen estates involved in the process. This expropriated land, which measures 9 Ha, will be the subject of a *Research plan* that will include intensive radiological characterisation on the surface and at depth, which will allow a three-dimensional representation of the current situation of radioactive contamination to be developed. This last phase will be carried out in cooperation with Lawrence Livermore National Laboratory (LLNL) of the US Department of Energy (DOE).

During 2006 work has continued on updating of the radiological characterisation of the surface of the zone affected by the accident, which covers an area of approximately 300 Ha.

#### **Specific surveillance programme at the Inert Materials Recovery Centre (CRI-9) located in the Marismas de Mendaña**

During 2006 tracking has been performed of the radiological surveillance programme implemented at the Inert Materials Recovery Centre (CRI-9), located in the marshes of the Marismas de Mendaña, in the province of Huelva, an installation that was affected by the smelting of a source of caesium-137 that occurred at the Acerinox steelyard.

### **2.3. Protection against natural radiation sources**

In 2002, following the publication of the *Regulation on Protection against Ionising Radiations*, the CSN initiated an *Action plan* for the development of the requirements of title VII. This plan also included the development of specific standards for protection against exposure to radon inside buildings, in accordance with the Recommendation of the European Commission (90/143/Euratom, of February 21st 1990).

In accordance with the plan mapped out, the CSN has performed a series of actions aimed at identifying those activities that might represent a significant risk for the workers, the public and the environment and proposing adequate radiological protection measures.

As regards the pilot projects, 2006 has seen the continuation of those relating to coal-fired thermal power plants, to the manufacturing of phosphoric acid and fertilizers, the manufacturing of titanium oxide, ceramic industries using zirconium sands and the manufacturing and use of compounds of thorium.

In relation to protection against radon gas inside dwellings, the research project for the measurement of concentrations of radon in work places and houses in Catalonia has now been completed. The project for the measurement of radon gas in houses in Galicia continues, the aim being to obtain information on the content of this isotope inside some 2,500 dwellings. In February 2003 the CSN sent a letter to the Ministry of Public Works with a proposed text on protection against radon in newly constructed buildings for it to be included in the Technical Building Code. The Code was approved on March 17<sup>th</sup> 2006, without any requirements on protection against radon being included. In June 2006, following analysis of the situation, the Council submitted another document to the Ministry of Housing, attaching the same proposal for consideration in future revisions of the Code.

Also within the framework of the programme for protection against natural radiation sources, work has continued on the project on the content of natural isotopes, among them <sup>222</sup>Rn, in the public water supply in the autonomous community of Galicia.

In 2006 the CSN approved a revision of the *Action plan* that, along with an update, incorporates a detailed schedule of the activities to be performed by the CSN to comply with the functions assigned to it by the Regulation. One of the most significant aspects is the creation of a national natural radiation network (Redradna).

In addition to the generic aspects of the control of exposures due to natural radiation, the competent authorities have issued specific requests to the CSN regarding certain industries. The Council issued a report for the environmental impact statement on the *Project for removal of sludges accumulated in the Flix reservoir* as a result of releases from the Erkros phosphates factory. Likewise, several evaluations have been performed in relation

to the environmental radiological impact of the project for the removal of phosphate gypsums from a disused Erkros factory in Cartagena and the Casablanca oil platform in Tarragona.

## 2.4. Epidemiological study

In view of the social concern regarding the potential effects of the radiations emitted by nuclear facilities on the health of the population living around such installations, on December 9<sup>th</sup> 2005 the Plenary Session of the Spanish Congress approved a bill urging that an epidemiological study be carried out.

On April 18<sup>th</sup> 2006 the CSN and the Instituto de Salud Carlos III signed a collaboration agreement for the performance of an epidemiological study to investigate the possible effects for the local population of exposure to radiations as a result of the operation of the Spanish nuclear and radioactive facilities involved in the nuclear fuel cycle. In accordance with the aforementioned agreement, the term for performance of the work is to the end of February 2009, when the final results report is to be submitted.

The study to be performed incorporates an assessment of the exposure deriving from the routine operation of the facilities, from the beginning of their service lifetime to 2003, with efforts made to reconstruct the history of exposure of the populations through the surveillance of radioactive effluents and environmental radiological surveillance in the areas close to the installations. The study also considers exposures due to the natural radiation in these areas and in two other areas of the Spanish mainland with high and low background radiation levels.

Following the signing of the aforementioned agreement, the Instituto de Salud Carlos III and the CSN began to work in their respective areas of competence, the activities being coordinated

through a mixed tracking commission set up for this purpose.

Likewise, the Consultation Committee was created, made up of 26 members whose function is to track the work performed within the study, to provide advice on general or specific matters and to analyse the results.

## 2.5. Radioactive waste

### Management of spent fuel and high level waste

The number of irradiated fuel assemblies in storage as of December 31<sup>st</sup> 2006 in the pools at the operating nuclear power plants and the dry cask storage facility at the Trillo plant amounted to a total 10,581. Of these, 4,708 are assemblies from the boiling water reactor (BWR) plants of Santa María de Garoña and Cofrentes and 5,873 are from the country's pressurised water reactor (PWR). The latter include the 252 assemblies from the Trillo plant that are stored in 12 Ensa-DPT casks housed at the plant's individual temporary storage facility. The inventory of irradiated fuel and the situation of the nuclear power plant storage facilities are reflected in table 5.

The following activities were especially significant during 2006:

- Approval of the individual temporary storage facility for the José Cabrera nuclear power plant, based on the use of ventilated steel-concrete casks known as HI-STORM 100Z (Holtec International Storage and Transfer Operation Reinforced Module). The CSN carried out an inspection on the process of manufacturing these casks.
- Favourable appreciation of the generic design of a centralised temporary storage facility for spent fuel and high level waste, for which there are references at international level. This is based on dry storage vault type technology, in a building equipped with partially buried metallic shafts

**Table 5. Spent fuel inventory and situation of the facilities of storage of the Spanish nuclear power stations at the end of year 2006**

Nuclear Power	Total capacity	Reserve in core	Effective capacity	Capacity occupied	Free capacity	Degree of occupation	Year of saturation
Number of spent fuel components						% <sup>1</sup>	
José Cabrera (s)	548	69	479	377	102	78.71	<sup>3</sup>
Sta. M <sup>a</sup> de Garoña (s)	2,609	400	2,209	1,748	461	79.13	2015
Almaraz I (s)	1,804	157	1,647	1,076	571	65.33	2021
Almaraz II (s)	1,804	157	1,647	1,004	643	60.96	2022
Ascó I (s)	1,421	157	1,264	972	292	76.90	2013
Ascó II (s)	1,421	157	1,264	884	380	69.94	2015
Cofrentes (s)	4,186	624	3,562	2,960	602	83.10	2009 <sup>4</sup>
Vandellós II (s)	1,594	157	1,437	780	657	54.28	2020
Trillo (s)	805	177	628	528	100	84.08	<sup>5</sup>
ATI <sup>2</sup> de Trillo (c)	1,680		1,680	252	1,428	15.00	
<b>Total</b>	<b>17,872</b>	<b>2,055</b>	<b>15,817</b>	<b>10,581</b>	<b>5,236</b>	<b>66.90</b>	

(s) swimming pool

(c) container

1 The degree of occupation refers in all cases to the effective capacity.

2 Individual Temporary Storage Facility.

3 The plant has been in the definitive SHUTDOWN condition since April 2006. The hypothetical year of saturation of the fuel pool would have been 2015.

4 Year of saturation with respect to the current situation, bearing in mind that re-racking has been performed in the west pool and not in the east pool, which might provide an additional margin of a few years.

5 In view of the availability of an Individual Storage Temporary facility, no pool saturation problems are foreseen.

or tubes for storage of the capsules containing the spent fuel and vitrified high level waste. The basic conceptual design of the Centralized Temporary Storage facility also includes the temporary storage of intermediate level radioactive waste packages in a storage annex or module on the surface.

- Control of the inventory of stored spent fuel and other components and control of the operating conditions of the nuclear power plant fuel storage pools and the Trillo individual temporary storage facility.
- Tracking and control of the manufacturing of Ensa-DPT type metallic casks.

#### Management of low and intermediate level waste

In 2006 the operating nuclear power plants generated solid low and intermediate level

radioactive wastes with an estimated activity of 25,949.59 GBq, conditioned in 2,930 drums each having a capacity of 220 litres.

In 2006, 4,088 waste packages or containment units were received at the El Cabril disposal facility, plus 24 samples of low and intermediate level radioactive waste:

- 2,508 drums and 24 samples from nuclear facilities.
- 1,580 drums from radioactive facilities.

The following are particularly significant activities performed during 2006:

- Tracking and control of the treatment, conditioning and temporary storage systems for the wastes generated.

- Control and tracking of the inventory of solid radioactive wastes stored at these facilities.
- Control of the processes of acceptance of each type package.

Finally, in relation to very low level waste, it should be pointed out that, in 2006, 110 radioactive lightning rods were removed, the total number of such items removed now amounting to 22,374.

## 2.6. Radiological emergencies and security

### 2.6.1. Radiological emergencies

The following were particularly significant in 2006, as regards the CSN's activities for radiological emergency preparedness:

- Off-site nuclear emergency plans: favourable report on the master plans for the five off-site nuclear emergency plans.
- Site emergency plans: revision of the Site emergency Plans of several plants and performance of annual drills.
- Exercises and drills: in 2006 the nuclear plants and facilities carried out their obligatory annual site emergency drills. In addition, there was activation and operational verification of the Ciemat emergency radiological surveillance mobile unit, in coordination with the radiological group of the PENTA, the Ecorinte 2006 exercise for internal coordination with the Directorate General for Civil Defence of the autonomous community of Castilla-La Mancha, which consisted of an accident involving the transport of radioactive material, and four international exercises with the International Atomic Energy Agency (IAEA).
- Assignment of resources: the CSN has maintained and improved its response capacity in areas potentially affected by nuclear or radiological emergencies. In 2006, the Ciemat mobile radiological surveillance unit was joined by the mobile environmental radiological surveillance unit of the Regional Government of Extremadura, thus providing an area of action covering the entire Iberian Peninsula. This mobile unit is integrated in the radiological alert network of the Community of Extremadura and is part of a collaboration agreement between the aforementioned Regional Government and the University of Extremadura. In addition, local emergency support technicians were available from a radiological protection technical unit and the personal internal dosimetry service of Tecnatom. Furthermore, throughout 2006 there has been continued compliance with the contract for the supply of three thousand electronic direct reading dosimeters and corresponding management software.
- Information for the population: the CSN has worked on the design of informative publications, on the extension of its website <http://www.csn.es>, on the organisation of visits to the Information Centre and Salem and on seminars aimed at the general public. In parallel to the above, the CSN participated through the heads of the radiological groups of the off-site nuclear emergency plans in sessions providing information to the population at local level.
- Participation in drawing up of the *Basic directive for the planning of Civil Defence against radiological risks*. The latest draft of this directive was submitted to the Permanent Commission of the National Civil Defence Commission in June 2006.
- Training of participants: theoretical and practical training sessions were held for each of the off-site nuclear emergency plans.

- CSN's Emergency Room (Salem): the CSN keeps the Salem operative permanently (24 hours a day, every day of the year). Work has continued on improving the audiovisual support and communications equipment and systems.
- Incidents: during 2006 the emergency room was activated on two occasions, as a result of the following events:
  - a) On April 10<sup>th</sup> a fire broke out close to the Vandellós II nuclear power plant, causing activation of the facility's *Site emergency plan* and leading to declaration of a situation of *Emergency Pre-alert*. There were no radiological consequences.
  - b) On July 12<sup>th</sup> *Mode 1* was declared in the emergency room as a result of the accident that occurred that same day on highway A45, in the Málaga direction, affecting a van that was transporting radioactive. The driver

of the van was killed but there were no radiological consequences.

## 2.6.2. Security of materials at nuclear facilities

The following activities, among others, have been carried out by the CSN during 2006:

- Favourable report on ratification of the *Amended Convention on the Physical Protection of Nuclear Material*.
- Inspections of the security systems of the Cofrentes, Ascó and Vandellós II nuclear power plants, the Enusa fuel assembly manufacturing facility at Juzbado (Salamanca), the Centre for Energy-Related, Environmental and Technological Research (Ciemat) and the nuclear material transport company Express Truck.
- Initial and on-going training activities and collaboration in national and international programmes.

## 3. Public information, institutional relations and international relations

### 3.1. Public information and communication

The CSN has continued its efforts to increase transparency and improve its information and communication policy. The following are particularly noteworthy among the activities carried out in 2006:

- Drawing up of a procedure on the broadcasting of specific items of information.
- Publication of inspection records as from August 2006.
- Publication of the minutes of Council meetings and of the technical reports associated with CSN decisions.
- 66 press releases were issued, along with 69 brief memoranda on reportable events, and the CSN responded to the requests for information from the media.
- The website (www.csn.es) received 130,038 visits.
- As regards attention to the public, there have been replies to 300 external consultations that have given rise to a database on the most frequently asked questions, accessible via the CSN website.
- The CSN Information Centre received 278 visits, representing a total 6,438 visitors.
- In the area of publications, 22 new documents have been published and various informative brochures, videos and a DVD have been updated and re-printed. During 2006 more than 80,000 copies of technical publications and informative materials have been distributed.

- The CSN continued to organise its series of conferences and technical sessions, in addition to other activities aimed at promoting greater public awareness of the functions and responsibilities of the Council through participation in congresses, fairs and exhibitions.
- Attendance at the Local Information Committees in areas close to nuclear power plants.

### 3.2. Institutional relations

#### Relations with Parliament

The following appearances were made before the Congress during 2006:

- On May 22<sup>nd</sup> 2006, the lady chairman, commissioners and members of the technical staff of the CSN appeared before the Commission for Industry, Tourism and Commerce, along with representatives of Association of Municipal Councils in Areas with Nuclear Power Plants, Greenpeace and Ciemat, in relation to the proposed bill reforming Law 15/1980, of April 22<sup>nd</sup> on the *Creation of the Nuclear Safety Council*.
- On October 18<sup>th</sup> 2006, the lady chairman of the CSN appeared before the Commission for Industry, Tourism and Commerce to present the general report on activities carried out by the CSN during the year 2005.

The following reports were submitted to the Congress during 2006:

- 14 reports, requested via resolutions of the Commission for Industry, Tourism and Commerce on December 27<sup>th</sup> 2005 and corresponding to the Annual Report for that year.
- One report on the detailed independent international evaluation of the lessons learned

from the event at Vandellós II nuclear power plant.

- One report on the studies performed by all the nuclear power plant licensees and on the specific action plan of each plant in relation to the incident at Vandellós II.

In 2006 the CSN responded to the following questions posed by the Congress and the Senate:

- 29 written questions from members of Congress.
- 38 written questions from members of the Senate.

#### **Relations with the Central Administration**

The CSN continued its collaboration with the institutions, in their respective realms of competence, with the Ministry of Industry, Tourism and Commerce, the Ministry of the Interior, the Ministry of Education and Science, the Ministry of Public Health and Consumption, the Ministry of Defence, the Ministry of the Environment, the Ministry of Foreign Affairs and Cooperation and the Office of the President of the Government.

The following activities were particularly significant in 2006:

- Signing, on April 18<sup>th</sup> 2006, of a collaboration agreement between the Nuclear Safety Council and the Instituto de Salud Carlos III for performance of an *Epidemiological Study to investigate the possible effects of ionising radiations deriving from the operation of Spanish nuclear and radioactive fuel cycle facilities on the health of the population residing close to such installations.*
- Collaboration with the recently created Military Emergency Unit, centering on aspects relating to information exchange, the training of participants, communications and advice on the procurement of emergency equipment.

#### **Relations with the autonomous community administrations**

During 2006 the agreements on the assignment of functions with the eight following autonomous communities: Principality of Asturias, Catalonia, Galicia, Balearic Islands, Canary Islands, Navarre, the Basque Country and Valencia remained in force, the operation of which is considered to be satisfactory for both the CSN and the communities in question. On December 26<sup>th</sup> 2006 a similar agreement was signed with the autonomous community of the Region of Murcia.

The following aspects have been particularly significant during 2006:

- Signing of a collaboration agreement between the CSN, the Council for the Environment of the Regional Government of Extremadura and the University of Extremadura for the exchange of radiological data from their respective networks of automatic stations and also the availability of a vehicle completely equipped for emergency response.
- Training of five new inspectors at the service of various autonomous communities.
- The mixed commissions for the tracking of the function assignment agreements signed with the autonomous communities of the Balearic Islands, the Basque Country, Catalonia, Valencia, Navarre and Galicia held different meetings during the year. There was also a coordination meeting for all the accredited inspectors on November 23<sup>rd</sup> 2006.

#### **Relations with the local administrations**

Relations with the local administrations continued throughout 2006. Special mention might be made of the signing of a specific collaboration agreement between the Nuclear Safety Council and the Association of Municipal Councils in Areas with Nuclear Power Plants for consolidation of the

Local Information Committees in the seven Spanish nuclear zones, the objective being to develop the collaboration initiatives included in the framework collaboration agreement.

#### Relations with other entities, organisations and social groups

In general, the CSN undertakes various collaboration activities with other entities, organisations and social groups.

The following were particularly significant in 2006:

- Updating of the agreements with universities, Cedex and Ciemat for performance of the environmental radiological surveillance plans of the network of sampling stations (dense and spaced networks), the independent environmental radiological surveillance programmes and the environmental radiological surveillance programme for the aquatic medium.
- The CSN continues its patronage of the following: the *CSN chair* at the University College of Mining Engineers (Madrid Polytechnic University), the *Federico Goded Chair of Nuclear Safety* at the Polytechnic University of Madrid and the *Argos Chair of Nuclear Safety* at the University College of Industrial Engineers of Barcelona. The Council also continues to collaborate with different universities in promoting training programmes in the areas of nuclear safety and radiological protection.
- A meeting was held with Greenpeace with a view to establishing channels of communication ensuring maximum transparency in the information exchanged by the two institutions, and communications and reports were submitted in response to questions from several citizens' organisations.
- A meeting was held with the State Coordinator of nuclear power plant Workers' Committees

and several reports were issued to this organisation in response to requests.

- The relationship of cooperation with professional associations in the nuclear and radiological protection sector continued.
- Granting of aids for the performance of training and information activities relating to nuclear safety and radiological protection, to a value of 50,000 euros.

The budget for subsidies during 2006 amounted to 50,000 euros.

This budget has been used to finance or co-finance projects with different national organisations and entities, collaborations with different universities, congresses and conferences, etc.

### 3.3. International relations

The CSN continued to maintain its presence in international organisations: the United Nations International Atomic Energy Agency (IAEA), the European Union (EU) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD), through participation in their governance bodies, advisory committees and technical working groups.

The following activities were particularly significant in 2006:

Within the framework of the European Union (EU):

- Participation in the meetings of the EU Atomic Questions Group and the *ad hoc* Group on Nuclear Safety, which in 2006 completed the report on harmonisation in nuclear safety and waste management requested by the Council of the European Union.

- Participation in the meeting of the Permanent Group on the Transport of Radioactive Material, for the harmonisation of the standards and regulatory procedures of the different member countries.
- Participation in the sixth project for assistance to the Ukrainian regulatory body, UK/RA/06, financed with Tacis funds.

Within the IAEA:

- Development and planning of the tasks contemplated in the programme of activities and establishment of the preparatory and final schedules of the IRRS mission (Integrated Regulatory Review Service) requested from the IAEA by Spain in 2005.
- Contribution of 465,000 euros to the budget of the organisation for technical assistance projects, for the most part for South American countries. Reception of grant holders and scientific visits from Chile, Cuba and Hungary. Technical assistance for the delivery of 10 training workshops.
- Attendance at the fiftieth *General IAEA Conference* in mid September 2006, with the participation of delegates from the member countries.
- Participation in three research and development projects and in the development of a database on the inventory of radioactive sources.
- Participation in 52 meetings of the different technical and advisory committees and working groups, with special emphasis on the safety standards committees (SSC) and those corresponding to radiological protection (RASSC), safety in radioactive waste management (WASSC) and safety in transport (TRANSSC).

Within the NEA/OECD:

- Participation in the steering committee (SC) and the committees on nuclear regulatory activities (CNRA), safety of the nuclear facilities (CSNI), radioactive waste management (RWMC), radiological protection and public health (CRPPH), nuclear science (NSC) and nuclear law (NLC).
- Participation in 14 research and development projects and in the development of a database on occupational exposure.

Furthermore, the CSN adheres to and collaborates in international conventions or agreements, such as the *Convention on Nuclear Safety*, the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, the *Convention on Physical Protection of Nuclear Material*, the *Oslo-Paris Convention for Protection of the Marine Environment of the North-East Atlantic* (OSPAR), the *Convention on Early Notification of a Nuclear Accident* and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*.

The most noteworthy activities in 2006 have been the following:

- Participation in the second Review Meeting of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, at which the second national report to the Convention was reviewed.
- During 2006, the CSN has drawn up the national reports for the OSPAR Convention on releases from the Spanish nuclear facilities.

Likewise, the CSN promotes and participates in three associations constituted by counterpart regulatory bodies, the International Nuclear Regulators Association (INRA), the Western European Nuclear Regulators Association

(WENRA) and the Ibero-American Forum of Radiological and Nuclear Regulatory Authorities (FORO).

The following activities have been particularly significant in 2006:

- Agreement appointing Spain as the host nation and chair of INRA in 2007.
- Hosting of the plenary meeting of WENRA in 2006 in Madrid, presentation by the CSN of the preliminary version of the national action plan for the harmonisation of reactor safety and proposal for the creation of a new activity for the study of regulatory practices in the member countries.

- Approval of the new statutes of FORO in 2006 in development of the Constitutional Charter, setting up of the Foro Secretariat and Spanish presidency from June 2006 to June 2007.

The CSN has agreements or protocols signed with organisations carrying out similar functions in 19 countries.

As regards noteworthy bilateral activities, attention may be drawn to the exercise for comparison of the nuclear power plant supervision practices with the *NRC*, recommended by the international independent evaluations team of the *NEA*, which revised the CSN report on lessons learned from the event at Vandellós II nuclear power plant.

Figure 3. Bilateral agreements map



## 4. Regulations and standards

The CSN has made important efforts in promoting and driving standards in relation to nuclear safety and radiological protection before the authorities and organisations involved in the process of developing and adopting standards.

As regards the technical standards issued by the CSN during 2006, attention may be drawn to the fact that the following instructions were approved and published by the Council:

- Nuclear Safety Council Instruction IS-09, of June 14<sup>th</sup> 2006, *establishing criteria to be fulfilled by nuclear facility and materials security systems, services and procedures.*
- Nuclear Safety Council Instruction IS-10, of July 25<sup>th</sup>, *establishing criteria for the notification of events to the Council by the nuclear power plants.*

Seven instructions and six CSN safety guides are in an advanced stage of preparation.

During 2006, within the process of preparation of the CSN instructions and safety guides and in order to comply with the procedure contemplated in section b) of Article 1 of *Law 27/2006, of July 18<sup>th</sup>, regulating information access rights, rights of public participation and rights to recourse to justice in environmental issues*, incorporating European Council directives 2003/4/CE and 2003/35/CE, and prior to their approval and publication in the Official State Journal, the process of collecting comments by the public and stakeholders, as defined in article 2 of the said law, has been included.

The CSN has actively participated in promoting several legislative projects of varying legal rank, some of particularly wide scope:

- Proposal for amendment of the *Nuclear Energy Act* in relation to the system of penalties.
- Revision of the *Regulation on Nuclear and Radioactive Facilities.*
- Revision of the *Royal Decree on the installation and use of X-ray apparatus for medical diagnosis purposes.*
- Drawing up of the *Basic Directive on Civil Defence against radiological risk.*
- Project for a *Royal Decree on the Security of nuclear materials.*
- Transposition of *Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel.*

Several provisions affecting the regulatory framework of the CSN have been published in 2006, the following being particularly significant:

- Law 9/2006, of April 28<sup>th</sup>, on the *Assessment of the environmental effects of certain plans and programmes.*
- Royal Decree 229/2006, of February 24<sup>th</sup>, on the *Control of high activity sealed radioactive sources and orphan sources.*
- Royal Decree 775/2006, of June 23<sup>rd</sup>, *creating the inter-ministerial Commission for the establishment of criteria to be fulfilled by the site of the centralised temporary storage facility for spent nuclear fuel and high level wastes, and associated technological control.*

It should be pointed out that in 2006 arrangements continued in relation to the Bill on the Reform of the *Law Creating the CSN* in the Congress, as a result of which the CSN has worked on tracking and evaluation from the legal point of view of the texts provided by the different Parliamentary groups.

## 5. Management of resources

### 5.1. Improvement of the CSN organisation and plans

#### Improvements to the internal organisation of the CSN

In keeping with the resolutions of the Congress, as regards actions to improve the organisation of the CSN, the activities relating to the IAEA's IRSS Mission and the lessons learned from the Vandellós II nuclear power plant event have been particularly noteworthy.

During 2006, and as a step prior to performance of the IRSS Mission, a self-assessment covering all the processes of the Organisation has been carried out for the first time at the CSN. This self-assessment has served as a basis for definition of the action plan for the IRSS, and the document *Initial actions within the IRSS action plan* was drawn up, including proposals on the specific action plans for each process, derived from the diagnosis and analysis carried out by the different organisational units.

As a result of preparations for the aforementioned IRSS mission, the Project for the updating of the CSN management system was initiated. Aspects relating to this issue are dealt with in the present report.

The actions deriving from the CSN report on lessons learned from the essential services water system piping degradation event at Vandellós II nuclear power plant constitute another of the issues that have marked the work performed by the CSN throughout 2006.

In October 2005, the CSN requested that a group of NEA experts reviewed the report drawn up by the Council on the lessons learned from the event that occurred at the Vandellós II plant in August

2004. On March 2<sup>nd</sup> 2006, in response to the CSN's request, the NEA published its corresponding report, which included a series of improvement actions suggested by the consulting team set up by the latter for this purpose.

#### Strategic Plan and Annual Work Plan

As regards analysis of compliance with the *Strategic plan for 2005-2010*, it should be pointed out that during 2006 all the strategic objectives of the plan have progressed to a greater or lesser extent.

In response to Council requirements, at the end of the first six months of the year the *Annual work plan, PAT 2006*, was revised. This revision implied including the actions deriving from the IRSS mission, integrated review of the nuclear regulation, the actions foreseen in the report drawn up by the Western European Nuclear Regulators Association (WENRA) and the actions deriving from the report by the Advisory Committee of the Nuclear Energy Agency (NEA), which evaluated the report on lessons learned from the incident at the Vandellós II nuclear power plant.

#### Research plan

The objective of the research projects carried out has been to improve the know-how, methods and tools used by the CSN staff in the performance of its functions, thus cooperating in ensuring that its actions be more efficient and effective. The projects also contribute to increasing the competence of the licensees of regulated facilities or activities and of those other installations such as research centres and universities that provide support to the CSN or to the licensees.

Fifty-five projects were under way in 2006, with a CSN contribution of 1,800,000 euros, in accordance with the courses of action established in the *CSN research plan*. Many of these research projects were undertaken in collaboration with other institutions, the collaboration with Unesa, Ciemat and Enresa, and the OECD Nuclear Energy

Agency at international level, being especially noteworthy.

The number of projects completed by year end amounted to 20, with 35 remaining under way, 15 in relation to radiological protection and 20 to nuclear safety.

### Training plan

Training is especially important in an organisation like the CSN, due to the technological, organisational and procedural changes that occur in the areas affecting its activity and development.

During 2006 the activities contemplated in the *CSN Training plan* were carried out. At the beginning of 2005 the Council approved the setting up of a Training Commission. This Commission has undertaken the activities required to achieve the objectives mapped out, with special attention given to the design of the *Training plan* for 2006.

The efforts made in training by the CSN were oriented on the one hand towards the imparting and updating of knowledge in the areas of nuclear safety and radiological protection, the development of management, organisational and communications skills, standards, administration and management and information systems and, on the other, towards the development of specific language learning programmes (English, French and German) and training processes on the handling of data-processing tools and resources by the CSN personnel.

At year end, the CSN training activities had registered 1,018 attendances, with an average 2.30 attendances per person.

The overall number of hours dedicated to personnel training amounted to 51,338, and the total cost to 493,798.41 euros.

### Internal Quality Plan

Forty-three procedures were approved, four relating to management, 13 to administration and 26 to technical matters. Of these, 33 corresponded to the Integrated Plant Supervision System (SISC).

The *Procedures programme* based on the document *Initial actions of the IRRS action plan* was drawn up and work was performed on updating of the *CSN Organisation and operation manual*.

As a result of preparation for the IRRS mission, a project for the updating of the CSN management system was initiated, including revision of the *Quality manual*.

The internal audits continue, and in 2006 a specific audit was performed on the Dosimetry Bank within the Sub-directorate for Operational Radiological Protection.

### Information systems plan

A remote application has been placed in service allowing data and schedules corresponding to the *Environmental radiological surveillance plan* to be dispatched and validated *on line*. Likewise, an environment of collaboration has been developed for the sharing of documentation among the participants in the epidemiological study being performed by the Instituto de Salud Carlos III and commissioned by the CSN.

An important boost has been given to the development, maintenance and implementation of the Spanish nuclear power plant indicators system. Also, a new Operating Incident Management system (FIO) has been implemented.

A new system for the management of licences has been placed in service, the system for the remote dispatch of operator licence data manager by the Radioactive Activities Coordination Service (SCAR) of the Regional Government of Catalonia.

Replacement of the structured wiring of the building has been initiated, with a view to improving the CSN local network.

## 5.2. Management of human and economic resources

### Human resources

As of December 31<sup>st</sup> 2006, the staff of the CSN numbered 442 persons. The number of women working for the Nuclear Safety Council represents 47.74 % of the total workforce.

Throughout the year selection processes have been launched to cover seven posts via the system of free appointment. The two candidates that passed the selective tests were appointed as officials of the Senior Division of the Nuclear Safety and Radiological Protection Technical Corps. A further two candidates were appointed as officials in the same division through internal promotion.

### Economic resources

The economic aspects are broken down into budgeting items and financial aspects, the accounting of the Organisation being carried out in accordance with the *General public accounting plan*.

#### a) Budgeting items

- The initial budget of the CSN for the 2006 financial year amounted to a total 41,432 thousand euros. This initial budget underwent an increase due to the budget modifications performed during the year, reaching the figure of 41,885 thousand euros. With respect to the previous year, both the initial and the definitive budgets trended downwards.
- It should be pointed out that the total net recognised rights for the year, resulting from the revenues management process, amounted to 41,599 thousand euros, of which 41,534 thousand euros (99.84 %), corresponded to non-financial operations. Of the total Net

Recognised Rights, 35,926 correspond to heading III (Tariffs, public prices and other revenues), which imply an execution of 99.60% with respect to the definitive forecasts of 36,070.

- The current transfers of 5,029 thousand euros, compared to definitive forecasts of 5,030 thousand euros, amount to an execution rate of 99.98.
- Furthermore, the net income amounted to 41,076 thousand euros, 35,560 thousand of which correspond to heading III Tariffs and other Revenues.
- The commitments acquired, to the sum of 38,241 thousand euros, amounted to 92.30% of the definitive budgeting forecasts. It should be pointed out that the total liabilities recognised reached the sum of 37,548 thousand euros, an execution of 89.64 % with respect to the definitive budget of 41,885 thousand euros.

#### b) Financial aspects

- The personnel costs are quantitatively the most important, since they represented 58.52 % of the total. The personnel costs include salaries, social security costs to be paid by the employer and social welfare costs.
- In second place are external services (27.98%), the fundamental components of which were the services of independent professionals, maintenance expenses and communications.
- In third place are transfers and subsidies, 9.14%, which include transfers to the autonomous communities, subsidies for nuclear safety and radiological protection, post-graduate scholarships and transfers abroad.
- Transfers for depreciation are in fourth place at 5.20%.

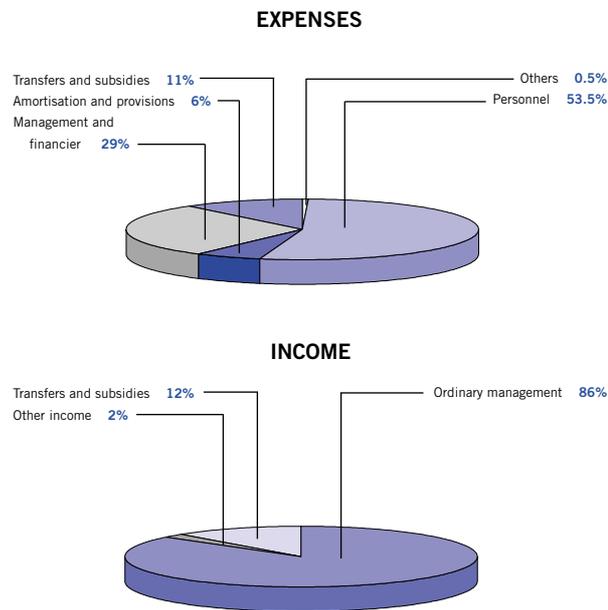
- Finally, the rest of the expenses not represented include transfers to provisions, taxes, financial costs and extraordinary losses and expenses.

As regards income, the fee for services rendered was the main source of CSN financing, representing

85.93% of the total, the remainder, 14.07%, corresponding to current transfers and subsidies, financial income and other management revenues.

The financial year gave a positive result amounting to 4,700 thousand euros.

**Figure 4. Financial data. Results account. 2006**



## 6. Restructuring of the Nuclear Safety Council

The former lady chairman of the CSN, Ms. María Teresa Estevan Bolea, vacated her post by Royal Decree of October 27<sup>th</sup> 2006 due to her having reached the age established in this respect by the *Law Creating the CSN*.

By Royal Decrees issued on December 1<sup>st</sup> 2006, the commissioners Mr. José Ángel Azuara Solís, Ms. Paloma Sendín de Cáceres and Ms. Carmen Martínez Ten vacated their posts.

By Royal Decree issued on December 1<sup>st</sup> 2006, Ms. Carmen Martínez Ten was appointed Chairperson of the Nuclear Safety Council.

By Royal Decrees issued on December 1<sup>st</sup> 2006, Messrs. Antonio Colino Martínez, Luis Gámir Casares and Francisco Fernández Moreno were appointed commissioners.

During the meeting held on December 4<sup>th</sup> 2006 to constitute the Board of the Council, Mr. Luis Gámir Casares was appointed Vice-Chairman of the CSN.

## Annex: list of abbreviations

ANAV:	Asociación Nuclear Ascó – Vandellós II.	ISO:	International Organization for Standardization.
BWR:	Boiling Water Reactor.	ITC:	Complementary Technical Instruction.
Ciemat:	Centre for Energy-Related, Environmental and Technological Research.	KJ:	Vandellós II NPP emergency diesel generator motor cooling water system.
CNRA:	Committee for Nuclear Regulatory Activities of the NEA.	LLNL:	Livermore National Laboratory.
CRPPH:	Committee for radiological protection of the NEA.	MITYC:	Ministry of Industry, Tourism and Commerce.
CSNI:	Committee for the nuclear safety of facilities of the NEA.	NEA:	OECD Nuclear Energy Agency.
DOE:	Department of Energy.	NLC:	NEA Nuclear Law Committee.
DPT:	Dual Purpose Cask: transport and storage.	NRC:	US Nuclear Regulatory Commission.
EC:	European Community.	NSC:	NEA Nuclear Sciences Committee.
EF:	Vandellós II NPP essential services water system.	OECD:	Organisation for Economic Cooperation and Development.
EG:	Vandellós II NPP component cooling water system.	OSPAR:	Oslo-Paris Convention for the protection of the marine environment of the North-East Atlantic.
Enresa:	Spanish national radioactive waste management agency.	PAT:	CSN annual work plan.
ENSA:	Equipos Nucleares S.A.	PEN:	Off-site nuclear emergency plan.
ENUSA:	Empresa Nacional del Uranio S.A.	Pimic:	Integrated plan for improvement of the Ciemat installations.
EU:	European Union.	PVRAIN:	Independent environmental radiological surveillance programme.
Euratom:	European Atomic Energy Community.	PWR:	Pressurized Water Reactor.
FORO:	Ibero-American Forum of Radiological and Nuclear Regulatory Authorities.	RASSC:	IAEA committee for technical standards on radiological protection.
GJ:	Vandellós II NPP essential chilled water system.	RD:	Royal Decree.
HI-STORM:	Holtec International Storage and Transfer Operation Reinforced Module .	RF:	Radioactive Facility.
IAEA:	International Atomic Energy Agency.	ROP:	NRC Reactor Oversight Process.
INES:	International Nuclear Events Scale .	RWMC:	NEA radioactive waste management committee.
INRA:	International Nuclear Regulators Association.	Salem:	CSN's Emergency Room.
IRRS:	International Regulatory Review Service.	SC:	NEA Steering Committee.
IS:	Nuclear Safety Council Instruction.	SCAR:	Radioactive Activities Coordination Service of the Regional Government of Catalonia.
ISA:	Integrated Safety Assessment.	SISC:	Integrated Plant Supervision System.
		SSC:	IAEA Technical Standards Committee.
		TRANSSC:	IAEA committee for technical standards on the transport of radioactive materials.

UFG: Unión Fenosa Generación.

UK: United Kingdom.

UNESA: Spanish electricity industry association.

WASSC: IAEA committee for technical standards on radioactive waste.

WENRA: Western European Nuclear Regulators Association