

RADIOLOGICAL EMERGENCIES

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Nuclear activities are carried out with the two-fold aim of preventing accidents and mitigating any consequences should they occur. In accordance with the “defence in depth” concept, the necessary steps must therefore be taken to deal with a radiological emergency, no matter how improbable. A “radiological emergency” is understood to mean a situation arising from an incident or accident which is liable to lead to the emission of radioactive material or a level of radioactivity liable to jeopardise public health¹. The term “nuclear emergency” applies to events which could lead to a radiological emergency in a basic nuclear installation (BNI) or during the transportation of radioactive materials. Non-radiological emergency situations can also arise in BNIs.

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

1 ANTICIPATING

1 | 1 Looking ahead and planning

1 | 1 | 1 On-site and off-site emergency plans

Application of the principle of defence in depth entails the inclusion of severe accidents with a very low probability of occurrence when drafting the emergency plans, in order to determine the actions necessary to protect plant personnel and the population and to control the accident.

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

The purpose of the off-site emergency plan, drafted by the *préfet*² is to protect populations in the short term in the event of an accident and provide the licensee or the party in charge of transport with outside intervention assistance. It specifies the initial actions to take to protect the population, the roles of the various services concerned, the systems for giving the alert, and the human and material resources likely to be engaged.

1 | 1 | 2 Responding to any other radiological emergency situation

Apart from incidents affecting nuclear installations or the transport of radioactive materials, radiological emergency situations can also occur:

- during performance of a nuclear activity, whether for medical, research or industrial purposes;

- in the case of intentional or inadvertent dispersal of radioactive substances into the environment;
- if radioactive sources are discovered in places where they are not supposed to be.

In such cases, intervention is necessary to put an end to any risk of human exposure to ionising radiation.

ASN, together with the ministries and stakeholders concerned, drafted government circular DGSNR/DHOS/DDSC 2005/1 390 of 23 December 2005. This circular defines how the State departments are organised in the case of an event liable to lead to a radiological emergency situation other than those situations covered by an existing off-site emergency plan.

With the support of IRSN, ASN is responsible for overseeing the actions of the facility head or site owners, for advising the competent police authority with regard to the steps to be taken to prevent or mitigate the direct or indirect effects of ionising radiation on human health, including through environmental hazards, and for taking part in the circulation of information.

Faced with the many possible originators of an alert and the associated alert-raising channels, it was deemed necessary to designate a one-stop shop to centralise all the alerts and then forward them to the other stakeholders. This one-stop shop is the Departmental Fire and Emergency Response Operations Centre – Alert Processing Centre which can be reached by dialling 18 or 112.

1 | 1 | 3 Role of ASN in the preparation and monitoring of emergency plans

The on-site emergency plan

Pursuant to decree 2007-1557 of 2 November 2007, a BNI licensee is required to send ASN a file containing the on-site emergency plan before commissioning the installation.

The on-site emergency plan must specify the organisational measures, response methods and necessary resources the

1. Article R.1333-76 of the Public Health Code.

2. In a *département*, representative of the State appointed by the President.

licensee implements in the event of an emergency in order to protect its personnel, the public and the environment and to preserve or restore the safety of the installation.

During 2010, ASN continued preparing a draft ASN decision defining the means of managing emergency situations, and the content of the on-site emergency plan. This work is being done within the more general framework of the creation of the new BNI regime as resulting from the TSN Act.

Participation in drafting the off-site emergency plans

Pursuant to the 13 September 2005 orders concerning the off-site emergency plan and the ORSEC plan, the *préfet* is responsible for preparing and approving the plan. ASN assists the *préfet* in analysing the technical data to be provided by the licensees, in order to determine the nature and scope of the consequences of an accident. This analysis is conducted jointly by ASN and IRSN, its technical support organisation, taking into account the most recent available data on severe accidents and radioactive material dispersal phenomena.

Population protection actions

The off-site emergency plans identify the population protection actions to limit the consequences of an accident. The *préfet* decides whether or not to deploy these actions on the basis of levels of action according to the predicted dose that would be received by a person situated in the open air at the time of the accident.

The action levels are defined on the basis of the most recent international recommendations and, since 2003, have been stipulated in regulatory requirements. The action levels are defined by ASN decision 2009-DC-0153 of 18 August 2009, which modified the action level with regard to the administration of stable iodine.

For example, the off-site emergency plans defined for the vicinity of a PWR reactor stipulate sheltering of the population and the absorption of stable iodine within a 10-kilometre radius, plus evacuation of the population within a 5-kilometre radius.

1 | 2 Controlling urban development around nuclear sites

Four main principles underpin the protection of populations against technological risks:

- reducing risks at source;
- implementing off-site emergency plans;
- controlling urban development
- informing the population.

The aim of controlling urban development is to limit the consequences of a serious accident for the population and property. Actions to control urban development around non-nuclear industrial facilities has been deployed since 1987. These actions have been reinforced since the AZF accident of 2001. The TSN Act now empowers the public authorities to introduce public protection restrictions limiting or prohibiting new constructions in the vicinity of BNIs.

The urban development control actions involve the division of responsibilities between the licensee, the mayors and the State. The licensee is responsible for its activities and the related risks.

The mayor is responsible for producing the town planning documents and issuing building permits. The *préfet* informs the mayors of the risks that exist and checks the legality of the acts of the municipalities. ASN assists the *préfet* in the urban development control action.

In recent years, urban development pressure in the vicinity of nuclear sites has increased. It is therefore important to incorporate the control of urban development into the management of the nuclear risk. Current ASN doctrine regarding the control of urban development around nuclear installations concerns those installations requiring an off-site emergency plan. It primarily aims to guarantee the practical implementation of the actions stipulated in the off-site emergency plan with regard to sheltering and evacuation, particularly in areas that could be impacted by fast-kinetics accidents. Since 2006, ASN has asked to be consulted with regard to building permit applications made in the immediate vicinity of nuclear installations. ASN has so far issued about 40 reserved or unfavourable opinions on some 300 projects submitted.

A circular from the Ministry of Ecology dated 17 February 2010 has asked the *préfets* to exercise tighter vigilance over urban development near nuclear installations. This circular specifies that the utmost attention must be given to projects that are sensitive due to their scale, their intended purpose, or the difficulties they would create in terms of population protection in the zones of immediate danger. This circular tasks ASN and the DGPR (General Directorate for Risk Prevention) with leading a pluralistic working group to determine the ways and means of controlling activities around nuclear installations.

During 2010, ASN thus led wide-ranging discussions with the government administrations, elected officials and licensees concerned. These discussions resulted in the drawing up of a draft guide presenting the broad principles of urban development control. These principles are essentially:

- preserve the operability of the off-site emergency plans;
- favour urban development outside the risk zone;
- allow controlled development that meets the needs of the resident population.

This guide was submitted for consultation to representatives of the elected officials concerned, to the ANCCLI and to the licensees. ASN wants this guide to provide a basis for broad consultation among the local stakeholders so that the urban planning documents take account of the risks generated by nuclear installations.

1 | 3 Organising a collective response

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

Act 2004-811 of 13 August 2004 on the modernisation of civil security, makes provision for an updated inventory of risks, an overhaul of operational planning, performance of exercises involving the population, information and training of the population, an operational watching brief and alert procedures. A number of decrees implementing this act were passed during the course of 2005 and include:

- decree 2005-1158 of 13 September 2005 concerning off-site emergency plans;
- decree 2005-1157 of 13 September 2005 concerning the ORSEC plan.
- decree 2005-1156 of 13 September 2005 concerning the local safeguard plan.

The scope of radiological emergency situations is clarified in the government directive of 7 April 2005. The response organisation of the authorities and that of the licensee are presented in the diagram below.

1|3|1 Local response organisation

- In an emergency situation, two parties have the authority to take operational decisions:
- the licensee of the affected nuclear installation, which implements the organisational provisions and the means needed to bring the accident under control, to assess and mitigate its

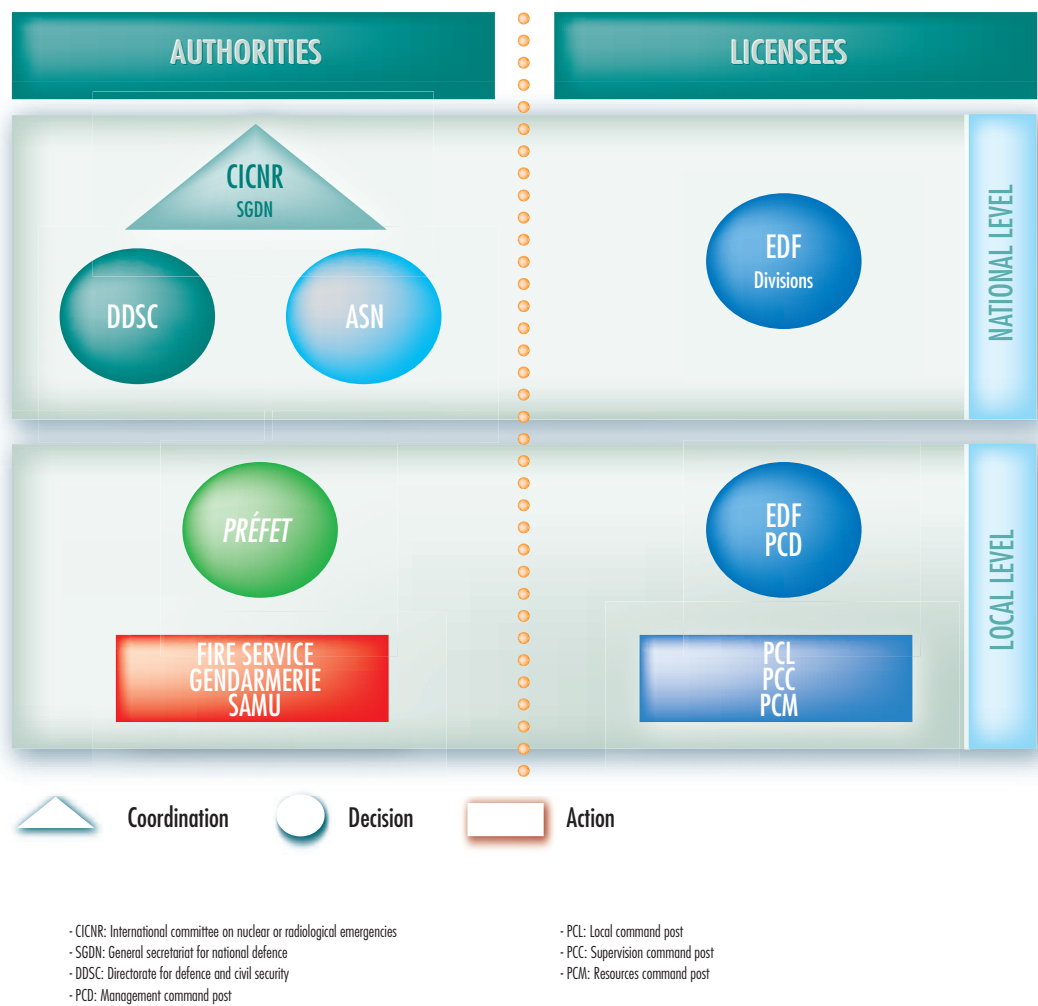
consequences, to protect persons on the site and alert and regularly inform the authorities. This arrangement is defined beforehand in the licensee’s on-site emergency plan;

- the *préfet* of the *département*³ in which the installation is located, who takes the necessary decisions to protect the population, the environment and the property threatened by the accident. He acts in the framework of the off-site emergency plan. He is thus responsible for coordinating the resources - both public and private, human and material - deployed in the plan. He keeps the population and the mayors informed of events. Through its regional division, ASN assists the *préfet* in drafting the plans and managing the situation.

ASN relies particularly on its regional divisions for organising local actions.

3. Administrative region headed by a *préfet*

Diagram 1: emergency organisation in an accident situation affecting a nuclear reactor operated by EDF



1|3|2 National response organisation

The relevant ministries and the ASN jointly advise the *préfet* with regard to the protective measures to be taken. They offer the *préfet* information and advice to enable him to assess the condition of the installation, the scale of the incident or accident and any potential developments.

The main bodies concerned are as follows:

- Ministry of the Interior: the Directorate for Civil Security (DSC) houses the Government Emergency Management Operational Centre (COGIC) and the Nuclear Risk Management Support Team (MARN). It provides the *préfet* with material and human resources for the protection of individuals and property;
- Ministry of Health: responsible for human health protection against the effects of ionising radiation;
- Ministry of Ecology: the Nuclear Safety and Radiation Protection Mission (MSNR) takes part in the State's nuclear safety and radiation protection responsibilities, jointly with the other competent administrations, especially those responsible for civil security;
- Ministry of Defence: the Defence Nuclear Safety Authority (ASND) is the competent authority for regulating the safety of secret basic nuclear installations (INBS), military nuclear systems (SNM) and defence-related transport operations. A protocol was signed by ASN and the ASND on 26 October 2009 to ensure coordination between these two entities in the event of an accident affecting an activity under the supervision of the ASND, to facilitate the transition from the emergency phase managed by the DSND (Delegate for Nuclear Safety and Radiation Protection for National Defence Installations and Activities);
- General Secretariat for Defence and National Security (SGDSN): the SGDSN handles the secretarial functions for the Interministerial Committee for Nuclear and Radiological Emergencies (CICNR). It is responsible for ensuring consistency between the ministries concerned regarding the planned actions in the event of an accident and for planning and assessing the exercises. The CICNR is convened at the initiative of the Prime Minister. Its role is to coordinate governmental action in the event of a radiological or nuclear emergency;
- ASN is involved in the management of radiological emergency situations. It assists the Government with all questions under its responsibility and informs the public about the safety of the installation in which the emergency situation originated. ASN's responsibilities in an emergency situation are detailed in point 2 | 1 | 1.

1|4 Protecting the public

1|4|1 General protective actions

The population protection actions that can be taken during the emergency phase are described in the off-site emergency plan. The steps taken are designed to protect the population and prevent affections attributable to exposure to ionising radiation or to toxic substances present in the releases.

In the event of a serious accident, the *préfet* can envisage a number of measures to protect the population:

- sheltering and listening: the individuals concerned, alerted by a siren, take shelter at home or in a building, with all openings carefully closed, and wait for instructions from the *préfet* broadcast by radio;
- administration of stable iodine tablets: when ordered by the *préfet*, the individuals liable to be exposed to releases of radioactive iodine are urged take the prescribed dose of potassium iodide tablets;
- evacuation: in the event of an imminent risk of large-scale radioactive releases, the *préfet* may order evacuation. The populations concerned are asked to prepare a bag of essential personal effects, secure and leave their homes and go to the nearest muster point.

In the event of effective release of radioactive substances into the environment, these actions also include the first action that should be decided on exit from the emergency phase to prepare for management of the post-accident phase. The region would then be zoned with:

- a population protection zone (ZPP) within which contamination reduction actions will be rapidly undertaken;
- a tightened surveillance zone (ZST) within which the consumption and sale of foodstuffs produced will initially be prohibited, and subsequently subject to a conditional release inspection based on the maximum permissible radioactivity levels set by the European Commission;
- if necessary, a population clearing zone within the ZPP if external exposure levels due to deposits justify it.

The *préfet* ensures that the population is regularly informed of developments in the situation and its consequences.

1|4|2 Iodine tablets

The administration of stable iodine tablets is one of the population protection measures the *préfet* may decide to order in a radiological emergency situation. In 2009, in collaboration with other government departments and EDF, ASN coordinated the 4th campaign of iodine tablet distribution to the population located in the vicinity of nuclear power plants (NPPs), within the zone covered by the off-site emergency plan. Distribution was organised in three phases: people were first invited to collect their stable iodine tablets from the pharmacy, then boxes of tablets were posted to those households that had not collected them, and lastly the tablets were made permanently available in the pharmacies.

At the end of the first phase of distribution, nearly 50% of the persons concerned nationwide had collected their boxes of tablets from the pharmacy. In early 2010, the boxes were sent by mail to those persons who had not collected them from a pharmacy. After this second phase, the overall coverage of the populations residing near the NPPs was approximately 93%.

The government circular of 27 May 2009 provides for a third phase in which blank withdrawal slips are provided in pharmacies. This system means that stable iodine tablets are available for distribution at all times and free of charge to persons newly arrived in the area, whether as permanent or temporary residents, or in case of loss or omission.

The experience feedback will be analysed in 2011 with all the stakeholders, and a more detailed assessment will be made with

the *préfectures*. A qualitative investigation will be initiated to determine why people did not collect their tablets, so that the method of distributing stable iodine to the populations can be optimised.

For the rest of the country outside the zones covered by off-site emergency plans, stocks of tablets are held in each *département*. These stocks would be distributed to the populations by the public authorities in the event of a radiological emergency situation. The minister in charge of health is coordinating work to improve the ways and means of mobilising these stocks.

1|4|3 Care and treatment of exposed persons

In the event of a nuclear or radiological accident, a significant percentage of the people involved could be contaminated by radionuclides. Such contamination could necessitate special treatment by the emergency response teams.

Circular 800/SGDN/PSE/PPS 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. These arrangements, which also apply to an accident, are designed to offer guidelines for the services and organisations in charge of planning and managing emergency situations both on the site of the event and in hospitals.

The “Medical response to a nuclear or radiological event” guide, coordinated by ASN and published in 2008, comes in addition to the circular DHOS/HFD/DGSNR 2002/277 of 2 May 2002 concerning the organisation of medical care in the event of a nuclear or radiological accident. This circular is supplemented by circular DHOS/HFD 2002/284 of 3 May 2002 concerning the organisation of the hospital system in the event of arrival of large numbers of exposed or injured people, setting up a departmental plan of hospital capacity provisions and a zone-based organisation for all nuclear and radiological, but also biological and chemical risks. This guide provides all the information useful to the medical teams in charge of collecting and transporting the injured, as well as for the hospital personnel receiving them in the health care establishments.

1|5 Understanding the long-term consequences

The post-accident phase deals with the consequences of the event. It covers the handling of varied consequences (economic, health, social), that should be considered in the short, medium or even long term, with a view to returning to an acceptable situation. Pursuant to the government directive of 7 April 2005, 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*”.

To produce a doctrine and after testing post-accident management during national and international exercises, ASN convened all the

stakeholders around a steering committee responsible for post-accident aspects, the CODIRPA. This committee comprises ASN, as coordinator, and representatives of the various ministerial departments concerned by the subject, health agencies, associations, and Local Information Committees (CLIs) and IRSN representatives.

The CODIRPA has addressed a large number of subjects, such as the lifting of population sheltering orders and the return of evacuated populations, the strategy for measuring environmental radioactivity, contamination reduction, waste management, restrictions on the consumption and export of foodstuffs, water, population health monitoring, persons intervening in situations of lasting exposure and their indemnification. It has also addressed cross-disciplinary subjects such as the organisation of the public authorities, governance and public information, and examined - where applicable - regulatory questions specific to them. Reports on these subjects have been drawn up jointly with the stakeholders and published on the ASN website.

CODIRPA set up a new organisation in 2009, creating two commissions, one to study the transition phase and one to study the longer-term picture.

The first CODIRPA commission is preparing a guide on the management plans for exiting the emergency phase. This operational guide provides the local authorities with useful elements for preparing their local plan for exiting the emergency phase (action to be taken during the first week of the transition phase, etc.). A first draft of this guide has been proposed. It is currently on trial in several pilot *départements* that host a NPP, as well as in several municipalities involved in the preparation of the radiological section of the Communal Disaster Contingency Plan (PCS). This commission is also preparing guidelines for management of the transition phase (which can range from a few weeks to a few months after the accident).

The second commission is also preparing guidelines for the management of the long-term phase, integrating the international work carried out in Belarus (Core, Corex) after the Chernobyl accident.

In 2009, the first elements of the post-accident doctrine were tested during national nuclear or radiological emergency exercises. The exercise carried out on 8 and 9 April 2010 on the Cattenom NPP included the question of whether or not to evacuate the population in the post-accident situation.

An international seminar will be held in May 2011 to present the work of the CODIRPA to the local actors (*préfectures*, municipalities, CLIs, etc.), to French experts involved in the work, to foreign experts involved in similar initiatives, to foreign radiation protection authorities and the French and foreign organisations concerned.

2 RESPONDING TO AN EMERGENCY SITUATION

2|1 Assisting the Government

2|1|1 ASN's duties in emergency situations

In an emergency situation, the responsibilities of ASN, with the support of IRSN, are as follows:

- 1) to ensure that judicious provisions are made by the licensee;
- 2) to advise the Government;
- 3) to contribute to the dissemination of information;
- 4) to act as Competent Authority within the framework of the international conventions.

Overseeing of actions taken by the licensee

In the same way as in normal operating conditions, licensee actions are regulated by ASN in an emergency situation. In this particular context, ASN ensures that the licensee exercises in full its responsibility for keeping the accident under control, mitigating the consequences, and rapidly and regularly informing the authorities. It does not take the place of the licensee in the technical steps taken to deal with the accident.

Advising the Government

The decision by the *préfet* concerning the population protection actions to be taken depends on the actual or foreseeable consequences of the accident around the site. It is up to ASN to inform the *préfet* of its recommendations on this subject, taking account of the analysis conducted by IRSN. This analysis combines diagnosis (understanding of the situation at the installation concerned) and prognosis (assessment of possible short-term developments, notably radioactive releases). It also concerns the steps to be taken to protect the health of the public.

Circulation of information

ASN is involved in information circulation in a number of ways:

- informing the media and the public: ASN contributes to informing both the media and the public in different ways (press releases, press conferences). It is important that this should be done in close collaboration with the other entities which are themselves involved in communication (*préfet*, local and national licensee, etc.);
- institutional information: ASN keeps the Government informed, along with the SGDSN responsible for informing the President of the Republic and the Prime Minister.
- informing foreign nuclear safety authorities.

Function of Competent Authority as defined by international conventions

The TSN Acts provides for ASN to act as Competent Authority under the international conventions. As such it collates and summarises information for the purpose of sending or receiving notifications and for transmitting the information required by these conventions to the international organisations (IAEA and

European Union) and to the countries concerned by possible consequences on their own territory.

2|1|2 The organisation of ASN

Organising the response to accidents occurring on BNIs

In the event of an incident or accident occurring in a BNI, ASN, with the help of its technical support organisation IRSN, sets up the following organisation:

- at the national level, an emergency centre comprising:
 - a decision-making level or strategic management command post (called PCD), located in ASN's emergency centre in Paris. This centre is headed by the ASN Chairman or his representative. Its role is to adopt a stance or make decisions to advise the *préfet* in charge of running the emergency operations;
 - a communication level supported by a communication unit located near the ASN's PCD, run by an ASN representative. The ASN Chairman or his representative acts as spokesperson, a role which is distinct from that of the head of the PCD;
- at the local level, one delegation sent to the *préfecture* and one sent to the accident site, to assist the *préfet* in his decisions and communication actions, and to ensure that the decisions taken by the licensee are justified.

ASN is supported by an analysis team working in IRSN's Technical Emergency Centre (CTC). ASN and IRSN have signed draft agreements with the main nuclear licensees regarding the organisational setup in an emergency situation. 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.

Diagram 2 presents the overall safety organisation set up, in collaboration with the *préfet* and the licensee.

Diagram 3 shows the structures set up between the communication units and the PCD spokespersons with a view to allowing the necessary consultation to ensure consistency of the information issued to the public and the media.

Organising for any other radiological emergency situation

A dedicated hotline enables ASN to receive calls notifying incidents involving non-BNI sources of ionising radiation 24 hours a day, 7 days a week. The information given during the call is transmitted to an ASN official who will act accordingly. Depending on the seriousness of the accident, ASN may decide to activate its emergency response centre in Paris.

Once the authorities have been alerted, the response generally consists of four main phases: care and treatment of the individuals involved, confirmation of the radiological nature of the event, securing of the zone and reducing the emissions, and finally, clean-out.

Diagram 2: nuclear safety organisation

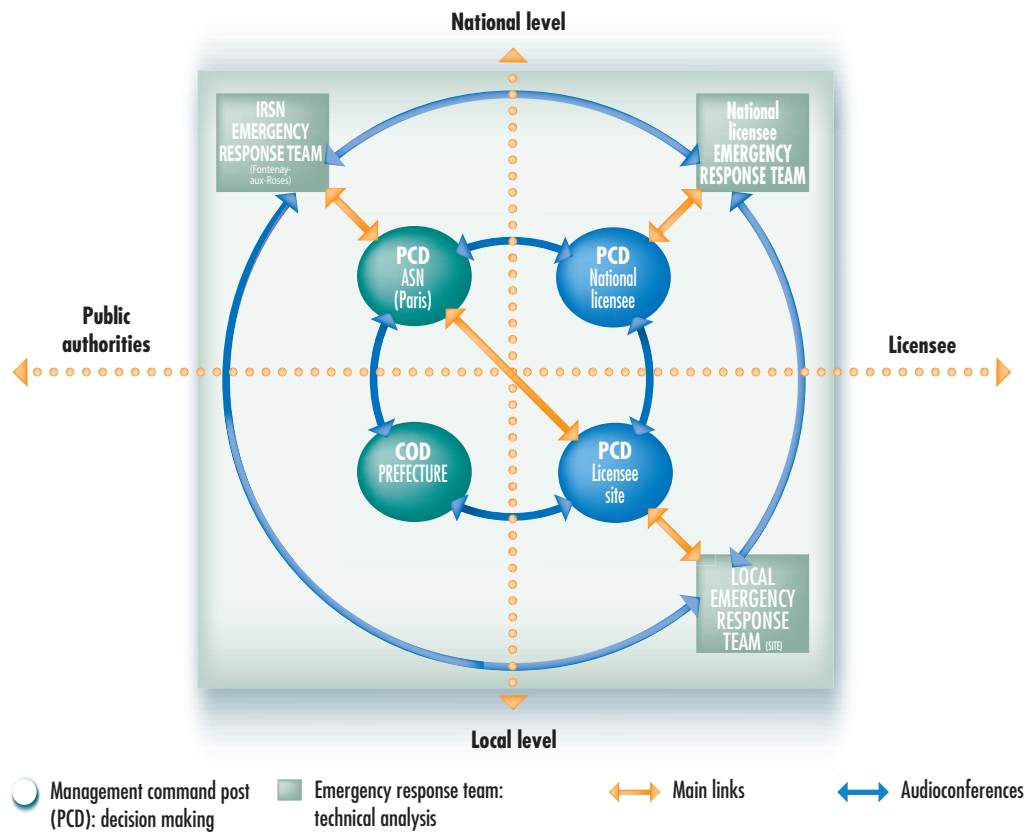
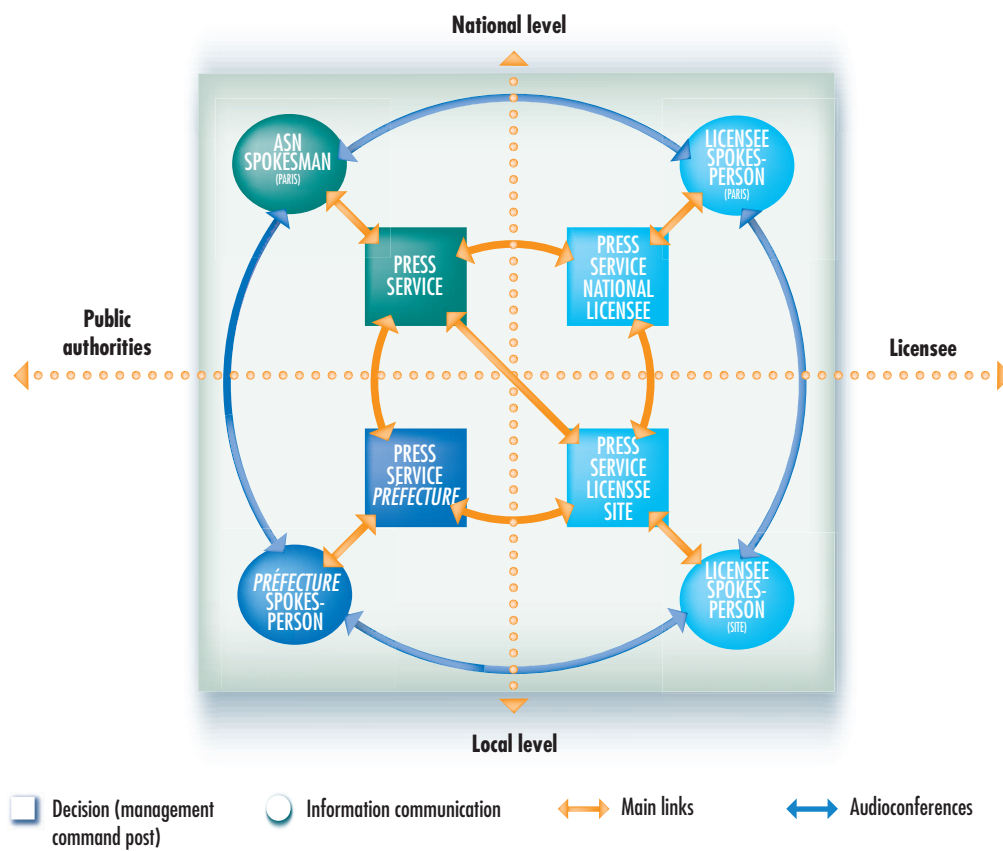


Diagram 3: communication organisation



The mayor or the *préfet* coordinates the intervention teams on the basis of their technical competence and decides on the protection measures for the public.

In these situations, responsibility for the decision and for implementing protective measures lies with:

- the head of the establishment carrying out a nuclear activity (hospital, research laboratory, etc.) who implements the on-site emergency plan specified in article L. 1333-6 of the Public Health Code (if the risks inherent to the installation so justify) or the owner of the site with regard to the safety of the persons on the site;
- the mayor or *préfet* concerning public safety outside nuclear installations.

During 2010, ASN continued its efforts to set up a standby duty rota for its teams, but this has been delayed for administrative reasons.

2|1|3 ASN's emergency response centre

In order to be able to carry out its responsibilities, ASN has its own emergency response centre, equipped with communication and data processing tools enabling:

- swift mobilisation of ASN staff;
- reliable exchange of information between the many stakeholders concerned.

The fact of activating the emergency response centre in no way constitutes a judgement of the gravity of the situation. In the event of an alert, activating this centre gives ASN technical management and communication techniques readily accessible to all the players.

The emergency response centre has been activated in real-life incident situations. In 2009, it was activated five times due to unfavourable climatic conditions threatening the Blayais NPP, a fire that placed the nuclear installations of Cadarache at risk, and the loss of a cold source at the Cruas and Fessenheim NPPs. In 2010, it was activated because of meteorological phenomena that threatened the Blayais NPP (the storm "Xynthia").

As demonstrated by these events, ASN's alert system allows swift mobilisation of ASN and IRSN staff. 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 DSC, the SGDSN and Météo-France. This system is regularly tested during exercises or when actual emergencies arise.

In addition to the public telephone network, the emergency response centre is connected to several autonomous restricted access networks providing secure direct or dedicated lines to the main nuclear sites. ASN's PCD also has a video-conferencing system which is the preferred means of contact with IRSN's CTC. The PCD also uses dedicated computer systems for alerts and information exchanges with the European Commission, the IAEA and the member states (ECURIE – European Community Urgent Radiological Information Exchange System, ENAC – Early Notifications and Assistance Conventions).

2|2 Ensuring efficient coordination with international authorities

Considering the potential repercussions that an accident can induce in other countries, it is important for the various countries to be informed and to intervene in as coordinated a way as possible. This is why IAEA and the European Commission offer the member countries tools to help with notification, intervention and assistance. ASN plays an active role in the preparation of these tools.

Independently of any bilateral agreements on the exchange of information in the event of an incident or accident with possible radiological consequences, France is committed to applying the Convention on Early Notification of a Nuclear Accident adopted on 26 September 1986 by IAEA and the decision of the Council of European Communities of 14 December 1987 concerning community procedures for an early exchange of information in the event of a radiological emergency. On 26 September 1986, France also signed the convention adopted



ASN emergency centre in a nuclear emergency exercise – September 2010





American delegation that attended the Penly nuclear emergency exercise – September 2010

by IAEA concerning assistance in the event of a nuclear accident or a radiological emergency.

The government directives of 30 May 2005 and 30 November 2005 specify the procedures for application of these texts in France and instate ASN as the competent national authority. It is therefore up to ASN to notify the event without delay to the international institutions and to the States concerned, to supply relevant information quickly in order to limit the radiological consequences and finally to provide the ministers concerned with a copy of the notifications and information transmitted or received.

Within IAEA's National Competent Authorities' Coordinating Group (NCACG), ASN has been the elected chair of the competent authorities for Western Europe since 2005.

2|2|1 Bilateral relations

Within the framework of bilateral relations, particularly with neighbouring countries, ASN continued discussions in 2010 concerning the exchanges of information relating to planning and emergency situations.

In 2010, ASN also continued its meetings with foreign counterparts responsible for managing emergency situations (British, Irish, Swiss and German). ASN also hosted an American delegation that came to observe a nuclear emergency exercise on the



Meeting of the Franco-German "emergency" working group – March 2010

Hosting an American delegation

Following on from an ASN mission in the USA in 2009 and observation of the emergency exercise at the Comanche Peak NPP (Texas), an American delegation was invited to France by ASN.

From 8 to 10 September 2010, ASN hosted a delegation comprising three representatives of the U.S. Nuclear Regulatory Commission (US NRC) and one representative of the Federal Emergency Management Agency (FEMA).

On 9 September, the members of the delegation attended the national emergency exercise at the Penly NPP. Two of the members joined the team at the préfecture, while the other two observed the exercise from the ASN emergency centre.

ASN presented its organisation and its activities in this domain, and summarized the work of the CODIRPA. Numerous topics relating to emergency situation management were discussed in detail, particularly population protection and public communication actions in accident situations. The American delegation underlined:

- the advantages of separating the functions of spokesperson and head of the ASN emergency centre;
- the good practice of holding periodic audio conferences between the main players;
- the great commitment of all the players;
- the fact that the separation of the ASN and IRSN emergency centres complicates the technical assessment of the situation;
- the first decisions, which went far beyond what would have been recommended in the United States.

Penly NPP on 9 September 2010 (see box). In November, ASN was invited by its Spanish counterpart (CSN) to observe an exercise in post-accident management following a dirty bomb attack.

2|2|2 Multilateral relations

ASN took part in 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 situation. For this action plan, ASN is helping to define the strategy concerning international assistance requirements and resources and to set up the Assistance Response Network (RANET). ASN is also working with NEA to define a strategy for carrying out international exercises.

Within the heads of European radiation control authorities group (HERCA), ASN has continued to take part in meetings of the group responsible for proposing harmonised pan-European population protection actions. The work has highlighted the

various international approaches to the intervention levels or the messages addressed to the populations in an emergency. In 2010, the work was directed towards harmonised and more operational application of the international recommendations.

2|2|3 International assistance

The above-mentioned government directive of 30 November 2005 defines the procedures for international assistance when France is called on or when it requires assistance itself. For each ministry, it contains an obligation to keep an up-to-date inventory of its intervention capability in terms of experts, equipment, materials and medical resources, which must be forwarded to ASN. As coordinator of the national means of assistance (RANET database), ASN takes part in the IAEA's work on the operational implementation of international assistance.

France has been called upon four times since 2008 to assist a foreign country in a radiological emergency situation.

3 LEARNING FROM EXPERIENCE

3|1 Carrying out exercises

In order to be fully operational, the entire response system and organisation must be regularly tested. This is the purpose of the nuclear and radiological emergency exercises. These exercises, which are defined by an annual circular, involve the licensee, the local and national public authorities - particularly the *pré-fectures* - ASN and IRSN. They are a means of testing the off-site emergency plans, the response organisation and procedures and help with training the participating staff. The main objectives 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 condition, 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.

3|1|1 Nuclear alert tests and mobilisation exercises

ASN periodically carries out tests to check the correct functioning of the system for alerting its staff. The system is also used for the exercises described below and undergoes unannounced tests.

3|1|2 Exercises

Continuing in line with the previous years, ASN - in collaboration with the SGDSN, the DSC and the ASND - has prepared the programme of national nuclear and radiological emergency exercises for 2010, notified to the *préfets* in a circular of 26 October 2009. In this context, ASN coordinates the meetings to discuss good practices and possible lines of improvement. These meetings serve to establish various objectives that are common to the national stakeholders. The circular proposed new objectives to the *préfets* for 2010 on the following themes:

- unannounced exercises: performing unannounced exercises tests the alerting system, the responsiveness of the emergency organisations and the circulation of information. The date and place of this type of exercise are not known to the participants;
- post-accident management: some targeted aspects of the post-accident management doctrine figuring in the draft guide for exiting from the emergency phase can be tested;
- strong media pressure: greater realism is achieved by simulating particularly intense and scripted media pressure exerted on a large number of entities via diverse channels;
- extensive health impact: having to manage a large number of injured and/or contaminated people enables the emergency medical chain to be tested from the accident site to the hospital environment;



Radioactive materials transport exercise in Lot et Garonne – October 2010



Measurement teams during the RMT exercise in Lot et Garonne – October 2010

- “minor” accident: an event whose seriousness does not necessitate immediate activation of the off-site emergency plan but allows the organisation’s reaction to be observed;
- extensive radioactivity measurement actions: substantial measuring means are deployed to test their coordination in the field, the feedback and processing of results, and their integration in the decisions.

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 2010.

In 2010, France took part in the international exercises organised by the European Community and IAEA. These tests provide an opportunity to check the alert, transmission and information

exchange procedures between the competent national authority (ASN) and the emergency centres of the European Commission and IAEA.

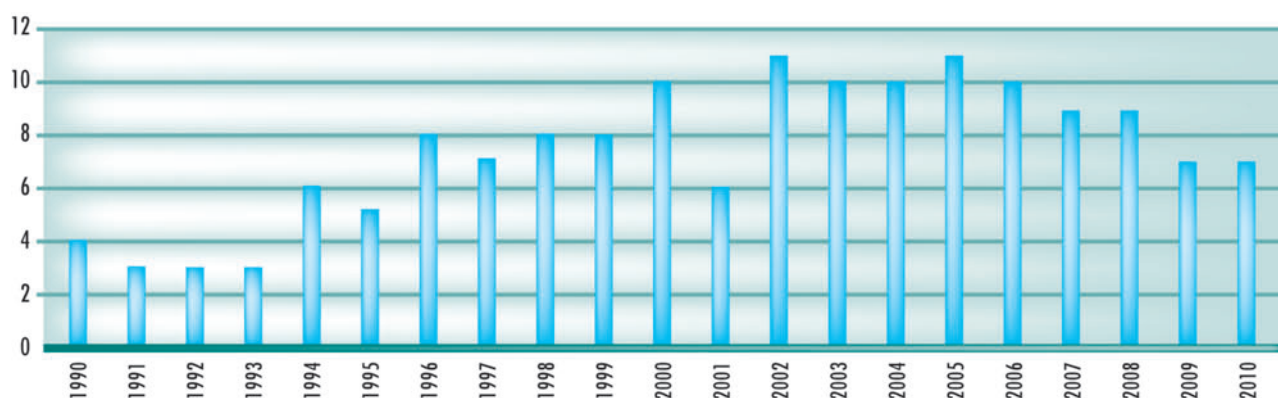
Apart from the national exercises, the *préfets* are asked to conduct local exercises with the sites that concern them, in order to improve preparations for a nuclear or radiological emergency situation, including testing of the time needed to mobilise all the parties concerned.

Carrying out a national nuclear and radiological emergency exercise every 2 to 5 years, depending on the complexity of the nuclear sites concerned, would seem to be a fair compromise between staff training and the time it takes for organisations to implement changes. A total of seven national exercises were carried out in 2010.

Table 1: national civil nuclear and radiological emergency exercises conducted in 2010

Nuclear site	Date of exercise	Particular characteristics
Cattenom NPP	8 April 2010	Cross-border cooperation, validation of evacuation principles, performance and coordination of radiological measurements, testing of post-accident recommendations.
CEA Marcoule	29 April 2010	Population alert, interdepartmental coordination, coordination between the Marcoule site licensees, application of the DSND/ASN protocol.
Chooz NPP	6 May 2010	Testing of population alert systems, exchanges with Belgian authorities, testing of the first post-accident actions.
Civaux NPP	17 June 2010	Population alert, testing of sheltering and listening, post-accident management.
Penly NPP	9 September 2010	Testing of off-site emergency plan in concerted phase, actual evacuation of population after sheltering, use of mobile measuring detectors, strong media pressure and ministerial involvement.
AREVA Pierrelatte	28 September 2010	Population sheltering and listening, population alert, coordination of the site licensees, testing of the medical chain, application of the DSND/ASN protocol.
Civil transport of radioactive material (Lot-et-Garonne)	21 October 2010	Extensive measurement actions, decontamination, recovery of damaged package.

Graph 1: national nuclear and radiological emergency exercises conducted from 1990 to 2010



The number and scale of the national exercises are considerable when compared with practices abroad. The IAEA international review mission in 2006 (IRRS mission) and the follow-up mission in 2009 underlined the importance of this programme of exercises. They enable ASN staff and national stakeholders to accumulate a wealth of knowledge and experience in managing emergency situations. These exercises are also an opportunity to train field personnel, with about 300 staff being involved in each exercise.

3 | 2 Assessing with a view to improvement

Assessment meetings are organised in each emergency response centre immediately after each exercise. Along with the other participants in the emergency exercise, ASN aims to identify the good and bad practices highlighted during the operating experience feedback meetings in order to improve the response organisation as a whole. These same feedback meetings are organised in order to learn the lessons from any real situations that have occurred.

The real situations that occurred thus demonstrated the importance of communication in an emergency, in particular to inform the public sufficiently early and avoid the spread of rumours that could lead to panic among the population. The draft international protocols were modified and aim to inform foreign authorities as early as possible. In certain cases, the licensee is required to send information about an incident directly to the foreign authorities. Specific alert criteria will also be sent out to the air quality monitoring associations.

The emergency exercises have, among other things, led to improvements in procedures and doctrines. 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 NPPs. 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 off-site emergency plans asking the populations to take shelter by alerting them through a network of sirens or other means of telephone-based alert.

Since 2007, the systematic use of decision-making audio-conferences has led to greater consistency in the steps taken to protect workers and the population as decided on by the licensee and the public authorities.

The purpose of the emergency response organisation is to prevent, inform and protect the public. During the exercises, it became clear that the siren system triggered by the licensees to alert the population did not cover the entire intervention perimeter in all cases. In these conditions, EDF undertook to complement the existing siren system with a system of telephone alerts, called “SAPPRE”. This new additional procedure automatically calls the landlines of the individuals concerned. This experimental system was tested on numerous occasions during the national exercises conducted since 2007. It is currently being deployed by all the licensees concerned.

In a post-accident situation, the doctrine adopted initially left it up to the decision-makers to assess whether the population should be kept at home or evacuated, on the basis of a range of dose values. A number of zones corresponding to specific issues (waste, population protection, ban on consumption, etc.) were also proposed. The exercises carried out showed the difficulty of taking a decision based on overly complex technical criteria. The exercises thus enabled a simplification of the various post-accident zones to be proposed.

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 to determine the public authorities’ response to the events. Experience feedback from the exercises shows that the measurement results took a long time to reach the experts and decision-makers. 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 government directive of 29 November 2005. This directive now needs to be implemented in the off-site emergency plans, in order to produce local measurement programmes tailored to the individual installations. ASN has maintained its commitment to this subject, to contribute towards improved access to and utilisation of the radioactivity measurements taken by the various

stakeholders (licensees, SDIS, IRSN, etc.). This work led to the issuing of a circular on 12 October 2010 by the Minister of the Interior, relative to the development of a measurement master programme. This document was sent to all the *préfectures* to enable them to draft a specific measurement master plan to be appended to the off-site emergency plan.

The exercises are a means of improving existing procedures:

- the scenarios increasingly frequently include a health component, involving management of the (sometimes contaminated) injured, who have to be given care and be evacuated;

- testing of the information procedures between the *départements* or even the countries in the vicinity of an installation help broaden the scope of mutual communication.

Experience feedback from nuclear or radiological 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. ASN calls all the stakeholders together twice a year to review good practices and identify areas for improvement.

4 OUTLOOK

In collaboration with the public administrations and public establishments concerned, ASN has coordinated the drafting of an annual circular relative to the national nuclear or radiological emergency exercises. The objectives chosen for 2011 aim at testing the safety/security interface, the implementing of a real-life population evacuation exercise, the population protection actions to be ensured when exiting from the emergency phase, and the integration of extensive communication with the population. It is also planned to carry out exercises with an earthquake or major fire as the originating cause, and a minor accident whose seriousness does not immediately reveal a necessity to activate the off-site emergency plan.

ASN will continue its work to strengthen its doctrine for the control of urban development around the BNIs. ASN wants to better inform the local authorities of the risk generated by nuclear

installations so that it is considered to a greater extent in the development strategy of municipalities. This information must be provided coherently and systematically for all installations with an off-site emergency plan. In the longer term, ASN wishes to apply public protection restrictions to limit urban development and therefore the consequences of an accident affecting an installation.

The CODIRPA international seminar scheduled for May 2011 will provide an opportunity to take stock of the work undertaken in the post-accident domain. The awaited publication of the emergency phase exit guide and the guidelines for managing the transition and long-term phases will be accompanied by a reflection on the future programme of work in the post-accident domain, and on how the current organisation of the CODIRPA - which will have fulfilled its mission - should evolve.