

Final Shutdown, Decommissioning and Delicensing of Basic Nuclear Installations in France

GUIDE N° 6

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Preamble

The ASN collection of guides is intended for professionals concerned by the nuclear safety and radiation protection regulations (licensees, users or transporters of ionising radiation sources, health professionals). These guides can also be issued to the various stakeholders, such as the local information committees (CLIs).

Each guide sets out recommendations with the aim of:

- explaining the regulations and the rights and obligations of the persons concerned by the regulations;*
- explaining the regulatory objectives and, as applicable, describing the practices considered by ASN to be satisfactory.*
- giving practical tips and information concerning nuclear safety and radiation protection:*



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1 INTRODUCTION

1.1 Context and regulatory references

- [1] Environmental Code, specifically title II of book I and titles IV and IX of book V
- [2] Decree 2007-830 of 11th Mai 2007 amended relative to the nomenclature of the basic nuclear installations
- [3] Order of 7th February 2012 amended, setting the general rules concerning basic nuclear installations
- [4] ASN Resolution 2008-DC-0106 of 11th July 2008 relative to the implementation of internal authorisation systems in basic nuclear installations;
- [5] ASN Resolution 2010-DC-0179 of 13th April 2010 defining an audition process of licensees of basic nuclear installations and the Local Information Committees before the issue of some resolutions or opinions
- [6] ASN Resolution 2013-DC-0360 of 16th July 2013 relative to control of detrimental effects and the impact of basic nuclear installations on health and the environment
- [7] ASN Resolution 2014-DC-0420 of 13th February 2014 relative to basic nuclear installations technical modifications
- [8] ASN Resolution 2015-DC-0508 of 21st April 2015 relative to the study of waste management and the inventory of waste produced in the BNIs
- [9] ASN Resolution 2015-DC-0532 of 17th November 2015 relative to the BNIs safety cases
- [10] ASN Resolution relative to the periodic safety assessment of BNIs carried out in accordance with articles L.593-18 and L.593-19 of the Environmental Code (this resolution is still in a draft form when the current guide has been issued- cf. draft version of 29th March 2013)
- [11] ASN Resolution 2017-DC-0587 of 23th March 2017 relative to the packaging of radioactive waste and the conditions of acceptance of the radioactive waste packages in the disposal BNIs
- [12] ASN policy about the decommissioning and delicensing of basic nuclear installations in France – April 2009
- [13] Basic principles of the ASN doctrine of 4th October 2012 on the management of sites contaminated by radioactive substances
- [14] ASN Guide N°9: Determining the perimeter of a BNI – version of 31th October 2013
- [15] ASN Guide N°14 : Post-Operational Clean-Out of structures in BNIs in France – version of 30th August 2016
- [16] ASN Guide N°23: Drafting and modification of the waste zoning plan for basic nuclear installations – version of 30th August 2016
- [17] ASN Guide N°24: Management of soils, contaminated by the activities of a basic nuclear installation – version of 30th August 2016

1.2 Scope of application

This ASN guide applies to every licensee of a basic nuclear installation (BNI) with the exception of radioactive waste disposal facilities (§10 still applies). Consequently the term “basic nuclear installations” when used in this guide, does not include radioactive waste disposal facilities.

The guide provides guidance for the development of the decommissioning and delicensing arrangements established by the Environmental Code [1] and the order of February 7, 2012 [3]. This guide is informed by the ASN’s general policy statement [12] regarding the decommissioning and delicensing of basic nuclear installations in France.

1.3 Purpose of the guide



At the end of their operating cycle, BNIs are shut down and subject to operations to prepare for and execute the decommissioning process, with the end objective being delicensing and the reuse of the site for a different activity.

The term decommissioning generally covers all the activities carried out after shutting down an installation in order to achieve a predefined end state including: post-operational clean-out of the process equipment; dismantling of equipment; cleaning of work areas; clean-up or rehabilitation of the grounds; dismantling of civil engineering structures if necessary; and conditioning, removal, and disposal of the resulting waste (whether radioactive or not). All these operations are carried out in compliance with article L.593-1 of the environmental code that requires the protection of people, property, and the environment against any harmful effects. Upon completion of the decommissioning process, subject to certain conditions, a BNI can be delicensed.

1.4 Statute of the guide

This guide replaces the previous version which was issued on July 16, 2015. It includes the modifications to the environmental code resulting from the August 17, 2015 act¹, the February 10, 2016 order² and the June 28, 2016 decree.³

This new version takes into account these new legal arrangements and also the experience gained from the review of previously submitted shut down and decommissioning requests from licensees. This guide has been subject to a consultation with all stakeholders and the public during the first half of 2016.

1.5 Definitions

The following definitions aim to clarify the ones already adopted by the general commission of terminology and neology of the nuclear engineering.

- Decommissioning
Decommissioning includes every technical operation implemented to achieve a predefined end-state, enabling the delicensing of the related nuclear facility. The decommissioning stage follows the operational stage and ends when the delicensing process is completed.
- Clean-up
Clean-up operations are those which reduce or eliminate radioactivity or any other hazardous substance that remain either in the structures or the soils.
- Delicensing
Delicensing is an administrative operation that aims to withdraw permanently the facility from the list of BNIs, in which case the facility is no longer regulated under the nuclear regulatory framework and all related legal duties end as a result. This can happen only after the completion of the decommissioning works and the demonstration by the licensee that the end state has been achieved.

¹ Act n°2015-992 of 17th August 2015 relative to the Energy Transition for Green Growth.

² Order n°2016-128 of 10th February 2016 relative to miscellaneous arrangements about nuclear aspects.

³ Decree n°2016-846 of 28th June 2016 relative to the modification, final shut down and decommissioning of the basic nuclear installations and also subcontracting



2 THE IMMEDIATE DISMANTLING STRATEGY

The article L.593-25 of the Environment Code [1] establishes that the immediate dismantling strategy must be implemented by the basic nuclear installations licensees: “*When the operations of a basic nuclear installation are fully or partly shut-down, the nuclear licensee carries out its decommissioning as soon as possible, in acceptable economic conditions and in compliance with the principles mentioned in the article L.1333-1 of the public health code and in II of article L.110-1 of the current code.*” This strategy prevents the technical and financial burdens of decommissioning from being left for future generations. It also allows the licensee to benefit from the invaluable knowledge and skill of the current operational teams (cf. [12]).

The adopted strategy in France aims to ensure that:

- The licensee anticipates decommissioning by preparing for it from the design stage;
- The licensee updates the decommissioning plan for the facility and submits their decommissioning request before final shut-down, or at the time of final shut-down.
- Decommissioning operations are carried out as soon as possible, the timeline of the operations ranging from several years to several decades according to plant complexity.

3 THE DECOMMISSIONING PLAN

Every licensee of a basic nuclear installation (BNI) has to develop a decommissioning plan. This plan is created at the licensing stage in accordance with article R. 593-16 of the Environmental Code [1]. If a facility was licensed before this legal requirement went into effect, the decommissioning plan shall be created at the time of a significant plant modification, a periodic safety review, or if required by ASN in compliance with article 8.3.1 of the order [3].

The decommissioning plan is updated in compliance with the article 8.3.1 of the order [3]:

- when the installation is commissioned,
- when the creation authorisation is modified in any way,
- if necessary, for any plant modifications subject to the conditions of articles R.593-55, R. 593-56, R.593-57, and R. 593-58 of the Environmental Code [1];
- for each periodic safety review, when the related safety case is submitted (the periodic safety review is still required for non-operational nuclear facilities).

When the operational stage ends, the decommissioning plan is of the utmost importance. For this reason, and consistent with article R. 593-66 of the Environmental Code [1], it must be updated when the licensee declares its intent to shut down the plant, as required by article L.593-26 of the Environmental Code [1]. The decommissioning plan is thus a legal piece of the decommissioning application provided by the licensee to support their request.

In order to detail the regulatory expectations regarding the content of the decommissioning plan, ASN has defined a list of themes to be addressed in the plan (see Appendix 1).

In general the decommissioning plan:

- explains the methods envisaged for decommissioning the facility and, if applicable, the methods for the remediation and monitoring of the site;
- details and justifies the decommissioning strategy chosen by the licensee (cf. §2) and describes the expected duration between the final shutdown of the facility and the end of its decommissioning. This duration covers the time between final shutdown and the start of the decommissioning operations as well as the duration of the operations themselves;
- defines and justifies the state of the plant, both at the moment of final shutdown and when decommissioning operations begin (initial state). It also defines and justifies the expected end-

state of the site once decommissioning of the plant is completed (final end state as defined in article 8.3.2 of the order [3]);

- describes the measures taken by the licensee to preserve the history of the facility, including relevant information pertaining to its subsequent decommissioning (i.e. radioactive and hazardous substances used, radiological maps, events, etc.). These measures ensure that the accessibility of this information is also described.
- takes into account the specificities of the plant even if some areas can be shared by several BNIs under the control of the same licensee.

4 THE END-OF-LIFE PHASES OF BASIC NUCLEAR INSTALLATIONS

As soon as a basic nuclear installation (BNI) is definitively shut down, it has to be decommissioned and the authorisation must be changed to reflect the new condition of the facility (the creation authorisation specifies the facility is in the operational stage). Furthermore, the decommissioning operations result in a change in the risks of the plant, which are not covered by the initial safety basis that underpins the creation authorisation. Consequently, these operations cannot be carried out under the initial creation authorisation decree. **In accordance with the provisions of article L.593-25 of the Environmental Code [1], decommissioning of a BNI is governed by a new decree issued after having consulted ASN.**

It is important to distinguish these two stages in the lifecycle of an INB (see *fig. 1*):

- the operational phase governed by the creation authorisation decree (DAC);
- final shutdown and the decommissioning phase governed by the decommissioning authorisation decree, which modifies the DAC.

The decommissioning case, as required by the article L.593-27 of the Environmental Code [1], shall cover all equipment, structures and facilities presents within the boundary of the BNI (except for the specific case of a partial dismantling of an installation cf. §9.4.3). The future of the equipment, structure and facilities remaining in operations is defined consistent with the methods as described in § 9.4.

The decommissioning decree does not nullify the creation authorisation decree (DAC) but modifies⁴⁵ it by:

- abrogating the requirements related to the operations that are not relevant any more;
- specifying the decommissioning operations and the primary elements of them, with regard to the protection of the legal interests mentioned at the article L.593-1 of the Environmental Code [1].

⁴ Some legacy plants still operated, created before 1963 and reported in accordance with the article 14 of the decree of 11th December 1963, do not have a creation authorization decree. In this case there is not a DAC to modify.

⁵ Before the implementation of the law of August 17, 2015, the standard practice was as follows: the final shutdown and decommissioning authorisation decree nullified the creation authorisation decree (DAC) with the exception of the article creating the INB and authorised decommissioning operations and the essential elements of operation, with a view to protecting the interests mentioned in Article L. 593-1 of the Environmental Code [1].

Stages of the BNI lifetime⁶

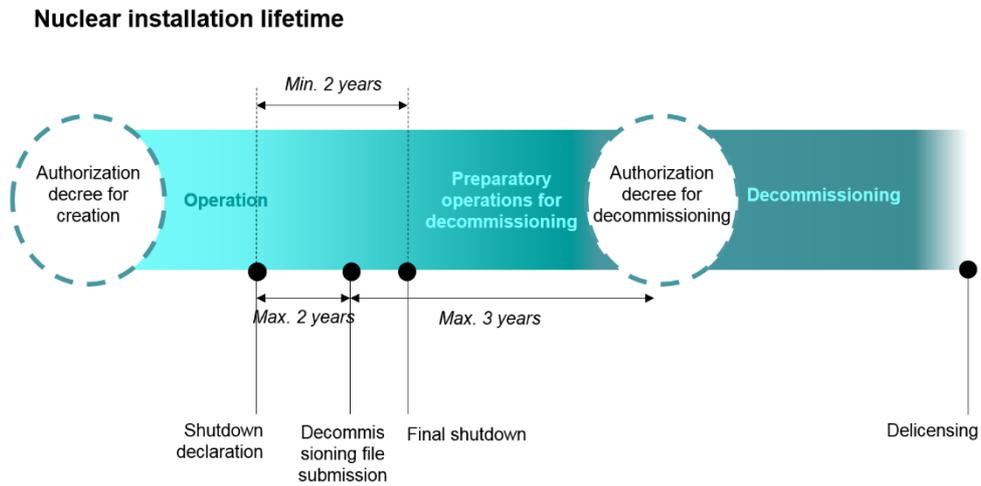


Fig.1.

⁶ The time periods between the submission of the decommissioning file covers the period between the submission of the decommissioning file and the publication of the decree (at most 3 years, except in special cases) as well as the effective entry into force of the decree when ASN approved the revision of the operating rules for the installation (at most 1 year).

5 NOTIFICATION OF FINAL SHUTDOWN

5.1 The final shutdown notification

When the licensee plans to permanently shut down their plant fully or partly, they must report that decision to the minister in charge of nuclear safety and ASN. This notification *“is made at least **two years** before the expected shutdown date or as soon as possible if the shutdown is implemented with a shorter notification window for reasons that the licensee explains.”* consistently with the article L.593-26 of the Environmental Code [1]. Article R. 593-66 of the Environmental Code [1] requires that this notification is accompanied by an update to the decommissioning plan.

This notification is reported by the licensee to the Local Information Committee (CLI) and made accessible to the public electronically.

Should the planned date of the final shutdown change, or should the notification change significantly, the nuclear licensee must update their notification. This update is subject to the same requirements for disclosure and publication. The deadline for the submission of the decommissioning application is still determined from the initial notification date (cf. §6.1).

If the notification is not complete then ASN notifies the licensee what documents and information are missing. This request has no impact on the planned shutdown date in accordance with article L.593-26 of the Environmental Code.

5.2 The final shutdown

Consistent with article L.593-26 of the Environment Code [1], the licensee is not authorized to operate its facility as of shutdown date indicated in its notification.

Final shutdown can also result from an extended outage of the facility (cf. §10).

6 DECREE PRESCRIBING THE IMPLEMENTATION OF THE DECOMMISSIONING OPERATIONS

6.1 Decommissioning Case

Article L.593-27 of the Environment Code [1] requires the licensee to submit the decommissioning case no more than two years from the date of the final shutdown notification. In light of lessons learned from the processing of previous decommissioning applications, ASN recommends that the licensee submit its request at least three years before the planned date for the start of the decommissioning operations. ASN also recommends that the licensee take into account, when necessary, the time required for other required administrative procedures⁷.

The decommissioning application and the accompanying notice are made of the elements mentioned in article R. 593-67 of the Environmental Code [1]. Appendix 2 provides additional guidelines for the content of some of these elements.

Concurrent to the submission of the decommissioning application, ASN recommends that the licensee also send an update of the waste management study as specified by article 2.3.3 of the resolution [8], in particular the article 2.3.3 and the guidance [16] with the aim of optimizing waste zoning and taking into account the upcoming decommissioning operations. As specified by article 3.6.5 of the resolution [8], any areas that have been cleaned on the surface but may still have remaining contamination or radioactivity in the related structures or soils⁸ must be recategorised by the licensee as a “Contaminated Waste Zones (ZDC) with enhanced memory as defined by the guidance [16].

In addition, the licensee must update the local emergency plan if needed and submit it to ASN so that it can be approved before the decommissioning operations start.

These last two administrative pieces are not part of the decommissioning application.

Special case of complex facilities, not including pressurized water reactors (PWRs)

Consistent with article L.593-27 of the Environmental Code [1], the licensee can request, for certain complex installations other than pressurized water reactors, an extension of up to two years of the two-year period between the final shutdown notification and the submission of the decommissioning application. This request must be justified and submitted to the Ministry in charge of nuclear safety one year at the latest before the licensee is required to submit its decommissioning application. Consistent with article R. 593-67 of the Environmental Code [1], “*the Ministry in charge of nuclear safety shall submit to the Nuclear Safety Authority a draft order that either accepts or rejects the extension request. The opinion of the French Nuclear Safety Authority is deemed favourable if it is not released within two months. This period can be reduced, in case of an urgent need, by the Minister in charge of nuclear safety. This extension request is considered rejected when the six months period ends without an answer.*”

ASN considers that the complexity of a facility must be justified by the licensee and that cannot be based solely on the fact that it is a basic nuclear facility. Therefore ASN considers that only some BNIs can be considered complex.

Special case of facilities regulated under the IED directive

⁷ For example, the procedure required by article 37 of the 25th March 1957 Euratom treaty or those required by the Defense Code (article L.1333-8; articles L.1332-22 and following)

⁸ This reclassification may, under certain conditions (in particular the absence of work that could lead to the dispersion of radioactive substances or the production of contaminated or potentially contaminated waste) be carried out later during decommissioning operations. In any case, it must be carried out before the start of the cleaning operations at the latest (cf. §4 of the guidance [15]).

The decommissioning plan provides for the nuclear facilities which are regulated under the 2010/75/UE directive of the 24th November 2010 related to the industrial emissions (said “IED”) the arrangements for remediation of the site to achieve a state at least similar to the one observed in the basis report which is stipulated at the I of the article L.593-32 of the Environment Code [1], when such report exists, and taking into account the technical and economic feasibility of the considered arrangements.

6.2 Assessment of the decommissioning application and its supporting notice

6.2.1 Acknowledgment of receipt of the application

Provided the decommissioning application is fully compliant with the relevant sections of the Environmental Code [1], the Minister in charge of nuclear safety delivers an acknowledgment of receipt to the licensee within two months of receiving the request. This acknowledgment of receipt indicates the start of the assessment period.

6.2.2 Assessment

6.2.2.1 Assessment of the regulatory compliance of the decommissioning case

Once requested by the Ministry in charge of nuclear safety, ASN performs an assessment of the decommissioning application in regards to its completeness and consistency within four months from the date of receiving the application. The objectives of this assessment are to verify that:

- The application is sufficiently developed such that relevant stakeholders can develop a firm understanding of the project and its impact on the legally protected interests stipulated in article L.593-1 of the Environmental Code [1]. In particular, it is verified that the identification and assessment of the key challenges are performed and that studies to address them have been developed. The review also considers whether safety claims are clearly supported by relevant arguments and evidence (see appendix 2);
- The decommissioning application is compliant with relevant regulations in particular the order of February 7, 2012 [3] and ASN’s resolutions;
- The studies undertaken are consistent with the legally protected interested stipulated at the article L.593-1 of the Environmental Code [1] with consideration of all relevant technical, organisational and human factors (implementation of an integrated and proportional approach).

If, during this assessment, gaps or inconsistencies are identified that prevent the continuation of the review, ASN will inform the Minister in charge of nuclear safety to explain the issue. If it appears as if the application is incomplete, the Minister will send any requests for additional information to the licensee and the review period may be paused, if necessary. If not, the technical assessment continues.

6.2.2.2 *Starting the consultations*

Within at most 18 months after having received the decommissioning application, ASN inform the Minister responsible for nuclear safety whether, based on the current state of its assessment, it considered that the application is not expected to change significantly and therefore the required consultations may be started. In the event that, during this period, the risks and disadvantages related to the legally protected interests stipulated at the article L.593-1 of the Environmental Code [1] have changed significantly, then ASN reports it to the Ministry in charge of nuclear safety who, if needed, requests that the licensee complete the application and suspends the assessment timeline.

If no significant modifications have occurred, consistent with article L.122-1 of the Environmental Code [1], the decommissioning case is then submitted to the relevant authority regarding the environment (*le Conseil général de l'environnement et du développement durable; the General Council for Sustainable Development and the Environment*). The council has 3 months from the date of receipt of the file to deliver its opinion in accordance with article R.122-7 II of the same code.

The Ministry in charge of nuclear safety then launches the public inquiry process and local consultations in accordance with articles R. 593-21, R. 593-22, and R. 593-23 of the Environmental Code [1].

6.2.2.3 *End of the assessment*

ASN sends to the Minister in charge of nuclear safety its conclusions from both the technical review and the consultations (e.g. environmental authority, local councils, local public committee, public inquiry). ASN also informs the licensee of their conclusions and, where appropriate, can also prepare a resolution to modify or supplement⁹ the current provisions in compliance with articles 18, 25 and the VI of article 38 of the decree R. 593-38, R. 593-40, and R. 593-69 of the Environmental Code [1].

6.2.2.4 *Extension of the assessment period*

Consistent with article R. 593-69 of the Environmental Code [1], the duration for the assessment of a decommissioning case is 3 years, extendable by two years at the most by the Minister in charge of nuclear safety. The assessment period is halted when a request for supplemental information is made by this Minister.

6.2.3 Development of the decommissioning decree

On the basis of the conclusions of the assessment by ASN, the Minister in charge of nuclear safety develops and submits a draft decree to the licensee, who has two months to submit their observations in accordance with the terms of article R. 593-25 of the Environmental Code [1].

The Minister in charge of nuclear safety then draws up the draft decree.

Consistent with article R. 593-25 of the Environmental Code [1], the Minister then submits it to ASN to get their opinion¹⁰ in accordance with article L.592-25 of the Environmental Code [1].

In accordance with the resolution [5], ASN shall inform the licensee and the relevant CLI of the opportunity for a hearing in front of the ASN commission before it issues its opinion on the draft decommissioning decree.

6.3 **Alignment between the decommissioning application and the periodic safety review**

⁹ ASN may modify previous requirements governing the operation of the installation which would no longer be applicable during dismantling operations.

¹⁰ The opinion is said to be favourable if it is not issued within two months. This period can be reduced, in case of a justified urgency, by the Minister of the nuclear safety when seizing ASN.

The procedures for conducting a periodic safety review (PSR) on facilities being decommissioned are explained in § 8.1.3. The current § deals only with the alignment between the decommissioning application and the PSR when it takes place during or shortly after the final shutdown of the facility.

In practice, when a PSR is planned shortly after the final shutdown, ASN recommends the licensee anticipate the PSR so that the assessment can be performed simultaneously with the decommissioning application. This offers several benefits. On one hand, the compliance assessment which is the first part of the PSR enhances the knowledge of initial state of the facility and site that support the decommissioning scenario; and on the other hand, the safety basis developed as part of the decommissioning case can underpin the safety reassessment, which is required as the second part of the PSR¹¹. In addition, the conclusions of the PSR are likely to inform the decommissioning strategy and the conditions for its implementation and may lead to an adaptation of the safety arrangements.

7 THE DECOMMISSIONING PREPARATION STAGE

7.1 Legal framework

The first operations relating to the final shutdown of a basic nuclear installation can be performed before the decommissioning decree is issued. These are called "*post operational clean out*" operations (POCO). They are carried out within the framework of the creation authorisation decree for a basic nuclear installation (INB) and can be completed once the decommissioning decree is issued.

The type of operations eligible for POCO are described in § 7.2.

However, the completion of these operations is not a prerequisite for the submission of the decommissioning application nor the issue of the decommissioning decree. Consistent with article 3.1.8 of the resolution [9], the licensee must describe in its decommissioning application “the on-going POCO that are or may still be in progress when the decommissioning decree is issued”¹².

In practice, the duration of POCO must be limited and not exceed several years.

The update of the decommissioning plan submitted by the licensee with their final shutdown notification in accordance with article R. 593-66 of the Environmental Code [1] includes a description of the expected POCO, the resulting modifications in terms of organisation, the main equipment required for the decommissioning, the wastes disposal routes, the project baseline and the final state once POCO operations have been achieved. **The licensee has to justify that the POCO operations remain within the safety envelope of the operations permitted by the creation authorisation decree and the related safety basis.** If any of the POCO operations are subject to the modifications procedures discussed in sections 7 and 8 of the Environmental Code [1], the licensee shall specify this in the decommissioning plan and then follow their procedures for the implementation of these POCO operations. Unless adequately justified, no POCO operation planned for implementation before the decommissioning decree is issued should result in a significant modification to the facility or its authorised operating conditions.

¹¹ When it is performed simultaneously with the decommissioning file review, some parts of the PSR case can refer to the safety case which is part of the decommissioning file.

¹² For example, in reactor decommissioning file, the spent fuel retrieval starts during the POCO stage and continues under the decommissioning decree. These operations were described in the decommissioning file.

Finally, in compliance with article R. 593-67 of the Environmental Code [1], the licensee submits in their decommissioning application, a document that describes the state of the facility at the completion of POCO operations and before the start of decommissioning operations.

ASN recommends that the licensee inform the local information committee (CLI) of the POCO operations envisaged as part of the preparatory decommissioning phase and that they keep the CLI updated regularly as to the status of the operations and report the results once operations have been completed.

As a result of the experience gained in terms of safety, waste management and radiation protection, the decommissioning decree sets a deadline for the licensee to submit an assessment of the POCO operations to the Minister in charge of nuclear safety and to ASN, typically six months after the completion of the operations.

7.2 Technical aspects

As stated before, decommissioning operations **cannot be** carried out during the POCO stage. Consequently, **the POCO stage is limited to the following operations provided they are supported by the facility safety case (under the creation authorisation decree):**

- final actions related to the operation of the facility (e.g. *phasing out of experiments in a research laboratory*);
- cleaning of the facility;
- preparation of the decommissioning operations (e.g. *fitting of premises, preparation of worksite, training of personnel, installation of the equipment necessary for decommissioning*);
- characterisation of the installation (e.g. *radiological mappings, notably based on intrusive and/ or destructive samples; collection of data relevant for decommissioning (operating knowledge management)*);
- modification, adaptation or renovation of the infrastructure (i.e. *electricity, fluids, ventilation, etc.*) as soon as they are informed by the expected upcoming dismantling operations ;
- removal of hazardous substances present at the installation (i.e. *radioactive materials¹³, chemical products, fluids, waste, etc.*)¹⁴.

Limited, irreversible dismantling operations of equipment may be carried out during the POCO stage. These operations are authorised on a case-by-case basis in accordance with the articles R.593-55, R.593-57, R.593-58, R.593-59, if applicable, of the Environmental Code [1], taking into account the specificities of the facility. If the removal of these materials requires major, irreversible dismantling of equipment, these operations are to be carried out within the legal framework of the decommissioning decree, even if similar operations have already been carried out during the operation of the facility, in particular regarding maintenance or equipment replacement.

Exceptionally, small pilot projects, may can also be carried out during the POCO stage. The licensee shall justify in the decommissioning plan why they are needed to support decommissioning operations (see § 7.1) and their alignment with the facility safety standards.

7.3 Construction of a new equipment, facilities or infrastructure

During the decommissioning stage, the licensee can commission new equipment, facilities or infrastructure within the BNI, in particular to complete waste treatment and conditioning operations. This is described in §8.1.4.

The construction of new equipment, facilities or infrastructure that will be operated to support decommissioning operations may can be carried out before the decommissioning decree is granted if

¹³ For example, for a pressurized water reactor, these operations may include unloading the core and removing fuel from the INB.

¹⁴ In particular, in accordance with the provisions in article L. 593-26 of the Environmental Code [1], in order to reduce the risks mentioned in article L.593-1 of the same code.

this construction is not expected to result in significant consequences to the legally protected interests stipulated in article L.593-1 of the Environmental Code [1]. These operations are permitted on a case-by-case basis in accordance with the articles R.593-55, R.593-57, R.593-58, R.593-59 ,if applicable, of the Environmental Code [1].

When a permit is required for construction or where works are subject to prior urban planning approval, the construction can start only once the permit has been granted and once the public inquiry regarding the decommissioning application has ended (in compliance with the article L.425-12 of the urban planning code). In all cases, the authorisation granted for construction does not affect the authorisation to operate the equipment or facility, which is subject to the decommissioning decree or a specific authorisation granted by ASN.

8 THE DECOMMISSIONING STAGE

8.1 Regulatory framework

8.1.1 The decommissioning decree

The decommissioning operations carried out under the decommissioning decree are required to achieve the predefined final state and delicense the basic nuclear installation (BNI). The decommissioning decree prescribes the decommissioning operations, defines the stages, and specifies the schedule for completion. It also authorizes, if required, the creation of equipment necessary for decommissioning.

The decommissioning decree implementation

To better manage the transition between the safety cases during the shift from the operational decree into the decommissioning one, the Environmental Code [1] states that the decommissioning decree does not enter into force immediately. Within three months after the issuance of the decree, the licensee shall submit an update of their safety case to ASN on decommissioning operations and also an update of the operating rules. The decommissioning decree takes effect when ASN grants approval of these operating rules or, at the latest, one year from when the decree was issued. ASN recommends that the licensee, to the extent possible, consider sending some chapters of their operating rules before the decommissioning decree is issued.

As soon as the decommissioning decree is implemented, the applicable safety case is that of the decommissioning file (and any updates sent during the review), as well as any updates safety case and the operating rules sent after its publication. However if the decommissioning decree is implemented before the updated operating rules have been approved, the previous version of the rules is enforced and the licensee must not undertake any operations which are not covered by this version.

Decommissioning operations or steps subject to prior notification of or approval by ASN

Depending on the conclusions of the review, the decommissioning decree may specify some stages within the decommissioning timeframe. The licensee must inform ASN prior to the start of any stage specified in the decree. In addition, ASN may require regulatory hold-points for some specific operations or stages.

These hold-points regulate the operations that would present the highest risks or disadvantages for the legally protected interests stipulated in article L.593-1 of the Environmental Code [1]. The content of the required application case is defined in the article R.593-70 of the Environmental Code [1]. The documentation from the licensee that would enable a release of the hold points includes an update of the safety case and the operating rules and, if necessary, an update of the environmental impact



assessment, the local emergency plan and the waste management study¹⁵. The licensee should indicate which part of the documents have been amended. The length of the investigation is set, by article R. 593-28 of the Environmental Code [1], at one year, extendable by an additional year.

8.1.2 Evolutions of the safety case

The safety case must be kept up to date as decommissioning operations are carried out.

During the decommissioning phase, changes to the safety case requirements and operating rules may be required. The importance of these modifications for the protected interests mentioned in article L. 593-1 of the Environmental Code [1] can vary significantly. The majority are authorized by the decommissioning decree. If not, they are subject to the provisions in Sections 7 and 8 of the Environmental Code [1].

8.1.3 The periodic safety review

Pursuant to the provisions of article L.593-18 of the Environmental Code [1], BNIs in the decommissioning stage are still subject to the periodic safety review requirement. These reviews are typically performed every 10 years. A different frequency can be specified in the final shutdown and decommissioning authorisation decree, depending on the particularities of the installation undergoing decommissioning and the envisaged decommissioning time frame.

The methods for carrying out this review are specified in a resolution [10], including specific provisions for facilities undergoing decommissioning.

The purpose of the periodic review of decommissioning facilities is to check that the level of safety of the installation is as high as possible under acceptable economical and technical terms until delicensing, if necessary with the implementation of additional or compensatory measures proportionate to the risks.

The periodic safety review of a decommissioning facility must be performed in light of planned developments and decommissioning operations, taking into account in particular, the evolution of the defined requirements associated with elements important for protection (EIPs) and activities important for protection (AIPs) needed during decommissioning. The examination shall be proportionate to the risks and disadvantages presented by the installation and to the planned dismantling operations, as well as to the duration of use of equipment. Equipment present in the installation but no longer used during the decommissioning phase should not be excluded *a priori*. If necessary, they should be considered as potential aggressors within the facility.

8.1.4 New equipment, systems or installations for decommissioning operations

The construction and use of new equipment, systems or installations must be covered by the decommissioning application. The only exception is that where the construction of such equipment, systems or installations may be authorised before the implementation of the decommissioning decree, as discussed in § 7.3. In this case, the use of the equipment, systems or installations must be covered by the decommissioning application.

Such equipment must meet the safety requirements currently in effect, particularly in terms of taking into account the hazards discussed in article 3.5 and 3.6 of the order [3] during their construction, in a

¹⁵ Article 14, part III of the decree of 28th June 2016 stipulates that “when a decommissioning decree issued before the publication of the present decree makes the carrying out of some decommissioning operations subject to an approval or authorization from the Minister in charge of nuclear safety or ASN before they can start, these approvals or authorizations are delivered in accordance with article 38 1 of the 2th November 2007 Decree”. This clarifies which authority has to enforce this legal requirement and also the content requirements for the file that would be submitted to release the hold-points for the oldest decrees.

manner proportionate to the risks and disadvantages they present and also to their features (source term, expected operating timeframe, etc.). The licensee shall justify in its decommissioning application, the safety requirements associated with this equipment, as well as the modified installation.

The ASN considers that the creation of such installations or equipment may only be authorised within the perimeter of the installation to be decommissioned if they are necessary for the decommissioning of this BNI. The construction of a facility mainly related to the decommissioning of other nuclear installations must be carried out under the procedures for creating a new facility (INB, ICPE, CSP) or within the modification process of the facility that benefits the most from this new facility. In addition, this new equipment, as well as the arrangements for its subsequent decommissioning, must be described as precisely as possible in the decommissioning application. Thus, the construction and decommissioning of these new installations are authorised by the decommissioning decree in accordance with the article R593-70 of the Environmental Code [1]. Prior authorisation from the ASN for their construction or entry into service, but also for their dismantling, may be required.

8.2 Technical aspects

8.2.1 Operations concerned

The decommissioning phase comprises the work that aims at dismantling and removing the equipment and structures of the installation that enabled its operation, including the parts of the installation that fulfilled the functions of radioactivity containment barriers. The resulting radioactive waste is conditioned, characterised and then disposed of through the approved methods that comply with the order [3] and the resolutions [8] and [11]. The licensee shall ensure rigorous tracking of the waste (traceability) through to disposal.

The systems used to control, monitor and maintain the installation in a safe state during the operating phase are gradually put out of service then dismantled once they no longer contribute to maintaining the safety of the installation.

During the decommissioning phase, the nature of the risks presented by the installation and its physical state can evolve very rapidly. To maintain the safety of the installation at all times, the licensee shall ensure that the safety measures implemented are appropriate for the risks presented by the installation. To this point, certain systems (electrical networks, fire detection systems, etc.) sometimes require refurbishing operations.

The decommissioning phase can also involve the following types of operations:

- waste treatment, including the construction of facilities for carrying out this treatment;
- complete post-operational clean-out (POCO) operations and/or destruction of structures;
- clean-up and/or rehabilitation of contaminated soils (*some soils may have been contaminated during the period of operation*).

With the aim of definitively declassifying nuclear waste zones into conventional waste zones, clean-out operations may be performed on the structures constituting the nuclear waste zones that could have been subject to penetrative contamination or activation. The very nature of these operations to remove sections in the structures considered as radioactive waste damages the structures concerned. ASN guides n°14, 23 and 24 [16, 17, 18] indicate the conditions necessary for the delicensing of nuclear waste zones into conventional waste zones.

8.2.2 Activities and elements important for protection



As the decommissioning operations progress and the inventory of dangerous and radioactive substances decreases, the safety requirements are gradually reduced. The result of this is that certain elements important for protection (EIP) as defined in article 1.3 of the act [3] can be gradually phased out, as can the associated periodic examination, maintenance, inspections and tests. The defined requirements for the EIPs and AIPs can also be phased out.

Changes carried out under the conditions described in the decommissioning application shall not be affected by the resolution [7] in accordance with article 3 therein.

8.2.3 Accounting for ageing management

Prior to decommissioning, the licensee shall take into account the ageing of equipment required for safety and shall establish a monitoring and maintenance program for such equipment. These measures are described in the safety basis described in the framework describing decommissioning operations (i.e. the safety case, impact studies, operational rules, etc.) and are reassessed during the periodic safety review. In general, the maintenance program for the facility is implemented, reviewed and modified taking into account all the evolutions of the facility:

9 FINAL STATE OF THE FACILITY, INSTITUTIONAL CONTROLS

9.1 Final state of the facility after decommissioning

The **final state** of a basic nuclear installation (BNI) upon completion of its decommissioning is **detailed** and **justified** in the **decommissioning plan** transmitted to support the final shutdown and decommissioning application. Any **uncertainties** associated with the definition of the final state (i.e. insufficient characterisation, impossibility of cleaning out certain zones for technical reasons, etc.) must be mentioned. The description of the final state comprises:

- the physical state of the installation after decommissioning (*structures intact or destroyed, facilities that continue to be operated – see §8.4*);
- the radiological status (*building, land and soils situated within the perimeter of the installation*);

In accordance with the provisions of article 8.3.2 of the order [3], “*the final state reached at the end of the decommissioning must be such as to prevent the risks or disadvantages that the site may present for the interests mentioned in Article L. 593-1 of the Environmental Code, taking into account the plans for reuse of the site or buildings and the best methods and techniques for remediation and decommissioning available under acceptable economic conditions*”. To this end, the ASN recommends, in accordance with its policy [12] and doctrine [13], that licensees shall apply post-operational clean-out (POCO) operations and decommissioning practices that take into account the best scientific and technical knowledge to date, with the aim of attaining a final state in **which all the hazardous substances, and radioactive substances in particular, have been removed from the BNI**¹⁶. This is the reference approach as defined by the ASN.

In the event that, as a result of the characteristics of the pollution, this approach would be difficult to implement, the licensee must go as far as reasonably possible in the clean-up process. In all cases when the licensee deviates from the reference approach, they must submit the technical or economic justification explaining the need for the deviation.

In accordance with the principles of radiation protection, the dose to workers and members of the public must be as low as reasonably achievable. The ASN recognises that it is not possible to justify an end state by considering a clearance thresholds. In fact a threshold leading to an annual dose of 300 μSv ¹⁷ for workers or members of the public is not an acceptable objective in principle.

The basic nuclear installation (BNI) licensee shall more specifically:

- establish a complete clean-out methodology if the structures of the BNI require it (see Guide [15]);
- define a site remediation strategy based on the guidance in the guide [17] when the land on which the installation is situated is likely to be polluted, regardless of the nature of the pollution.

9.2 Special case of achieving the final state in two stages

ASN considers it as possible, as an exception, to complete the cleaning process in two stages, with an intermediate phase where the facility or certain buildings are in use subject to compliance with the following cumulative conditions:

¹⁶ In some cases, on-site storage of this waste may be considered. This option is being studied within the context of the PNGMDR. In the opinion 2016-AV-0258 of 18 February 2016, ASN published its position: “*Considering that the local storage of certain radioactive waste, particularly where the production of waste will be the most important, would have the advantage of limiting the transport of waste in terms of distance and volume, in accordance with the principles set out in Article L. 541-1 of the Environment Code, ASN considers it necessary for AREVA, CEA and EDF to study before the end of June 2020, in conjunction with Andra, the possibility of creating dedicated local storage facilities adapted to certain types of waste, under conditions of respect for the protection of human health, safety and the environment that are at least equivalent to those of Cires. The environmental impact of these management methods will have to be compared with a scenario of sending waste to Cires.*”

¹⁷ See IAEA guide N. WS-G-5.1., “*Release of sites from regulatory control on termination of practices*”, 2006

- The licensee has an established and feasible short-term industrial project for which they wish to use the buildings being decommissioning for a defined period of time and consequently, the maintenance of the buildings does not allow for either the completion of the cleaning of the structure or the polluted soil underneath the building;
- The facility is not located on a site that is in the process of “denuclearization” (i.e. there are other active BNIs on the site operated by the same licensee);
- The licensee goes as far as reasonably possible in the cleaning of the facility during the first phase, while not affecting the performance of the structures;
- The licensee uses the best available techniques to characterize any contamination under the buildings;
- Any soil contamination (radioactive or chemical) present under the buildings is acceptable with regard to the interest mentioned in article L. 593-1 of the Environmental Code and does not migrate, its movement can be monitored at a defined frequency and the postponement of soil decontamination is not incompatible with the subsequent remediation of the building;
- The 3 stages (initial clean-up, use of the building for a defined period of time, and final clean-up) are described in the decommissioning application and the milestones are prescribed by the decommissioning decree.
- The use of the building during the interim period complies with the principles mentioned in L. 1333-1 of the Public Health Code, in particular in terms of justification and optimisation.

9.3 Delicensing

A licensee wishing to delicense a decommissioned BNI sends a delicensing request to ASN accompanied by an application in accordance with article R. 593- 73 of the Environmental Code [1].

Delicensing is an administrative operation that consists of removing the installation from the list of "basic nuclear installations". The delicensed installation is no longer subject to the legal and administrative requirements for BNIs. Delicensing lifts the regulatory controls applicable to BNIs. Delicensing can only take place after the completion of the decommissioning process, after justification that the targeted final state has been achieved is provided, and if needed, after the implementation of institutional controls. If the licensee has not achieved the targeted final state, they must demonstrate why it was not possible (see Guides [15] and [17]) in accordance with § 9.1, as well as an assessment of the residual impact (see Guides [15] and [17]) and any proposed institutional controls.

The licensee’s demonstration of the achievement of the targeted final state must be robust and based on at a minimum:

- a thorough analysis of the history of the facility,
- as through an analysis of the soil and groundwater contamination as possible, including under existing buildings (i.e. *radiological and chemical analyses, verification of the absence of buried waste, etc.*),
- the justification that the decontamination has been carried out as far as reasonably possible using the “*best available techniques for decontamination and decommissioning under acceptable economic conditions.*”

In accordance with article R. 593- 73 of the Environmental Code [1], ASN will send the prefect the decommissioning request sent by the licensee, with a note explaining the effect of a decommissioning measure. The prefect shall obtain the opinion of the affected municipalities, who then have 3 months to submit their opinions. The prefect sends their opinion to ASN, together with the opinions collected from the municipalities. ASN also submits the decommissioning request along with the explanatory note to the local information committee (CLI), who also have 3 months within which to submit their opinion.

In accordance with article L. 593-33 of the Environmental Code [1], the decommissioning approval takes the form of a resolution by ASN submitted for approval to the Minister charged with nuclear safety.

After delicensing a BNI, any new activity or facility must comply with the regulations in effect (i.e. declaration, registration or authorization of an ICPE (installation classified for environmental protection grounds), public health code, creation of a new BNI) and is subject to any restrictions imposed by institutional controls. **The creation of an ICPE for the sole purpose of maintaining the uncleaned buildings of a former BNI is prohibited.**

In addition, in the event of a threat to the interests mentioned in article L. 593-1 of the Environmental Code and in accordance with article L. 593-20 of the Environmental Code, the ASN may, at any time, even after the facility has been delicensed, prescribe any necessary assessments or provisions.

9.4 Institutional controls

Different types of institutional controls can be applied depending on the final state reached.

In all cases where the licensee can demonstrate that the decommissioned installation and the land on which it is located present no risk to public health and safety or to the protection of nature and the environment, no matter what the site may be used for in the future (i.e. they are free of any radioactive or chemical pollution), the provisions in article L. 593-40 of the Environmental Code [1]¹⁸ make it possible to guarantee the preservation of information regarding the presence of a former BNI on the land concerned (i.e. information for future buyers). Therefore no institutional controls are necessary.

In cases where the **licensee cannot demonstrate the absence of any residual radioactive or chemical pollution that would pose a risk to public health and safety or to the protection of nature and the environment whatever the possible uses are**, institutional controls shall be applied in accordance with articles R. 593- 81 and R. 593-82 of the Environmental Code [1]. In this case, the decommissioning request is one of the documents submitted as part of the public inquiry and the ASN recommends that the consultation mentioned in §9.2 be organised in a coordinated manner.

Institutional controls can be instituted at the request of the licensee or the administration (e.g. ASN, prefecture, municipal council). These can contain a number of restrictions on use (e.g. industrial use only) or precautionary measures (e.g. preservation of records, radiological measures in case of erosion, etc.). The ASN can make the application of such institutional controls a prerequisite for the delicensing of a BNI. These institutional controls also include a clause that guarantees the preservation of the information regarding the presence of a former BNI on the parcels of land concerned. The provisions of article L. 593-40 of the Environmental Code [1] also apply in this case.

9.5 Continued operation of equipment, systems, or installations within a definitively shutdown BNI

In certain cases, the licensee may wish to continue certain activities that were linked to the operation of the BNI undergoing decommissioning, either for limited period of time after the start of decommissioning operations (*“non-durable operations”*), or for a long period of time after

¹⁸ Article L. 593-40 of the Environmental Code
“The sale of land on which a BNI has been operated is subject to Article L. 514-20”

Article L. 514-20 of the Environmental Code
“Where an installation subject to authorization or registration has been operated on land, the seller of the land must inform the buyer in writing; he must also inform him, insofar as he is aware of them, of the significant dangers or risks resulting from the operation. If the seller is the operator of the installation, he shall also inform the buyer in writing whether his activity has involved the handling or storage of chemical or radioactive substances. The deed of sale attests to the completion of this formality.”

decommissioning (“*durable operations*”). As indicated in § 4, the licensee may, in some cases, wish to dismantle part of the installation while continuing to operate the rest.

The considered cases are as follows:

- Case of a long-term piece of equipment, system or installation within a permanently shut down BNI;
- Case of the permanent shutdown of part of the BNI;
- Case of a non-permanent piece of equipment, system or installation within a permanently shut down BNI.

9.5.1 Case of a long-term piece of equipment, system or installation within a permanently shut down BNI

When Installations Classified for the Protection of the Environment (ICPEs) or Installations, Works, or Other Activities (Installations, Ouvrages, Travaux et Activités - IOTAs) are located within the perimeter of the basic nuclear installation (BNI) and the licensee wishes to continue their operation after delicensing of the BNI and their operation is not affected by the BNIs decommissioning operations, these facilities may continue operating without submitting a new authorisation application or declaration to the administration, subject to the provisions of R. 593-73 of the Environmental Code [1]. Under the same conditions, the facilities or activities that were not subject to the ICPE or IOTA system¹⁹ due to their presence within the perimeter of the BNI, but which, because they have been delicensed, enter into this regulatory framework, can also continue to operate without submitting a new authorisation application or declaration. The licensee must define accurately these equipment, system or installation in their decommissioning application.

9.5.2 Case of a long-term piece of equipment, system or installation within a permanently shut down BNI that is required for the operation of another BNI

As indicated in the guide [14], there may be some cases where equipment, systems or installations necessary for the operation of another BNI that are located within the perimeter of a BNI undergoing decommissioning.

To avoid any overlap between decommissioning and operating activities and to avoid situations of partial decommissioning, ASN recommends that these equipment, systems or installations be moved to within the perimeter of another BNI at the latest by the time decommissioning of the original BNI is completed, unless this would involve a change in licensee. In order to do this, the licensee would submit the request to move the equipment, system, or installation to within the perimeter of the BNI in accordance with the procedures in paragraph five of the guide [14] together with the submission of the decommissioning application.

In some cases, the equipment, system, or installation may be kept within the perimeter of the decommissioning BNI if they are necessary for decommissioning and if they also meet one of the following conditions:

- they undergo significant modifications related to the decommissioning process;
- their operation is primarily related to this BNI;
- the risks and disadvantages associated with this part of the decommissioning installation are the most significant.

¹⁹ Equipment or facilities necessary for the operation of the nuclear installation, as defined in article L. 593-3 of the Environmental Code [1].

In these special cases, the equipment, system, or installation may be kept in the decommissioning BNI will be transferred to another BNI at the latest at the time of decommissioning.

9.5.3 Case of the permanent shutdown of part of the BNI

In this case the licensee has definitively stopped the operation of part of the installation and wants to proceed with its decommissioning, in accordance with the objectives referred to in Article L. 593-25 of the Environmental Code to dismantle in "as short a time as possible" while continuing the operation of the rest of the installation. The provisions of Article R. 593-72 of the Environmental Code [1] are applied.

In this case, the final shutdown notification (§5) applies to the part definitively stopped but the licensee specifies "*the part of the installation which it wishes to continue operating and the modifications to account for the shutdown*". The elements transmitted in support of the final shutdown notification and the decommissioning application relate solely to the part of the installation definitively shutdown. The licensee justifies in his decommissioning plan (§5 and §6) this choice of decommissioning part of the BNI. Upon reaching the shutdown date mentioned in the final shutdown notification, the operation of the part of the installation that the licensee wants decommissioned is no longer authorized to operate.

Case where the two parts of the installation are "independent"

This case is where the two parts of the installation are:

- administratively attached because they are within the perimeter of a single BNI but would each be subject to the BNI regulations when viewed independently;
- and independent of each other in the sense that the operation of one is not necessary for the operation of the other.

In order to manage, in an efficient and transparent manner, the operation of one part of the BNI and the decommissioning of the other, it is necessary to split the BNI into two separate BNIs. The ASN must then ensure:

- the licensee's ability to keep the relevant part of the installation operating, particularly if this requires any long-term projects;
- the true independence of the two installations.

The conclusions of the last periodic safety review are a part of the verification of the first condition above. The procedure in article R. 593-44 of the Environmental Code [1] should be followed. It consists of creating a new installation for the part to be decommissioned, the decommissioning of which is prescribed as soon as it is created, and an amendment to the creation authorisation for the INB whose operation is continued to take into account changes in the scope of the still-operating installation and its activities.

Case where the two parts of the installation are not "independent"

At the end of decommissioning operations, the licensee shall provide the ASN with documented confirmation that all of the prescribed partial decommissioning operations have been carried out. The documentation shall contain the elements described in article R. 593-73 of the Environmental Code [1]. However, "*the part of the facility undergoing decommissioning continues to be within the BNI's perimeter until decommissioning is final*". The decommissioning procedure does not apply after decommissioning of one part of the BNI.

In this case, the licensee must be vigilant with regards to the maintenance of its safety case and keep separate within the safety case and operational rules, the provisions relating to the operational part and the decommissioning part of the BNI.

9.5.4 Case of temporary equipment, system or installation within the perimeter of a definitively shutdown BNI

It is possible, in certain cases, to keep operating certain temporary pieces of equipment, systems, or installations within a BNI undergoing decommissioning when the following cumulative conditions are met:

- The decommissioning of the part of the BNI kept operational during the first stages of decommissioning must be completed by a strict deadline that is defined in the decommissioning application;
- The part of the BNI kept operational must be clearly distinct from the part being decommissioned;
- The safety case must demonstrate the safety of all operations, both decommissioning and operating. In particular, the risks that are present when the two types of operations are occurring simultaneously should be carefully addressed;
- The operational period must be relatively short and consistent with the duration for decommissioning for the other installations;
- The decommissioning strategy adopted by the licensee in regards to the planning and sequencing of the operations to be performed must be justified in the decommissioning plan.

In this case, the decommissioning application must explicitly provide for the decommissioning of these installations.

10 EXTENDED STOPPAGE OF WORK AND FINAL SHUTDOWN

10.1 General provisions

Article L.593-24 of the Environmental Code states that, *“If a basic nuclear installation (BNI) ceases to operate for a continuous period of more than two years, its shutdown shall be deemed definitive. The Minister charged with nuclear safety may, at the request of the licensee, and by reasoned order issued after consulting with the ASN, extend this period by a maximum of three additional years.”*

The procedures for extension are defined in article R. 593-74 of the Environmental Code [1]:

- A “standard” procedure where a request is transmitted by the licensee no later than 18 months after the start of the shutdown. The Minister in charge of nuclear safety shall grant or refuse the extension by reasoned order, issued after consulting with the ASN. The request is considered to be rejected if the Minister fails to respond with 6 months
- An “emergency” procedure where, in the event of hazards at the end of work or during start-up operations, the licensee may request an extension up to 23 months after the start of the shutdown. The Minister in charge of nuclear safety may, by reasoned order and after the ASN has issued its opinion, grant an extension of 6 months. In the absence of a response within one month, the 6 months extension is considered approved.

Once the point at which a shutdown is considered definitive is reached, the ASN shall issue a resolution setting the date of submission of the decommissioning application for the now permanently shutdown facility.

10.2 The ceasing of operations

The ASN defines the ceasing of operations referenced in articles L. 593-24 and L. 593-26 of the Environmental Code [1] as the state of a BNI characterized by:

- the absence of electricity production by a self-sustaining nuclear chain reaction for a nuclear power reactor,
- the absence of a self-sustaining nuclear chain reaction for a nuclear reactor (with the exception of a power generating reactor),
- the absence of nuclear fuel preparation for facilities that prepare nuclear fuel,
- the cessation of enrichment operations for nuclear fuel enrichment facilities,
- the cessation of nuclear fuel manufacturing operations for nuclear fuel manufacturing facilities,
- the cessation of nuclear fuel treatment operations for nuclear fuel treatment facilities,
- the cessation of the receipt and storage operations of new radioactive waste for radioactive waste storage facilities,
- the stopping of the beam for ion or electron accelerators.

For radioactive material storage facilities, the ceasing of operations is characterized by:

- the absence of radioactive materials being stored,
- or by the permanent cessation of the receipt of radioactive materials, a level of safety insufficient to continue the permanent storage of radioactive materials and the initiation of the removal of stored materials.

These definitions do not address the case of facilities that fall under the framework of a BNI because of the quantity of radioactive or fissile materials present, as opposed to the activities performed at the site. For these facilities, the shutdown is characterized by the ceasing of all operations at the facility.

APPENDIX 1: Typical contents of the decommissioning plan

The decommissioning plan required by article R. 593-16 of the Environmental Code [1] (creation of a basic nuclear installation), shall include at least the chapters A, B, C.1 to C.3, D.1 and D.2 (envisaged final state) of the table of contents below.

In accordance with the procedures, the decommissioning plan is regularly updated during operation. The decommissioning plan required by article R. 593-66 of the Environmental Code [1] shall include all the chapters of the table of contents below.

A- Presentation and justification of the chosen decommissioning strategy

B- General information on decommissioning

1. Methodological principles relative to decommissioning, site rehabilitation and its subsequent monitoring.
2. Measures taken at the installation design stage to facilitate its decommissioning.
3. Measures taken by the licensee to guarantee the conservation of the history of the installation and access to the associated data.
4. Measures taken by the licensee to guarantee the maintaining of competences and knowledge of the installation (knowledge management)
5. Estimates of the quantities and methods for managing the waste resulting from decommissioning, taking into account existing or planned management solutions developed under the National Radioactive Materials and Waste Management Plan.
6. Studies to be carried out, along with any possible future research and development.
7. Characterizations to be carried out to consolidate the hypothesis taken into account in the demonstration mentioned in article L. 593-7 of the Environmental Code [1].
8. Potential impact on the fuel cycle, if any.

C- Breakdown of the decommissioning process

1. Description and justification of the initial state at the beginning of the decommissioning operations, as well as the preparatory operations to be undertaken.
2. Defining of the decommissioning steps.
3. Planned schedule, duration of operations.
4. Description of the planned work to be carried out.
5. Identification of the equipment that will be necessary for the decommissioning operations.
6. Identification of the safety and radiation protection objectives.
7. Refining forecasted waste quantities, taking account of their management and also the management of effluent, state of conventional safety risks
8. List the main AIP and EIP that are required for decommissioning
9. Description of the chosen clean-out methodologies (for ground, structures, etc.).
10. The organization for managing decommissioning operations (e.g. staff, contractors, sub-contractors, etc.)
11. Justification of the technical choices from the aspect of nuclear safety, radiation protection, waste management, effluent discharges and conventional risks.

D-Final state envisaged

1. Presentation and justification of the chosen final state²⁰
2. Projections for the future use of the site.
3. Uncertainties associated with the description of the final state.
4. Evaluation of the impact of the installation and the site after achieving the targeted final state, envisaged monitoring methods.

²⁰ For nuclear installations subject to the provisions of Directive 2010/75/EU of 24 November 2010 on industrial emissions known as “IED,” the plan requires the return of the site to a state similar to that observed in the report mentioned in article L. 593-32 of the Environmental Code [1], where such a report exists, taking into account the technical and economic feasibility of the measures envisaged.

APPENDIX 2: Contents of certain documents in the decommissioning authorisation application file

This appendix describes the regulatory content of certain documents in the decommissioning application and specifies the expectations of the ASN.

Preliminary Safety Case

This is one of the documents constituting the safety case requirements for the installation. It describes and demonstrates the safety provisions adopted for the installation during the decommissioning phase. Its content is defined by the ASN resolution [9]. The safety case covers all the different decommissioning phases. It also describes the measures taken for the transition from one phase to the next, based in particular on physical and radiological situation assessments at the end of each phase.

Impact study

The impact study carried out in accordance with the provisions of articles L. 122-1 and R. 593-17 of the Environmental Code [1]:

- an analysis of the state of the site and its environment prior to decommissioning;
- an analysis of the direct and indirect effects of the installation, whether temporary or permanent, on the environment and public health;
- a presentation of the planned water intakes and liquid effluent discharges;
- a presentation of the planned effluent discharges into the atmosphere;
- the desired limit discharge values (liquids and gases), their radiological and chemical characteristics and the justification for these values;
- the evaluation of public exposure to ionising radiation, taking into account the irradiation caused directly by the installation and the transfers of radionuclides;
- the waste that will be produced during installation decommissioning, whether radioactive or not, indicating the volume, nature, toxicity and the envisaged methods of removal.

The licensee identifies the decommissioning steps that could lead to a change in the water intakes and effluent discharges that would require a modification of the ASN requirements governing discharge limit values and environmental monitoring procedures.

Notice

In this document the licensee demonstrates that it has the technical and organisational means to successfully decommission a basic nuclear installation. This notice complies with articles 2.1.1 and 2.1.2 of the order [3].

In addition to the elements that it must submit relating to its capacity to operate a basic nuclear installation, the operator shall demonstrate that it has the financial means to carry out the decommissioning of a basic nuclear installation and to ensure the management of the waste produced by the decommissioning operations. In particular, it shall submit an assessment of the costs mentioned in Article L. 594-1 of the Environment Code [1].

The document demonstrating compliance of the proposed operations with the legislative and regulatory requirements relating to health and safety of personnel and radiation protection shall include, at a minimum, the following:

- a summary of the regulations in force relating to health, safety and radiation protection,
- the general policy implemented by the operator in these areas,
- the specific provisions taken for the application of the principles and rules defined in these areas.

With regard specifically to radiation protection, the following are described:

- the general principles: responsibilities, organisation of the department(s) in charge of radiation protection, optimisation approach, dosimetric monitoring, intervention conditions in the area, etc.

- the arrangements made for the supervision of workers,
- training,
- organisation in the event of an incident or accident (detection and management of events).

The waste study

The waste study update required by the article 2.3.3 of the ASN resolution [8] describes the methods of management of the waste produced during the decommissioning phase, and the chosen disposal routes. This revised waste study is based on the ASN resolution [8] and the guidance [16] ASN. In order to take into account the particularities of the management of waste from an installation undergoing decommissioning, the licensee shall present:

- an optimised evaluation of the quantities and the physical, chemical and radiological characteristics of the waste and effluent resulting from the decommissioning operations;
- the resulting families of waste and the associated management routes;
- the on- or off-site needs for specific treatment or pre-treatment and storage or disposal facilities for the waste produced by the decommissioning work;
- the packages for conditioning the waste produced and the transport packages necessary for waste removal.

If the quantities or characteristics of the waste produced by the operations cannot be accurately determined at the time the file is submitted, the licensee can update the waste study as soon as possible in accordance to the ASN resolution [8] and the guidance [16].



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