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1 Government bill on transparency and security in the nuclear field

On July 7, 1998, the Meurthe-et-Moselle *député* and former chairman of the Parliamentary Office for Scientific and Technology Choices Assessment, Jean-Yves Le Déaut, delivered a report to the Prime Minister on the French system of radiation protection, control and nuclear security. Subsequent to this, a Government bill on transparency and security in the nuclear field was submitted to the Senate on June 18, 2002 by the minister for ecology and sustainable development. It was then incorporated, following some amendments, into the energy policy strategy bill, of which it constituted Title V, and was made available for public viewing on the ASN website and the ministry for ecology and sustainable development website on November 7, 2003. In March 2004 it was decided that the provisions relating to transparency and security in the nuclear field would be removed from the energy policy strategy bill and examined at a later date.

It has now been decided that the first reading of the bill on transparency and security in the nuclear field will take place in the Senate during the first quarter of 2006.

Furthermore, on January 5, 2006, the French President announced that he had asked the Government "to create, through the law on nuclear transparency (...) an independent authority for control of nuclear security, radiation protection and information." In consideration of this request, and in order to benefit from deliberations on the structure of control systems for these facilities since the bill was submitted on February 22, 2006, the Government submitted a letter of correction to the Senate. The letter requested firstly the insertion into the bill of a title to establish an independent administrative body responsible for control of nuclear safety and radiation protection, and information in these areas, and secondly, an amendment to the title relating to basic nuclear facilities.

Aside from these provisions, the bill completes the general legislative framework of nuclear activities as defined by public health law. The bill aims to prevent the health hazards and inconveniences of nuclear activity for individuals and the environment and to enhance knowledge of the risks related to this activity and of the preventive measures taken.

Defence-related nuclear facilities and activities are subject to an obligation of information and control, as are the facilities and activities covered by this bill. This obligation will be implemented within conditions set by the Conseil d'État which reconcile organisation of nuclear safety and radiation protection with the requirements of national defence.

The bill provides the main definitions and principles to be implemented in terms of nuclear activity

It defines nuclear security, nuclear safety and radiation protection. It sets out the principles to be observed in the operation of nuclear activity: the precaution principle, the preventive action principle and the polluter-payer principle set out in environmental law as well as the general radiation protection principles (justification, optimisation and limitation) set out by public health law.

The bill also pronounces the right of the general public to be informed on the risk of exposure to ionizing radiation caused by nuclear activity and on effluents emitted by facilities, and it requires that the costs of measures to prevent and reduce risks and effluent emissions be met by the parties responsible for nuclear activity.

The bill creates a Higher Nuclear Safety Authority (HASN)

The bill creates a higher nuclear safety authority (HASN) as an independent administrative body. The bill confers responsibility on the HASN for State-wide control of nuclear safety and radiation protection as well as public information in these areas.

The HASN will be consulted on the Government's decisions, particularly on regulatory bills regarding nuclear safety and may specify the terms for technical application. It will be responsible for control of nuclear safety and radiation protection. Information on nuclear safety and radiation protection will also be one of its major areas of activity.

The bill states that the HASN will comprise a college of five members: three of them, including the chairman, will be designated by the French President; one will be designated by the chair-

man of the National Assembly and the other by the chairman of the Senate.

The bill organises transparency in the nuclear field

The bill establishes the right to access information held by operators of facilities with a source of ionising radiation exceeding certain thresholds and by operators of radioactive materials transport. This measure sets nuclear activity apart from other industrial activities that are not subject to an obligation to transparency.

A CLI (local information commission) is established on each site housing a BNI (basic nuclear facility) and may take the form of an association. Its main role is that of a provider of information and cooperation in terms of nuclear safety and radiation protection for the particular site. It may request the services of specialists and perform measurements or analyses in the environment. It is financed by allocation of a portion of BNF tax revenues and may be eligible for public subsidies. A CLI federation is also established.

A High Committee on nuclear security transparency, made up of members nominated by decree, has been created as the guarantor of information and the transparency principles set out by the bill. The High Committee helps develop and disseminate information and may be consulted on any important issues regarding nuclear safety and radiation protection, control and associated information.

The bill updates the administrative status of nuclear facilities and clarifies and strengthens the control systems and applicable sanctions

A specific system has been established for BNIs and applies to nuclear reactors, to facilities for industrial and commercial enrichment, production, treatment, storage or disposal of nuclear fuels, to facilities containing radioactive or fissile materials, according to thresholds defined by a decree read by the Conseil d'État and to certain particle accelerators.

The authorisation system echoes the notion of the provision of the amended decree 63-1228 of December 11, 1963 relating to nuclear facilities, updating it to meet international standards in this field. It also incorporates new provisions such as the establishment of public easements to maintain a protective scope on existing sites and on the entire land area of facilities after dismantling.

Nuclear safety inspectors are designated by the HASN to police the facilities. They have judiciary police powers and may report on any offences of which they are aware.

The offences are the same as those set out in other risk-prevention legislation, and in particular they appear in the environmental code for classified facilities for environmental protection. The severity of administrative and criminal sanctions depends on the specific nature of the risks presented by BNIs and the transport of radioactive materials. If necessary, a facility may be closed down or its activity suspended.

Lastly, the provisions applicable in the event of an incident or accident – nuclear or otherwise – dictate a general obligation to inform the authorities.

The provisions of the bill to create a new radiation protection inspection system, particularly in healthcare establishments and research centres where radiation sources are used, were incorporated into the public health code by law 2004-806 of August 9, 2004 relating to public health policy. These provisions round out the reform of control of nuclear safety and radiation protection and the reorganisation of services responsible for this control, both performed in 2002.

2 The challenges and ambitions of the ASN

The ASN is a public body that controls nuclear safety and radiation protection for the protection of workers, patients, the general public and the environment against hazards and nuisances related to nuclear activity, and more broadly, to ionizing radiation. This body also helps keep citizens informed in these areas.

The ASN, the men and women who work for it, perform their duties in full observance of four essential values: competence, independence, discipline and transparency.

Responsibilities and aspirations

The facilities, activities and situations portfolio under the authority of the ASN is one of the world's largest and most diversified. It includes a standardised fleet of reactors which produce most of France's electricity, all fuel cycle facilities, research facilities and plants which are practically unique in the world. The ASN also controls thousands of facilities and activities where ionizing radiation sources are used for medical, industrial or research purposes. Lastly, the ASN controls the transport of radioactive materials, with several hundred thousand shipments made annually throughout France.

Furthermore, the ASN strives to develop a broader view of its scope of control, considering material aspects as well as organisational and human factors. It monitors the impact of activities on individuals and the environment and ensures clear, exhaustive and safe management of radioactive waste.

The diversity and significance of the sectors and areas controlled by the ASN confer considerable responsibilities. The ASN must ensure efficient, relevant and transparent control of nuclear activity always with the aim of ongoing progress. At national level, it is responsible for protecting and informing citizens. At international level, it must act as one of the major nuclear safety authorities, taking care to cooperate with its peers and ensure that nuclear safety and radiation protection principles are observed throughout the world. Two years ago, the ASN devised a multi-year strategic plan – "For progress in nuclear safety and radiation protection" – which was made public and which features the main strategic focuses for the coming years.

The ASN's ambition is to ensure effective, legitimate and credible supervision of nuclear activities which is recognised by citizens and constitutes an international reference.

Organisation and operation

As of January 1, 2006, the ASN has 378 agents. One of its strengths lies in the diverse backgrounds of its agents, including engineers in industry and health, doctors and pharmacists, legal experts and administrators and specialists in the social sciences and communication.

This diversity, however, must not lead teams to be detached from one another. The ASN strives to develop a shared culture, based on the principle of ongoing improvement and geared towards its final aim, which is the protection of citizens and the environment.

The ASN is headed by a managing director supported by a staff comprising his deputies and cabinet. It encompasses the central departments responsible for drafting general technical regulations and coordinating regional teams in charge of controlling facility land use and activities. Each of the ASN's entities helps to inform the general public, within its specific field, on nuclear safety and radiation protection.

With a view to structuring internal information exchange and helping to capitalise on information, the ASN began in 2005 to implement a shared information system (ASN-IS). It is being gradually deployed to all fields of the ASN, particularly that of radiation protection. The ASN must now make this tool the basis for its operation.

Performance of control

The ASN, with such major responsibilities, must ensure that it is effective and efficient. It must ensure that the scope and precision of the controls it performs are in proportion to the safety risks and stakes.

During the past few years, the ASN has introduced different levels of intervention in terms of nuclear safety and radiation protection control. It intervenes directly in major issues, specifically by overseeing nuclear safety and radiation protection inspection. It organises and oversees

the intervention of approved bodies in the most standardised areas, particularly those concerning control of standardised equipment such as radiology machinery. Lastly, it aims to implement the principle of the prime responsibility of nuclear operators and users of ionizing radiation by extending, within certain limits, the range of decisions that they may make without ASN authorisation.

An international reference

With responsibility for control of one of the world's main nuclear fleets, the ASN's brief extends beyond national borders. There are two main reasons for ASN's resolute investment on the international scene: firstly the comparison of bilateral or multilateral practices and information-sharing techniques will strengthen its nuclear safety and radiation protection control capacity and thus boost its performance and secondly the creation of a world network of Nuclear safety authorities will greatly facilitate management of feedback and emergency situations on an international scale. This principle is illustrated by the responsiveness and efficiency of the various European Nuclear safety authorities and international organisations such as the OECD's international nuclear agency in sharing information at the time of the foundry explosion near the Sosnoby Bor plant in Russia in late 2005.

Lastly, the ASN aspires to be an international reference and at the end of 2006 will undergo an international audit on its organisation and operation, to be conducted by its peers and managed by the IAEA. The audit report will be made public on receipt in early 2007.

Working towards an independent authority

The French President, in his New Year speech to the "Forces Vives de la Nation" (a gathering of key representatives of French civil society, insurance and business associations, trade unions and employers' associations) on January 5, 2006, explained that he had asked the Government "to create, this year, through the law on nuclear transparency, an independent authority for control of nuclear safety, radiation protection and information".

There will thus be a change to the ASN's legal status during 2006. This change stands to confirm and strengthen the organisation and practices adopted by the ASN over the past thirty years and also to reinforce the values on which its actions are based: competence, independence, discipline and transparency.

In 2006, the ASN will work on government projects to prepare this major statutory change and throughout the year will strive to maintain its standards in terms of nuclear safety and radiation protection control.

3 Controlling exposure to radon

Radon-related risks

Exposure to radon, along with medical exposure, is the leading source of the French population's exposure to ionizing radiation. Radon is a certain cause for lung cancer in humans (classified in group I by the International Agency for Research on Cancer (IARC)). According to available estimates, the numbers of lung cancers that can be attributed to radon in France are far fewer than those caused by tobacco. However, according to a recent European study, around 9% of lung cancers in Europe are caused by radon. Thus the number of people exposed has made radon a public health issue which calls for action, especially since exposure can be significantly reduced by often simple measures.

Regulatory initiatives from the ASN since 2002

Beginning in 2002, the ASN began to implement a new regulatory framework for managing radon-related risks in public places. The new system is now fully operational:

- radon measuring campaigns, carried out between September and April, are assigned to approved bodies; 101 bodies, approved for the current campaign, carry out measurements according to the new AFNOR standards;
- the list of the 31 top-priority districts and the categories of establishment where measurements must be performed has been published, and the DDASS departments are responsible for drawing up the local list with the names of these establishments.

These regulatory projects will be completed in early 2006 with the publication by the labour ministry, with support from the ASN, of a law on managing radon-related risks in the workplace.

Inter-ministerial action plan 2005-2008

Based on the initiatives adopted by the Government in June 2004 within the context of the national health and environment plan (PNSE), in 2005, the ASN drew up a plan, in collaboration with the ministry for urban planning and construction, to coordinate the actions of various national bodies involved in this area, such as the radiation protection and nuclear safety institute (IRSN), the health monitoring institute (InVS) and the scientific and technical building institute (CSTB) and also to promote regional initiatives to strengthen the skills of local stakeholders. The aim of the plan is three-fold:

- to create a new policy for managing radon-related risks in the home and in new buildings;
- to support and control the implementation of regulations for managing radon-related risks in public places;
- to improve and disseminate knowledge on exposure and radon-related risks.

Managing radon-related risks in existing housing and in new buildings

The PNSE gives priority to the management of radon-related risks in housing since exposure may be high given that more time is spent in the home than in the workplace, for example.

In 2006, assistance mechanisms will be identified to encourage the reduction of radon levels in housing and a feasibility study will be conducted on incorporating radon measurements into the housing health standards required for real estate transactions. A project underway for new housing in top-priority districts will lead to the establishment of building standards to limit radon concentrations.

Lastly, training and information initiatives will be geared towards building professionals in order to better structure bids for renovation projects following an initial diagnosis indicating high radon concentrations.

Control and monitoring of regulation in public places

An initial campaign carried out between 1999 and 2002 produced diagnoses in more than 13,000 public establishments, particularly schools. The results of these measurements, published by the ASN in 2003, were used to make an initial identification of non-compliant establishments: 8% of the establish-

[1] *"Radon in homes in risk of lung cancer: collaborative analysis of individual data from 13 European case-control studies"* S. Darby, D. Hill, M. Tirmarche, et al., British Medical Journal, December 2004.

ments checked had ambient radon concentrations falling between 400 and 1000 Bq/m³, and 4% passed the 1000 Bq/m³ mark. A new report will be produced in late 2006 based on the results of the current campaign, and this will provide new indicators.

Particular emphasis will be placed on the follow-up by DDASS departments of non-compliant establishments to ensure implementation of corrective actions. Within the context of the approvals it issues, the ASN will also organise control of approved bodies in order to check the quality of the measurements performed.

Another important initiative involves updating the list of top-priority areas, using national criteria to be defined, in order to complete or correct the 2004 list of 31 top-priority districts, taking into account the district areas neglected by this classification.

Knowledge on exposure and radon-related risks

The improvement and dissemination of knowledge on radon exposure and the related risk are closely linked to the implementation of a relevant information system. On the initiative of the general health department, the database currently under construction (housing/health), accessible via Internet, will include a section devoted to radon. In the long term this should allow the pooling of existing data and new data collected by the approved bodies.

The Inter-ministerial action plan identifies public information strategy initiatives and studies to be implemented to improve knowledge of radon-related risks and the management of these risks, with an emphasis on studies involving characterisation of the risk of lung cancer in the most exposed regions.

4 EPR Reactor Project Safety

Safety objectives determined

The ASN judges the safety of reactors currently in service in France as satisfactory. It considers, however, that any project involving new generation electronuclear reactors must reach an even higher safety level.

With this in mind, in 1993, French and German Nuclear Safety Authorities jointly determined heightened safety objectives for the EPR reactor project (European Pressurized water Reactor), within the scope of an evolutionary design encompassing experience feedback from currently operating reactors:

• the number of incidents must be reduced, in particular via enhancement of system reliability and better account being taken of aspects related to human factors;

• risk of core meltdown must be reduced even further;

• radioactive releases which may result from conceivable accidents must be minimized:

– for accidents not involving core meltdown, measures to protect people living in the vicinity of the damaged plant must not be necessary (no evacuation or sheltering);

– for accidents involving low-pressure core meltdown, measures to protect people must be very limited with regards to scope and duration (no permanent rehousing, no emergency evacuation beyond the immediate vicinity of the site, limited sheltering, no long-term restriction on consumption of foodstuffs);

– for accidents which might lead to significant early radioactive releases, in particular accidents involving high-pressure core meltdown, these must be "practically eliminated".

As a result of operational experience acquired from reactors in service, the ASN has also requested that operational constraints and aspects related to human factors be taken into account from the design stage, with the particular aim of enhancing radiation protection for workers and restricting radioactive releases together with the quantity and activity of waste produced.

Examples of improvements brought about by the EPR reactor project

The objectives thus determined have led reactor designers to propose, within the framework of safety options, a certain number of improvements in terms of safety, among which the following may be mentioned as illustrations:

– with regards to reducing accident risks, significant reinforcement at civil engineering level of the nuclear island to afford enhanced protection against external hazards, including earthquakes, industrial explosions and aircraft crashes;

– with regards to taking into account management of serious accidents from the design stage, placing, under the reactor vessel, a dedicated device to recover, contain and cool the melting core;

– with regards to taking into account the human factor in accident management, design-induced longer times left to operators before their intervention becomes necessary.

The EPR reactor project: an opportunity to harmonise safety approaches between European countries

From the outset of the project, French and German Nuclear Safety Authorities, together with their technical supports and the groups of experts attached to them worked in close collaboration to determine the project's safety requirements and examine the design options put forward.

Although reduced since the German government's decision in 1998 to abandon the nuclear field, this collaboration has been maintained, and certain German experts continue to take part in work on technical aspects of the project.

In addition, Finnish electricity generating utility TVO submitted a request in 2004 for permission to build an EPR reactor for which the Finnish Nuclear Safety Authority (STUK), after examining the project for a year, gave the go-ahead to the Government who subsequently authorised construction at the beginning of 2005. Against this backdrop, Finnish and French Nuclear Safety Authorities decided to strengthen their collaboration in this field: besides remitting all reports dealing with the assessment already carried out in France with regards to the EPR project to STUK, several joint technical meetings took place. More

than a mere mutual sharing of information, these exchanges make it possible to examine the opportunity for harmonising certain design provisions and take into account the differences in approach towards safety issues from which they arose. In addition, in 2004 the ASN appointed a Finnish expert within the Standing Group of experts for nuclear reactors. Finally, on behalf of STUK, the ASN inspected the beginning of production of the major components in the Finnish project such as the vessel and the steam generators.

The Nuclear Safety Authority's position

On the 28th September 2004, on behalf of the ministers in charge of nuclear safety, the nuclear safety and radiation protection general manager sent a letter to EDF's CEO setting out the public authorities' position on the safety options for the EPR project.

On the basis of the examination carried out by the ASN with the backing of the Standing Group of experts for nuclear reactors attached to it, the public authorities consider that the safety options chosen satisfy the objective for enhancing safety in comparison to current reactors and request EDF to comply with the two compendia of technical rules appended to the letter. At the safety option stage, this appreciation must, moreover, be confirmed by the examination of certain detailed design studies.

The position of the public authorities, which is of a technical nature, in no way constitutes authorisation to construct an EPR reactor. Such authorisation comes under the procedures established by decree no. 63-1228 of the 11th December 1963 regarding nuclear facilities.

Preparing a possible request for authorisation to set up a nuclear site

The procedure for dealing with a request for authorisation to set up a nuclear site is defined by the aforementioned decree of the 11th December 1963.

In particular, the decree stipulates that, to back up any request for authorisation to set up a nuclear site submitted to the ministers in charge of nuclear safety, the future plant operator must:

- submit for examination by the ASN a preliminary safety analysis report (RPS) encompassing description of the site and the operations that will be carried out there, inventory of the risks that it presents, regardless of the source thereof, analysis of the provisions made to prevent such risks and measures to reduce the probability of accidents and subsequent effects;

- present a documentary file which will be subject to a public enquiry, including various site plans together with, on the basis of RPS contents, a study of hazards and an environmental impact report. This file must also stipulate the provisions aimed at facilitating the future dismantling of the site.

When preparing a request for authorisation, EDF sent the ASN at the beginning of 2004 a so-called generic version of the RPS project, as this included no specific element linked to the choice of the site and, in October 2005 a first complete version of the report. Examination by the ASN of these proposed reports makes it easier to deal with any future request.

Olkiluoto nuclear site in Finland. Background: existing reactors. Foreground: simulated image of the EPR reactor

The public debate over the pilot EPR project

On the 21st October 2004, EDF announced that it had chosen the Flamanville site for a proposed location of an EPR-type reactor. EDF then referred to the National Commission for Public Debate (CNDP), in accordance with article R. 121-1 of the environment code which provides for a mandatory national public debate to take place on the proposed setting up of a new basic nuclear site. Following this debate which began on the 3rd October 2005 and which is scheduled to end on the 18th February 2006, EDF may submit a file requesting authorisation for setting up an EPR reactor. Then the ASN will deal with the request and in particular examine the safety issues relating to the location of the site of the EPR reactor, and will especially check that site-specific constraints (risk of flooding, earthquake risks, uncertain climatic factors, etc.) have been correctly taken into account at site design and dimensioning levels with a view to ensuring safety.

5 Working towards a law on radioactive waste in 2006

Context

Article L. 542-3 of the environment code states that the Government must submit to Parliament, before December 30, 2006, a summary report on research on the future of high-level radioactive waste, accompanied by a bill authorising, if necessary, the creation of a disposal facility for high-level and long-lived radioactive waste.

2006 will clearly be an important year for the management of radioactive waste in France.

Preparing to meet the deadline

All those involved in radioactive waste have finalised the key elements for preparing to meet the deadline set by article L. 542-3 of the environment code.

The first element was the publication in November 2004 of the *National inventory of radioactive waste and reusable material* produced by the ANDRA (national radioactive waste management agency). This inventory, the first of its kind in France, provides a broad and complete view of the quantities of existing and future waste by 2010 and 2020. It also includes an inventory of materials considered to be reusable, such as spent fuel. The inventory will be updated in early 2006.

The OPECST (Parliamentary Office for Scientific and Technology Choices Assessment) organised a series of hearings at the beginning of 2005, to take stock on research into the management of high-level long-lived waste. In March 2005, the OPECST published the report *To look after the long term, an act in 2006 on the sustainable management of radioactive waste*, which sets out proposals for the improving radioactive waste management in France.

The main players in research, the CEA for enhanced partitioning and transmutation of long-lived radionuclides and long-term storage, and the ANDRA for disposal of waste in deep geological repositories, submitted their reports to the Government in June 2005. These reports present the results of 14 years of research including the results obtained by the ANDRA from its research in the Meuse Haute-Marne underground laboratory in Bure.

National plan for management of radioactive waste and reusable materials: a general framework for managing radioactive waste

Following a recommendation by the OPECST, in 2003 the ASN offered to conduct a feasibility study for the national plan for managing radioactive waste. The minister for ecology and sustainable development announced the launch of the plan during a Cabinet on June 4, 2003. The ASN coordinated the development for public bodies of the National plan for management of radioactive waste and reusable materials (PNGDR-MV) by creating a working group made up of representatives of elected officials, waste producers, managers of radioactive or non-radioactive waste, representatives from the ministries concerned, technical specialists and environmental protection associations.

The main objectives of the PNGDR-MV are as follows:

- to seek solutions for managing all radioactive waste, regardless of who has produced it;

- to ensure consistency of the radioactive waste management system;

- to allow all radioactive waste to be directed into suitable channels, including when the party responsible for the waste is unable to send it to the ANDRA, thus recognising the ANDRA's status as a public service provider.

The efforts made during development of this plan have produced the following strategy:

A long-term management channel for low-level long-lived waste will be developed by the ANDRA and could be commissioned by 2012.

In 2010, the holders of reusable radioactive waste will present the ministers in charge of nuclear safety with studies on possible management channels if these materials were to be considered waste. Studies of reusable radioactive waste for which reconditioning processes are being developed and have never been implemented will be presented in 2008.

The ANDRA and the producers of used sealed radioactive waste are conducting studies to produce long-term management solution sources. The results of these studies will be presented in 2009 to the ministers in charge of nuclear safety.

For tritiated waste that cannot be disposed of on the surface or near surface repositories, the CEA, in conjunction with the ANDRA, will seek the best storage solutions for the decay process required before disposal, in order to present a management strategy to the ministers in charge of nuclear safety by 2008.

The state of solutions for short- and long-term management of waste with enhanced natural radioactivity will be examined upon renewal in 2009.

Analyses of the long-term impact of disposal of uranium mining residues will be conducted by the operator of these repositories. An appraisal of the study results will be presented to the ministers in charge of nuclear safety by January 1, 2008.

Public information and consultation

The Government consulted the national public debate commission on the issue of radioactive waste management. The debate was conducted under the authority of the specific public debate commission from September 2005 to January 2006. It allowed the interested parties, waste producers, disposal facility managers and the relevant administration and environmental protection associations to express their views on the matter. The public debate meetings were held in regions where facilities research on waste management or storage of existing waste are located. The debate provided the opportunity to discuss technical aspects - specifically through meetings held at the Cité des Sciences et de l'Industrie de la Villette in Paris - as well as societal and economic aspects.

The national public debate commission published a preliminary report at the end of January 2006.

Evaluation of research

Article L. 542-3 of the environment code gave rise to the creation of the CNE (national evaluation commission), charged with submitting an annual report to Parliament on the status of research conducted by the ANDRA and the CEA. The CNE also submitted a summary report to the Government in January 2005 on research conducted during the previous 14 years.

The Nuclear safety authority, after consulting its advisory body on waste on the Argile 2005 affair, also submitted its findings to the Government on the safety and radiation protection of cases submitted by research professionals. This report was published on the ASN website: www.asn.gouv.fr. From all the cases submitted, the ASN highlights the following:

- the technological feasibility of partitioning and transmutation is not yet established. Even if such a solution were implemented, high-level long-lived radioactive waste would not be completely eliminated. Another solution is required.

Indeed, research conducted on partitioning and transmutation of long-lived radionuclides contained in waste shows that the industrial application of partitioning and transmutation methods would not be feasible before 2040 and even then could not include all high-level long-lived waste. Furthermore, partitioning and transmutation would still generate residual waste.

Moreover, recovery of waste packages already produced and packaged for treatment by partitioning then transmutation would not be desirable for reasons related to safety, radiation protection and cost. A definitive management solution is therefore necessary for these packages;

- long-term storage is not a definitive solution for managing high-level long-lived waste.

Indeed, research conducted on conditioning and long-term storage of radioactive waste confirms that storage is an essential step to allow cooling of certain waste packages before they are disposed of in deep geological repositories.

On the other hand, the ASN considers that the solution of renewing long-term storage several times should not be chosen as a system of reference, since it requires to control the process over centuries and assumes retrieval of the waste by future generations, which would be difficult to guarantee over a period of several hundred years;

- disposal in deep geological repositories is undeniably a definitive management solution.

This is the long-term management method favoured by many countries with nuclear-based electricity production.

Moreover, the results obtained by the ANDRA in the Bure laboratory on the Callovo-Oxfordian strata and its geological environment show that a safe disposal facility in the transposition zone would be feasible. This "transposition zone", with a surface area of 200 m^2 to the north and west of the Bure laboratory, would have similar properties to those in the underground laboratory;

- regarding disposal reversibility, the most desirable solution would be a step-by-step disposal

management system starting with commissioning of the repository and ending with its closure. The decision to close the disposal facility, and thus rule out reversibility, shall be taken by Parliament.

The ASN believes that, in theory, the reversibility option can have only a limited duration. Indeed, easy access to waste packages must be limited in time since a delay in closing disposal sites may jeopardise the notion, perhaps even in the long term, of the safety of storage, which is based on the ability of the clay strata to confine the radioactivity contained in the waste for long periods of time.

Additionally, it would be difficult to guarantee that provisions allowing reversibility will last beyond a period of more than 300 years. The notion of reversibility requires active management of the disposal facility during the entire reversibility phase to ensure surveillance and maintenance at minimum, along with institutional control to avoid the disposal facility being abandoned before its closure.

A law in 2006 on radioactive waste management

In accordance with article L. 542-3 of the environment code, the Government has prepared a bill that takes account of research findings and opens new perspectives for the management of high-level long-lived waste. It is set to be debated by Parliament some time in 2006.

This bill should not address only high-level long-lived waste. In accordance with the OPECST recommendation of March 2005, the focus of the National plan for management of radioactive waste and reusable materials and the methods for updating it should be approved within the context of the bill submitted to Parliament.

In view of the results obtained, Parliament should make a decision in 2006 on the follow-up to the process initiated in 1991.

Handling of casks containing cemented hulls and end-pieces in the storage hall at COGEMA's UP3 plant in La Hague

6 IRRT: an international audit of ASN in 2006

In 2005, the ASN asked the International Atomic Energy Agency (IAEA) to schedule an ASN audit assignment for the end of 2006. This audit will encompass all of the ASN's nuclear safety and radiation protection activities.

The IAEA is responsible for drafting and publishing international standards regarding safety of nuclear facilities, transport of radioactive materials, management of radioactive waste and protection against ionizing radiation. The IAEA also works to promote and apply these standards.

These standards consolidate the international consensus on matters relating to safety and safety control in terms of the responsibility of operators, control bodies and States. Some of these standards relate specifically to the organisation and legislative and regulatory framework of the nuclear safety authorities.

The IAEA offers member states various services for evaluation and application of their safety standards.

For standards concerning nuclear operators, the Operational safety review team (OSART) audits involve a team of experts from nuclear safety authorities in third countries which audit a nuclear facility. On request from the ASN, all French nuclear plants will undergo an OSART audit before the end of the decade.

The bodies performing audits of nuclear safety authorities include the following: Integrated Regulatory Review Team (IRRT) for the organisation of authorities responsible for nuclear safety control, Radiation Safety and Security Infrastructure Appraisal (RaSSIA) for authorities in charge of radiation protection and Transport Safety Appraisal Service (TranSAS) for those operating in safety of radioactive material transport. Several IRRT audits have been conducted worldwide over the past few years, generally in emerging countries, EU candidate countries or countries with a small nuclear fleet.

The IRRT audit of the ASN will be conducted by a team of at least fifteen peers from other countries' nuclear safety regulatory bodies, coordinated by IAEA specialists. The audit will take place over two weeks in November 2006. It will include presentations, interviews with ASN agents, the ministers to which it reports, its technical support and particularly with the Institute of radiation protection and nuclear safety (IRSN), as well as with the ASN's main stakeholders (administrative bodies, operators, professional corporations, professional societies, associations, etc.). It will also involve appraisals of the ASN's organisation and practices at national and regional level. The auditors will also accompany the ASN inspectors in their field assignments, whether these are inspections, technical meetings or emergency situation management drills.

As mentioned above, the audit will focus on all the businesses of the ASN in terms of nuclear safety and radiation protection. However, since the ASN underwent a TranSAS audit in 2004, the portion of the IRRT audit relating to transport of radioactive materials will be applied to follow-up of the implementation of action plans following this audit.

The audit will produce a report to be published in early 2007, prepared by the IAEA. The report will feature a list of recommendations, comments and good practices. The recommendations generally involve discrepancies with regard to IAEA standards and require action. The suggestions are guidelines for improving the efficiency and effectiveness of the authority being audited. Good practices are included for information, particularly for any other nuclear safety authorities which may consult the report. The ASN is responsible for putting them into practice.

The ASN will publish the full report in early 2007, probably simultaneously with the publication of the report on nuclear safety and radiation protection in France in 2006.

A follow-up assignment will be scheduled to evaluate the implementation of IAEA recommendations and standards.

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The ASN has a three-fold objective in pursuing this first worldwide-scale IRRT audit of a nuclear safety authority responsible for control of a major, diversified nuclear fleet.

Firstly, it wishes to undergo external evaluation by its peers to ensure that its organisation and practices comply with international standards and, by

fully incorporating recommendations made by its peers, to improve its relevance and efficiency.

Secondly, it wishes to present to its peers a number of its practices, particularly those which it believes go beyond IAEA recommendations. Specifically, although this is not routine in an IRRT audit, the ASN has asked the IAEA that the audit also evaluate its role and practices in terms of public information, communication and transparency.

Lastly, the ASN hopes to start up a movement which would lead all major nuclear safety authorities to request an IRRT audit in the coming years. The performance of these multiple audits should lead each authority to provide specialists to make up audit teams. This international peer network will be a platform for debate and discussion on the organisation, efficiency and practices of the nuclear safety authorities and the control activities they perform. It could lead to a very positive comparison of nuclear safety authorities and thus "upward" standardisation of the organisations and practices relating to control of nuclear safety and radiation protection.

7 Harmonisation of nuclear safety in Europe

Background

To begin with, nuclear energy is developed mainly on a national basis and consequently applied national safety standards. It soon became apparent that when confronted with the same safety problem, two countries could come forward with different technical responses, possibly reflecting the fact that a nuclear facility which was judged as being satisfactory in one country might not be considered as compliant with practices or regulations in the other.

Over and beyond the potentially cross-border nature of harmful effects and risks of accidents, the necessity to harmonise approaches on nuclear safety and radiation protection issues is also a result of the economic environment. Liberalisation of the electricity market and the global nature of the economy (well illustrated by the recent choice of Finnish electricity utility TVO of a Franco-German designed EPR reactor) are good reasons for such harmonisation. The Nuclear Safety Authorities of different countries must see that enhanced competition does not give rise to down-levelling of safety. On the contrary, it must ensure that safety levels continue to improve. With this in mind, it is important to foster a joint approach in the nuclear safety field, without making the least concession on the essential point: nuclear safety must be the first priority.

The ASN's position

In terms of objectives, for the ASN, harmonisation of safety in Europe must not serve as a pretext for developing detailed European safety standards in parallel with those that exist at world level drawn up by the International Atomic Energy Agency (IAEA): how legitimate would such standards be, if they were not recognized outside Europe and were not the result of a wider consensus?

In terms of methods, harmonisation could not be carried out separately from existing safety approaches, nor without the link with organisations which today exert control. Currently, expertise on nuclear safety issues is situated at the level of each country, and it is for this reason that national Nuclear Safety Authorities are in the best position to carry out such a process efficiently.

From a practical point of view, the level of detail aimed for within the scope of harmonisation must be tailored to the target: safety requirements must be sufficiently close to offer the same level of safety, with comparable industrial constraints, which means that a sufficiently accurate level should be reached without, however,

seeking to harmonise detailed points which do not provide any added value.

The means to the end

The IAEA is an organisation within the United Nations set-up. Its activities include drafting texts which set out safety principles and practices and which Member States (totalling 139) may use as a basis for their own national regulations. Drafting of these texts is a slow process as consensus must be reached between States and is supervised by the Commission on Safety Standards (CSS), chaired since 2005 by André-Claude Lacoste, which coordinates the work of technical committees.

So as to meet the request for harmonisation between relatively homogeneous countries (from a political, scientific, technical and economic point of view), at the beginning of 2003, the European Commission put forward two proposed joint directives called "the nuclear package", one of which defines general principles in the field of nuclear site safety, and the other deals with management of spent fuel and radioactive waste. It proved impossible to adopt these texts due to opposition of several EU Member States.

For their part, members of the WENRA association, created in 1999 on an ASN initiative and which brings together the 17 Safety Authority heads of the European Union's "nuclear" countries and Switzerland, have for several years been undertaking a programme aimed at harmonising technical rules in these two fields.

The WENRA approach

According to the definition used within the scope of WENRA's work, harmonisation will be achieved when there no longer exists any substantial difference between countries with regards to national safety requirements and subsequent application to sites. The task is, therefore, on the one hand, to define a minimum regulatory or para-regulatory framework for all countries concerned by the harmonisation process, and, on the other hand, to ensure that defined requirements are actually implemented by operators in these countries.

For WENRA members, harmonisation must not bring about any reduction in the level of safety; rather, when it is felt suitable, it must be able to make it possible to raise the level. It is not a question of seeking the least common denominator for different countries where safety is concerned. On the other hand, purely and simply stacking up different regulations would lead to inapplicable, even contradictory requirements. Thus, within the scope of WENRA's harmonisation work, the safety level targeted is that represented by the "top quarter". In addition, it would be acceptable for a country with stricter requirements than those which serve as reference for comparison and such a country would not be requested to lower its sights.

WENRA's harmonisation programme is developed by two work groups. The first deals with existing electronuclear reactors and the second (created after obtaining the first encouraging results in the reactor field) with radioactive waste management and dismantling. The ASN is taking an active part in the work of these two groups and one of its representatives chaired, up to January 2005, the working group on radioactive waste management and dismantling.

The results WENRA's work

During their most recent plenary meeting in Stockholm, in December 2005, WENRA members examined the reports submitted by the two working groups. They decided to publish them on their websites and present them to the different interested parties during a seminar in Brussels in February 2006.

It is clear that the two groups have fulfilled their mandate. A set of joint safety "reference levels", largely based on IAEA standards, was worked out and the situation of each individual country examined. The reports show that most of the "reference levels" have already been implemented on sites, but that a number of them are not formally required by documents recognized within the scope of the WENRA study. Consequently, if harmonisation is to be achieved, there must be significant effort towards developing regulatory or para-regulatory texts.

In accordance with commitments made, each WENRA member will, before the end of 2006, present an action plan which, with regards to technical fields where differences have been noted, aims at aligning its national practices with the defined "reference levels". The final objective is that national practices be harmonised by 2010.

Perspectives

The different approaches dealt with above are complementary and, in different ways, all lead to the harmonisation of nuclear safety in Europe. In particular, the European Commission's "nuclear package" initia-

tive and the steps taken by the WENRA association are bound, in the long run, to converge.

Without waiting, the ASN intends to take advantage of the results of on-going work to enhance its regulations and put other countries' "good ideas" to use in order to heighten nuclear safety in France. With regards to power reactors, the ASN has begun work revising general technical regulations and has already taken into account discussions within WENRA's "reactor" working group.

Finally, the direction taken by WENRA has already given rise to considerable work from organisations associated with it. It has made it possible to lay the foundations for future harmonisation work in Europe and could serve as an example in the radiation protection field.

8 Chernobyl – what has been achieved over the past 20 years

20 years of questions for a number of French people.

20 years of enhanced scientific knowledge.

20 years of heightened prevention of accidents and crisis management for public authorities.

What really happened in France in April and May 1986?

The accident happened in the middle of the night, on Saturday 26th April at 1:23 am, local time, but Soviet authorities did not issue any official information about an explosion concerning reactor no. 4 at the Chernobyl nuclear site until the evening of Monday 28th April. Meanwhile, on the morning of Monday 28th April, experts at Swedish nuclear sites noted a rise in ambient radioactivity concerning several sites and which therefore came from an external source. They rapidly informed their colleagues in other countries who, over the following days, confirmed similar observations. They quickly made the link with a fire at the Chernobyl site observed via satellites.

The national weather forecasting service indicated that an Azores anticyclone was forming and that air masses from eastern Europe would not affect France much. What no one had yet realized was that the initial explosion which had only lasted a few seconds had torn open the reactor core, thereby exposing it to the open air, and that the reactor fire, in particular the significant mass of graphite it contained, was continuing to release considerable quantities of radionuclides into the atmosphere. The fire finally lasted for ten days, with two peaks of radioactive emission on day 1 and day 9, during which significant variation in the weather took place.

During all these days between the end of April and the beginning of May 1986, radioactivity measurements in the environment carried out by the Ministry of Health's Central Department for Protection against Ionizing Radiation (SCPRI), the Ministry of Agriculture's National Centre for Veterinary and Food Studies (CNEVA) and the Treasury's Department for Consumption, Competition and Repression of Fraud (DGCCRF) were increased. Numerous other radioactivity measurements were also carried out by nuclear operators (CEA, EDF, COGEMA) on their respective sites.

The results of radioactivity measurements were communicated to the media (in particular press agencies) by the abovementioned bodies and especially by the SCPRI via daily telexes. The first increase in atmospheric radioactivity was slight and was only noted for the 30th April during the daytime by certain stations in the south-east of France. This increase concerned all the country's stations on the 1st May, with maximum recordings peaking on the 3rd May and decreasing tenfold the following day.

On the basis of data at their disposal, radiation protection specialists felt that there was no call to take specific protective measures for the public.

France and French media discovered the extent of the accident over its traditional long weekends of the 1st and 8th May, particularly long that year since the two public holidays fell on a Thursday. After the legislative elections of the 18th March 1986, France had a changeover in government which led to a cohabitation. The seriousness of the accident and the extent of the radioactive dispersion surprised the French authorities, as it did all other national authorities, and the response to such an event did not meet the challenges. Thus, some countries merely intensified their environmental radioactivity measurements, whereas others distributed stable iodine, issued warnings or imposed restrictions which, incidentally, differed depending on the country (putting livestock back into stables, restricting the use of rainwater, moderating or restricting the use of milk and/or leaf vegetables, reducing open-air activities). On the 6th May, the European Commission recommended maximum permissible levels of radioactive contamination for certain foodstuffs [Recommendation 86/156/EEC of the European Commission of the 6th May 1986 issued to Member States concerning the coordination of national measures taken with regards to agricultural produce following radioactive fallout from the Soviet Union].

In the spring of 1986, no one had the scientific knowledge they do today.

The first lessons learnt from the Chernobyl accident

A critical analysis of the Chernobyl accident was carried out by the ASN and its technical support, the IRSN, and this helped to draw important lessons for nuclear safety and radiation protection.

Nuclear reactors

The accident confirmed that safety depended on reactor design itself. The pressurized water reactors operating in France have 3 major advantages over their RBMK type counterparts in Chernobyl: their stability, the presence of a rapid automatic shutdown system and the existence of a thick concrete containment whose tightness and integrity are regularly checked and which constitutes a 3rd additional barrier between radioactive substances and the environment, whereas RBMK reactors only really have two.

Accident prevention

Systematic research into scenarios of reactivity accidents that were not envisaged at design stage and which might cause a very rapid rise in reactor power liable to lead to a major accident, is undertaken for French nuclear reactors. Study results enable specific responses to be defined.

Control of organisational and human factors

Analysis of the causes of the Chernobyl accident indicated the major role played by men and organisations at the source of the accident. An in-depth reflection on the role or organisational and human factors in reactor safety led to the notion of "safety culture", followed by the idea for safety management.

Communication with the public

The period immediately following the Chernobyl accident confirmed the great difficulty for public and media to have a clear idea of the severity of anomalies, incidents and accidents liable to affect a nuclear site. Consequently, the Higher Council for Nuclear Safety and Information (CSSIN) suggested that a scale of severity be determined that would be simple to understand and easy to use and which would enable incidents to be ranked by their level of severity.

International awareness

Given that the Chernobyl accident had repercussions in a certain number of neighbouring nations, the international community was led to negotiate several conventions aimed at preventing accidents and limiting their consequences.

Health repercussions

The unforeseen occurrence, as early as 1990, of thyroid cancers in children in Belarus, Ukraine and Russia (approximately 4,000 cases recorded today) led to formalisation of a specific approach aimed at providing preventive protection of the thyroid in the eventuality of radioactive iodine being given off as a result of an accident at a nuclear reactor: administration of stable iodine, prevention of inhalation and ingestion of radioactive iodines.

For over 20 years, France has endeavoured to perfect its nuclear safety and radiation protection system

For over 20 years, and on the basis of lessons learnt firstly following the 1979 Three Mile Island accident in the USA, then the Chernobyl accident, France has been constantly enhancing its system for managing nuclear safety and radiation protection at all levels.

Public authority organisation

In the area of public authority organisation, a central administrative board, the Nuclear Site Safety Board (DSIN) was set up in 1991 to replace the Central Department for Nuclear Site Safety (SCSIN). The DSIN initially reported to the Department of Trade and Industry, then to Ministries respectively in charge of industry and the environment. The SCPRI closed in 1994 and was replaced by the Office for Protection against Ionizing Radiation (OPRI). Following this, nuclear safety and radiation protection were brought closer together so as to optimise the system. Thus the DSIN and the main centre of the OPRI merged in 2002 to form the Nuclear Safety and Radiation Protection Board (DGSNR). From the point of view of expertise, the Radiation Protection and Nuclear Safety Institute (IRSN) was also set up in 2002 from the Protection and Nuclear Safety Institute (IPSN) and the OPRI expertise centre. This body may still develop alongside the transformation of the ASN into an independent administrative authority as announced by the French Republic President on 2006, January 5.

The ASN, made up of the DGSNR and the eleven regional DSNR, is today an organisation with 400 employees, as against just 170 in 1986 for controlling nuclear safety in France.

Operators

At operator level, which in particular means EDF, the safety culture is fostered and organisational and human factors taken into account. Each incident is precisely analysed so that incident feedback experience may be taken into account to improve organisations, work methods and sites. In this spirit, EDF has set up different tools for teams involved in the operational sector: risk analysis before action, self-assessment and self-diagnostics. In addition, the most difficult operations are specifically monitored. Operators are re-

quested to provide more complete and more realistic assessments of the radiological repercussions of accidents and these assessments are appraised by the IRSN.

Monitoring operators

Operators are monitored rigorously by the ASN and control has been strengthened and diversified. The monitoring goes from the design stage to dismantling of sites and mainly consists of site inspections, inspections of worksites when power reactors are shut down for maintenance, on-site technical meetings with the operators of Basic Nuclear Facilities (BNFs) or manufacturers of materials used in the sites, and examination of supporting documentation issued by operators. Inspections include routine inspections, more in-depth inspections on issues with particular technical difficulties, review inspections over several days, inspections with sampling and measurements, inspections immediately following an incident or a significant event. Today, there are approximately 700 inspections annually covering all nuclear sites.

Managing accident situations

The regulatory system for preventing and restricting repercussions of a nuclear accident was enhanced in 1990, thereby providing action plans with a regulatory basis. Internal emergency plans (PUIs) were set up by operators to meet with accident situations on a nuclear site. Specific action plans (PPIs) were set up in 1988 by department prefectures concerned by the presence of a basic nuclear facility (BNF) should the consequences of the event outstrip the capacity of the site to limit the radiological repercussions for civilian populations in the case of significant discharge. PPIs were improved in 2000 so as to take a reflection phase into account. An inter-ministerial directive of the 7th April 2005 covers the actions to be taken by public authorities in the case of an event which gives rise to a radiological emergency situation (informing civilian populations, managing the alert, organising the crisis at national, local and central levels). So as to optimise management of nuclear events, the ASN and IRSN have each set up an emergency centre with powerful communication means. These centres have been activated in real situations and proved to be highly efficient during the flooding of the Blayais facility during the December 1999 storm and the Rhone floods in December 2003.

Exercises and drills

So as to be fully operational, the whole system and organisation is tested on a regular basis by nuclear emergency drills as set out in an annual circular. These exercises are managed from the emergency centres and bring together the operator, local and national public authorities, in particular prefectures, the DGSNR and IRSN. In practice, carrying out an emergency drill every three years on each nuclear site seems to be a reasonable compromise between training people and the time needed for organisations to evolve. Thus, since the 1980s, the number of exercises has been significantly increased to reach ten or so per year by 2005. The exercises make it possible to test emergency plans, organisation and procedures and contribute to training participating staff. The main objectives of the exercises are determined at the beginning of the drill. They mainly aim at correctly assessing the situation, bringing the site where the accident has occurred to a safe status, taking suitable measures to protect civilian populations and ensuring good communication to media and the populations in question. At the same time, the exercises enable the alert system of national and international authorities to be tested. They also enable the provisions to be tested for administering stable iodine to prevent thyroid contamination in an accident where radioactive iodine is dispersed, in cases where a projected dose to the thyroid of 100 mSv might be exceeded.

Monitoring the environment

So as to supply public authorities without delay with information which will help them to make decisions, the networks for monitoring radioactivity in the environment have been developed and modernised; they are today managed by the IRSN. The number of stations which carry out daily collection of atmospheric particles (aerosols) has been increased. The other systems have been automated and can automatically give an alert if the threshold is exceeded. From 1991 onwards, the Teleray network has been developed for continuously measuring the dose rate linked to ambient gamma radiation (181 detectors spread throughout the country). The six automatic Hydroteleray stations continuously monitor gamma radioactivity in major French rivers downstream of nuclear sites. As for the thirteen Telehydro stations, these enable continuous monitoring of water in major metropolitan areas' water-treatment plants.

In addition to IRSN laboratories, 38 laboratories from various origins are approved by the ASN and are able to analyze radioactivity in the environment. Moreover, should a radiological emergency situation arise public authorities must have information available on the state of environmental ra-

dioactivity, and measurement figures constitute a decision-making tool. With this objective in mind, the inter-ministerial directive of the 29th November 2005 details the organisation set up to ensure such measurements and interpret the results.

Distributing stable iodine

As early as 1987, recommendations for administering stable iodine as an immediate preventive measure for the intervention levels then in force were drawn up within the framework of organising medical care on the first day of any radiological or nuclear accident. In 1990, France included taking iodine tablets as counter-measures into the PPIs. Stocks were then built up in the plants and at national level. In 1996, public authorities decided to go on to the preventive distribution phase. In 2001, against the backdrop of terrorist attacks, local stocks were made up and the possibility to meet any demand from the civilian population via back-up stocks. In all, the whole of the French population was now concerned by the distribution of stable iodine (60 million tablets have been manufactured by the central armed forces pharmacy and distributed throughout the country). Finally, in 2005, the third distribution campaign was carried out together with finalisation of local and back-up stocking that had been begun four years previously.

Medical action

As early as 1996, a manual entitled "medical action in response radiological or nuclear events", was drawn up for healthcare professionals. The document was revised after September 2001 and has been regularly updated since. In addition, orders and circulars have been issued with a view to optimising medical action (so-called Red Plan) and dealing with victims, including situations which might involve a great number of victims (so-called White Plan) in hospital infrastructures. Regional organisation in defence zones has been set up by the Ministry of Health. Specific training for health professionals and in particular medical emergency treatment in cases of nuclear and radiological risk have been set up and are currently being continued.

Informing the public and communicating

In 1987, the telematic magazine on French Minitel, MAGNUC, was created by the ASN. Since then, ASN opened its Internet website on www.asn.gouv.fr in May 2000. Updated in real time, the site makes all current news available on topics concerning nuclear safety and radiation protection.

A scale of seriousness for incidents and accidents in electronuclear reactors which have a bearing on nuclear safety and enable classification on the basis of factual criteria was initially drawn up in France, then taken up and modified by the OECD and the IAEA leading to the current INES scale applicable to nuclear sites and transport of radioactive substances. This scale was extended to radiation protection in 2004.

Orders of the 21st February 2002 and the 4th November 2005 complete the systems for alerting and informing civilian populations in the eventuality of a radiological emergency situation.

International actions

The previously mentioned actions were taken against a backdrop of exchanges with the international community, in particular with international bodies such as the IAEA and the NEA.

France is contracting party to four conventions: two conventions deal with prevention of nuclear accidents (convention on nuclear safety of the 17th June 1994 to which France has been a party since the 24th October 1996, joint convention on the safety of spent fuel management and on the safety of radioactive waste management of the 29th September 1997 to which France has been a party since the 18th June 2001) and two others concerning repercussion management (convention on the rapid notification of a nuclear accident and convention on assistance in the eventuality of a nuclear accident or emergency radiological situation of the 26th September 1986 to which France has been a party since the 6th April 1989). France also applies European regulations on the importing or on the contamination of foodstuffs (Euratom Regulation no. 3954/87 of the Council of the 22nd December 1987 determining maximum permissible levels of radioactive contamination for foodstuffs and fodder for livestock in the wake of a nuclear accident or in any other emergency radiological situation; EEC Regulation no. 3955/87 of the Council of the 22nd December 1987 concerning the conditions for importing agricultural produce from third countries in the wake of the accident that occurred at the Chernobyl nuclear plant).

Over and beyond rapidly informing European Union Member States in the eventuality of a radiological or nuclear alert, databases have been set up to pool results of environmental monitoring measurements (DATAREM for sampling and EURDEP for telemetry).

In addition, France takes part in working groups of the OECD Nuclear Energy Agency (NEA) on post-accident management and organises international nuclear emergency exercises called INEX, the analysis of which is taken into account when optimising the French approach to post-accident management.

Finally, in 1999, the ASN took the initiative of creating the WENRA association which brings together the seventeen Safety Authority heads of the European Union's "nuclear" countries and Switzerland. WENRA's target is to foster a joint approach in the field of nuclear safety and associated regulations, by sharing respective experiences, exchanging staff and defining common reference levels.

Nuclear safety in Eastern European countries

The international community has made the safety of Eastern European reactors one of its priorities. France has played an important role in the efforts towards cooperation which are currently continuing: closure of the oldest reactors and in particular closure of RBMK reactors (the last one at the Chernobyl plant was closed in 2000), improvement of operational safety of existing nuclear plants and modernisation of their technical systems, and overall modernisation of nuclear plants whose construction has to be finished. In addition, the promotion of a real safety policy is ensured with regards to these countries, in particular via the strengthening of safety authorities and separating nuclear control and operation.

Health repercussions in France

Approximately 500 French people with thyroid ailments have registered complaints since 1999 since they feel that their pathology is linked to the radioactivity dispersed at the time of the Chernobyl accident and that the preventive measures which should have been taken at the time were not. The doctors from the thyroid research group of the French Society of Endocrinology (see Reference) are of the opinion that the thyroid pathologies are not linked to the Chernobyl accident. Since the matter has been referred to the courts which have begun to examine the complaints, the final conclusions must be awaited.

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Over the past 20 years, the considerable efforts deployed in France have completely transformed the nuclear control system and the organisation of the response to nuclear accident situations. For its part, the ASN is unrelentingly continuing its approach to optimise nuclear safety and radiation protection supervision in France, rigorously and with a concern for seamless transparency.

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9 Informing the Public

Informing the public about nuclear safety has always been one of the Nuclear Safety Authority's (ASN) missions. Since 2002 and the institutional reform in civilian nuclear control in France, this mission has been confirmed and extended to the field of radiation protection.

Targets and supports

In order to fulfil this mission, the ASN develops dedicated supports and actions which enable it to make information available to the public, expressed in simple terms and able to be accessed by as many people as possible. The www.asn.gouv.fr website whose audience is constantly growing, the annual report on Nuclear Safety and Radiation Protection in France, the *Contrôle* review and the topics it deals with, public information sheets or the ASN's public information centre constitute the ASN's main information tools.

Also encompassed within this mission are ASN attendance at conferences or seminars in France or abroad, in partnership with the Radiation Protection and Nuclear Safety Institute (IRSN), and participation in the "Nuclear under close surveillance" travelling exhibition.

Committed to be closer to citizens, in 2005 the ASN published a brochure on the organisation, at local level, of nuclear safety and radiation protection supervision of each of the nineteen EDF-run nuclear plants. The brochure was distributed to over 500,000 households in the vicinity of the sites.

The ASN also informs various opinion relays. It contributes towards regularly informing media by organising theme-focused press conferences. It is also dedicated to fostering the action of Local Information Commissions (CLIs). The ASN also runs the secretariat of the Higher Council for Nuclear Safety and Information (CSSIN) to which it regularly sets forth its actions. The ASN also has regular relations with elected representatives and environmental protection associations.

Seamless transparency

Technology has accelerated the circulation of information. Citizens express increasingly precise needs at information level. For its part, the ASN wishes to give ever-enhanced account of its actions. This naturally leads it to continue its commitment with a concern for transparency, while at the same time avoiding saturating information channels and implementing approaches which accompany, enhance awareness or even have an educational purpose that will enable citizens and elected officials to have easier access to information.

Informing the public and ensuring transparency with regards to nuclear activities should, moreover, be reinforced with the proposed bill on transparency and safety in the nuclear field. This text, which should soon be brought before Parliament by the Minister for Ecology and Sustainable Development, recognizes a right for public access to information held by nuclear plant operators and those in charge of transporting radioactive substances.

Stakeholders involvement and public consultation

The ASN wishes to promote stakeholder participation (representatives of environmental protection associations, industrialists or administrations, elected representatives etc.) in drafting regulatory texts of general scope. It also wishes to foster information to the public about the drafting thereof and enable it to give its opinion on contents.

The proposed National Plan for Management of Radioactive Waste and Reusable Material (PNGDR-MV) fulfils this dual target. Drafted by an ASN-steered working group and extended to different stakeholders, it went on-line in the summer of 2005 to collect opinions on the ASN's website www.asn.gouv.fr. All comments received have also been put on-line, thereby fuelling the debate on an important current, social topic.

Public awareness and ASN's image

In 2005, in partnership with the TNS SOFRES Institute, the ASN instigated an opinion study aimed at quantifying how well aware the public was of the ASN and how satisfied different types of public were with the information it delivers.

The first part of this opinion study was carried out at the end of 2005 with a representative sample of

Information and documentation center of ASN at 6, place du Colonel Bourgoin à Paris 12e

the general public and a sample called "informed public" made up in particular of journalists, elected representatives, heads of associations, administrative heads, CLI chairpersons, healthcare professionals and teachers representing an informed public. It emerges that, although a large majority of interviewees were aware of the existence of a control organisation, few were able to cite the ASN spontaneously or recognize its name (16% of those interviewed in the general public sector).

Overall awareness of the ASN was, however, greater with informed public and reached 61%. This public had a better perception of the regulatory mission (30% as against 8% with the general public), but relatively few were aware of the informative mission (13% as against 4% among general public interviewees that said they know of the ASN).

Challenges

The ASN aims to ensure a nuclear control that is efficient, legitimate, credible and recognized by citizens and one which constitutes an international reference. For a large part, this is based on its capacity for informing, associating and accounting to people.

This objective covers all current or future ASN actions for informing the public and ensuring transparency.

The first results from the opinion and ASN awareness study will also have to be taken into account by the Authority within the scope of its policy for informing general and professional publics, in particular to heighten its institutional image, enhance awareness as well as the way its missions are perceived.

10 Internal authorisations

Internal authorisations: strengthening efficiency of control and responsibility of nuclear facility operators

The ASN must focus its efforts on areas that help ensure that nuclear safety and radiation protection control is as efficient as possible.

The broadening of the ASN's scope of control over the last few years, particularly its responsibility in the field of radiation protection, carries a certain risk, in that the ASN can subject all nuclear activity to its own issuance of authorisations, without any overall oversight.

This natural "sociological tendency" is a question of habit or novelty. If the ASN is not careful, its effectiveness may be significantly weakened by this natural tendency which may lead it to spread its resources too thin and not focus its efforts on matters carrying the greatest risk to nuclear safety or radiation protection.

Moreover, the existence of a controller influences the behaviour of the party being controlled. One of the fundamental principles regarding the safety of high-risk activities is that the operator of these activities is the responsible party. If the ASN intervenes too zealously, it risks taking on the role of internal controller, which should be performed by the operator on its own activities or decisions. Indeed, the controller may be wrongly perceived as being the final safety net, for example by closely monitoring safety issues.

ASN is encouraging operators to develop a system of internal authorisations to boost the efficiency of its own action and the responsibility of operators. The system aims to make operators responsible for certain decisions formerly subject to ASN authorisation.

For certain operations not involving the fundamental safety of facilities, operators may, subject to a report by an internal commission independent of the teams operating the facilities, issue their own authorisations for implementation of these operations, instead of the ASN.

This policy was initially developed for the CEA nuclear research laboratories where, by definition, the people in charge of the facilities make numerous minor changes to them in the context of their research. A commission which is independent of the operators of the facilities in question, comprising mainly CEA agents from other fields and specialists outside the CEA, issues a report to the operator - the site manager - on the acceptability of small-scale operations planned by its teams. The site manager, after consultation of this report, may then decide to issue the authorisation, within certain limits. In October 2005, the manager of the Valrhô centre authorised the introduction of new equipment to measure the thermal stability and the flash point of organic liquids and contaminated solvents with a view to their destruction in the future DELOS plant.

This strategy was also quickly applied in CEA facilities that are being dismantled and for which numerous minor operations are required within the overall dismantling process. For example, while awaiting the evacuation of the low-level waste produced by the dismantling of the enriched uranium treatment workshops, the manager of the Cadarache centre authorised the head of this plant to build a temporary storage area for this waste.

The process also applies to EDF reactors being dismantled. In order to issue authorisations, the manager of the plant in question uses the report from the deconstruction safety committee of the CIDEN (Deconstruction-Environment Engineering Centre). For example, the samples taken from the disassembled heat exchangers from the CHINON A3 plant being dismantled in view of their elimination in the waste reactor system were authorised by the manager of the CHINON plan in April 2005.

The process also applies to certain phases of operation of EDF production plants, particularly to changes in the level of water in the primary cooling system during maintenance operations.

Deployment to the COGEMA plant in La Hague is under consideration.

The ASN has set out a strict framework for the internal authorisations system.

Internal authorisations must first be scheduled. The schedule is conveyed to the ASN as early as possible so that it may check that the authorisations in question are de facto internal authorisations, i.e. authorisations for minor operations. If necessary, the ASN may decide to submit a particular project for fast-track authorisation.

Then, if issued by the operator, the internal authorisations and the limits within which the op-

erations have been authorised are declared to the ASN, which may then decide to monitor their correct implementation.

Lastly, the ASN uses specific inspections to ensure the quality of the reports given internally and evaluates the independence of the commission.

If there is doubt as to the quality of the process for a particular operator or facility, the ASN may, at any time, decide to re-establish a system whereby its own authorisation is required for all operations.

The internal authorisation system allows the ASN to focus its efforts on issues with the greatest impact on safety, all the while making the operators responsible for their own choices.

The internal authorisation system meets the needs for efficiency mentioned above. It values the inspections made by the ASN since an authorisation request evaluated by the ASN in advance becomes an internal authorisation controlled subsequently by the ASN. The responsibility for undertaking operations thus falls entirely on the operators and the control performed by the ASN is not hindered by the framework that it would itself have determined if it had authorised the operation.

The introduction of this system means that the ASN and its technical advisor, the IRSN, play the role of quality controllers of the scheduling, preparation and internal control of nuclear operators, thus boosting their legitimacy as controllers.

The inspections made by the ASN over the past two years on the quality of the internal authorisation requests submitted by operators tend to confirm an improvement in the quality of the justifications presented in them, in comparison with the same type of requests submitted previously. This is a good indicator of the positive nature of the system.