Nuclear activities are carried out with the two-fold aim of preventing accidents, but also of mitigating any consequences should they occur. To achieve this, in accordance with the principle of defence in depth, provision must be made to deal with a radiological emergency, however improbable. A "radiological emergency" is one resulting from an incident or accident likely to lead to the release of radioactive materials or to a level of radioactivity likely to harm public health, as defined in article R. 1333-76 of the Public Health Code. The term "nuclear emergency" is reserved for events which could lead to a radiological emergency in a basic nuclear installation or a transport of radioactive materials.

For activities with a high level of risk, such as BNIs, the emergency provisions, which can be considered the "ultimate" lines of defence, comprise special organisational arrangements and emergency plans, involving both the licensee and the authorities. These plans in particular specify the nature of the responses to be provided for to protect the population, given the scale of the exposure. This regularly tested and appraised emergency arrangement is regularly revised to take account of experience feedback from exercises, and the management of real situations such as those which occurred in the nuclear power plants at Civaux on 12 May 1998, le Blayais on 27 December 1999, Cruas and Tricastin on 2 and 3 December 2003 and, more recently, at Nogent-sur-Seine and le Blayais on 30 September and 28 October 2005.

Radiological accidents can also occur outside BNIs, either in an institution carrying out nuclear activities (hospital, research laboratory, etc.), or owing to the loss of a radioactive source, or by inadvertent or intentional dispersal of radioactive substances into the environment. For certain sites, this type of situation could be managed through an on-site emergency plan. It is up to the authorities to ensure protection of the population when necessary. The ASN is involved in this for questions relating to radiation protection.

Other situations can also trigger a response, for example situations arising from nuclear activities or industrial activities which handled materials containing natural radioelements (uranium or thorium) in the recent or more distant past. Although generally less important than accident situations in terms of exposure, these situations, in which exposure is liable to last for a long time if nothing is done ("long-term" exposure), do nonetheless present a human health risk in the medium to long term. They are mentioned in Chapter 15.

In the light of the experience acquired in recent years through regular emergency exercises and through application of France's international commitments, the texts concerning the organisation of the various parties involved in managing radiological emergencies were updated in 2005. The ASN was closely involved in preparing four interministerial directives adopted during the course of the last year:

- interministerial directive of 7 April 2005 concerning the action of the public authorities in response to an event leading to a radiological emergency;

- interministerial directive of 30 May 2005 concerning application of the International Convention on Early Notification of a Nuclear Accident (signed by France on 26 September 1986) and the 14 December 1987 decision by the Council of European Communities concerning community procedures for a rapid exchange of information in the event of a radiological emergency;

- interministerial directive of 29 November 2005 concerning the collection and processing of environmental radioactivity measurements in response to an event leading to a radiological emergency;

- interministerial directive of 30 November 2005 concerning application of the International Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (signed by France on 26 September 1986).

1 Radiological emergencies not covered by the emergency plans

1.1

Response to radiological emergencies

Radiological emergencies can arise:
- during performance of a nuclear activity, whether for medical, research or industrial purposes. For example: a fire in a radioactive source storage area, an accident with an industrial irradiator, and so on;
- in the case of intentional or inadvertent dispersal of radioactive substances into the environment. For example: inadvertent incineration of a radioactive source;
- if radioactive sources are discovered in places where they are not supposed to be.

It is then necessary to respond, to put an end to any risk of human exposure to ionising radiation.

Owing to the diversity of the situations and locations in which these events can occur, it would be unfeasible to create a specific emergency plan for each one. This is why, in order to deal with these situations and in addition to the nuclear emergency management system described in point 2, the ASN together with the ministers and stakeholders concerned, drafted interministerial circular 2005/1390 of 23 December 2005. This circular defines how the State's services are organised in the case of an event leading to a radiological emergency other than those situations covered by an existing emergency plan. It also comprises a specimen local agreement for the technical support that EDF or AREVA could provide to the public authorities in the event of a radiological or nuclear (non-BNI) situation.

1.1.1

Responsibility for the response

In these situations, responsibility for the decision and for implementing protective measures lies with:
- the head of the establishment performing a nuclear activity (hospital, research laboratory, etc.) who implements an on-site emergency plan as stipulated in article L. 1333-6 of the Public Health Code (if the potential risks from the installation so warrant) or with the site owner concerning human safety on the site;
- the mayor or prefect concerning human safety in areas accessible to the public.

In the case of an accident occurring in a place where there is no clearly identified responsibility (irradiation due to an isolated source, contamination by dispersal of radioactive substances, etc.), responsibility for the response lies with the Mayor or with the Prefect of the *département* .

1.1.2

Response principles

Faced with the number of possible sources of alerts and the corresponding alert circuits, there has to be a "one-stop shop" where all alerts arrive and where they are then passed on to the other parties concerned. This one-stop shop is the fire brigade's central emergency call alert processing unit which can be reached by dialling 15, 17, 18 or 112.

1. Administrative division of the size of a county.

Once the authorities have been alerted, the response generally consists of four main phases: care for the persons involved, confirmation of the radiological nature of the event, securing the zone and reducing the emission and, finally, clean-up.

The prime objective of the authorities must be to care for the persons involved. Both physical and psychological care must be provided for those involved, treatment must be given to the injured and, if the radiological nature of the event is confirmed, to any persons likely to have been contaminated or exposed to the emission sources.

Confirmation of the radiological nature of the event involves verification and validation of any information concerning the possible existence of a radiological risk and assessment of the need for any specific response resources. This assessment is based on the intervention by specialised teams (licensee, CMIR, IRSN, CEA, etc.).

The purpose of securing the zone and reducing emissions is human and environmental protection. During this phase, the following types of measures are taken: marking out a safety perimeter, confinement of the emission sources, biological protection, and so on. All these measures are designed to bring the situation back under control.

Clean-up is part of the post-emergency phase. The aim is to restore an acceptable situation, in particular by cleaning up the site and removing any emission sources to installations authorised to receive them.

The Mayor or the Prefect coordinates the response teams, on the basis of their technical competence, and decides on the protection measures.

1|1|3

The role of the ASN

In these situations, in the same way as for accidents occurring in nuclear installations, the ASN is responsible - with the support of the IRSN - for supervising the actions of the head of the establishment or site owner, for advising the relevant police authority with respect to the steps to be taken to prevent or mitigate the direct or indirect effects of ionising radiation on human health, including through damage to the environment, and to take part in dissemination of information.

The ASN opened a telephone hot-line in 2003 (toll-free radiological emergency number 0 800 804 135). The purpose of this hot-line is to receive calls from the one-stop shop (see point 1|1|2) notifying incidents involving non-BNI sources of ionising radiation and is open round the clock, 7 days a week. The information given during the call is transmitted to an ASN supervisor who will act accordingly. Depending on the seriousness of the accident, the ASN can activate its emergency response centre in Paris.

1|1|4

Care and treatment of contaminated victims

The terrorist attacks of 11 September 2001 in New York and the explosion of the AZF plant in Toulouse on 21 September 2001 led the authorities to envisage disaster scenarios which could occur anywhere in the country, with large numbers of injured (from several hundred to several thousand). In the case of a nuclear or radiological accident, a significant percentage of these injured could be contaminated by radionuclides, posing specific care and treatment problems for the emergency response teams.

Circular 800 of 23 April 2003 specifies the national policy concerning the use of emergency and care resources in the event of a terrorist act involving radioactive materials. The methodology described in this interministerial document does not aim to replace the generic procedures contained in the plans currently in force, in particular the government's PIRATOME plan, but more to guide the services and organisations in charge of planning and managing emergency situations.

Together with the Hospitalisation and Health Care Directorate (DHOS) of the Ministry for Health, the services of the Defence High Official (HFD) of the Ministry for Health, the specialists of the Paris SAMU (emergency medical service), the armed forces radiological protection service (SPRA), the IRSN, CEA, EDF and universities, the ASN drew up a series of primary response sheets called the "Medical response to a nuclear or radiological event". This document contains all useful information needed by front-line medical personnel responsible for collecting and transporting the injured, as well as by hospital personnel who will be receiving them in the nearby hospital facilities. This guide acts as a teaching aid for the medical emergency professionals national training programme set up by the Ministry for Health and the French SAMU emergency medical service.

The "Medical response to a nuclear or radiological event" file comes in addition to circular 2002/277 of 2 May 2002 concerning the organisation of medical care in the case of a nuclear or radiological accident. This circular is supplemented by circular 2002/284 of 3 May 2002 concerning the organisation of the hospital system in the event of arrival of large numbers of victims, setting up a departmental plan of hospital capacity provisions and a zone-based organisation for all nuclear and radiological, but also biological and chemical hazards. The "Medical response to a nuclear or radiological event" file is currently being revised to take account of the new zone-based organisation and offer improved support for the medical personnel training sessions involving practical work currently being deployed nationally.

In 2005, jointly with the Hospitalisation and Health Care Directorate (DHOS) and the General Directorate for Health (DGS) at the Ministry for Health, the ASN took part in the visits organised by the Defence High Official (HFD) to the various defence areas, in order to identify any difficulties and the procedures for implementing these arrangements.

Management of contaminated victims during an exercise in Brazil on 6 October 2005

1|2

Response interventions in 2005

In 2005, the ASN was contacted via its radiological emergency hot-line, through its on-call staff or directly by those in charge of the dossiers, with regard to events such as triggering of detection portals (customs posts, technical landfills), discovery of unidentified sources during an inventory (hospital, high school), or even theft of sources. Even if they entail no health risk, these events warrant verification and radioactivity measurements.

In December 2005, in its capacity as competent national authority under the terms of the 30 November directive mentioned above, the ASN was contacted with regard to the gammagraphy accident that occurred in Chile (see box).

Gammagraphy accident in Chile

On 15 December 2005 in Chile, three workers accidentally came into contact with a high-level iridium 192 source that had been lost the previous day following a gammagraphy operation on the site on which they were working. One seriously irradiated worker was sent to France to receive the necessary care.

A team of international experts appointed by the IAEA, including a specialist physician from the IRSN, went to visit the site on 19 December. Given the worrying state of health of one of the three workers, the team recommended that he be transferred to a specialist unit.

Through the intermediary of the IAEA, Chile requested French help, which was approved and on 29 December the injured worker was admitted to the Percy armed forces teaching hospital in Clamart, where he was looked after by a specialised medical team.

As the competent national authority under the terms of the International Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the ASN will continue to ensure that this care is given in satisfactory conditions.

2 NUCLEAR EMERGENCY SITUATIONS

The Chernobyl accident on 26 April 1986, showed that a nuclear accident was possible, and that it was necessary to make adequate preparation for and be able to respond to it. The psychological, social and economic consequences of possible population displacement or a more general restriction on the consumption or sale of foodstuffs must be taken into account by the authorities. Furthermore, more realistic assessments of the potential releases are needed.

Since this accident, France has continued to perfect its nuclear emergency management system, reinforcing its response measures and its regulatory framework for preventing and mitigating the consequences of a nuclear accident:

• With respect to the licensees:
- developing the notion of "Safety Culture", and attaching greater importance to human factors;
- taking account of experience feedback from significant events in order to improve the organisation, working methods and installations (see chapter 4 point 1|3|3);
- setting up on-site emergency response organisations: on-site emergency plans (PUI) required by a decree of 1990;
- more complete and realistic assessments of the radiological consequences of accidents (reassessment by the IRSN).

• With respect to the authorities:
- limitation of the radiological consequences for the population in the event of a major release: the off-site emergency plans (PPI) were set up by a decree of 1988 and then improved in 2000 to include a reflex phase. Decree 2005-1158 of 13 September 2005 concerning the off-site emergency plans specifies exercise frequency, PPI updating and public consultation;
- definition of response levels (sheltering, evacuation, absorption of stable iodine): initial recommendations in 1993 and levels finally determined in 2003;
- organisation of the authorities: directives mentioned at the beginning of the chapter (action by the authorities in response to an event leading to a radiological emergency (public information, alert management, national emergency response organisation, both locally and centrally), organisation of radioactivity measurements);
- public information and communication actions;
- definition of a severity scale for classifying nuclear safety events on the basis of factual criteria which led to the INES scale, implemented in France in 1994 and extended in 2004 to take in radiation protection (see chapter 6);
- orders of 30 November 2001 concerning creation of an emergency alert system around a BNI with a PPI and of 4 November 2005 concerning information of the population in the event of a radiological emergency.

All these measures were taken in a context of exchanges with the international community, particularly within international organisations (IAEA, NEA). The International Convention on Early Notification of a Nuclear Accident (1986), the International Convention on Assistance in the Case of a Nuclear Accident (1986) and European regulations on the importation or contamination of foodstuffs (1987) are noteworthy examples.

If it is to be considered fully operational, the entire response system must be regularly tested. This is the purpose of the nuclear emergency exercises. These exercises, which are the subject of an annual circular, involve the licensee, the local and national authorities - particularly the prefectures - the ASN and the IRSN. They are a means of testing the emergency plans, the response organisation and procedures and help with training the participating staff. The main aims of the exercises are defined at the beginning of the exercise. They are primarily to ensure a correct assessment of the situation, to bring the installation on which the accident occurred to a safe state, to take appropriate measures to protect the population and to ensure satisfactory communication with the media and the populations concerned. At the same time, the exercises are a means of testing the arrangements for alerting the national and international organisations.

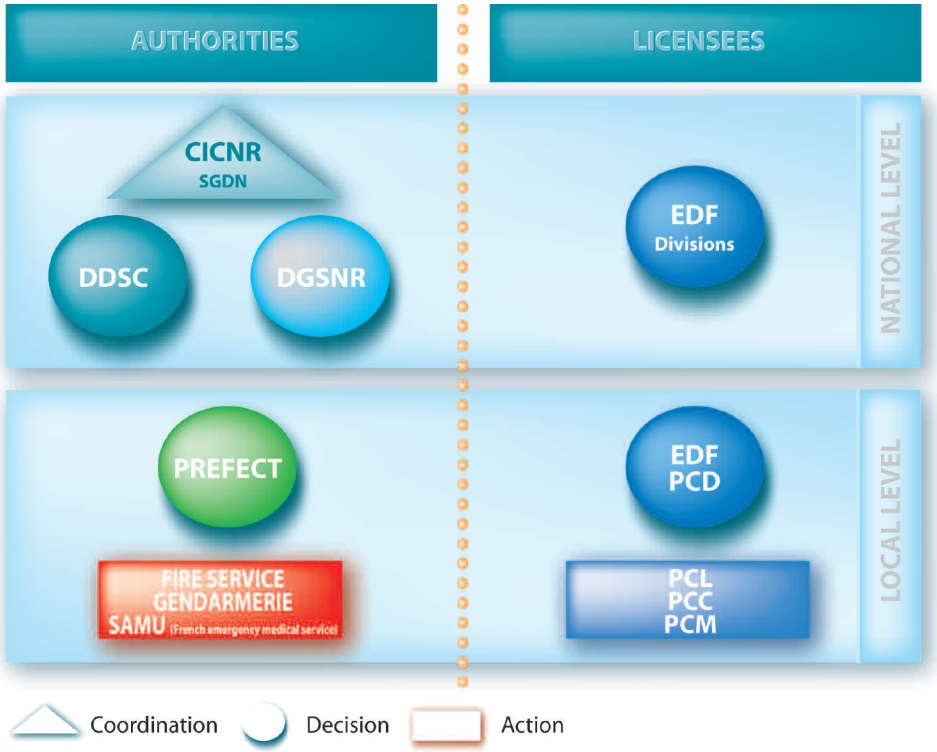
Efforts are today continuing into improving post-accident situation management. France takes part in the working groups of the OECD's Nuclear Energy Agency (NEA) concerning post-accident management and organises INEX international exercises, analysis of which should lead to a draft policy within the next two years.

2 | 1 General organisation

The response by the authorities to an incident or accident is determined by a number of legal texts concerning nuclear safety, radiation protection, public order and civil defence, as well as by the emergency plans.

Law 2004-811 of 13 August 2004 modernising civil defence sets new guidelines. It in particular provides for an up to date inventory of the risks, an overhaul of operational planning, the performance of exercises involving the population, information and training of the population, an operational watch and the alert. In 2005, a number of decrees implementing this law were adopted, in particular:
- decree 2005-1156 of 13 September 2005 concerning the local safeguard plan;
- decree 2005-1157 of 13 September 2005 concerning the ORSEC plan (general plan organising the emergency services if a disaster is declared by the State at departmental, defence zone, or maritime prefecture level);
- decree 2005-1158 of 13 September 2005 concerning PPIs.

Standard emergency management arrangement for a nuclear reactor operated by EDF



- CICNR: Interministerial committee on nuclear or radiological emergencies
- SGDN : General secretariat for national defence
- DDSC : Directorate for defence and civil security
- PCD : Management command post
- PCL : Local command post
- PCC : Supervision command post
- PCM : Resources command post

The main purpose of these regulations is to organise the emergency services at Mayor and Prefect level.

The scope of a nuclear emergency and more generally of any radiological emergency, is clarified in the interministerial directives described at the beginning of this chapter. The response organisation of the authorities and of the licensee is presented in the above arrangement. This is specifically designed to deal with an accident in an EDF reactor. A similar organisation is put in place when dealing with another nuclear licensee or in the event of an accident involving a radioactive material transport. In this latter case, the emergency plan is referred to as the Specialised Emergency Plan for the Transport of Radioactive Materials (PSS-TMR).

2 | 1 | 1

Local provisions

In a emergency situation, only two parties are authorised to take the operational decisions:
- the licensee of the affected nuclear installation, who must implement the organisational provisions and the means provided to bring the accident under control, to assess and mitigate its consequences, to protect site staff and alert and regularly inform the authorities. This arrangement is defined beforehand in the licensee's mandatory PUI;
- the Prefect of the *département* in which the installation is located, who is responsible for decisions as to the measures required to ensure the protection of both population and property at risk owing to the accident. His actions will be regulated by the PPI specially prepared for the vicinity of the installation concerned. He is thus responsible for co-ordination of the PPI resources, both public and private, equipment and manpower. He keeps the population and the authorities informed of events.

2 | 1 | 2

National provisions

The ministers concerned take all necessary measures to enable the Prefect to make the appropriate decisions, notably by providing, as does the licensee, all information and recommendations which could assist him in his appraisal of the condition of the installation, the seriousness of the incident or accident and possible subsequent developments.

The main bodies concerned are as follows:
- Ministry of the Interior: the Directorate for Civil Security and Defence, which has at its disposal the Operational Centre for Interministerial Emergency Provisions and the Nuclear Risk Management Aid Mission, which place at the disposal of the Prefect the human reinforcements and equipment resources he requires to safeguard people and property;
- Ministry for Health: the ASN, which is responsible for the human health protection against the effects of ionising radiation;
- Ministry of Industry and Ministry for the Environment: the ASN for supervision of the safety of nuclear installations with the technical support of the IRSN. The Minister for Industry also coordinates national communications in the event of an incident or accident affecting a nuclear installation under his supervision, or occurring during a radioactive materials transport. As the competent authority, the ASN collects and summarises the information necessary for the notifications, information and assistance requests provided for in the international conventions dealing with notification of third parties in the event of a radiological emergency;
- Ministry of Defence and Ministry of Industry: the Defence Nuclear Safety and Radiation Protection Delegate is the competent authority for supervising the safety of secret basic nuclear installations, military nuclear systems and defence-related transports. A protocol between the Director General of the ASN and the DSND was signed on 26 January 2005 to ensure coordination between these two entities if an accident were to affect an activity supervised by the DSND, in order to facilitate transition from the emergency phase managed by the DSND to the post-accident phase for which the ASN is competent;
- General Secretariat for National Defence (SGDN): the SGDN handles the secretarial functions for the Interministerial Committee for Nuclear and Radiological Emergencies (CICNR). It is responsible for coordinating the action of the ministries concerned regarding the planned measures in the event of an accident and for ensuring that exercises are scheduled and then assessed.

The CICNR is a committee convened at the initiative of the Prime Minister. Its role is to coordinate governmental action in the event of a radiological or nuclear emergency situation.

2 | 1 | 3

Emergency plans

a) general principle

Application of the defence in depth principle implies inclusion of severe accidents with a very low probability of occurrence in the basic data used to define the emergency plans, in order to determine the countermeasures to be implemented to protect plant staff and populations and bring the affected plant to a safe configuration.

The on-site emergency plan (PUI), prepared by the licensee, is aimed at restoring the plant to a safe condition and mitigating accident consequences. It defines the organisational provisions and the resources to be implemented on the site. It also comprises provisions for rapidly informing the authorities.

The off-siteemergency plan (PPI or PSS-TMR), drafted by the Prefect, are aimed at protecting populations in the short term in the event of potential danger and providing the licensee with outside assistance for such actions. It defines the tasks assigned to the various services concerned, the warning system utilisation instructions and material and human resources.

b) technical bases and countermeasures

The emergency plans must allow an effective response to accidents liable to occur at BNIs. This implies the definition of technical bases, i.e. the adoption of one or more accident scenarios encompassing the possible consequences, with a view to determining the nature and extent of the remedial means required. This task is made all the more difficult by the fact that real significant accidents are fortunately extremely rare and the approach is therefore mainly based on a conservative theoretical scenario involving estimation of the source terms (in other words the quantities of radioactive material released), with calculation of their dispersal into the environment and a final assessment of the radiological impact.

On the basis of the response levels defined in the 13 October 2003 order, it is then possible to define in the PPIs the population protection measures that appear to be justified in order to limit the direct impact of the release. Such measures could include:

- sheltering and monitoring the situation from indoors, firstly to protect the inhabitants from direct irradiation and from contamination from the radioactive plume, and secondly to keep them informed;
- absorption of stable iodine in addition to sheltering in cases where the release comprises radioactive iodine (notably iodine 131);
- preventive evacuation, when the above measures offer inadequate protection owing to the levels of activity released.

For example, the maximum conceivable accident on a pressurised water reactor could lead to the decision being taken within 12 to 24 hours to evacuate the population living within a 5 kilometre radius, and order sheltering of the population with absorption of stable iodine within a 10 kilometre radius.

2 | 2

The role and organisation of the ASN

2 | 2 | 1

The ASN's emergency role

In an emergency situation, the ASN, with IRSN assistance and the co-operation of the Regional Directorate for Industry, Research and the Environment (DRIRE) concerned, has a four-fold function:

1) ensure that judicious provisions are made by the licensee;

2) advise the Prefect;

3) contribute to the circulation of information;

4) act as competent authority within the framework of the international conventions.

a) supervision of licensee actions

In the same way as in normal operating conditions, licensee actions are supervised by the ASN in an emergency situation. In this particular context, the ASN must ensure that the licensee fully carries out its duty to control the accident, minimise the consequences and rapidly and regularly inform the authorities, but it will not attempt to replace the licensee in implementing the technical measures to deal with the accident. In particular, when several action strategies are available to the licensee to control the accident, some may have significant environmental consequences. It is therefore important for the ASN to monitor the conditions in which the corresponding choice is made by the licensee.

b) advising the prefect

The decision by the Prefect concerning the population protection measures to be taken depends on the actual or possible consequences of the accident around the site and it is the ASN which advises the Prefect in this respect, on the basis of the analysis performed by the IRSN. This analysis combines diagnosis (understanding of the situation at the plant concerned) and prognosis (assessment of possible short-term developments, notably radioactive release). This advice also concerns the steps to be taken to protect the health of the public.

c) circulation of information

The ASN is involved in information circulation in a number of ways:
- information of the media and the general public: the ASN contributes to informing both the media and the general public in different ways (press releases, website, press conference). It is important that this should be done in close collaboration with the other organisations who are themselves involved in communication (Prefect, local and national licensee, etc.);
- information of the authorities: the ASN keeps the supervisory Ministers informed, together with the SGDN (General Secretariat for National Defence), which in turn informs the President of the Republic and the Prime Minister. The ASN also ensures that the DGEMP (General Directorate for Energy and Raw Materials) at the Ministry for Industry is kept informed;
- information of foreign safety authorities: without prejudice to application of the international conventions signed by France concerning information exchanges in the event of an incident or accident liable to have radiological consequences, the ASN informs foreign safety authorities, especially those with which it has mutual safety information agreements (Belgium, Switzerland, United Kingdom, etc.).

d) function of competent authority as defined by international conventions

Since the publication of decree 2003-865 of 8 September 2003, the ASN has been the competent authority under the terms of the above-mentioned international conventions. In this capacity, it collects and summarises the information needed for the notifications, information and requests provided for in these conventions. This information is forwarded to the international organisations (IAEA and European Union).

In 2005, France in particular took part in the international exercises organised by the European Community and the IAEA (Convex 3 and Ecurie 3). These exercises in particular test the alert, information transmission and exchange procedures between the national alert contact point (Ministry of foreign affairs), the national competent authority (ASN) and the emergency centres of the European Community and the IAEA.

2 | 2 | 2
Provisions concerning nuclear safety

Main components

In the event of an incident or accident occurring in a BNI, the ASN, with the technical support of the IRSN and the Nuclear Safety and Radiation Protection Divisions (DSNRs) of the DRIREs, sets up the following organisation:

- at national level:
• a decision-making body or command centre (called PCD), located in the ASN's emergency management centre in Paris. This body is managed by the Director General of the ASN or his representative. It is required to adopt positions or make decisions but to refrain from technical analysis of the ongoing accident. A spokesperson, who is not the PCD head, is appointed to represent the ASN with the media;

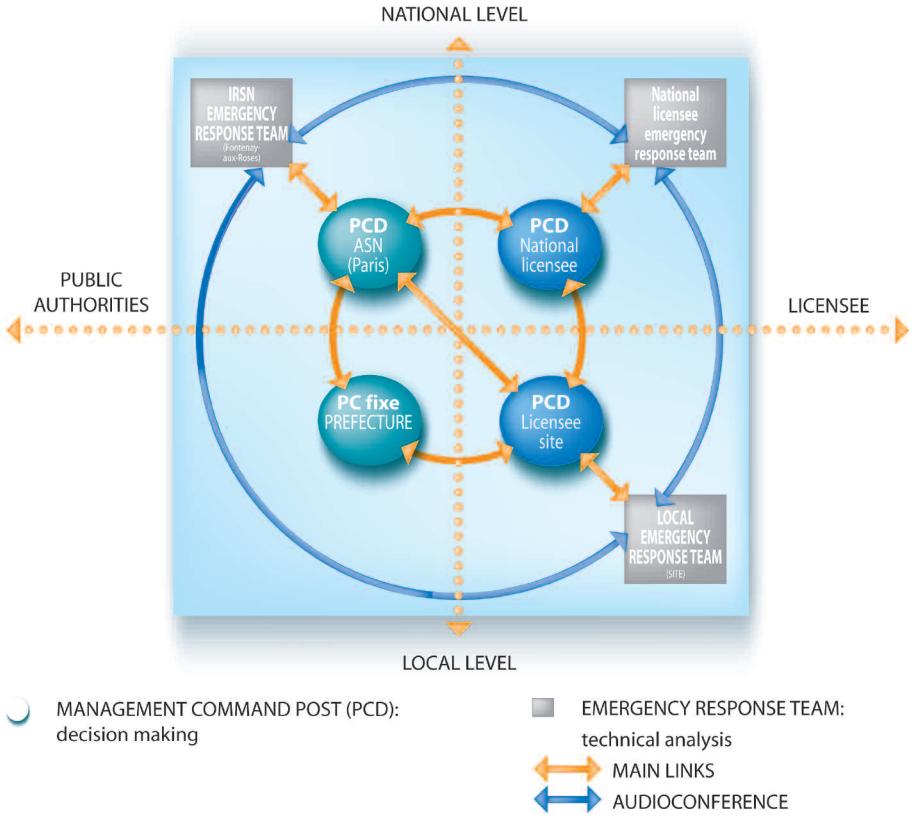
•an information unit located near the ASN PCD, coordinated by an ASN representative with the help of staff from the Communication department (SIRCOM) of the Ministry of the Economy, Finance and Industry;
•an emergency response analysis team, led by the IRSN Director General or his representative. This team is resident at the IRSN technical emergency centre, located in the nuclear research centre at Fontenay-aux-Roses. This team is required to work closely with the licensee's technical teams to exchange the available information for analysing the accident situation and predicting its development and consequences;

–at local level:
•a local team at the prefecture, consisting mainly of representatives from the ASN's regional offices, whose purpose is to assist the Prefect in making his decisions and implementing his communication actions by providing explanations enabling understanding of the technical aspects involved, in close collaboration with the ASN PCD;
•a local team at the affected plant site, also consisting of DSNR engineers, assisting the site PCD head. It takes no part in licensee decisions, but ensures that responsibilities are correctly assumed, notably as regards information of the authorities. This team also collects relevant data for use in the context of the ensuing post-accident inquiry.

The ASN, its technical support organisation the IRSN, and the main nuclear licensees have signed protocols covering emergency response planning. These protocols designate those who will be responsible in the event of an emergency and define their respective roles and the communication methods to be employed.

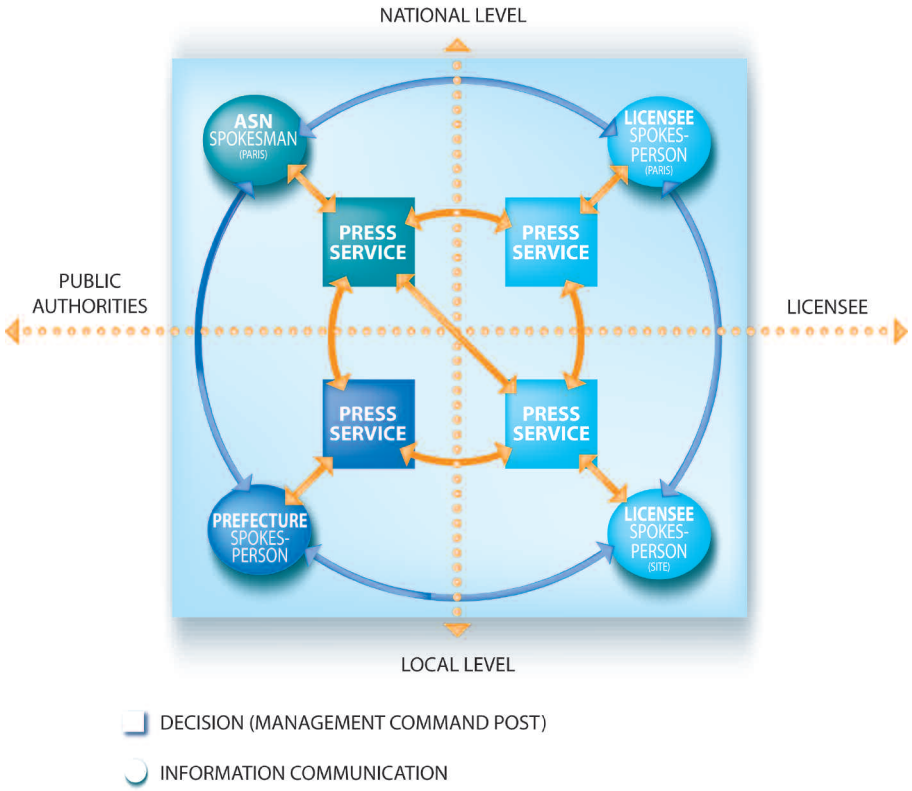
The diagram below presents the overall safety structures set up, in collaboration with the Prefect and the licensee. It shows that the licensee has a local PCD on the site and usually a national PCD in Paris, each connected with its own emergency response team. The various connections shown on the diagram indicate information exchanges.

Safety organisation



The diagram below shows the structures set up between the communication units and the PCD spokespersons with a view to allowing the necessary consultation ensuring consistency of the information issued to the public and the media.

Communication organisation



2 | 2 | 3

The ASN emergency response centre

In order to be able to carry out these assignments, the ASN has its own emergency response centre, equipped with communication and data processing facilities enabling:
- swift mobilisation of ASN staff;
- reliable exchange of information between the many partners concerned.

This emergency response centre was activated in a real situation for the first time on 12 May 1998 when an incident occurred in the Civaux plant, and on 28 and 29 December 1999 to deal with the incident in the Le Blayais nuclear power plant, following the severe storm of 27 December 1999. It was used again on 2 and 3 December 2003 during the violent storms in the Rhone valley, which caused the Cruas nuclear power plant to trigger its on-sitePUI and alert the ASN. During the course of these two days, the Tricastin plant and its operational hot unit (BCOT)

The ASN emergency centre during an emergency exercice

also triggered their PUI. The emergency response centre was also used on 16 May 2004 when a fire broke out in a non-nuclear zone in the Cattenom plant.

In 2005, the emergency response centre was activated on 30 September, when an incident occurred on one of the reactors in the Nogent-sur-Seine plant after water was sprayed onto the reactor's electrical control cubicles. In the night of 27 October 2005, it was again called into service after a pressure rise in the core cooling system of a reactor in the Le Blayais nuclear power plant.

As demonstrated by these events, the ASN alert system allows rapid mobilisation of the ASN staff and the IRSN engineer on-call. This automatic system sends out an alert signal to all staff carrying radio-pagers or mobile phones, as soon as the alert is triggered remotely by the licensee of the nuclear installation in which the alert originated. It also sends out the alert to the staff of the DDSC, the SGDN and Météo-France. This system is regularly tested during about ten exercises a year, as well as when actual emergencies occur.

In addition to the public telephone network, the emergency response centre is connected to several restricted access networks providing secure direct or dedicated lines to the main nuclear sites. The ASN PCD also has a video-conferencing system which is the preferred means of contact with the IRSN's CTC. The PCD also makes use of IT equipment adapted to its assignments, in particular for information exchanges with the European Commission and the Member States.

Since 2005, the PCD has had access to the dose rate values permanently measured by the IRSN's Téléray network of probes.

2|2|4

Role of the ASN in the preparation of emergency plans

a) on-site plan approval and supervision of application

Since January 1991, and in the same way as the safety analysis report and the general operating rules, the PUI is among the safety documents which have to be submitted to the ASN by the licensee at least six months before the installation of radioactive materials in a BNI. In this context, the PUI is assessed by the IRSN and the relevant Advisory Committee expresses its opinion on it.

The ASN monitors correct application of the on-site emergency plans, in particular through inspections (see chapter 4).

b) participation in off-site plan preparation

Under application of the 13 September 2005 orders concerning the PPI and the ORSEC plan, the prefect is responsible for preparing and approving the PPI. He is assisted by the ASN, which supplies the basic technical elements, as derived from the IRSN assessment, taking account of the most recent available data on serious accidents and dispersion of radioactive or chemical materials and ensuring consistency in this respect between the PPI and the PUI.

Considerable work has been done in recent years to take account of accidents which could cause a radioactive release leading to a response level being exceeded off the site within less than 6 hours. A response reflex phase, containing special provisions enabling the prefect to initiate a response, has been introduced into the PPIs. The licensee is provided with objective criteria approved by the ASN and comprising predetermined and easily accessible parameters. Definition of the response levels is based on the most recent international recommendations and, since 2003, has been stipulated in regulatory requirements (see point 2|1|3).

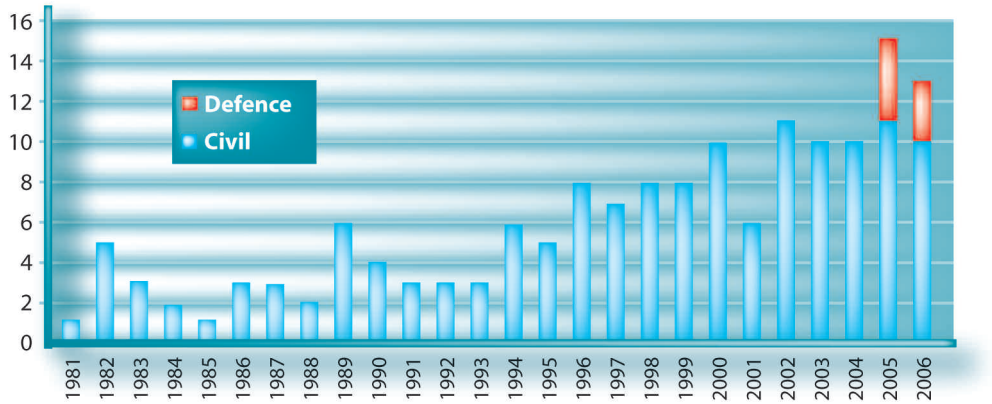
As part of this PPI overhaul, the ASN approved the rapidly evolving accident scenarios defined by the licensees.

2 | 3

Accident simulation exercices

It is important not to wait for a significant accident to actually occur in France before testing the emergency response provisions described, under real conditions. Exercises are periodically organised as training for emergency teams and to test resources and organisational structures with a view to identifying weak points. In practice, carrying out an emergency exercise every three years on each site with a BNI would seem to be a fair compromise between staff training and the time needed to make changes to the response organisation. Since the 1980s therefore, the number of exercises has risen significantly and in 2005, reached a level of about ten a year for civil installations, as shown on the following graph:

Number of emergency exercices (1981-2006)



Review meetings are organised in each emergency command post immediately after each exercise. Along with the other participants in the emergency exercise, the ASN aims to identify the good and bad practices highlighted during the experience feedback meetings in order to improve the response organisation as a whole.

One major benefit of the emergency exercises has been to improve procedures and policies. For example, to avoid exposure of the personnel in charge of distributing iodine tablets during the release phase, the authorities decided on preventive distribution of iodine tablets within a 10 km radius around nuclear power plants. Furthermore, to take account of rapidly evolving accidents in which the authorities do not have time to react, the decision was taken to incorporate a reflex phase in the PPIs asking the populations to take shelter by alerting them through a network of sirens, which can be activated by the nuclear licensee on behalf of the prefect.

2 | 3 | 1

Exercice sessions involving the ASN

a) nuclear alert tests and mobilisation exercices

The ASN periodically conducts checks to ensure that the resources in its emergency response centre and its staff alert system network are working correctly. The system is also used for the exercises described below and undergoes unannounced tests.

b) national nuclear accident simulation exercices

As in previous years, the ASN prepared a programme of national nuclear emergency exercises for 2005, announced by the prefects in a circular signed jointly by the Director General of the ASN, the DSND, the DDSC and the SGDN. This circular of 10 January 2005 in particular describes two different types of exercises:
- exercises targeting "nuclear safety", involving no actual population actions and mainly aimed at testing the decision process on the basis of a freely established technical scenario;
- exercises targeting "civil defence", involving actual application, on a significant scale, of PPI countermeasures for population protection (alert, sheltering, evacuation) built around a scenario based on the population participation conditions adopted.

During most of these exercises, simulated media pressure is placed on the main parties concerned, in order to test their ability to communicate. The following table describes the key characteristics of the national exercises conducted in 2005.

In addition to the national exercises, the prefects are asked to conduct local exercises with the sites under their jurisdiction, in order to improve preparations for an emergency situation.

The national emergency exercise carried out on 22 March 2005 around the Belleville-sur-Loire site was of a civil defence type targeting post-accident conditions. Civil defence actions were planned, including the creation of decontamination chains involving several dozen volunteers and a medical/psychological emergency unit. This exercise enabled the following to be tested:
- deployment and integration of the measurements taken by Hélinuc (helicopter-borne radioactivity measurement system);
- draft sheets to popularise technical information concerning radioactivity;
- restrictions on the consumption of fresh produce.

National nuclear emergency exercices carried out in accordance with the circular of 10 January 2005

NUCLEAR SITE	DATE OF EXERCICE	EXERCICE TARGET	PARTICULAR CHARACTERISTICS
Nogent-sur-Seine (EDF)	3 February 2005	Nuclear safety	
Golfech (EDF)	3 March 2005	Civil defence	Management of numerous injuries on the nuclear power plant site
Belleville (EDF)	22 March 2005	Civil defence	Long exercise. Practice in the post-accident phase
Fessenheim (EDF)	19 May 2005	Civil defence	International relations with the CENAL (Swiss national alarm centre)
Institut Laue Langevin	14 June 2005	Civil defence	
Penly (EDF)	23 June 2005	Nuclear safety	Participation by the maritime prefecture
Radioactive materials transport (Val d'Oise)	22 September 2005	Civil defence	
Saint Laurent des Eaux (EDF)	11 October 2005	Civil defence	Prior triggering of the flood (PSS) (specialized emergency plan)
La Hague	20 October 2005	Civil defence	Interfacing with the maritime prefecture, ensuring sheltering by a school
Tricastin (EDF)	24 November 2005	Civil defence	PSS implementation

c) international exercice sessions and cooperation

The ASN maintains international relations to exchange good practices observed during exercises carried out abroad. In 2005, the ASN therefore:

- took part in an emergency exercise in Brazil (see box);
- jointly with the NEA, ran the INEX exercise dealing with post-accident situations;
- went to Bratislava in Slovakia, to take part in an international workshop.

The ASN also welcomed foreign delegations (United Kingdom, South Africa) as observers for the national exercises organised in France.

A French delegation went to Brazil between 4 and 7 October 2005, on the one hand to observe a nuclear emergency exercise and on the other to discuss radiation protection practices. Brazil has 2 power reactors at Angra dos Reis, a coastal site 150 km south of Rio de Janeiro. The emergency exercise was "large scale" and mobilised more than 600 people. The following points were particularly noteworthy:
- significant participation by the armed forces (navy, army, air force) in policing, transportation of decontamination specialists, provision of long-term structures for population care and management duties;
- alerting and distribution of messages and instructions to the population via a network of sirens and loudspeakers installed throughout the area concerned;
- in the vicinity of the power plant, construction of a robust hospital for decontamination and treatment of contamination injuries, training of doctors in dealing with persons who have been injured or contaminated with radioactivity;
- extensive media pressure.

The ASN took part in an international workshop organised by the NEA in Bratislava in Slovakia, from 18 to 20 May 2005. This workshop focused in particular on compensation for nuclear-related damage. It was supervised by the OECD's Nuclear Energy Agency (NEA) and brought together 114 participants from 27 countries. The exercise concentrated on application of the Vienna Convention on civil liability for nuclear damage and the Joint Protocol relative to application of the Vienna Convention and the Paris Convention. This workshop was an opportunity to compare responses from various countries and identify the discrepancies and shortcomings that exist in implementation of the nuclear accident compensation mechanisms. Finally, the problems linked to the coexistence of several international compensation regimes were highlighted.

The ASN took part in the IAEA's work to implement an action plan by the competent authorities to improve international exchanges of information in the event of a radiological emergency. For this action plan, the ASN is helping to define the international strategy, requirements and assistance resources and to set up the emergency assistance response network (ERNET). The ASN is also working with the NEA to define a strategy for carrying out international exercises.

This work in particular led to the above-mentioned interministerial directive of 30 May 2005. Work is also in progress with respect to international assistance in the event of an accident or radiological emergency, which in particular includes creation of a data bank listing the technical and human resources available and defining a protocol for the exchange of information with foreign safety authorities.

2 | 3 | 2

Lessons learned from the exercice sessions

The emergency exercise scenarios generally involve a simulated release of radioactivity outside the installation in which the accident occurs. This enables the entire national emergency response organisation, particularly the local emergency response services, to practice dealing with the risks and consequences of radioactive contamination of the population, their homes, the food chain and the environment. The first protective steps taken are generally based on highly conservative estimates and calculations. However, in the longer term, radioactivity measurements from around the installation are vital in being able to define the authorities' response to the events.

Experience feedback from the exercises shows that the measurement results were reaching the experts and decision-makers too late. In the light of these findings, the national stakeholders worked to improve the response organisation and procedures. This led to drafting of the above-mentioned interministerial directive of 29 November 2005.

This directive now needs to be implemented in the emergency plans, if local measurement programmes are to be tailored to the individual installations. There are plans to have these arrangements tested during emergency exercises in 2006. An initial assessment will then be conducted following this first year of testing.

"TMR" exercice of 22 September 2005
Val d'Oise *Département*

A national "radioactive materials transport" (TMR) exercise was held on 22 September 2005. It was headed by the Val d'Oise prefect's office and coordinated by the ASN, in close collaboration with the Ministry of the Interior (DDSC). This exercise involved a COGEMA LOGISTICS road convoy from the Paluel nuclear power plant.

All of the State regional offices concerned and the mayors of the communes of Chauvry and Bethemont-La-Forêt were mobilised to manage the technical and communication aspects of the event.

Some photos taken on an accident exercise site

This exercise demonstrated the importance of the following points:
- rapid transmission of radioactivity measurements to the decision-making centres;
- training of those involved in the emergency, in particular the field response crews;
- mutual familiarity of all those involved, and cooperation between services.

Every three years, each nuclear installation is required to take part in a national emergency exercise, involving the entire national emergency response organisation. The various prefectures involved in these exercises have been seen to be constantly progressing. To ensure that this constant improvement continues, the exercise scenarios are made increasingly complex and include increasing numbers of parameters and players. The exercises are also a means of improving existing procedures:
- the Channel and North Sea region maritime prefecture took part in the exercises at Penly and La Hague in 2005. These exercises tested and improved joint interaction with the land-based prefectures;
- the scenarios increasingly frequently include a health component, involving treatment of the injured (sometimes contaminated), who have to be given care and be evacuated in a potentially or actually hazardous environment;
- the various emergency command post procedures now include joint audio-conferences which can, when necessary, improve the understanding of sometimes complex situations.

Experience feedback from these emergency exercises also brings to light those actions or procedures which need to be improved. All the stakeholders take these points on board and actively look for solutions. In this respect, the ASN calls all participants together twice a year to review good procedures, but also to define where improvements could be made.

Finally, on 30 September and 27 October 2005, two incidents which occurred in the nuclear power plants at Nogent-sur-Seine and Le Blayais triggered a national emergency response. The ASN's emergency response centre was activated in less than 30 minutes and the oft-practiced procedures were put into motion calmly and unhurriedly. The incidents did not entail any measures to protect the populations and no radioactivity was released into the environment.

2|4

Developments in nuclear emergency provisions

As in any other nuclear safety field, emergency response structures have to develop on the basis of experience. The main sources of experience in France are the exercises and exchanges with other countries, as well as any significant events in France (see point 2|2|3) or abroad (Tokai-Mura accident on 30 September 1999).

On 14 December 2005, the ASN held the seventeenth national conference of local information committees (CLIs), jointly with the national CLI association (ANCLI). This conference was devoted to local emergency management and involved discussion of the potential role of the CLIs, particularly in the post-accident phase.

An effective means of protection against radioactive contamination of the thyroid gland

2 | 4 | 1

Stable iodine preventive distribution

In the event of substantial accidental release from a nuclear reactor, provision has been made for the absorption of stable iodine tablets by populations in the vicinity of the site concerned, with a view to providing thyroid protection against the harmful effects of radioactive iodine. Up until 1997, emergency plans provided for distribution of tablets, in the event of an accident, from concentrated stocks, generally stored on or near the nuclear sites. The first accident exercise sessions (1995 and 1996), which included the actual distribution of dummy tablets, in an emergency context, soon showed the difficulties involved. Apart from time considerations, this method was intrinsically contradictory: the population was asked to take shelter immediately, while at the same time emergency teams were carrying out urgent door-to-door distribution of tablets. In 1997, preventive distribution of stable iodine tablets to the populations living in the vicinity of the nuclear power plants was carried out.

The tablets distributed had a shelf-life of 3 years. A further preventive distribution of stable iodine tables therefore took place in 2000. Since then, the shelf-life of the tablets has been raised to 5 and then 7 years. In 2005, the third preventive distribution of iodine tablets took place (see box). It

Results of the iodine pre-distribution campaign in 2005

The purpose of the campaign was to achieve a high level of coverage and enable anyone moving into the PPI zone during the 5-year tablet validity period to be able to find a local distribution point easily.

The chosen method was to initiate a first phase on 4 March 2005, with distribution of boxes of tablets around 4 pilot sites (Nogent, Belleville, Fessenheim, Golfech). This was based on a system of personal, nominative letters sent out on official headed notepaper, signed by the DDSC, the ASN and the French Order of Pharmacists. A nominative exchange voucher was enclosed with the letter, for presentation at one of the pharmacies listed on the back of the letter. A total of 45,243 letters were sent and a specific support programme was organised locally (information of pharmacists, communication with local stakeholders and local population).

The results of this initial phase are detailed in the following table and show:
- that the average distribution rate for the 4 sites is better than 60%,
- that distribution was to a very large extent via the nominative exchange vouchers sent out with the letter. However, blank vouchers available from pharmacies complemented the nominative voucher system.

SITE	Belleville	Fessenheim	Golfech	Nogent	Total
Number of letters sent	18732	5778	10657	10076	45243
Percentage of vouchers returned to the licence	63.3%	73.1%	52.6%	57.9%	60.8%
including blank vouchers	4.9%	7.5%	3.9%	7%	5,6%
Number of boxes collected from pharmacies	12147	4968	6710	6515	30340

To improve the coverage in the PPI zones concerned, additional distribution took place, with direct mailing of boxes of tablets to the homes which did not come to collect theirs. In the end, 47,509 boxes were distributed around the 4 pilot sites.

This method was a way of better controlling distribution because those who actually received boxes were precisely identified. In this way, the final coverage was close to 100%. It also enabled a strong partnership to be forged with the pharmacists, providing identical, clearly identified points of contact in all areas, for the tablet 5-year validity period. To guarantee this service on a long-term basis, a stock of boxes will be available in each pharmacy in the area via the pharmaceutical distribution channel.

involved two phases. The first phase was at the beginning of the year on four sites, in order to assess the most efficient distribution method in terms of population coverage (circular of 8 February 2005 concerning preventive distribution of stable iodine tablets). On the basis of the lessons learned from this phase, a second distribution phase was applied to all remaining sites, starting in the summer (circular of 11 August 2005 concerning preventive distribution of stable iodine tablets). During the course of this campaign, the ASN sent out a folder to about 500,000 homes, presenting nuclear safety and radiation protection supervision (see chapter 6 point 1|2|5).

Furthermore, in the terrorism context of autumn 2001, the Government also asked the prefects, in a second part of the circular of 14 November 2001, to make provision for stockpiling in each *département* to meet national requirements and improve protection of children, adolescents and young adults against the effects of radioactive iodine outside the PPI perimeters. To create these stocks, the Ministry for Health ordered 60 million tablets from armed forces central pharmaceutical supplies. Delivery of the tablets began in 2002 and ended in 2005. A circular dated 23 December 2002 provides the Prefects with a guide for drawing up stable iodine tablet stock management plans. These plans are currently being drawn up by the prefectures.

Finally, on the basis of the experience acquired over the past ten years and practices in neighbouring countries (Belgium, Switzerland), a working group initiated updating of the policy for use of iodine tablets and submitted its conclusions at the end of 2005.

2|4|2

Emergency response provisions regarding radioactive material transport accidents

In the event of a transport accident in France, requiring the triggering of a specialised radioactive material transport emergency plan (PSS-TMR), ASN assignments are the same as for a BNI accident. However, in this case, its licensee supervision assignment covers the consignor, the carrier of the packages involved and possibly the carriage commission agent.

The organisation of the ASN relies mainly on local bodies: the DRIREs and in particular the DSNRs, whether located in the region or in a neighbouring region.

Following on from the action taken in 2004, and in conjunction with the Ministry for the Interior, the ASN is monitoring the work being done to overhaul the PSS-TMR, initiated by the circular of 23 January 2004 sent out to the prefects and revising the PSS-TMR. The ASN participated in drafting the circular. This aspect is developed further in Chapter 11.

Emergency exercise involving transport of radioactive materials on 22 September 2005

As in previous years, the ASN took part in organising a "transport" exercise involving the Val d'Oise prefecture and all the authorities concerned, with the Paluel plant as consignor and COGEMA Logistics as transporter. This exercise was carried out on 22 September 2005 (see "TMR" exercise box).

2.4.3 Post-accident management

The post-accident phase concerns how to deal with the consequences of the event, which are of widely differing natures (economic, health, social) and which have to be resolved in the short, medium and indeed long term if a situation felt to be acceptable is to be restored. In application of the interministerial directive of 7 April 2005, the ASN, in association with the ministerial departments concerned, is responsible for "establishing the framework, for defining, preparing and implementing the steps necessary to deal with the post-accident situation".

In order to draft a post-accident policy, the ASN first of all focused on developing the post-accident aspect when carrying out national and international exercises (such as INEX3) and initiating a more general debate by bringing together all the stakeholders in a steering committee (CODIR-PA) in charge of the post-accident aspect. The ASN set itself a time-frame of 2 years for reaching agreement on a post-accident phase policy.

Since the "Becquerel" exercise carried out in October 1996 around the Saclay site, several interministerial working parties have been set up for the purpose of defining how the various post-accident phase problems should be dealt with. Other exercises were carried out to identify the main topics involved:

- the exercise of 22 March 2005 concerned the Belleville-sur-Loire nuclear power plant. National and local working groups were set up, to prepare for the national emergency exercise. These groups in particular took account of the conclusions of the Aube prefecture task force;
- the "INEX3 FR" exercise was an international event organised by the ASN and managed by the NEA. This exercise, which took place in France on 9 December 2005, was an opportunity to confirm and classify the main problems involved in radioactive contamination of cereal crops.

One of the first noteworthy lessons learned from these exercises was the simulated restriction on the consumption and sale of foodstuffs. These exercises were an opportunity for a more detailed look at how to manage the beginning of this phase.

Finally, in a letter of 13 April 2005, sent out to the main ministerial departments and organisations concerned, the ASN proposed creating a steering committee for managing the post-accident phase of a nuclear accident or radiological emergency (CODIR-PA). The committee began its work at a meeting held on 24 June 2005. To assist with the deliberations of the CODIR-PA, a summary of all the studies conducted on post-accident phase management, both in France and abroad, was produced in 2005.

3 OUTLOOK

In 2005 a considerable amount of work was done to update texts dealing with the response organisation to be implemented in the event of a radiological emergency, with the issue of a circular and four interministerial directives. The ASN aims to use 2006 to adapt its organisation and test interactions between the various stakeholders. To do this, the ASN intends:

- to organise an exercise to test implementation of an emergency response organisation appropriate to radiological emergencies that could arise outside nuclear installations as defined in the circular of 23 December 2005;

-to produce a protocol for exchange of information between safety authorities, in particular comprising a standard exchange format and to propose it to its counterparts in the neighbouring countries to facilitate application of the 30 May 2005 directive on early notification;
-to create a database of national authorities with competence for assistance in the event of a nuclear accident or radiological emergency in application of the 30 November 2005 directive on assistance. This work will be done jointly with the IAEA's ERNET (Emergency Response Network) which is designed to create a joint database to allow early identification of the available international assistance;
-to lay down the framework and prepare the measures necessary for dealing with post-accident situations in accordance with the role entrusted to it in the 7 April directive on the actions of the authorities.

In collaboration with the administrations and public institutions concerned, the ASN drafted the circular of 28 December 2005 regarding exercises in 2006, ensuring that precise and factual goals can be defined sufficiently early. Defining these goals, which take account of experience feedback, will allow better preparation of the specifications and a better appreciation of how well the exercise was performed. Sufficiently early, multi-year programming will also make it easier to distribute these exercises more evenly.

The ASN will also strive to increase and diversify international relations, which are always a mine of information, with other countries (for example: Belgium, Finland, Italy, etc.).

Finally, the ASN will test the response organisation put in place by the Pierrelatte plant licensees to deal with an accident involving several of them, during an in-depth inspection. On this occasion it will simulate accidents to test coordination between licensees.