

# Decrees, Orders, Circulars

## GENERAL TEXTS

### MINISTRY FOR THE ENVIRONMENT, ENERGY AND THE SEA, IN CHARGE OF INTERNATIONAL CLIMATE RELATIONS

#### Order of 23<sup>rd</sup> February 2017 implementing decree 2017-231 of 23<sup>rd</sup> February 2017 implementing article L. 542-1-2 of the Environment Code and establishing the prescriptions of the National Plan for Radioactive Materials and Waste Management

NOR: DEVR1635310A

**Persons concerned:** managers, producers or holders of radioactive waste, nuclear safety regulators.

**Subject:** National Plan for Radioactive Materials and Waste Management.

**Entry into force:** the text will enter into force the day following its publication.

**Notice:** the order specifies the studies and reports which must be submitted pursuant to the National Plan for Radioactive Materials and Waste Management.

**References:** this order can be consulted on the Légifrance website (<http://www.legifrance.gouv.fr>).

The Ministry of the Environment, Energy and the Sea, in charge of international climate relations,

Having regard to the Environment Code, more particularly chapter II of title IV of book V;

Having regard to Programme Act 2006-739 of 28<sup>th</sup> June 2006 relative to the sustainable management of radioactive materials and waste, in particular its articles 3 and 4;

Having regard to the Energy Transition for Green Growth Act 2015-992 of 17<sup>th</sup> August 2015;

Having regard to decree 2000-361 of 26<sup>th</sup> April 2000 concerning the tax and additional taxes applicable to basic nuclear installations pursuant to article 43 of the 2000 Budget Act;

Having regard to decree 2007-243 of 23<sup>rd</sup> February 2007 concerning the secure financing of nuclear costs;

Having regard to decree 2007-1557 of 2<sup>nd</sup> November 2007 amended, relative to basic nuclear installations and to the regulation of the transport of radioactive substances, in terms of nuclear safety;

Having regard to decree 2017-231 of 23<sup>rd</sup> February 2017 implementing article L. 542-1-2 of the Environment Code and establishing the prescriptions of the National Plan for Radioactive Materials and Waste Management;

Having regard to the order of 9<sup>th</sup> October 2008 concerning the nature of the information that those responsible for nuclear activities as well as the companies mentioned in Article L. 1333-10 of the Public Health Code are required to produce, update and periodically transmit to the French National Agency for the Management of Radioactive Waste.

Having regard to the order of 7<sup>th</sup> February 2012 setting the general rules concerning basic nuclear installations; Having regard to the order of 1<sup>st</sup> October 2014 setting the values for the multiplying

coefficients mentioned in 3 of article 58 of the 29<sup>th</sup> December 2013 amendment Budget Act 2013-1279 for 2013;

Having regard to the National Plan for Radioactive Materials and Waste Management (PNGMDR) published pursuant to article L.542-1-2 of the Environment Code;

Having regard to the 28<sup>th</sup> July 2015 report from the working group on the reutilisation of very low level materials;

Having regard to the report from the “LLW-LL” working group at the High Committee for transparency and information on nuclear security of 7<sup>th</sup> October 2011; Having regard to the opinion of the environmental authority concerning the National Plan for the Management of Radioactive Materials and Waste (2016-2018) of 20<sup>th</sup> July 2016;

Having regard to the ASN opinion dated 13<sup>th</sup> December 2016,

Orders as follows:

## TITLE I

### GENERAL PROVISIONS

**Art. 1.** – Before 31<sup>st</sup> December 2017, IRSN will send the Ministers responsible for nuclear safety and energy a report on the methodology and possible criteria for assessing the harmfulness of radioactive materials and wastes. This report includes considerations on the evolution of the characteristics of radioactive materials and wastes over the short, medium and long-term, their ecotoxicity and the impact associated with the management modes envisaged in the National Plan for the Management of Radioactive Materials and Waste.

**Art. 2.** – As of the 2018 edition, the national inventory stipulated in article L. 542-12 (1<sup>o</sup>) of the Environment Code:

- i. includes benchmark industrial scenarios compatible with the objectives of the above-mentioned Act of 17<sup>th</sup> August 2015;
- ii. presents a potential future scenario with discontinuation of nuclear generation of electricity, in which the materials not reutilised are reclassified as waste;
- iii. studies a variant of the scenario involving renewal of the NPP fleet, but in which the future fleet would not comprise any fast neutron reactors.

## TITLE II

### RADIOACTIVE MATERIALS

#### CHAPTER I

#### Depleted uranium

**Art. 3.** – In order to prevent saturation of its depleted uranium storage facilities by 2022, Areva will submit an authorisation application with the administrative authority for the creation of a new facility or an application to extend depleted uranium storage capacity before 31<sup>st</sup> December 2017.

Areva informs the Minister responsible for energy and ASN of the submission of this application.

**Art. 4.** – In accordance with the provisions of article D.542-81 of the Environment Code and jointly with the owners of depleted uranium, ANDRA will submit a depleted uranium disposal feasibility study to the Minister responsible for energy before 31<sup>st</sup> December 2019, based on a detailed radiological and chemical inventory of these substances transmitted by their owners. The study will specify the cost of this disposal and the potential impact of these quantities of radioactive

substances on the planned disposal routes. The depleted uranium owners contribute to the oversight and financing of this study.

ASN is asked for its opinion on this study.

## CHAPTER II Reprocessed Uranium

**Art. 5.** – In order to prevent saturation of its reprocessed uranium storage facilities by 2021, Areva will submit an authorisation application with the competent administrative authority for the creation of a new facility or the extension of reprocessed uranium storage capacity, before 31<sup>st</sup> December 2017.

**Art. 6.** – Before 31<sup>st</sup> December 2017, EDF will send the Minister responsible for energy a document presenting its strategy for the medium-term reduction in the stocks of reprocessed uranium held and then for capping the quantity of these stocks. The key steps and corresponding deadlines for monitoring this strategy are identified in this study.

ASN is asked for its opinion on this study.

**Art. 7.** – In accordance with the provisions of article D.542-81 of the Environment Code and jointly with the owners of reprocessed uranium, ANDRA will submit a reprocessed uranium disposal feasibility study to the Minister responsible for energy before 31<sup>st</sup> December 2019, based on a detailed radiological and chemical inventory of these substances transmitted by their owners. The study will specify the cost of this disposal and the potential impact of these quantities of radioactive substances on the planned disposal routes. The reprocessed uranium owners contribute to the oversight and financing of this study.

ASN is asked for its opinion on this study.

## CHAPTER III Plutonium and spent fuels

**Art. 8.** – Before 31<sup>st</sup> December 2017, Areva, EDF, CEA and ANDRA will send the Minister responsible for energy detailed data on the cost of managing the spent fuels and radioactive waste they produce. This more specifically includes the cost of transport, storage, characterisation, possible reprocessing, or disposal. For spent fuels from naval propulsion systems, only metal spent fuels are concerned by this request.

**Art. 9.** – Together with EDF, CEA and ANDRA, Areva is carrying out a comparative analysis of the environmental impacts of a spent fuels reprocessing strategy, as compared with a strategy with no reprocessing, giving consideration to the entire fuel cycle, from uranium mining up to the disposal of the secondary waste.

Areva will be submitting the results of this analysis to the Minister responsible for energy before 30<sup>th</sup> June 2018.

ASN is asked for its opinion on this study.

**Art. 10.** – Given the foreseeable saturation of spent fuel storage capacity (spent UOx, URE, MOx) between 2025 and 2035, EDF will, by 31<sup>st</sup> March 2017, send the Minister responsible for energy its strategy for managing storage capacity for spent fuels from PWR reactors (spent UOx, URE et MOx) and the corresponding calendar for the creation of new storage capacity.

Before 30<sup>th</sup> June 2017, EDF will also send ASN the technical and safety options for the creation of new storage capacity.

ASN is asked for its opinion on these points.

Before 31<sup>st</sup> December 2020, EDF will send the Minister responsible for nuclear safety a creation authorisation application for a new spent fuels storage facility, or a substantial modification application in the event of the extension of an existing facility.

**Art. 11.** – Jointly with EDF and Areva, CEA is drawing up a study programme which could be carried out in the prototype mentioned in point 1 of article 3 of the above-mentioned Act of 28<sup>th</sup> June 2006 in order to provide a representative scale demonstration of the proposed technological capacity for:

- multi-recycling of the plutonium contained in the spent fuels using depleted uranium, in particular the stocks of spent MOx fuels from water reactors;
- stabilising or reducing the plutonium inventories through increased consumption of this substance;
- transmuting the americium.

In this programme, CEA presents the radioactive waste produced by these technologies and the fuel cycle facilities which would be needed to run these demonstrations.

The programme will be submitted to the Minister responsible for energy before 31<sup>st</sup> December 2018.

ASN is contacted for its opinion on this programme.

**Art. 12.** – Before 31<sup>st</sup> December 2017, EDF will send the Minister responsible for energy a report on the technical and economic feasibility of large-scale reprocessing of spent MOx and URE fuels, with reutilisation of the separated substances (uranium and plutonium) in the fuel cycle facilities as well as in thermal neutron reactors.

Together with CEA, this report specifies the quantities of plutonium needed for the deployment of a fleet of generation IV fast neutron reactors and, as necessary, specifies the maximum quantities of spent URE, MOx and UOx fuels not used in the current fleet which could be mobilised for this purpose.

ASN is asked for its opinion on this report.

**Art. 13.** – Before 31<sup>st</sup> December 2017, CEA will send the Minister responsible for energy a report presenting the types of all the experimental reactor spent fuels held, the developments needed to enable them to be reutilised and the properties of interest in the separated materials with a view to reutilisation.

Before 31<sup>st</sup> December 2017, EDF will send the Minister responsible for energy a report presenting the types of the EL4 reactor spent fuels from the Monts d'Arrée NPP, the developments needed to enable them to be reutilised and the properties of interest in the separated materials with a view to reutilisation.

ASN and ASND are asked for their opinion on this report.

**Art. 14.** – With regard to the interim studies to be performed on the feasibility of disposal of substances in the CIGEO reserve inventory, ANDRA will by 30<sup>th</sup> June 2018 send the Minister responsible for energy a study on the feasibility of direct disposal of spent fuels from experimental reactors and metal spent fuels from naval nuclear propulsion, on the basis of a radiological and chemical inventory of these substances transmitted by their owners before 30<sup>th</sup> June 2017. Data on spent fuels from naval propulsion are handled in compliance with the provisions of articles R. 2311-1 and following of the Defence Code.

ASN and ASND are asked for their opinion on this study.

**Art. 15.** – Before 30<sup>th</sup> June 2018, ANDRA will send the Minister responsible for energy a cost evaluation for the direct disposal of spent fuels from the operation of NPP reactors, experimental reactors and metal spent fuels from naval nuclear propulsion.

This evaluation shall be submitted to ASN and ASND for their opinion and to those in possession of these spent fuels for their comments.

**Art. 16.** – Before 31<sup>st</sup> December 2018, jointly with ANDRA and Areva, CEA will send the Minister responsible for energy a comparison of the cost of a reprocessing programme for spent fuels from experimental reactors and metal spent fuels from naval nuclear propulsion, with the cost of direct disposal.

ASN and ASND are asked for their opinion on this report.

**Art. 17.** – Before 31<sup>st</sup> December 2017, CEA will send the Minister responsible for energy additional demonstrations of the effectively reutilisable nature of all physical-chemical and isotopic forms of the plutonium in its possession, with the exception of the plutonium assigned to the means necessary for implementing the deterrence policy mentioned in article L. 1331-1 of the Defence Code. It will specify the developments required to enable it to be reutilised.

ASN and ASND are asked for their opinion on these data.

#### CHAPTER IV **Thorium-bearing materials**

**Art. 18.** – Before 31<sup>st</sup> December 2017, Areva and Solvay will send the Minister responsible for energy a report comprising:

- i. the inventories of thorium-bearing materials in their possession, their description - more specifically including a radiological and chemical inventory, their location and their storage conditions;
- ii. the possible reprocessing or packaging prior to any disposal, if these materials were in the future to be reclassified as waste;
- iii. the foreseeable management routes, in this same case.

Before 31<sup>st</sup> December 2019 and in accordance with the provisions of article D.542-81 of the Environment Code, ANDRA will send the Minister responsible for energy a thorium hydroxide and thorium nitrate disposal feasibility study, in the event of them in the future being reclassified as waste, based on a detailed radiological and chemical inventory of these substances transmitted by

their owners. The study will specify the cost of this disposal and the potential impact of these quantities of radioactive substances on the planned disposal routes. The thorium hydroxide and thorium nitrate owners contribute to the oversight and financing of this study.

ASN is asked for its opinion on these studies.

TITLE III  
**LONG-TERM MANAGEMENT OF RADIOACTIVE WASTE**  
CHAPTER I  
**Radioactive waste legacy disposal sites**

**Art. 19.** – The investigations carried out by Areva, CEA and EDF on areas in which legacy disposal sites have been confirmed or are suspected must be completed before 31st December 2017. On this date, they will submit data to the Ministers responsible for nuclear safety and energy explaining the management modes envisaged for each legacy disposal site.

ASN and ASND are asked for their opinion on these data.

CHAPTER II  
**Very low level radioactive waste (VLLW)**

**Art. 20.** – Before 30<sup>th</sup> June 2018, Areva, CEA and EDF will send the Minister responsible for energy a study presenting the following:

- i. on the basis of experience feedback from decommissioning worksites, the methodology and the uncertainties associated with the forecast VLL waste production estimates;
- ii. decommissioning case studies for each licensee, evaluating the volumes of VLL waste produced according to several post-operational clean-out scenarios. The level of uncertainty associated with these case studies will be evaluated.

ASN and ASND are asked for their opinion on this study.

**Art. 21.** – Before 31<sup>st</sup> December 2020, Areva, CEA and EDF will send ASN the lessons learned from implementation of waste zoning in their facilities, in order to identify best practices in terms of design, construction and operation, such as to optimise waste zoning in the facilities and make it easier to declassify the areas of possible nuclear waste production during decommissioning.

**Art. 22.** - Before 31<sup>st</sup> March 2017, ANDRA shall send the Minister responsible for energy and the Prefect of the Aube *département* a conclusive study of the use of very low level rubble as infill material for the voids in the CIREs vaults.

ASN is asked for its opinion on this study.

**Art. 23.** – Before 31<sup>st</sup> December 2018, ANDRA will deploy a solution for reutilisation of very low level rubble as infill material for the voids in the CIREs vaults, subject to application of the procedures applicable to classified installations, the conclusions of the study mentioned in article 22 and the feasibility of its implementation in economically acceptable conditions, with the economic analysis having to include uncertainties regarding the future cost of the repository.

**Art. 24.** – On the basis of the recommendations in the above-mentioned report from the working group on the reutilisation of VLL materials, Areva and EDF will, before 30<sup>th</sup> June 2018, send the Minister responsible for energy a file comprising:

- i. a presentation of the technical and safety options (preliminary design stage) for a processing facility for the large homogeneous batches of VLL metal materials, along with its commissioning schedule;
- ii. a description of the associated management routes, which must as a priority be sought in the nuclear industry.

ASN and ASND are asked for their opinion on this file.

**Art. 25.** – Together with Socodei and the producers of VLL radioactive waste, ANDRA will for each type of incinerable VLL waste submit a study before 31<sup>st</sup> December 2017, comparing incineration and then disposal of residues with direct disposal, in terms of individual health, the environment and security. This analysis will more particularly take account of the radioactive and chemical discharges resulting from the incineration process.

ASN is asked for its opinion on this study.

**Art. 26.** – Before 30<sup>th</sup> June 2020, Areva, CEA and EDF, together with ANDRA, shall send the Minister responsible for energy a study on the feasibility of creating disposal facilities on or close to their respective sites, suitable for certain types of VLL wastes, the characteristics of which mean that their disposal in dedicated facilities other than CIRES could be envisaged, in compliance with the requirements concerning the protection of individual health, security and the environment, in acceptable technico-economic conditions. The environmental impact of these management methods is to be the subject of a comparative analysis between this option and the scenario involving transportation to CIRES.

The performance of this study will rely on an iterative approach comprising, on the one hand, the forecasts by the nuclear licensees of the volumes, specific activity and physico-chemical properties of the types of VLL waste concerned and, on the other, on ANDRA's definition of the characteristics of the appropriate disposal concepts.

ASN and ASND are asked for their opinion on this study.

**Art. 27.** – Before 30<sup>th</sup> June 2018, with a view to densification of the waste emplaced in the CIRES, ANDRA together with the VLL waste producers and SOCODEI, will therefore send the Minister responsible for energy a study analysing several options, with regard to protection of the interests mentioned in Article L. 511-1 of the Environment Code: densification on the producer sites, improvements to existing equipment or commissioning of new equipment in CIRES.

ASN and ASND are asked for their opinion on this study.

**Art. 28.** – Before 30<sup>th</sup> June 2018, the producers of VLL metal waste and SOCODEI, together with ANDRA, shall submit a technico-economic feasibility study on the melting of VLL metal waste for densification. This study shall include the environmental impacts.

ASN is asked for its opinion on this study.

**Art. 29.** – ANDRA shall specify the conditions for increasing the volume and radiological capacity of CIRES for the same ground footprint and shall confirm that this is possible. If this is confirmed,

ANDRA shall submit an application to the Prefect of the Aube *département* for an increase in the authorised capacity of CIREs at least 6 years before the anticipated saturation of this facility.

ANDRA informs the Minister responsible for energy and ASN of the submission of this application.

**Art. 30.** – Before 31<sup>st</sup> December 2020, ANDRA shall examine the updating of the VLL repository acceptance criteria for certain waste containing thorium-bearing substances, in accordance with the repository's safety objectives. At that time, ANDRA will submit a review of this examination to the Minister responsible for energy and to ASN.

**Art. 31.** – Before the end of 2020, ANDRA and the waste producers will send the Minister responsible for energy an updated overall industrial scheme for the management of very low level waste, as specified in article D. 542-85 of the Environment Code. This update includes a proposal for a multi-criteria analysis chart able to demonstrate the pertinence of the choices made for the management of VLL waste, more particularly with regard to the environment.

ASN and ASND are asked for their opinion on this scheme.

**Art. 32.** – Before 31<sup>st</sup> December 2018, Areva, CEA and EDF will send the Minister responsible for energy a study for the assessment and mitigation of the environmental impacts of the transport of VLL waste to the CIREs repository, if necessary after processing.

ASN is asked for its opinion on this study.

### CHAPTER III

#### **Low and intermediate level, short-lived waste (LL/ILW-SL)**

**Art. 33.** – Before 31<sup>st</sup> December 2018, Areva, CEA and EDF, together with Socodei when necessary, will send the Minister responsible for energy the preliminary design technical and safety options for a lead processing facility.

ASN is asked for its opinion on this study.

**Art. 34.** – Before 31<sup>st</sup> December 2017, Areva, CEA, EDF and SOCODEI will send the Minister responsible for energy a study on transport procedures for LLW/ILW-SL waste, if necessary after processing, such as to reduce the environmental impacts.

ASN is asked for its opinion on this study.

### CHAPTER IV

#### **Low-level, long-lived waste (LLW-LL)**

**Art. 35.** – Before 30<sup>th</sup> June 2018, Andra will send ASN an interim report which, together with the design studies, will define the safety requirements applicable to the repository. A copy of this document is sent to the ASND. ASN will communicate its opinion on this document to the Ministers responsible for energy and nuclear safety.

**Art. 36.** – Before 30<sup>th</sup> June 2019, ANDRA will send the Minister responsible for energy the technical and safety options corresponding to a preliminary stage of a near-surface disposal facility for low level, long-lived waste.

ASN is asked for its opinion on this study.

**Art. 37.** – Before 31<sup>st</sup> December 2021, ANDRA will send ASN a safety options file corresponding to a preliminary design stage for a near-surface disposal facility for low level, long-lived waste. By 31<sup>st</sup> March 2017, ANDRA will propose a prudent target commissioning date for the repository.

**Art. 38.** – Before 31<sup>st</sup> December 2017, EDF and CEA will send the Minister responsible for energy an interim report on the studies into the processing-decontamination possibilities for graphite wastes. ASN and ASND are asked for their opinion on this interim report.

According to the results of this interim report and provided that processing of graphite waste is necessary for it to be accepted in the repository, EDF and CEA will send the Minister responsible for energy a file presenting the technical and safety options corresponding to the preliminary design stage for a graphite waste processing facility, by 31<sup>st</sup> December 2019.

ASN, ASND and ANDRA are asked for their opinion on this file.

**Art. 39.** – CEA and EDF will be continuing their studies in order to make sure that the radiological inventory of the graphite waste is reliable:

i. in order to consolidate the inventory reverse evaluation method, EDF and CEA must use additional measurement campaigns to confirm the conservative nature of the total <sup>36</sup>Cl inventory currently presented. EDF is completing its measurements and will send the Minister responsible for energy a study presenting its results and conclusions before 30<sup>th</sup> June 2019. EDF will in particular specify the <sup>36</sup>Cl radiological content of all of its graphite wastes. CEA will complete its measurements before 31<sup>st</sup> December 2021 and, before 30<sup>th</sup> June 2019, will send the Minister responsible for energy a study presenting its interim results and conclusions.

ASN, ASND and ANDRA are asked for their opinion on these studies;

ii. ANDRA, CEA and EDF are making progress in their understanding of the behaviour of the <sup>14</sup>C contained in the graphite waste placed in disposal conditions, more specifically its release kinetics and, more particularly for the organic fraction, its speciation, retention and the nature of the corresponding complexing organic molecules in the expected surrounding media. The first results of these studies should be available in good enough time to be incorporated by ANDRA into the drafting of the report mentioned in article 36.

**Art. 40.** – Before 31<sup>st</sup> December 2019 and jointly with the waste producers, ANDRA will send the Minister responsible for energy the overall industrial scheme for management of all low level, long-lived radioactive waste specified in article D. 542-87 of the Environment Code and including the following aspects:

- i. an inventory more specifically including the graphite waste, bitumens, radium-bearing waste and the fraction of the waste produced as of 1<sup>st</sup> January 2019 by the Areva NC plant in Malvési, requiring management in a LLW-LL route;
- ii. continued investigations on the Soulaines site for siting of a disposal facility. The inventory of waste liable to be disposed of on this site is clarified and substantiated;
- iii. the search for a second near-surface disposal site, as a priority on or near to existing BNIs and SBNIs;
- iv. interim inclusion of certain LLW-LL waste in the reference inventory (CBF- C'2 waste) or the reserves (graphite waste [sleeves], LLW-LL bituminous encapsulated waste [not processed] and GCR waste from la Hague) of the CIGEO inventory.

ASN and ASND are asked for their opinion on this system.

**Art. 41.** – Before 30<sup>th</sup> June 2018, Andra will send the Minister responsible for energy a presentation of the methodology used to search for a second LLW-LL disposal facility in accordance with the HCTISN recommendations of 7<sup>th</sup> October 2011, giving priority to a search on or near to existing BNI and SBNI sites, along with the corresponding inventory.

**Art. 42.** – In order to produce the industrial management system for LLW-LL waste mentioned in article 40, the producers and owners of LLW-LL wastes define and send the following to the Ministers responsible for energy and nuclear safety, before 31<sup>st</sup> December 2017:

- i. the existing storage capacity, specifying availability;
- ii. the saturation or end of operation forecasts for this capacity and the need for new capacity over the coming thirty years, taking account of the decommissioning operations on shut down BNIs carried out in accordance with the provisions of article L. 593-25 of the Environment Code and on the shut down SBNIs;
- iii. the time needed to commission new storage capacity.

ASN and ASND are asked for their opinion on these data.

**Art. 43.** – Before 31<sup>st</sup> December 2019, EDF will send the Minister responsible for energy the preliminary design level technical and safety options for a graphite waste storage facility concerning the waste stored in the Saint-Laurent-des-Eaux silos and, as necessary, the waste produced by decommissioning of the reactor which will be the first gas-cooled reactor to be decommissioned, if the production calendar for these wastes is not compatible with the calendar for commissioning of and reception of waste in the first LLW-LL repository.

ASN is asked for its opinion on these points.

## CHAPTER V

### **High level and intermediate level, long-lived radioactive waste (HLW/ILW-LL)**

**Art. 44.** – Before 31<sup>st</sup> December 2017, EDF, Areva and CEA will carry out an analysis of the acceptability in CIGEO of the packages of radioactive waste which were packaged by this date, in the light of the preliminary version of the preliminary acceptance specifications for CIGEO transmitted by ANDRA:

- i. with regard to the families of radioactive waste packages currently being produced or those for which production is planned within the next 10 years, this analysis will be able to identify any incompatibilities between the expected characteristics of the packages to be produced and these specifications. If such cases are identified, the producers of HLW and ILW-LL waste concerned shall update their packaging strategy;
- ii. with regard to the families of radioactive waste packages for which production is completed as at the date of publication of this order, this analysis will be able to identify any incompatibilities between the characteristics of the packages produced and these specifications and the additional data to be acquired to improve the understanding of the packages in the light of the requirements contained in these specifications. If any incompatibilities are identified:
  - a technical dialogue is initiated between ANDRA and the corresponding waste producers, to define the appropriate methods for dealing with these deviations;
  - in the light of this analysis, the producers of HLW and ILW-LL waste and ANDRA present the study programme to be implemented.

As necessary, the time-lines for the delivery of waste packages to the planned deep geological repository are updated.

Before 31<sup>st</sup> December 2017, the results of this approach are transmitted to the Minister responsible for energy who submits them to ASN and ASND for their opinion.

**Art. 45.** - CEA is continuing its studies on the characterisation and packaging of the ILW-LL waste produced before 2015. On the basis of the hierarchy of studies to be carried out, CEA provides the Minister responsible for energy with a calendar for the performance of the envisaged R&D programme, before 30<sup>th</sup> June 2017.

ASN and ASND are asked for their opinion on this calendar.

**Art. 46.** – CEA, together with ANDRA and the owners of bituminised wastes, is continuing to study the behaviour of bituminised waste packages (reactivity and ageing in particular) in order to acquire the scientific and technical data needed to assess their physico-chemical and thermal behaviour during the repository's reversible phase and beyond. If it so considers necessary, ahead of the studies, ANDRA will provide CEA with information about the behaviour of the bituminised packages it wishes to obtain for preparation of the CIGEO safety case.

By 30<sup>th</sup> June 2017, CEA will submit a report describing all the available results to the Ministers responsible for energy, nuclear safety and defence.

By 30<sup>th</sup> June 2018, ANDRA will send the Ministers responsible for energy, nuclear safety and defence a report assessing the impact of these results on the conditions for acceptance of bituminised waste packages in CIGEO.

ASN and ASND are asked for their opinion on these reports.

**Art. 47.** – By 30<sup>th</sup> June 2018, CEA and Areva will send the Minister responsible for energy and nuclear safety and the Minister for defence the CEA part of a study report on the means of transport for bituminised waste packages.

ASN and ASND are asked for their opinion on this report.

**Art. 48.** – Further to the opinion of ASND and ASN on the CEA report submitted in 2015 concerning the thermal processing option for bitumen encapsulated waste, CEA is continuing R&D studies on methods of processing and packaging bitumen encapsulated waste (LLW-LL and ILW-LL) in particular combining chemical and thermal processes.

By 30<sup>th</sup> June 2018, CEA will send a progress report on these works to the Ministers responsible for energy, nuclear safety and defence.

By 31<sup>st</sup> December 2019, CEA, Areva, EDF and ANDRA will send the Ministers responsible for energy, nuclear safety and defence a technical, economic and safety assessment report comparing the various modes of processing and packaging envisaged for the bituminised waste (geological disposal and alternative solutions). This study includes all the steps in waste management as well as the impact of the various choices on the design and sizing of CIGEO: transport, safety during storage and in the operating phase, environmental impacts, long-term radiological impacts.

ASN and ASND are asked for their opinion on these reports.

**Art. 49.** – Together with CEA and ANDRA, Areva is continuing with work to develop the incineration/vitrification process, called PIVIC, aiming to package ILW-LL organic waste rich in

alpha emitters, for commissioning in about 2030. Before 31<sup>st</sup> December 2018, Areva will provide the Minister responsible for energy with an interim report on this work.

ASN is asked for its opinion on this report.

**Art. 50.** – Before 31<sup>st</sup> December 2017, CEA will send the Minister responsible for energy its system for the retrieval of structural waste such as magnesium cladding from spent gas-cooled reactor fuels and powder waste from the processing of spent gas-cooled reactor fuels stored in Marcoule, along with the development plan for the corresponding packaging units, plus a schedule demonstrating compliance with the time-frame defined in Article L. 542-1-3 of the Environment Code.

ASN and ASND are asked for their opinion on this system.

**Art. 51.** – Before 30<sup>th</sup> June 2018, CEA will send the Minister responsible for energy a forecast inventory from 2016 to 2100 of the radioactive materials and wastes present in the spent fuels which would be produced by the French NPPs in the various scenarios, more specifically following on from those studied with EDF and Areva in the PNGMDR 2013-2015.

In this study and together with ANDRA, CEA will also present an estimate of the total footprint of these radioactive substances in a deep geological repository.

ASN is asked for its opinion on this study.

**Art. 52.** – Before 31<sup>st</sup> December 2017, ANDRA will send the Minister responsible for energy the technical data on the basis of which it ruled out the near-surface storage facilities design option.

ASN is asked for its opinion on these points.

**Art. 53.** – Before 30<sup>th</sup> June 2017, EDF, CEA and Areva will send the Minister responsible for energy the future storage requirements for all families of HLW and ILW-LL waste, covering at least the next twenty years. Within this context, EDF, CEA and Areva are studying the sensitivity of the storage requirement to shifts in the CIGEO project development schedule. This analysis will be able to identify any threshold effects in terms of future storage requirements or extensions to the operating life of existing storage facilities. These sensitivity studies, included in the report submitted to the Minister for energy, are based on the assumptions made by the licensees for the decommissioning of their facilities over the coming twenty years.

ASN is asked for its opinion on these points.

**Art. 54.** – As part of their work on the logistics system specified in article D. 542-93 of the Environment Code, EDF, CEA and Areva will send the Minister responsible for energy a study on the modes of transport for HLW and ILW-LL packages from their storage facilities to CIGEO, by 31<sup>st</sup> December 2017. This study comprises:

- i. a detailed schedule of the design studies, approval studies and manufacture of the transport packagings necessary for the packages intended for CIGEO, on the basis of experience feedback from the development of packagings in the past;
- ii. an optimised system of modes of transport to CIGEO, including a description of the means of transshipment compatible with the multimodal transports selected or envisaged, as well as a description of the modifications to the transport infrastructures necessary for implementation of the system.

ASN and ASND are asked for their opinion on this study.

**Art. 55.** – For the CIGEO creation authorisation application, ANDRA explains the quantity and nature of the packages necessary so that the pilot industrial phase mentioned in article L. 542-10-1 of the Environment Code can, on the one hand, consolidate the safety case and, on the other, demonstrate the ability of the facility to gradually ramp up to an industrial rate of disposal.

ANDRA and the radioactive waste producers take account of this pilot industrial phase when drawing up the delivery time-lines for the packages intended for deep geological disposal.

**Art. 56.** – Before 31<sup>st</sup> March 2017, ANDRA will send the Minister responsible for energy a proposal of the types and quantities of waste to be included in the CIGEO reserve inventory.

**Art. 57.** – Together with the producers, ANDRA may include certain waste belonging to the CIGEO reserve inventory in the inventory intended for the CIGEO creation authorisation application and in the corresponding safety case, without the transfer of this waste to CIGEO being considered as the reference solution.

## CHAPTER VI

### **Radioactive waste requiring specific work**

**Art. 58.** – *Mercury waste.*

1. On the basis of the data supplied by Areva, CEA and EDF concerning the properties of the waste packages that could be produced using a metal mercury stabilisation process, Andra will by 31<sup>st</sup> December 2017 complete its study on the acceptability from the standpoint of individual health, security and the environment, of the metal mercury stabilised by sulphur in the existing repositories and, as necessary, will update the acceptance specifications of its installations to clarify the corresponding procedures. The Minister responsible for energy and ASN are kept informed of this approach.

2. As of their declaration in the national inventory on 31<sup>st</sup> December 2016, Areva, CEA and EDF differentiate between waste containing metal mercury that can be treated using the above-mentioned process and the other mercury waste. The waste which can be treated will no longer be declared as having no disposal route provided that the updated acceptance specifications for the existing repositories enter into force.

**Art. 59.** - *Organic oils and liquids*

1. Before 31<sup>st</sup> December 2017, Areva and CEA, together with ANDRA or SOCODEI if necessary, will provide the Minister for energy with a progress briefing on the development and implementation of the processes envisaged for treatment of organic oils and liquids. They must in particular:

- i. continue studies on treatment by mixing with polymers and verify their acceptance in Centraco and ANDRA's disposal facilities. The management route selected shall in particular be substantiated in the light of the risks for security, public health and the protection of nature and the environment;
- ii. identify the inventory of waste which could be treated in the various processes developed by CEA and Areva and justify the management route chosen.

ASN is asked for its opinion on these points.

2. Before 31<sup>st</sup> December 2017, EDF and ANDRA will study the acceptability in the routes set up by Areva and CEA of the liquid oils and organic waste in their possession. They will submit the conclusions of their studies to the Minister responsible for energy, who will ask ASN for its opinion.

**Art. 60.** - *Activated waste from small producers outside the nuclear power sector*

1. Before 31<sup>st</sup> December 2017, ANDRA will send the Minister responsible for energy a statement of progress concerning the acceptance of activated waste from the small producers.

ASN is asked for its opinion on these points.

2. As an interim measure, the activated waste from the small producers outside the nuclear power sector is identified and declared in the category of waste without disposal route in the national inventory of radioactive materials and wastes specified in article L. 542-12.

**Art. 61.** - *Tritiated waste.*

1. Before 31<sup>st</sup> December 2017, CEA and SOCODEI, jointly with Andra, will send the Minister responsible for energy a comparison of different tritiated waste management solutions, comprising storage, incineration and direct disposal, with regard to the protection of individual health, security and the environment.

ASN and ASND are asked for their opinion on this study.

2. Before 31<sup>st</sup> December 2020, Andra will study the possibility of its facilities accepting tritiated waste from defaulting responsible parties, for storage or disposal. By that time it shall submit its conclusions to the Minister responsible for energy.

ASN is asked for its opinion.

3. Andra is continuing with the work to consolidate the inventory of tritiated waste (solid, liquid, gaseous) from small producers from outside the nuclear power industry and that held by the national defence forces.

4. ANDRA is continuing research on appropriate management routes for gaseous and liquid tritiated waste from small producers outside the nuclear power sector and, before 31<sup>st</sup> December 2019, will submit a progress report on its work to the Minister responsible for energy. Areva, CEA and SOCODEI are participants in this approach in order to determine the possibilities for processing this type of waste in their facilities in acceptable technical and economic conditions and the possibility of acceptance for storage. A goal is to pool facilities for processing of waste from small producers outside the nuclear power sector.

ASN and ASND are asked for their opinion on this study.

5. The definition of a final management route for all liquid and gaseous tritiated waste from the small producers outside the nuclear power sector will be established by 2025.

6. The liquid and gaseous tritiated waste from the small producers outside the nuclear power sector is declared in the category of waste without disposal route in the national inventory of radioactive materials and wastes specified in article L. 542-12.

7. The storage facilities intended for the tritiated waste produced by the ITER facility make provision for the storage of solid tritiated waste from the small producers. Before 31<sup>st</sup> December 2017, ANDRA will send the Minister responsible for energy the strategy envisaged for the management of solid tritiated waste from the small producers, pending the commissioning of storage facilities planned for ITER.

ASN is asked for its opinion on this strategy.

8. The storage in secret BNIs of tritiated waste not from activities linked to the deterrent policy mentioned in article L. 1333-1 of the Defence Code is only possible in limited quantities and if the need can be clearly justified. This storage is possible provided that the characteristics of the tritiated

waste are compatible with the safety baseline requirements of the secret BNI and that this storage does not compromise the main purpose of this facility.

**Art. 62. – Used sealed sources.**

1. While ensuring protection of individual health, security and the environment, ANDRA is examining the benefits and the possibility of reassessing the 1 Bq criterion for its VLL waste disposal facility, opting for definition of a source activity limit (LAS) per radionuclide, rather than a fixed value, in the same way as is planned for the Aube repository.

2. While ensuring protection of individual health, security and the environment, ANDRA is examining the possibility of making the following changes to the Aube repository acceptance specifications:

- i. reassessment of the specific activity criterion (LAM) of the waste packages;
- ii. taking account of size for large sources, when determining the LAS;
- iii. acceptance of multi-radionuclide sources;
- iv. acceptance of certain neutron sources;
- v. acceptance of sources containing tritium;
- vi. studying the feasibility of the repositories accepting specific sealed sources comprising no physical barrier as ordinary radioactive waste, so that their physico-chemical nature can be taken into account, and considering them more to be unsealed objects without the same implications in the event of intrusion some time in the distant future;
- vii. defining procedures so that, as and when necessary, mixtures of sources and other wastes could be accepted in the current disposal routes, while retaining the traceability of the sources.

3. Before 31<sup>st</sup> December 2017, ANDRA will send the Minister responsible for energy a status report on the deployment of management routes for used sealed sources considered to be waste and will continue to examine source disposal needs with the holders concerned.

ASN is asked for its opinion on this study.

**Art. 63. – Waste from the Areva site in Malvési.**

1. The very low level radioactive waste produced as of 1<sup>st</sup> January 2019 by the Areva NC plant in Malvési is identified and declared in the VLL waste category of the national inventory of radioactive materials and wastes specified in article L. 542-12 of the Environment Code and taken into account in the forecast inventories of this category of waste, more specifically with regard to the studies mentioned in chapter 3 of this order.

2. The LLW-LL waste produced as of 1<sup>st</sup> January 2019 by the Areva NC plant in Malvési is identified and declared in the LLW-LL waste category of the national inventory of radioactive materials and wastes specified in article L. 542-12 of the Environment Code and taken into account in the forecast inventories of this category of waste, more specifically with regard to the studies mentioned in chapter 4 of this order.

3. Before 30 June 2017, Areva will draft a management strategy for the desiccated sludges currently produced by the Malvési plant and which will not be stored in BNI 175 called Ecrin. If desiccated sludges are produced after 2019, they are included in the LLW-LL waste category of the national inventory of radioactive materials and wastes specified in article L. 542 (12<sup>a</sup>) of the Environment Code.

CHAPTER VII  
**Mining waste rock and uranium ore processing residues**

**Art. 64.** – AREVA will consequently be extending the approach already underway on some of the treatment plants to all the treatment plants for the waters from former uranium mining sites, in order to define and justify the strategy adopted for the changes made to the processing of the water collected on the former mining sites under its responsibility.

An interim review will be submitted to the Minister responsible for mines by 31<sup>st</sup> December 2017.

ASN is asked for its opinion on this interim review. The complete report on this approach is required for the time-frame of the 2019-2021 PNGMDR.

**Art. 65.** – Areva will be supplementing the study on the connection between the discharges from the Bois Noirs-Limouzat site and the build-up of contaminated sediments in Saint-Clément lake with the results of microbiological characterisations and those of analyses of the interstitial waters in the sediments in Saint Clément lake. A study will be sent to the Minister responsible for mines before 31<sup>st</sup> March 2017.

ASN is asked for its opinion on this study.

Areva will then supplement this study with:

- modelling of transfers from the mining sites to the sediment build-up areas downstream, on the basis of the characterisation results acquired in the La Besbre catchment basin;
- modelling of the transfer of fixed radionuclides to the sediment carrier phases for various sediment management scenarios applied to the sediments of the La Besbre catchment basin.

An interim report will be submitted to the Minister responsible for mines by 31<sup>st</sup> December 2018.

ASN is asked for its opinion on this interim report.

**Art. 66.** – Areva will continue the process to survey waste rock piles, more specifically through the environmental reports required by the circular of 22<sup>nd</sup> July 2009, specifying:

- i. those with the most significant uranium contents;
- ii. the levels of exposure with which they could be associated in the various conceivable scenarios;
- iii. the utilisation or rehabilitation situations identified on these sites.

Areva is sending this information to IRSN so that it is made available to the public in the MIMAUSA database. These actions shall be finalised before 31<sup>st</sup> December 2017.

**Art. 67.** –

1. Areva is continuing the process initiated to study mining waste rock from the former uranium mines in France, in particular with regard to the long-term evolution of the mining waste rock piles and, for the sites identified in its study, will develop geochemical models to predict uranium migration from the waste rock piles to the environment, taking account of the possible usage change scenarios as well as the foreseeable long-term disturbances (loss of waste rock pile integrity, changes in usage, climatic event, etc.). Areva shall demonstrate that its conclusion of low uranium mobility is consistent with the environmental markers observed on the sites.

This study will be sent to the Minister responsible for mines before 30<sup>th</sup> June 2018. ASN is asked for its opinion on this study.

2. Areva is verifying and, as applicable, completing its study to ensure that its model is representative of all types of waste rock piles (sedimentary context, hydrogeological condition, etc.). This study will be sent to the Minister responsible for mines before 31<sup>st</sup> December 2019. ASN is asked for its opinion on this study.

**Art. 68. –**

1. Areva is continuing with and completing the modelling work on the long-term transfer of uranium and radium in the case of the residues disposal sites selected in its study. Areva is more specifically taking samples of residues at depths representative of the hydrogeochemical conditions within the disposal sites, characterising the corresponding interstitial waters and demonstrating the consistency between the uranium and radium mobility conceptual models used, the characteristics of the interstitial water thus obtained and the observed environmental markers.

Before 31<sup>st</sup> December 2017, this study will be sent to the Minister responsible for mines, who will ask ASN for its opinion.

2. Areva is verifying and, as applicable, completing its study to ensure that its model is representative of all types of uranium mining residue disposal sites. This study will be sent to the Minister responsible for mines before 31<sup>st</sup> December 2019. ASN is asked for its opinion on this study.

**Art. 69. –**

1. Areva is continuing to compile the geotechnical files and is applying the methodology defined by the working group on the mechanical stability of the embankments on all or some of its sites. Following this step, Areva will analyse the results of this assessment and will return its conclusions on the robustness of the structures for the envisaged lifetimes and will submit proposals for the monitoring and upkeep of the structures or their reinforcement. These conclusions will be based on the one hand on the results of the study of the long-term strength of these structures and, on the other, on the assessment of the possible consequences of their structural failure. These studies will be sent to the Minister responsible for mines before 31<sup>st</sup> December 2018. ASN is asked for its opinion on these studies.

2. The working group is being consulted by Areva with regard to the implementation of this method on a few cases and will submit its conclusions by 31<sup>st</sup> December 2017.

**Art. 70. –** Areva is making regular progress briefings on the campaign to the Ministers concerned and to ASN and will submit a report on the steps taken during this survey, more particularly specifying:

- i. how the comments received during the consultation with the public and the stakeholders were taken into account;
- ii. a summary of how the various cases in which uranium mining waste rock is present are dealt with;
- iii. the outlets which will or have received uranium mining waste rock;
- iv. the implementation of the action plan defined in the supplementary instruction of 4<sup>th</sup> April 2014.

This report will be sent to the Minister responsible for mines before 31<sup>st</sup> December 2017.

ASN is asked for its opinion on this summary.

Areva will finalise the steps to deal with mining waste rock before 31<sup>st</sup> December 2019.

TITLE IV.  
**FINAL PROVISIONS**

**Art. 71.** - The decree of 7<sup>th</sup> November 2014 implementing decree 2013-14 of 27<sup>th</sup> December 2013 implementing article L. 542-1-2 of the Environment Code and establishing the prescriptions of the National Plan for Radioactive Materials and Waste Management is repealed.

**Art. 72.** - The Director General for Energy and the Climate and the Director General for the Prevention of Risks are responsible, each within their own field, for executing this order, which will be published in the Official Journal of the French Republic.

Done on 23<sup>rd</sup> February 2017.

SÉGOLÈNE ROYAL