

CONTRÔLE

SPECIAL ISSUE



ASN report abstracts on the state of Nuclear Safety and Radiation Protection in France in 2012

THE FRENCH NUCLEAR SAFETY AUTHORITY REVIEW N° 196 APRIL 2013



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The Nuclear Safety Authority presents its Report on the state of nuclear safety and radiation protection in France in 2012.

This report is required by article 7 of the 13th June 2006 Act on transparency and security in the nuclear field, now integrated into the Environment Code (article L. 592-31).

It was submitted to the President of the Republic, the Prime Minister and the Presidents of the Senate and the National Assembly, pursuant to article 7 of the above-mentioned Act.

It was presented to representatives of Parliament on 16th April 2013 at an OPECST hearing, and the press.

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Editorial



Paris, March 5, 2013

2012 was an important year for the development of nuclear safety in France. Following the Fukushima accident, ASN instructed the licensees to take steps to improve the robustness of the nuclear facilities, with a binding implementation schedule.

In terms of radiation protection, 2012 was characterised by continuation of the efforts begun several years ago to control the risks linked to the use of ionising radiation in the medical sector. The major radiotherapy accident in Epinal, brought to light in 2006, and the resulting trial in 2012, are a painful reminder of the stakes involved in this field.

ASN considers that in 2012 the state of nuclear safety and radiation protection in France has remained on the whole relatively satisfactory. ASN nonetheless underlines the need to continue with permanent improvement of nuclear safety and radiation protection, demanding increased efforts on the part of the licensees and more stringent inspections.

Seeking
continuous
improvement
in nuclear safety
and radiation
protection



From left to right :

Philippe JAMET
Commissioner

Michel BOURGUIGNON
Commissioner

Pierre-Franck CHEVET
Chairman

Margot TIRMARCHE
Commissioner

Jean-Jacques DUMONT
Commissioner

The lessons from the Fukushima accident: the long-term view

Following the stress tests¹ performed in 2011 in the wake of the Fukushima accident, ASN considered that the facilities examined offered a level of safety such that there was no need to request that any of them be shut down. At the same time, ASN considers that their continued operation demands that their robustness to extreme situations be increased beyond their existing safety margins, as rapidly as possible.

For those facilities with the most significant safety issues, ASN issued a range of major requirements on 26 June 2012: increased protection of the facilities against natural events, creation of a “hardened safety core” of particularly robust equipment, emergency response teams able to intervene on the facilities impacted within a few hours. The definition of the hardened safety core will be finalised in 2013.

The stress tests approach is being gradually extended to all the other facilities.

In agreement with the French High Committee for Transparency and Information on Nuclear Security, ASN made sure that social, organisational and human factors were included. ASN defined its priorities: maintaining and renewing skills, in particular at a time when one generation of workers is giving way to the next, the conditions for subcontracting in normal and in accident conditions, and the development of research on these subjects.

In June 2012, ASN set up the nuclear safety social, organisational and human factors steering committee (COFSOH), which is open to all the stakeholders: administrations, licensees, subcontractors, trades unions, experts, associations, etc. The first meetings of this committee led to definition of the programme of work to be initiated in 2013.

The Fukushima accident confirmed the importance of the work started by ASN in 2005, with all the stakeholders within the Steering committee for managing the post-accident phase of a nuclear accident (CODIRPA). This work led to the November 2012 publication of the first elements of national nuclear post-accident doctrine. The CODIRPA will next work on accidents on a scale comparable to the

1. Previously referred to in France as “complementary safety assessments” (CSA).

Fukushima disaster and will define what steps to take in the field, with all the players concerned.

ASN underlines that the lessons learned from the Fukushima disaster go far beyond the specific Japanese context. It will take many years to fully analyse the accident, its management and what improvements need to be made to existing facilities and organisations, world-wide.

Lifetime of facilities: considering uncertainties

The French nuclear industry, whether reactors or fuel cycle facilities, was to a large extent built during the period 1970-1990.

These facilities experience ageing, which is mainly manifested by:

- the physical deterioration of the equipment, whether or not replaceable (for example the reactor vessels and containments);
- the obsolescence of their design bases with respect to the safety requirements applied to the more recent facilities.

Maintaining a satisfactory level of safety over time therefore requires:

- guaranteeing the condition of the facilities and their conformity with the safety requirements;
- periodically re-assessing these requirements and improving the facilities in order to bring their level of safety more in line with that of the most recent facilities.

The ten-yearly safety review required by law is a key element of this approach. Following this review, ASN rules on the facility's ability to remain in service.

For EDF's 900 MWe nuclear reactors, ASN ruled in 2009 on the principle of extending operation beyond the thirty year lifetime, even up to forty years, subject to the result of the periodic safety review of each facility.

Operation beyond this lifetime would, from the safety viewpoint, require an examination of particular scope, taking account of the hypotheses and margins used for the 40-year design basis, operating experience feedback, improvements in current knowledge and the foreseeable changes to the safety requirements for the period in question.

The thought currently being given to the energy transition process must therefore take account of the uncertainty surrounding the lifetime of the NPPs, the strategic nature of which was underlined by the Government audit office in a public report of January 2012. ASN in particular underlines the need to ensure sufficient electricity production

capacity, regardless of the origin, to be able to deal with the eventuality – which is always possible despite the precautions taken – of the simultaneous shutdown of several facilities for safety reasons.

Research: a key issue for ASN

Safety and radiation protection require technical and scientific expertise that must be regularly brought up to date. ASN thus gave itself the means to identify priority areas for research in this respect. An international scientific committee, set up in 2010, regularly examines the proposed orientations. On the basis of its recommendations, ASN issued a first opinion on 10 April 2012, concerning social, organisational and human factors, radiobiology, ageing of PWR metal components and non-destructive testing.

Exposure of the public: controlling medical doses

ASN is particularly preoccupied by two types of situations:

- situations potentially leading to accidents in the radiotherapy, interventional radiology and industrial radiography fields;
- situations involving repetitive or chronic exposure to ionising radiation (medical field and radon).

In radiotherapy, particular vigilance is required concerning the conditions for deploying and learning how to use highly complex new equipment as well as the development of new irradiation procedures enabling stronger and better targeted doses to be delivered to the tumour, but which require even more precautions.

The training of interventional radiology professionals in patient radiation protection needs to be strengthened, in order to optimise the doses delivered to the patients and minimise the risks of radiological burns.

With regard to repetitive or chronic exposure situations, a considerable rise in medical imaging doses worldwide can be seen, particularly in the most industrialised countries, in particular owing to the use of scanners and radiological screening. In order to control this rise, application of the justification and optimisation principles needs to be strengthened. In particular, the medical imaging examinations correct usage guide, which has been revised and is available on the Internet, will be promoted among doctors requesting examinations. At the same time, the MRI device pool must be expanded so that it can replace scanners for specific indications.

All these changes increase the need for medical physicists, owing to their essential role in optimising techniques and quality assurance, but also for development of the radiation protection culture. For several years now, ASN has pointed out that their numbers and their role need to be reinforced, including in medical imaging, where there is a significant shortage. The profession of medical physicist must be recognised, which requires regulatory clarification of the corresponding radiation protection and health care safety responsibilities.

With regard to exposure to naturally occurring radioactivity, radon can lead to a risk of lung cancer as a result of chronic inhalation. ASN is taking part in implementing the 2011-2015 national action plan built around five main pillars, in particular the reduction of exposure in the home.

Finally, the phenomenon of individual radiosensitivity, which is well-known to radiotherapists and linked to genetic anomalies in DNA damage signalling and repair, could also appear at lower doses. This could concern about 10% of the population, whose sensitivity to the doses received could be multiplied by a factor of up to 5.

Long-term waste management: debate before decision

With regard to the monitoring of radioactive waste management, ASN in conjunction with the General Directorate for Energy and Climate (DGEC), as part of a pluralistic working group, established the National Radioactive Waste and Materials Management Plan (PNGMDR) for the period 2013-2015, which was transmitted to Parliament in December 2012. The PNGMDR is an essential component of the waste management process, as its aim is to ensure that there are safe management solutions for each category of radioactive material and waste, to identify the foreseeable need for storage and disposal facilities and to define all the steps to be taken so that this need is met as rapidly as possible.

In this respect, ASN underlines the importance of the public debate on the project for deep geological disposal of high or intermediate level waste, programmed for 2013. This milestone is a key step in implementing a long-term management solution, in compliance with the safety objectives and the calendar imposed by the 28 June 2006

Programme Act on the sustainable management of radioactive materials and waste.

At the same time, ASN will continue to work with foreign safety regulators on the safety of such a disposal facility, in particular with regard to questions affecting reversibility.

Towards a harmonised international vision

For ASN, the construction of a European nuclear safety and radiation protection framework has always been a major objective. ASN is continuing its work, jointly with its counterparts, to harmonise safety requirements and promote the independence of safety regulators and transparency.

This harmonisation is based on the work being done by the Western European Nuclear Regulators' Association (WENRA) and the Heads of European Radiological Protection Competent Authorities (HERCA). Thanks to this approach, the stress tests performed in Europe in the wake of the Fukushima accident, under the control of the safety regulators of the member States, are considered to be a global benchmark.

More broadly, ASN is heavily involved in bilateral relations around the world, or within NEA and IAEA. The next meeting of the international Convention on Nuclear Safety, to be held in 2014, will be an important one in the light of the follow-up to the Fukushima accident. André-Claude Lacoste, former Chairman of ASN, has been elected to chair it.

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Monitoring nuclear safety and radiation protection requires that day-to-day actions be taken within the context of a more long-term view.

With a commission renewed in November 2012, seeing the arrival of Margot Tirmarche, Commissioner, and Pierre-Franck Chevet, Chairman, ASN is continuing its work in line with its strategic guidelines and in compliance with its values: competence, rigor, independence and transparency. ■

The year 2012

Paris, March 5, 2013



“A relatively satisfactory year in terms of nuclear safety and radiation protection in France, but one that will remain marked by the Fukushima accident”

2012 was relatively satisfactory in terms of nuclear safety and radiation protection. It was still marked both nationally and internationally by the aftermath of the Fukushima accident.

Regulation

In its opinion of 3 January 2012 on the stress tests, ASN recommended that the draft order setting out the general rules for facilities be signed as rapidly as possible. This order, prepared by ASN together with the Ministers responsible for nuclear safety, was published on

8 February 2012. It makes a significant contribution to improving safety: it for example sets new requirements for monitoring of contractors by the licensees and includes the "reference levels" defined by the WENRA association which, for several years now, has been working on defining common European baseline safety requirements.

About fifteen ASN regulatory resolutions will be binding on the licensees. They will specify how this order is to be applied to safety policy and management, waste management and fires. The resolution containing water intake, discharge and environmental monitoring should be published in 2013.

The European Commission has started work on merging into a single text three Euratom directives concerning basic radiation protection standards, protection against medical exposure and monitoring of high-level sources. Another draft directive, adopted in September 2011, reinforces protection of the general public, workers and patients, for example with respect to dose limits. It is being examined at the European level and publication is expected during the course of 2013. In 2012, ASN was particularly closely involved in these negotiations. It will be just as closely involved in the transposition process which will follow the adoption of this directive.

In the field of small-scale nuclear activities, a number of resolutions should be issued in 2013 concerning the design rules for medical facilities using ionising radiation and the registration, monitoring, collection and disposal of radioactive sources. ASN is also concerned by the increase in the number of industrial radiography incidents observed in recent years. It has therefore begun work on tightening up the regulations, in particular so that the operators opt for alternative methods that are non-irradiating or involve less irradiation, and are able to better deal with any malfunctions or problems.

Finally, in 2008, the Government decided to entrust ASN with monitoring the protection of high-level sources against malicious acts. Legislation will be required to make this resolution effective: a Bill was therefore tabled before the Senate in March 2012.

Authorisations and licenses

The activities with the highest risks are closely monitored and require authorisations that are generally delivered by ASN after analysis of the provisions made by the party responsible for the activity. If these provisions are inadequate, the authorisation is either not granted or is not renewed.

Thus, in the medical field, ASN issued 639 authorisations (for computed tomography, nuclear medicine, external radiotherapy, brachytherapy and for blood product irradiators). For the users of radioactive sources and following examination of the application, ASN issued 257 new authorisations and 1002 renewals, while revoking 233 authorisations.

The creation, final shutdown and decommissioning of basic nuclear installations (BNI) are subject to authorisation by means of a decree following the issue of an opinion by ASN. Thus, in 2012, a decree authorised the creation of the ITER experimental fusion facility and the modification of the GANIL particle accelerator.

Every ten years, the nuclear facilities undergo a periodic safety review, following which ASN issues a resolution on whether or not they may continue to operate. ASN retains the right to shut down a nuclear facility at any moment, if necessary. In 2012, ASN thus considered that operation of EDF's Bugey 2 reactor could continue provided that a number of requirements were met. In late 2012, ASN verified compliance with the requirements applicable to EDF's Fessenheim 1 reactor, in particular that concerning the addition of a supplementary cooling system. ASN also approved the technical dossier concerning increasing the thickness of the basemat, needed to ensure compliance with another major requirement.

ASN also issued the last authorisation for partial resumption of decommissioning work on CEA's ATPu in Cadarache. These operations had been suspended by ASN in October 2009, following an under-evaluation of the quantity of plutonium retained in the glove boxes. This event was rated level 2 on the INES¹ scale. ASN carried out 10 inspections of the ATPu between October 2009 and July 2012, the date of this last authorisation.

1. INES scale (International Nuclear Event Scale) is a scale of classification of the significant events following their importance; this scale contains 8 levels (from 0 to 7).

Inspections

The inspection is an essential component of the regulatory process. ASN carries out more than 2,000 each year – 2,093 in 2012 – in all the fields it monitors and regulates: small scale nuclear facilities, transport, BNIs, pressure vessels, approved organisations and laboratories. ASN also carried out 281 days of labour inspection work.

The inspection effort must be proportional to the nuclear safety and radiation protection issues. Therefore, in 2012, ASN carried out 107 inspections in the field of industrial radiography and 143 in the field of radiotherapy, two areas in which malfunctions and problems can have serious consequences for individuals.

One in four of these inspections is unannounced. They can include sampling or measurements, can take place on a construction site or during transportation and may be a reaction in response to an event. They can also lead to formal notice being served or an official report being drafted. The ASN inspectors thus sent 23 reports to the public prosecutors during the course of 2012. Following a tritium leak, the EDF Civaux site was served formal notice to restore the leaktightness of its storage tanks. The AREVA site at La Hague was also given formal notice to meet the regulations regarding protection against the risk of fire.

Most of these inspections require no more than a single day. Some, however, last several days: these are the in-depth inspections which are the result of a process of benchmarking with various foreign safety regulators. The in-depth inspection consists in having a site or a topic inspected by a team of about ten inspectors, with the support of IRSN. Until now, a few in-depth inspections were carried out every year on the basic nuclear installations. In 2012, an in-depth inspection was carried out on the organisation and control of the projects for the recovery and packaging of the legacy waste on the AREVA site at La Hague, or the subcontracting and radiation protection of workers on the CEA Cadarache site. In 2012, the first in-depth inspection in the small-scale nuclear field was carried out over a three-day period on an ONERA site in Toulouse, by five ASN inspectors, accompanied by two IRSN engineers. The ASN inspection concerned the conformity of the facilities, the organisation of radiation protection and compliance with the licensee's undertakings.

All the inspection follow-up letters are posted on the ASN web site. As at 31 December 2012, 10,445 letters were thus available on www.asn.fr.

Information and transparency

The decree of 29 December 2011 stipulates that the Authority responsible for the public inquiry provides the public with the main documents in the inquiry dossier by electronic means. BNIs are concerned by this provision. This approach aims to make it easier for the public to familiarise themselves with the projects. Resorting to this method of providing information should make it appreciably easier for the public to express themselves. These provisions came into force on 1st June 2012.

Every year, ASN reports on its actions to Parliament, in particular when it submits its annual report on the state of nuclear safety and radiation protection in France. In 2012, this presentation was delayed - 16 October - owing to the Presidential and legislative elections. As part of the budget discussions, ASN was also called to a hearing on the aftermath of Fukushima and on waste management.

On 28 February 2013, ASN presented the Parliamentary Office for the Evaluation of Scientific and Technological Choices with the new national radioactive waste and materials management plan (PNGMDR) for the period 2013 to 2015. This plan is the waste management roadmap for the next three years. It is the result of considerable pluralistic work: experience has shown that on difficult subjects such as the management of radioactive waste, or the definition and implementation of a post-accident approach, the pluralistic method was highly constructive. After the Fukushima accident, ASN decided to apply this approach to social, organisational and human factors.

ASN also gives regular presentations to the HCTISN (French High Committee for Transparency and Information on Nuclear Security) or its working groups. The work done by the HCTISN is making a fundamental contribution to the goal of transparency enshrined in the TSN Act. ASN has also increased its financial support for the Local Information Committees set up for all the large nuclear facilities. ASN's eleven regional divisions are contributing to the development of their activities.

ASN also reported on its actions to the general public and the media on a regular basis. Eighty-six information notices and press releases were published by ASN in 2012. The aftermath of the Fukushima accident led to two press conferences, one on the ASN opinion concerning the stress tests on 3 January and the other on the corresponding instructions and requirements on 26 June. Press briefings are also regularly held, for example to

coincide with the periodic publication of *Contrôle* magazine, a review that ASN has been publishing for the past 20 years and which in 2013 will undergo a transformation to a more informative and educational format.

Pursuant to the TSN Act, the resolutions and opinions of the ASN Commission are made public. Since late 2012, in order to further develop transparency, the most important requirements imposed on the licensees by ASN are published, jointly with IRSN, which provides the technical support essential to these requirements.

In the event of an incident or accident which could lead to significant exposure to ionising radiation, the user of this radiation (small-scale nuclear or medical facility, BNI, transport operation) is required to notify ASN without delay. This notification must enable the origin of the event to be understood so that steps can be taken to prevent it happening again. Independently of this process, the public must be informed of those events whose importance so warrants. Thus, in 2012, 149 events were rated level 1 on the INES scale and 4 events were rated level 2 (absence of siphon-breaker on a pipe in the Cattenom 2 and 3 reactor pools; loss of a package containing medical radioactive fluorine during a shipment in Nîmes; failure to comply with criticality management rules in the FBFC facility (AREVA) in Romans-sur-Isère; inappropriate operations in attempting to release a high-level gamma radiography source in the Esso refinery at Fos-sur-Mer).

With regard to radiotherapy, the events involving a patient are assessed using the ASN-SFRO scale: in 2012, ASN was notified of 142 level 1 and three level 2 events (delivered dose fractioning error, inadvertent superposition of radiation beams and failure to consider previous irradiation).

Accident situation management

Even if everything is done to avoid it, an accident, even a severe one, can never be ruled out, as recalled by the Fukushima accident. Preparing for the management of accident situations is therefore essential.

In an accident situation, ASN, with the support of IRSN, checks the steps taken by the licensee, advises the Government and its local representatives of the population protection measures required, and informs the public of the situation. ASN is also the international point of contact.

In 2012, owing to the Presidential and legislative elections, only five national emergency exercises were held,

including one on the CEA site in Cadarache, with the scenario being the consequences of an earthquake. The ASN emergency centre was activated for these exercises; it can also be triggered for actual incidents or accidents. Thus, in 2012, it was activated for the incident which affected an EDF nuclear reactor in Penly, following tripping of a fire alarm and failure of a reactor coolant pump oil system.

The Fukushima accident also demonstrated the importance of managing people and territories in the wake of a nuclear accident. This is precisely the purpose of the "post-accident" approach overseen by ASN since 2005, at the request of the Prime Minister. This pluralistic approach, involving a total of several hundred experts from a range of backgrounds (local information committees, associations, elected officials, health agencies, appraisal organisations, authorities, etc.) achieved a major milestone with the November 2012 transmission to the Prime Minister of doctrine elements covering the emergency phase exit, transitional and long-term periods.

To conduct its work, the CODIRPA set up various theme-based working groups as of 2005. Experiments designed to test the doctrine under construction were carried out at the local level in 2010 on three nuclear sites and in various neighbouring communes, as well as during national emergency exercises since 2008. All this work led to two international seminars organised by ASN in 2007 and 2011.

In 2013, this work on post-accident management will continue by testing the aspects of doctrine relating to the various accident situations, by applying them to the territories and extending the approach to more severe accident situations than those so far studied.

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ASN has robust internal participative practices, as illustrated by the internal conventions of 2003, 2006 and 2009 and the multiyear strategic plan (PSP) drafting process. Preparation of the new PSP began in 2011. It was approved on 12 November 2012, at a joint meeting of the former Commission and the new one, thus illustrating the continuity of our actions.

Entitled "Taking up the challenges of nuclear safety and radiation protection: monitoring, independence and transparency", the PSP comprises five strategic lines :

- enhancing the legitimacy of the ASN resolutions and positions, this in particular entails reinforcing consultation and information about the reasons behind these resolutions and positions;
- developing an efficient working environment and promoting skills, in particular by developing and reinforcing the independence of ASN in the management of its human and financial resources. The consolidation of ASN's Paris region central entities in a new headquarters in March 2013 is a clear contribution to this orientation;
- developing a forward-looking approach, in particular through research or by identifying future problems, for example individual radiosensitivity. This is what has been done since 2005 on post-accident situations, which has just led to transmission to the Prime Minister and publication of the first elements of post-accident doctrine;
- making the European framework a driving force for nuclear safety and radiation protection around the world. Relations established between European nuclear regulators or radiation protection authorities, in particular through WENRA and HERCA, make a contribution to achieving this goal. The support requested from its

counterparts, including ASN, by the Belgian nuclear safety regulator, the AFCN, for dealing with cracks in the vessels of Belgian reactors Doel 3 and Tihange 2 is one illustration of this;

- raising and fuelling discussions and debates on the topic of nuclear safety and radiation protection. ASN is thus willing to be a participant in the forthcoming debates on nuclear safety and radiation protection.

Finally, I would like to underline the quality of the work done by our joint bodies. 2012 was in this respect extremely productive, with the creation of the small-scale activities technical committee, the joint consultative committee and the new CHSCT, but also with the numerous exchanges concerning the relocation of our divisions and the creation of our headquarters in Montrouge. My thanks go to all those who contributed to the quality and indeed the serenity of this process.

I would also like to underline the commitment, professionalism and ready availability of the ASN staff. I thank them for the considerable work they accomplish day after day, both in the field and in our premises. I would also like to thank IRSN and the Advisory Committees of experts, whose constant involvement is essential in ensuring the quality of our resolutions. ■

Nuclear safety authority (ASN)

competence

independence

rigour

transparency

ASN was created by the 13th June 2006 Nuclear Security and Transparency Act. It is an independent administrative authority responsible for regulating civil nuclear activities in France. It also contributes towards informing citizens.

ASN is tasked, on behalf of the State, with regulating nuclear safety and radiation protection in order to protect workers, patients, the public and the environment from the hazards involved in nuclear activities.

ASN aims to provide efficient, impartial, legitimate and credible nuclear regulation, recognised by the citizens and regarded internationally as a benchmark for good practice.



Its roles, its key figures, its

Its roles

Regulating

ASN contributes to drafting regulations, by giving the Government its opinion on draft decrees and ministerial orders, or by taking regulatory decisions of a technical nature.

Authorising

ASN examines all individual authorisation applications for nuclear facilities. It can grant all authorisations, with the exception of major authorisations for basic nuclear installations, such as creation and decommissioning. ASN also issues the licenses provided for in the Public Health Code concerning small-scale nuclear activities and issues authorisations or approvals for radioactive substances transport operations.

Monitoring

ASN is responsible for ensuring compliance with the rules and requirements applicable to the facilities or activities within its field of competence. Inspection is one of ASN's main means of monitoring, although it also has appropriate powers of enforcement and sanction.

Informing

Primarily through its website www.asn.fr and its *Contrôle* magazine, ASN informs the public and the stakeholders (local information committees, environmental protection associations, etc.) of its activity and the state of nuclear safety and radiation protection in France.

In emergency situations

ASN monitors the steps taken by the licensee to make the facility safe. It informs the public of the situation. ASN assists the Government. It in particular sends the competent Authorities its recommendations concerning the civil security measures to be taken.



Regulation and monitoring of diverse activities and facilities

Nuclear power plants, radioactive waste management, nuclear fuel shipments, radioactive substances packages, medical facilities, research laboratories, industrial activities, etc. ASN monitors and regulates an extremely varied range of activities and installations. This regulation covers:

- 58 nuclear reactors producing nearly 80% of the electricity consumed in France, along with the EPR reactor currently under construction;
- all French fuel cycle facilities, from fuel enrichment to reprocessing;
- several thousand facilities or activities which use sources of ionising radiation for medical, industrial or research purposes;
- several hundred thousand shipments of radioactive substances made annually nationwide.

The help of experts

When taking certain decisions, ASN calls on the expertise of technical support bodies. This is primarily the case with the Institute for Radiation Protection and Nuclear Safety (IRSN). ASN also requests opinions and recommendations from scientific and technical Advisory Committees of experts.

organisation



Key figures in 2012

471

staffs

592

technical opinions sent
to ASN by IRSN

276

inspectors

10,445

inspection follow-up letters
available on www.asn.fr
on 31.12.2012

81%

management

32

Advisory Committee
meetings

2,093

inspections of nuclear facilities;
radioactive substance shipments;
the medical, industrial and research
sectors; approved organisations

28

press conferences

75.6

million euros total budget
for ASN

84

million euros budget devoted
to IRSN appraisal work

3,319

authorisations

5

accident simulation
exercises

Its organisation

The ASN Commission

The Commission defines ASN general policy regarding nuclear safety and radiation protection.

<p>Pierre-Franck Chevet chairman</p> <p>nominated on 12 November 2012 for a 6-year term</p>	<p>Michel Bourguignon commissioner</p> <p>nominated on 8 November 2008 for a 6-year term</p>	<p>Jean-Jacques Dumont commissioner</p> <p>nominated on 15 December 2010 for a 6-year term</p>	<p>Philippe Jamet commissioner</p> <p>nominated on 15 December 2010 for a 6-year term</p>	<p>Margot Tirmarche commissioner</p> <p>nominated on 12 November 2012 for a 6-year term</p>
<p>designated by the President of the Republic</p>			<p>designated by the President of the Senate</p>	<p>designated by the President of the National Assembly</p>

Commission figures in 2012

66
sessions

37
opinions

76
resolutions

Impartiality

The Commissioners perform their duties in complete impartiality and receive no instructions either from the Government or from any other person or institution.

Independence

The Commissioners perform their duties on a full-time basis. Their mandate is for a six-year term. It is not renewable.

The duties of a member can only be terminated if a majority of the Commissioners sitting on the Commission rule on his or her incapacity or accept his or her resignation. The President of the Republic may terminate the duties of a member of the Commission in the event of a serious breach of his or her obligations.

Competences

The Commission takes decisions and publishes opinions in ASN's *Official Bulletin*.

The Commission defines ASN external relations policy both nationally and internationally.

The Commission defines ASN regulatory policy. The Chairman appoints the nuclear safety inspectors, the radiation protection inspectors, the conventional safety inspectors for the nuclear power plants and the staff responsible for verifying compliance with the requirements applicable to pressure vessels.

The Commission decides whether to open an inquiry following an incident or accident. It presents the ASN Report on the state of nuclear safety and radiation protection in France to Parliament. Its Chairman reports on ASN activities to the relevant commissions of the French Parliament's National Assembly and Senate as well as to the Parliamentary Office for the Evaluation of Scientific and Technological Choices.

The Commission drafts ASN internal regulations and appoints its representatives to the High Committee for Transparency and Information on Nuclear Security.

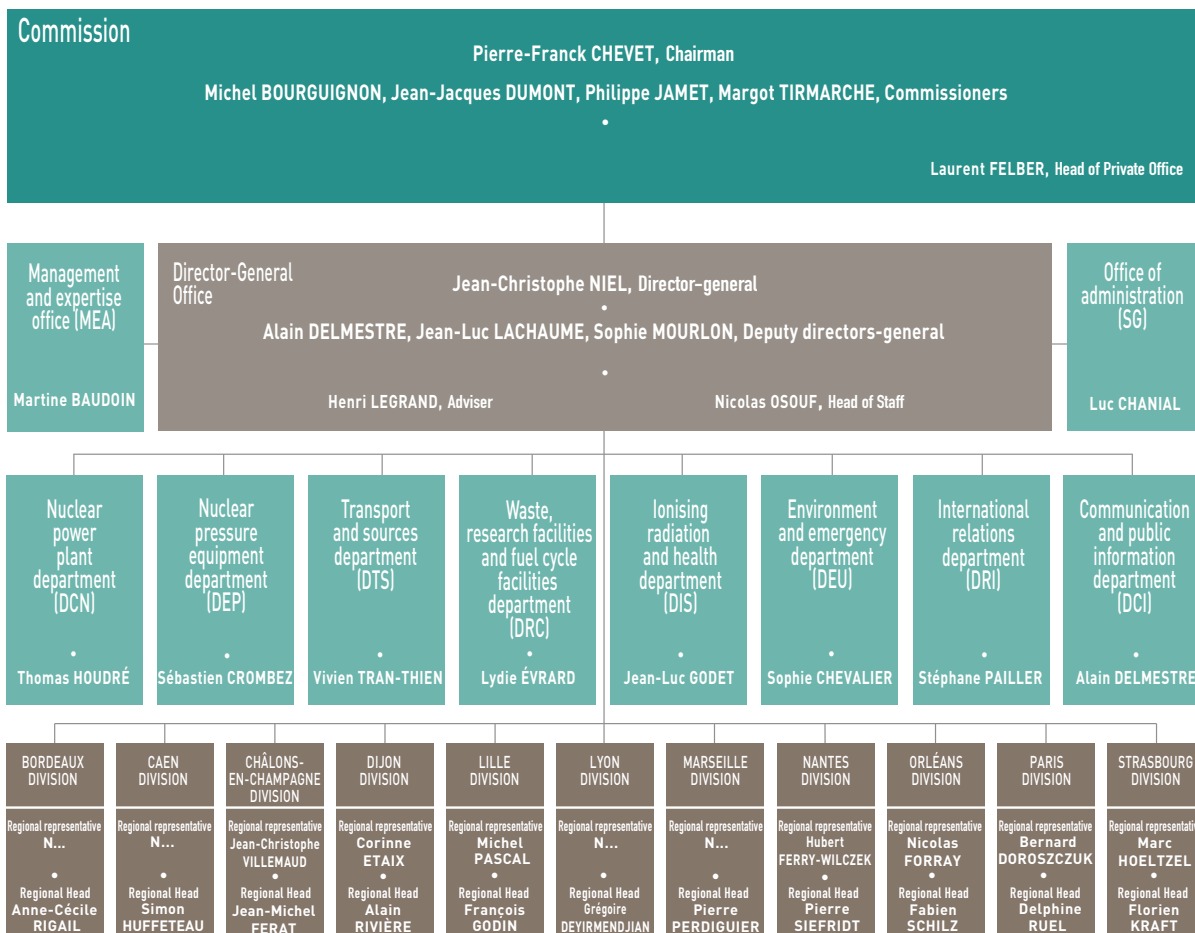
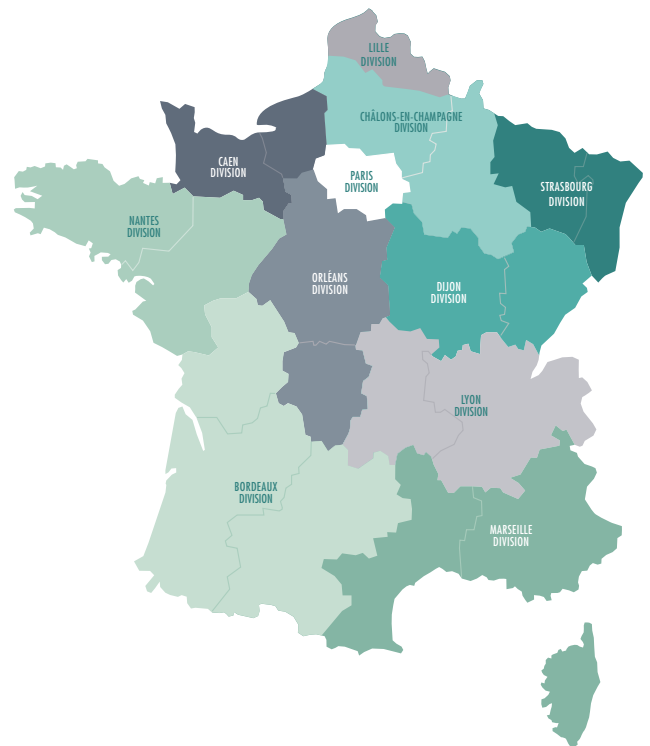
The Head office departments and regional divisions

ASN comprises head office departments and eleven regional divisions with competence for one or more administrative regions. This organisation enables ASN to carry out its regulation and monitoring duties over the entire country and in the overseas territories of France.

The head office departments are organised thematically and are responsible at a national level for their fields of activity.

The ASN regional divisions operate under the authority of the regional representatives, appointed by the ASN Chairman. They are ASN's representatives in the regions and contribute locally to the ASN's public information role. The divisions carry out most of the direct inspections on nuclear facilities, radioactive substances transport operations and small-scale nuclear activities.

In emergency situations, the divisions assist the Prefect of the *département*, who is in charge of protection of the populations, and monitor operations to safeguard the installation on the site, provided that it is accessible and does not constitute a hazard.



On February 1st, 2013

Significant events of 2012



1	Nuclear activities: ionising radiation and health and environmental risks	17	7	International relations	29	13	Nuclear fuel cycle installations	41
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1

Nuclear activities: ionising radiation and health and environmental risks

Nuclear activities are activities entailing a risk of exposure to ionising radiation, emanating either from an artificial source or from natural radionuclides processed for their radioactive, fissile or fertile properties, as well as interventions in the event of a radiological risk following an accident or a contamination event.

These nuclear activities include those conducted in basic nuclear installations (BNIs) and for the transport of radioactive substances, as well as in all medical, veterinary, industrial and research facilities where ionising radiation is used.

Ionising radiation is defined as radiation that is capable of producing ions - directly or indirectly - when it passes through matter. It includes X-rays, alpha, beta and gamma rays, and neutronic radiation, all of which have different energies and penetration powers.

The effects of ionising radiation on living beings can be "deterministic" (health effects such as erythema, radiodermatitis, radionecrosis, etc., which are certain to appear when the dose of radiation received exceeds a certain threshold) or "probabilistic" (probability of occurrence of cancers). The protective measures against ionising radiation aim to avoid deterministic effects, but also to reduce the probability of occurrence of radiation-induced cancers.

Understanding the risks linked to ionising radiation is based on health monitoring (cancer registers), epidemiological investigation and risk assessment via extrapolation to low doses of the risks observed at high doses. Many uncertainties and unknown factors nonetheless persist, in particular with regard to high-dose radiopathologies, the effects of low doses or the effects on non-human species. Individual radiosensitivity (variability of the effect of a given dose according to the individual receiving it) is an ongoing

field of research and one that involves questions that go beyond the boundaries of radiation protection.

Exposure to ionising radiation in France

The entire French population is potentially exposed to ionising radiation, but to differing extents, depending on whether the ionising radiation is of natural origin or the result of human activities.

On average, the exposure of an individual in France was estimated by IRSN at 3.7 millisieverts per year, varying by a factor of 2 to 5 depending on the location: the sources of this exposure are as follows:

- for about 1 mSv/year, naturally occurring radioactivity excluding radon, including 0.5 mSv/year for radiation of telluric origin, 0.3 mSv/year for cosmic radiation and 0.2 mSv/year for internal exposure from food;
- for about 1.4 mSv/year, radon with considerable variation related to the geological characteristics of the land (a classification of the *départements* was produced according to the radon exhalation potential) and to the buildings themselves; in zones defined as high-priority, periodic measurements must be taken in teaching or health and social establishments, in places of work and, as of 2014, in residential buildings;
- for about 1.3 mSv/year, medical treatments, with a clear upward trend (from 0.8 mSv per year in 2002 to 1.3 mSv per year in 2007, the last year included in the estimates currently available) primarily due to the increase in the doses delivered by diagnostic radiological examinations. Particular attention is required in monitoring and reducing the doses linked to medical imaging, in particular when alternative techniques exist;
- representing 0.03 mSv/year, the other artificial sources of exposure: past airborne nuclear tests, accidents affecting facilities, releases from nuclear installations.

The automated monitoring networks managed by IRSN nationwide allow real-time monitoring of environmental radioactivity, signalling any abnormal variation.

Some workers are subject to particular levels of exposure. With regard to nuclear workers, who undergo specific monitoring (about 350,000 individuals in 2011), the annual dose remained lower than 1 mSv (annual effective dose limit for the public from nuclear activities) for nearly 96% of the workforce monitored; the number of times the limit of 20 mSv (annual regulatory limit for nuclear workers) was exceeded is significantly down (12 cases in 2011); the same applies to the collective dose (drop of about 46% since 1996) whereas the population monitored has increased by about 50%. For workers in activity sectors entailing

technological enhancement of naturally occurring radioactive materials, the doses received in 85% of cases are less than 1 mSv/year. In a number of known industrial sectors however, it is quite probable that this value will be occasionally exceeded.

Finally, aircrews are subject to particularly close monitoring owing to their exposure to cosmic radiation at high altitude. Of the recorded doses, 81% are between 1 mSv per year and 5 mSv per year, while 19% are below 1 mSv per year.

Outlook

For 2013, ASN will remain particularly attentive to the correct working of the professional exposure monitoring system managed by IRSN (SISERI). Furthermore, the expected publication of new regulations for screening of radon exposure in the home will be an opportunity to organise the compilation of all radon exposure data in a single national system. Another point worthy of attention will remain the increase in France of the doses delivered to patients during the course of diagnostic examinations.

Hyper-sensitivity to ionising radiation is also worth particular attention in terms of applied research, both nationally and internationally.

Finally, the steps taken at a national level on the question of the link between child leukemias and environmental factors will continue to be closely monitored within a pluralistic framework.



2

The principles and stakeholders in the regulation of nuclear safety and radiation protection

Nuclear activities must be carried out in compliance with the eight fundamental principles of the Environment charter, the Environment Code and the Public Health Code (CSP).

The principles involved are the prevention principle (anticipation of any environmental threat through rules and measures taking account of the "best available techniques at an economically acceptable cost), the "polluter-pays" principle (the polluter responsible for the environmental damage bears the cost of pollution prevention and remediation), the precautionary principle (the lack of certainty, in the light of current scientific and technical knowledge, must not delay the adoption of proportionate preventive measures), the participation principle (the populations must take part in determining public decisions), the justification principle (a nuclear activity can only be carried out if justified by the advantages it offers by comparison with its inherent exposure risks), the optimisation principle (exposure to ionising radiation must be kept as low as is reasonably achievable), the limitation principle (the regulations set limits for an individual's exposure to ionising radiation resulting from a nuclear activity except for medical or biomedical research purposes) and the principle of the nuclear licensee's responsibility for the safety of its installation.

The nuclear activity regulators

The current French organisation for the regulation of nuclear safety and radiation protection was established by the 13 June 2006 Act on transparency and security in the nuclear field (TSN Act); this regulation is primarily the responsibility of the Government and ASN, within the legislative framework defined by and under the control of Parliament.

Parliament regularly monitors the regulation of nuclear safety and radiation protection, in particular through its special commissions, which conduct hearings, or the Parliamentary Office for the Evaluation of Scientific and Technological Choices (OPECST), which has issued a number of reports on this subject and to which ASN presents its annual report on nuclear safety and radiation protection in France.

On the advice of ASN, the Government defines the general regulations for nuclear safety and radiation protection. Also on the advice of ASN, it takes key individual decisions concerning BNIs (creation or decommissioning authorisation, closure in the event of an unacceptable risk, etc.). It is responsible for civil protection in an emergency.

In the current governmental organisation, the Minister for Ecology, Sustainable Development and Energy is responsible for nuclear safety and, together with the Minister for Social Affairs and Health, for radiation protection.

In the *départements*¹, the Prefects², as representatives of the State, are the guarantors of public order and have a particular role to play in the event of an emergency, given that they are in charge of prevention measures for the population. The Prefect also takes part in the various procedures concerning the nuclear installations in his *département*, overseeing local consultations and providing the Ministers or ASN with his recommendations as applicable.

ASN is an independent administrative authority created by the TSN Act. It is responsible for regulating nuclear safety and radiation protection and contributes to informing the populations on these subjects. It sends the Government proposals for regulatory texts and is consulted on the texts prepared by the Ministers. It clarifies the regulations by issuing regulatory decisions which are then sent to the competent ministers for approval. It issues certain individual authorisations and proposes others to the Government. Nuclear activities are monitored and

1. Administrative region headed by a prefect.

2. Government representative at local level.

inspected by the ASN staff and by organisations duly authorised by ASN. ASN contributes to France's European and international actions. It alerts and informs the Authorities of third-party States in the event of a radiological emergency and in turn receives alerts and information from them. Finally, it provides its assistance for management of radiological emergencies.

In technical matters, ASN relies on the expertise provided by IRSN and by the Advisory Committees of experts (GPE) that it has set up. It also convenes pluralistic working groups enabling all the stakeholders to contribute to drafting doctrines and action plans and monitor their implementation.

ASN has made a commitment to research, to identify areas of knowledge essential for medium and long-term expertise. In 2010, it therefore created a Scientific Committee.

ASN is run by a Commission of five full-time, irrevocable commissioners, nominated for a non-renewable 6-year mandate by the President of the Republic (who nominates the Chairman and two commissioners) and by the President of the Senate and the President of the National Assembly (who each nominate one commissioner). 2012 was marked by the nomination of a new Chairman (Pierre-Franck Chevet succeeding André-Claude Lacoste) and a new commissioner (Margot Tirmarche replacing Marie-Pierre Comets).

ASN has head office departments and eleven regional divisions around the country. On 31 December 2012, its total workforce stood at 471 employees. In 2012, the ASN budget reached 75.6 million euros. Moreover, the technical support provided to ASN by IRSN amounts to €84 M; these credits include a State subsidy and the revenue from a tax paid by the licensees of the large nuclear facilities.

These resources as a whole enable ASN to perform most of its duties. However, these credits are at present divided among five budget programmes, which hinders the overall clarity of the cost of regulation and also leads to problems with budgetary preparation, settling budget allocation conflicts and execution.

2012 was the last year of implementation of the "Multiyear strategic plan" (PSP) for the period 2010-2012.

The organisation of nuclear security and transparency also involves a number of consultative bodies, in particular the High Committee for Transparency and Information on Nuclear Security (HCTISN), an information, consultation and debating body for the risks related to nuclear activities and the impact of these activities on human health,

the environment and nuclear security. There is also the French High Public Health Council (HCSP), a scientific and technical consultative body reporting to the Minister for Health and which takes part in defining multi-year public health objectives, evaluates the extent to which national public health targets are met and helps with their annual monitoring.

Outlook

For ASN, 2013 will be the first year of implementation of its new three-year PSP adopted at the end of 2012.

In terms of organisation, the changes to the GPE and greater stakeholder involvement in the working groups, will be two major areas of work. ASN will continue to overhaul and clarify the financing of the regulation of nuclear safety and radiation protection.



3

Regulation

The legal framework for radiation protection is based on international norms, standards and recommendations issued by various organisations, including the International Commission on Radiological Protection (ICRP), an NGO which publishes recommendations about protection against ionising radiation, the International Atomic Energy Agency (IAEA) which regularly publishes and revises nuclear safety and radiation protection standards, and the International Organisation for Standardisation (ISO) which publishes international technical standards.

At a European level, under the Euratom Treaty, various directives set basic rules for radiation protection, safety and the management of radioactive waste and spent fuel; these directives are binding on all the member States.

With regard to radiation protection, a process to merge and revise directives ended in September 2011 with a project presented by the European Commission; it could be adopted in 2013.

Nationally, the legal framework for nuclear activities has been extensively overhauled in recent years. The main texts appear in the Public Health Code (CSP) and in the Environment Code, in which the TSN Act was codified in January 2012. Other texts are more specialised, such as the Labour Code, which deals with radiation protection of workers, or the Defence Code, which contains provisions regarding defence-related nuclear activities or the prevention of malicious acts. Finally, various texts apply to certain nuclear activities but without being specific to them.

The activities or situations regulated by ASN include a number of different categories presented below, along with the relevant regulations.

Small-scale nuclear activities: this category covers the many fields that use ionising radiation, including medicine (radiology, radiotherapy, nuclear medicine), human biology, research, industry and certain veterinarian, forensic or foodstuff conservation applications.

The Public Health Code (CSP) created a system of authorisation or notification for the manufacture, possession, distribution (including import and export), and utilisation of radionuclides or products or devices containing them. Licences are issued by ASN and notifications are filed with the ASN regional divisions.

The general rules applicable to small-scale nuclear facilities are the subject of regulatory ASN resolutions.

Exposure of individuals to radon: human protection is based primarily on the obligation of monitoring in geographical areas where the concentration of naturally occurring radon can be high. This monitoring is mandatory in certain premises open to the public and in the workplace. A strategy to reduce this exposure is necessary, should the measurements taken exceed the action levels laid down in the regulations. In 2014, this obligation should be extended to residential buildings.

Activities involving technological enhancement of naturally occurring radioactive materials: certain professional activities which cannot be defined as "nuclear activities" can lead to a significant increase in the exposure to ionising radiation on the part of the workers and, to a lesser extent, the neighbouring populations. This in particular concerns activities which utilise raw materials, construction materials or industrial residues containing natural radionuclides not used for their radioactive, fissile or fertile properties (phosphate extraction and phosphate-based fertiliser manufacturing industries, dye industries, in particular those using titanium oxide and those utilising rare earth ores such as monazite). The radiation protection measures required in this field are based on a precise identification of the activities, an estimation of the impact of exposure for the persons concerned, the implementation of corrective measures to reduce this exposure, if necessary, and to monitor it. They are governed by the Labour Code and by the Public Health Code (CSP).

Basic nuclear installations (BNI): these are the most important nuclear facilities; they are the facilities of the nuclear electricity generating sector (nuclear power plants, main facilities of the "fuel cycle"), the large storage

and disposal facilities for radioactive substances, certain research facilities and the large accelerators or irradiators. There are nearly 150 of them, spread over about 40 sites.

The legal regime for the BNIs is defined by section IX of book V of the Environment Code and its implementing decrees. This regime is said to be "integrated" because it aims to prevent or manage all risks and detrimental effects that a BNI is liable to create for man and the environment, whether or not radioactive in nature. It in particular requires that the creation or decommissioning of a BNI be authorised by a decree issued on the advice of ASN and that it authorise start-up of the installation and stipulate requirements regarding its design and operation with respect to protection of the population and the environment.

ASN is carrying out work to overhaul the general technical regulations for BNIs, together with the ministry responsible for the environment (MEDDE); this led to the publication of the order of 7 February 2012 setting out the general rules concerning BNIs, which will be supplemented in the next few years by about twenty ASN regulatory resolutions.

The transport of radioactive substances: the safe transport of radioactive substances is based on the "defence in depth" principle involving on the one hand the packaging and its content, which must withstand the foreseeable transport conditions, and on the other the means of transport and its reliability, plus the response measures deployed in the event of an incident or accident. The consignor is responsible for implementing these lines of defence.

The regulations concerning the transport of radioactive substances have a particularly international flavour. They are based on the IAEA recommendations integrated into the national agreements covering the various modes of dangerous goods transport. At a European level, the regulations are grouped into a single 24th September 2008 directive, transposed into French law by an amended order dated 29th May 2009, known as the "TMD order".

Within this legal framework, ASN is responsible for approving package models for the most hazardous shipments.

Contaminated sites and soils: management of sites contaminated by residual radioactivity resulting either from a past nuclear activity, or an activity which generated deposits of natural radionuclides, warrants specific radiation protection actions, in particular if rehabilitation is envisaged. Depending on the current and future uses of the site, decontamination objectives must be set and the removal

of the waste produced during clean-out of the contaminated premises and soil must be managed, from the site up to storage or disposal.

In 2012, ASN published its doctrine for the management of sites contaminated by radioactive substances.

Outlook

In 2013, ASN will contribute to the work to revise the European directives and transpose into French law the directive establishing a community framework for the responsible and safe management of waste and spent fuels. It will continue to publish its regulatory resolutions concerning BNIs or small-scale nuclear facilities. 2013 could also see an Act passed requiring that those in possession of sources take steps to prevent malicious acts and giving ASN the task of monitoring and inspecting these steps.



4

Regulation of nuclear activities and exposure to ionising radiation

In France, nuclear activity licensees have prime responsibility for the safety of their activity. They cannot delegate this responsibility, and must ensure permanent surveillance of their installations.

Control and regulation of nuclear activities is a fundamental responsibility of ASN. Its goal is to verify that all licensees assume their responsibility in full and comply with the requirements of the regulations concerning nuclear safety and radiation protection.

Inspection is the key means of control available to ASN. It designates the inspection work requiring that ASN inspectors visit an inspected site; this consists in spot-checks on the conformity of a given situation in relation to a regulatory or technical baseline requirement. Any deviations found during the inspection can lead to administrative or penal sanctions.

ASN has a broad vision of inspection, encompassing material, organisational and human aspects. Its actions take the tangible form of decisions, requirements, inspection follow-up documents and assessments of safety and radiation protection in each sector of activity.

ASN applies the principle of proportionality when determining its actions, so that the scope, conditions and extent of its regulatory action are commensurate with the health and environmental safety implications involved.

Regulation is part of a multi-level approach and is carried out with the support of IRSN. It applies to all phases in the life of the installation, including operation, shutdown and decommissioning.

ASN also inspects the organisations and laboratories it approves, to enable them to take part in nuclear safety and radiation protection checks and monitoring. ASN is responsible for labour inspections in the nuclear power plants.

Whenever it deems necessary, ASN seeks the advice of technical support organisations, primarily IRSN. For the more important matters, ASN requests the opinion of the competent Advisory Committee (GPE) after analysis by IRSN. For the other subjects, the safety analyses are the subject of an IRSN opinion sent directly to ASN.

Regulation is supplemented by awareness programmes designed to ensure familiarity with the regulations and their application in practical terms appropriate to the various professions.

The inspections may be unannounced or notified to the licensee a few weeks before the visit. They take place mainly on the site or during the course of the relevant activities (work, transport operation). They may also concern the head office departments or design and engineering departments at the major licensees, the workshops or engineering offices of the subcontractors, the construction sites, plants or workshops manufacturing the various safety-related components.

ASN performs different types of inspections: routine inspections; in-depth inspections, taking several days and requiring about ten inspectors; inspections with sampling and measurement; inspections following a significant event; construction site inspections, ensuring a significant ASN presence on the sites on the occasion of reactor outages or particular work, especially during the decommissioning phase; inspection campaigns which are inspections performed in a large number of installations, using identical procedures.

ASN considers that protection of the public and the environment is an essential part of its regulation of nuclear activities, whether carried out in a BNI or in the industrial and medical fields. This impact is mainly assessed on the basis of measurements or the evaluation of discharges from the facilities.

ASN has the authority to carry out an immediate technical inquiry in the event of an incident or accident in a nuclear activity.

In certain situations in which the licensee fails to conform to the regulations or legislation, or when it is important that appropriate action be taken by it to remedy the most serious risks immediately, ASN may impose the penalties provided for by law.

In parallel with ASN's administrative action, reports can be drafted by the inspector and sent to the Public Prosecutor's Office.

The main significant events of 2012

In 2012, ASN carried out 2,093 inspections: 802 inspections in the BNIs; 112 inspections on transport operations; 1,050 inspections in small-scale nuclear facilities and 129 inspections of approved organisations and laboratories.

ASN carried out 281 days of labour inspections and 20 inspections involving sampling.

The definition of the inspections programme continued to take account of the lessons learned from the Fukushima nuclear accident.

It should be noted that ASN conducted its first in-depth inspection of a small-scale nuclear facility, with a three-day inspection of ONERA in Toulouse.

In order to guarantee the quality of the environmental radioactivity measurements, ASN issued 105 approvals in 2012 and extended a further sixty.

Furthermore, a panel of users was set up in 2012, to test and then improve the website of the national network of environmental radioactivity monitoring (RNM).

Finally, ASN convened the pluralistic committee for monitoring the tritium action plan.

In 2012, ASN was notified of:

- 1,170 significant events concerning nuclear safety, radiation protection and the environment, as relating to BNIs;
- 59 significant events concerning the transport of radioactive substances;
- 593 significant events concerning radiation protection in small-scale nuclear facilities.

In 2012, ASN took administrative action (formal notice, suspension, etc.) against 9 licensees and managers of nuclear activities. Further to the observed infringements, it sent 23 reports to the Public Prosecutors, 11 of which were on account of labour inspections in NPPs.

Outlook

ASN has already scheduled 1,886 inspections for 2013. It will mainly inspect activities with high potential risks, defined on the basis of the operating experience feedback from 2012. Its programme of inspections was optimised to further increase its effectiveness. ASN will carry out in-depth inspections of small-scale nuclear facilities.

In 2013, ASN will continue to revise the conditions for notification of significant events, based on the events notification guide for small-scale nuclear activities and the changes to the regulations in the BNI sector.

It will draw conclusions from the implementation of an approach proportionate to the risk in small-scale nuclear facilities, in particular by proposing changes to the penalties policy applicable to the industrial and medical fields.

In the environmental field, ASN will complete the overhaul of the BNI regulations, with the publication of a regulatory ASN resolution concerning water intake, discharges and environmental monitoring.

ASN will implement its tritium action plan. It will make known the results of the work on the environmental radioactivity monitoring strategy nationwide and around the nuclear sites. An overhaul of the RNM website will be initiated, in order to improve its clarity and make it easier for the public to understand the measurement results.



5

Radiological emergency and post-accident situations

Nuclear activities are carried out with the two-fold aim of preventing accidents and mitigating any consequences should they occur. An accident can never be completely ruled out and the necessary provisions for dealing with and managing a radiological emergency situation must be planned, tested and regularly revised.

For activities with a high level of risk, such as BNIs, the emergency arrangements comprise special organisational arrangements and off-site emergency plans, involving both the licensee and the public authorities. These arrangements, which are regularly tested and assessed, are subject to regular revisions to integrate experience feedback from exercises and from the management of real-life situations.

In the event of an emergency, ASN's role is the following, for questions concerning the regulation of nuclear safety and radiation protection, with the help of its technical support organisation, IRSN:

- to verify the soundness of the steps taken by the licensee;
- to advise the Government and its local representatives;
- to take part in informing the public;
- to act as Competent Authority within the framework of the international conventions.

Following on from the radiological emergency management phase, to ensure management of the post-accident phase, ASN in 2005 set up a steering committee (CODIRPA), whose doctrine concerning the emergency phase exit, transition and long-term periods was published in November 2012.

ASN also takes part in the national level review of important subjects such as urban development around nuclear sites, in order to mitigate the consequences of a severe accident on both population and property.

Following the Fukushima accident, considerable thought was given nationally and internationally with a view to consolidating and, if necessary, improving the organisation of the public authorities.

At the national level, ASN is closely involved in interministerial work on nuclear emergency management.

At an international level, ASN takes part in the experience feedback work being done within international bodies such as IAEA or NEA, or within regulatory body networks, such as WENRA or HERCA, which bring together the heads of the European nuclear safety or radiation protection authorities.

The main significant events of 2012

In order to perform its duties, ASN has its own emergency centre, the activation of which is in no way indicative of the gravity of the situation. In 2012, this centre was activated for the 5 April 2012 incident which occurred on the Penly site.

In November 2012, ASN sent the Prime Minister elements of the doctrine drafted by the CODIRPA, covering the emergency exit, transition and long-term phases, accompanied by an opinion from the ASN Commission. They were posted on www.asn.fr and sent out to the ministries concerned.

In late 2012, the CODIRPA, chaired by ASN, decided to continue its work in order to take account of the lessons learned from post-accident management of the Fukushima disaster, but also to ensure support for the preparatory work to be organised in the regions.

In 2012, ASN continued to conduct regular exchanges with its transboundary counterparts with regard to coordinated emergency management procedures. A procedure specifying the transboundary alert and information exchange mechanisms was defined with Switzerland.

ASN is continuing to develop bilateral relations in emergency management with countries such as Russia, Sweden and South Korea. In these three countries, ASN staff were able to attend emergency exercises in 2012, in the capacity of observers.

The Fukushima accident highlighted the problems that would be encountered by ASN, IRSN, but also their

European counterparts, in managing a large-scale accident in Europe. In April 2012, ASN thus took part in the meeting of the competent Authorities concerning the conventions on early notification and international assistance.

ASN is a member of the IAEA's National Competent Authorities' Coordinating Group (NCACG) and has represented the competent authorities of Western Europe since 2005. ASN also works with the NEA and participates in the Working Party on Nuclear Emergency Matters (WPNEM).

At the European level, ASN is a participant in the "Emergencies" working group reporting to the HERCA Association. This group is tasked with proposing harmonised European actions to protect the general public, on the one hand in the event of an accident in Europe and, on the other, in the event of a more remote accident, in the light of the lessons learned from the Fukushima Daiichi NPP accident.

Within the WENRA Association, ASN is pilot for the "Mutual assistance" working group tasked with proposing mutual assistance actions between European safety regulators, with a view to ensuring coordinated, rational and efficient accident management.

With regard to international assistance in the event of a radiological emergency and as the competent authority, ASN was contacted by Peru in 2012 for assistance concerning workers accidentally exposed to a radioactive source in a gamma radiography device.

In the same way as in previous years, ASN together with the General Secretariat for Defence and National Security (SGDSN), the General Directorate for civil security and emergency management (DGSCGC) and the Defence Nuclear Safety Authority (ASND), prepared the 2012 programme of national nuclear and radiological emergency exercises concerning BNIs and radioactive substance transport operations. This programme took account of experience feedback from Fukushima. Five emergency exercises were organised on the topics of civil protection and/or nuclear safety.

ASN is also involved in preparing and carrying out other emergency exercises with a nuclear safety component, organised by other players such as its counterparts in charge of nuclear security (HFDS) or defence-related facilities (ASND); international bodies (IAEA, European Commission, NEA); the Ministries (Health, Interior, etc.).

Outlook

In accordance with the duties entrusted to it by the TSN Act, ASN makes a full contribution to the review process being carried out by the public authorities following the Fukushima accident, with the aim of improving the national radiological emergency organisation.

ASN thus identified areas for improvement in its own emergency organisation. In 2013, it will have a new emergency system.

The Fukushima accident highlighted the problems that would be encountered by ASN and its European counterparts in managing a large-scale accident in Europe. The nuclear safety regulators confirmed the need for international work to improve their organisation.

ASN will also clarify and reinforce its doctrine concerning urban development around the BNIs. With the support of the Ministry for the Environment it will finalise the guide for the control of activities around BNIs, so that it can then be sent out to the Prefects' offices.

In the field of post-accident situation management, jointly with the Ministry for the Interior, ASN will send the Prefects those aspects of doctrine concerning the exit from the emergency phase, so that they are taken into account and included in the PPIs.

Finally, at an international level, ASN will continue the European initiatives taken with a view to transboundary harmonisation of actions to protect individuals in an emergency situation and to develop a coordinated response by the safety and radiation protection Authorities in the event of a near or remote accident.



6

Public information and transparency

The TSN Act of 13 June 2006 constituted a significant innovation in that it defined transparency and the right to information in the nuclear field: “Transparency in the nuclear field consists in the set of provisions adopted to ensure the public’s right to reliable and accessible information on nuclear security”. ASN is responsible for the correct implementation of the requirements of the TSN Act, particularly those concerning transparency.

ASN is intensifying its own actions with regard to transparency, through active communication with the general public, the media, the institutional public and professionals. ASN ensures that the TSN Act is implemented by the stakeholders. It supports the measures taken by the Local Information Committees (CLIs) and the High Committee for Transparency and Information on Nuclear Security (HCTISN) to promote transparency.

Through its regulation and inspection of the nuclear licensees, ASN is developing their compliance with their transparency obligations. The licensees are required to release to anyone who so requests the information in their possession concerning the risks involved in their activities and the safety or radiation protection measures taken by them to prevent or mitigate these risks.

Each year ASN presents its *Report on the state of nuclear safety and radiation protection in France* to Parliament.

On www.asn.fr, ASN posts the follow-up letters to the inspections performed by its inspectors every year in all the fields inspected. On its website, ASN also posts the

opinions and recommendations of its Advisory Committees of experts.

The main significant events of 2012

As ASN’s primary source of information for the public, its website www.asn.fr, consulted in 2012 by more than 700,000 visitors, presents nuclear safety and radiation protection news in France, as well as ASN’s actions and position statements. Since 2011, ASN has been using video as well as links to the social networks.

Since the Fukushima accident, there has been a significant surge in demand from an English-speaking audience. ASN continued to develop the English version of its website, www.french-nuclear-safety.fr.

In June 2012, ASN placed on-line its 32 resolutions regarding the nuclear facilities concerned by the stress tests followed, in autumn 2012, by the licensee stress tests reports.

Since 2009, ASN has published the *Lettre de l’Autorité de sûreté nucléaire* (letter from the regulator). This recto-verso one-page format newsletter is a means of dealing with fundamental subjects and of covering topical news issues. It is sent out to nearly 2,000 recipients by post and in 2012 its electronic version had more than 4,700 subscribers.

Three issues of *Contrôle* magazine were published in 2012 and sent out to a distribution list of more than 10,000 in France and abroad: n° 193, in March, on radioactive substance transport operations, n° 194, in May, on extracts from the ASN report on the state of nuclear safety and radiation protection in 2011, n° 195 in November on the management of sites and soils contaminated by radioactive substances.

The ASN Report on the state of nuclear safety and radiation protection in France is a reference document concerning the status of the activities regulated by ASN in these two fields. It is presented to Parliament every year and sent out to more than 2,000 recipients.

Transparence magazine was created in 2010 for the ASN staff and is published three times a year. It is also distributed to a targeted external audience.

In 2012, the ASN Public Information and Documentation Centre responded to more than 1,600 queries.

The joint ASN and IRSN educational exhibition “*Nuclear applications and society: from understanding to regulation*”,

welcomed 4,000 visitors in 2012 at the Hérault département's *Maison de l'environnement*.

In 2012, ASN supported the publication of the book by Philippe Saint Raymond recording the history of the French nuclear safety regulator and entitled "*Une longue marche vers l'indépendance et la transparence*" (The long journey towards independence and transparency).

In order to improve the professional public's knowledge of the technical, organisational and human aspects of nuclear safety and radiation protection regulations and culture, ASN publishes thematic reports or "monographs". The monographs produced since 2011 concern radiotherapy, interventional radiology and medical physics.

The "ASN guides" collection was created as an educational tool for professionals. In 2012, it comprises 16 non-prescriptive guides.

ASN is also developing its relations with the professionals during symposia which it organises, or in which it takes part. Dose optimisation in medical imaging was one of the ASN priorities in 2012. The other regional professional seminars were devoted to radiotherapy, nuclear medicine and industrial radiography.

In 2012, ASN played an active role in the international sharing of radiation protection experience, on the occasion of the 13th IRPA Congress in Glasgow (Scotland) and the IAEA-WHO International Conference on Radiation Protection in Medicine, in Bonn (Germany).

ASN maintained close ties with the international, national and regional media throughout the year. In 2012, ASN informed journalists at about thirty national and regional press briefings, through about twenty press releases, a hundred or so information notices and numerous interviews.

The eleven regional divisions were asked to present ASN's actions and explain local issues during the course of 19 regional conferences.

ASN must also be capable of responding to media queries should a nuclear event occur. In 2012, three civil emergency exercises included simulated media pressure.

In order to report on its activities and its duties, ASN has numerous exchanges with Parliament. In 2012, the ASN Chairman received six hearings before various commissions or on the occasion of specific missions.

At a regional level, the ASN Commission met senior elected officials and institutional representatives. The

discussions focused essentially on improving transparency and the debate on nuclear subjects.

In 2012, ASN spoke at international, national and regional debates on "post-Fukushima" and nuclear safety, as well as on the management of a nuclear accident.

In order to promote experience feedback and share public information best practices, ASN is continuing to work closely with its counterparts and the international stakeholders, by running an assistance mission to help the Ukrainian safety regulator (SNRIU), and by taking part in international conferences and seminars, such as that of the NEA in May 2012 in Madrid or that of the IAEA in Vienna, in June 2012.

The CLIs, of which there were 36 as at the end of 2012, are financed by the local authorities and by ASN. In 2012, ASN decided to boost its support to the CLIs and their federation by two-thirds, devoting about one million euros to them. ASN support is not restricted simply to financial aspects. Thus, in 2012, the CLIs took part in 14 post-Fukushima inspections. The 24th Conference of Local Information Committees brought together 240 participants on 12 December 2012 in Paris at the initiative of ASN and in partnership with ANCCLI.

In 2012, the HCTISN held four ordinary plenary meetings and one extraordinary meeting, one year after the Fukushima accident; it also ran several working groups. The High Committee is associated in all steps of the process, run by ASN, to assess the safety of nuclear facilities in the light of the Fukushima accident. ASN considers that the HCTISN plays an important role in establishing a national consultation process. ASN makes an active contribution to the work of the High Committee.

Outlook

In 2013, ASN will continue to develop its actions to communicate with the general public, in order to make the technical subjects presented to them clearer and more accessible.

It will enhance transparency and information on the subjects under its responsibility, together with the other players and stakeholders. The opening of its new public information centre, its strengthened relationships with schools and the national education system, the creation of a new exhibition on nuclear risks, are all designed to raise awareness among the various audiences with regard to the risk culture and to questions concerning nuclear safety and radiation protection.

It will also be continuing to overhaul its publications, in order to be more educational, and will in particular increase the number of videos made available on-line on *www.asn.fr*. ASN will continue to suggest that the public contribute to draft regulatory texts, by submitting their opinion on *www.asn.fr*.

Developing exchanges with elected officials and stakeholders will continue to be one of the focal points of its public information actions. ASN will also take part in the energy transition debate to address the topics that concern it.

In 2013, ASN will continue its efforts to develop the implementation of measures promoting the transparency of the licensees and of procedures concerning nuclear activities.

ASN will also seek to improve the practical effectiveness of the public participation procedures, in particular by following up on the work done in 2012 by the multipartite working group it co-chaired with the Greenpeace association.

ASN will also draw the first conclusions from the recent extension to those in charge of the main radioactive substances transport operations of the provisions concerning access to the information in the possession of some entities responsible for nuclear activities. It will submit proposals for implementation of these arrangements to other nuclear activity categories with an impact on the public and the environment.

Finally, ASN will continue to support CLI activities. With ANCCLI and in agreement with the licensees, it will establish rules of good practice to make it easier for the CLIs to perform their duties. It will reiterate its proposals to the Government with a view to ensuring that the CLIs are given the resources they need.



7

International relations

ASN devotes significant resources to international cooperation, with the aim of contributing to strengthening nuclear safety and radiation protection worldwide and becoming recognised as an “international benchmark”.

The main significant events of 2012

2012 was marked by particularly intensive work performed by the international organisations, in order to share the initial analyses of the accident that occurred at the Fukushima Daiichi nuclear power plant. ASN played a full role in this process of reflection and recalled that the Fukushima disaster raised fundamental questions, which go beyond the particular characteristics of the Fukushima reactors and how they are operated, and that all of the States will have to draw their own conclusions. ASN also considers that the independence of the national regulators needs to be reinforced internationally.

2012 saw the end of the European Union’s stress tests exercise, launched by the European Council in March 2011. This work was done under the aegis of ENSREG, the official organisation of the European Union’s safety regulators and the European Commission. These stress tests, which subjected the European nuclear power plants to complementary assessment of their robustness in the light of the initial lessons learned from the Fukushima disaster, were carried out in 2011 in the 15 member States with nuclear reactors, plus Switzerland and Ukraine. They were followed by a peer review of the reports issued by the various States, between early January and late April 2012, by eighty European experts, under the supervision of a Council chaired by the ASN Commissioner, Philippe Jamet. The experts analysed the national reports, examined the replies by the safety regulators to the many questions they raised and carried out inspections in each

country where a nuclear site was visited. The members of ENSREG and the European Commission adopted and published the final stress tests report on 26 April 2012 and issued recommendations and suggestions for improving the safety of the NPPs in Europe. The stress tests exercise is now the subject of a recommendations follow-up monitoring plan implemented nationally under the responsibility of the safety regulators, who published their action plans in late 2012.

The stress tests exercise was unprecedented in Europe and mobilised exceptional resources (about 500 man/years) for the examination of 140 nuclear reactors, based on common specifications. This exercise was made possible thanks to the close cooperation between European safety regulators that has been a feature since 1999 of the WENRA (Western European Nuclear Regulators' Association) informal club. It demonstrates the effectiveness of a single, coordinated international approach, implemented under national responsibility, in advancing safety at an overall European level and within each of the member States.

Europe is the main focus of international action by ASN, which thus aims to contribute to building a Europe that is at the forefront of nuclear safety, the safe management of waste and spent fuel and radiation protection. After the adoption of European directives on the safety of nuclear facilities (2009) and the management of waste and spent fuels (2011), ASN is actively participating in consultation work on the draft European directive for basic standards concerning health protection against the dangers arising from exposure to ionising radiation.

In the field of radiation protection, HERCA (Heads of European Radiation Control Authorities) is continuing its work in 2012, in particular with the approval of a "guideline document" for the use of the dose passport and the gradual implementation of a system for emergency communications between the HERCA member countries and the European Commission.

Outside Europe, a large number of initiatives have been taken to harmonise nuclear safety practices and regulation. Within IAEA, ASN actively participates in the work of the Commission on Safety Standards (CSS) which drafts international standards for the safety of nuclear installations, waste management, the transport of radioactive substances and radiation protection. Although not legally binding, these standards do constitute an international reference, including in Europe. ASN is also closely involved in the peer review process, which is a key component

of the consideration being given to changes in the international nuclear safety framework. Within the NEA (OECD's Nuclear Energy Agency), ASN takes part in the work of the Committee on Nuclear Regulatory Activities (CNRA), to which Jean-Christophe Niel, Director General of ASN, was elected Chairman in December 2012. Finally, ASN takes part in the MDEP (Multinational Design Evaluation Programme) the aim of which is a common assessment of the design of new reactors, such as the EPR or the AP1000. This programme, initiated in 2006 by ASN and the US Nuclear Regulatory Commission (NRC), currently comprises twelve regulatory authorities and is contributing to the eventual harmonisation of the safety objectives, codes and standards associated with the safety analysis of new reactors.

ASN has signed bilateral cooperation agreements with many countries. It also maintains close relations with the main countries equipped with nuclear reactors or looking to acquire them and with countries, such as Ireland and Norway, which are not nuclear but are interested in radiation protection and emergency situation management issues. It also pays particularly close attention to relations with France's neighbours. For many years, ASN has been promoting exchanges with or seconding personnel to its foreign counterparts and opens up the Advisory Committees to foreign experts.

In 2012, ASN continued to be approached by countries wishing to benefit from its assistance in the regulation of nuclear safety. In line with its policy, ASN responds to requests as part of its bilateral actions with the safety regulator of the country concerned, or via instruments that are either European (EU Instrument for Nuclear Safety Co-operation) or international (IAEA's Regulatory Cooperation Forum). The purpose of this cooperation is to enable the countries concerned to acquire the safety and transparency culture that is essential for a national system of nuclear safety and radiation protection regulation.

Finally, France is a contracting party to four international agreements aimed at preventing accidents linked to the use of nuclear energy and mitigating their consequences. IAEA is the depository of these agreements and acts as secretary. 2012 was marked by the organisation of the fourth review meeting of the Joint Convention on the safety of spent fuel management and the safety of radioactive waste management, as well as an extraordinary meeting of the Convention on Nuclear Safety devoted to the aftermath of the Fukushima accident.

Outlook

In 2013, in the field of international relations, ASN will continue to make an active contribution to improving nuclear safety and radiation protection around the world.

At the European level, ASN will contribute to a peer review of the national action plans set up after the post-Fukushima stress tests and to the second edition of the European Conference on Nuclear Safety in June 2013. Changes to the European nuclear safety framework should be formally submitted by the Commission to the member States: ASN, jointly with the relevant Government departments, will pay close attention to preserving the clarity of where responsibilities lie for the regulation of nuclear activities, pursuant to national laws and the international principles in force.

Furthermore, after the extraordinary meeting of August 2012 by the contracting parties to the Convention on Nuclear Safety, the decisions made will need to be implemented in 2013. It will also be up to ASN to coordinate the drafting of the France report for the 6th review meeting of this Convention, to be held in April 2014 under the chairmanship of André-Claude Lacoste.

Finally, ASN asked for an IRRS (Integrated Regulatory Review Services) audit mission by the IAEA in 2014. It will have to initiate preparatory work in 2013



8

Regional overview of nuclear safety and radiation protection

This chapter sets out the nuclear safety and radiation protection situation observed locally by ASN's regional divisions. Summary sheets present the BNIs and small-scale nuclear facilities (medical, industrial and research) and the local actions particularly representative of ASN's work in the regions.

This presentation follows the same principle as that adopted in the various ASN information media, in particular on www.asn.fr



9

Medical uses of ionising radiation

For more than a century, medicine has made use of various sources of ionising radiation, both for diagnostic purposes and for therapy. Even if their benefits and usefulness have long been medically proven, these techniques do however make a significant contribution to exposing the population to ionising radiation.

Behind exposure to natural ionising radiation, medical exposure represents the second source of exposure for the population and the leading source of artificial exposure.

In 2011, according to IRSN, 196,237 people working in the field of medical uses of ionising radiation (57% of all the exposed workers monitored) received dosimetric monitoring.

As at the end of 2012, in France, there are several thousand conventional or dental radiology appliances, about a thousand computed tomography facilities, 217 nuclear medicine departments using unsealed sources for in vivo or in vitro diagnosis and internal radiotherapy, and 175 external radiotherapy centres equipped with 444 treatment devices, treating some 200,000 patients every year.

The use of new radiopharmaceutical products is continuing to develop, as is the use of radiology devices in operating theatres for radio-guided surgical procedures, which can require long-duration exposure of the patients but also of the professionals, in particular their hands.

In 2012, ASN drew up a new picture of the radiation protection situation in nuclear medicine departments, based on inspections performed from 2009 to 2011, and carried

out a fresh review of health care safety in radiotherapy, based on the inspections performed in 2011.

ASN was notified of 536 significant radiation protection events (ESR) in the medical field in 2012. This number is more than 14% up on 2011. There is a significant rise in notifications in the interventional radiology, nuclear medicine and computed tomography sector, even if half of all notifications come from radiotherapy departments, thus indicating greater observance of the incidents notification system on the part of the professionals.

Since the notification system was put into place in 2007, the number of ESR in the medical field has risen and by the end of 2012 had reached an average of 40 notifications per month. About two-thirds of radiotherapy departments notified at least one event in 2012. 90% of radiotherapy departments notified ASN of at least one ESR.

Of these 536 ESRs, 70 concern workers and all fields of activity, 345 concern patients of which 257 (142 level 1 and 3 level 2 on the ASN-SFRO scale) were in radiotherapy and 78 concerned sources, waste and radioactive effluents.

The radiation protection situation in radiotherapy

Since 2007, radiotherapy health care safety has been a priority for ASN regulation and inspection. In the light of the results of the inspections and the progress made in terms of treatment safety, the radiotherapy centres are, since 2012, inspected every two years. For those centres which are under-performing, an annual frequency is maintained.

In May 2012, ASN contributed to the final report of the national committee monitoring the actions taken to improve the safety and quality of radiotherapy care, piloted by the French National Cancer Institute (INCa).

ASN considers the progress made by the centres to be on the whole satisfactory. There has been a very real rise in awareness and reactivity within the profession, with regard to radiation protection culture, formal drafting of practices and risk management with regard to external beam radiotherapy patient treatment.

The situation with regard to the organisation of medical radiation physics, in particular the number of medical physicists, has improved, although it is not completely satisfactory.

ASN draws attention to the dissemination of new techniques and the need to define the conditions for the deployment of new equipment and the corresponding new

practices, in particular for preliminary analysis of the associated risks.

The radiation protection situation in nuclear medicine

ASN draws up an inventory of radiation protection in nuclear medicine, based on the inspections carried out in the 217 departments during the period 2009-2011.

Although the professionals are increasingly aware of their regulatory obligations with regard to worker radiation protection, progress is still needed in risk assessment and in individual workstation studies, because 25% and 20% of the departments respectively have not carried them out as at the date of the inspection.

Most of the regulatory requirements concerning radiation protection of patients are adhered to by the nuclear medicine departments. However, certain points could be further improved, such as worker training in radiation protection of patients, or the use of the diagnostic reference levels (DRL) for optimisation of the doses administered to the patients.

Nearly all the departments inspected today have a management plan for contaminated wastes and effluents, although this often needs to be completed.

Moreover, 44% of the establishments with nuclear medicine departments are not yet equipped with a permanent detection system to check waste intended for non-radioactive waste disposal routes.

Finally, a review process involving all the stakeholders (in particular those in charge of health care establishments, nuclear medicine professionals and public sanitation network and sewage plant operators) was initiated in early 2013 on the conditions for the discharge of effluents contaminated by radionuclides in the collective sanitation networks.

The radiation protection situation of patients in conventional radiology and computed tomography

The rise in the doses delivered to medical imaging patients (nearly 50% average rise since 2002), in particular in computed tomography, remains a subject for concern.

In 2012, a summary was made of the inspections carried out in 2011 concerning radiation protection of computed tomography patients.

ASN considers that there is a need for more effective application of the principle of justification of radiological

examinations, so that each examination performed is actually useful, and so that the doses delivered during the examinations are optimised, through greater quality assurance. Furthermore, the move to hire and train medical radiation physicists (PSRPM) must be continued for at least five years in the medical imaging sector.

Radiation protection of patients is on the whole satisfactory; however, progress is expected in the justification for medical prescriptions, the training of patient radiation protection professionals, the involvement of physicists in the exposure optimisation processes, the analysis of the DRL results to optimise exposure, the performance of external quality control of scanners, formal drafting of procedures, in particular for treatment of pregnant women.

Concerning the radiation protection of workers, this is considered to be on the whole satisfactory. However, progress is expected with regard to performance of the individual workstation studies, the implementation of dosimetric monitoring and the radiation protection training of the workers.

Finally, at a European level, ASN is a participant in the HERCA initiatives aimed at scanner manufacturers and European medical societies, designed to give greater importance to optimisation and justification.

The radiation protection situation in interventional radiology

Since 2009, the monitoring and regulation of radiation protection in interventional radiology has been a national priority for ASN. In recent years, ASN has been notified of ESRs after the appearance of lesions (radiodermatitis, necrosis) in patients who had undergone particularly lengthy and complex interventional procedures. The exposure of some workers has also exceeded the regulatory limits.

Concerning workers as a whole, the inspections continued to reveal inadequacies in the risk assessments, workstation studies and in identification and delimitation of regulated areas. Incomplete use of active dosimetry and a lack of appropriate dosimetric monitoring, in particular of the extremities in the case of certain fluoroscopy-guided procedures, as well as an absence of medical monitoring of the practitioners, are also significant shortcomings. The persons competent in radiation protection (PCR) do not always have the means or the powers enabling them to perform their duties in full. The situation is better in fixed radiology facilities than in the operating theatres.

With regard to patients, the inspections show a lack of radiation protection culture in the departments carrying out interventional radiology. Failures have also been observed in application of the principle of dose optimisation. They are the result of insufficient operator training and are linked to a shortage of medical physicists and appropriate equipment. The lack of radiological protocols for most of the procedures performed in the operating theatre and an imperfect understanding of the doses emitted during procedures create potential risk situations.

ASN considers that urgent measures are required to improve the radiation protection of patients and workers in interventional radiology.

They concern an increase in the numbers of medical physicists, user training, quality assurance, the auditing of professional practices. The availability of the PCR and the means allocated to them must also be increased.

ASN also considers that for existing radiology systems which are not so equipped, the installation of devices capable of estimating the dose of radiation delivered during radiological procedures should be made mandatory.



10

Industrial, research and veterinary uses and source security

Industry, research and numerous other sectors use sources of ionising radiation in a wide variety of applications ranging from industrial irradiation, to monitoring of parameters or radiography, to the detection of lead in paint. The radiation sources are either sealed or unsealed radionuclide sources or electric generators of ionising radiation.

The main significant events of 2012

In the field of industrial radiography, several recent gamma radiography incidents recalled the significant radiation protection issues involved in these activities. In 2012, in particular, an incident rated level 1 on the INES scale occurred in the Le Blayais NPP, and a level 2 incident occurred in the Esso refinery in Fos-sur-Mer. The control and regulation of industrial radiography is therefore a priority for ASN, with more than 100 inspections carried out in 2012, some in collaboration with the labour inspectorate. Moreover, on 27 September 2012, ASN sent a circular letter to all operators reminding them of the regulations and asking that improvements be made in the preparation of work sites and the management of incidents. Finally, ASN is initiating an approach designed to tighten up the regulations in this respect and underlines that there are alternative methods which should be studied by the ordering customers and their contractors.

The regulation carried out by ASN since 2002 on research establishments and laboratories using sources, has shown a clear improvement in radiation protection in this sector. The situation could however still be improved on

certain points of the regulations, particularly internal radiation protection monitoring, management of radioactive effluents and waste and the disposal of old sealed sources.

With regard to veterinary structures, the administrative situation has been continuously improved for a number of years now (as at end 2012, nearly 2,200 structures had been notified or authorised) but this is still unsatisfactory given the number of establishments utilising ionising radiation in the country (about 5,000).

With regard to the suppliers of radioactive sources or devices, ASN is carrying out reinforced regulation of the establishments producing radiopharmaceuticals by means of cyclotrons. ASN also considers that the regulatory framework concerning the suppliers of electrical devices generating ionising radiation is inadequate, even though the marketing of this type of device is of prime importance for the optimisation of the subsequent exposure of the users.

ASN opinions

ASN considers that the increase in the number of cases of detection of radioactivity in metals and consumer goods across the world is worrying and feels that France must rapidly define a national strategy for detection of radioactivity nationwide.

The removal of old lightning arresters containing radioactive sources is an activity involving major radiation protection challenges. ASN therefore wants to see an organised recovery of these radioactive lightning arresters, and for several years now has been informing the professionals to ensure that their removal guarantees compliance with radiation protection requirements for the workers and the public. ASN has tightened up this process since 2009 by recalling the obligations incumbent upon the professionals concerned and in 2012, jointly with IRSN, by conducting a campaign of measurements to assess the protective measures necessary when removing radioactive lightning arresters.

There are many interfaces and common objectives between monitoring sources for radiation protection and safety purposes and monitoring them to combat malicious acts. This is why ASN's counterparts abroad are usually responsible for monitoring both domains. ASN has the necessary hands-on knowledge of the sources concerned - which are regularly inspected by its regional divisions - to accomplish both missions. The Government also decided to entrust ASN with oversight of the monitoring and

protection measures incumbent on the party responsible for the nuclear activity; the legislative process initiated in 2008 led to tabling of a Bill before the Senate in 2012, with a view to setting up monitoring of the protection of radioactive sources against malicious acts.

Outlook

In 2013, ASN will be maintaining significant monitoring efforts in the field of industrial radiography, in the light of recent experience feedback and the radiation protection issues involved in this activity.

The work done by ASN concerning the suppliers of electric generators of ionising radiation should enable a resolution to be issued in 2013 setting out technical requirements for the devices distributed in France.

The guide intended for the professionals concerning the means of protection necessary when removing radioactive lightning arresters will be published in 2013 on the basis of the results of the measurements campaign carried out in 2012. At the same time ASN will, together with the French National Agency for Radioactive Waste Management (ANDRA), continue to study how to speed up removal of these lightning arresters, taking account of ANDRA's capacity for recovering them.

With regard to source security, ASN and its institutional partners will continue in 2013 to prepare the implementing texts required for effective implementation of regulation. At the same time, it will continue and strengthen the measures started in 2012 designed to produce an inventory of the existing installations, on the occasion of the radiation protection inspections it carries out.



11

Transport of radioactive substances

About 900,000 packages of radioactive substances, or about 600,000 transport operations, circulate in France every year, representing a very small percentage of the total dangerous goods traffic.

85% of the transported packages are intended for the health, non-nuclear industries or research sectors, of which about 30% is accounted for by the medical sector alone. The nuclear industry accounts for about 15% of the annual transports of radioactive substances (for example, about 300 annual shipments of new fuel, 250 of spent fuel, about thirty of MOX fuels and about sixty of plutonium oxide powder).

The content of the packages varies widely: their radioactivity level varies from a few thousand becquerels for low-activity pharmaceutical packages, to trillions of becquerels for spent fuel. Their weight also varies from a few kilogrammes to about a hundred tonnes.

Road transport accounts for about 90% of radioactive substances shipments, rail 3% and sea 4%. Air transport is widely used for small, urgent packages to be transported long distances, for example short-lived radiopharmaceuticals. All of these transport operations can be international.

The main participants in transport arrangements are the consignor and the carrier. The consignor is responsible for package safety. ASN ensures correct application of the regulations concerning the safe transport of radioactive and fissile substances for civil uses. This safety must not be confused with security, or physical protection, which is the prevention of loss, disappearance, theft or misappropriation of nuclear materials (usable for making weapons), for which ASN is not responsible.

The major risks in the transport of radioactive substances are the risks of irradiation, contamination, criticality, but

also toxicity or corrosion. To prevent them, the radioactive substances in the packages must be protected from fire, mechanical impact, water ingress into the packaging, thus facilitating criticality reactions, chemical reaction between package components, etc. Safety is thus based above all on the robustness of the package, which is the subject of rigorous regulatory requirements. Given the international nature of these shipments, the regulations are drawn up on the basis of recommendations issued by the IAEA.

The duty of information binding on the nuclear licensees was made applicable to transport managers by the ordinance of 5 January 2012, which determines the threshold as of which the information requested by the citizen must be communicated to him or her.

The main significant events of 2012

In 2012, ASN issued 50 approval certificates for package models, defining their conditions of manufacture, utilisation and maintenance. ASN updated the applicant's guide, which in particular presents the required content of the package safety file, the safety requirements and operating experience feedback.

ASN performs inspections at all the stages in the life of a package: from manufacture and maintenance of a packaging, to package preparation, shipment and reception. In 2012, ASN carried out about a hundred inspections in the field of radioactive substances transport (all sectors).

In 2012, ASN inspected the manufacture of 30B cylinders used to transport uranium hexafluoride, as well as the manufacture of the elastomer seals used for spent fuel packages. ASN thus carried out six targeted inspections on the maintenance of packagings in the nuclear power generating industry cycle.

For the packages that do not require ASN approval, the consignor must be able, at the request of ASN, to provide the documents proving that the package design complies with the applicable requirements. The various inspections performed in 2012 reveal improvement with regard to the documents presented to ASN, however ASN observes that on the sites of the entities concerned (designer, manufacturer, distributor, owner, consignor, companies performing the regulatory drop tests, package maintenance, etc.). there are shortcomings in the demonstration of package conformity with the regulations, in particular the description of the authorised contents and the demonstration of the integrity of containment of the radioactive substances.

At the end of 2012, ASN carried out three technical inspections at AREVA, EDF and CEA, in order to make an inventory of safety management in the field of transport. These inspections are still being analysed and will lead to an action plan in 2013.

Any deviation from the regulations or the safety files applicable to the transport of radioactive substances must be notified to ASN.

In 2012, 52 events rated level 0, six events rated level 1 and one event rated level 2 on the INES scale were notified to ASN. These figures have been falling for two years. However, 2012 saw a level 2 event corresponding to the loss of a package containing radioactive fluorine for medical purposes.

The drop in the number of events observed in 2011 and 2012 can essentially be explained by a change in the recording of events concerning impacts on radiopharmaceutical packages in airports. To facilitate incident analysis, the corresponding notification criterion was adjusted so that only significant impacts that could affect the safety of the package are taken into account. Minor impacts having no consequences must now simply be logged, and no longer have to be notified to ASN.

More than half of the events are notified by the industrial stakeholders in the nuclear cycle (EDF and AREVA in particular). About 17% of the events concern the radioactive pharmaceutical products shipped by CIS bio international.

Very few transport-related event notifications are made by the conventional industry and research sectors. This low notification level is probably due to small-scale nuclear activity professionals failing to notify events, usually due to a lack of familiarity with the events notification process.

Road transport accounts for the majority of the notified events. The proportion of events concerning air transport, about 16% in 2012, reflects greater awareness by the airport companies that detect deviations and are more familiar with the notification process. These events essentially involve package impacts or falls during handling, or temporary or definitive losses in transit. Few events involve rail or maritime transport. These figures are in agreement with transport movements in France.

The events notified in 2012 mainly concern package classification errors, losses of medical packages during airport transit, inadequate or defective securing of equipment packages transported for EDF, falls or impacts when handling medical packages in airports, contamination and radiation intensity limits being exceeded, but without human exposure or contamination.

An inventory of the safety of transportation of radioactive substances in France was produced by ASN, based on the event notifications transmitted to ASN and the inspections covering the period 2007 to 2011.

Outlook

As part of the revision of the technical regulations for BNIs, ASN will continue to tighten the regulatory framework and the requirements concerning on-site transport operations performed within the perimeter of the BNIs.

ASN will continue to examine the lessons to be learned from the Fukushima accident in the field of transport operations, in particular by improving the assessment of the existing safety margins in the design of the transport packages and by examining whether improvements are needed in order to prevent the occurrence of a very low probability accident.

In 2013, ASN will contribute to the draft European regulation on the shippers of radioactive substances, or will publish a resolution on this subject.

In 2013, inspection of the manufacture and maintenance of transport packages subject to approval and packages not subject to approval will remain priorities.



12

Nuclear power plants

Regulating nuclear power plants (NPPs) is one of ASN's fundamental duties. The 58 French nuclear reactors in operation are technically similar and are operated by EDF.

ASN applies the highest standards for regulating NPPs and adapts them continuously in the light of new knowledge. It is developing an integrated vision of control and regulation that covers not only the design of new installations, their construction, modifications, integration of feedback on events or maintenance issues but also, via the expertise its inspectors have built up, social, human and organisational factors, radiation protection, the environment, worker safety, as well as the application of labour legislation.

The main significant events of 2012

The inspections carried out following the Fukushima accident

Following the nuclear accident in Fukushima, ASN considered that stress tests were required on the French civil nuclear facilities with regard to the type of events which led to the Fukushima accident (see pages devoted to the aftermath of the Fukushima accident). Following these stress tests, ASN considered that the NPPs offered a level of safety such that there was no reason to immediately shut down any of them. At the same time, ASN considers that their continued operation demands that their robustness to extreme situations be increased beyond their existing safety margins, as rapidly as possible. In its resolutions of 26 June 2012, ASN in particular required that the following measures be taken:

- a "hardened safety core" of material and organisational measures to control the fundamental safety functions in extreme situations;

- the "Nuclear Rapid Intervention Force" (FARN) proposed by EDF, a national emergency system involving specialised crews and equipment for intervening on an affected site within less than 24 hours;
- reinforced measures to reduce the risk of fuel storage pools emptying;
- the performance of feasibility studies for additional means to protect ground and surface water in the event of a severe accident.

At the request of ASN, EDF's proposal for the creation of a "hardened safety core" was analysed by IRSN and presented to the Advisory Committee for reactors (GPR) in December 2012. In 2013, ASN will issue a position statement on the dossier submitted.

At the same time, the topics covered by the stress tests were the subject of 19 targeted inspections in the NPPs in 2011, followed by inspections in 2012 to verify the actions taken.

Finally, the reports from the various European States issued further to the stress tests were submitted to a peer-review process at a European level, from January to April 2012 (see previously, the notable findings of chapter 7).

Regulation of construction of the EPR reactor in Flamanville

The construction work on the Flamanville 3 EPR reactor began in September 2007, following the Government's authorisation, based on a favourable opinion issued by ASN. In this opinion, ASN considered that the proposed design was able to meet the ambitious safety objectives it had set for new reactors. The next regulatory step is "commissioning" authorisation by ASN. In preparation for this step, ASN in 2007 initiated a review of certain topics requiring lengthy examination and checks on the detailed design of the more important or innovative systems, including the instrumentation and control system, so that it could rule on their ability to comply with the safety requirements. In accordance with the request submitted by ASN in 2009, consistently with the stance adopted by its Finnish and British counterparts, EDF reviewed the design of the I&C system for the Flamanville 3 EPR reactor.

Following the analysis of these modifications, jointly with IRSN, ASN in 2012 concluded that the I&C architecture proposed by EDF was able to guarantee the safety of the systems used to manage incident or accident situations.

At the same time, ASN is in charge of oversight of reactor construction (detailed design studies, factory manufacturing, construction site), through documentary

examinations and inspections, in a manner proportionate to the safety, radiation protection and environmental protection issues. Thus, in 2012 and with the support of IRSN, ASN carried out six inspections in the engineering centres and 18 inspections on the construction site concerning the safety of the facility. It also carried out 36 days of labour inspection work. In 2012, ASN paid particular attention to complex concreting activities, to the welding of the pool liners and to the processing of defects detected on the supports (brackets) of the reactor building's polar crane. Concerning the manufacture of nuclear pressure equipment, ASN assesses, or has approved inspection organisations assess, their conformity with the requirements of the regulations applicable to this equipment. ASN thus carried out, or had approved inspection organisations carry out, more than 650 checks on this equipment at the manufacturer AREVA NP, its suppliers and their subcontractors.

ASN is making efforts to impart an international dimension to the regulation described above, in particular by maintaining close relations with the safety regulators of countries in which construction of an EPR type reactor is either in progress (Finland, China) or planned. ASN is also actively participating in the MDEP multinational cooperation programme for new reactors and in particular, together with IRSN, in the work of the working group dedicated to the detailed design of the EPR, which in 2012 looked at severe accidents, I&C, probabilistic safety assessments (PSA), modelling of accidents and transients, technical specifications, on-site hazards and experience feedback from the Fukushima accident. This cooperative work helps reinforce the robustness of the safety reviews conducted.

ASN opinions

In ASN's opinion, 2012 was a relatively satisfactory year in terms of nuclear safety and radiation protection in NPPs. However, in the light of the past year's results, ASN considers that operational stringency (compliance with operating rules, line connection of systems) and maintenance in the NPPs requires particular vigilance on the part of EDF. The licensee's efforts must also be intensified in the field of environmental protection.

ASN attaches particular importance to the stringency of day-to-day operations and notes that this point is a priority for EDF. Nonetheless, ASN has seen no improvement by comparison with 2011, notes that this point is the origin of an increased number of significant incidents and considers that EDF needs to make further efforts, in particular to prepare for operational interventions, the

rigorous application of baselines and the management of temporary instructions.

ASN considers that the new baseline requirements for on-site emergency plans (PUI) put into place by EDF in November 2012 improves the sites' preparation for the management of emergency situations.

As in previous years, ASN closely the steps taken by EDF to prevent and manage fires. Over the past ten years, ASN observes that considerable resources have been deployed to improve how the fire risk is handled and the overall level has progressed. There are however still areas of inadequacy. For example, deviations in the management of breaks in fire sectors, in the issue of fire permits or in monitoring of contractor training in fire prevention, remain all too frequent.

The field of maintenance could also be improved, particularly the management of spare parts, the preparation for maintenance operations and the availability of human and material resources for these activities. These inadequacies contribute to an increased number of maintenance-related equipment deviations in 2012. Having become aware that in the past certain ageing phenomena had not been sufficiently anticipated, EDF reviewed its maintenance strategy, which now focuses more on preventive measures. Nonetheless, ASN notes that with the measures decided on following the Fukushima accident and those linked to the reactor periodic safety reviews, EDF is faced with a far greater volume of work for which activity scheduling and resource availability requires greater attention.

Equipment maintenance and replacement programmes, the safety review process and correction of the deviations identified all help keep NPP equipment in a generally satisfactory condition. ASN notes that in 2011, EDF launched an action plan for management of the qualification of equipment and spares for accident conditions, subjects on which there had been shortcomings in recent years; ASN will closely monitor the effective implementation of this plan. ASN also notes that there is room for improvement in the integrity of the second containment barrier but that it is improving thanks to the steam generators cleaning strategy adopted in recent years.

With regard to social, organisational and human factors, ASN considers that the organisation set up on the EDF sites to manage staff skills and qualifications is on the whole satisfactory, well-documented and coherent. On the other hand, ASN feels that the organisation and the specific steps taken to improve how human factors are taken into account in operation and maintenance, differ from one

site to another and could be further improved. Thus, in 2012, ASN once again observed numerous shortcomings on several sites, concerning equipment availability, operational documents, workspace ergonomics and human-machine interfaces. ASN notes the considerable efforts made by EDF to develop the adoption of practices to enhance the reliability of the interventions (“human performance” project) but considers that this approach must remain a complement to other improvement actions concerning the organisation and management of safety or of intervention conditions. ASN observes that even on sites where these reliability practices have been adopted, “human” or “organisational” aspects still contribute to the occurrence of significant events.

In the NPPs, ASN is also responsible for the labour inspection duties, which enables it to carry out control and inspection that includes nuclear safety issues. In the field of safety, ASN observes that the results of 2012 have improved, in particular for EDF employees, that severe accidents were rare in 2012 and that there were no fatal accidents. In 2012, ASN once again observed that the maximum working hours were exceeded, especially during reactor outages. ASN considers that EDF must continue with the substantial efforts made since 2011 to improve the situation. Furthermore, despite the adoption of a vigilant, “best-bidder” buying policy, which should have a positive impact on the services subcontracted, ASN drew EDF’s attention to potential or even confirmed situations (as proven by the issue of violation reports) of exploitation or illegal transfer of manpower. Finally, in terms of professional relations and with regard to all the NPPs, the ASN’s labour inspectorate notes that the institutions representing the personnel function on the whole correctly, even though social dialogue is occasionally locally difficult.

Generally speaking, ASN considers that the radiation protection organisation defined and implemented in the NPPs is on the whole satisfactory. Collective dosimetry per reactor and individual dosimetry in particular are both down in 2012 by comparison with 2011. As this reduction is partly linked to a lesser volume of maintenance work, ASN stresses that EDF must reinforce its actions to mitigate the expected rise in collective and individual dosimetry in the light of the forthcoming refurbishment of major NPP components. ASN notes that in 2012, even though significant progress had been made in recent years, there was an increase in the number of events concerning industrial radiography operations.

With regard to the environment, despite the positive picture observed in previous years and a satisfactory

organisation on most of the sites, ASN still observes numerous deviations by all the NPPs and considers that there is room for performance improvements in this field. EDF does not give sufficient attention to processing deviations regarding the conformity of the facilities, the implementation of maintenance programmes and the updating of operational documents.

The ASN assessment of each NPP is detailed in chapters 8 and 12 of the report. Some sites stand out in this general assessment:

- with regard to nuclear safety: Blayais, Fessenheim and Penly NPPs. In this respect, ASN notes the particular involvement of the EDF head office departments in preventive maintenance and compliance with regulatory requirements at Fessenheim NPP; ASN also observed that the Saint-Laurent site had achieved significant progress in relation to previous years;
- in the field of radiation protection: Blayais, Civaux, Saint-Laurent and Golfech NPPs;
- in the environmental field: Dampierre NPP.

Other sites are under-performing with respect to at least one topic:

- with regard to nuclear safety: Civaux, Cruas, Paluel NPPs and, even though ASN does see certain improvements, Chinon NPP;
- in the field of radiation protection: Cattenom and Fessenheim NPPs;
- in the environmental field: Belleville, Chinon, Civaux and Tricastin NPPs. For the Saint-Alban site, ASN considers that performance has improved in 2012, but that the site is still under-performing.

Outlook

The measures stipulated by ASN following the Fukushima accident involve work that is both complex and wide-ranging. ASN will provide specific monitoring and pay particular attention to EDF’s integration of experience feedback from the accident, a process that will take several years.

Regulation of the construction of the Flamanville 3 EPR will continue until authorisation for commissioning of the installation. ASN will in particular develop the regulatory tools necessary for managing the preparation and control of the facility start-up tests and the final review of the commissioning authorisation application file, jointly with its foreign counterparts concerned.

In the light of the anticipated increase in the volume of maintenance over the coming years, ASN will obtain the

opinion of the Advisory Committee of experts for reactors (GPR) concerning the optimisation of doses during future reactor outage campaigns for the NPPs operated by EDF.

ASN will continue to monitor the optimisation of discharges from NPPs and EDF actions to maintain reservoirs and tanks with a view to preventing pollution.

In 2013, ASN will continue to examine the periodic safety reviews of the French NPPs, and should in particular adopt a stance on the continued operation of the Bugey 5, Dampierre 1, Fessenheim 2, Gravelines 1, Tricastin 1, Chooz, Civaux, Saint-Alban, Nogent, Cattenom 2 and 3, Belleville and Penly 1 reactors. ASN considers that this process is the cornerstone of the safety improvement approach. In 2013, ASN will also rule on the study and work programme proposed by EDF with a view to extending the operating life of its reactors beyond 40 years.



13

Nuclear fuel cycle installations

The fuel cycle comprises the fabrication of the fuel and its subsequent reprocessing after it has been used in the nuclear reactors.

The main plants of the cycle – COMURHEX, AREVA NC Pierrelatte, EURODIF, GEORGES BESSE II, FBFC, MÉLOX, AREVA NC La Hague – are part of the AREVA group. These plants include facilities which have BNI status.

The main significant events of 2012

With regard to uranium enrichment activities, ASN authorised the cessation of industrial production by the EURODIF plant. This shutdown, effective on 7 June 2012 will be followed by a phase involving rinsing of the circuits with chlorine trifluoride (ClF₃) lasting about three years and called PRISME, followed by final shutdown and decommissioning of the facility. The PRISME operation will enable virtually all of the uranium deposits to be recovered. This operation, subject to authorisation by means of decree, should begin in 2013.

In parallel with the EURODIF shutdown, the GEORGES BESSE II plant, comprising two enrichment units, is gradually being brought on line. Half of the facilities of the South unit are running, while ASN examines the authorisation application for commissioning of the North unit, scheduled for 2013. ASN sees as a positive sign that, in accordance with its request, AREVA has shut down the EURODIF plant using the gaseous diffusion enrichment process, replacing it by the GEORGES BESSE II plant using the gas centrifuge enrichment process, which is an improvement in terms of nuclear safety.

With respect to fuel fabrication activities, the year was marked by incidents calling into question the safety-criticality rules employed within the FBFC plant. In particular, the repeated failure to abide by the packaging and internal transfer rules for fissile materials within the plant, indicative of a lack of safety culture and insufficient integration of experience feedback, led ASN to rate this event level 2 on the INES scale. Corrective measures were immediately taken by the licensee, but a more detailed analysis of the root causes is still to be carried out under ASN supervision.

ASN has also undertaken the analysis of the dossier submitted on 15 September by AREVA for the CERCA plant as part of work package 2 of the stress tests.

With regard to the back-end fuel cycle, the most significant point is the currently ongoing review by ASN, with the technical support of IRSN, of the conclusions of the first periodic safety review of the UP3-A plant at La Hague. This involves work of considerable scope, which will lead to ASN ruling on the conditions for the continued operation of this plant. This work will also determine a general periodic review methodology for the facilities of the AREVA group. ASN is particularly attentive to ensuring that the safety-related equipment and the corresponding requirements are correctly defined and incorporated into the dossiers supplied by AREVA.

ASN assessments and outlook

Cross-disciplinary aspects

ASN notes that efforts must be made to implement the AREVA group's social, organisational and human factors policy in all the facilities, and to involve the outside contractors in this as a matter of course. ASN will demand tracking of the development of subcontracting data and closer monitoring of outside contractors. It will in particular request improvements in the control of project management, including when this is ensured by a subsidiary of the group.

In line with the actions taken this year, ASN will in 2013 be particularly attentive to the integration of experience feedback by the AREVA group licensees, and to the implementation of the internal authorisation systems.

Finally, ASN will specifically control the measures necessary for implementation of the additional safety measures requested following the stress tests: the AREVA proposals concerning the definition of systems, structures and components robust to off-site hazards and the

management of emergency situations, will thus be examined in 2013.

Tricastin site

In 2013, ASN will rule on the dossier transmitted by AREVA concerning the reorganisation of the Tricastin site, with the aim of the licensee AREVA NC taking over operation of all the facilities. Furthermore, within the framework of the stress tests performed subsequent to the Fukushima Daiichi accident, ASN will continue to closely control the implementation of measures to reinforce the safety of the site's facilities which use large quantities of UF₆ and hydrofluoric acid, in particular reinforcing the seismic resistance of certain installations classified on environmental protection grounds (ICPE) and taking account of the chemical risk in the emergency plans of the operators on the Tricastin site. Finally, ASN will continue to examine the commissioning application for the North unit and the REC II facility in GEORGES BESSE II.

Romans-sur-Isère site

In 2013, ASN will be vigilant with respect to improving the nuclear safety performance of AREVA FBFC. It in particular asks AREVA for improved application of the safety-criticality rules in the FBFC plant and an improvement in the quality of the studies performed. It will be attentive to compliance with the deadlines for the actions taken following the safety reassessment of the units within the site facilities. It will also be attentive to ensuring the implementation of the improvements planned as part of the stress tests.

MÉLOX plant

ASN will be vigilant with regard to the means adopted to assist with the changes in materials used, given the anticipated requirements in terms of safety and radiation protection. In this context, the management of dosimetry and the ability to prevent social, organisational and human factor risks will therefore be regulation and inspection priorities.

The periodic safety review file for the MÉLOX plant, which will be examined in 2013, is a key step in the operation of the facility.

ASN will monitor the implementation of the measures adopted further to post-Fukushima experience feedback.

La Hague site

For the La Hague plants, ASN considers that efforts must be continued, particularly for the recovery and packaging of legacy waste on the site and for the integration of operating experience feedback and the notification of

significant events. With the framework of the periodic safety reviews of the facilities, 2013 should see the continuation of the process to identify elements important for safety and improvements in the general operating rules for these plants. With regard to the periodic safety review of the UP3-A plant, ASN asked IRSN to closely examine operating experience feedback and to check the conformity of the elements important for safety with the safety requirements defined, in the light of any changes they may have undergone and their ageing.

As regards the recovery of legacy waste, ASN will be attentive to ensuring that U-turns in industrial strategy do not further delay the recovery and disposal of the waste from Silo 130 or the sludge from STE2 and HAO. ASN has already issued instructions in this respect in 2010 for silo 130 and will issue a resolution concerning the entire legacy waste recovery programme in 2013.

Finally, ASN will continue to monitor the internal authorisations system implemented in 2011 in the La Hague plant.

14



Nuclear research facilities and various nuclear installations

Nuclear research facilities and facilities not directly linked to the nuclear power generating industry consist of the BNIs in CEA's civil sector, BNIs of other research organisations and a few other BNIs which are not power reactors and which do not take part in the nuclear fuel cycle.

The main significant events of 2012

Management of civil engineering operations

Owing to the safety issues linked to the satisfactory management of civil engineering operations, ASN exercises close scrutiny of the two major ongoing construction sites, that of ITER (international thermonuclear experimental reactor) and that of the Jules Horowitz reactor (RJH). In order to facilitate the monitoring of the progress of construction on RJH, pursuant to the decision setting out the requirements for the design and construction of the reactor, CEA transmits a quarterly progress report for the project. This document makes it possible to identify activities or particular points that ASN wishes to include in its spot-checks, during the course of the inspections.

The inspections carried out by ASN in 2012 particularly concerned the integration of the requests and remarks formulated further to previous inspections on the construction/civil engineering theme, or further to the examination of the design files relative to the pouring of certain concrete structures. In the case of the RJH site, inspections were thus carried out to check the processing of anomalies detected on a wall of the equipment storage pool and a wall of the reactor building containment.

For the two major construction sites mentioned, ASN considers that the civil engineering operations are taking place satisfactorily.

The installations

The main subjects of concern for ASN with regard to CEA installations in 2012 are:

- the methodologies for the forthcoming periodic safety reviews of the LECA, LECL and LEFCA;
- the authorisation issued by ASN to allow refuelling of the core of the CABRI reactor.

The main subjects concerning installations other than those operated by CEA are as follows:

- publication of the creation authorisation decree for the ITER;
- publication of the decree modifying the creation authorisation decree for the GANIL;
- finalisation of examination of the periodic safety review for the CIS bio international facility in Saclay, made difficult by the poor quality of the documents submitted by the licensee.

Assessments and outlook

The research and other facilities regulated by ASN and operated by various licensees differ widely but are usually small in size. The way that safety and radiation protection are handled varies significantly from one licensee to another. ASN thus ensures appropriate monitoring of each of these facilities.

Taking account of this diversity, ASN defined priorities for submission of the stress tests concerning the nuclear facilities other than power reactors. A prior analysis was conducted to assess the risks in the light of the experience feedback from the Fukushima accident and the "potential source term". Given the diversity of the nuclear fleet, each facility must be studied individually.

In 2013, ASN will issue a position statement on the "hardened safety core" of the facilities for which the stress tests were examined in 2011. It will also issue a position statement on the stress test reports transmitted in September 2012, which concern:

- nine other CEA facilities (PÉGASE, CABRI, RAPSODIE, MCMF, LECA, Cadarache storage yard, CHICADE, ORPHÉE, ATALANTE);
- the support functions on the CEA Cadarache and Marcoule sites;
- ITER;
- CIS-bio international.

Finally, it will draft resolutions concerning all the facilities which have not yet undergone a stress test. These resolutions will in particular clarify the deadlines for transmission of the stress test reports.

Moreover, ASN considers that the "major commitments" initiative implemented by CEA over the last 4 years must be continued and regularly expanded to include new "major commitments". Any extension to the deadline must therefore firstly be duly justified, and secondly be discussed beforehand with ASN. Generally speaking, ASN will remain vigilant in ensuring compliance with the commitments made by CEA, both for its facilities in service and those being decommissioned. Were this to prove necessary, ASN could issue instructions, as was the case in 2012 for storage removal operations in the MASURCA facility. Similarly, ASN will remain vigilant in ensuring that CEA performs exhaustive periodic safety reviews of its facilities so that ASN can conduct its examination in satisfactory conditions. In this respect, as the missing elements have finally been transmitted, it will be possible to conclude the examination of the periodic safety review on the ÉOLE and MINERVE facilities in 2013.

In 2013, ASN will continue to pay particular attention to new projects such as the RJH, the GANIL extension, or the ITER facility, and the restart of the CABRI facility. Construction of the ITER facility and divergence of the CABRI reactor will be the subject of requirements from ASN.

ASN will in particular monitor the work required of CIS bio international following the periodic safety review of its facility.

Finally, in mid-2012, CEA sent ASN a safety guidelines document concerning the ASTRID (Advanced sodium Technological Reactor for Industrial Demonstration) prototype, a sodium-cooled fast neutron reactor. This dossier will be examined by the Advisory Committee for reactors. ASN's conclusions will be submitted in the second half of 2013.



Safe decommissioning of basic nuclear installations (BNIs)

Decommissioning, a phase covering all the activities performed after shutdown of a nuclear facility, until it reaches a predetermined final state, at present concerns about thirty nuclear installations. This phase entails radiological and conventional risks, some of which are similar to those present during the operation of the installation.

In 2011, ASN stipulated the performance of stress tests in order to take account of the experience feedback from the Fukushima accident. Thus, in September 2012, EDF, CEA and AREVA transmitted stress test reports for the facilities being decommissioned.

The main significant events of 2012

In 2012, ASN continued its monitoring of the EDF reactors decommissioning operations.

With regard to the Brennilis reactor, in accordance with the provisions of the partial decommissioning decree signed in July 2011, EDF submitted a further complete decommissioning authorisation application in late December 2011. In 2012, ASN submitted its opinion to the minister responsible for nuclear safety concerning the acceptability of this dossier and considered that, given the cancellation of the building permit for ICEDA, a facility that EDF proposes using for waste management, the dossier could not be submitted to the public inquiry as it stood.

Following the significant event which occurred in the Bugey NPP on 9 August 2011 involving the presence of artificial radionuclides in a dumpster full of conventional rubble, ASN in November 2011 served EDF with formal

notice to comply with the regulations. This formal notice was lifted in 2012 after a further inspection by ASN.

In July 2012, ASN also served EDF with formal notice to reinforce its emergency situations management resources on the Creys-Malville site, in particular where the SUPERPHENIX reactor decommissioning operations are taking place.

With regard to monitoring of the decommissioning of the CEA facilities, ASN in particular issued the final approval in June 2012 for partial resumption of the decommissioning work on the ATPu, which had been suspended in October 2009 owing to an incident rated level 2 on the INES scale, which revealed shortcomings in the fissile materials accounting and tracking procedures. In addition, following the violation report issued by ASN in October 2009, CEA was sentenced by the Aix-en-Provence courts on 14 March 2012 to pay a fine of 15,000 euros for failure by a BNI corporate licensee to immediately notify an incident or accident. CEA did not appeal this decision.

Concerning the AREVA group's facilities being decommissioned, ASN served the SICN company with formal notice in March 2012 to complete the decommissioning and clean-out work on the Veurey-Voroize plant as the date set in the decree for finalisation of the decommissioning operations had been exceeded. The ASN inspectors carried out a further inspection of the facility in September 2012 and observed that this work was on track for completion.

Finally, in 2012, ASN issued a resolution delicensing the Strasbourg university reactor.

Outlook

The main actions ASN will carry out in 2013 will firstly be the continuing development of the regulatory framework for decommissioning, and secondly the close monitoring of certain installations. ASN will thus concentrate on finalising the polluted soils clean-out guide for sites being decommissioned and the complete clean-out methodologies guide, following publication of the BNI order.

In 2013, ASN will continue its inspections of installations undergoing decommissioning. It will focus in particular on:

- finalising its opinions concerning the draft final shutdown and decommissioning (MAD-DEM) decrees for the nuclear facilities of the UP2 400 plant at La Hague;
- examining the complete decommissioning authorisation application for the Brennilis NPP, to be completed by the licensee, paying particular attention to the evolution of the administrative situation of ICEDA;

- paying particular attention to CEA's finalisation of the decommissioning operations concerning the enriched uranium processing facility (ATUE) as rapidly as possible;
- examining the stress test reports transmitted by EDF for its facilities being decommissioned, following the Fukushima accident and issuing additional instructions designed to increase the robustness of the facilities to extreme situations;
- reviewing the preparatory operations for final shutdown of the installations that will soon be shut down and decommissioned (PHÉNIX, COMURHEX, EURODIF).

Finally, the announcement of the postponement of several decommissioning deadlines has led ASN to ask the CEA for an interim report on the updating of its decommissioning strategy; ASN will examine these updated elements.



16

Radioactive waste and contaminated sites and soils

The management of radioactive waste is governed by the 28 June 2006 Programme act on the sustainable management of radioactive materials and waste, today codified in the Environment Code. This Act sets a clear framework for management of all radioactive waste, in particular by requiring the adoption of a national radioactive materials and waste management plan (PNGMDR) revised every three years.

The purpose of the PNGMDR is to inventory the existing radioactive materials and waste management methods, to identify the foreseeable needs in terms of storage or disposal facilities and to clarify the necessary capacity for these facilities and the storage durations. Concerning radioactive waste for which there is as yet no final management solution, the PNGMDR defines the objectives.

The main significant events of 2012

The PNGMDR

The third edition of the PNGMDR, which covers the period 2013-2015, was finalised this year. This new version takes account of the recommendations expressed in the PNGMDR 2010-2012 assessment report by the OPECST. The structure of the PNGMDR was thus revised, so that the information concerning a given technology is grouped together and so that the single document is compatible with different reading strategies. Furthermore, as part of the transparency and consultative approach adopted, the major disagreements between the various stakeholders are shown in this new version.

In the drafting of the PNGMDR, account was also taken of Council directive 2011/70/Euratom establishing a community framework for the responsible and safe management of spent fuel and radioactive waste, which defines the content of the national waste and spent fuels management programmes, for which national law transposition work will be completed in 2013. It thus presents a description of the financial issues, with indications of the cost and financing mechanisms, the concepts and the plans for the period following closure, along with indicators.

The PNGMDR continues the measures initiated by the previous version and stresses the need to develop global industrial schemes for waste management, to develop recycling and reuse solutions for very low level waste, in order to preserve scarce disposal space and to continue with studies for low level, long-lived waste and high and intermediate level, long-lived waste.

The PNGMDR was sent to the Government's General Secretariat in December 2012.

ASN doctrine for sites and soils contaminated by radioactivity

In 2012, ASN adopted its doctrine for the management of sites contaminated by radioactive substances, which specifies its fundamental principles. It considers that the exposure of individuals to ionising radiation as a result of operations to manage sites polluted by radioactive substances must be kept as low as reasonably achievable in the light of current technology and of economic and social factors. This is why the reference approach is, whenever technically possible, to completely clean-out sites contaminated by radiation, even if human exposure from said radioactive pollution appears to be limited.

For ASN, polluted sites should be dealt with today, so that no intervention is required in the future.

ASN assessments and outlook

Generally speaking, ASN considers that the French radioactive waste management system, built around a clearly defined body of legislative and regulatory texts, a national radioactive materials and waste management plan (PNGMDR) and an agency dedicated to the management of radioactive waste (ANDRA), is capable of regulating and implementing a structured and coherent national waste management policy.

In 2012, ASN continued with its actions aimed at ensuring that radioactive waste is managed safely, from the moment it is first produced. ASN thus regulates its

management within the nuclear installations and periodically assesses the strategies put in place for this purpose by the licensees. ASN in particular remains attentive to ensuring that the licensees recover the legacy waste stored on their sites. ASN notes that the licensees are late in doing this or are experiencing technical difficulties, leading to postponement of the removal from storage of legacy waste on the La Hague and CEA sites. In addition, in 2013, ASN will continue to attentively follow the retrieval from storage of wastes, with particular emphasis on that presenting the greatest safety risk.

With regard to the long-term management of radioactive waste, ASN is encouraged by the way ANDRA operates its radioactive waste disposal facilities. ASN considers that there must be safe disposal routes for all waste. To this end, it is of the opinion that France should be provided with a facility to allow disposal of low level long-lived waste. ASN will therefore attentively follow the process of the search for a site and development of disposal solutions.

With regard to high and intermediate level, long-lived waste, ASN considers that key steps in the development of the disposal project will be reached in the next few years. In its opinion on the dossier submitted by ANDRA in 2009, ASN defined the main areas for work to be taken further, prior to submission of the creation authorisation application, which should take place in 2015. ASN in particular recommended that ANDRA pursue the analysis of certain risks linked to the operation of the installation and specify the technical provisions to be adopted to manage them, deploying demonstrators to complete its understanding of the damage resulting from the excavation of large structures and to qualify the sealing techniques for the drifts and the connections between the surface and the underground facilities.

The public debate scheduled for 2013 will be an opportunity for ANDRA to clarify the progress made concerning aspects linked to the industrial design of Cigéo, its safety, its reversibility, its location and its surveillance.

Ahead of this debate, ASN will issue opinions on the studies submitted by ANDRA in 2011 and 2012. ASN will also take part in the debate and will present its role in the examination process as well as its expectations on key subjects such as operating and long-term safety, or reversibility.

ASN will also continue its involvement in work being done on these topics internationally, in particular within IAEA, the European nuclear safety regulators' Group (ENSREG), the Western European Nuclear Regulators' Association (WENRA) and bilaterally with its counterparts.

ASN will take part in the 2013 transposition of the European directive establishing a community framework for the responsible and safe management of spent fuel and radioactive waste.

With regard to the former uranium mining sites, ASN will in particular monitor the satisfactory performance of the steps taken by AREVA for management of the mine tailings.

In accordance with its recently published doctrine on sites and soils polluted by radioactivity, ASN will be strengthening its actions in 2013, together with the administrations concerned and the other stakeholders. ASN will continue its significant commitment to operational oversight of Operation Radium Diagnosis being carried out in the Paris area.

following the Fukushima accident

The continuous reinforcement of nuclear safety

As with the Three Mile Island and Chernobyl accidents, detailed analysis of experience feedback from the Fukushima accident could take about a decade. The consequences of the accident do effectively represent a considerable amount of work not only for the licensees but also for ASN and its technical support organisation, IRSN.

Two years after the accident, it can already be asserted that the national and European stress tests have demonstrated the effectiveness of a coordinated international approach, implemented within the framework of national responsibilities, in enhancing overall safety at a European level and in each of the member countries.

In this spirit, ASN will be particularly vigilant in monitoring the implementation of all the requirements it has prescribed. It will play an active part in the work initiated at the European level, in particular within ENSREG and the WENRA and HERCA associations, following the recommendations and suggestions of the peer review conducted in the first half of 2012.



The exceptional earthquake of magnitude 9 on the Richter scale, which occurred on 11 March 2011, off the coast of Honshu, Japan's main island, caused a tidal wave which struck the coast, devastating everything in its path. This major natural disaster had consequences on six nuclear sites located along the North-Eastern edge of the Island of Honshu. The tidal wave in particular swept over the protective dyke of the Fukushima Daiichi power plant and submerged the facilities, damaging the cooling installations and destroying the emergency generators¹, a situation that was exacerbated by the fact that the off-site electrical power supply lines had been brought down. Consequently, the reactor cores and the nuclear fuel storage pools could no longer be cooled, resulting in a nuclear accident.

As soon as the disaster was announced, ASN activated its emergency centre in order to obtain a clear picture of the accident which had struck the Fukushima Daiichi nuclear

power plant, so that the French population could be kept informed. The emergency centre, which was operational 24/7 was kept active for a month, until the situation was stabilised.

Following the Fukushima Daiichi accident, stress tests and inspections were started on the French nuclear facilities, which led ASN to issue requirements in 2012 designed to significantly reinforce the safety margins of the facilities assessed. In 2012, ASN also defined priorities for upcoming work on social, organisational and human factors (SOHF) and pointed out the need to strength certain safety baseline requirements. Finally, ASN continued to participate in nuclear emergency management work and international harmonisation of standards.

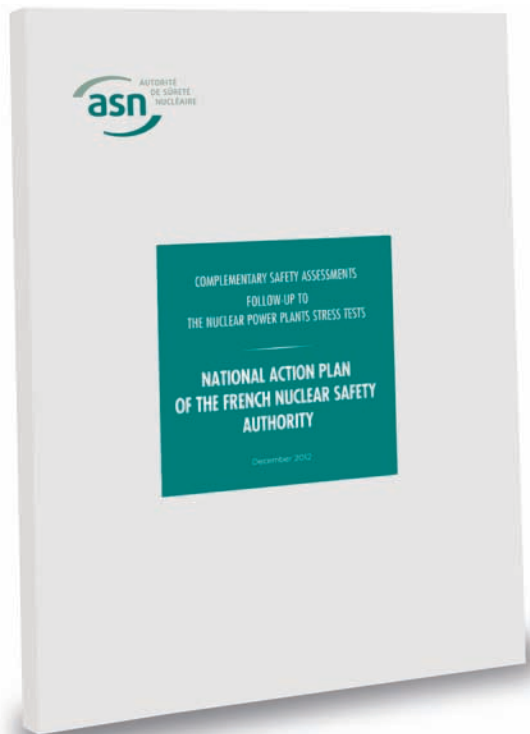
Stress tests on French nuclear facilities

In France, the stress tests were in response to a two-fold requirement: firstly, within a European framework, with the organisation of stress tests of NPPs by seventeen European countries, as requested by the European Council on 24th and 25th March 2011, and secondly, within a national framework with the performance of a nuclear safety audit of the French civil nuclear facilities in the light of the Fukushima Daiichi accident, as requested by the Prime Minister on 23rd March 2011.

The first results of this initiative were integrated into the report submitted at the extraordinary meeting of the contracting parties at the August 2012 Convention on Nuclear Safety (CSN)², which itself gave rise to a number of recommendations.

The European framework

The European Council of heads of State and Government asked the European Commission and the European nuclear safety regulators to perform stress tests designed to check the robustness of the NPPs to exceptional situations such as those which led to the Fukushima accident. The results of these stress tests were then examined by a European level peer review conducted under the supervision of the ENSREG³. This



1. Electricity generator which, in the event of the loss of off-site electrical power, can provide the electricity needed to run the pumps circulating the cooling water.
 2. The CSN, which is ratified by 75 countries, concerns civil nuclear power reactors in operation. It was adopted in June 1994 and France ratified it in September 1995. Its contracting parties agree to submit a report describing how the obligations of the Convention are implemented, along with the best safety practices in their respective countries. The reports of the contracting parties are examined at a review meeting during which each party can put questions to the others. The second extraordinary review meeting was organised in August 2012, and was devoted to the measures implemented or planned by the Contracting Parties further to the Fukushima accident.
 3. ENSREG, set up in March 2007, is the European nuclear safety regulators' Group, a grouping of the heads of the European Union's safety regulators and the European Commission.

review mobilised some 80 experts from 24 States and the European Commission.

This review was organised into three sections: natural initiating events (earthquake, tsunami, and extreme climatic conditions), loss of the facility's safety systems, and severe accident management.

The ENSREG report of 26 April 2012, concluding the peer review and validated by the European Commission, indicates that all the countries have taken measures of varying degrees to improve the safety of the facilities, and that despite differences in national approaches, consistency is observed in the definition of the subjects to be addressed and the solutions envisaged. It contains two principal recommendations for the national nuclear safety regulators. They concern:

- the need to implement recognised measures to protect the integrity of containment;
- the need to improve the prevention of accidents resulting from extreme natural phenomena and to mitigate their consequences.

Regarding France more specifically, the ENSREG report gives a positive appreciation of the results of its stress tests, and notes the comprehensive nature of the assessments conducted under ASN's supervision. ENSREG commended the wide range of improvements decided on to reinforce the safety of the French nuclear facilities beyond the existing safety margins, and notably the creation of a "hardened safety core" of measures designed to control the fundamental safety functions in extreme situations. This report also makes several recommendations, particularly concerning the extension of the scope of certain studies, which have been taken into account by ASN in its national action plan.

In accordance with the conclusions of the European Council of June 2012 and as part of the ENSREG global action plan of July 2012, ASN published its national action plan on 20 December 2012, presenting the progress of the implementation of:

- the decisions taken at national level further to the Fukushima accident;
- the recommendations resulting from the European stress tests;
- the recommendations resulting from the extraordinary meeting of contracting parties to the Convention on Nuclear Safety in August 2012.

This action plan should undergo a European level peer review, which will end with an ENSREG seminar in Spring 2013.

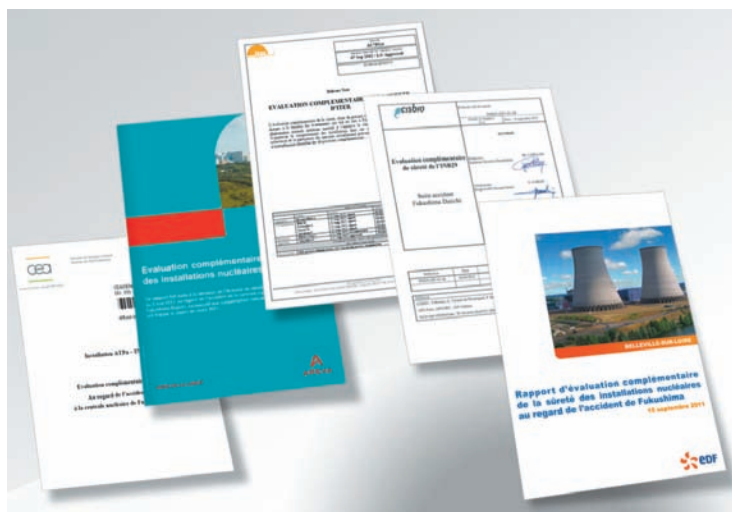
The national framework

In particular further to a request from the Prime Minister, ASN initiated a study of the safety of the nuclear facilities, primarily the NPPs, in the light of the accident which struck the Fukushima nuclear power plant.

This study, which was the subject of the stress tests approach, was carried out according to the specifications drafted at a European level, with two extensions:

- on the one hand, the study conducted in France concerns all nuclear facilities, including research facilities and fuel cycle plants. The 150 French nuclear facilities were split into three groups in descending order of priority for the stress tests: 80 high-priority facilities, including all the NPPs, were examined in 2011; a second batch of facilities was the subject of licensee reports in 2012, currently being examined by ASN and its technical support organisation IRSN; the third batch will be examined in due course, in particular on the occasion of the relevant periodic safety reviews;
- on the other, the specifications were supplemented by points concerning the use of subcontractors, which was also assessed.

In its report on the stress tests of the priority nuclear facilities published on 3rd January 2012, ASN indicates that the level of safety of the facilities examined is sufficient for it not to demand the immediate shutdown of any one of them. At the same time, ASN considers that their continued operation demands that their robustness to extreme situations be increased beyond their existing safety margins, as rapidly as possible.



ECS licensees' reports – September 26, 2012

ASN thus required that the licensees adopt a range of measures designed to provide the facilities with the means to enable them to deal with:

- a combination of natural phenomena of an exceptional scale and exceeding those adopted in the design or the periodic safety review of the facilities,
- severe accident situations following the prolonged loss of electrical power or cooling and liable to affect all the facilities on a given site.

On 26th June 2012, ASN adopted 32 resolutions, each one setting some thirty complementary requirements. These resolutions cover all the facilities examined in 2011, including the EDF NPPs, all the facilities on the AREVA Tricastin and La Hague sites and certain research facilities operated by CEA and the Laue Langevin Institute (ILL). These measures will significantly reinforce the safety margins of the facilities beyond their design-basis levels. These resolutions oblige the licensees to conduct a considerable amount of work, involving significant investments in human resources and skills⁴. The work has started and will take several years. For the more complex measures, whose completion dates lie further in the future, the resolutions stipulate interim measures.

In particular, the licensees will be required to set up a "hardened safety core" of material and organisational measures to control the fundamental safety functions in extreme situations. All the sites will therefore need to have a robust emergency organisation and premises, able to withstand the occurrence of a large-scale event affecting several facilities. For the EDF NPPs, the "hardened safety core" will comprise "bunkerised" electrical systems which must be in place everywhere before 2018; as of the end of 2013, additional emergency diesel generators will have to be installed. For this "hardened safety core", the licensees submitted a detailed dossier in mid-2012 presenting the equipment to be added and the corresponding time-lines. ASN will issue a position statement on these dossiers in mid-2013, based on the conclusions of the examination by IRSN and Advisory Committees for reactors and for laboratories and plants.

For the lower-priority facilities in the second batch, the stress test reports were submitted by the licensees in September 2012. The facilities in particular concerned

include those being decommissioned by EDF, the ITER facility, CIS bio international and the CERCA plant in Romans-sur-Isère. ASN and its technical support organisation have begun their examination of these reports. ASN will issue a position statement after examination by the Advisory Committees scheduled for July 2013.

Inspections of French nuclear facilities following the Fukushima accident

In addition to the stress tests, ASN conducted a campaign of inspections targeting topics related to the Fukushima Daiichi accident.

These inspections, carried out during the summer of 2011 on all the nuclear facilities felt to be high-priority for the stress tests, comprised field checks on the conformity of the licensee's equipment and organisation with the existing safety baseline requirements. In 2012, inspections were carried out to check that the corrective measures requested after the 2011 inspections had actually been implemented on these priority facilities. These inspections revealed that the licensees on the whole took the planned steps satisfactorily.

Inspections were also carried out in 2012 on the lower-priority facilities which had not been the subject of targeted inspections in 2011 on topics related to the Fukushima accident. They showed that the general condition of the facilities was satisfactory, but that there were deviations on certain sites, in particular in Creys-Malville, where ASN served formal notice on the licensee.

In 2013, ASN will continue to monitor performance of the corrective measures requested as a result of these inspections.

An open and transparent approach

ASN attached the greatest importance to ensuring that the overall approach to the stress tests performed following the Fukushima accident, was both open and transparent.

Representatives of the High Committee for Transparency and Information on Nuclear

4. These individual resolutions are legally binding on the licensees. These resolutions are issued by ASN on the basis of article L. 592-20 of the Environment Code and form a part of the legal framework applicable to nuclear activities in France. This framework consists of the Environment Code (containing the provisions of the Act on transparency and security in the nuclear field of 13 June 2006), the Public Health Code, the Labour Code and the various implementing texts: decrees and ministerial orders (issued on the advice of ASN) and regulatory resolutions (general, legally binding resolutions) issued by ASN on the basis of article L. 592-19 of the Environment Code. ASN also regularly sends the licensees formal requests by post.

Security (HCTISN⁵), the local information committees (CLI⁶) and several foreign nuclear safety regulators were invited to the technical meetings as observers, and to take part in the targeted inspections performed by ASN; these various stakeholders also received copies of the reports transmitted by the licensees. Some observers submitted contributions to the analysis of the licensee reports, which ASN incorporated into its conclusions.

At each step in the process, whether European or French, ASN posted the various documents produced on its website (www.asn.fr), and more specifically:

- the ASN resolutions;
- the stress test specifications for the European and French frameworks;
- the list of nuclear facilities concerned;
- the reports of the tests performed by the licensees;
- the opinions of the Advisory Committees of experts;
- the follow-up letters to the inspections performed by ASN;
- the report submitted to the European Commission and the Prime Minister.

Lastly, ASN published several information notices and held four specific press conferences. The presentation to the press of the 2011 report on the state of nuclear safety and radiation protection in France, on June 28th 2012, also provided an opportunity to review the follow-up to the stress tests.

Social, organisational and human factors

Social, organisational and human factors, which are key elements in safety, received particular attention during the stress tests performed in France. On completion of the various investigations, ASN indicated that it had identified three priorities in this area: Renewal of the licensees' workforce and skills; the organisation of the use of subcontracting, which is a crucial and difficult subject;

research on these topics, for which national or European programmes have to be initiated.

Following the stress tests, ASN set up a pluralistic working group on these subjects called the COFSOH (Social, organisational and human factors steering committee). In addition to ASN, this committee includes representatives of institutions, environmental protection associations, personalities chosen for their scientific, technical, economic, social, or information and communication expertise, persons in charge of nuclear activities, nuclear industry professional federations and representative employees' unions.

Three plenary meetings of this committee were held in 2012. The work will continue in 2013, in particular on the following topics: subcontracting in a normal operating situation (organisation and intervention conditions), legal questions concerning the use of subcontractors, management of emergency situations.

Strengthening of safety baseline requirements

In its opinion of January 2012 on the stress tests on the high-priority French facilities, ASN recommended that the draft order setting out the general rules for BNIs be signed as rapidly as possible. This order was published in the *Official Journal* on 8 February 2012.

Requirements in terms of emergency preparedness and management were thus introduced into the regulations, and the monitoring of outside contractors was tightened: the order requires the licensee to directly monitor interventions that are important for safety. This order also underlines the requirements relative to the handling of deviations, particularly with regard to the cumulative impact of different deviations and the analysis of their recurrence.

Moreover, work continued in 2012 to review the methodology for assessment of the effects of earthquake and flooding on nuclear facilities and to re-assess the risks induced by the other industrial activities present around the nuclear facilities. ASN in particular intends in early 2013 to publish a new guide for protection of nuclear facilities against the risk of flooding.

5. Created by the 13 June 2006 Act on transparency and security in the nuclear field, the HCTISN is a national body for information, consultation and debate on the risks related to nuclear activities. It comprises elected officials, experts and representatives of civil society.

6. The CLIs are set up around the main nuclear facilities and are local information and consultation bodies.

Nuclear emergency management

ASN is a participant in all the national and international reviews concerning the organisational measures to be adopted by the public authorities in the wake of the Fukushima nuclear accident.

At a national level, therefore, ASN takes part in the ministerial work being done on experience feedback concerning management of a nuclear emergency. At an international level, ASN takes part in the experience feedback work being done within international bodies such as IAEA or NEA, or within regulatory body networks, such as WENRA and HERCA, which bring together the heads of the European nuclear safety and radiation protection authorities.

Experience feedback from the Fukushima Daiichi accident will also be an opportunity for ASN to take further the work being done by CODIRPA on management of the post-accident phase, concerning the processing of the consequences of a nuclear accident, from the economic, health and social standpoints in the short, medium and long terms, with a view to returning to a situation considered to be acceptable. In November 2012, ASN published the first parts of the national doctrine on nuclear post-accident management, collating in a single document the specific recommendations for exiting the emergency phase and the guidelines for the transition and long-term phases. Experience feedback from the accident in Japan will make a valuable contribution to this approach.

Revision of international safety standards

With the aim of harmonising exchanges with its foreign counterparts, ASN is heavily committed to international relations, whether bilateral, community level or international (see significant events in chapter 7 concerning international relations).

In 2012, following the Fukushima accident, ASN in particular took part in the peer review of the national reports on the NPP stress tests, a review that was chaired by Philippe Jamet, an ASN Commissioner.

ASN is also a source of proposals for changes to the European nuclear safety regulatory framework. It will continue to be heavily involved in the work of WENRA and aims to see Europe become a driving force behind improvements to nuclear safety worldwide. ■



CONTRÔLE

the French Nuclear Safety Authority review

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The screenshot shows the ASN website interface. At the top, the ASN logo and name 'ASN | AUTORITÉ DE SÛRETÉ NUCLÉAIRE' are visible, along with a search bar. Below the header is a navigation menu with categories like 'MULTIMEDIA', 'COMPLEMENTARY SAFETY ASSESSMENTS', 'EPR REACTOR', 'NEWS RELEASES', 'TECHNICAL SUPPORT', 'REFERENCES', 'EVENTS', and 'ASN'S PUBLICATIONS'. The main content area is divided into several sections: 'News releases' featuring a large image of a worker in a yellow safety vest and a headline about the 'Third ten-yearly periodic safety review of Fessenheim NPP reactor n°2'; 'ASN's videos' with a video player and a headline 'L'Orme des merisiers: implementation of the ASN reference approach'; 'Recent publications' with a list of documents including 'Nuclear safety and radiation protection in France in 2011' and 'Comité review #193'; and 'Direct access' with links to 'ASN Organisation Chart' and 'ASN Institutional brochure'. Social media icons for Facebook, Dailymotion, and Twitter are also present.

News about nuclear safety and radiation protection, the activities of the French Nuclear Safety Authority (ASN) as regards industry and operators, the reports of the Magazine *Contrôle*, follow-up letters after inspections, local action, practical information and comprehensive archives. Find out all you want to know about the Authority of Nuclear Safety and what it does - permanently at your service on the web.



Improving nuclear safety
and radiation protection

