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A - Introduction

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1. General

1.1 Purpose of the report

Article 9(1) provides that Member States are to submit a national report on the implementation of this Directive to the European Commission no later than 22 July 2020.

1.2 Authors of the report
This report was drawn up by the French authorities, with contributions from the operators of the nuclear installations presented in Chapter 2, namely Électricité de France (EDF), Orano, the Commissariat à l’énergie atomique et aux énergies alternatives (CEA), the Institut Laue — Langevin (ILL) and the international ITER Organization. The preparation of the report has been coordinated by the French Nuclear Safety Authority (Autorité de Sûreté Nucléaire ASN). The final version was completed in July 2020, after consultation with the relevant French parties.

1.3 Structure of the report
This report is structured according to the guiding principles for the national reports drawn up by the members of the ENSREG. The presentation is ‘article by article’, with each article being the subject of a separate chapter at the beginning of which the corresponding text of the article of the Directive is highlighted in a grey-shaded box.

1.4 Publication of the report
The above-mentioned Directive does not lay down any obligation relating to the communication of the national reports to the public. Nevertheless, the French authorities, which are committed to improving public information and transparency in the field of nuclear safety, have decided to make the French national report accessible to any interested person. This report will therefore be available, in French, on the ASN’s website (www.asn.fr).

2. Installations concerned
The Law on nuclear safety and transparency (loi relative à la transparence et à la sécurité en matière nucléaire or ‘TSN Law’) of 13 June 2006 (now codified in the Environmental Code, cf. Section 4(1)) defines a basic nuclear installation (BNI) as an installation which, due to its nature or due to the quantity or activity of the radioactive substances contained therein, is subject to a specific control regime. These installations must be authorised by a Government decree issued following a public enquiry and an opinion from the Regulatory Authority. Facilities under construction, in operation, in the process of being shut down or decommissioned, are part of the regime governing basic nuclear installations.

For technical or legal reasons, the concept of a basic nuclear installation may cover different physical situations: thus, in a nuclear power plant (CNPE), each reactor can be considered as an individual basic
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nuclear installation, or a single basic nuclear installation may consist of two reactors. Similarly, a plant in
the fuel cycle or a CEA centre may consist of a number of basic nuclear installations. These different
configurations do not alter the conditions regarding control.

This report covers all nuclear installations in operation or under construction which are considered to be
basic nuclear installations, as listed in Article 3(1) of this Directive (see the detailed list in Annex 1),

- nuclear power plants: the existing stock, operated by Électricité de France (EDF), comprises 56
  operating pressurised water reactors (PWR), built in successive standardised stages, which were
coupled to the network between 1978 and 1999 and are all in service. In addition, a third
  generation EPR reactor has been under construction at the Flamanville site since 2007;
- fuel cycle installations (operated by Orano, with the exception of installations in Romans sur Isère
  operated by Framatome): nuclear enrichment and fuel fabrication plants, as well as treatment
  installations;
- research reactors:
  o In France, two research reactors are in operation, the Cabri reactor operated by the CEA
    and the High Flux Reactor (HFR) operated by the Institut Laue-Langevin (ILL).
  o The CEA started the construction of the Jules Horowitz reactor (RJH) in 2006. This new
    irradiation pool-type reactor will help to cover R&D needs until approximately 2050.
  o In addition to these reactors, the ITER (International Thermonuclear Experimental
    Reactor) project will test the nuclear fusion reaction with the aid of tritium and deuterium
    plasmas to test, inter alia, equipment for future power reactors that implement this
    response;
- nuclear installations in the process of being shut down and decommissioned;
- finally, spent fuel storage installations, as well as radioactive waste storage installations which
  are on the same site and which are directly related to the nuclear installations listed above.

3. National nuclear safety policy

This part is dealt with in Section 4(1).
Article 4. Legislative, regulatory and organisational framework
1. Member States shall establish and maintain a national legislative, regulatory and organisational framework (‘national framework’) for the nuclear safety of nuclear installations. The national framework shall provide in particular for:
   (a) the allocation of responsibilities and coordination between relevant national bodies;
   (b) national nuclear safety requirements covering all stages of the lifecycle of nuclear installations;
   (c) a system of licensing and prohibition of operation of nuclear installations without a licence;
   (d) a system of regulatory control of nuclear safety performed by the competent regulatory authority;
   (e) effective and proportionate enforcement actions, including, where appropriate, corrective action or suspension of operation and modification or revocation of a licence.

The determination on how national nuclear safety requirements referred to in point (b) are adopted and through which instrument they are applied remains within the competences of the Member States.

2. Member States shall ensure that the national framework is maintained and improved when appropriate, taking into account operating experience, insights gained from safety analyses for operating nuclear installations, development of technology and results of safety research, when available and relevant.

4.1 Legislative and regulatory framework

At national level, France has established and maintains in force a legislative and regulatory framework for the nuclear safety of basic nuclear installations.

The legal regime of basic nuclear installations has been thoroughly renovated by Law No 2006-686 of 13 June 2006 (the ‘TSN’ Law) and its implementing decrees, in particular Decree No 2007-830 of 11 May 2007 (‘BNI nomenclature’ Decree) and No 2007-1557 of 2 November 2007 (‘BNI Procedures’ Decree), but also, at technical level, by the Order of 7 February 2012 laying down the general rules on basic nuclear installations (‘BNI Order’). Since 2012, the provisions of the two main laws specifically relating to basic nuclear installations - the TSN Law, Programme Law No 2006-739 of 28 June 2006 concerning the sustainable management of radioactive materials and waste (‘Waste’ Law) - are codified in the Environmental Code.

Since April 2019, implementing decrees have also been codified in the regulatory part of the Environmental Code.

The provisions of the Environmental Code thus now form the basis of the licensing and control regime applicable to all basic nuclear installations.


B - Provisions adopted by article — Articles 4 to 8e

4(1)(a) The assignment of responsibilities

The legislative and regulatory framework provides for the division of roles between the Government and the ASN and proper coordination between these bodies.

In France, the control of nuclear safety and radiation protection is essentially the responsibility of three stakeholders: Parliament, the Government and the ASN.

- Parliament intervenes in the field of nuclear safety and radiation protection, in particular by voting on the law.
- The Government exercises regulatory power. It is therefore responsible for laying down general regulations concerning nuclear safety and radiation protection. The Environmental Code also entrusts it with the responsibility for making major decisions on basic nuclear installations, for which it relies on proposals or opinions from the ASN. It also has advisory bodies such as the High Committee for Transparency and Information on Nuclear Safety (HCTISN). The Government is also responsible for civil protection in the event of an emergency.
- The definition and implementation of nuclear safety policy is the responsibility of the Minister for Nuclear Safety, who draws on the ASN’s control and the expertise of the Institute for Radiation Protection and Nuclear Safety (IRSN). The Minister in charge of nuclear safety is currently the Minister for Ecological Transition. In the Ministry of Ecological Transition (MTE), the Directorate-General for Energy and Climate (DGEC) develops the policy and implements the Government’s decisions on the civil nuclear sector. In particular, the DGEC draws up policy on the management of radioactive materials and waste. The Nuclear Safety and Radiation Protection Mission (MSNR), within the Directorate-General for Risk Prevention (DGPR) of the MTE, prepares, coordinates and implements the Government’s tasks concerning nuclear safety and civil radiation protection. In particular, in liaison with the ASN, it is responsible for proposing the Government’s policy on nuclear safety and radiation protection, with the exception of nuclear installations and activities focusing on defence and the protection of workers against ionising radiation.
- The ASN, established by the TSN Law, is an independent administrative authority that participates in the control of nuclear safety, radiation protection and nuclear activities referred to in Article L.1333-1 of the French Public Health Code. Its tasks are to regulate, authorise, monitor and support public authorities in managing emergency situations and to contribute to the provision of information to the public and to transparency in its areas of competence.

The Law empowers the ASN to supplement the implementing provisions of the decrees and orders adopted in the field of nuclear safety or radiation protection by regulatory decisions of a technical nature which are subject to the approval of the Minister in charge of nuclear safety or radiation protection. The ASN has established a programme of decisions of a regulatory nature which are intended to specify the provisions deriving from the decrees or orders relating to basic nuclear installations. By July 2020, some 20 regulatory decisions were adopted, of which 10 directly related to basic nuclear installations.

As regards individual decisions, the ASN grants the authorisations, with the exception of the major authorisations of basic nuclear installations, such as the decree prescribing their creation or the operations to decommission them, taken by the Government further to an opinion from the ASN.

The Law also provides the ASN with the power to impose requirements on the operator throughout the life of the installation, including at the time of dismantling, for example to prevent a particular risk or to request the correction of an irregularity.

The ASN is responsible for monitoring compliance with their obligations. Nuclear safety inspectors and radiation protection inspectors, who are appointed by the ASN, are responsible for monitoring and controlling nuclear activities. Labour inspection in nuclear power plants is entrusted to ASN inspectors who are placed under the authority of the Minister for Labour for the purpose of performing these duties.
B - Provisions adopted by article — Articles 4 to 8e

4(1)(b) National requirements

The legal regime of basic nuclear installations is said to be ‘integrated’, since it is intended to prevent or control all the risks and nuisances which a basic nuclear installation may create for people and the environment, whether or not they are of a radioactive nature.

The operator of a basic nuclear installation is subject to numerous obligations under the law, which are implemented under the supervision of the ASN.

It is subject to an obligation to obtain a decision at each major stage in the life of the installation: a decision to create, commission, modify, dismantle or decommission (cf. Section 4(1)(c)). Furthermore, the law requires operators to carry out regular reviews every ten years. The assessment of the review conclusion reports may lead to the ASN adopting additional requirements.

Throughout the life of the basic nuclear installation, the ASN may impose the necessary requirements for the protection of protected interests (safety, public health or the protection of nature and the environment) on the operator.

The operator must provide a certain amount of information to the ASN and report on significant safety events. The analysis of significant events by the ASN is part of the monitoring carried out by the ASN. The review of the feedback may lead to requests from the ASN to improve the state of the installation and the organisation.

4(1)(c) Licensing procedures

French legislation and regulations prohibit the operation of a basic nuclear installation without a licence. Basic nuclear installations are currently regulated under Title IX of Book V of the Environmental Code. This title provides for a procedure for licensing the establishment, followed by a series of authorisations issued during the main stages of the life of basic nuclear installations: the establishment, commissioning and possible modification of the installation. The operator then declares the final shutdown of its installation and the Government prescribes the dismantling operations to be carried out. Finally, the ASN makes the decision to decommission a basic nuclear installation, which removes it from the statutory system of supervision by the ASN.

An operator operating a basic nuclear installation either without the necessary licences or in contravention of these authorisations may be subject to coercive measures, administrative penalties or criminal penalties provided for in the Environmental Code (cf. Section 4(1)(e)).

4(1)(c)(i) Licensing the establishment

The application for a licence to establish a basic nuclear installation is submitted by an industrial company with a view to its operation to the Minister responsible for nuclear safety. The application must be accompanied by a file composed of several parts, including the detailed plan of the installation, the impact assessment, the preliminary version of the safety report, the risk control study and the decommissioning plan.

Supervision of the licensing procedure is carried out by the competent departments under the authority of the Minister responsible for nuclear safety (Nuclear Safety and Radiation Protection Mission, MSNR). The technical investigation is assigned to the ASN. The Minister then forwards the application and the file attached to it to the Prefect, who shall submit it to the Environmental Authority set up within the General Council for the Environment and Sustainable Development of the Ministry of Ecological Transition for its opinion.

Public enquiry:
B - Provisions adopted by article — Articles 4 to 8e

In addition to the possible organisation of a public debate, licences to set up an installation are issued following a public enquiry.

The purpose of this enquiry is to inform the public and to collect their assessments, suggestions and counter-proposals in order to enable the Minister responsible for nuclear safety to have all the necessary elements before any decision is taken.

The Prefect opens the public enquiry in at least each of the municipalities with territory less than five kilometres from the perimeter of the installation. The duration of this investigation is at least one month; it is set by the Prefect. The file submitted by the operator in support of its application for a licence is made available, excluding the preliminary version of the safety report. It may be consulted, under certain conditions, during the course of the public enquiry. The opinion of the Environmental Authority is attached to the file.

The main documents that comprise the public enquiry file is made available to the public electronically by the Prefect. This is intended in particular to facilitate public knowledge of projects, in particular by persons who do not reside in the places where the enquiry is organised. The use of this method of making information available and the opportunity to comment electronically is intended to facilitate and improve public expression.

Consultation of the Local Information Committee (CLI):

A Local Information Committee¹ may be set up as soon as the application for a licence to establish a basic nuclear installation has been submitted. In any event, it must be effective after the licence to establish an installation has been issued.

Decisions on applications for basic nuclear installations are subject to a hearing procedure of the operator and the CLI by the ASN, including decisions to license the establishment when the CLI has been set up in time to do so.

Consultation of the European Commission:

Under Article 37 of the Euratom Treaty, the French authorities transmit the general data on installation projects that are likely to discharge radioactive effluents to the European Commission. The Commission issues an opinion on the basis of the dossier submitted. This opinion is attached to the application for a licence to establish an installation.

The technical investigation of the application and the creation authorisation decree (décret d’autorisation de création (DAC)):

In order to carry out the technical investigation of the dossier, and in particular of the preliminary version of the safety report accompanying the application to licence the establishment, the ASN requests expert opinions from the French Institute for Radiation Protection and Nuclear Safety (IRSN).

In light of the technical investigation and the results of the consultations, the nuclear safety and radiation protection mission (MSNR) draws up a preliminary draft decree on the creation authorisation for the installation. The Minister responsible for nuclear safety issues this preliminary draft decree to the operator. The operator has two months to submit its observations. The Minister also obtains the opinion of the ASN. Operators and the CLI have the opportunity to be heard by the ASN panel before it delivers its opinion.

The licence to establish a basic nuclear installation is issued by decree of the Prime Minister based on the report of the Minister responsible for nuclear safety.

¹ Local Information Committees (CLIs) are pluralist assemblies established for each basic nuclear installation in France; they have the general task of monitoring, information and consultation in the field of nuclear safety and radiation protection.
B - Provisions adopted by article — Articles 4 to 8e

The creation authorisation decree sets the scope and the characteristics of the installation. It also sets the deadline for commissioning the installation. It also imposes the essential requirements for the protection of public health and safety and the protection of nature and the environment. Finally, it may set an authorisation period (but existing licences in France are, in practice, given for unlimited periods of time).

The requirements laid down by the ASN for the application of the creation authorisation decree:

For the application of the creation authorisation decree, the ASN defines the requirements relating to the design, construction and operation of the basic nuclear installation which it considers necessary for nuclear safety.

The ASN sets out the requirements for the abstraction of water from the basic nuclear installation and for discharges from the basic nuclear installation. The specific requirements laying down the limits on discharges from basic nuclear installation into the environment are subject to the approval of the Minister responsible for nuclear safety.

4(1)(c)(ii) Authorisation for commissioning

The law provides that the authorisation for commissioning a basic nuclear installation is issued by the ASN.

Commissioning corresponds to the initial use of radioactive material in the installation or initial use of a particle beam. With a view to commissioning, the operator sends the ASN a file containing the update of the safety report on the ‘as built’ installation, the general operating rules, a study on waste management, the internal emergency plan and the decommissioning plan.

The commissioning of an installation is subject to authorisation by the ASN, issued after the investigation of a technical file, the contents of which are specified in the regulatory part of the Environmental Code.

4(1)(c)(iii) The modification of a basic nuclear installation

Any substantial modification to the installation is subject to a procedure that is similar to an application for an establishment licence.

A modification is considered to be substantial in the cases referred to in Article R.593-47 of the Environmental Code:

- a change in the nature of the installation or an increase in its maximum capacity;
- a modification of the essential elements for the protection of interests mentioned in paragraph 1 of Article L.593-1 of the Environmental Code, which are included in the authorisation decree;
- an addition, within the perimeter of the installation, of a new basic nuclear installation, the operation of which is linked to that of the installation in question.

The other modifications constitute ‘significant’ changes to the installation and are, depending on their importance, either to be declared or to be authorised by the ASN subject to the terms of Article L.593-15 of the Environmental Code.

On 30 November 2017, the ASN adopted Decision No 2017-DC-0616 relating to the significant modifications to basic nuclear installations, which specifies the criteria for distinguishing the significant modifications to be subject to authorisation by the ASN from those subject to declaration.

4(1)(c)(iv) Periodic review

Pursuant to Article L.593-18 of the Environmental Code, the operator is required to carry out a periodic review of its installation every ten years.
B - Provisions adopted by article — Articles 4 to 8e

Periodic reviews allow for large scale checks and modifications of the installations to improve their safety, taking into account the developments in requirements, practices and knowledge as well as feedback. They therefore include not only a verification of the compliance of the installation, including the assessment of equipment ageing management, but also a reassessment of the safety of the installation.

4(1)(c)(v) Dismantling decree

Where the operator provides for the permanent cessation of operation of its installation, it shall make the declaration to the Minister responsible for nuclear safety and to the ASN. That declaration must be made at least two years before the scheduled date of the cessation or as soon as possible if that cessation is carried out with a shorter notice for reasons justified by the operator.

The dismantling of an installation is prescribed by a Government decree, which is adopted after obtaining the opinion of the ASN. The dismantling file submitted by the operator is subject to the same consultations and enquiries as those applicable to applications for a licence to establish the basic nuclear installation and in the same manner. The dismantling decree lays down, inter alia, the characteristics of the dismantling and the period within which it is to be carried out.

After dismantling, an installation may be decommissioned.

4(1)(d) Monitoring of nuclear activities

Article L.592-22 of the Environmental Code specifies that the ASN monitors compliance with the general rules and the specific safety and radiation protection requirements to which basic nuclear installation operators and those responsible for nuclear activities are subject.

The ASN’s monitoring of nuclear safety and radiation protection extends to environmental protection and, in nuclear power plants, to labour inspection. Checks on the application of all the provisions relating to labour regulations (concerning in particular occupational safety or social security measures for the protection of staff) are carried out at the nuclear power plants by ASN inspectors designated for this purpose by the Chairperson of the ASN. They follow training given by the Ministry of Labour and thus belong to the labour inspection system, the central authority of which is the Directorate-General for Labour. They are subject to its rules of professional ethics. The Labour Inspectorate has three main tasks – monitoring, information and advice – and they concern working conditions and the protection of workers.

In the nuclear power plants, monitoring measures relating to nuclear safety, radiation protection and labour inspection very often cover common subjects, such as the organisation of sites or the conditions governing the use of subcontractors. Moreover, in order to ensure that basic nuclear installation operators only have to deal with one contact person, the law entrusts the ASN with the supervision of the application of the legislation in respect of all the pressure equipment of an establishment comprising a basic nuclear installation.

Supervision of nuclear activities by the ASN is one of its fundamental tasks. This monitoring shall consist of verifying that any person responsible for a nuclear activity fully assumes responsibility for and complies with the requirements of the nuclear safety and radiation protection regulations. It is based on a thorough technical dialogue with the operators, including the organisational dimensions. It takes into account all aspects of the protection of people and the environment, in an integrated approach. The procedures for inspecting the ASN are adapted to the specific characteristics and challenges of the various types of installations (nuclear power plants, research reactors, cycle installations, etc.).

This control is carried out at different levels:

- when examining applications for authorisation from the operator, when examining and analysing the files, documents and information provided by the operator in order to justify its action. The same applies to the appraisal of the ten-year periodic review reports submitted pursuant to
Provisions adopted by article — Articles 4 to 8

Articles L.593-18 and L.593-19 of the Environmental Code. The purpose of this inspection is to ensure that the information and demonstrations provided are relevant and sufficient;
- throughout the life of basic nuclear installation, through visits, inspections on all or part of the installation and documentary or on-the-spot checks. Visits and inspections may be unannounced or scheduled. They sometimes present important challenges, such as the planned shutdown of nuclear reactors. Monitoring is also carried out by means of analyses, including an analysis of the significant events to be reported by the operator.

The operator is responsible for providing the ASN with the information necessary for the inspection. This information should make it possible to analyse the technical demonstrations presented by the operator and to target inspections. It must also make it possible to know and track the important events which mark the operation of a basic nuclear installation. The ASN, as necessary, is supported by the IRSN.

In its monitoring, the ASN includes the idea of proportionality to guide its action in order to adapt the scope and depth of its monitoring to the issues in terms of nuclear safety and radiation protection.

4(1)(e) Proportionate coercive measures

4(1)(e)(i) Enforcement actions and administrative penalties

Where the ASN identifies breaches of regulatory requirements, enforcement actions and administrative penalties may be imposed on operators after formal notice has been served.

In the event of a failure to fulfil obligations, and irrespective of the type of installation, the Environmental Code provides for enforcement actions and progressive administrative penalties, which are imposed after a letter of formal notice and are defined in Articles L.171-8 and L.596-4:
- lodging of a sum equivalent to the amount of the work to be carried out with a public accountant;
- the automatic execution of works at the expense of the operator, and any sums deposited in advance may be used to pay for these works;
- suspension of the installation or operation (e.g. restarting operation) until the operator has brought it into compliance.

Order No 2016-128 of 10 February 2016 laying down various nuclear provisions supplemented those provisions to enable the ASN to order:
- the payment of a daily penalty of up to EUR 15,000;
- payment of an administrative fine of up to EUR 10 million for failure to comply with the provisions applicable to basic nuclear installations, EUR 1 million for failure to comply with the provisions applicable to equipment under nuclear pressure and EUR 30,000 in other cases. That fine is imposed by a sanction commission, which consists of four members (judges of the Council of State and the Court of Cassation) who are neither members of the panel nor of the departments of the ASN.

In practice, as regards enforcement actions and administrative penalties under Articles L.171-8 and L.596-4 of the Environmental Code, the ASN essentially issues letters of formal notice. These are published on the ASN website and have a strong coercive power. The ASN took 5 decisions to issue letters of formal notice in 2019.

As regards equipment under nuclear pressure, the ASN also has a suitable range of enforcement actions at its disposal, and may in particular suspend the certificate of conformity of equipment under nuclear pressure pending implementation by the operator of measures to correct a detected anomaly (as with the suspension of the certificate of compliance of a Fessenheim steam generator in 2016).
4(1)(e)(ii) Precautionary measures

The law also provides for precautionary measures to safeguard safety, public health and hygiene or to protect the environment. The ASN may therefore:

- in the event of serious and imminent risks, suspend the operation of a basic nuclear installation on a provisional basis, communicate this without delay to the Minister responsible for nuclear safety, who also has this power under the Environmental Code (cf. Section L.593-21);
- prescribe at any time the necessary assessments and implementation of the necessary provisions in the event of a threat to the interests referred to above.

4(1)(e)(iii) Criminal penalties

Criminal offences, as defined in the texts, are recorded in reports drawn up by the inspectors and forwarded to the Public Prosecutor, who decides whether or not to prosecute.

The Environmental Code provides for criminal penalties, detailed in Articles L.596-11 and L.596-12; these include fines of EUR 7,500 to EUR 150,000, which can be combined with imprisonment of 1 to 3 years depending on the nature of the offence. For legal persons who are declared criminally liable, the amount of the fine may be up to EUR 10,000,000. Infringements provided for in Article R.596-16 of the Environmental Code are also recorded in the reports of the ASN inspectors.

By way of example, the ASN drew up eight reports concerning basic nuclear installations in 2019.

4(1)(e)(iv) Coercive powers in the event of non-compliance with the Labour Code

In carrying out their duties in nuclear power plants, the ASN’s labour inspectors have all the monitoring, decision-making and coercive powers of inspectors under common law. Observation, formal notice, reports, summary proceedings (to put an immediate end to risks) or even the stoppage of works constitute a range of powers of leverage or coercion available to ASN labour inspectors. ASN labour inspectors also have the option of carrying out checks on work equipment or sampling chemical substances to verify that the proper conditions for protecting workers are in place.

Failure to comply with the health and safety rules laid down in the Labour Code constitutes a criminal offence punishable by a fine of EUR 10,000 per offence and per employee involved in the offence.

Finally, labour inspectors have an extended range of powers in relation to the administrative sanctions that can be used, inter alia, in the areas of working time or the posting of foreign workers.

4.2 Maintaining and improving the legislative and regulatory framework

Order No 2016-128 of 10 February 2016 laying down various provisions in the field of nuclear energy, adopted on the basis of Law No 2015-992 of 17 August 2015 on the energy transition for green growth, known as the ‘LTECV’, made it possible to complete the transposition of several directives, including the provisions of the Nuclear Safety Directive of 8 July 2014, for the legislative part.

The main new provisions in the nuclear field include:

- enhancing citizens’ transparency and information, including strengthening and extending the tasks of local information committees (CLIs) and strengthening certain procedures for informing people;
- the stabilisation of the system of basic nuclear installations together with the management of the use of subcontracting, the development of the authorisation scheme for basic nuclear installations and the renovation of the arrangements for the final shutdown and dismantling of basic nuclear installations;
- clarification of the organisation of nuclear safety and radiation protection monitoring by the ASN and the IRSN.
B - Provisions adopted by article — Articles 4 to 8e

This Law and this Order thus make significant changes to the legislative framework (also included in the Energy Code) governing nuclear activities and their control. In particular, Article L.591-2 stipulates that the State shall ensure that the nuclear safety and radiation protection regulations, as well as its control, are assessed and improved, where appropriate, taking into account the experience gained from the operation, the lessons learned from nuclear safety analyses carried out for nuclear installations in operation, the development of technology and the results of nuclear safety research, if available and relevant.

At regulatory level, Decree No 2019-190 of 14 March 2019 updated and codified the regulatory provisions hitherto applicable to basic nuclear installations, the transport of radioactive substances and the transparency of nuclear materials in the Environmental Code.

The BNI Order of 7 February 2012 is also a fundamental part of the regulatory framework. It has been clarified by regulatory decisions of the ASN. The technical regulation is consistent with that of the other Member States, as it incorporates the ‘reference levels’ of the Western European Nuclear Regulators Association (WENRA). This regulation takes into account the feedback obtained in the operation of the installations. The BNI Order is being updated to incorporate the experience gained from its application in recent years.

In the context of the current restructuring of the general technical regulation, the basic safety rules are amended or supplemented in the form of guides from the ASN. The purpose of each guide, in the form of recommendations, is:

- to clarify the regulation and rights and obligations of those involved in the regulation;
- to clarify the regulatory objectives and describing, where appropriate, the practices which the ASN considers satisfactory;
- to provide practical elements and useful information on nuclear safety and radiation protection.

Each guide takes into account the safety requirements for the design of reactors resulting from the publications of the International Atomic Energy Agency (IAEA) and the reference levels, safety targets or recommendations published by the Western European Nuclear Regulators Association (WENRA).

The ASN must ensure that operators can demonstrate that the means they propose to implement allow them to achieve the security objectives specified by the guides. There are currently some 40 guides from the ASN which can be consulted on its website.
**Article 5. Competent regulatory authority**

1. Member States shall establish and maintain a competent regulatory authority in the field of nuclear safety of nuclear installations.

2. Member States shall ensure the effective independence from undue influence of the competent regulatory authority in its regulatory decision-making. For this purpose, Member States shall ensure that the national framework requires that the competent regulatory authority:
   - (a) is functionally separate from any other body or organisation concerned with the promotion or utilisation of nuclear energy, and does not seek or take instructions from any such body or organisation when carrying out its regulatory tasks;
   - (b) takes regulatory decisions founded on robust and transparent nuclear safety-related requirements;
   - (c) is given dedicated and appropriate budget allocations to allow for the delivery of its regulatory tasks as defined in the national framework and is responsible for the implementation of the allocated budget;
   - (d) employs an appropriate number of staff with qualifications, experience and expertise necessary to fulfil its obligations. It may use external scientific and technical resources and expertise in support of its regulatory functions;
   - (e) establishes procedures for the prevention and resolution of any conflicts of interest;
   - (f) provides nuclear safety-related information without clearance from any other body or organisation, provided that this does not jeopardise other overriding interests, such as security, recognised in relevant legislation or international instruments.

3. Member States shall ensure that the competent regulatory authority is given the legal powers necessary to fulfil its obligations in connection with the national framework described in Article 4(1). For this purpose, Member States shall ensure that the national framework entrusts the competent regulatory authorities with the following main regulatory tasks, to:
   - (a) propose, define or participate in the definition national nuclear safety requirements;
   - (b) require that the licence holder complies and demonstrates compliance with national nuclear safety requirements and the terms of the relevant licence;
   - (c) verify such compliance through regulatory assessments and inspections;
   - (d) propose or carry out effective and proportionate enforcement actions.

5.1 The legal basis of the Regulatory Authority

Law No 2006-686 of 13 June 2006 on nuclear safety and transparency, known as the ‘TSN Law’ codified in the Environmental Code, established the Nuclear Safety Authority (ASN), an independent administrative authority responsible for monitoring, on behalf of the State, nuclear safety and radiation protection to protect workers, patients, the public and the environment from the risks associated with civil nuclear activities.

The Nuclear Safety Authority consists of a panel of five members appointed by decree of the President of the Republic for their competence in the fields of nuclear safety and radiation protection. The panel can avail itself of the departments placed under the responsibility of the President. The decisions and opinions of the ASN are taken by its panel or by delegation of its powers.

Order No 2016-128 of 10 February 2016 establishes the ASN’s Sanctions Committee. This Committee will operate in the second half of 2020. Administrative fines are intended to be imposed by the Sanctions Committee so as to observe the principle of the separation of the duties of investigation, indictment and judgment provided for by French law and international conventions in the context of the right to a fair trial.

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2 The TSN Law defines nuclear safety as including ‘nuclear safety, radiation protection, preventing and combating malicious acts, as well as civil security actions in the event of accidents.’
B - Provisions adopted by article — Articles 4 to 8e

All the provisions relating to the organisation, operation, mission and powers of the ASN, including its Sanctions Committee, are set out in Chapter 2 of Title IX of Book V of the Environmental Code (legislative part and regulatory part). The responsibilities of the ASN are described in Section 4(1)(a) of this report.

5.2 Effective independence of the Regulatory Authority

5(2)(a) Functional separation

The ASN is an independent administrative authority. Therefore, it does not receive any instructions from the Government or the Head of State, or from any other person or institution. Although it is part of the State, it is not a ministerial department, nor is it under guardianship or subject to arbitration by the Prime Minister in the event of disagreement with other public authorities.

Independence from the Government is supported by the way in which the five commissioners on the panel are appointed: three of the commissioners, including the Chairperson, are nominated by the President of the Republic; the two other commissioners are nominated by the President of the National Assembly and by the President of the Senate respectively. The members have a six-year term of office. It is not renewable. Collective responsibility also constitutes an element of the independence of the ASN.

The independence of the ASN is also guaranteed by the commissioners’ non-revocability. Thus, the duties of a member may be terminated only in the event of their being prevented from fulfilling such duties or having resigned, as established by the panel consisting of a majority of the commissioners. The President of the Republic may also terminate the duties of a member of the panel in the event of a serious breach of obligations.

The ASN reports on its activities to the European Parliamentary Office for Evaluation of Scientific and Technological Options (OPECST), at the latter’s request, and also submits its annual report on the state of nuclear safety and radiation protection to this body.

Moreover, as provided by Law No 2017-55 of 20 January 2017 laying down the general rules governing independent administrative authorities and independent public authorities, the ASN, like any other independent administrative authority:
- sends a report on the performance of its tasks and resources to the Government and Parliament before 1 June each year. The report is made public;
- reporting on its activities to the relevant standing committees of the National Assembly and the Senate at their request.

5(2)(b) Decision-making

The ASN does not receive any instructions from the Government or from any public institution when making its decisions (cf. Section 5(2)(a)). It is totally independent from any political power. Rules of professional ethics also ensure that there is no conflict of interest which could jeopardise the independence of the ASN (cf. Section 5(2)(e)).

The law empowers the ASN to supplement the implementing provisions of the decrees and orders adopted in the field of nuclear safety or radiation protection through regulatory decisions of a technical nature. In drawing up its regulatory decisions and guides, the ASN must, in particular, ensure that legislation implemented is:
- clear, to be understood by all and applied without difficulty in interpretation,
- structured, in order to avoid duplication (particularly with standards) or fragmentation of requirements in many regulatory or individual texts,
- proportionate to the challenges of protection of the interests referred to in Article L.593-1 of the Environmental Code so as to ensure as low a level of risk as possible under economically acceptable conditions,
B - Provisions adopted by article — Articles 4 to 8e

- consistent with international standards such as those laid down by the IAEA and the recommendations and reference levels laid down by the ICRP (International Commission on Radiological Protection) or by WENRA,
- applicable, i.e. designed to enable the operators and industries concerned to assume their responsibility as well as possible and to take into account, as soon as possible, the objectives of the legislation and its consequences in the definition of their guidelines,
- updated to take into account improvements in available technology;
- preferably defined in the form of an obligation to achieve results. When the definition of the means appears necessary (in particular so that the regulatory requirements are precise and verifiable), it must be preceded by the presentation of the expected results. In such a case and in order to avoid blocking possible technical developments, the regulation must, subject to exceptions, allow the use of alternative means for which the operators justify the equivalence.

Regulatory decisions are approved by the Minister responsible for nuclear safety or the Minister responsible for radiation protection. In accordance with Article 21 of the Constitution of 4 October 1958 in force, the Prime Minister is the main holder of the regulatory power. The ‘second’ regulatory power given to the ASN is constitutional only if the Authority’s regulatory decisions are subject to an approval by the Minister responsible for nuclear safety or the Minister responsible for radiation protection. The purpose of this approval is to ensure that the secondary legislation adopted by the ASN complies with the higher level regulation (decree and order) which it specifies. Approval is given on an all or nothing basis (the Ministers approve or refuse the approval) and the reasons must be given for refusal (Article R.592-20 of the Environmental Code). These Ministers may not in any circumstances alter the decisions of the ASN. Since 2006, the date on which the ASN was set up in the form of an independent administrative authority, there has been no refusal to approve any of the ASN’s regulatory decisions.

The legitimacy of the ASN’s decisions is based on a set of principles implemented with rigour, competence, transparency and independence. This implementation is based on an efficient internal functioning mode.

ASN is the competent authority to prescribe to the operator of a basic nuclear installation any measure necessary to protect the interests essential for the protection of the environment as defined in Article L.593-1 of the Environmental Code (safety, public health, environmental protection, etc.). It has the power to take a large number of individual decisions that punctuate the life of basic nuclear installations (authorisation for commissioning, authorisation of significant changes, etc.). Finally, it may take administrative enforcement actions and even impose fines through its Sanctions Committee.

The ASN calls on external experts, as necessary, to assist it in its analyses and investigations leading to decision-making, in particular the IRSN and standing expert groups (cf. 5(2)(d)). It may also have to consult local information committees on certain draft decisions, for example on the draft rules on effluents and on environmental protection.

The ASN carries out its activities in compliance with the principle of transparency and public information. For this reason:

- it carries out the necessary public consultations prior to decision-making, in accordance with the conditions laid down by national provisions in conformity with international and European legislation in this field;
- it publishes all its decisions and opinions in its Official Bulletin on its website.

5(2)(c) Financial means

Since 2000, all the resources in terms of staff and operations which contribute to the performance of the tasks assigned to the ASN have been taken from the general budget of the State.
In the 2020 Finance Law, the ASN budget was EUR 65.77 million in payment appropriations (PA). This includes EUR 48.12 million in staff expenditure and EUR 17.65 million in PA for operating appropriations, central departments and the 11 territorial divisions of ASN and intervention appropriations.

The Chairperson of the independent public authority is the authorising officer for revenue and expenditure. The Decree of 7 November 2012 on budgetary management and public accounting provides that ‘Ministers shall be the sole principal authorising officers of the revenue and expenditure of the general budget, of the ancillary budgets and of the special accounts, in respect of the appropriations made available to them under Article 7(IV) of the Organic Law of 1 August 2001’. Article 75 of that Decree provides that ‘the secondary authorising officers shall act pursuant to a delegation of powers of the principal authorising officers, within the framework of a functional or territorial competence’ and that ‘unless otherwise specified by law, the Chairperson of an independent administrative authority shall act as secondary authorising officer’. The Chairperson of the ASN therefore automatically has the delegation of power from the Minister to act as secondary authorising officer within the framework of its functional competence.

In addition, as provided for by law, the ASN relies on the IRSN, which provides it with technical expertise (supported by research where necessary) for an amount of EUR 84.3 million dedicated to the ASN’s technical support action. Pursuant to Article L.592-14 of the Environmental Code, the Nuclear Safety Authority is consulted by the Government on the proportion of the State subsidy of the Institute for Radiation Protection and Nuclear Safety corresponding to the technical support mission of this Institute to the Authority.

In total, in 2019, the State budget for transparency and control of nuclear safety and radiation protection in France amounted to EUR 297.42 million.

The panel of the Nuclear Safety Authority (ASN) issues an annual statement on the resources devoted to the monitoring of nuclear safety and radiation protection. This statement is published on the ASN’s website.

5(2)(d) Human resources

The overall workforce of the ASN as at 31 December 2019 amounts to 521 persons, of which 288 are in the central services, 230 are in the territorial divisions and 3 are in other countries.

As at 31 December 2019, the average age of officers of the ASN was 45 years and three months. The balanced age pyramid and the diversification of the profiles recruited allow the ASN to have the qualified human resources needed for its mission.

Competence is one of the four core values of the ASN. Mentoring and initial and continued training, whether of a general nature related to nuclear techniques, communication or legal matters, and daily practice, are essential elements in the proficiency of ASN officers. The management of the skills of the ASN officials is based, in particular, on a course of technical training which is defined for each official under a training reference framework with minimum experience requirements.

The ASN has inspectors who are designated and authorised by the Chairperson of the ASN, in accordance with the procedures laid down in the Environmental Code (regulatory part), provided they have acquired legal and technical expertise or professional experience, or undergone mentoring or training. They carry out their monitoring activities under the authority of the Director-General of the ASN and have regularly updated practical tools for carrying out their inspections. They take the oath and are bound by professional secrecy. As at 31 December 2019, there were 238 appointed nuclear safety inspectors, including 121 in the regional divisions and 117 in the central services.

The ASN also has the support of technical experts in preparing its decisions. The Institute for Radiation Protection and Nuclear Safety (IRSN, www.irsn.fr) is the main body.
B - Provisions adopted by article — Articles 4 to 8e

The IRSN is a State public establishment of an industrial and commercial nature which carries out expert and research activities, in particular in the field of nuclear safety and radiation protection. The Institute conducts and implements research programmes in order to build the national capacity of public expertise on the most advanced scientific knowledge internationally and to contribute to the development of scientific knowledge of nuclear and radiological risks. It is responsible for providing technical support to public authorities responsible for safety, radiation protection and security. A five-year agreement concluded between the ASN and the IRSN lays down the detailed rules for the deployment of this technical support. Each year it is broken down into a protocol which enables priorities to be refined in light of the issues at stake in terms of nuclear safety and radiation protection.

To prepare its decisions on the most important issues of nuclear safety and radiation protection, the ASN also requests opinions and recommendations from standing expert groups (GPE), which have been placed under the authority of its Director-General. Eight standing expert groups were set up to shed light on technical subjects on the nuclear safety and radiation protection of installations and activities in their area of competence, namely nuclear reactors, laboratories and plants implementing radioactive material, decommissioning installations, radiation protection in medical settings, radiation protection in environments other than medicine, waste, transport and nuclear pressure equipment. They generally rely on an expert report from the IRSN, a working group or the nuclear pressure equipment directorate of the ASN.

The GPE consists of experts appointed on the basis of their competence, from the academic, community and industry sectors involved in the subjects covered. The participation of foreign experts helps to enrich the work of the GPE, which thus benefits from international experience, methods and expertise.

5(2)(e) Conflicts of interest

Two charters of ethics respectively governing ASN commissioners and officers (Annex 1) and experts participating in expert appraisal work carried out at the request of the ASN (Annex 2) are annexed to the ASN internal regulations (Decision No 2018-DC-0644 of 9 October 2018).

In Annex 1, Chapter 1 for commissioners, and Chapter 2 for the ASN officers, describe the arrangements for the prevention of conflicts of interest, namely:

- the definition and arrangements for managing such situations (Articles 1, 26 and 27);
- details of the action to be taken in the event of a risk of conflict (Articles 2 and 26);
- the rules governing gifts and invitations received in the performance of their duties (Articles 3 and 28);
- reporting obligations (Articles 11 to 21 and 41 to 44);
- the procedure to be followed (ethical review) in the event of professional retraining in the private sector (Articles 22, 23, 39 and 40);
- the possibility to consult and receive advice from the ASN’s compliance officer (Article 51).

ASN staff are made aware of the risk of conflicts of interest through:

- an informational presentation on 'the ethical rules governing ASN officers' during training sessions for new arrivals, at which time they are given the ASN's internal regulations;
- information meetings for specific public audiences (contractual, CEA and IRSN officers made available to the ASN) on the topic of human resources;
- the dissemination of information on the ASN intranet.

The various chapters of Annex 2 describe the mechanisms for preventing conflicts of interest, for each category of expert work carried out at the request of the ASN.

The five-year agreement between the ASN and the IRSN, to which Article 21 of Annex 2 to the ASN internal regulations refers, provides (Article 6(1)) that 'the activities defined in this agreement shall be carried out in accordance with the laws, rules and codes of professional conduct and quality in force, in
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particular of the Charter of health experts [approved by Decree No 2013-413 of 21 May 2013], when it is applicable and the IRSN’s Code of Ethics and Professional Conduct, and under the full responsibility of the IRSN, whether carried out by its own staff or by subcontractors’.

As regards the arrangements for preventing conflicts of interest in force at the IRSN, mention should be made of: the public declaration of interests (Article L 1451-1 of the Public Health Code); the Code of Ethics and Professional Conduct and the Ethics Commission of the Institute (respectively provided for in Articles R. 592-48 and R. 592-56 of the Environmental Code) and the ethics review, provided for by Law No 83-634 of 13 July 1983, applicable to employees of the Institute who leave the Institute to pursue their career in the private sector. The IRSN Code of Ethics and Professional Conduct is available on the website of the establishment. Article 4(3) of the Code states that the Institute is required to inform the recipients of its technical support, as far as they are concerned, of its links with industry.

The members of the GPE are required to comply with the provisions of the charter for external expertise carried out at the request of the ASN, set out in Annex 2 to the ASN internal regulations. In particular, an organisation has been established to identify and address the relevant links and conflicts of interest.

5(2)(f) Ensuring public awareness

Ensuring public awareness is a task of the ASN which is enshrined in the law. The second paragraph of Article L.592-1 provides: ‘[The ASN] shall be involved in informing the public and in transparency in its fields of competence’. As an independent administrative authority, the ASN is fully responsible for its communication: it shall not be subject to any external validation or arbitration.

As stated in Section 8(1) to 8(4) of this report, the ASN actively communicates to the general public, the media, the institutional public and professionals, in particular via its website and its Official Bulletin where all the decisions it adopts are published. The ASN informs citizens, the media, the institutional public and professionals of basic nuclear installations and of nuclear safety and radiation protection requirements through the year. It presents all its monitoring activities and the actions it undertakes in this context, disseminates them widely and explains its decisions and positions, as necessary. The ASN organises regional press conferences each year in order to report on the state of nuclear safety as closely as possible to the installations that have been inspected. After each inspection, it publishes a ‘letter of inspection’ which sets out its findings and recommendations to the operator. It also edits notes, guides and reports for professionals, which are accessible to the public.

The ASN and its officers are subject to the general obligations to protect sensitive information. Each type of protected information thus forms the subject of a specific regulatory framework (for example, for the purpose of the confidentiality of national defence, in Chapter I of Title I of Book III of Part II of the National Defence Code). In practice, the secrets concerned are those mentioned in Article L.311-5 of the Code on Relations between the Public and the Administration.

5.3 Regulatory tasks of the Regulatory Authority

5(3)(a) The definition of national requirements

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

In fact, the law empowers the ASN to supplement the implementing provisions of the decrees and orders adopted in the field of nuclear safety or radiation protection by regulatory decisions of a technical nature, which are subject to the approval of the Minister responsible for nuclear safety or radiation protection.

As recent examples, the ASN has been actively involved in adapting the necessary regulatory provisions following the amendments introduced by the Law of 17 August 2015 and the order of 10 February.
5(3)(b) Regulatory provisions to ensure compliance with national requirements

Basic nuclear installations are currently regulated under Title IX of Book V of the Environmental Code. This Title provides for a procedure for licensing the establishment, followed by a series of authorisations issued during the main stages of the life of basic nuclear installations: the establishment, commissioning and possible modification of the installation.

The ASN examines licence applications. When it does this, it checks that the application files comply with the regulations in force. These must contain all the supporting documents enabling the competent authority to make the decision to issue the licence or to refuse it.

At the design and construction stage, the operator forwards the safety reports that describe and justify the design principles, the dimensioning calculations of the equipment, their rules of use and testing, the quality organisation set up by the supervisor and its suppliers. Once the basic nuclear installation has entered into operation, all the major safety changes require an application for authorisation or a declaration to the ASN, or even a request for modification of the establishment licence submitted to the Minister responsible for nuclear safety.

The purpose of the files provided by the operator is to demonstrate that the objectives set out in the general technical regulations, as well as those which it has set itself, are complied with. The ASN monitors the completeness of the dossier and the quality of the demonstration. The examination of these files may lead the ASN to accept or reject the operator’s proposals, to require additional information or studies or to allow the execution of work on compliance with the regulatory requirements.

The law requires operators to regularly conduct periodic reviews. The ASN assesses the reports on the conclusion of operators’ reviews, may require additional information and impose additional requirements necessary to provide a framework for continued operation.

Throughout the life of the basic nuclear installation, the ASN may therefore impose the necessary requirements for the protection of protected interests (safety, public health or the protection of nature and the environment) on the operator.

5(3)(c) Assessments and inspections by the ASN

As mentioned in Section 4(1)(d) of this report, the ASN’s monitoring of nuclear activities constitutes one of its fundamental tasks.

The ASN carries out the monitoring of nuclear activities by taking the following actions:
- inspection, generally on site or in a controlled service, or of carriers of radioactive substances. This involves checking, by sampling, whether a given situation is in line with a regulatory or technical reference system, but also, possibly, to assess the operator’s practices in relation to current best practices;
- authorisation, after analysis of the applicant’s demonstration that its activities are under control from a radiation protection and safety perspective;
- providing feedback, in particular by analysing significant events;
- the approval of bodies and laboratories involved in radioactivity measurements and in the monitoring of radiation protection, as well as the authorisation of bodies to monitor pressure vessels;
- on-site presence, which is also common outside of inspections.

The inspection carried out by the ASN is based on the following principles:
- the purpose of the inspection is to verify compliance with the provisions required by the regulation. It also aims at assessing the situation with regard to the issues of nuclear safety and radiation protection; it seeks to identify best practices and sub-optimal practices, and assess possible developments;
B - Provisions adopted by article — Articles 4 to 8e

- the scope and depth of the inspection is based on the risks inherent in the activity and on whether they are actually taken into account by the persons responsible for carrying out the activity;
- the inspection is neither systematic nor exhaustive; it is based on sampling and focuses on the topics with the highest stakes.

The ASN implements different types of inspections:
- routine inspections;
- reinforced inspections, which consist of a thorough examination of a topic targeted by a larger team of inspectors than for a regular inspection;
- review inspections, which take place over several days and cover several subjects, involve a dozen inspectors. They are designed to conduct thorough examinations and are headed by experienced inspectors;
- inspections with samples and measurements. These involve testing samples, independently of that of the operator, discharges and the environment of the installations;
- event inspections carried out as a result of particular significant events;
- site inspections, which make it possible to ensure that the ASN has a significant presence on sites in the event of reactor shutdowns or special works, in particular in the construction or decommissioning phase;
- inspection campaigns, involving inspections carried out on a number of similar installations, using a specific structure.

5(3)(d) Coercive measures

In the event of failure by the operator to comply with the nuclear safety and radiation protection requirements, the ASN may take proportionate coercive measures, as set out in Section 4(1)(e) of this report.
Article 6. Licence holders

Member States shall ensure that the national framework requires that:

(a) the prime responsibility for the nuclear safety of a nuclear installation rests with the licence holder. That responsibility cannot be delegated and includes responsibility for the activities of contractors and sub-contractors whose activities might affect the nuclear safety of a nuclear installation;

(b) when applying for a licence, the applicant is required to submit a demonstration of nuclear safety. Its scope and level of detail shall be commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site;

(c) licence holders are to regularly assess, verify, and continuously improve, as far as reasonably practicable, the nuclear safety of their nuclear installations in a systematic and verifiable manner. That shall include verification that measures are in place for the prevention of accidents and mitigation of the consequences of accidents, including the verification of the application of defence-in-depth provisions;

(d) licence holders establish and implement management systems which give due priority to nuclear safety;

(e) licence holders provide for appropriate on-site emergency procedures and arrangements, including severe accident management guidelines or equivalent arrangements, for responding effectively to accidents in order to prevent or mitigate their consequences. Those shall in particular:
   (i) be consistent with other operational procedures and periodically exercised to verify their practicability;
   (ii) address accidents and severe accidents that could occur in all operational modes and those that simultaneously involve or affect several units;
   (iii) provide arrangements to receive external assistance;
   (iv) be periodically reviewed and regularly updated, taking account of experience from exercises and lessons learned from accidents;

(f) licence holders provide for and maintain financial and human resources with appropriate qualifications and competences, necessary to fulfill their obligations with respect to the nuclear safety of a nuclear installation. Licence holders shall also ensure that contractors and subcontractors under their responsibility and whose activities might affect the nuclear safety of a nuclear installation have the necessary human resources with appropriate qualifications and competences to fulfil their obligations.

6(a) The primary responsibility for nuclear safety

The system of organisation and regulation of nuclear safety in France is based on the primary responsibility of the operator. This principle is enshrined in Article L.593-6 of the Environmental Code. This Article specifies that the operator shall give priority to the protection of protected interests and to its continuous improvement, primarily through the prevention of accidents and the limitation of their consequences for nuclear safety. It formalises this policy in a document explicitly affirming this priority. This Article also provides that an operator shall define and implement an integrated management system to ensure that the requirements relating to the protection of the interests of the basic nuclear installation system are systematically taken into account in any decision relating to its installation.

The ASN, on behalf of the State, shall ensure that this responsibility is fully assumed in compliance with the regulatory requirements.

In addition, Article L.593-6-1 provides that the operator shall carry out supervision of activities which are important for the protection of protected interests where they are carried out by external parties, to ensure that those external parties have the appropriate technical capacity to carry out those activities and that it may not delegate its supervision to a service provider.

The limits to the possible use of subcontracting are laid down in provisions in the regulatory part of the Environmental Code:
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- an operator may only use external parties to carry out activities that are likely to have a significant impact, subject to certain conditions, and subject to maintaining the ability to control such activities and the operation of their installation;
- it must limit, as far as possible, the number of levels of subcontracting. When it entrusts an external party with the performance, within the perimeter of its installation from its commissioning until its decommissioning, of services or work likely to have a significant impact, such services or work may only be performed, except in special cases, by first- or second-tier subcontractors. Where the use of an external party or subcontractors below the second tier makes it possible to ensure better protection of the protected interests, the ASN may derogate from the above-mentioned provisions with a substantiated decision;
- an operator may not entrust an external party with operational responsibility and control of the operation of a basic nuclear installation, including in relation to the treatment of accidents, incidents and deviations, as well as emergency preparedness and management;
- where the operator intends to entrust an external party with activities that are likely to have a significant impact, it shall assess the tenders taking into account, inter alia, criteria conferring priority on the protection of protected interests. It ensures, beforehand, that the companies it intends to call upon have the technical capacity to carry out the interventions in question and control the associated risks;
- the operator shall notify the external parties of the document formalising its policy on the protection of protected interests on the basis of the risks or disadvantages that its installation may pose. The contract with the external parties shall specify the obligations necessary for the application of the above provisions, which shall be imposed upon each of the parties;
- the operator shall monitor the activities which may have a significant impact and which are carried out by external parties. For that purpose, it shall set up a system for the transmission of information from external parties, in particular with a view to giving feedback.

In practice, each operator shall implement arrangements to ensure that the rules are known, understood and applied by all their staff, as well as by all contractors and subcontractors. Operators shall ensure that their installations are operated by their own staff. They shall call on contractors or subcontractors for specific cases, for example:
- peaks in activity (scheduled shutdowns, needs of highly seasonal nature);
- maintenance of the installations;
- optimisation of the performance or use of specialised or rare skills and resources;
- assessment or manufacturing activities requiring specialised engineering or manufacturing needs.

With regard to the responsibility of the operator for the activities of contractors and subcontractors, each operator shall implement internal arrangements to meet the regulatory requirements:
- For many years, the CEA has defined a subcontracting policy to ensure compliance with its specific obligations, to specify the rules and procedures, but also to develop them when areas for improvement have been identified or new objectives, particularly in terms of safety, have been set or reinforced. Those provisions thus implemented enable it to guarantee its responsibilities as an operator of nuclear installations.

The CEA makes use of companies recognised for their technical competence in order to provide services or work necessary for the performance of its tasks and activities or for its operation. Control of the activities carried out by external parties with the presence of contractors’ staff in the basic nuclear installations represents a major challenge due to the tasks entrusted and the risks involved in the joint activity.

- EDF controls the use of service providers and subcontractors to ensure the best performance of the nuclear fleet at all times, in terms of nuclear safety, radiation protection, the environment,
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security and production. EDF has set up a system for the qualification of companies involved in the nuclear sector. The aptitude test covers technical skills, socio-economic skills (including adherence to the Progress Charter for an Exemplary and Efficient Nuclear Power and the principles of the Social Specifications of the Strategic Committee for the Nuclear Sector (CSFN) and compliance with the provisions of the EDF Agreement on socially responsible subcontracting), the management of safety, radiation protection and the environment, safety culture and quality organisation. To maintain the nuclear fleet in operation, as well as the changes made to it, EDF makes use of service providers to meet the following needs:

- the use of rare or specific skills (in occupations such as metalwork, valves and fittings, repairs and expertise);
- the highly seasonal nature of individual shutdowns, most of which are in summer;
- the deployment of a specialist labour force in and out of each unit (essentially for the logistics of construction sites).

EDF monitors the activities carried out by external parties (outside EDF) proportionately to their importance for the demonstration of safety.

In addition, as regards assessment or manufacturing activities, EDF may call upon engineering firms and specialist manufacturers. These assessments or the production are carried out on the basis of specifications defined by EDF in its role as an architect.

- The implementation of subcontracting activities by Orano is carried out in strict compliance with the regulatory requirements in this area to enable the group to ensure its full responsibility as a nuclear operator. In particular, no matter what segment of activity is involved in subcontracting, Orano systematically retains the resources and skills to ensure:

  - formulation of the requirement;
  - following up of cases;
  - operational monitoring;
  - receipt and implementation of the service;
  - crisis management (emergency situation) where appropriate.

Thus, in the specific case where an industrial operator is used for the operation of a nuclear workshop, the head of the Orano installation receiving the service is systematically assisted by a team that has the correct skills to ensure thorough monitoring of the activities, the developments in the safety framework and the periodic reviews (safety reviews), as well as the continued manning of key posts on the installation in the event of crisis management.

Orano uses process owners with rare or specialised resources, as well as the best skills and practices, to optimise the performance of its installations, products and services. In practice, Orano may have recourse to external companies and subcontracting activities, in particular for:

- optimising the performance of its installations via process providers (for example, the CEA for the vitrification of the La Hague reprocessing plant, or the company ETC (Enrichment Technology Company Limited) for the enrichment installations of the Tricastin platform);
- availing of specialised or rare skills and resources (civil engineering, ventilation, fire protection, etc.);
- access to significant experience in the conduct of nuclear industrial installations or otherwise under contracts for industrial operators (e.g. energy production, packaging of waste), in particular in the case of activities which are ‘non core’ (such as installations supplying utilities);
- absorbing activity spikes that require a variety of specialities and, in particular, during scheduled maintenance shutdowns (mechanical, piping, operating devices, etc.);
- having a higher level of competitiveness in ‘non-core’ activities (plumbing, lighting, painting, electricity, repair of channels, etc.).
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- producing third-party expert reports or carrying out independent checks (for example, measurements, surveys or analyses by recognised independent organisations).

In certain specialised areas, such as that of remediation-dismantling or the transport of nuclear materials, companies likely to be involved must be accepted in advance in order to verify their organisation, management system and their technical capacities to implement specific measures. This internal acceptance at Orano is issued by an authority independent of the chain of purchases. It is renewed periodically.

- The ILL monitors all levels of the subcontracting chain. This direct monitoring by the operator is proportionate to the safety concerns and takes the characteristics of this chain into account. The policy of the ILL with regard to the management of safety and environmental protection is distributed, known, understood and applied by all staff as well as all contractors and subcontractors. It is defined for the period 2019 to 2024 in the ‘Policy in the field of the protection of interests’, and is specified in its Integrated Management System (Système de Gestion Intégré (SGI)).

A note describes the organisation chosen for the process of ‘Monitoring external parties’ for all activities involving the design, manufacture, construction and installation of systems, structures or components which are important for protection, or for activities which are important for protection. This process meets the requirements of the Environmental Code and the Order of 7 February 2012. The head of the ILL Risk Quality and Safety Unit [Cellule Qualité Sûreté Risques (CQSR)] in the ILL takes the lead in the process of ‘monitoring external parties’ and is therefore responsible for this process being carried out and ensuring that it runs smoothly. It summarises the monitoring of external parties carried out during the year. The CQSR is responsible for carrying out audits of external parties.

- The ITER policy for the management of safety and environmental protection complies with the applicable national laws and regulations. It is distributed, known, understood and applied by all staff and all contractors and subcontractors. The ITER Organization is responsible for the monitoring of external operators, for all activities involving the design, manufacture, construction and installation of systems, structures or components which are important for protection, or for activities which are important for protection. The ITER Organization monitors all levels of the subcontracting chain. This direct monitoring by the operator is proportionate to the safety concerns and takes the characteristics of this chain into account, and is ensured through inspections and audits. At this stage, the inspections carried out by the nuclear operator are focused on the proper transmission of safety requirements and their application in terms of technical requirements, the monitoring of external parties, the organisation of technical inspections and the verification of compliance with safety requirements.

6(b) Demonstrating safety

The Environmental Code provides for a procedure for licensing the establishment followed by possible authorisations covering the operation of a basic nuclear installation, from its commissioning until its final shutdown, dismantling and decommissioning, including any modifications to the installation.

At the stage of the application for licensing the establishment of the basic nuclear installation, the operator must provide a demonstration of safety in relation to the importance of the hazards posed by the installation for the protected interests. The principles for drawing up this safety demonstration are laid down in Title III of the Order of 7 February 2012. The principle of defence-in-depth, the implementation of which forms part of the requirements of this Order, is an integral part of the demonstration of safety. This Order also states that the demonstration of safety must be carried out on the basis of a careful,
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deterministic approach, integrating the technical, organisational and human dimensions, which may be supplemented by probabilistic assessments.

The safety demonstration must be provided at the stage of application for authorisation for commissioning in the preliminary safety report. The decision of the ASN No. 2015-DC-0532 specifies the content of the safety report which must make it possible to justify the provisions adopted at each stage of the life of the installation in order to comply with regulations and to guarantee safety. The safety report must include all information necessary to ensure that all risks (radiological or non-radiological) and attacks (of internal or external origin) have been taken into account. It takes account of the specific characteristics of the site and its environment (meteorology, geology, hydrology, industrial environment, etc.).

When applying for an authorisation to commission its installation, the Environmental Code requires the operator to update the preliminary safety report submitted in the context of the application to licence the establishment. This update makes it possible, in particular, to assess the compliance of the installation constructed with the regulatory requirements laid down in its creation authorisation decree and by the ASN’s decisions on the installation.

6(c) The assessment and verification of the nuclear safety of installations

The Environmental Code (cf. Section L.593-6) and the Order of 7 February 2012 requires the operator to implement an integrated management system that enables the safety to be maintained and continuously improved. During the operation of basic nuclear installations, including during dismantling, the safety assessment and verification is carried out in a continuous and periodic manner.

Maintaining and continuously improving safety

In order to monitor the safety level of their installations on an ongoing basis, operators are required to ensure that the correct operation of the equipment is maintained and that the deviations detected are addressed.

Periodic testing and preventive maintenance programmes on materials and systems, carried out by the operator, play an important role in maintaining an acceptable level of installation safety. The ASN monitors the proper performance of these activities during its inspections. The Order of 7 February 2012 requires the operator to take all the necessary measures to detect deviations relating to its installation and to deal with them in a timely manner to address the issues. Furthermore, as soon as possible, it must examine each deviation to determine, in particular, its importance for the protection of protected interests and whether precautionary measures must be immediately implemented. The ASN examines the procedures and deadlines for bringing into conformity proposed by the operator.

The Order of 7 February 2012 also requires the operator to analyse trends relating to the repetition of similar deviations of a similar nature. These analyses should enable the operator to identify possible preventive, corrective or curative actions, and to prioritise and implement them.

In addition, the feedback from the operation obtained as a result of significant events is a source of continuous improvement in the safety level of the installations. The analysis of the feedback, together with the related regulatory requirements, is presented in Section 8b(2) of this report.

In accordance with the principle of continuous improvement of the safety level, operators must periodically implement changes in particular in respect of material and operational rules. These changes include the handling of deviations, periodic reviews or the incorporation of feedback. Finally, continuous improvement may result from changes in regulatory requirements.

Thus, the regulatory provisions lead operators of basic nuclear installations to regularly implement improvements to their organisation, their process, their demonstration of safety and to the operation of their installations and their installations themselves.
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By way of example, in view of the results of the corrosion measures, Orano has implemented complementary measures to maintain the containment of the radioactive materials in the event of the penetration of the evaporators that concentrate the fission products. These evaporators will be replaced as of 2022 by new equipment that incorporates all these new safety provisions. In addition, on the Tricastin site, the recent commissioning of new installations has made it possible to replace existing installations.

EDF identified the following improvements in particular:
- the revision of flood protection measures at several sites following the feedback obtained as a result of the flooding of the Blayais site in 1999;
- the review of its maintenance processes;
- the modification of the organisation in the control room, including the increase in the minimum number of staff required;
- the replacement of the fire detection system with a more efficient technology.

**Periodic reassessment of the safety of the installations**

Pursuant to Article L.593-18 of the Environmental Code, an operator must periodically review its installation every 10 years. The periodic review is an opportunity for an in-depth examination of the condition of the installations to verify that they comply with the applicable safety framework. It also aims to improve the safety level of the installations. Section 8c(b) of this report sets out the requirements and checks associated with the periodic reviews as well as the improvements implemented in this context.

**Reassessment of the safety of installations in the light of an accident**

The Order of 7 February 2012 requires the operator to systematically analyse information resulting from operating experience at its installation, or at other installations, similar or otherwise, in France or abroad, or from research and development.

As regards the lessons to be drawn from the accident at the Fukushima Daiichi nuclear power plant, in 2011 ASN initiated an evaluation of the safety of basic nuclear installations in light of this feedback. This process corresponded to the request of the Prime Minister and to the conclusions of the European Council on the conduct of stress tests in order to verify the robustness of nuclear power plants in the face of exceptional situations of the kind that led to the accident at the Fukushima Daiichi nuclear power plant. It was carried out in accordance with the European level specifications developed by WENRA (validated by ENSREG). It should be pointed out, firstly, that the approach carried out in France involved all basic nuclear installations, including the research and fuel cycle installations, and, secondly, that the specifications were supplemented by points relating to social, organisational and human factors.

The additional safety assessments (ECS) consisted of a targeted reassessment of the safety margins of basic nuclear installations in the light of the events which took place at Fukushima Daiichi, namely: extreme natural events (earthquake, flooding, climatic conditions) and their cumulation, which could push the safety functions of the installations to their limits and lead to a serious accident.

At the end of the additional safety assessments of basic nuclear installation priorities, the ASN considered that the installations examined had a sufficient level of safety and that the immediate shutdown of any of them was not warranted. However, in 2012 the ASN issued requirements for the introduction of additional provisions to improve the robustness of basic nuclear installations in the face of the risks of extreme attacks and the prevention and mitigation of accidents. In November 2013 and January 2014, the ASN clarified its requirements with additional decisions. These new requirements correspond to substantial work and investment which began in 2012 and is spread over a number of years. They consist of the establishment, for all installations that require it, of a ‘hard core’ of physical and organisational arrangements which enable the basic safety functions to be controlled in extreme situations. Its purpose is to prevent a serious accident, to limit massive radioactive discharges in an accident scenario which could not have been controlled and, even in extreme situations, to enable the operator to carry out the...
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Tasks assigned to it in managing a crisis. The materials which form part of that core must be designed to withstand major events (earthquake, flooding, etc.) larger than those taken into account in their design. In addition, such equipment must be protected from internal and external stress caused by these extreme situations.

6(d) The implementation of safety priority management systems

By including it at legislative level, Order No 2016-128 of 10 February 2016 reinforced the requirement for the operator of a basic nuclear installation to give priority to the protection of protected interests and to its continuous improvement. The law also requires the operator to formalise its policy in this area in a document which must explicitly state this priority. Moreover, the Order of 7 February 2012 requires the operator to ensure that the policy is disseminated and understood by anyone who can implement it, including external parties. It also requires the operator to assess its policy on the protection of protected interests and the effectiveness of its implementation at least every five years.

This Order also requires the operator to set up and formalise an integrated management system to ensure that the requirements relating to the protection of the above-mentioned interests are taken into account in the management of the installation.

The operator must therefore set up, formalise and seek to improve an integrated management system to ensure that the requirements relating to the protection of protected interests are taken into account in the management of its installation. The ASN has issued a guide (Guide No 30) setting out its recommendations on policy to protect protected interests and integrated operator management systems.

During its inspections, the ASN monitors the operator’s compliance with the legislative and regulatory requirements referred to above. Inspections concerning safety management, the treatment of discrepancies, internal control or the operator’s purchasing policy, for example, make it possible to check that the operator considers the protection of protected interests as a priority in all economic and industrial considerations. These inspections, which are carried out at local and national level, also allow the ASN to examine the application and understanding of the policy of protecting protected interests through the various stakeholders involved.

6(e) Emergency plans

The Environmental Code requires the operator to transmit the internal emergency plan (PUI) when applying for commissioning of a basic nuclear installation. The internal emergency plan sets out the organisational measures, the methods of intervention and the means the operator must implement in the event of an incident or accident to limit the impact on staff, the public and the environment and to maintain or restore the safety of the installation. It also includes provisions for early reporting to public authorities.

The operator’s obligations in respect of emergency preparedness and management are laid down in Title VII of the Order of 7 February 2012. These obligations concern, in particular:
- the organisation of material and human resources to carry out its tasks;
- informing the authorities and the public;
- the establishment of agreements enabling it to make use of external resources;
- exercises which can be used to test the emergency plan, draw lessons from them and, where appropriate, identify developments.

The associated provisions were set out in ASN Decision No 2017-DC-0592 of 13 June 2017 related to obligations of operators of basic nuclear installations in terms of preparation and management of emergency situations, and to the content of the internal emergency plan, known as the ‘emergency’ decision, ratified by the Decree of 28 August 2017. This Decision takes into account, in particular, the feedback obtained from the Fukushima accident (crisis management rooms, means of communication and emergency situations affecting several installations simultaneously). The Decision stipulates, in particular:
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- human resource requirements (staffing, expertise);
- requirements with regard to the premises for managing emergency situations;
- the crisis exercise and situational awareness requirements (programme, provisional timetable);
- the information that the operator must provide to the authorities.

As part of the authorisation procedures for the commissioning of basic nuclear installations, the ASN examines and approves the internal emergency plans and the updating thereof.

The purpose of the internal emergency plan, established by the operator, is to restore the installation to a controlled and stable condition and to limit the consequences of the event. Operators have instructions and procedures to be applied in the event of an incident or accident. In particular, EDF applies accidental conduct procedures with a 'status approach'\(^3\) principle resulting from the feedback obtained from the Three Mile Island accident. The strategies and rules of conduct of the nuclear power reactors in the event of an incident or accident are defined in the general operating rules (RGE). The ASN regularly monitors the processes for drawing up and validating the rules of conduct in the event of an incident or accident, their relevance and the way in which they are implemented. In this context, the ASN may simulate a situation with the installation's operating teams to monitor the application of the above rules and the management of specific equipment used in the event of an accident. It ensures in particular the proper application of the principles governing the organisation of the crisis teams described in the EDF framework validated by the ASN. The reactors of the EDF French fleet also have a serious accident intervention guide (Guide d'Intervention en situation d'Accident Grave (GIAG)), which is intended to provide support for operating and crisis teams to ensure optimum containment of the radioactive products. The possible actions to reduce the consequences of a serious accident are set out in this guide. When the GIAG is implemented, priority is no longer to safeguard the reactor core, but to secure the containment. The application of the GIAG entails the abandonment by the operating team of current procedures for operation in the event of an accident. Responsibility for operation is then transferred from the operation team to the crisis teams, with the GIAG defining the strategies for using the systems for all stakeholders working on the crisis. The operating team implements what are referred to as 'immediate' actions, which need to be performed without delay in case of core degradation and then implements the recommendations of the crisis teams based on the proposed strategies and the outcome of the accident.

France organises around fifteen national crisis exercises every year. These exercises involve the operator, the prefecture, the ASN, the IRSN and certain third-party organisations (Météo France, etc.). These exercises serve both as training for stakeholders (validation of methods of operation, crisis tools, etc.) and a simple tool to verify, by the ASN, that operators have an actual operational crisis organisation.

The ASN also regularly carries out inspections on the topic of 'Crisis organisation and resources'. In recent years, it has carried out the following inspections with simulations:

- in 2018, the ASN carried out a review inspection (comprising a team of a dozen inspectors) at the Tricastin site, including a large-scale unannounced exercise leading to the activation of the internal emergency plan. The inspection then took place on the various installations at the large Tricastin site, with each team of inspectors conducting theoretical or practical simulations. This inspection allowed for both the quality of the site's operational response and the quality of the crisis organisation to be tested. It has also shown the value of carrying out inspections with field exercises in order to make the ASN's investigation of the provisions of the internal emergency plans more robust;

\(^3\) The status approach consists of the application of the reactor operating (i.e. steering) strategies according to the actual state of the boiler, regardless of the events that led to this status. A permanent diagnosis makes it possible, if the situation deteriorates, to abandon the current procedure and to apply another one that is more suitable.
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- in 2019, in order to test the alert chain and the setup of the entire operator’s crisis organisation, the ASN simultaneously inspected the central services of the Alternative Energies and Atomic Energy Commission (CEA), which is responsible for the national crisis organisation, and the CEA Marcoule site where an incident had been simulated. By triggering a crisis exercise simulating an aircraft crash on the Marcoule site, followed by a fire in the ATALANTE plant, the team of inspectors present on the Marcoule site was able to observe the initial steps taken by the on-call management and then the deployment of the local crisis centre. At the same time, the set-up of the crisis organisation of the CEA’s central services was observed by the team of inspectors present on the CEA Saclay national site;

- in 2019, ASN carried out an inspection at the Dampierre-en-Burly nuclear power plant on crisis organisation and resources, with a particular focus on the Rapid Nuclear Response Force (FARN) regional service: the purpose of the inspection was to check, through random checks, that the organisation and resources of the FARN, which are planned at regional level to ensure its role as a support for a site that has been involved in an accident, are relevant and operational. This inspection included, in particular, a simulation involving the departure of a FARN unit to an accident site in another region at the request of EDF’s national crisis organisation.

6(f) The financial and human resources of the licence holders

The Environmental Code requires the operator to have available technical, financial and human resources, as set out in a notice and to implement the means necessary for exercising its responsibility. The Environmental Code provides that the licence to establish a basic nuclear installation takes account of the technical and financial capacities of the operator, which must enable it to carry out its project in accordance with the interests referred to in Article L.593-1 of the Environmental Code, ‘in particular to cover the cost of dismantling the installation and restoration, monitoring and maintenance of its location or, for radioactive waste storage installations, to cover the final shut-down, maintenance and surveillance costs’.

The Environmental Code also requires the operator to ensure that external parties have the appropriate technical capacity to carry out activities which are important for the protection of the interests referred to in Article L.593-1 of the Environmental Code.

The Order of 7 February 2012 requires the operator to implement a policy on the protection of protected interests, which defines objectives and specifies the operator’s strategy to achieve them and the resources it employs to devote to it.

The Order of 7 February 2012 requires the operator to possess in-house, internally, in its subsidiaries or in companies controlled by it, the technical skills for understanding and permanent ownership of the foundations of the activities of the design, construction, operation, final shutdown, decommissioning, maintenance and supervision of basic nuclear installations. The operator must describe the technical skills necessary for carrying out these activities and the capacities at its disposal in a notice.

Article 7(4) of the ASN’s guide to policy on control of the risks and disadvantages of basic nuclear installations and an integrated management system recommends that ‘the operator’s financial resources shall enable it to cope with reasonably foreseeable economic risks which may have an impact on the protection of protected interests, whether such risks are specific to the basic nuclear installations (for example, unforeseen heavy maintenance operations) or are global (for example, market risk)’.

In addition, Law No 2006-739 of 28 June 2006 establishes a legal framework for securing the financing of nuclear costs (decommissioning costs for basic nuclear installations and costs for the management of

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4 The FARN is a national emergency scheme comprising specialised teams and equipment to allow intervention in less than 24 hours on an accident site.
spent fuel and radioactive waste). This legal framework provides that the nuclear operator must prudently assess the decommissioning costs of its installations or, for radioactive waste storage installations, their closure, maintenance and monitoring costs. It must also assess the costs of spent fuel and radioactive waste management. This legal framework aims to secure the financing of nuclear costs, in line with the ‘polluter pays’ principle. It is therefore the responsibility of the nuclear operator to take over this funding, through the constitution of a portfolio of dedicated assets up to the level of the anticipated costs. This is done under the direct supervision of the State, which analyses the situation of the licence holder and may prescribe the measures necessary in the event of a finding of insufficiency or inadequacy. This supervision is exercised by the ministries responsible for the economy and energy. In this context, the nuclear operator provides them, inter alia, with the triennial reports and annual update notes which are subject to a joint review by the Directorate-General for Energy and Climate (DGEC) and the Directorate-General of the Treasury. The ASN and the delegate for Nuclear Safety and Radiation Protection for Defence-Related Nuclear Installations and Activities (DSND) are systematically consulted on these reports to examine the consistency of the strategy for decommissioning and management of spent fuel and radioactive waste taken into account by the operator for the assessment of the nuclear costs with regard to the issues of nuclear safety and radiation protection. In any case, the operator remains responsible for the proper financing of its long-term costs.

The ASN’s monitoring of skills and human resources is primarily based on inspections carried out with the support of the IRSN. Staffing, recruitment, training, the monitoring of external expertise and the organisation put in place by the operator to manage these topics are regularly examined during inspections.
Article 7. Expertise and skills in nuclear safety  
Member States shall ensure that the national framework in place requires arrangements for education and training to be made by all parties for their staff having responsibilities relating to the nuclear safety of nuclear installations in order to maintain and to further develop expertise and skills in nuclear safety.

7.1 The expertise and skills of licence holders

7(1)(a) Regulatory requirements.

It is the responsibility of the operator of a basic nuclear facility to have sufficient, suitable and qualified human resources. The regulatory requirements for the resources available to the operator of a basic nuclear installation are laid down in particular in the Environmental Code and the Order of 7 February 2012. In particular, Article 2(5)(5) of that Order states that ‘the activities important for protection, their technical control and the verification and evaluation activities shall be carried out by persons with the necessary expertise and skills’. In this context, the operator must implement appropriate training arrangements in order to maintain and develop the expertise and skills required for its staff or external parties. The ASN has issued a guide (Guide No 30) setting out its recommendations on the management of expertise.

The operator’s obligations in respect of emergency preparedness and management are laid down in Title VII of the Order of 7 February 2012, in particular as regards the organisation of material and human resources to carry out its tasks. The associated provisions were clarified by ASN Decision No 2017-DC-0592 of 13 June 2017. That Decision takes into account, in particular, the feedback obtained from the Fukushima Daiichi accident (crisis management rooms, means of communication and emergency situations affecting several installations simultaneously). In particular, it specifies the human resources requirements (staffing, expertise).

7(1)(b) Measures taken by licence holders

CEA

At the Directorate-General for the CEA, the Directorate for Security and Nuclear Safety is responsible for the provision of safety-related training. In this context, it is responsible for drawing up training programmes with the support of the centres of expertise and in relation to the Directorate for Human Resources and Social Relations.

The main training courses cover nuclear safety, criticality, organisational and human factors (FOH), safety culture. Targeted training has also been put in place, for example as regards the inclusion of FOHs in the activities that involve both a safety issue and a significant FOH component.

In accordance with the requirements of the BNI Order and the section of standard ISO 9001-2008 on human resources, the expertise of the persons assigned to positions that are important for safety on a basic nuclear installation must be guaranteed. The principles adopted for the qualification and authorisation procedure are:

- separation of qualification and authorisation responsibilities;
- recognition of the qualification by a responsible person who, if considered useful, has recourse to specialists;
- recognition of qualifications, in particular by the assessment of skills acquired in the course of professional experience and not only by training;
- taking into account the diversity of the means of acquiring skills (initial and vocational training, professional experience, self-training, mentoring);
- traceability of qualification and authorisation decisions.
Specific training for the preparation of the post of head of a basic nuclear facility covers the following aspects: management of persons and operations, nuclear safety in the CEA and, in operation, the legal responsibilities of the operator, radiation protection and waste management. This training must be carried out prior to taking up duties.

Forecasted management of jobs and competences updates the skills required for running the programmes and operating the installations on an annual basis with a forward-looking vision over a number of years.

EDF

EDF has a coordinated national training organisation and a professional skills unit for industrial performance dedicated to the development and implementation of training.

In order to ensure that the skills of its employees are acquired, maintained and developed, each unit carries out an annual survey that is formalised through interviews between each employee and their direct manager. Nodes of coherence define the benchmark organisations and jobs. For these jobs, a framework connects the activities carried out with the means to acquire the skills. Generic training is also available, including ‘design safety’ and ‘safe operating’ training courses in the field of security.

In the Nuclear Production Division, new entrants are systematically enrolled onto an initial eight-week training course with the ‘Académie des Savoirs Communs’ (common knowledge academy) which covers the operation, safety and quality culture, safety and radiation protection, etc. Depending on the field of intervention, the course is being carried out by an ‘Académie de Savoirs Spécifiques Métier’ (academy of specific trade knowledge), which provides the basis for a profession (e.g.: operating technician).

Beyond the foundation of basic and occupational training, a focus on annual topics can be offered in the professions on the basis of feedback. For example, training for feedback regarding non-conformities with the technical operational specifications for all operating teams is planned for 2020/2021.

Finally, the unit training committees define ‘just in time’ training in order to ensure that certain sensitive activities are carried out, including operation through the use of simulators or via the ‘dummy spaces’ for maintenance.

For jobs with a high profile (operation, safety engineer, etc.), an authorisation system is organised. Regular refresher courses are set up and run by network of bodies.

Members of the crisis organisation are appointed on the basis of their skills related to their duties in the organisation. They undergo regular training and sessions at the local and national level. Some training sessions are organised with the ASN and the public authorities.

ILL

The Heads of Group, Department or Division are responsible for managing the expertise and skills of the staff for which they are responsible for carrying out activities connected with the activities important for protection (AIPs).

The Head of the Training Office is in charge of the process of competence management, training and qualification of staff. The Training Office provides technical support to the Heads of Group for the organisation of in-house or external training. The Head of the Risk Quality and Safety Unit has a technical support role in defining the paths for obtaining skills. It also has the role of verifying that the process is being carried out.

There are two types of courses:
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- a general training course, focusing on the knowledge of the nuclear environment and its specific features (safety, radiation protection, etc.) and on the particular technical knowledge needed to carry out the operations;
- a company-based training course, the purpose of which is to acquire knowledge of the circuits and systems concerned, as well as practical training on the various operations.

The stages of the course must be completed before the person’s qualification must be identified. After completion of the compulsory stages and at the end of an interview, the Head of the Unit will announce the qualification of the employee.

ITER

The recruitment process, organisation, definition of responsibilities, annual evaluation and training contributes to the maintenance and development of nuclear safety expertise and skills.

Each new arrival receives training on arrival at the ITER Organization. The purpose of this training is to acquire a basic knowledge of the French nuclear safety framework and its application to the ITER project, to acquire a basic knowledge of the Order of 7 February 2012 (and in particular the responsibility of each person with regard to nuclear safety) and to promote safety-oriented behaviour. This training is coupled with a visit to a basic nuclear CEA installation at Cadarache.

This initial training is supplemented regularly by specific workshops on topics based on the issues at stake in the project: regulation of pressure equipment, application of the Order of 7 February 2012, basic principles and applications of radiation protection for the installation, activities which are important for the protection during the construction and assembly of the installation, the ITER approach to nuclear safety analysis, etc.

Orano

Maintaining expertise is an important issue for the Orano Group, which has made it a priority in its Environmental Safety Policy to develop the technical and managerial skills of management and to implement the training actions identified following regular assessments of skills in nuclear safety and safety culture.

An annual skills review process has been implemented within the Group to identify professions where there are concerns in relation to recruitment, staff turnover and key skills: in particular, this process aims to control the level of skills in the operational teams, as well as in those in charge of safety and radiation protection.

An ambitious annual safety training programme including dedicated modules for crisis management and safety culture development is being deployed. For several years, it has included two cross-cutting health, safety, environment (HSE) leadership programmes, known as Safety Excellence and Safety Focus. These programmes include, in particular, measures to assess HSE skills under management, and provide training or awareness raising on HSE risks and their management. They are aimed at all members of the operational chain of delegation (Directorate-General, operational members of executive or management committees, site managers, heads of installation, project managers and internal engineering) and nuclear safety professionals (in particular, the safety of installation or operation, safety studies engineers). In all, almost 700 staff are covered by these two arrangements.

In the field of training for the technical steps specific to the activities of Orano, employees are provided with suitable training installations that enable them to learn technical processes in environments that are representative of normal working situations (for example: teleoperation, working with glove boxes). In 2019, in the case of the Melox plant, the ‘glove box’ training involved 560 Melox employees via 38 training...
sessions. The volume of safety training corresponded to 15,000 hours of training from a total 76,000 hours of training in the establishment.

In recent years, the group has also focused on the implementation of practices known as intervention reliability practices (IRP). In this context, training in IRPs has been enhanced by the establishment of training sites which enable operators to take ownership of these tools in a real work situation and to measure the conditions for success and the benefits practically: La Hague thus trained all operators as well as maintenance and radiation protection teams on these tools, with more than 400 staff trained per year.

Digital development is also being implemented on various topics related to nuclear safety and industrial security (examples of e-learning awareness modules in crisis management and emergencies, quality fraud detection and prevention, nuclear safety culture, basic nuclear installation or REACH regulation, and digital situational awareness training for workers in glove boxes at Melox, or identification of design risks for internal engineering employees).

In the area of emergency management, the group has a national and local crisis management organisation. An annual programme of exercises regularly allows all or part of the crisis arrangements to be tested on a regular basis. This programme incorporates the implementation of the national intervention force of the group following the feedback from the Fukushima Daiichi accident.

7.2 The competence and qualifications of the Regulatory Authority

Competence is one of the four core values of the ASN.

Article 19 of Decision No 2018-DC-0644 of the Nuclear Safety Authority of 9 October 2018 adopting the Nuclear Safety Authority’s rules of procedure provides that ‘the Director-General shall ensure, in particular through the recruitment policy and appropriate training plan, that the staff of the Nuclear Safety Authority acquire, maintain and further develop the skills and qualifications necessary for the performance of the ASN tasks. In particular, it shall ensure that the ASN complies with the competence and qualification requirements laid down in Articles 7 and 8b of Council Directive 2009/71/Euratom of 25 June 2009.’

The ASN implements a diversified recruitment policy with the aim of having sufficient, qualified and complementary human resources necessary for its tasks. The balanced age pyramid and diverse experience profiles allow the ASN to have qualified human resources at its disposal.

In order to reinforce the credibility and the quality of its activities, the ASN:

- has set up a qualification system for its inspectors based on recognition of their technical competence;
- has adopted certain foreign practices which have been identified through exchanges of inspectors between Regulatory Authorities;
- promotes the openness of its inspectors to other monitoring practices.

The management of the competence of ASN inspectors is based on a formal course of training prior to their authorisation as inspectors. This training framework, which is evolving, is adapted to the tasks of each inspector. In accordance with the provisions of Articles L.592-22 and L.592-23 of the Environmental Code, which provide, inter alia, that ‘[the ASN] shall designate among its staff the nuclear safety [... ] and radiation protection inspectors’ and Decree No 2007-831 of 11 May 2007 laying down the procedures for the designation and authorisation of nuclear safety inspectors, which provides that ‘nuclear safety inspectors and officers responsible for monitoring nuclear pressure equipment[...] shall be chosen on the basis of their professional experience and legal and technical knowledge’, the ASN has implemented a

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5 REACH is a European regulation (Regulation No 1907/2006) which entered into force in 2007 to ensure safe manufacture and use of chemicals in European industry.
B - Provisions adopted by article — Articles 4 to 8e

formalised process leading to the approval of some of its officers to carry out its inspections and, where necessary, carrying out judicial enforcement tasks.

In addition to continuous training, mentoring also contributes to the acquisition of skills.

Mentoring, initial and continued training, whether general related to nuclear techniques, the field of communication or law, as well as training in day-to-day practice, are therefore essential elements of ASN officer professionalism.

As regards emergencysituations, pursuant to the Order of 29 December 2017 determining the cases in which the ASN must resort to on-call staff, the decision of the Chairperson of the Nuclear Safety Authority of 8 January 2018 sets up an on-call arrangement within the Nuclear Safety Authority aimed at strengthening the robustness of the organisation of the Nuclear Safety Authority to enable it to respond to radiological emergencies or to emergency response needs in the event of an alert, crisis or accident falling within the competence of the Authority. Article 8 of that Decision states that ‘any member of the staff involved in the on-call duty shall receive training in the duties performed within the period of the on-call duty. This two-day training shall take place prior to the first day of the on-call duty and shall be renewed at least once every four years.’ In addition, the ASN participates in national nuclear crisis exercises, set out in an annual circular, the last of which is dated 6 December 2019. These exercises, regulated by an annual interministerial instruction, are implemented jointly by the operator, the local and national public authorities, in particular the prefectures, the ASN and its technical support to the IRSN. Their purpose is, inter alia, to train persons who may be involved in the State’s response to a nuclear or radiological emergency, including in particular the ASN.

In 2019, nearly 3,800 days of training were delivered to ASN officers during 230 sessions of 133 different traineeships.
**Article 8. Transparency**

1. Member States shall ensure that necessary information in relation to the nuclear safety of nuclear installations and its regulation is made available to workers and the general public, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation. That obligation includes ensuring that the competent regulatory authority and the licence holders, within their fields of responsibility, provide in the framework of their communication policy:

   - (a) information on the normal operating conditions of nuclear installations to workers and the general public; and
   - (b) prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation.

2. Information shall be made available to the public in accordance with relevant legislation and international instruments, provided that this does not jeopardise other overriding interests, such as security, which are recognised in relevant legislation or international instruments.

3. Member States shall, without prejudice to Article 5(2), ensure that the competent regulatory authority engages, as appropriate, in cooperation activities on the nuclear safety of nuclear installations with competent regulatory authorities of other Member States in the vicinity of a nuclear installation, inter alia, via the exchange and/or sharing of information.

4. Member States shall ensure that the general public is given the appropriate opportunities to participate effectively in the decision-making process relating to the licensing of nuclear installations, in accordance with relevant legislation and international instruments.

8.1 Provision of information related to the safety of nuclear installations

The Law of 13 June 2006 on nuclear safety and transparency (TSN) defined not only a right to information for the public but also a duty of transparency for nuclear stakeholders. It defines transparency in nuclear matters as ‘the public’s right to reliable and accessible information’ (Article 1).

This same Law established the High Committee for Transparency and Information on Nuclear Safety (HCTISN), a body for information, consultation and debate on the risks associated with nuclear activities and the impact of these activities on human health, the environment and nuclear safety. This High Committee is composed of members of parliament, representatives of CLIs, representatives of environmental associations, representatives of trade unions of representative employees, representatives of persons responsible for nuclear activities, members appointed for their specific knowledge and representatives of the State. The High Committee may issue an opinion on any matter in these fields, as well as on the related checks and information. It may also address any issues relating to the accessibility of information on nuclear safety and propose any measures to ensure or improve transparency in relation to nuclear matters. The High Committee may be consulted by the Minister responsible for nuclear safety, the chairpersons of the competent committees of the National Assembly and the Senate, the President of the OPECST, the chairpersons of the CLI or the operators of basic nuclear installations on any matter relating to information concerning nuclear safety and its monitoring.

The Law of 18 August 2015 on the energy transition for green growth (TECV) established an obligation to provide regular information to the residents living near a nuclear installation on the nature of the accident risks associated with this installation, the consequences of such accidents, the safety measures planned and the action to be taken in the event of an accident. This information shall be provided at the expense of the operator.

8(1)(a) Providing information under normal conditions

8(1)(a)(i) Provisions adopted by the regulatory authority

The ASN participates in public information and transparency in its areas of competence (Article L.592-1 of the Environmental Code).
The legislation of 2006 on nuclear safety and transparency and of 2015 on the energy transition for green growth gave the ASN the task of deciding on the state of nuclear safety and radiation protection. Each year, in accordance with the requirements of the law, the ASN publishes the Report by the ASN on the state of nuclear safety and radiation protection in France, which is presented to Parliament and to the media. The report is public. The ASN also informs citizens, the media, the institutional public and professionals of basic nuclear installations and of nuclear safety and radiation protection requirements throughout the year. It presents all its monitoring activities and the actions it undertakes in this context, disseminates them widely and explains its decisions and positions, as necessary. The ASN organises regional press conferences each year in order to report on the state of nuclear safety as closely as possible to the installations that have been inspected. After each inspection, it publishes a ‘letter of inspection’ which sets out its findings and recommendations to the operator. It also edits notes, guides and reports for professionals, which are accessible to the public.

The ASN invests to ensure that citizens are well informed about nuclear risk and are developing the right radiation protection habits in all circumstances. The ASN develops comprehensive communication arrangements involving paper publications, the website, social networks, press relations and meetings and exchanges with stakeholders. In 2019 to 2020, the ASN participated in the campaign to distribute iodine tablets around nuclear power plants, a communication operation aimed at developing the ‘culture of radiation protection’ of 2.2 million French people.

The ASN equips CLIs with the tools and support needed to ensure proper information is provided to audiences that have not yet been informed. The ASN considers that the proper functioning of local information committees contributes to safety and maintains a quality dialogue with them. It ensures that the CLIs are informed to the fullest extent possible, including by attending public meetings.

The ASN also promotes the involvement of civil society and attaches great importance to ensuring that citizens contribute to the maintenance of nuclear safety and radiation protection: for example, it consults stakeholders and the public on its draft decisions. For this reason, it ensures that the principles of nuclear safety and radiation protection are understood by as many as possible, produces explanatory documents and seeks to make the most technical issues accessible. Any citizen may send requests for information to the ASN online (to info@asn.fr), by post and by telephone.

The ASN is required to answer questions and send documents as part of the right to information. The stakeholders of the ASN (NGOs, individuals, professionals, local authorities, etc.) make use of their right to information; they respond to requests:

- for the transmission of administrative documents (Law No 78-753 of 17 July 1978 - which includes documents held by the ASN, which the latter has produced or have been produced by third parties: operators, etc.);
- for information relating to the effects of nuclear activities on the environment in accordance with Articles L.124-1 to L.124-8 of the Environmental Code;
- information on ASN’s position statements on technical, environmental, regulatory, nuclear safety and radiation protection topics etc.

With more than 50,000 unique visitors on average per month, the website www.asn.fr is the core of the public information system (more than 3.2 million pages viewed in 2018). The ASN places a large number of resources on www.asn.fr

- inspection follow-up letters;
- opinions regarding significant events (from Level 1 upwards on the INES scale);
- information notes and press releases;
- decisions made by the ASN and the reference texts (laws, decrees, orders, opinions, etc.);
- the opinions and recommendations of the standing groups of experts appointed by it;
- etc.
B - Provisions adopted by article — Articles 4 to 8e

Most of the information notes, announcements and publications and high profile content are translated into English on the ASN’s website.

The ASN also relays its most important current affairs to social networks and via a bi-monthly electronic newsletter to almost 5,000 subscribers.

Finally, the ASN is heard, several times each year, by the Parliament on its activities, on subjects relating to nuclear safety and radiation protection and within the framework of the draft budget law.

8(1)(a)(ii) Measures taken by licence holders

Article 2(8)(1) of the Order of 7 February 2012 provides that the operator shall lay down detailed rules enabling all persons to:

- access information which is made public on the initiative of the operator or in accordance with the laws or regulations applicable to it;
- obtain the information referred to in Article L.125-10 of the Environmental Code.

These arrangements shall be published on a website chosen by the operator, which shall be updated periodically and forwarded to the local information committee for information purposes.

In addition, Article 2(8)(2) requires the operator to publish the report provided for in Article L.125-15 of the Environmental Code on a website of its choice.

The main nuclear operators implement voluntary public information policies.

Each year, each basic nuclear installation operator draws up a public report covering, in particular, significant operational developments and the actions it carries out with regard to the prevention of risks to public health and the environment.

The operators maintain a continuous dialogue with CLIs.

In addition, the operators inform the public about the significant events occurring in their installations. In particular, EDF publishes any significant safety, radiation protection or environmental event on its website or its external newsletter. In addition to providing systematic information to local information committees and recording it in the annual report called upon by the TSN Law for all significant events, Orano, for its part, issues a press release for any significant event classified in Level 1 or above on the INES scale.

Site visits are also organised by the operators.

8(1)(b) Information in the event of an incident or accident

The BNI Order provides that, in emergency situations, the operator of a basic nuclear installation shall alert the Prefect, the Nuclear Safety Authority and keep them regularly informed of changes in the situation and its actual or potential consequences outside of the site. The operator shall also inform the local information committee without undue delay.

In an emergency situation, the Environmental Code (Article L.592-32) requires the ASN to inform the public of the state of the installation at the origin of the emergency situation, when it is subject to its control, and of any discharges into the environment and their risks to human health and the environment. The ASN is involved in disseminating information:

- to the media and the public: for publication of press releases and for press conferences; this action is coordinated with the other entities that have a duty to communicate (prefects, local and national operators, etc.);
- institutional and Community stakeholders: local authorities, ministries, prefectures, political authorities, directorates-general of administrations, ANCCLI (the French National Association of Committees and Local Information Committees), local information committees, etc.;
- foreign security organisations.
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Therefore, the ASN has a stand-by system and a communication unit that can be mobilised 24/7. Several crisis exercises involving simulated media pressure are organised every year to test the information-provision capabilities of the different stakeholders. Communication in a crisis situation is outlined in Section 8d(1) of this report.

The Environmental Code provides that the ASN acts as the competent authority under the international conventions on early notification and assistance of 1986. For this reason, it compiles and summarises information with a view to ensuring or receiving notifications and transmitting the information provided for in those conventions to international organisations (International Atomic Energy Agency (IAEA) and European Commission) and to countries affected by possible consequences on their territory, in conjunction with the Ministry responsible for foreign affairs.

The ASN has signed bilateral agreements with the main border countries (Germany, Belgium, Luxembourg, Switzerland) to facilitate the exchange of information in the case of events which may have radiological consequences.

8.2 Public information in accordance with international legislation and instruments

The ASN and the operators have internal arrangements for dealing with requests for information in a responsive manner, while taking account of other interests provided for by law (cf. Section 5(2)(f)). This organisation provides for a rereading of documents prior to transmission, which may lead to the redaction of certain information, in line with the law. Sensitive information is not disseminated (e.g. physical protection for transport).

8.3 International cooperation

Maintaining bilateral relations with border and other European countries is one of the priorities of the ASN. A large number of topics contributed to the ASN’s bilateral relations in 2019, including, in particular, the construction of new reactors, the safety of reactors in operation and cycle installations, crisis management and cross-inspections.

In addition, and in a complementary manner to its bilateral relations, for the first time in 2019, the ASN brought together the nuclear safety and radiation protection authorities of Germany, Belgium, France, Luxembourg and Switzerland for a cross-border seminar. The aim of the seminar was to discuss a number of issues which were discussed at the various bilateral meetings, but in a wider context. The topics selected for this first exercise were cross-inspections, stakeholder consultation, retention of competences within the authorities and, lastly, emergency preparedness in a cross-border context. This form of sharing, which is broader than in a bilateral meeting and closer than in a multilateral context, has shown its value in deepening these subjects and formulating joint proposals to strengthen international cooperation.

8.4 Participation in the decision-making process

Public enquiry:

In accordance with the Environmental Code, a public enquiry is carried out on applications for licensing of the establishment and the dismantling of a basic nuclear installation. The public enquiry file includes in particular the impact assessment and the risk management study. It presents the risk inventory of the installation project and the analysis of the measures taken to prevent them, in an accessible manner. The study also includes a non-technical summary to facilitate the public’s awareness of the information contained therein.

In addition, Law No 2015-992 of 17 August 2015 on energy transition for green growth supplemented the applicable provisions, stating that: “The measures proposed by the operator during reviews beyond the thirty-fifth year of operation of a nuclear power reactor shall, after a public enquiry, be subject to the authorisation procedure by the Nuclear Safety Authority referred to in Article L.593-15.” These provisions
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were introduced in Article L.593-19 of the Environmental Code. This system enables the public to decide on the conditions for the continued operation of nuclear power reactors beyond the duration initially considered in their design.

Public consultation on draft individual and regulatory decisions:

Article 7 of the Charter on the Environment enshrines the right of every person to participate in the preparation of public decisions that have an impact on the environment. This provision applies to many of the decisions taken by the ASN or the regulatory texts (drafts of the decree and order adopted by the Government in particular) on which the ASN draws up an opinion.

In 2019, 33 draft decisions concerning basic nuclear installations were subject to public consultation via the ASN website.

After the consultation, which lasts for several weeks, a summary of how the comments have been taken into account is published on asn.fr, no later than the date of publication of the decision.

Public consultation for improving the safety of the 900 MWe reactors of the French nuclear fleet in the context of their fourth periodic review:

The HCTISN, on the basis of its fact-finding missions, consultative and debates on the risks associated with nuclear activities, decided to launch a consultation on the generic phase of the fourth periodic review of the 900 MWe reactors of the French nuclear fleet (32 reactors operated by EDF and spread over eight sites). This new, original consultation approach, which was not provided for in the regulations, was implemented at the stage of their 40th year of operation in order to obtain the public’s opinion on the conditions for the continued operation of these 900 MWe units, on line and at local consultation meetings. The consultation involved a number of stakeholders (HCTISN, ASN, IRSN, EDF, ANCCLI, CLI).

The public was able to discuss issues with experts from EDF, ASN and IRSN during public meetings, ask questions and access online information on the platform created for this consultation.

On the basis of 15 thematic areas, the public was asked to determine the priority topics for discussions on improving safety.

That consultation took place between 6 September 2018 and 31 March 2019. The information and collection of questions and opinions from the public were provided at local and national level via a digital platform. In total, 16 meetings with 1,300 participants were organised around each of the eight sites concerned, as well as in higher education institutions.
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Article 8a  Nuclear safety objective for nuclear installations

1. Member States shall ensure that the national nuclear safety framework requires that nuclear installations are designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents and, should an accident occur, mitigating its consequences and avoiding:
   
   (a) early radioactive releases that would require off-site emergency measures but with insufficient time to implement them;
   
   (b) large radioactive releases that would require protective measures that could not be limited in area or time.

2. Member States shall ensure that the national framework requires that the objective set out in paragraph 1:
   
   (a) applies to nuclear installations for which a construction licence is granted for the first time after 14 August 2014;
   
   (b) is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the framework of the periodic safety reviews as defined in Article 8c(b).

8a(1) Regulations for the prevention of accidents and mitigation of their consequences

At national level, France has established and maintains in force a legislative and regulatory framework for the nuclear safety of basic nuclear installations. The Environmental Code, in particular through its Articles L 593.4 and L 593.6 and subsequent articles, but also the Order of 7 February 2012, require that nuclear installations be designed, sited, constructed, commissioned, operated and dismantled with the aim of preventing accidents and, in the event of an accident, to limit their consequences. Article 3(9) of the Order of 7 February 2012 imposes the following requirement: ‘the demonstration of nuclear safety must prove that accidents that could lead to large releases of hazardous substances or to hazardous effects off the site that develop too rapidly to allow timely deployment of the necessary population protection measures are physically impossible or, if physical impossibility cannot be demonstrated, that the measures taken on or for the installation render such accidents extremely improbable with a high level of confidence.’ Furthermore, Article 1(2) of the Order requires, under the general provisions, that ‘the operator shall ensure that the provisions adopted for the performance of the activities ... in view of the state of knowledge, practices and the vulnerability of the environment, enable the risks and disadvantages mentioned in Article L. 593-1 of the Environmental Code to be brought to as low a level as possible under economically acceptable conditions ...’ These requirements are applicable to all basic nuclear installations (new or existing).

8a(2) Entry into force of the regulation

8a(2)(a) For new basic nuclear installations

In 1993, the French and German security authorities defined the safety objectives for the new generation of pressurised water reactors. These objectives include, in particular, objectives on reducing the risk of fusion of the core and reducing the radiological consequences of accidents. In this respect, an important objective is to achieve a significant reduction in radioactive discharges which may result from any conceivable accidents, including accidents involving fusion of the core. In the case of accidents without fusion of the core, there must be no need for measures to protect people living in the vicinity of the damaged power plant (no evacuation, no shelter). Accidents involving the fusion of the core which would lead to significant early releases must be ‘virtually eliminated’: if they cannot be considered as physically impossible, design measures must be taken to exclude them. This objective relates in particular to accidents involving the fusion of the core under pressure.
The review of the safety options of the EPR project was completed in October 2000 with the adoption by the standing reactor group (GPR) and the associated German experts of a document entitled ‘Technical guidelines for the design and construction of the next generation of nuclear power plants with pressurised water reactors’. These technical guidelines set out the general objectives established in 1993 and the technical recommendations drawn up by the French and German experts and endorsed by the French Nuclear Safety Authority throughout the investigation of the safety options. These technical guidelines were formalised in 2004.

The construction authorisation decree for the EPR reactor at Flamanville in 2007 requires the operator to put in place provisions for the prevention of accidents involving fusion of the core which could lead to significant early releases. It also requires the operator to ensure the reliability of the active components and the overall performance of the containment devices, which make it possible to use only very limited and long-term measures to protect the population in the event of an accident involving the fusion of the low-pressure core. The ASN, with the support of the IRSN and the standing expert groups, examined the conformity of the design of the Flamanville EPR reactor with those regulatory requirements.

In 2017 the ASN and the IRSN published a guide on the design of pressurised water reactors, which aims to specify the objectives and general principles of design and to make recommendations for meeting the regulatory requirements, in particular as regards the prevention of incidents and accidents of a radiological nature and the limitation of their consequences. In this respect, it states in particular that:

- an objective must be to limit, during incidents or accidents, discharges of radioactive or dangerous substances or hazardous effects, as well as their impacts on human beings and the environment, to as low a level as possible under economically acceptable conditions, taking into account advances in technology and practice at the time of design;
- fuel fusion accidents which are likely to lead to significant radioactive releases with kinetics that would not permit the timely implementation of the necessary measures to protect populations must be made physically impossible or otherwise extremely improbable with a high level of confidence;
- the measures to protect the populations that would be needed in the case of other fuel fusion accidents must be very limited in terms of scope and duration (no permanent rehousing, no evacuation outside the immediate vicinity of the site, no shelter outside the vicinity of the site, no restrictions on the consumption of foodstuffs in the long term outside the vicinity of the site). To that end, these types of accidents must not lead to widespread contamination of the environment and to environmental pollution in the long term.

The ASN decides on the safety options files (DOS) for new nuclear installations (for installations other than PWR, they are generally unique) and the associated general safety objectives retained by the operators. ASN ruled in 2019:

- on the DOS of a centralised storage of spent fuel. The aim of this new installation was to move towards levels of radiological consequences which do not require the implementation of measures to protect the population in the event of accidents, and to make accidents which would lead to significant or early discharges extremely improbable;
- on the DOS of the EPR2.

8a(2)(b) For basic nuclear installations in operation

In accordance with Article 9(4)(I) of the BNI Order, the provisions of that Order enter into force on 1 July 2013, subject, however, to parts II and VII of that Article, which provide for deferred entry into force in certain cases. Thus, under Article 9(4)(VI) of the BNI Order, the provisions of Article 3(9) relating to the nuclear safety objective referred to above apply to installations already in operation on 1 July 2013, with effect from the first deadline after 1 July 2015 for, inter alia: the submission of a review report as provided for in Article L.593-19 of the Environmental Code, the submission of a request for authorisation of a
substantial modification under Article R.593-47 of the Environmental Code or the submission of a decommissioning file.

Since the TSN law of 13 June 2006, all nuclear installations have been subject to a periodic review obligation every ten years. For installations not subject to review prior to the date of entry into force of the TSN law (in particular, research laboratories, plants and reactors), the deadline for submission of the review conclusion report was November 2017. To date, all basic nuclear installations have been subject to one or more reviews, which have led to the implementation of reasonably practicable improvements in order to prevent accidents and to limit their consequences (cf. Section 8c(b)).

In addition, the ASN has initiated a procedure for assessing the safety of basic nuclear installations in the light of the accident at the Fukushima Daiichi nuclear power plant. As a result of that examination, it has issued numerous decisions to basic nuclear installation operators in order to ensure that their material and organisational arrangements make it possible:

- to prevent or limit the progress of a serious accident;
- to limit massive discharges of radioactive elements into the environment in the event of an accident;
- for the operator to carry out the tasks incumbent upon it in the management of an emergency situation.

Some of the resulting changes are significant and are being implemented as part of the reassessment of the safety of the periodic safety reviews, which is intended to improve the level of safety of installations.

EDF has implemented significant developments at these installations in the context of the feedback obtained from Fukushima Daiichi, by significantly increasing human and organisational resources in order to better prevent/mitigate situations of total loss of electricity sources and loss of the cold source (strengthening of crisis organisation, creation of the FARN, addition of diesel and a water source for each reactor).

In addition, the safety objectives adopted at the 4th periodic review of the 900 and 1300 MWe classes of reactor have been defined in view of the safety objectives set for third-generation reactors, in particular the EPR. EDF is therefore extending its safety demonstration to the prevention and mitigation of serious accidents, including in the event of extreme circumstances, irrespective of the scale, and is implementing major changes.

During the latest safety review, the ILL defined a core set of redundant prevention and mitigation systems to ensure that the radiological consequences in extreme conditions are acceptable within the scope of the particular intervention plan (within a radius of 500 m around the reactor). At the start of the first 2018 cycle, all of these systems were operational.

The main improvements carried out on the CEA's installations concern topping up the water in the pools following an extreme earthquake and improving protection against the risk of fire, in particular through the installation of an automatic non-seismic power supply cut-off on certain installations when an earthquake is detected.

For Orano, factoring in the lessons learned from the Fukushima Daiichi accident at the Fukushima power plant (Japan, 2011) has led to the deployment of new methods of crisis management and remediation to maintain the safety of installations in the case of external attacks (earthquake, wind, flood, etc.) that are very unlikely and of higher levels than those taken into account in the initial dimensioning. Thus, new crisis command posts (PC) are now in service at the La Hague and Tricastin sites. Furthermore, additional mobile equipment is operational. This equipment is used, for example, to ensure water inventory in fuel storage pools, as well as to cool the condensers of the fission product evaporators at La Hague and to store new rods at Melox.
B - Provisions adopted by article — Articles 4 to 8e
Article 8b Implementation of the nuclear safety objective for nuclear installations

1. In order to achieve the nuclear safety objective set out in Article 8a, Member States shall ensure that the national framework requires that where defence-in-depth applies, it shall be applied to ensure that:
   (a) the impact of extreme external natural and unintended man-made hazards is minimised;
   (b) abnormal operation and failures are prevented;
   (c) abnormal operation is controlled and failures are detected;
   (d) accidents within the design basis are controlled;
   (e) severe conditions are controlled, including prevention of accidents progression and mitigation of the consequences of severe accidents;
   (f) organisational structures according to Article 8d(1) are in place.

2. In order to achieve the nuclear safety objective set out in Article 8a, Member States shall ensure that the national framework requires that the competent regulatory authority and the licence holder take measures to promote and enhance an effective nuclear safety culture. Those measures include in particular:
   (a) management systems which give due priority to nuclear safety and promote, at all levels of staff and management, the ability to question the effective delivery of relevant safety principles and practices, and to report in a timely manner on safety issues, in accordance with Article 6(d);
   (b) arrangements by the licence holder to register, evaluate and document internal and external safety significant operating experience;
   (c) the obligation of the licence holder to report events with a potential impact on nuclear safety to the competent regulatory authority; and
   (d) arrangements for education and training, in accordance with Article 7.

8b(1) Application of the concept of defence-in-depth

The Order of 7 February 2012, in particular Article 3(1) thereof, requires the operator to apply the principle of defence-in-depth in its nuclear safety demonstration, which consists of the implementation of successive and sufficiently independent levels of defence aimed at:
   - preventing incidents;
   - detecting incidents and implementing measures which, on the one hand, prevent them from leading to an accident and, on the other hand, restore a normal operating situation or, failing that, achieve and subsequently maintain the installation in a safe state;
   - controlling the accidents that could not be avoided or, failing that, limiting their worsening, by taking over the control of the installation in order to restore it and keep it in a safe state;
   - managing accident situations that could not be contained in such a way as to limit the consequences, in particular, to people and the environment.

The implementation of this principle is based in particular on:
   - the choice of a suitable site, taking into account, in particular, the risks of natural or industrial origin affecting the installation;
   - the identification of the functions necessary for the demonstration of nuclear safety;
   - a prudent design approach, involving dimensioning margins and using, as appropriate, adequate physical redundancy, diversification and physical separation of the important elements for protection which perform the functions necessary for the demonstration of nuclear safety, in order to achieve a high level of reliability and to ensure the functions referred to in the previous subparagraph;
   - the quality of the design, construction, operation, shutdown, decommissioning, maintenance and monitoring of the installations;
   - preparation for the management of possible incident and accident situations.
Furthermore, the function of containment of radioactive substances is ensured by the interposition of one or more sufficiently independent successive barriers between those substances and the people and the environment and, if necessary, by a dynamic containment system. The number and effectiveness of such arrangements are proportionate to the scale and impact of potential radioactive releases, including in the event of an incident or accident.

The ASN examines the application of defence-in-depth at the time of its investigations (application for authorisation for commissioning, application for modification subject to authorisation, report on significant events, periodic safety review, etc.).

8b(2) **Actions to promote and strengthen an effective nuclear safety culture**

a) The French legislative and regulatory frameworks require the operator to define a policy which gives priority to the protection of protected interests, and to establish and formalise an integrated management system to ensure that the requirements of the laws and regulations, the authorisation decree, and the requirements and decisions of the Nuclear Safety Authority are taken into account.

For this reason, EDF has drawn up the Security Policy for the Nuclear Production Division and has become more operational in the integrated management system (SMI), which have prioritised safety. The establishment of an independent safety chain, 24/7, concretely illustrates the importance attached to security (as this provision only exists in this area): every day, the Operation Manager must compare their assessment of the safety of the units to that of the ‘independent' Safety Engineer, who challenges the former on their management and their safety stances.

EDF has also set up a Safety Culture roadmap that is steered by each power plant. In this context, debates are organised to hear possible alerts and to show the primacy given to safety. Thus, the discussions on the course of the Davis Besse event allow managers and staff to reconsider their practices, in order to avoid the slow drift that has been observed in the feedback obtained from this international incident.

b) The Order of 7 February 2012 requires the operator to implement an integrated management system which includes provisions enabling it, in particular, to collect and exploit the feedback obtained from the operation of its installation or from other installations, whether similar or otherwise, in France or abroad, or from research and development. They should also learn lessons from significant events abroad.

c) As regards the events affecting nuclear safety, the Order of 7 February 2012 requires operators to report significant events that occur in nuclear installations to the ASN. Criteria for reporting have therefore been laid down in an ASN guide entitled ‘Guide to the declaration procedure and coding system for criteria concerning significant events relating to safety, radiation protection or the environment, applicable to basic nuclear installations and the transport of radioactive materials'. Each significant event is classified on the INES scale by the ASN. The BNI Order requires the operator to complete its declaration within two months by a report setting out the conclusions which the operator draws from the analysis of the event and the measures it is taking to improve safety or radiation protection and to avoid recurrence.

d) The ASN ensures that the operator has carried out a relevant analysis of the event, has made appropriate arrangements to rectify the situation and avoid recurrence, and has disseminated the feedback. Furthermore, in its investigations, the ASN examines the collection and use of the operator's feedback with the support of the IRSN and the standing expert groups.

e) The requirements for staff training and education are set out in Sections 7(1) to 7(2) of this report.

Operators have implemented specific provisions to promote and strengthen an effective safety culture:

- every two years EDF conducts the Safety Perception Questionnaire (QPS), which is now based on the WANO reference system, on its power plants. Its evaluation can be used to take account
B - Provisions adopted by article — Articles 4 to 8e

of the feedback and possible alerts from stakeholders on the ground. The resulting improvement actions are reintegrated into the multi-year Safety Culture roadmaps so that further progress can be made on safety issues;

- Orano has reinforced training on the issue of safety culture and has developed a self-assessment process for each of the operational entities of the group. This self-assessment implements a tool inspired by international standards that are the references in this area (IAEA, WANO). The objective is that the exercise should lead to the identification of improvement points and the implementation of related progress activities. For example, the development of an e-learning module on the culture of shared nuclear safety within the group is the result of a request expressed internally by the operational entities. This training module builds on the safety culture from the WANO system. The broad deployment of this training activity is aimed at reaching several thousands of staff from the operational entities from the first year;

- in addition to 'settled' safety, the CEA undertakes to focus on 'managed' safety, which is based on the quality of initiatives, competence, personal commitment and the functioning of collective bodies and the organisation, the involvement and adherence of all employees and their ability to take ownership of the issues at stake.

The ASN monitors the safety culture of operators according to three levels:

1. the inspections allow the level of safety culture to be perceived by the operators. In addition, some inspections include a specific section where inspectors conduct formalised interviews with the parties on the ground. The purpose of these interviews is to provide an explanation by the interviewed person of their activity and the context of this activity (in particular the meaning given to their work);

2. the analysis of significant events provides another insight into the safety culture, in particular through the analysis of the root causes of the events;

3. a more comprehensive view is also provided periodically in the instructions of the safety management of operators. The analyses carried out under these instructions are submitted to the experts of the Standing Groups, which lead to an external view.

As far as the Safety Authority is concerned, the ASN has had an integrated management system since 2012 which is based on international standards, such as the ‘GSR Part 1’ and ‘GSR Part 3’ of the IAEA, and ISO 9001 standard. Its quality policy statement places its quality management system at the heart of its organisation so that it can carry out its missions in accordance with its values and ambitions, and evaluate and continuously improve the activities and operations of the ASN. This quality management system also contributes to the dissemination of the common culture of the ASN described in the document ‘our collective commitment’ to all officers. It helps to create the necessary framework for the implementation of a rigorous approach as well as a questioning attitude.

The ASN has long-term experience in this field and a very practical approach:

- the safety culture is at the core of the ASN’s culture and values. The ASN has formalised the guiding principles of its monitoring activities in the framework of its strategic plan. They form the basis of a shared culture and collective know-how;

- the ASN gives priority to safety, as evidenced by its recent positions, such as: the decision to stop the four Tricastin reactors until the strengthening of the dyke earthquake protection, the position on the repair prior to the commissioning of the eight welds of the vapour pipes of the EPR at Flamanville;

- the ASN has a very strong questioning attitude: it is not satisfied with the operator’s initial responses and continues with its questioning until all the necessary information is obtained, as was the case in the case of carbon segregation. If a deviation is detected, it systematically queries the possible extension to other equipment or installations;
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- the organisation of the ASN enables decisions to be made collectively. This enables everyone to express themselves, whatever their hierarchical level, in a friendly listening environment.
Article 8c  Initial assessment and periodic safety reviews

Member States shall ensure that the national framework requires that:

(a) any grant of a licence to construct a nuclear installation or operate a nuclear installation, is based upon an appropriate site and installation-specific assessment, comprising a nuclear safety demonstration with respect to the national nuclear safety requirements based on the objective set in Article 8a;

(b) the licence holder under the regulatory control of the competent regulatory authority, reassesses systematically and regularly, at least every 10 years, the safety of the nuclear installation as laid down in Article 6(c). That safety reassessment aims at ensuring compliance with the current design basis and identifies further safety improvements by taking into account ageing issues, operational experience, most recent research results and developments in international standards, using as a reference the objective set in Article 8a.

8c(a)  Choice of site

The Environmental Code, in particular Articles L 593.7 et seq. which govern the licensing procedure for the establishment of a basic nuclear installation, requires the operator to provide a preliminary version of the safety report in its application for licensing the establishment. This preliminary version must justify that the project achieves, taking into account in particular the vulnerability of the installation’s environment, a level of risk as low as reasonably possible under economically acceptable conditions.

Furthermore, the Order of 7 February 2012 stipulates that the principle of defence-in-depth, which is involved in drawing up the safety demonstration, must be based in particular on the choice of a suitable site, taking account, in particular, of the risks of natural or industrial origin to the installation.

Lastly, the ASN Decision No 2015-0532 on safety reporting for basic nuclear installations provides that the safety report at the stage of the establishment authorisation decree provides elements which make it possible to verify that the provisions adopted in respect of the risks associated with external attacks, whether of natural or industrial origin or linked to the communication channels, are sufficient. The elements presented must make it possible to assess the characteristics of the attacks of external origin used in the demonstration of nuclear safety.

When examining an application for a licence to establish a basic nuclear installation, with the support of the IRSN and the standing expert groups, the ASN pays attention to the specific features of the site and the design of the installation. However, before applying for a licence to establish a basic nuclear installation, the operator must inform the administration of the site(s) on which it plans to construct that installation. The ASN, with the support of the IRSN, analyses the safety-related characteristics of sites: seismicity, hydrogeology, industrial environment, cold water sources, etc. The hazard characterisation of the site, as well as the dimensioning of the installations, to cope with these hazards are the subject of basic safety rules or guides.

8c(b)  Safety reviews

8c(b)(i) Regulatory requirements

Pursuant to Article L 593-18 of the Environmental Code, the operator must carry out periodic reviews every 10 years for all operating or decommissioning nuclear installations. In France, the periodic review covers the safety aspects as well as the aspects of environmental protection and non-radiological risks.

That review must make it possible to assess the situation of the installation in the light of the rules applicable to it and to update the assessment of the risks or disadvantages which the installation presents, taking into account in particular the condition of the installation, the experience gained during operation, knowledge development and the rules applicable to similar installations. The periodic review is an opportunity for an in-depth examination of the condition of the installations to verify that they comply with the applicable safety framework. The review includes a verification of the compliance of the installation, including the assessment of equipment ageing management, as well as a reassessment of the safety of
the installation in order to improve the safety level of the installations. To this end, the requirements for the current installations are compared to those for the most recent installations and the improvements that can be reasonably implemented are proposed by the operator. At the end of that review, the operator sends a report containing the conclusions of that examination and, if necessary, the provisions it plans to take to remedy the deficiencies or to improve the safety of its installation to the Nuclear Safety Authority and the Ministers responsible for nuclear safety. After analysing the report, the Nuclear Safety Authority may impose new technical requirements.

Prior to the review, the operator sends a review guidance file (DOR) to the ASN. This file must enable the ASN to ensure that the general review methodology proposed by the operator and the arrangements for carrying out the conformity review and safety reassessment correspond to the expectations of the ASN and that the operator carries out the actions and uses sufficient resources to conduct its review. At the end of its investigation, the ASN takes a position, after consulting the standing groups of experts according to the issues at stake at the installation, on the scope of the security review laid down in the review guidance file. If necessary, it may ask for operator additions (topics to be discussed in greater detail, regulatory developments to be taken into account, etc.).

The conformity assessment consists of a comparison of the actual state of the installation with the safety standard and applicable regulations, including its creation authorisation decree and the requirements of the ASN. The 10-year conformity assessment does not exempt the operator from its obligation to ensure the continuous compliance of its installations. This is regularly monitored by the ASN through the numerous inspections it has carried out on the sites. The periodic review is also an opportunity to review the effects of ageing on the materials. Thus, for example, for reactors passing through their third ten-year period, an ageing analysis has been carried out for all the degradation mechanisms which could affect the components which are important for safety and non-classified components which may have an impact on the operation of major safety components. The demonstration of ageing management must be based on the feedback from operation, the maintenance arrangements and the possibility of repairing or replacing components. This analysis leads to the preparation of an aptitude file for continued operation.

The purpose of the safety reassessment is to assess the safety of the installation and to improve it in the light of:
- French regulations, most recent safety objectives and practices in France and abroad;
- the feedback from operating the installation;
- feedback from other nuclear installations in France and abroad;
- lessons learned from other installations or equipment at risk.

At the end of the studies carried out on each of the selected subjects, changes that enable the implementation of safety improvements are defined. These changes must be investigated by the ASN.

The report concluding the periodic review referred to in Article R.593-18 of the Environmental Code sets out the conclusions of the regulatory compliance review of its installation, as well as changes to address deviations or improve the safety of the installation. This report must be investigated by the ASN. The ASN communicates its analysis of the report to the Minister responsible for nuclear safety and may lay down additional requirements. The timetable for the periodic reviews of the various installations, the conclusions of the ASN analysis and the technical requirements are presented on the ASN’s website.

8c(b)(ii) Measures taken by licence holders
All operators of nuclear installations in operation or in the process of decommissioning carryout periodic reviews under Article L.593-18 of the Environmental Code every 10 years.

For the REPs, see this [link on the ASN website](#) and this [link](#) for the other installations.
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Illustrations of the actions carried out as part of the reviews are set out below:

- Having regard to the EDF nuclear reactors, the fourth periodic review of 900 MWe units presents particular challenges:
  - some materials reach the lifespan taken into account in their design. Studies on the compliance of installations and the control of the ageing of materials should therefore be reviewed, taking into account the actual degradation mechanisms found and the maintenance and replacement strategies implemented by EDF;
  - the reassessment of the safety of these reactors, and the resulting improvements (cf. Section 8a(1) and 8a(2)), are carried out with regard to new generation reactors, such as the EPR, whose design meets significantly enhanced safety requirements.

- The main improvements proposed and realised by the ILL during these reassessments related to:
  - the seismic strengthening of the reactor building and its major protective equipment to take into account the development of seismic standards and the strengthening of adjacent buildings to ensure their stability or at least their inviolability from the reactor building;
  - replacement of the security rods in silver-indium-cadmium with more efficient bars of hafnium;
  - the establishment of a final stage circuit complements the provisions for preventing the risk of emptying of the battery unit in the event of a breach on the primary coolant circuit of the reactor units;
  - installation of the ground water circuit (redundant) to ensure that the fuel remains submerged and cooled. This circuit may also be used for fire-fighting purposes;
  - the installation of the seismic deflation circuit (redundant) to maintain the reactor containment in a vacuum with filtration of the extraction;
  - the installation of the automatic cut-off of the non-seismic power supply to the earthquake threshold in order to avoid any post-earthquake fire of electrical origin;
  - the creation of a new operational crisis management station even in extreme conditions.

- The approach implemented by Orano is based on the development of a highly structured methodology on the assessment of conformity, with a particularly important part of it dedicated to ageing. This led to the development of new control technologies for equipment that is not directly accessible, the deployment of monitoring plans, the carrying out of additional studies to confirm the need to strengthen certain anti-earthquake equipment and the modifications relating to the concentrators of the fission products (conditions of operation, increased checks and additional provisions to limit the consequences in the event of a breach). These periodic reviews are now continuous processes with three to four ongoing projects at the same time. They are organised specifically in project mode, supported by internal engineering entities and a dedicated cluster of project support experts: this cluster ensures the provision of common cross-cutting methodologies, sharing of experience between entities and monitoring of practices to be taken into account.

- The CEA has developed its safety approach by applying a more generic approach to safety in the safety reviews of its oldest plants, based, in particular, on an analysis of safety by ‘operating conditions’ (postulated initiating events). This leads to a safety ranking of the components that are required to perform an important safety function and that must be qualified. This ranking determines the requirement level for production as well as operation and monitoring. This has led to significant improvements in safety. Furthermore, the CEA has implemented improvements in civil engineering for earthquake and fire protection based on advanced fire hazard studies.
**Article 8d On-site emergency preparedness and response**

1. Without prejudice to the provisions of the Directive 2013/59/Euratom, Member States shall ensure that the national framework requires that an organisational structure for on-site emergency preparedness and response is established with a clear allocation of responsibilities and coordination between the licence holder, and competent authorities and organisations, taking into account all phases of an emergency.

2. Member States shall ensure that there is consistency and continuity between the on-site emergency preparedness and response arrangements required by the national framework and other emergency preparedness and response arrangements required under Directive 2013/59/Euratom.

**8d(1) The national structure for emergency preparedness**

Law No 2004-811 of 13 August 2004 on the modernisation of civil security provides for an updated risk census, the renovation of operational planning, the carrying out of exercises which involve the population, informing and training of the population, operational monitoring and alerting. Several decrees implementing this Law, codified in the Internal Security Code in Articles L.741-1 to L.741-32, concerning in particular the plans for the organisation of the civil security response (ORSEC) and the particular intervention plans (PPI), came to this end in 2005.

The organisation of the public authorities in the event of a nuclear or radiological incident or accident is defined by the Prime Minister’s Circular No 5567/SG of 2 January 2012 on the Government organisation for the management of major crises, as well as a group of texts relating to nuclear safety, radiation protection, public order and civil security.

The national response plan ‘Major Nuclear or Radiological Accident’ has been developed under the aegis of the General Secretariat for Defence and National Security (SGDSN), a department under the responsibility of the Prime Minister. This plan, which was published in February 2014, responds to radiological emergencies of any kind. It complements the existing planning arrangements at local level (PUI and PPI), proposing ways to establish the national crisis management strategy. This plan incorporates the international dimension of crises and the possibilities for mutual assistance in the event of an occurrence.

In an emergency situation, the main players and decision-makers are:

- the operator of the nuclear installation where the accident has occurred, which implements the organisation and means defined in its internal emergency plan (PUI) (cf. Section 6(e));
- the mayor of the municipality, who, being in the vicinity, plays an important role in anticipating and supporting measures to protect populations. The mayor of a municipality included in the scope of a PPI must establish and implement a municipal back-up plan for this purpose to plan, organise and structure the measures to accompany the decisions of the Prefect. It is also a relay for informing and raising awareness among populations during the iodine distribution campaigns;
- the Prefect of the department in which the installation is located, who takes the decisions necessary to ensure the protection of the population, the environment and the property endangered by the accident. It operates under the PPI and ORSEC (organisation of the civil security response) plans. It ensures that people and mayors are informed;
- the ASN, which monitors the activities of the operator in the field of nuclear safety and radiation protection. In an emergency situation, it acts on the IRSN’s evaluations and assists the Prefect in managing the situation;
- the IRSN, which mobilises the experts in its mobile unit for the deployment of resources on the ground and the operation of surveillance networks. ‘Mobile human resources’ allow for the implementation of measures for the internal contamination of persons. Lastly, the established laboratories carry out expert reports on the exposure of individuals (radiotoxicological analyses, anthroporadiometry, dosimetry reconstruction) and analyse the samples taken in the environment.
B - Provisions adopted by article — Articles 4 to 8e

Pursuant to the Circular of 2012, an Interministerial Crisis Unit (CIC) is activated by the Prime Minister in the event of a major crisis requiring the coordination of many stakeholders. The CIC includes decision-makers from the ministries concerned, the ASN (for the management of radiological emergencies), other bodies (such as the IRSN, Météo-France, etc.) and the managers of the national nuclear operators concerned (e.g. the CEA, EDF or Orano).

The departments of the ministries concerned in the context of their mandate, as well as the ASN, coordinate their efforts to advise the Government, through the CIC, on the protection measures to be taken. They provide information and advice which may help to assess the state of the installation, the scale of the incident or accident, its possible developments and the actions needed to protect the population and the environment. In order to ensure its advisory role, the ASN relies on the IRSN, which carries out the diagnosis and prognosis of the safety of the installation and the radiological consequences on the environment and the potential or actual population. On the basis of these assessments, the ASN offers the authorities technical, health and medical measures with a view to ensuring the protection of people and the environment, as well as measures to restore the safety of the affected installations. The ASN and IRSN also have the task of supporting communication by public authorities by providing educational information on the situation, putting risks into perspective and reporting the results of environmental radioactivity measurements.

The table below shows the position of the public authorities (Government, the ASN and technical experts) and of the operators in a radiological emergency situation. These stakeholders operate in their respective fields of competence relating to expertise, decision, action and communication, for which regular conference calls are organised. The discussions lead to decisions and guidelines on the safety of the installation and the protection of the population. Similarly, the relationships between the communication units and the spokespersons of the crisis centres ensure the consistency of information that is provided to the public and the media.

### Positioning of various stakeholders in a radiological emergency

<table>
<thead>
<tr>
<th>CIC: Interministerial Crisis Unit</th>
<th>DECISION</th>
<th>EXPERT ASSESSMENT</th>
<th>ACTION</th>
<th>COMMUNICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public authorities</strong></td>
<td>Government (CIC) Prefect</td>
<td>/</td>
<td>Prefect Civil security</td>
<td>Government (CIC) Prefect</td>
</tr>
<tr>
<td></td>
<td>ASN (Emergency Centre) and representative in prefecture</td>
<td>IRSN Météo - France</td>
<td>IRSN (mobile units)</td>
<td>ASN IRSN</td>
</tr>
<tr>
<td><strong>Operators</strong></td>
<td>National and local</td>
<td>National and local</td>
<td>National and local</td>
<td>National and local</td>
</tr>
</tbody>
</table>

8d(2) Consistency and continuity between emergency preparedness and response arrangements

The Euratom Directive 2013/59 was transposed into national law by Order No 2016-128 of 10 February 2016, which laid down various provisions on nuclear matters, then Order No 2018-437 of 4 June 2018 on
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the protection of workers against the risks arising from ionising radiation, Order No 2018-438 of 4 June 2018 on protection against the risks arising from ionising radiation, to which certain workers are subject, and Order No 2018-434 of 4 June 2018 on various nuclear provisions. The latter text is the one which deals with matters relating to the management of emergency situations, in particular by creating Articles R.1333-81 to R.1333-89 of the Public Health Code.

In an emergency situation, the State official in the department has emergency management recommendations drawn up primarily by the IRSN and the ASN concerning protection measures against ionising radiation. The officers of the IRSN and the ASN which provide the emergency centres are trained to meet the requirements of Directive 2013/59/Euratom. The recommendations during the first emergency phase are established to comply with the reference levels defined in Article R.1333-84 (effective doses of 10 mSv for sheltering and 50 mSv for evacuation, a thyroid equivalent dose of 50 mSv for the administration of stable iodine). As soon as information on environmental contamination becomes available, the recommendations made to the representative of the State in the department shall incorporate the requirements laid down in Article R.1333-82 and R.1333-83 (reference level of 100 mSv for the duration of the radiological emergency). The continuum between these two types of recommendations is ensured by the continuity of crisis management within the emergency centres of the IRSN and the ASN.
Article 8e  Peer-reviews

1. Member States shall, at least once every 10 years, arrange for periodic self-assessments of their national framework and competent regulatory authorities and invite an international peer review of relevant segments of their national framework and competent regulatory authorities with the aim of continuously improving nuclear safety. Outcomes of such peer reviews shall be reported to the Member States and the Commission, when available.

2. Member States shall ensure that, on a coordinated basis:
   (a) a national assessment is performed, based on a specific topic related to nuclear safety of the relevant nuclear installations on their territory;
   (b) all other Member States, and the Commission as observer, are invited to peer review the national assessment referred to in point (a);
   (c) appropriate follow-up measures are taken of relevant findings resulting from the peer review process;
   (d) relevant reports are published on the above mentioned process and its main outcome when results are available.

3. Member States shall ensure that arrangements are in place to allow for the first topical peer review to start in 2017, and for subsequent topical peer reviews to take place at least every six years thereafter.

4. In case of an accident leading to situations that would require off-site emergency measures or protective measures for the general public, the Member State concerned shall ensure that an international peer review is invited without undue delay.

France regularly hosts and participates in self-assessments, in particular under the aegis of the IAEA or the European Commission.

8e(a)  Regular self-assessments

Order No 2016-128 of 10 February 2016 provides that the regulations on nuclear safety and its control are to be maintained and improved (Article L.591-2 of the Environmental Code). Furthermore, this Code (Article L.591-6) requires the State to organise periodic assessments, at least every ten years, of the regulatory and legislative framework in the field of nuclear safety and radiation protection, as well as its organisation of its regulatory and supervisory functions (the ASN) and to undergo an international peer review for the continuous improvement of nuclear safety. These assessments are jointly organised by the Ministers responsible for nuclear safety or radiation protection and the ASN. The results of these assessments are communicated to the Member States of the European Union and to the European Commission, where available.

IRRS missions: The first IRRS (IAEA Integrated Regulatory Review Service) mission was conducted in 2006 and 2009 respectively. The ASN underwent another IRRS full scope mission in 2014, after which 46 recommendations and suggestions were issued by the team of auditors. An action plan has been drawn up by the ASN to respond to these recommendations and suggestions and take appropriate measures. The follow-up mission took place from 1 to 9 October 2017. The audit team concluded that France has significantly strengthened the framework for its control of nuclear safety and radiation protection, while pointing out the need for the ASN to remain vigilant on the issue of human resources in view of the safety concerns of the French nuclear installations. A total of 40 recommendations have been closed or are considered to be ‘subject to implementation of ongoing actions’. The report of this mission, like those previous, was uploaded to the ASN site in March 2017.

OSART missions: An Operational Safety Review Team (OSART) aims at conducting an objective of operational security in the host nuclear power plant on the basis of the IAEA safety standards and best international performance and best practices. On average, an OSART mission is organised in France...
every year. In 2013, the entire French nuclear fleet was the subject of at least one OSART mission. Half a dozen missions will take place in the period 2019 to 2021.

**WANO reviews:** the safety performance of nuclear power plants at the La Hague plant is assessed by the World Association of Nuclear Operators (WANO) through peer reviews. Since 2013, each unit has been subject to a review every four years together with an audit of EDF’s nuclear inspection. With regard to Orano, the La Hague plant has also been subject to peer reviews every four years since 2014, in parallel with the inspections carried out by the group’s General Inspectorate.

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**8e(b) EU topical peer reviews**


Article L.591-7 of the Environmental Code provides that, at least once every six years, an assessment of a specific topic related to nuclear safety or radiation protection in basic nuclear installations is to be organised and that the assessment is subject to an international peer review.

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**8e(c) The first EU topical peer review ‘TPR ageing’**

The first topical peer review (TPR) focused on ageing management. This review, in line with the terms of reference drawn up by ENSREG and the technical specification of WENRA, focused on programmes to manage the ageing of nuclear power plants and research reactors of more than 1 MWth. In particular, it was concerned with the implementation of programmes for the ageing management of certain types of equipment, namely electrical cables, pipes which are not readily accessible, reactor vessels and concrete containments. The assessment report was drawn up in 2017 by the ASN, which acted as coordinator, with contributions from the IRSN, EDF, the CEA and the ILL.

Actions to improve the French installations were identified in the assessment report as well as by the peer review. A national action plan was then developed to address them.

In addition, the second topical peer review will result in the publication of the national reports by 2023. The framing of this review, in particular in view of the feedback from the first exercise, and the choice of the subject, commenced at the end of 2019.

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**8e(d) International peer review in the event of an accident**

Article L.591-8 of the Environmental Code provides that an international investigation should be organised in the event of an accident leading to situations requiring off-site emergency response measures or measures to protect the population.

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7 See the National Action Plan on the ASN site at [this link](#).
## ANNEX 1 – LIST OF BASIC NUCLEAR INSTALLATIONS IN FRANCE

### A(1)(1) List of nuclear power reactors in operation or under construction

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>NAME AND LOCATION OF THE INSTALLATION</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>DU BUGEY NUCLEAR POWER PLANT (reactors 2 and 3) 01980 Loyettes</td>
<td>EDF</td>
<td>2 PWR reactors CP0 900 MWe</td>
</tr>
<tr>
<td>84</td>
<td>DAMPIERRE-EN-BURLY NUCLEAR POWER PLANT (reactors 1 and 2) 45570 Ouzouer-sur-Loire</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>85</td>
<td>DAMPIERRE-EN-BURLY NUCLEAR POWER PLANT (reactors 3 and 4) 45570 Ouzouer-sur-Loire</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>86</td>
<td>BLAYAIS NUCLEAR POWER PLANT (reactors 1 and 2) 33820 Saint-Ciers-sur-Gironde</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>87</td>
<td>TRICASTIN NUCLEAR POWER PLANT (reactors 1 and 2) 26130 Saint-Paul-Trois-Châteaux</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>88</td>
<td>TRICASTIN NUCLEAR POWER PLANT (reactors 3 and 4) 26130 Saint-Paul-Trois-Châteaux</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>89</td>
<td>BUGEY NUCLEAR POWER PLANT (reactors 4 and 5) 01980 Loyettes</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>96</td>
<td>GRAVELINES NUCLEAR POWER PLANT (reactors 1 and 2) 59820 Gravelines</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>97</td>
<td>GRAVELINES NUCLEAR POWER PLANT (reactors 3 and 4) 59820 Gravelines</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>100</td>
<td>ST-LAURENT-DES-EAUX NUCLEAR POWER PLANT (reactors B1 and B2) 41220 La Ferté-St-Cyr</td>
<td>EDF</td>
<td>2 PWR reactors CP2 900 MWe</td>
</tr>
<tr>
<td>103</td>
<td>PALUEL NUCLEAR POWER PLANT (reactor 1) 76450 Cany-Barville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>104</td>
<td>PALUEL NUCLEAR POWER PLANT (reactor 2) 76450 Cany-Barville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>BNI no.</td>
<td>NAME AND LOCATION OF THE INSTALLATION</td>
<td>Operator</td>
<td>Type of installation</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------</td>
<td>----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>107</td>
<td>CHINON NUCLEAR POWER PLANT (reactors B1 and B2) 37420 Avoine</td>
<td>EDF</td>
<td>2 PWR reactors CP2 900 MWe</td>
</tr>
<tr>
<td>108</td>
<td>FLAMANVILLE NUCLEAR POWER PLANT (reactor 1) 50830 Flamanville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>109</td>
<td>FLAMANVILLE NUCLEAR POWER PLANT (reactor 2) 50830 Flamanville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>110</td>
<td>BLAYAIS NUCLEAR POWER PLANT (reactors 3 and 4) 33820 Saint-Ciers-sur-Gironde</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>111</td>
<td>CRUAS NUCLEAR POWER PLANT (reactors 1 and 2) 07350 Cruas</td>
<td>EDF</td>
<td>2 PWR reactors CP2 900 MWe</td>
</tr>
<tr>
<td>112</td>
<td>CRUAS NUCLEAR POWER PLANT (reactors 3 and 4) 07350 Cruas</td>
<td>EDF</td>
<td>2 PWR reactors CP2 900 MWe</td>
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<tr>
<td>114</td>
<td>PALUEL NUCLEAR POWER PLANT (reactor 3) 76450 Cany - Barville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>115</td>
<td>PALUEL NUCLEAR POWER PLANT (reactor 4) 76450 Cany - Barville</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>119</td>
<td>ST-ALBAN NUCLEAR POWER PLANT (reactor 1) 38550 Le Péage-de-Roussillon</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>120</td>
<td>ST-ALBAN NUCLEAR POWER PLANT (reactor 2) 38550 Le Péage-de-Roussillon</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>122</td>
<td>GRAVELINES NUCLEAR POWER PLANT (reactors 5 and 6) 59820 Gravelines</td>
<td>EDF</td>
<td>2 PWR reactors CP1 900 MWe</td>
</tr>
<tr>
<td>124</td>
<td>CATTENOM NUCLEAR POWER PLANT (reactor 1) 57570 Cattenom</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>125</td>
<td>CATTENOM NUCLEAR POWER PLANT (reactor 2) 57570 Cattenom</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>126</td>
<td>CATTENOM NUCLEAR POWER PLANT (reactor 3) 57570 Cattenom</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
</tbody>
</table>
## ANNEXES

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>NAME AND LOCATION OF THE INSTALLATION</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>127</td>
<td>BELLEVILLE-SUR-LOIRE NUCLEAR POWER PLANT (reactor 1) 18240 Léré</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>128</td>
<td>BELLEVILLE-SUR-LOIRE NUCLEAR POWER PLANT (reactor 2) 18240 Léré</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>129</td>
<td>NOGENT-SUR-SEINE NUCLEAR POWER PLANT (reactor 1) 10400 Nogent-sur-Seine</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>130</td>
<td>NOGENT-SUR-SEINE NUCLEAR POWER PLANT (reactor 2) 10400 Nogent-sur-Seine</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>132</td>
<td>CHINON NUCLEAR POWER PLANT (reactors B3 and B4) 37420 Avoine</td>
<td>EDF</td>
<td>2 PWR reactors CP2 900 MWe</td>
</tr>
<tr>
<td>135</td>
<td>GOLFECH NUCLEAR POWER PLANT (reactor 1) 82400 Golfech</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>136</td>
<td>PENLY NUCLEAR POWER PLANT (reactor 1) 76370 Neuville-lès-Dieppe</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>137</td>
<td>CATTENOM NUCLEAR POWER PLANT (reactor 4) 57570 Cattenom</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>139</td>
<td>CHOOZ B NUCLEAR POWER PLANT (reactor 1) 08600 Givet</td>
<td>EDF</td>
<td>1 PWR reactor N4 1,450 MWe</td>
</tr>
<tr>
<td>140</td>
<td>PENLY NUCLEAR POWER PLANT (reactor 2) 76370 Neuville-lès-Dieppe</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>142</td>
<td>GOLFECH NUCLEAR POWER PLANT (reactor 2) 82400 Golfech</td>
<td>EDF</td>
<td>1 PWR reactor P4 1,300 MWe</td>
</tr>
<tr>
<td>144</td>
<td>CHOOZ B NUCLEAR POWER PLANT (reactor 2) 08600 Givet</td>
<td>EDF</td>
<td>1 PWR reactor N4 1,450 MWe</td>
</tr>
<tr>
<td>158</td>
<td>CIVAUX NUCLEAR POWER PLANT (reactor 1) 86320 Civaux</td>
<td>EDF</td>
<td>1 PWR reactor N4 1,450 MWe</td>
</tr>
<tr>
<td>159</td>
<td>CIVAUX NUCLEAR POWER PLANT (reactor 2) 86320 Civaux</td>
<td>EDF</td>
<td>1 PWR reactor N4 1,450 MWe</td>
</tr>
</tbody>
</table>
### ANNEXES

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>NAME AND LOCATION OF THE INSTALLATION</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>167</td>
<td>FLAMANVILLE NUCLEAR POWER PLANT (reactor 3) 50830 Flamanville</td>
<td>EDF</td>
<td>1 PWR reactor EPR 1,600 MWe (under construction)</td>
</tr>
</tbody>
</table>

### A(1)(2) List of fuel cycle installations in operation

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>NAME AND LOCATION OF THE INSTALLATION</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>FUEL FABRICATION PLANT 26104 Romans-sur-Isère</td>
<td>Framatome</td>
<td>Fuel fabrication</td>
</tr>
<tr>
<td>98</td>
<td>NUCLEAR FUEL FABRICATION UNIT 26104 Romans-sur-Isère</td>
<td>Framatome</td>
<td>Fuel fabrication</td>
</tr>
<tr>
<td>116</td>
<td>PLANT FOR THE TREATMENT OF SPENT FUEL ELEMENTS FROM LIGHT WATER NUCLEAR REACTORS ‘UP3 A’ (La Hague) 50107 Cherbourg</td>
<td>Orano Cycle</td>
<td>Processing of radioactive substances</td>
</tr>
<tr>
<td>117</td>
<td>PLANT FOR THE TREATMENT OF SPENT FUEL ELEMENTS FROM LIGHT WATER NUCLEAR REACTORS ‘UP2 800’ (La Hague) 50107 Cherbourg</td>
<td>Orano Cycle</td>
<td>Processing of radioactive substances</td>
</tr>
<tr>
<td>118</td>
<td>LIQUID EFFLUENT AND SOLID WASTE TREATMENT PLANT ‘STE3’ (La Hague) 50107 Cherbourg</td>
<td>Orano Cycle</td>
<td>Processing of radioactive substances</td>
</tr>
<tr>
<td>151</td>
<td>NUCLEAR FUEL FABRICATION PLANT (MELOX) 30200 Chusclan</td>
<td>Orano Cycle</td>
<td>Fuel fabrication</td>
</tr>
<tr>
<td>155</td>
<td>TU 5 INSTALLATION 26701 Pierrelatte</td>
<td>Orano Cycle</td>
<td>Processing of radioactive substances</td>
</tr>
<tr>
<td>168</td>
<td>GEORGES BESSE 2 PLANT FOR SEPARATION OF URANIUM ISOTOPES BY CENTRIFUGATION 26702 Pierrelatte</td>
<td>Orano Cycle</td>
<td>Processing of radioactive substances</td>
</tr>
</tbody>
</table>
### NAME AND LOCATION OF THE INSTALLATION

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>Name and Location</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>175</td>
<td>Tanks B1 and B2 (Malvési) 11100 Narbonne</td>
<td>Orano Cycle</td>
<td>Packaging and storage of radioactive substances</td>
</tr>
<tr>
<td>138</td>
<td>INSTALLATION FOR THE PURIFICATION AND RECOVERY OF URANIUM (IARU) (Tricastin) 26130 Saint-Paul-Trois-Châteaux</td>
<td>Orano Cycle</td>
<td>Plant</td>
</tr>
<tr>
<td>176</td>
<td>AREVA TRICASTIN ANALYSIS LABORATORIES (ATLAS) (Tricastin) 26700 Pierrelatte</td>
<td>Orano Cycle</td>
<td>Laboratory for the use of radioactive substances</td>
</tr>
<tr>
<td>178</td>
<td>TRICASTIN URANIUM FLEET (Tricastin) 26700 Pierrelatte</td>
<td>Orano Cycle</td>
<td>Storage of radioactive materials</td>
</tr>
<tr>
<td>179</td>
<td>P35 (Tricastin) 26700 Pierrelatte</td>
<td>Orano Cycle</td>
<td>Storage of radioactive materials</td>
</tr>
</tbody>
</table>
## A(1)(3) List of nuclear research reactors or those under construction

<table>
<thead>
<tr>
<th>BNI no.</th>
<th>NAME AND LOCATION OF THE INSTALLATION</th>
<th>Operator</th>
<th>Type of installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>CABRI (Cadarache) 13115 Saint-Paul-lez-Durance</td>
<td>CEA</td>
<td>Test reactor with a pressurised water loop since 2006 25 MWth</td>
</tr>
<tr>
<td>67</td>
<td>HIGH FLUX REACTOR (HFR) 38041 Grenoble</td>
<td>ILL</td>
<td>Swimming pool type reactor 57 MWth</td>
</tr>
<tr>
<td>172</td>
<td>JULES HOROWITZ (RJH) (Cadarache) 13115 Saint-Paul-lez-Durance</td>
<td>CEA</td>
<td>Swimming pool type reactor 100 MWth (under construction)</td>
</tr>
<tr>
<td>174</td>
<td>ITER (Cadarache) 13115 Saint-Paul-lez-Durance</td>
<td>ITER Organization</td>
<td>International fusion reactor project (under construction)</td>
</tr>
</tbody>
</table>
A(1)(4) List of civilian installations that have been shut down or decommissioned as at 31 December 2019, plus the Fessenheim nuclear power reactors 1 and 2 (shut down in 2020).
## ANNEXES

### ANNEX 2 – LIST OF MAIN ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency</td>
</tr>
<tr>
<td>ANCCLI</td>
<td>Association Nationale des Comités et Commissions Locales d’Information (the French National Association of Committees and Local Information Committees)</td>
</tr>
<tr>
<td>ASN</td>
<td>Autorité de Sûreté Nucléaire (French Nuclear Safety Authority)</td>
</tr>
<tr>
<td>CEA</td>
<td>Commissariat à l’énergie atomique et aux énergies alternatives (the French Atomic Energy and Alternative Energy Commission)</td>
</tr>
<tr>
<td>CIC</td>
<td>Cellule Interministérielle de Crise (Interministerial Crisis Unit)</td>
</tr>
<tr>
<td>CLI</td>
<td>Commission Locale d’Information (Local Information Committee)</td>
</tr>
<tr>
<td>CNPE</td>
<td>Centres Nucléaires de Production d’Electricité (Nuclear power plants)</td>
</tr>
<tr>
<td>DAC</td>
<td>Décret d’Autorisation de Construction (Construction authorisation decree)</td>
</tr>
<tr>
<td>ECS</td>
<td>Evaluations Complémentaires de Sûreté (Additional safety assessments)</td>
</tr>
<tr>
<td>EDF</td>
<td>Electricité de France</td>
</tr>
<tr>
<td>ENSREG</td>
<td>European Nuclear Safety Regulators Group</td>
</tr>
<tr>
<td>EPR/EPR2</td>
<td>European Pressurised Reactor</td>
</tr>
<tr>
<td>ESPN</td>
<td>Equipement Sous Pression Nucléaire (Equipment under nuclear pressure)</td>
</tr>
<tr>
<td>FARN</td>
<td>Force d’Action Rapide Nucléaire (Rapid Nuclear Action Force)</td>
</tr>
<tr>
<td>FOH</td>
<td>Facteurs Organisationnels et Humains (Organisational and human factors)</td>
</tr>
<tr>
<td>GIAG</td>
<td>Guide d’Intervention en Accident Grave (Serious accident intervention guide)</td>
</tr>
<tr>
<td>GPE</td>
<td>Groupe Permanent d’Experts (Standing expert groups)</td>
</tr>
<tr>
<td>GPR</td>
<td>Groupe Permanent Réacteur (Standing reactor group)</td>
</tr>
<tr>
<td>HCTISN</td>
<td>Haut Comité pour la Transparence et l’Information sur la Sécurité Nucléaire (High Committee for Nuclear Transparency and Information on Nuclear Safety)</td>
</tr>
<tr>
<td>ICPE</td>
<td>Installations Classées pour la Protection de l’Environnement (Classified Installations for the Protection of the Environment)</td>
</tr>
<tr>
<td>ILL</td>
<td>Institut Laue – Langevin</td>
</tr>
<tr>
<td>BNI</td>
<td>Basic nuclear installations</td>
</tr>
<tr>
<td>INES (scale)</td>
<td>International Nuclear and radiological Event Scale</td>
</tr>
<tr>
<td>IRSN</td>
<td>Institut de Radioprotection et de Sûreté Nucléaire (French Institute for Radiation Protection and Nuclear Safety)</td>
</tr>
<tr>
<td>ITER</td>
<td>International Thermonuclear Experimental Reactor</td>
</tr>
<tr>
<td>OPECST</td>
<td>European Parliamentary Office for Evaluation of Scientific and Technological Options</td>
</tr>
<tr>
<td>OSART</td>
<td>Operational Safety Review Team</td>
</tr>
<tr>
<td>PPI</td>
<td>Plan Particulier d’Intervention (Particular intervention plan)</td>
</tr>
<tr>
<td>PUI</td>
<td>Plan d’Urgence Interne (Internal emergency plan)</td>
</tr>
<tr>
<td>PWR</td>
<td>Réacteur à Eau sous Pression (Pressurised Water Reactor)</td>
</tr>
<tr>
<td>REX</td>
<td>Feedback</td>
</tr>
</tbody>
</table>
### ANNEXES

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGE</td>
<td>Règle Générale d’Exploitation (General operating rules)</td>
</tr>
<tr>
<td>RJH</td>
<td>Jules — Horowitz Reactors</td>
</tr>
<tr>
<td>WANO</td>
<td>World Association of Nuclear Operators</td>
</tr>
<tr>
<td>WENRA</td>
<td>Western European Nuclear Regulators Association</td>
</tr>
</tbody>
</table>