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From:	General Secretariat of the Council
To:	Permanent Representatives Committee (Part 2)/Council
Subject:	Report on the implementation of the obligations under the Convention on Nuclear Safety - 8th Review Meeting of the Contracting Parties

Delegations will find attached a pre-copy of the above document*.

* This report is in the process of being formally adopted by the Commission.

ANNEX

EUROPEAN ATOMIC ENERGY COMMUNITY

REPORT

On the implementation of the obligations under the

Convention on Nuclear Safety

8th Review meeting

of the Contracting Parties to the

Convention on Nuclear Safety (CNS)

Vienna, 23 March- 3 April 2020

(presented by the European Commission)

Executive Summary

Nuclear energy is part of the energy mix of half of the European Union (EU) Member States. The Energy Union Strategy stresses that Member States need to apply the highest standards of safety, security, waste management and non-proliferation as well as to diversify nuclear fuel supplies.

Within the framework of Article 40 of the Euratom Treaty, the Commission published the Nuclear Illustrative Programme, the so-called PINC in April 2016[1]. It specifically included investments related to post-Fukushima safety upgrades and those related to the long-term operation of existing nuclear power plants.

Nuclear safety remains of the utmost importance for the European Atomic Energy Community (hereinafter referred to as "Euratom").

This report presents the developments as regards the implementation of the obligations of the Euratom under the Convention on Nuclear Safety as of June 2019[2]. Member States referred to in this report are Member States of the European Union which are concomitantly members of the Euratom.

At the time of the preparation of this report, there are 126 operating nuclear power plants in the EU. Those are located in the following Member States: Belgium, Bulgaria, Czech Republic, Germany, Spain, Finland, France, Hungary, the Netherlands, Romania, Sweden, Slovenia, Slovakia and the United Kingdom. One Member States (Germany) has announced a plan to shut down permanently all its nuclear power plants by the end of 2022. One Member State (Poland) indicated its interest to enter into nuclear energy. In two other Member States, Italy and Lithuania, there are only nuclear power plants in permanent shutdown (not operating).

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1 https://ec.europa.eu/energy/en/news/commission-presents-nuclear-illustrative-programme. The final version of the PINC was published in 2017 after the opinion of the European Economic and Social Committee (EESC).

2 The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].

On 28 November 2018, the European Commission presented its strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050 – A Clean Planet for All[3]. The strategy shows how Europe can lead the way to climate neutrality by investing into realistic technological solutions, empowering citizens, and aligning action in key areas such as industrial policy, finance, or research – while ensuring social fairness for a just transition.

The EC Strategy envisages that, by 2050, more than 80% of electricity will be coming from renewable energy sources, which - together with a nuclear power share of approximately 15% - will be the backbone of a European low carbon power system.

Since the last report, several key actions were undertaken to enhance nuclear safety inside and outside the EU. The present document reports on progress on those initiatives since the last Review Meeting.

The First Topical Peer Review

A key action performed in the field of nuclear safety in the Euratom Community during the reporting period was the organisation of the first Topical Peer Review (TPR), as provided for by Directive 2009/71/Euratom as amended by Directive 2014/87/Euratom. It focused on "Ageing management of nuclear power plants and research reactors". All EU Member States that operate Nuclear Power Plants (NPPs) and/or research reactors equal to 1 MWth or above and three non-EU Member States (Norway, Switzerland, and Ukraine) participated in the TPR[4].

A Peer Review Workshop took place in May 2018 in Luxembourg bringing together 140 experts from EU and non-EU countries. The TPR Report and the accompanying country-specific findings were finalised and published in October of the same year[5].

[3] COM(2018) 773 final.

[5] http://www.ensreg.eu/sites/default/files/attachments/hlg_p2018-37_160_1st_topical_peer_review_report_2.pdf

The main conclusion of the TPR is that Ageing Management Programmes (AMPs) exist in all countries with NPPs, and although there are some differences of approach, no major deficiencies were identified in European regulation and implementation of AMPs at NPPs. However, it highlights differences in national approaches, and lists a high number of "TPR expected level of performance" (19 in total) that should be reached to ensure consistent and acceptable management of ageing throughout Europe. Four common challenges at EU level were also identified and will need to be tackled.

The review found that AMPs for research reactors are not regulated or implemented as systematically and comprehensively as for NPPs. Challenges remain with regard to the means to evaluate the effectiveness of AMPs and some follow-up actions are necessary to review practices and bring them fully in line with the new IAEA safety standards on ageing management. All regulators have agreed to develop a national action plan by September 2019, addressing the findings of the peer review.

The Council of the EU adopted Council Conclusions on this first TPR exercise on 18 March 2019[6]. In line with these Conclusions, ENSREG agreed in its March 2019 meeting to re-examine progress within three years and issue a status report of implementation of the first TPR by December 2021.

The Commission played an active and supportive role in the process of the TPR providing the administrative and logistical arrangements and acted as secretariat of the Board. The Commission also provided opportunities for public participation, information on the process and reports of the outcome of the TPR.

Implementation of the Euratom nuclear safety legislation in the EU

During the past three years, the Commission has monitored the transposition and effective implementation of the legal framework on nuclear safety, responsible and safe management of spent fuel and radioactive waste, and the radiation protection of workers as enshrined by the Euratom.

[6] https://data.consilium.europa.eu/doc/document/ST-7650-2019-INIT/en/pdf

The Euratom legislative framework consists of three key legislative acts, namely Directive 2009/71/Euratom, as amended by Directive 2014/87/Euratom (Nuclear Safety Directive), Directive 2011/70/Euratom on the responsible and safe management of spent fuel and radioactive waste, and Directive 2013/59/Euratom (revised Basic Safety Standards Directive). All three directives have now entered into force.

The Commission has been supporting the Member States in transposing those Directives, including through bilateral meetings, the organisation of dedicated workshops and assessments of national draft legislation notified under Article 33 of the Euratom Treaty.

- The amended Nuclear Safety Directive

The 2014 amendment to the Nuclear Safety Directive serves several objectives and strengthens the 2009 directive.

A corner stone of the 2014 amendment to the Nuclear Safety Directive is the high-level EU-wide nuclear safety objective. This objective was introduced in order to prevent accidents and, should an accident occur, to mitigate its consequences and avoid early and large radioactive releases. The set of principles and implementation mechanisms to improve and enhance the safety of nuclear power plants that derive from that objective as laid down in this Directive were later reflected in the Vienna Declaration on Nuclear Safety, which was adopted in 2015.

The other main improvements include: 1) strengthening the independence of national regulatory authorities; 2) setting up a European system of peer reviews on specific safety issues every six years (Topical Peer Reviews – see above); 3) increasing transparency on nuclear safety matters by informing and involving the public; and 4) promoting an effective nuclear safety culture.

It is important to mention that the Nuclear Safety Directive defines nuclear installations in a broader context than the Convention on Nuclear Safety, as it includes also research reactors and nuclear fuel cycle facilities (except for off-site waste management facilities).

Member States had to communicate to the Commission their laws, regulations and administrative provisions necessary to comply with the Directive by 15 August 2017.

During the reporting period, the Commission services launched the compliance assessments of the national transposition measures notified by the EU Member States in respect to amended Nuclear Safety Directive.

To ensure that Member States fully comply with the Directive, formal steps were taken with a number of Member States where completeness gaps were identified. In this respect, during 2017-2018, the Commission initiated 7 infringement procedures related to this Directive. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up. The conformity evaluations of the transposing measures are ongoing.

The effective implementation of the Nuclear Safety Directive is critical to achieving the highest nuclear safety standards. A key aspect of the Directive is the practical application of the nuclear safety objective in Member States. To this end, the Commission has been facilitating discussions involving Member States' nuclear safety regulators, technical experts and nuclear industry stakeholders, to review national approaches, identify common positions, as well as technical areas for further work.

National reports on the implementation of the amended Nuclear Safety Directive are due by 22 July 2020, based on which the Commission will submit its first report of progress made with the implementation of the amended Directive to the Council and European Parliament.

- The Radioactive Waste Directive (RWD)

The Radioactive Waste Directive (RWD) completes the safety framework established in the EU by putting obligations for the responsible and safe management of spent fuel and radioactive waste to avoid imposing undue burdens on future generations. Member States are to provide for appropriate national arrangements for a high level of safety in spent fuel and radioactive waste management to protect workers and the general public against the dangers arising from ionising radiation.

During the reporting period, the Commission also continued its assessment of the Member States' notified measures, national programmes and first reports on the implementation of the RWD.

Formal steps were taken with a number of EU Member States where transposition gaps were identified in order to ensure that these Member States fully comply with this Directive. In particular, the Commission initiated infringement procedures in 2018 related to incorrect transposition of the RWD against 15 Member States by sending letters of formal notice and one Member State was referred to the Court of Justice for its failure to notify its national programme.

Infringement procedures have also been launched in May 2018 and January 2019 against 17 Member States for non-compliance of their national programmes with the requirements of the Directive. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up.

The Commission also started the review of the Member States' second reports on the implementation of the RWD due on 23 August 2018, with the aim to issue its report to the Council and the European Parliament on progress and trends in 2019.

- The Basic Safety Standards Directive (BSS)

The Basic Safety Standards Directive sets out, in a single comprehensive document, Directive 2013/59/Euratom[7], the uniform basic safety standards for the protection of the health of individuals subject to occupational, medical and public exposures against the dangers arising from ionising radiation. Those basic safety standards for the protection against the dangers arising from ionising radiation take account of the status of science and technology.

The Directive covers all relevant radiation sources, including natural radiation sources, and integrates protection of workers, members of the public and patients. It also deals with all exposure situations, planned, existing, emergency, and harmonises numerical values with international standards.

Member States had to communicate to the Commission their laws, regulations and administrative provisions that transpose the Directives' obligations into their national frameworks, by 6 February 2018.

[7] The Directive repealed Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.

As with the amended Nuclear Safety Directive, during the reporting period, the Commission services launched the compliance assessments of the national transposition measures notified by the EU Member States.

To ensure that Member States fully comply with the BSS, formal steps were taken with a number of Member States where completeness gaps were identified. In this respect, during 2017-2018, the Commission initiated 9 infringement procedures related to this Directive. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up. The conformity evaluations of the transposing measures are ongoing.

The follow-up of the nuclear power reactors stress tests

Following the implementation of risk and safety assessments (stress tests) launched in the aftermath of the 2011 Fukushima nuclear accident, the Commission in collaboration with European Nuclear Safety Regulators Group (ENSREG) is continuing to follow the implementation of the measures taken by EU Member States in order to continue improving the safety of nuclear power plants. Already in November 2015, ENSREG issued a statement where it indicated that delays were encountered by several countries in safety upgrades implementation.

Member States committed to provide updates of the planned national actions every two years until complete implementation of their national action plans. The most recent updates were provided during 2017-2018. ENSREG performed an assessment of these updated national plans in 2018-2019. At the moment of the preparation of this Report, three Member States have completed their national action plans and reported to ENSREG, while others have scheduled further specific safety upgrades after 2020.

The Commission also continued to support the stress test of NPPs in EU neighbouring countries. In 2011, several non-EU countries indicated their willingness to undertake the Stress Tests including a peer review. The need for a consistent approach towards nuclear safety by all countries making use of nuclear energy was reinforced by shared vision that highlights the potential cross-border nature of nuclear accident.

Two countries, Switzerland and Ukraine, directly participated to the full process of the stress tests with the other EU countries in 2012 and to the National Action Plan peer reviews in 2013 and 2015. The stress tests peer review exercise took place in Armenia from 20 to 24 June 2016 and in Belarus from 12 to 16 March 2018.

Both in Armenia and Belarus, all parties worked together constructively during these peer reviews and with the full commitment to ensure full transparency and to improve nuclear safety. The exercise allowed for a comprehensive technical evaluation in line with the EU stress test scope.

A follow-up of the Armenian 2016 peer review is expected to take place at the end of 2019 to perform an independent assessment of the status of implementation of the Armenian National Action Plan.

The peer review report regarding Belarus, endorsed by ENSREG in July, was made public and presented to relevant stakeholders and the civil society. While it acknowledges the advanced passive safety features of the Ostrovets reactor, it makes substantive recommendations that necessitate follow-up and implementation measures. The Commission and ENSREG have been calling upon Belarus to swiftly prepare and present a National Action Plan to address the peer review findings and recommendations, in line with the practice followed for previous stress tests within the EU and with third countries. At the moment of preparation of this report, the Commission and ENSREG are still awaiting reception of this plan[8].

All information related to these peer review exercises is available on the ENSREG Website[9].

[8] Separately, Belarus was found non-compliant by the Implementation Committee of the ESPOO Convention for having provided insufficient documentation in its Environmental Impact Assessment with regard to the alternative sites considered for the new power plant explaining the final decision on site selection. The Committee did not consider nuclear safety issues.

[9] http://www.ensreg.eu/armenia-stress-test and www.ensreg.eu/EU-Stress-Tests/Country-Specific-Reports/EU-Neighbouring-Countries/Belarus.

Research activities

As far as research and innovation is concerned, the Commission continues to support research in the field of nuclear safety. This is in line with the Commission Communication on an Energy Union.

The current main instrument to support nuclear research at European level is the Euratom Research and Training Programme (hereinafter "Euratom Research Programme").

The Euratom Research Programmes for the period 2014-2020 provide for the framework for nuclear research and training activities with an emphasis on continuous improvement of nuclear safety, security and radiation protection, notably to potentially contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

The Programme is implemented through "direct actions", carried out by the European Commission's Joint Research Centre (JRC) and through "indirect actions", carried out by consortia of industry, academia, and research and development organisations, funded by the Commission's Directorate General for Research and Innovation (RTD).

The JRC contributes to the research needed for improved nuclear safety, security and waste management, standardisation, education and training, support to the relevant policies, as well as providing transnational access for Member States to its nuclear research infrastructures.

During the reporting period, the JRC also provided technical skills on behalf of the Commission for the follow-up of the post-Fukushima stress tests including in some EU neighbouring countries. It also provided technical support for the first Topical Peer Review under the Nuclear Safety Directive dealing with the ageing management of nuclear power plants and research reactors. DG RTD has also launched several projects aiming at improving nuclear safety' as a response to Fukushima-like accidents.

Other actions related to safety

The EU has provided financial assistance to improve safety during the reporting period. The EU, through its Instrument for Nuclear Safety Cooperation (INSC), has already committed EUR 241 million by 2018 in support of third countries to promote a high level of nuclear safety, radiation protection and the application of efficient and effective safeguards, out of EUR 325 million foreseen for the period 2014-2020. Euratom loans were provided to increase safety in neighbouring countries. The Commission also continued providing financial backing for decommissioning, especially in three Member States.

In addition, in support of the implementation of the Joint Comprehensive Plan of Action (JCPoA) with Iran, the Commission organised high-level seminars in 2017 and 2018 for Iranian decision makers addressing the themes of nuclear international governance, nuclear safety, waste management and international nuclear cooperation.

The EU and Iran reaffirmed their commitment to nuclear cooperation under Annex III of the JCPoA and agreed on a number of specific activities to be conducted in 2019, including a follow-up high-level seminar to be held in late 2019 in Iran.

The situation of Euratom as regards the Convention

The Euratom does not own nuclear installations as defined by the Convention[10]. All nuclear power plants on the territories of the EU Member States are regulated by the national regulatory authorities in accordance with their respective national laws and in conformity with the legal framework of the Euratom.

Euratom acceded to the Convention in 1999, as a regional organisation, and the Convention entered into force for Euratom on 30 April 2000. Since then, Euratom actively participates in all review meetings.

10 The only nuclear reactor owned by Euratom still in operation is the High Flux research Reactor (HFR) located at Commission's Joint Research Centre in Petten, the Netherlands. It is operated by the Nuclear Consultancy and Research Group (NRG) and it is regulated by the Dutch regulatory authority. Since 2005, the Netherlands includes the HFR in its CNS national review report. For these reasons, the present Euratom report provides no information on this reactor.

All EU Member States have signed and ratified the Convention and are now Contracting Parties[11].

Euratom possesses competences, shared with its Member States, as regards the legislative and regulatory framework (Article 7), assessment and verification of safety (Article 14), radiation protection (Article 15), emergency preparedness (Article 16), siting of nuclear installations (Article 17) and design, construction and operation of nuclear installations (Articles 18 and 19). Euratom reports upon these articles and also, on a voluntary basis, upon Articles 8 to 12.

The Euratom Treaty and the legal acts adopted on its basis ("Euratom law") entertain a *lex specialis* relationship with the Treaty on European Union (TEU) and the Treaty on the Functioning of the European Union (TFEU) and prevail over conflicting rules set out by the latter two Treaties.

Legislation adopted under the TFEU and legal acts adopted under the Euratom Treaty are legally binding upon Member States. They have primacy over national law. Moreover, Directives, which are to be transposed into national law, may be, subject to certain conditions, directly applicable within the legal systems of the different Member States.

To ensure a better understanding and easier peer review, the present report contains a revised and updated introduction about the legal framework of the EU and Euratom, explaining the legal instruments, the legislative procedures, the joint institutional framework, the general and special obligations of Member States and the enforcement mechanisms.

Since the Member States are responsible for implementing EU and Euratom law, the Euratom report only informs about the current legal framework, European initiatives and programmes, but not about the practical implementation in the Member States. This information is to be found in the respective national reports.

The present Euratom report is a stand-alone report, based on the last report for the 7th Review Meeting. It has been revised, updated and restructured to be in line with the revised Guidelines regarding National Reports. New information is in bold italics.

The report ends with a series of annexes, including the Declaration of Competences, the last Rapporteur's report and a list of Euratom legal acts.

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[11] The UK was a Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].

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SECTION I
INTRODUCTION

1. BACKGROUND

European Union (EU) energy policy plays a key role in the promotion of a more resource efficient, sustainable, low carbon, secure, and competitive Europe in the framework of the Europe 2020 new strategy for jobs and growth. In this context, as one of seven flagship initiatives, the Commission put forward the energy-relevant "Resource efficient Europe" initiative, to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency.

The Commission's Strategy for a European Energy Union[12], which was adopted ***by the Commission*** in February 2015, builds on five mutually reinforcing dimensions: energy security, solidarity and trust: the internal energy market; energy efficiency as a contribution to the moderation of energy demand; decarbonisation of the economy and research, innovation and competitiveness.

Nuclear energy currently generates ***27***% of all electricity in the EU and about ***half*** of its low-carbon electricity. ***At the time of the preparation of this report, t***he EU has ***126*** operating nuclear power reactors, representing about one-third of the operating nuclear power reactors in the world. Many of the EU nuclear power plants (NPPs) were constructed already three to four decades ago, and are based on designs and safety provisions that were continuously updated since then.

As the effects of nuclear accidents do not stop at national borders and can entail ***both*** potential harmful consequences for the health of workers and citizens ***and*** wide-ranging economic implications, nuclear safety is of the utmost importance to the EU and its citizens.

[12] COM(2015)80 - http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2015:80:FIN.

2. OVERVIEW OF THE EURATOM NUCLEAR PROGRAMME

The Euratom Community neither owns nor operates any nuclear installations as defined in Article 2(1) of the Convention. Such nuclear installations exist only in the territories of the Member States, to which the Euratom Treaty applies.

Despite the fact that the Convention applies to nuclear power reactors only, meaning research reactors are not formally covered by the Convention (see Art. 2), some Contracting Parties agreed to include them in their reporting during the ***6th*** CNS peer review conference. The only nuclear reactor owned by Euratom, which is still effectively in operation, is the High Flux Reactor (hereinafter: HFR) of the Commission's Joint Research Centre (hereinafter referred to as: 'JRC')[13] in Petten, Netherlands. The HFR research reactor is formally owned by the JRC on behalf of the Euratom Community, but ***the operator and licence holder is the Dutch nuclear services provider*** Nuclear Consultancy and Research Group (NRG)[14]. ***In the past, the JRC held the licence, but following a recommendation of the IAEA, it was transferred to the operator NRG in 2005.*** It is regulated by the Dutch regulatory authority, ***the Autoriteit Nucleaire Veiligheid en Stralingsbescherming (ANVS)***. ***Since 2005, the Netherlands includes the HFR in its National Report.*** For these reasons, the present Euratom report ***does not include*** information on the HFR.

3. THE EUROPEAN ATOMIC ENERGY COMMUNITY'S (EURATOM) ACCESSION TO THE CONVENTION ON NUCLEAR SAFETY

The European Union is neither a federal state, nor an intergovernmental organisation. The EU is, in fact, unique because it constitutes a new legal order in international law. For reasons of mutual social and economic benefit, its Member States have set up common institutions to which they delegate some of their sovereignty so that decisions on specific matters of joint interest can be taken at European level.

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13 For more information on the JRC please see below Section and Chapter 3.9.2.

14 ***NRG is a partnership of the Energy Research Centre of the Netherlands (ECN) and the ECN Nuclear Foundation.***

Like the EU, the European Atomic Energy Community (hereinafter referred to as "Euratom") is an international organisation endowed with international legal personality. While membership and organisation of Euratom are fully integrated with the European Union, Euratom is a separate legal entity bearing rights and duties on the international plane.

As a regional organisation as referred to in Article 30 (4) of the Convention on Nuclear Safety (hereinafter: the Convention), Euratom acceded to the Convention after the Decision of the Commission of 16 November 1999[15], adopted on the basis of Article 101 of the Euratom Treaty, following a Decision of the Council of 7 December 1998. The instruments of accession were deposited with the Director General of the International Atomic Energy Agency on 31 January 2000. Thus, for Euratom, the Convention entered into force on 30 April 2000 in accordance with Article 31(2) of the Convention.

The following ***Countries*** are Members of the EU and thus Members of Euratom ***at the time of the preparation of this report***: The Republic of Austria, the Kingdom of Belgium, the Republic of Bulgaria, the Republic of Croatia, the Republic of Cyprus, the Czech Republic, the Kingdom of Denmark, the Republic of Estonia, the Republic of Finland, the French Republic, the Federal Republic of Germany, the Hellenic Republic, the Republic of Hungary, Ireland, the Italian Republic, the Republic of Latvia, the Republic of Lithuania, the Grand Duchy of Luxembourg, the Republic of Malta, the Kingdom of the Netherlands, the Republic of Poland, the Portuguese Republic, Romania, the Slovak Republic, the Republic of Slovenia, the Kingdom of Spain, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland[16].

All EU Member States have signed and ratified the Convention on Nuclear Safety and are now Contracting Parties.

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15 Commission Decision 1999/819/Euratom of 16 November 1999 concerning the accession to the 1994 Convention on Nuclear Safety by the European Atomic Energy Community (EURATOM), OJ L 318, 11.12.1999, p. 2.

16 ***The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

4. STATEMENT OF THE COMMITMENT OF THE CONTRACTING PARTY TO THE CONVENTION ON NUCLEAR SAFETY

According to the Convention, regional organisations must – in matters within their competence – "on their own behalf, exercise the rights and fulfil the responsibilities, which the Convention attributes to States Parties" (Article 30(4) ii of the Convention). The participation of Euratom in the CNS Review Meetings is therefore limited to the fields for which a Community competence was declared by the Declaration under Article 30(4)iii of the Convention (see Annex 1).

On the basis of Article 2(b) and the relevant Articles of Title II, Chapter 3, entitled "Health and Safety" of the Euratom Treaty in connection with the Decision of the Court of Justice of the European Communities of 10th December 2002[17] the Community (Euratom) possesses competences, shared with the abovementioned Member States, in the fields of:

- Legislative and regulatory framework, covered by Article 7,
- Assessment and verification of safety, covered by Article 14,
- Radiation protection, covered by Article 15,
- Emergency preparedness, covered by Article 16 paragraph 1, 2 and 3,
- Siting of nuclear installations covered by Article 17,
- Design and construction of nuclear installations, covered by Article 18 and
- Operation of nuclear installations, covered by Article 19 of the Convention.

In conclusion, only the Articles 1 to 5, Article 7 and Articles 14 to 35 of the Convention apply to Euratom. This fact was and is duly reflected in the past[18] and present Euratom Reports presented by the Commission.

As the Nuclear Safety Directive covers additional Articles of the Convention, Euratom reports under Articles 8 to 12 on a voluntary basis.

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17 Judgment of the Court of 10 December 2002, *Commission of the European Communities v Council of the European Union*, C-29/99, ECLI:EU:C:2002:734, 102-103.

18 EURATOM Report on the implementation of the obligations of the Convention on Nuclear Safety (COM(2001) 568 final) and EURATOM Report on the implementation of the obligations under the Convention on Nuclear Safety, Brussels, 13.10.2004, C(2004) 374.

EXPLANATION OF THE PREPARATION, STRUCTURE AND MAIN FEATURES OF THE EURATOM REPORT

Euratom submits the present report for peer review at the ***8th*** Review Meeting of the Convention at the International Atomic Energy Agency (IAEA) to be held from ***23 March to 3 April 2020***. Since the Member States are responsible for implementing and applying Euratom legal acts, the Euratom report only informs about the current legal framework, European initiatives and programmes, but not on the practical implementation of the legal acts in question in ***each*** Member State. This information is found in the respective national reports.

This report is based on the last report for the ***7th*** Review Meeting. It has been revised, updated and restructured in line with the new Guidelines regarding National Reports under the Convention on Nuclear Safety[19]. It is a full report without references to previous reports to allow easy reading. New information has been highlighted, as recommended, in bold italics font. For a better follow-up of the ***7th R***eview **M**eeting, the ***outcome of the*** last Report ***on the 7th*** Euratom ***CNS Report*** has been annexed to the present report.

The Euratom report starts with an introduction on the general policy, the accession and declaration of competences, followed by a summary to highlight the follow-up from the ***7th*** Review Meeting. Finally, the Article by Article Review should demonstrate how Euratom, as a regional organisation, contributes to meeting the main objective of the Convention: to achieve and maintain a high level of nuclear safety worldwide by enhancing Community measures and international cooperation. It also shows how the Community meets the obligations of the applicable articles established by the Convention.

As Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations[20] adopted in 2009 and its subsequent 2014 amendment, deals with several aspects touched upon by Articles 8-12 of the Convention, the present Report provides selected information relating to said Articles of the Convention, even though it does so on a voluntary basis. In addition, the present Report covers Article 7 and Articles 14 to 19 of the Convention which are mentioned in the relevant Euratom Declaration under Article 30(4)iii of the Convention (deposited with the Director General of the IAEA on 11th May 2004).

19 INFCIRC/572/Rev.***6 of 19 January 2018***.
20 OJ L 172, 02/07/2009, p.18.

SECTION II

SUMMARY

1. THE EURATOM COMMUNITY'S EFFORTS IN ACHIEVING THE OBJECTIVES OF THE CONVENTION

The European Atomic Energy Community (Euratom) has been active in the field of nuclear safety for over 50 years, through the action of its institutions, in particular the Commission and the Council, at different levels. The commitment of Euratom and its Member States to a high level of nuclear safety and to the safe management of spent fuel and radioactive waste is reflected, in particular, in the existing Euratom legislative framework adopted under the Euratom Treaty as well as in the relevant Council Resolutions and conclusions of the European Council.

In the Council Resolution of 22 July 1975 on the technological problems of nuclear safety[21], the European Council considered that the technological problems relating to nuclear safety, in view of their environmental and health implications, called for appropriate action at Community level which would take into account the prerogatives and responsibilities assumed by national authorities. It recognised that it was the Commission's responsibility to act as a catalyst in initiatives taken at international level with regard to nuclear safety. As a result of this resolution, the Commission set up several expert groups dealing with nuclear safety matters. These groups, in which representatives of the safety authorities of the Member States participate, have actively contributed to the harmonisation of nuclear safety practices.

[21] OJ C-185 of 14.08.1975, p. 1.

The Council Resolution of 18 June 1992 on the technological problems of nuclear safety[22] encouraged the continuation of the process of consultation and co-operation established by the resolution of 1975, and recommended its extension to third countries, notably to the Central and Eastern European Countries (hereinafter: CEEC) and the New independent States comprising the Republics of the former Soviet Union as a result of its break-up (hereinafter: NIS). It further requested the Member States and the Commission to adopt as the fundamental and priority objective of Community cooperation in the nuclear field, in particular with the other European countries, especially those of Central and Eastern Europe and the Republics of the former Soviet Union, that of bringing their nuclear installations up to safety levels equivalent to those in practice in the Community and to facilitate the implementation of the safety criteria and requirements already recognized throughout the Community. Following this Resolution, participation in the different expert groups was extended to representatives of the CEECs and the NIS.

The Cologne European Council in June 1999 asked the Commission to ensure that high safety standards are applied in Central and Eastern Europe. Following on from this request, the safety of nuclear installations in the candidate countries[23] was evaluated by the Commission and the Council in 2001, making it possible to arrive at a European perspective with regard to nuclear safety agreed by the then fifteen Member States and the Commission.

The Laeken European Council in December 2001 marked the transition from reflection conducted in the perspective of enlargement to that of a global political vision at the level of the enlarged EU. One of the conclusions of this meeting was that *"the European Council undertakes to maintain a high level of nuclear safety in the Union. It stresses the need to monitor the security and safety of nuclear power stations. It calls for regular reports from Member States' atomic energy experts, who will maintain close contacts with the Commission".*

22 OJ C-172 of 08.07.1992, p. 2.

23 The fifth EU Enlargement comprised the largest number of countries ever admitted at one time: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia acceded to the EU on 1st May 2004, Romania and Bulgaria joined in on 1st January 2007.

The Brussels European Council of 8/9 March 2007 confirmed that it is for each and every Member State to decide whether or not to rely on nuclear energy and stressed, that this has to be done while further improving nuclear safety and the management of radioactive waste.[24]

To this effect the Council envisaged the creation of a high-level group on nuclear safety and waste management and suggested that broad discussion takes place among all relevant stakeholders on the opportunities and risks of nuclear energy.

On 8 May 2007 the Council adopted Conclusions on Nuclear Safety and Safe Management of Spent Nuclear Fuel and Radioactive Waste on the basis of the Presidency Conclusions of the Brussels European Council of 8/9 March 2007 in Brussels[25].

In these conclusions the Council recalled that nuclear safety is a national responsibility exercised where appropriate in an EU-framework and that decisions concerning safety actions and the supervision of nuclear installations would remain solely with the operators and national authorities. Community added value had been recognized in building common views on nuclear safety issues, and Council resolutions have paved the way for co-operation between Member States and the Commission.

Finally, the Council endorsed the Commission proposal[26] concerning the establishment of a High Level Group on Nuclear Safety and Waste Management. The group was later renamed ENSREG, the European Nuclear Safety Regulators Group. ENSREG's central mission is to strive for the continuous improvement in nuclear safety and radioactive waste and spent fuel management and their regulation, and to promote openness and transparency in those areas. ENSREG has divided its activities in four basic areas: Safety of nuclear installations, Radioactive waste and spent fuel management, Openness and transparency, and, recently, International cooperation.

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24 Council of the European Union, Brussels, 8-9 March 2007: Presidency Conclusions (9 March 2007: Brussels), Council Document No 7224/07 of 2 May 2007, REV 1, CONCL 1.

25 Council Conclusions on Nuclear Safety and Safe Management of Spent Nuclear Fuel and Radioactive Waste, 2798th ECONOMIC and FINANCIAL AFFAIRS Council meeting, Brussels 8 May 2007.

26 Communication from the Commission to the European Council and the European Parliament: "An Energy Policy for Europe", COM(2007) 1 final of 10.01.2007; SEC(2007)12.

In the area of nuclear safety, in 2009, the Council adopted Directive 2009/71/Euratom establishing a Community framework for nuclear safety (Nuclear Safety Directive). This Directive created a flexible, legally binding framework that defines basic principles and obligations governing nuclear safety. It reflected the provisions of the main international instruments on nuclear safety: the Convention on Nuclear Safety and the Safety Fundamentals established by the IAEA.

The objectives of the Nuclear Safety Directive were to maintain and promote the continuous improvement of nuclear safety and its regulation, as well as to ensure that EU Member States provide national arrangements for a high level of nuclear safety.

The 2011 Fukushima nuclear accident focussed renewed attention on the paramount importance of ensuring the highest levels of nuclear safety worldwide. The EU response to this event was immediate. In addition to the stress test process, the mandate from the European Council included the request to the Commission to review the existing legal and regulatory framework for the safety of nuclear installations and to propose any improvements that may be necessary. This led to the adoption of Directive 2014/87/Euratom amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, described extensively in Section 3.1. below, as well as under the various Articles of the Convention, as appropriate.

In the area of radiation protection, the Council adopted the revised Basic Safety Standards Directive (Council Directive 2013/59/Euratom), which modernises and consolidates the European radiation protection legislation.

This Directive consolidates the existing acquis of Euratom radiation protection legislation into one single piece of legislation, merging five directives and upgrading a recommendation to become legally binding.

The new Directive offers in a single coherent document basic safety standards for the protection against the dangers arising from ionising radiation which take account of the progress of science and technology, cover all relevant radiation sources including natural radiation sources, integrate protection of workers, members of the public, patients and the environment, cover all exposure situations (planned, existing, emergency) and harmonise numerical values with international standards. It also includes emergency preparedness and response provisions that were strengthened following the Fukushima nuclear accident. The Directive is extensively described in Section 3.3. below, as well as under various Articles of the Convention, as appropriate.

2. RESULTS FROM PREVIOUS REVIEW MEETINGS

The results of the review of the 7th Euratom Report by Rapporteur, as adopted by Country Group, were the following[27].

Two challenges were identified: (a) complete the implementation of the topical peer review process; (b) complete the follow-up assessment and facilitation of consistent implementation of the Nuclear Safety Directive (so that it is consistent in both schedule and content). Euratom was asked to report, especially in relation to the second challenge, at the next review meeting.

Three out of 3Three Challenges and 2 out of 2 Suggestions from the 6th Review Meeting have been closed. The adoption of the amended Nuclear Safety Directive and the introduction of a system of peer reviews on specific safety issues at a six-year interval were singled out as highlights.

Two good practices were identified: (a) the first topical peer review was launched in a proactive manner, even before date for transposition of the nuclear safety directive by EU Member States; (b) the implementation of the Instrument for Nuclear Safety Co-operation Program for assisting non-EU countries.

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[27] ***See "Rapporteur's Report for EURATOM of 27 March 2017 in the 7th Review Meeting under the Convention on Nuclear Safety", attached as annex 2.***

Two areas of good performance were identified: (a) the amended Nuclear Safety Directive made the safety objective for nuclear installations legally binding; (b) the publication of the Nuclear Illustrative Programme (PINC).

3. SIGNIFICANT CHANGES AND DEVELOPMENTS SINCE THE PREVIOUS EURATOM REPORT

3.1. Implementation of the revised legal and regulatory Euratom framework for the nuclear safety of nuclear installations

3.1.1. Amended Nuclear Safety Directive

The review of the Euratom legal framework for nuclear safety, also called for by Heads of State and Government in March 2011, led to a Commission proposal for substantial amendments to Directive 2009/71/Euratom. The proposals took account of the lessons learned from the nuclear stress tests and the Fukushima nuclear accident as well as the latest safety requirements of the Western European Nuclear Regulators Association (WENRA) and of the standards of the IAEA.

The European Parliament also encouraged a legislative review. In its 2013 Resolution on Stress Tests, it pointed out that "an overall nuclear safety and security policy […] should also guarantee the existence of strong and independent regulators", it called on the upcoming revision to be "ambitious in nature", including major improvements in areas such as "safety procedures and frameworks – in particular through the definition and implementation of binding nuclear safety standards that reflect state-of-the-art practices in the EU in technical, regulatory and operational respects – as well as in the role and resources of the nuclear regulatory authorities and, in particular, should boost the latter's independence, openness and transparency, while also strengthening monitoring and peer review".

The European Economic and Social Committee also expressed its support for the "Commission's intention to undertake an ambitious revision of the Nuclear safety Directive".

Following discussions in the Council, the amendment to Nuclear Safety Directive (Directive 2014/87/Euratom) was adopted on 8 July 2014.

A corner stone of the 2014 amendment to the Nuclear Safety Directive is the high-level EU-wide nuclear safety objective. This objective was introduced in order to prevent accidents and, should an accident occur, to mitigate its consequences and avoid early and large radioactive releases.

The set of principles and implementation mechanisms to improve and enhance the safety of nuclear power plants that derive from that objective as laid down in this Directive were later reflected in the Vienna Declaration on Nuclear Safety, which was adopted in 2015.

The new provisions of the Nuclear Safety Directive address the safety of the entire lifecycle of nuclear installations, i.e. siting, design, construction, commissioning, operation and decommissioning.

The amended Directive reinforces a number of mechanisms, such as defence-in-depth measures, on-site emergency preparedness and response arrangements and safety culture, in order to achieve the new nuclear safety objective.

Moreover, the Directive provides for regular safety reassessments of nuclear installations, to be carried out, every 10 years, by the licence holder under the supervision of the competent regulatory authority, to identify further safety improvements, taking into account, inter alia, ageing issues, using as a reference the aforementioned nuclear safety objective.

Under the amended Nuclear Safety Directive, the independence of the national regulatory authorities is strengthened, by requiring that they be provided with the appropriate means and competences to properly carry out the responsibilities assigned to them. In particular, the regulatory authority should have sufficient legal powers, sufficient staffing and sufficient financial resources for the proper discharge of the responsibilities assigned to it.

The Directive also contains provisions on periodic self-assessments of the Member States' national framework and competent regulatory authority through inviting, every 10 years, international peer reviews. It also lays out the organisation, every 6 years of topical peer reviews based on a specific topic related to nuclear safety.

Finally, the amended Nuclear Safety Directive enhances transparency on nuclear safety matters, by making the provisions on the information to be provided to the general public and the workers more specific. It also includes requirements on public participation in the decision-making process related to the licensing of nuclear installations.

The Directive entered into force on 14 August 2014. Member States had until August 2017 to transpose it into national legislation. To ensure a timely and adequate transposition of the amended Nuclear Safety Directive, the Commission has interacted with the Member States in the pre-transposition phases, including through the organisation of workshops on transposition.

The full and effective transposition and implementation of the Directive's requirements represent a priority for the Commission. To this end, the Commission is active in encouraging and supporting Member States in their effort to meet the Directive's obligations (notably the nuclear safety objective).

Workshops were organised focusing on the implementation of the Directive's requirements. In addition, ENSREG is carrying out a number of activities for supporting the Directive's implementation and providing guidance for the application of the nuclear safety objective, as described in Section 3.8.1 below.

In line with the transposition deadline, the Member States have communicated to the Commission their national transposing measures. During the reporting period, the Commission services launched the compliance assessments of the national transposition measures notified by the EU Member States in respect to amended Nuclear Safety Directive.

To ensure that Member States fully comply with the Directive, formal steps were taken with a number of Member States where completeness gaps were identified. At the time of the preparation of this Report, the Commission initiated 7 infringement procedures related to this Directive. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up. The conformity evaluations of the transposing measures are ongoing.

The next national reports on the implementation of the Directive are due to be sent to the Commission by 22 July 2020. Based on these national reports, the Commission will prepare its report to the Council and European Parliament.

3.1.2. Topical peer reviews (TPR)

Recognizing the importance of peer review in delivering continuous improvement to nuclear safety, the amended Nuclear Safety Directive in its Article 8(e)2 introduces a European system of topical peer review (TPR).

As of 2017, Member States are required to define every 6 years, through their competent regulatory authorities and making use of ENSREG as appropriate, a methodology, terms of reference and a time frame for peer reviews on a common specific technical topic related to the nuclear safety of their nuclear installations.

Member States are required to perform a national self-assessment and make arrangements for common peer reviews by other Member States' competent regulatory authorities of their national self-assessment, with the participation of the European Commission as an observer. The process provides for participation, on a voluntary basis, of States neighbouring the EU with nuclear power programmes.

ENSREG chose the subject of "ageing management" amongst other proposals by WENRA as the specific topic of the first national assessment and peer review in view of the age profile of European nuclear power plants, plans for long-term operation of some of these plants, and the safety significance of the topic.

ENSREG Working Group 1 drew up the Terms of Reference and WENRA the Technical Specifications of the first TPR, which together with a stakeholder engagement plan, were approved by ENSREG in January 2017.

The objective of the first Topical Peer Review was to examine how well Ageing Management Programmes in participating countries meet international requirements on ageing management (in particular WENRA Safety Reference Levels – (SRLs) and the IAEA Safety Standards). Moreover, the specific objectives were to examine national practices to:

- Enable participating countries to review their provisions for ageing management, to identify good practices and to identify areas for improvement.

- Undertake a European peer review to share operating experience and identify common issues faced by Member States.

- Provide an open and transparent framework for participating countries to develop appropriate follow-up measures to address areas for improvement.

The TPR covered the ageing management at nuclear power plants as well as nuclear research reactors with a power equal to 1 MWth or more. The review focused on the overall ageing management programmes and the application of these programmes to four selected systems, structures and components, namely reactor pressure vessels, electrical cables, concealed pipework and concrete containment structures. Altogether 16 EU member states with nuclear power plants and/or research reactors and 3 Non-EU member states (Norway, Switzerland, and Ukraine) participated in this first TPR.

The review process consisted of three phases.

In the first phase, national self-assessments were conducted against the WENRA Technical Specification. Results of the self-assessments were documented in the National Assessment Reports, published at the end of 2017.

The second phase started in January 2018 when the National Assessment Reports were made available for questions and comments from stakeholders. As an indication of the commitment to the Peer Review and the importance of the selected topic, this phase resulted in more than 2300 questions and comments. Subsequently, in May 2018, ENSREG organised a one-week workshop to discuss the results of the self-assessments, the questions and comments on the National Assessment Reports, as well as the replies to the questions, with a goal to identify and discuss both generic and country-specific findings on Ageing Management Programmes.

In the third and final phase of the Topical Peer Review in October 2018, ENSREG published the Topical Peer Review Report summarising the overall findings, and a set of country-specific findings. On the basis of these reports, participating countries should develop national action plans by September 2019. Further work at the European level in the framework of ENSREG was also identified.

Key findings of the TPR were:

- ***Ageing management programmes (AMPs) are in place for all NPP's, based on the IAEA safety standards and WENRA reference levels, although there are some differences of approach amongst the countries.***

- ***There is a need to bring implementation of ageing management of research reactors on par with NPPs. WENRA is expected to develop appropriate reference levels similar to that applying to NPPs.***

- ***Challenges remain as concerns the development of means to evaluate the effectiveness of AMPs.***

- ***The review also sets an expectation to all countries to review and implement the revised IAEA safety guide on ageing management to ensure a more consistent scope of Ageing Management Programmes.***

- ***The review highlights the utilization of Peer Review Services such as the IAEA Safety Aspects of Long Term Operation (IAEA SALTO) and Operational Safety Review Team (OSART) missions (with the module on LTO) as a good practice.***

Whilst the review highlights that Ageing management programmes (AMPs) are in place for all NPP's, based on the IAEA safety standards and WENRA reference levels, this is not the situation for Research Reactors. In the latter case, Ageing Management Programmes are neither regulated nor implemented as systematically and comprehensively, and therefore require further attention from both regulators and licensees.

The review did not identify any major deficiencies in European approaches to regulate and implement Ageing Management Programmes at Nuclear Power Plants. However, it highlighted differences in national approaches, and listed a high number of "TPR expected level of performance" (19 in total) that should be reached to ensure consistent and acceptable management of ageing throughout Europe". Four common challenges at EU level were also identified and will need to be tackled[28].

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[28] ***These were: Effectiveness of the OAMP and use of performance indicators; State of the art and qualified techniques for Non Destructive Examination for Reactor Pressure Vessels; Acceptance criteria for the degradation mechanisms of concrete structures; and Non-invasive inspection methods for long lengths or complex geometries of concealed piping.***

According to the TPR main outcomes, there were three categories of findings: challenge, TPR expected level of performance and good practice. For the specific country findings, the TPR expected level of performance was recognised as a good performance for those countries that already meet this expectation, and as an area for improvement for the others.

All regulators have agreed to develop a national action plan by September 2019, addressing the findings of the peer review.

The Council of the EU adopted Council Conclusions on the first TPR exercise 18 March 2019[29]. In line with these Conclusions, ENSREG agreed in its March 2019 meeting to re-examine progress within three years and issue a status report of implementation of the first TPR by December 2021.

The Council also called on the Commission to invite EU neighbourhood countries to take advantage of participation in EU topical peer reviews, to address the promotion and continuous improvement of the highest level of nuclear safety in third countries.

3.1.3. International Peer Reviews

Pursuant Article 8e, Member States are also required to arrange for periodic self-assessments of their national framework and competent regulatory authorities at least every 10 years[30] and to request an international peer review of relevant segments of their national framework and competent regulatory authorities with the aim of continuously improving nuclear safety. The outcomes of any peer review shall be reported to the Member States and the Commission, when available.

The IAEA Integrated Regulatory Review Service (IRRS) was selected through ENSREG[31] to fulfil these requirements. In view of the additional resources required, ENSREG and IAEA have cooperated to establish a European pool of expert reviewers, to participate in the IRRS programme, both within Europe and worldwide.

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29 https://data.consilium.europa.eu/doc/document/ST-7650-2019-INIT/en/pdf

30 ***As indicated in the Report from the European Commission to the Council and the European Parliament on the Implementation of Council Directive 2009/71/Euratom (COM(2015) 573 final) the "10 year period" for hosting an international peer review started from the transposition deadline of the 2009 Directive, i.e. 22 July 2011.***

31 ***ENSREG 2011 Report http://www.ensreg.eu/sites/default/files/ENSREG%20Report%202011%20final.pdf.***

Since 2011, the European Commission has supported the IAEA financially in the further development and implementation of the programme of the IRRS missions in the EU Member States[32] and has observed these missions with a defined goal to assess the overall effectiveness of the peer review process.

The 1st EU cycle of peer reviews 2011-2021 is well on schedule. By the end of 2018, the legal and organisational framework of all Member States operating nuclear power plants, has been reviewed through IAEA IRRS missions, while all EU Member States, have either already used this service or plan to do so by 2020.

In the context of its support to IAEA, the Commission hosted on 27-29 November 2018 in Luxembourg the IAEA's Workshop on lessons learnt from IRRS missions, including a one-day event dedicated to experience in the EU Member States.

The EU workshop brought together 30 senior regulators from 22 EU Member States. A number of lessons learned and possible future actions were identified, as well as the importance of IRRS, including the follow-up missions, in driving continuous improvement of the regulatory framework was recognised.

There were also proposals for improvement of the IRRS programme that included the improved dissemination of good practices identified during missions. The workshop also generated discussions on IRRS-ARTEMIS missions and allowed the sharing of feedback from the first combined mission to Spain in October 2018.

As the requirements of the EU Directives for peer reviews lead to an increase in IRRS and ARTEMIS missions in the EU the Commission follows the development of the programmes towards an optimised efficiency and effectiveness of the ARTEMIS/ IRRS interface.

3.2. Comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union overview

[32] ***https://gnssn.iaea.org/regnet/irrs/Pages/EC-IAEA-Cooperation-IRRS-in-the-EU.aspx.***

3.2.1. Background

In the Conclusions of its meeting of 24-25 March 2011, the European Council, comprising the Heads of State or Government of the EU Member States, stated that the safety of all EU nuclear plants should be reviewed on the basis of a comprehensive and transparent risk and safety assessment.

The mandate from the European Council also comprised the invitation for EU neighbouring countries to take part in the process.

The Commission and the European Nuclear Safety Regulators' Group (ENSREG)[33], which comprises the Euratom Member States' national nuclear safety or regulatory authorities responsible for nuclear safety, were invited to reassess the safety margins of the EU nuclear power plants in light of the Fukushima events.

All "Stress Tests" reports, including the licensee reports, have been made available on the ENSREG website[34].

3.2.2. Main findings from the Stress Tests

While the assessments found that the safety standards of nuclear power plants in Europe were generally high, further improvements were recommended.

The peer review Board report identified three main areas for further improvement*:*

- Developing European guidance by Western European Nuclear Regulators Association (WENRA), on the assessment of natural hazards, and safety margins;
- Using Periodic Safety Reviews (PSRs);
- Implementation of recognised measures to protect containment integrity.

[33] The role of ENSREG is to advise and assist the Commission, at its own initiative or at the initiative of the Commission, to progressively develop a common understanding and furthering common approaches in priority domains related to the safety of nuclear installations, the safety of the management of spent fuel and radioactive waste and transparency.

[34] http://www.ensreg.eu/node/3889.

3.2.3. *EU Stress Tests follow-up phases*

As a follow up to the stress tests, national action plans (NAcPs) were prepared by all participating countries, which set forth actions to improve nuclear safety as well as the schedule for their implementation. The majority of these actions were expected to be implemented by 2015-18, the latest foreseen date for completion being 2020.

These NAcPs were reviewed during a National Action Plan Workshop organised by ENSREG in 2013. The NAcPs were revised during late 2014 and reviewed during a 2nd NAcPs Workshop in the Spring of 2015. The second workshop focused in particular on evaluating progress of implementation, including any additional measures undertaken and changes made to the original schedule.

Special attention was devoted to the technical reasons for the changes proposed as well as to the review of studies and analyses identified and completed since the 2013 Workshop.

Already in November 2015, ENSREG issued a statement where it indicated that delays were encountered by several countries in safety upgrades implementation. Member States committed to provide updates of the planned national actions every two years until complete implementation of their national action plans. The most recent updates were provided during 2017-2018.

ENSREG performed an assessment of these updated national plans in 2018-2019. At the moment of the preparation of this Report, three Member States have completed their national action plans and provided reports describing the state of implementation of measures taken after the Fukushima nuclear accident to ENSREG, while others have scheduled further specific safety upgrades after 2020.

The reports and the NAcPs are available on the ENSREG website[35].

[35] ***http://www.ensreg.eu/EU-Stress-Tests/Country-Specific-Reports/EU-Member-States.***

3.2.4. *Voluntary participation of third countries in the Stress Test process*

As an outcome of the meeting of 23 June 2011 with Commissioner Oettinger, Deputy Ministers of Energy and senior representatives of the Ministries of Energy and national authorities responsible for nuclear energy of the Republic of Armenia, Republic of Belarus, Republic of Croatia, Russian Federation, Swiss Confederation, Republic of Turkey, Ukraine confirmed their willingness to undertake the Stress Tests including a peer-review.

The need for a consistent approach towards nuclear safety by all countries making use of nuclear energy was reinforced by shared vision that highlights the potential cross-border nature of nuclear accidents.

Two countries, Switzerland and Ukraine, directly participated to the full process of the Stress Tests with the other EU countries in 2012 and to the National Action Plan peer reviews in 2013 and 2015.

At that time Armenia was not ready to take directly part to the EU Stress Tests process like Ukraine and Switzerland did, but with the support of two INSC projects (A1.01/11 and A3.01/11) the Medzamor nuclear power plant and the Armenian Regulatory Body ANRA prepared their "Stress Tests" report which was submitted, in August 2015, to the Commission and ENSREG for peer review.

The "Stress Tests" Peer review exercise took place in Armenia from the 20th to the 24th June 2016. The peer review team (PRT) was composed of 10 EU experts (8 from EU Member states which have been nominated by ENSREG members and 2 from the European Commission).

Following this peer review mission, the final report was transmitted to ANRA end of August 2016 and later published on the ENSREG Website. All the information related to this peer review exercise is available on the ENSREG Website[36].

The situation has been quite similar for Belarus. The Commission kept since 2011 regular contact with the Belarus nuclear regulatory authority (Ministry for Emergency Situation (MES) represented by its department Gosatomnadzor (GAN)) to ensure that the peer review process is conducted in Belarus.

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[36] ***http://www.ensreg.eu/armenia-stress-test.***

Since 2013 the Commission supported the regulatory authority GAN with technical assistance focusing on the development of its expertise and independence building through the Instrument for Nuclear Safety Cooperation.

In October 2017, the MES represented by its GAN submitted its National Report on Stress Tests for Belarus Nuclear Power Plant to the Commission and the ENSREG for peer review.

The Peer Review Mission to Belarus took place from 12 to 16 March 2018 and was conducted in a constructive working atmosphere and in line with specifications for EU stress test.

This peer review was conducted by a team of 17 experts from EU and nonEU Member States including representatives from countries that use nuclear power as well as from those that do not. The team included also 2 representatives from the Commission and 3 observers from the IAEA, the Russian Federation and from Iran.

The Peer Review report, which was presented to the Belarussian authorities in June 2018, was endorsed by the ENSREG in July 2018 and published on its website[37].

Both in Armenia and Belarus, all parties worked together constructively during these peer reviews in the spirit of good neighbourly relations with the commitment to increase transparency and improve nuclear safety. The information provided allowed to produce a comprehensive technical evaluation in line with the EU Stress Test scope and ensured an equal treatment for these countries as regard to other non-EU countries that participated to this peer review process in the past.

A follow-up of the Armenian 2016 peer review is expected to take place at the end of 2019 to perform an independent assessment of the status of implementation of the Armenian NAcP.

In 2018, Belarusian regulator accepted to prepare a National Action Plan on how to address the recommendations in line with the practice of stress tests in all EU Member States. [The Commission and ENSREG expect to receive this National Action Plan for peer review in 2019.]

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37 ***www.ensreg.eu/EU-Stress-Tests/Country-Specific-Reports/EU-Neighbouring-Countries/Belarus.***

Participation of the EU neighbouring countries in the risk and safety assessments (stress tests) of NPPs was a successful first phase of a valuable and necessary process. The second phase of the stress tests – implementation of all the presented recommendations – has already started in some EU neighbouring countries or it will start soon. Stress tests recommendations should be implemented timely and properly in line with the National Action Plans and EU practices.

3.3. Council Directive ***2013/59/Euratom*** laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation (Revised 2013 Basic Safety Standards Directive)

In 2014, the Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation (Basic Safety Standards - BSS) was published. Member States ***were*** required to bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 6 February 2018.

With ***this*** Directive, the European Union modernise***d*** and consolidate***d*** the European radiation protection legislation. ***The BSS sets out, in a single comprehensive document, Directive 2013/59/Euratom, the uniform basic safety standards for the protection of the health of individuals subject to occupational, medical and public exposures against the dangers arising from ionising radiation. Those basic safety standards for the protection against the dangers arising from ionising radiation take account of the status of science and technology.***

The Directive covers all relevant radiation sources, including natural radiation sources, and integrates protection of workers, members of the public and patients. It also deals with all exposure situations, planned, existing, emergency, and harmonises numerical values with international standards.

The BSS ***offers detailed provisions on:***

- ***Protection of workers exposed to ionising radiation,***
- ***Protection of members of the public,***
- ***Protection of medical patients, undergoing radiodiagnosis or radiotherapy***

- ***Emergency preparedness and response***
- ***Safety and control of high-activity sealed sources***
- ***Regulatory control of practices***

Member States have communicated transposing measures of the Directive. During the reporting period, the Commission services launched the compliance assessments of the national transposition measures notified by the EU Member States in respect the BSS.

To ensure that Member States fully comply with the Directive, formal steps were taken with a number of Member States where completeness gaps were identified. In this respect, at the time of the preparation of this report, the Commission initiated 9 infringement procedures related to this Directive. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up. The conformity evaluations of the transposing measures are ongoing.

3.4. Adoption of the "Euratom Drinking Water Directive"

In addition to the new Basic Safety Standards Directive, a Directive laying down requirements for the protection of the health of the general public with regard to radioactive substances in water was adopted in 2013 (***Council Directive 2013/51/EURATOM*** "Euratom Drinking Water Directive"). In view of the importance for human health of the quality of water intended for human consumption, the EU laid down quality standards at Community level and provided for the monitoring of compliance with those standards, with the aim of enhancing radiation protection legislation.

In particular, the Directive sets out parametric values, frequencies and methods for monitoring radioactive substances in drinking water. Its transposition by Member States was due by 28 November 2015. The final transposing measures have been communicated to the Commission and the Commission assessment is currently in progress. ***The assessment results of Member States' transposition and implementation were discussed in a workshop held in October 2018.***

3.5. Revision of the existing legislation establishing maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other radiological emergency.

Following the nuclear accidents of Chernobyl in 1986 and of Fukushima in 2011, specific EU Regulations on import conditions into the EU of agricultural products, food and feed have been put in place. On the basis of the experience gained the Commission proposed to the Council in 2014 a revision of the existing legislation establishing maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other radiological emergency.

Council Regulation (Euratom) 2016/52 ***laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency (OJ L13, 15.01.2016) was adopted on 15 January 2016.***

With the adoption of the Regulation the relevant existing legislation was consolidated, new procedures for the exercise of implementing powers by the Commission were set out and more flexible procedures were provided, allowing specific reactions to any nuclear accident or radiological emergency in the EU, in the vicinity of the EU or in a remote country.

3.6. **Instruments for improving the level of nuclear safety in third countries**

The instrument of Nuclear Safety Co-operation is the only dedicated tool of the European Union addressing nuclear safety issues in third countries (i.e. non-EU countries)[38]. The geographical scope of the INSC focuses primarily on the Accession Countries and the neighbourhood of the EU where most of the funding is concentrated.

The EU, through this instrument has already committed EUR 241million by 2018 in support of third countries to promote a high level of nuclear safety, radiation protection and the application of efficient and effective safeguards, out of EUR 325 million foreseen for the period 2014-2020.

[38] ***Previously, the EU used the nuclear safety component of two major instruments: PHARE and TACIS.***

The three programme priority areas are: i) the promotion of a nuclear safety culture by supporting the regulatory authorities and their technical support organisations, ii) the safe management of nuclear waste and spent fuel, including remediation of former legacy sites and iii) establishment of an efficient nuclear material safeguards system.

Cooperation continues with Ukraine, Belarus, Armenia and, on a regional basis, with Central and South Asia. The EU has engaged with the regulatory authority of Turkey as embarking country and with Africa, promoting sustainable uranium mining.

The instrument also implements the EU commitments in Iran in line with Annex 3 of the Joint Comprehensive Plan of Action pursuant to the nuclear deal reached in 2015.

Over the last years, collaboration under the INSC with the IAEA has also been stepped up with the objective of further developing nuclear safety culture and the required expertise at global level and to support adherence to international Conventions and Treaties as well as to avoid duplication of activities in the cooperation programmes carried out for the third countries.

3.7. Cooperation with International Organisations

The IAEA and Euratom have been developing extensive scientific and technological cooperation for many years. An existing cooperation agreement between the IAEA and EURATOM, in force since 1 January 1976, provides a formal basis for the collaboration of the two organisations.

In May 2008, both organisations signed a Joint Statement where they agreed to examine concrete steps to significantly reinforce the quality and intensity of their cooperation. The IAEA and the European Commission currently cooperate in various areas and their cooperation has grown significantly over the last few years.

Based on the 1976 Cooperation Agreement and the 2008 "Joint Statement", the European Commission and the IAEA signed in 2013 a Memorandum of Understanding on nuclear safety, including expert peer reviews and emergency preparedness and response, allowing further synergies and avoiding duplication of efforts.

3.8. Experts Groups of the Commission

3.8.1. *High-level Group on Nuclear Safety and Waste Management (ENSREG)*

Following the endorsement of the Commission proposal[39] by the European Council of 8-9 March 2007, the Conclusions of the 2798th meeting of the Council of the European Union (Economic and Financial Affairs) of 8 May 2007 and the European Parliament resolution on Assessing Euratom — 50 years of European nuclear energy policy (10 May 2007), the Commission adopted a Decision establishing a "European High Level Group for Nuclear Safety and Waste Management (High Level Group)"[40] on 17 July 2007.

The High Level Group is based on the work carried out by ***EU*** Member States and the Commission in the "Working Party on Nuclear Safety (WPNS)" during 2005 and 2006 which aimed at improving the nuclear safety within the European Union. Later the Group was renamed ENSREG.

ENSREG brings together the senior representatives from the national nuclear regulatory or safety authorities of all EU Member States having competence in the areas covered, and a representative of the Commission. Its mandate is to develop common approaches in the domains of the safety of nuclear installations and the safety of the management of spent fuel and radioactive waste and to advise the Commission on possible Community legal acts in these fields

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[39] The Nuclear Illustrative Programme 2007 put forward a proposal to set up an EU High Level Group on Nuclear Safety and Waste Management; Communication from the Commission to the Council and the European Parliament of 4 October 2007, COM(2007) 565 final, p. 22, not published in the Official Journal; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0565:FIN:EN:PDF.

[40] OJ L 195/44 of 27.07.2007.

ENSREG's central mission is to strive for the continuous improvement in nuclear safety and radioactive waste and spent fuel management and their regulation, and to promote openness and transparency in those areas. The ENSREG Work Programme ***2018-20***[41] was agreed in ***July 2018*** and building on the achievements of the ***previous*** work programme***s*** focuses on:

- seeking continuous improvement in nuclear safety arrangements through:
    - ***Topical Peer Reviews (TPR) according to Art. 8e point 3 of the Nuclear Safety Directive***[42]***.***
    - ***implementation of Art. 8a-8c of the Nuclear Safety Directive.***
    - ***follow-up on the status of implementation of the WENRA Safety Reference Levels.***
    - ***reporting on the Stress Tests NAcPs implementation status.***
    - ***advice to the Commission and coordination of regulatory bodies on issues concerning long-term operation, new build and decommissioning.***
    - ***emergency Preparedness and Response through Monitoring and reporting on implementation of HERCA-WENRA approach.***
    - ***IAEA IRRS and ARTEMIS Peer Review Missions in the EU Member States.***
- seeking continuous improvement in radioactive waste management, spent fuel and decommissioning arrangements through:
    - ***report under Article 14 of the spent fuel and radioactive waste Directive 2011/70/EURATOM***[43]***.***
    - organising a workshop on European approaches to responsible and safe management of spent fuel and radioactive waste.
    - ***organise a technical meeting between EU regulatory authorities, TSOs and industry on Counterfeit, Fraudulent and Suspect Items (CFSI) issue.***

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41 ***http://www.ensreg.eu/sites/default/files/attachments/ensreg_wp_2018-2020.pdf.***

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

43 ***ENSREG published Guidelines for Member States reporting on Article 14.1 of Council Directive 2011/70 /Euratom. See: http://www.ensreg.eu/sites/default/files/attachments/guidelines_for_reporting_on_directive_2011-70-euratom.pdf***

- seeking enhanced openness and transparency by:
    - ***prepare ENSREG Regulatory 2019 Conference on Nuclear Safety accessible to all stakeholders, dedicated to furthering the central mission of ENSREG for continuous improvement.***
    - maintaining ***and improving*** a comprehensive ENSREG website***.***
- In the context of international cooperation developing and promoting a common understanding and continuous improvement in the fields of nuclear safety, spent fuel management and radioactive waste management worldwide through:
    - providing ENSREG with the ability to advise the European Commission in the areas of nuclear safety and radiation protection (where related to radioactive material management) within the Instrument for Nuclear Safety Co-operation (INSC)
    - ***implementing Stress Tests Peer Reviews for two neighbouring countries (Belarus, Iran and Turkey)***

The new work programme aims to provide clarity on the key tasks to be achieved by ENSREG and when and how they will be completed- enabling greater oversight by the plenary and increased transparency of the work of ENSREG.

In ***2015*** and ***2017,*** ENSREG submitted to the Commission two Activity Reports[44], presenting the activities undertaken by the Group, its discussions and recommendations covering nuclear safety, waste management and transparency aspects.

[44] ***http://www.ensreg.eu/sites/default/files/attachments/ensreg_report_november_2015.pdf and http://www.ensreg.eu/sites/default/files/attachments/5th_ensreg_report_2017_0.pdf.***

ENSREG held its ***fourth*** conference in Brussels on ***28 and 29 June 2017. It addressed several key topics like the licensing of new builds, the long-term operation of nuclear power plants, the reliability of the supply chain and quality controls and the spent fuel and radioactive waste management.***

Concerning the support for the implementation of the amended Nuclear Safety Directive, at the request of ENSREG, WENRA prepared a position paper on "timely implementation of reasonably practicable safety improvements to existing nuclear power plants", which was subsequently endorsed by ENSREG in 2017.

ENSREG is also involved in the implementation of the Nuclear Safety Directive. It has developed updated Guidelines to assist Member States in their reporting under the Directive by 2020.

3.8.2. *Article 31 Group of Experts*

It is laid down in Article 31 of the Treaty establishing the European Atomic Energy Community (the "Euratom Treaty") that a Group of scientific experts shall be attached to the Commission and shall have advisory status.

By virtue of the very high standing of its members, and their qualification in the fields of radiation protection and public health, the Group of scientific experts referred to in Article 31 of the Euratom Treaty (the "Group") is called upon to assume the all-important function of adviser to the Commission on preparing the basic standards to be established by the latter.

Moreover, the Treaty itself requires the Commission to consult the Group when revising and supplementing the basic standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation (Articles 31 and 32 of the Euratom Treaty). Thus, when putting forward proposals concerning the basic standards, the Commission convenes the Group so that it may formally obtain an expert opinion to enable it to guide its decisions and make the requisite choices. Such decisions are collectively given by the Group whose members, each being appointed on a personal basis, speak on their own behalf and act independently of all external influence.

The Commission may convene the Group not only on the occasions specifically laid down in the Treaty, but also whenever it considers such action to be necessary. A schedule of at least two meetings a year should permit the Commission to keep up a fruitful dialogue with the Group, whilst periodically requesting exchanges of view and guidance on any major problem affecting radiation protection. If necessary, additional meetings can be held or matters can be dealt in written procedure.

The members of the Group are appointed for a term of five years, renewable, by the Scientific and Technical Committee set up in compliance with Article 134 of the Treaty. In its present composition the Group's expertise is primarily in the field of radiation protection as specified in Articles 30 to 32 of the Euratom Treaty. For this reason, it focuses its opinions on those aspects of draft legislative measures which would enhance the overall objectives of radiation protection[45].

The Group adopted ***its*** own Rules of Procedure ***in 2017***[46].

Every year, the Commission organises, in cooperation with the Group of Experts referred to in Article 31 of the Euratom Treaty, a Scientific Seminar on emerging issues in Radiation Protection – generally addressing new research findings with potential policy and/or regulatory implications[47]. Leading scientists are invited to present the status of scientific knowledge in the selected topic.

Based on the outcome of the Scientific Seminar, the Group of Experts referred to in Article 31 of the Euratom Treaty may recommend research, regulatory or legislative initiatives. The Commission takes into account the conclusions of the Experts when setting up its radiation protection program. The Experts' conclusions are valuable input to the process of reviewing and potentially revising European radiation protection legislation.

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45 ***The opinions are available online: https://ec.europa.eu/energy/en/group-experts.***

46 ***https://ec.europa.eu/energy/sites/ener/files/documents/rules_of_procedure_article_31_group_of_experts_as_adopted_30_june_2017.pdf.***

47 ***https://ec.europa.eu/energy/en/topics/nuclear-energy/radiation-protection/scientific-seminars-and-radiation%20protection%20publications.***

In November 2018, the Group of experts adopted an Opinion on the Prolongation of the latest Post-Chernobyl Regulation – Council Regulation 733/2008 amended by Council Regulation 1048/2009[48] and an Opinion on the Proposal for a Directive of the European Parliament and of the Council on the protection of persons reporting on breaches of Union law (COM(2018) 218 final[49].

3.8.3. *Article 37 Group of Experts*

Under Article 37 of the Treaty Euratom Treaty, each Member State shall provide the Commission with general data relating to any plan for the disposal of radioactive waste in whatever form. On the basis of these data and following consultation of the Group of Experts referred to in Article 31, the Commission shall determine whether the implementation of such a plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State and deliver its opinion within six months.

The Group of Experts referred to in Article 37 and created pursuant to Article 31 was, originally, the same as the group participating in the development of the basic safety standards and therefore comprised mainly public health experts. However, given the technical problems inherent in examining general data relating to the disposal of radioactive waste from fuel cycle facilities, the Commission decided, very early on, to ask the Scientific and Technical Committee (the STC created pursuant to Article 134 of the Euratom Treaty, and, pursuant to Article 31, responsible for the appointment of experts to the group mentioned in Article 31), to appoint another group of scientific experts for the activities coming under Article 37. Members are appointed to the group every five years. The chairmanship of the group follows that of the Council of the EU.

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[48] ***https://ec.europa.eu/energy/sites/ener/files/opinion_on_prolongation_of_post-chernobyl_regulations_15_november_2018.pdf.***

[49] ***https://ec.europa.eu/energy/sites/ener/files/opinion_of_article_31_goe_on_the_whistler-blower_directive.pdf.***

The Group adopted its own Rules of Procedure in 2018[50].

Nevertheless, for a project presented by the Member State holding the Presidency, the chairmanship is assured by an expert from the Member State which held the previous Presidency or is due to hold the following one. The Secretariat of the Article 37 Group of Experts is provided by the Commission.

In the years 2012-2018, the Commission delivered sixty-two opinions. The opinions delivered are increasingly focusing on decommissioning and dismantling plans as well as radioactive waste management plans.

In this period, the Commission delivered three opinions that concerned new build of power reactors. Units 1+2 (two EPR reactors) at the Hinkley Point C site in the United Kingdom[51] and Units 3+4 (two VVER reactors) at the Mochovce site in Slovakia (both in 2012). Units 1+2 (two UK-ABWR reactors) at the Wylfa Newydd site in the United Kingdom (in 2018).

3.9. Nuclear safety research supported by Euratom

Euratom supports nuclear safety-related research through the Euratom Research and Training Programmes (hereinafter the "Euratom Research Programme"). Article 7 of the Euratom Treaty foresees the establishing of multi-annual Community research and training programmes in the fields of nuclear energy and uses of radiation. A significant part of this research falls within the scope the Convention. Euratom activities in the area of nuclear fission and radiation protection have been thoroughly reviewed, in the context of the post-Fukushima era.

The Euratom Research Programme was established by the Council Regulation (Euratom) N°1314/2013 of 16 December 2013 for five years: 2014-2018. ***It was extended for 2019-2020 by the Council Regulation (Euratom) N° 2018/1563 of 15 October 2018.***

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50 ***https://ec.europa.eu/energy/sites/ener/files/documents/rules_of_procedure_art37_goe.pdf.***

51 ***The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

Nuclear safety is one of the main Euratom Research Programmes objectives and is covered in all its aspects with this aim to reduce risk associated with radiation exposures from medical or industrial applications, and to support emergency preparedness and response in relation to accidents involving radiation.

The Euratom Research Programme also aims to sustain the development of fusion energy in view of developing fusions as a credible option for commercial low-carbon energy production. Other, equally important, tasks of the Euratom Research Programme will be advancing solutions for the management and disposal of spent fuel and radioactive waste, and for nuclear decommissioning.

The Euratom Research Programme provides research grants to universities and both private and public research entities through competitive calls for proposals (so-called indirect actions, managed by the Commission's Directorate-General for Research and Innovation), and funds research carried out by the Commission's Joint Research Centre, JRC (so-called direct actions).

The Commission adopted in June 2018 a proposal[52] for the Euratom Research Programme for the period 2021-2025 as a part of the legislative package for Horizon Europe. The Commission proposed to pursue the current programme's research activities, to expand research in non-power applications of ionising radiation, and to make improvements in the areas of education, training and access to research infrastructure.

3.9.1. *Nuclear research and training activities implemented through indirect actions*

The scope of indirect actions to implement the safety-related objectives of the Euratom Research Programme is specified in Annex I of the Council Regulation (Euratom) N°1314/2013 and include***s*** several specific objectives such as:

[52] ***Proposal for a Council Regulation establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe – the Framework Programme for Research and Innovation; COM(2018) 437 final.***

(a) Supporting safety of nuclear systems through joint research activities regarding the safe operation and decommissioning of reactor systems in use in the Union or, to the extent necessary in order to maintain broad nuclear safety expertise in the Union, those reactor types which may be used in the future, focusing exclusively on safety aspects, including all aspects of the fuel cycle such as partitioning and transmutation.

(b) Contributing to the development of safe, longer term solutions for the management of ultimate nuclear waste, including final geological disposal as well as partitioning and transmutation through joint and/or coordinated research activities on remaining key aspects of geological disposal of spent fuel and long-lived radioactive waste with, as appropriate, demonstration of technologies and safety. Support is to be provided also to research activities related to the management of other radioactive waste streams for which industrially mature processes currently do not exist.

(c) Supporting the development and sustainability of nuclear expertise and excellence in the Union, through the promotion of joint training and mobility activities.

(d) Supporting radiation protection and development of medical applications of radiation.

(f) Ensuring availability and use of research infrastructures of pan-European relevance.

For the implementation of the Euratom ***R***esearch ***P***rogramme, the European Commission adopted ***four*** work programmes ***(***2014-15, 2016-17, ***2018, and 2019-2020). The work programmes specify scope of research actions funded through competitive calls for proposals.***

3.9.1.1. Overview of the research and training actions funded by the Euratom Research Programme

The activities under call 2014-15 were organised in five main sections: A) Support safe operation of nuclear systems, EUR 26.5 million; B) Contribute to the development of solutions for the management of ultimate radioactive waste, EUR 16.5 million; C) Foster Radiation Protection, EUR 20 million; D) Cross-cutting aspects for Nuclear Fission and Radiation Protection, EUR 15.5 million; E) Support the development of nuclear competences at Union level and socio-economic aspects, EUR 12 million. 23 projects are funded for a total amount of EUR 90 million.

The activities under call 2016-17 were organised in six main sections: A) Support safe operation of nuclear systems, EUR 60 million; B) Contribute to the development of solutions for the management of radioactive waste, EUR 19.5 million; C) Foster radiation protection, EUR 10 million; D) Management of research reactor availability in Europe, EUR 6.5 million; E) Support the development of nuclear competences at EU level, EUR 5 million; F) Fission/fusion cross-cutting actions, EUR 8 million. 25 projects are funded for a total amount of EUR 109 million.

Regarding the safe operation of nuclear systems, three call topics focus on safety of existing (Generation II and III) and future (Generation IV and smaller modular reactor designs) nuclear power plants. This research is to be complemented by two further topics investigating safety of closed nuclear fuel cycles and pursuing materials research for Generation IV designs. Regarding solutions for the management of radioactive waste, the call topics address three different issues.

The first concerns deep geological disposal of radioactive waste and in particular validation of the properties of engineered barrier materials and the confirmation of performance of engineered barrier systems.

The second supports research for the overall management of radioactive waste other than geological disposal and encompasses the characterisation and treatment of different sorts of radioactive waste such as legacy waste, and waste arising from refurbishment or decommissioning. Particular attention is paid to the long-term safety of waste storage, the minimisation of the volume and of the toxicity of waste, as well as to the facilitation of waste handling and management. The third topic supports knowledge sharing and development of skills on radioactive waste management.

In the field of radiation protection, the 2016-2017 Work Programme supports research on impacts of low-dose exposure by funding epidemiology studies of people undergoing radiology procedures. This should allow the formulation of practical recommendations and improving protection of patients and staff in everyday medical practice.

Two further topics of the 2016-17 Work Programme address important strategic priorities for Europe, namely security of supply for nuclear fuel for research reactors and coordination of their exploitation. The development of adequate nuclear fuel, particularly important in view of the conversion from HEU to LEU, is also expected to contribute to the sustainable supply of medical radioisotopes. The coordination of the exploitation of research reactors aims at optimising the use of irradiation time in research reactors in order to avoid disruptions and delays in experiments and technical applications.

The fifth thematic area addressed in the 2016-17 Work Programme focuses on human resources and potential through inviting proposals for training schemes and grant programmes in order to maintain an adequate number of educated and trained nuclear researchers and professionals. The sixth theme concerns cross-cutting research of importance both in nuclear fission and fusion, and addresses the areas of multi-scale modelling of materials and tritium management.

The 2018 Work Programme (WP 2018) provides support of approximately Euro 69 million, through a competitive call for proposals, covering 11 different topics grouped under seven themes that address important challenges in nuclear research.

The most important research topic supported by WP 2018 is the European Joint Research Programme in the management and disposal of radioactive waste (EJP). This EJP with Euratom contribution of approximately EUR 32 million aims at increasing the knowledge for the safe start of operation of the world's first geological disposal facilities for high-level and long-lived radioactive waste in the advanced EU Member States within the next decade while also advancing all EU Member States' national programmes as rapidly as possible. EJP will also improve and develop science and technology for the management and disposal of other radioactive waste categories.

Regarding safe operation of nuclear systems (approximately EUR 17 million available for research grants), three call topics focus on safety of existing (Generation II and III) and future (Generation IV and smaller modular reactor designs) nuclear power plants. WP 2018 introduces the topic focused on provision of reliable nuclear data and IT tools to be used for different nuclear energy and non-energy applications.

WP 2018 supports development of a roadmap for decommissioning research aiming at safety improvement, environmental impact minimisation and cost reduction. In the field of radiation protection (EUR 7.5 million available), WP 2018 aims at funding research, complementing previous actions launched in 2014-2017, improving knowledge in the fields of human health effects of ionising radiation, radiation biology epidemiology, dosimetry, emergency preparedness and radioecology. WP 2018 also supports development of strategy for the exploitation of research results funded under previous Euratom Research and training Programmes in the field of radiation protection.

The fifth thematic area addressed in the WP 2018 (approximately EUR 4 million) focuses on education and training needed to sustain nuclear competencies. WP 2018 provides funding for a scheme supporting access to equipment and facilities of EU nuclear research laboratories for graduate and post-graduate students, researchers and technicians. In addition, each research action supported by WP 2018 is required to dedicate at least 5% of the total action budget to education and training activities for PhD students, postdoctoral researchers and trainees.

The WP 2018 introduces also a new action (approximately EUR 4 million) for encouraging innovation in nuclear safety. Its aim is to support technology transfer from the research community to the industry, exploiting innovative aspects of previous research funded by the Euratom Programme in the area of safety of nuclear installations, decommissioning, radiation protection and radioactive waste management. This action should focus on closer-to-the-market activities including prototyping, testing, demonstrating, piloting and scaling-up for new or improved products, processes or services.

Euratom Research Programme 2019-2020 provides support of approximately EUR 152 million for nuclear safety fission research under indirect actions. WP 2019-2020 will support research and training in both fission and fusion. Most of the funding in fusion research is for supporting implementation of the European fusion roadmap by the EUROfusion consortium.

On nuclear fission, WP 2019-2020 focuses again on the safety of nuclear systems, radiation protection and radioactive waste management. Particular attention is given to bringing innovation in the safety of reactors and in decommissioning by supporting technology transfer from the research community to industry.

WP 2019-2020 also contains research topics and actions in nuclear fission to support the implementation of the Nuclear Safety Directive and other related legislation.

On radiation protection, WP 2019-2020 supports further integration of research in this field, preparation of a research roadmap for medical applications of ionising radiation and ensuring their safe use. For research infrastructures, WP 2019-2020 launches important actions aiming to maximise the safety of existing and future research reactors.

3.9.1.2. Implementation of Euratom indirect actions

Indirect actions supported by the Euratom Research Programme are implemented by different research stakeholders (universities, industry, national laboratories, ***research institutes etc.***).

The Sustainable Nuclear Energy Technology Platform (SNETP), launched in September 2007, brings together all the key nuclear industrial and research organisations in Europe around a common vision for nuclear systems and safety-related research and development. The platform's Strategic Research and Innovation Agenda (SRIA), ***provides*** technology roadmaps and deployment strategies supporting the identification of opportunities for international cooperation[53].

Particularly for Generation II & III nuclear systems, members of SNETP have created, in November 2011, an international non-profit making organisation: the NUclear GENeration II & III Association (NUGENIA)[54].

The Implementing Geological Disposal Technology Platform (IGD-TP) was launched in November 2009. It provides the necessary focus in the lead up to the operation of geological repositories for high-level nuclear waste in Europe. ***The*** Coordination and Support Action "Towards a Joint Programming on Radioactive Waste Disposal" (the JOPRAD project***)*** supported by the ***2014-2018*** Euratom Research Programme prepare***d*** a proposal for a Joint Programme in the field of Radioactive Waste Management, including geological disposal***.***

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53 http://www.snetp.eu.

54 NUclear GENeration II & III Association (NUGENIA) under 1921 Belgian law - http://www.nugenia.org/.

In the area of radiation protection, the Multidisciplinary European Low Dose Initiative ***(MELODI*** -a non-profit making association) ***is*** focussing on research related to the impact of low dose radiation ***and cooperating*** with partner associations in radio-ecology, dosimetry, emergency management[55], as well as with five medical associations[56]. Effective cooperation between these various scientific communities and the coherent integration of their activities are key ***conditions for the success of the*** European Joint Programme (EJP)[57] in this field.

The above stakeholders groups are also instrumental in the design and implementation of nuclear education and training actions**.**

Euratom provides its contribution to the international cooperation on nuclear safety also under the legal framework of different bilateral cooperation agreements as follows: the Research & Development-PUNE Cooperation Agreement with China, the Technical Arrangement on nuclear safety research with the USA, and the Cooperation Agreements on nuclear safety with Russia, Ukraine, and Kazakhstan. Furthermore, ***Switzerland and Ukraine (as of 2016) became the associated countries for the Euratom Research Programmes These two associated countries and*** several third countries (Canada, Japan, Mexico, Norway, Russia, ***Korea*** and the USA) are participating in Euratom nuclear safety projects launched following ***Euratom H2020 Calls for proposal.***

Details of all ***Euratom research*** projects are available at***:*** ***http://cordis.europa.eu***.

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55 ALLIANCE – European Radioecology Alliance, EURADOS – European Radiation Dosimetry Group, NERIS – European Platform on preparedness for nuclear and radiological emergency response and recovery.

56 EANM – European Associations of Nuclear Medicine, EFOMP – European Federation of Organisations in Medical Physics, EFRS – European Federation of Radiographer Societies.

57 CONCERT: http://www.concert-h2020.eu.

3.9.2. Research and training activities implemented by direct actions and carried out by the Commission's JRC

The main activities of the JRC under the Euratom Research and Training Programme is to support both the Commission and Member States in fulfilling their Euratom Treaty's obligations, as well as contribute to the nuclear safety research needed for safe, secure and peaceful use of nuclear energy and other non-fission applications, and provide a scientific basis for the relevant Union policies.

For the extension to 2019-2020 of the Research and Training Programme of the European Atomic Energy Community the general objective continues to be pursuing nuclear research and training activities with an emphasis on continuous improvement of nuclear safety, security and radiation protection, notably to potentially contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

The specific objectives for the 2019-2020 remain the same as in the 2014-2018 period, including: improving nuclear reactor and fuel safety, radioactive waste management, including final geological disposal, partitioning and transmutation; decommissioning; emergency preparedness; increasing excellence in the nuclear science base for standardisation; fostering knowledge management, education and training; and supporting the policy of the Union.

The main JRC activities related to nuclear reactor and fuel safety are:

- Further developing the "EU Nuclear Safety Clearinghouse for Operational Experience Feedback", (organised via a network of EU regulators and Technical Support Organisations (TSOs), and operated by a centralised office located at the JRC). In this frame, the JRC regularly delivers topical reports on subjects important to the safe operation of European NPPs, and publishes quarterly reports on worldwide NPP operational events[58]. ***In 2017, the nuclear safety authority and the technical support organisation of Ukraine joined this network.***

- Providing regular technical support for the implementation of EU instruments promoting the improvement of nuclear safety outside the EU. This includes technical input for the development and implementation of projects of the Instrument for Nuclear Safety Cooperation (INSC).

[58] https://clearinghouse-oef.jrc.ec.europa.eu/.

- Providing technical support for the implementation of EU policy in the area of nuclear safety in particular the implementation of Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations and of Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste***. Of particular note since the last review meeting are: (a) the support provided for the transposition and monitoring of the implementation of the Directives and (b) the participation in the first Topical Peer Review required by the amended Nuclear Safety Directive on ageing management of nuclear power plants and research reactors.***

- In the framework of the lessons-learnt from Fukushima, ***the JRC is continuing*** specific efforts to better assess plant behaviour beyond the design base accidental conditions. ***In close cooperation with the OECD/NEA and the IAEA Trask Groups, the JRC*** has been developing research in nuclear severe accident management and prevention modelling (including the source term)***.*** Activities ***remain focused on*** modelling as well as dedicated experiments to characterise degraded/molten fuel in view of developing accident mitigation strategies and techniques for the remediation of a severe accident site. In this context, ***JRC participates to the OECD/NEA TCOFF (Thermodynamic Characterisation Of Fuel debris based on scenario analysis of severe accident progression at Fukushima Daiichi Nuclear Power Station) and the PreADES (Preparatory Study on Analysis of Fuel Debris) projects. The JRC is also actively contributing in the framework of the ASCOM (AStec COMmunity) collaborative project to the development of the ASTEC code, the European R&D reference code for severe accident assessment.***

- Production and qualification of reference samples and scientific data for safety assessment of both conventional and innovative nuclear fuels under operational, transient and accident conditions. These data provide input to the continuous upgrades of computer codes such as the TRANSURANUS code developed by the JRC.

- ***JRC provides nuclear reference data, material and measurements, and contributes*** to international databases of high accuracy nuclear reference data for nuclear energy and non-fission applications, in cooperation with IAEA and OECD-NEA.

- Reducing uncertainties associated with geologic repository of nuclear waste, and at implementing safe decommissioning, this taking into account that long-term storage (up to a few hundred years) of spent fuel as well as retrievability and recoverability requirements are becoming an option considered in several EU Member States.

- Pre-normative R&D and the participation in Materials Codes and Standards. The JRC carries out studies on structural materials performance and component integrity of nuclear materials, materials qualification, inspection and design in view of the safe long-term operation of nuclear power plants.

- The JRC is the Euratom implementing agent for the Generation IV International Forum (GIF) research and contributes to the development of evaluation methods to assess and compare safety and performance of next generation reactors, fuels, and fuel cycles concepts. ***In this context, the JRC is ensuring that the safety approach of innovative systems is in line with the principles indicated by the Nuclear Safety Directive.***

- Maintaining and further improving the operability of the Commission's tools for exchange of information in case of nuclear emergency (ECURIE), and routine environmental monitoring and exchange of data (***REMdb and*** EURDEP). Improvements include the further development ***and upgrades*** of the WebECURIE software (with full compatibility with IAEA systems) ***and of the EURDEP technology.***

- Regarding the routine environmental monitoring, the JRC maintained and upgraded the **REMdb and** EURDEP databases and provided regular training courses to Member States. ***New functionality for the support of international exercises was also introduced and tested***. Annual inter-comparison harmonisation exercises[59] with the national EU laboratories were also undertaken.

[59] ***See https://remon.jrc.ec.europa.eu/Services/Proficiency-Tests.***

- Support to the implementation of the BSS, and, in particular to the preparation of the European Atlas of Natural Radiation[60]. ***This Atlas is a collection of maps displaying the levels of natural radioactivity caused by different sources. It has been made available in digital format through a web portal, as well as the methodology and results for the maps already developed. So far, the digital Atlas contains: an annual cosmic-ray dose map; a map of indoor radon concentration; maps of uranium, thorium and potassium concentration in soil and in bedrock; a terrestrial gamma dose rate map; and a map of soil permeability. It helps the public: (a) familiarise itself with natural environmental radioactivity; (b) be informed about the levels of natural radioactivity caused by different sources; (c) have a more balanced view of the annual dose received by the European population, to which natural radioactivity is the largest contributor; (d) compare doses from natural sources of ionizing radiation and those from man-made (artificial) ones, hence, to better assess the latter***.

- Strengthening nuclear knowledge management and dissemination, ***and tackling the challenges of maintaining a qualified nuclear workforce to ensure the safety of present and future nuclear energy, decommissioning and waste management requirements. The latter are being addressed through the monitoring and analysis of human resources and on training and education needs,*** a broader, open access programme to the JRC research infrastructures, ***specific*** education and training courses for students and professionals, and the organisation and coordination of competence building and related activities.

3.10. Continuation of existing programmes and initiatives

3.10.1. European Union financial assistance to decommissioning

Upon their accession to the EU, Bulgaria, Lithuania and Slovakia committed to close down eight Soviet-designed nuclear power plants before the end of their scheduled lifetime. In exchange, the EU committed to provide financial assistance to the three Member States for decommissioning the designated power plants, namely:

[60] ***https://remon.jrc.ec.europa.eu/About/Atlas-of-Natural-Radiation.***

- Kozloduy Nuclear Power Plant (NPP) units 1 to 4 in Bulgaria;
- Ignalina NPP in Lithuania; and
- Bohunice V1 NPP in Slovakia.

Since 2014, the scope of the nuclear decommissioning assistance programmes[61, 62] is to assist the relevant Member States in implementing the steady process towards the decommissioning end-state whilst ensuring that the highest safety standards are applied.

In all three cases, the end-state is defined as brownfield: the nuclear reactor buildings will be dismantled as well as those auxiliary buildings that are not intended for re-use; near-surface repositories will be built or upgraded to dispose of low and intermediate level radioactive waste from decommissioning; and interim storage facilities will be commissioned for spent fuel and radioactive waste that cannot be disposed of in near-surface repositories.

Beyond decommissioning the disposal of spent fuel and radioactive waste in a deep geological repository is developed by each Member State in its national programme for the management of spent fuel and radioactive waste as required by the relevant directive[63].

The current assistance programme provides no new financial support for mitigation measures in the energy sector[64]. ***The*** implementation of existing projects will, however, continue for several years.

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[61] Council Regulation (Euratom) No 1368/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programmes in Bulgaria and Slovakia, and repealing Regulations (Euratom) No 549/2007 and (Euratom) No 647/2010 (OJ L346, 20.12.2013, p.1) & correction (OJ L8, 11.1.2014, p.31).

[62] Council Regulation (EU) No 1369/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programme in Lithuania, and repealing Regulation (EC) No 1990/2006 (OJ L346, 20.12.2013, p.7) & correction (OJ L8, 11.1.2014, p.30 & OJ L121, 24.4.2014, p.59).

[63] Council Directive 2011/70/Euratom of 19 July 2011 on establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L199, 2.8.2011, p. 48-56.

[64] In previous financial frameworks, EU financial assistance was established to support Member States to safely decommission reactors subject to early closure and to implement mitigation measures in the energy sector, such as replacement capacity, environmental upgrading, modernisation and energy efficiency.

Article 2 of each of the two regulations defines the main specific objectives of the decommissioning programmes for the 2014-2020 funding period. These objectives were further detailed in implementation procedures[65] adopted by the Commission in August 2014 and new baselines were established for each decommissioning programme up to the respective end-state.

In June 2018, the Commission established the mid-term evaluation report[66] of the nuclear decommissioning assistance programmes. It concluded that the three Member States made effective and efficient progress in decommissioning their respective nuclear power plant. Based on a revision of the detailed decommissioning plans, the mid-term evaluation report confirmed that no additional funding is needed in the current multiannual financial framework (MFF) (2014-2020) and that the programmes should be continued after 2020.

At the same time, the Commission adopted two proposals[67] for the continued support to decommissioning activities in Bulgaria, Lithuania and Slovakia in the MFF 2021 – 2027. In particular, the proposed co-funding after 2021 will enable Bulgaria and Slovakia to complete the decommissioning of the concerned reactors, and support Lithuania to continue safely and steadily the decommissioning of the Ignalina nuclear power plant, a first-of-a-kind process of unprecedented scale whereby graphite-cores must be dismantled.

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65 Commission Implementing Decision of 7.8.2014 on the rules of application for the nuclear decommissioning assistance programmes for Bulgaria, Lithuania and Slovakia for the period 2014-2020 — C(2014) 5449 final.

66 ***Report from the Commission to the European Parliament and the Council on the evaluation and implementation of the EU nuclear decommissioning assistance programmes in Bulgaria, Slovakia and Lithuania — COM(2018) 468 final.***

67 ***Proposal for a Council Regulation establishing the nuclear decommissioning assistance programme of the Ignalina nuclear power plant in Lithuania (Ignalina programme); and repealing Council Regulation (EU) No 1369/2013 - COM(2018) 466 final. Proposal for a Council Regulation establishing a dedicated financial programme for decommissioning of nuclear facilities and management of radioactive waste, and repealing Council Regulation (Euratom) No 1368/2013 - COM(2018) 467 final.***

3.10.2. *Euratom loans*

Euratom gives loans to finance investment in nuclear installations for the industrial production of electricity or the nuclear fuel cycle in Member States. It also gives loans to finance projects for improving nuclear safety in certain non-Member States.

This lending instrument was established by Council Decision 77/270/Euratom of 29 March 1977[68] empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations (the "Establishing Decision") in Member States. The ceiling for borrowing to fund Euratom lending was originally fixed by Council Decision 77/271/Euratom of 29 March 1977[69]. Subsequently, by various amendments of that Decision, the latest of which[70] increased it by 1 000 million **EUR** to 4 000 million **EUR**, the scope of the Euratom lending instrument was extended.

In a Decision dated 21 March 1994[71] the Council authorised the Commission to contract Euratom borrowings in order to contribute to the financing required for improving the degree of safety and efficiency of nuclear power stations in certain non-Member countries (the "Scope Extension Decision"). The proceeds of these borrowings would be assigned, in the form of loans, to the funding of projects to increase the safety and efficiency of the nuclear facilities in certain CEEC and NIS.

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68 Council Decision 77/270/Euratom of 29 March 1977 empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations, OJ L 88, 6.4.1977, p. 9–10.

69 Council Decision 77/271/Euratom of 29 March 1977 on the implementation of Decision 77/270/Euratom empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations, OJ L 88, 6.4.1977, p. 11.

70 Council Decision 90/212/Euratom of 23 April 1990, OJ No L 112, 03.05.1990, p 26.

71 Council Decision of 21 March 1994 amending Decision 77/270/Euratom to authorize the Commission to contract Euratom borrowings in order to contribute to the financing required for improving the degree of safety and efficiency of nuclear power stations in certain non-member countries, OJ L-84, 29.03.1994 p 4.

In the last years, Euratom loans have been granted to three projects: the safety upgrade of the Kozloduy Power Plant Units 5 and 6 in Bulgaria, the completion of Cernavoda Power Plant Unit 2 in Romania, and the safety upgrade of Khmelnitsky Power Plant Unit 2 and Rovno Power Plant Unit 4 in Ukraine.[72]

In 2013, a Euratom loan has been granted to the project "Complex (Consolidated) Safety Upgrade Program of Nuclear Power Units" in Ukraine. ***The Euratom Loan Agreement became effective, following the implementation of the conditions precedent attached to the loan. A first tranche of EUR 50 million was disbursed in May 2017. A second tranche, also of EUR 50 million, was disbursed in July 2018. The remaining EUR 200 million are expected to be funded and distributed over the course of 2019 and 2020, depending on the progress of the project.***

3.10.3. *European Nuclear Energy Forum - ENEF*

In the framework of the European Council Summit of 8 and 9 March 2007, the Heads of State and Government had an exchange of views on the contribution of nuclear energy in meeting the growing concerns about security of energy supply, reduction of CO_2 emissions and competitiveness, while taking fully into account nuclear safety and security aspects. In the Presidency conclusions[73], they also endorsed the Commission proposal to organise a broad discussion among all relevant stakeholders on the opportunities and risks of nuclear energy.

Since 2007 the European Nuclear Energy Forum (ENEF) has aimed to provide a unique platform for organising a broad discussion on opportunities and risks of nuclear energy, free of any "taboos", among all relevant stakeholders in the nuclear field: governments of the 28 EU Member States, European Institutions, including the European Parliament and the European Economic and Social Committee, nuclear industry, electricity consumers and the civil society.

The plenary meeting took place on 29-30 April 2019, in Prague. It covered the topics of "Ageing and long term operation of nuclear power plants in Europe" and "2050 Long term strategy", as recently outlined by the Commission in its strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050 – A Clean Planet for All.

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72 http://ec.europa.eu/economy_finance/financial_operation _instruments/financing_investment75_en.htm.

73 Council of the European Union Document No. 7224/1/07 REV 1 of 2 May 2007 (not published in the Official Journal), http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf.

4. OTHER SAFETY RELATED ACTIVITIES

4.1. Radioactive Waste and Spent Fuel Management

On 19 July 2011 the Council adopted the "Radioactive waste and spent fuel management Directive"[74], proposed by the Commission on 3 November 2010.

The Directive, which came into force on 22 August 2011, obliges Member States to establish a national legislative, regulatory and organisational framework covering all aspects of the management of spent fuel and radioactive waste from generation to final disposal. Member States were required to transpose the directive into their national legislation and inform the Commission of the relevant provisions before 23 August 2013.

To date all Member States have notified the Commission of their full transposition of the Directive. ***Following the assessment of the notified measures, the Commission decided to send letters of formal notice for incorrect transposition of the Directive to 15 Member States in May and June 2018.***

In addition, under the Directive, each Member State must prepare a national programme, which states, amongst others, their national policy together with their plans and measures for the implementation of the policy to ensure the responsible and safe management of spent fuel and radioactive waste, including plans for disposal of these materials.

National programmes had to be notified to the Commission not later than 23 August 2015. ***All Member States, but one, have submitted their national programme. This Member State was referred to the Court of Justice for its failure to notify its national programme.***

[74] Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L199 of 2.8.2011, p. 48-55.

The Commission, after requesting clarification from the Member States on the final programmes, decided to send letters of formal notice to 17 Member States in May 2018 for the non-compliance of their programmes with the requirements of the Directive. A similar letter was also sent to one additional Member State in January 2019. The Commission is now in dialogue with the Member States to solve the issues raised in the letters of formal notice. At the time of the preparation of this Report, Member States concerned are in the process of carrying out the necessary follow up.

Member States had to report on the implementation of the ***Directive*** by 23 August 2015 and every three years thereafter. ***On the basis of the first reports submitted by the Member States, the Commission adopted in May 2017 its first report to the Council and the European Parliament on the status of implementation of the Directive in the Member States and on the inventory of spent fuel and radioactive waste on the EU territory, in line with Art 14 of the Directive.***

The second reports by Member States on the implementation of the Directive had to be notified by 23 August 2018. All Member States, have, at the time of the preparation of this Report, submitted their reports. The Commission is planning to submit its second report to the Council and the Parliament on the implementation of the Directive by the end of 2019.

Moreover, as a Contracting Party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the Euratom Community presented a report on the implementation of this Convention ***during*** the review meeting of ***May*** 2018.

4.2. Shipments of radioactive waste and spent fuel

Council Directive 2006/117/Euratom[75] lays down a Community system of supervision and control of transboundary shipments of radioactive waste and spent nuclear fuel, so as to guarantee an adequate protection of the population. This Directive applies to transboundary shipments whenever the country of origin or the country of destination or any country of transit is a Member State of the Community.

The first report on the implementation of the Council Directive 2006/117/Euratom**[76]** was adopted by the Commission in April 2013**[77]**, ***while the second report was adopted in January 2018***[78].

The ***third*** notification of the shipments carried out by Member States in the period 201***5***-201***7*** had to be submitted by 25 December 201***8***, according to Art 20 of Council Directive 2006/117/Euratom.

To date all Member States have notified their reports to the Commission. The Commission is assessing the reports, and plans, in accordance with Article 21 of this Directive, to present a summary report for the European Parliament, the Council and the European Economic and Social Committee, ***in late*** 201***9.***

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75 ***Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel between Member States and into and out of the Community; OJ L337 of 5.12.2006 p 21-32.***

76 Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel between Member States and into and out of the Community; OJ L337 of 5.12.2006 p 21-32.

77 Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the implementation by the Member States of Council Directive 2006/117 EURATOM on the supervision and control of shipments of radioactive waste and spent fuels, COM (2013) 240 final, 25.4.2013.

78 ***Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on Member States implementation of Council Directive 2006/117 EURATOM on the supervision and control of shipments of radioactive waste and spent fuel, Second Report COM (2018) 6 final, 19.1.2018.***

SECTION III

IMPLEMENTATION OF THE CONVENTION

ARTICLE BY ARTICLE REVIEW

1. ARTICLE 6: EXISTING NUCLEAR INSTALLATIONS

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.[79]

Euratom does not possess, nor operate any nuclear installations as defined in Article 2(1) of the Convention. Such nuclear installations exist only in the territories of the Member States of the European Atomic Energy Community, to which the Euratom Treaty applies.

[79] Not applicable according to the revised Declaration of Competences (Annex 1; see Chapter 4 Statement of the Commitment of the Contracting Party to the Convention, p. 17 and Annex 1), which takes into account the Judgement of the Court of Justice of the European Union in case 29/99.

Council Directive 2009/71/Euratom, as amended by Council Directive 2014/87/Euratom, establishing a Community framework for the nuclear safety of nuclear installations (collectively referred to hereinafter as the "amended Nuclear Safety Directive") applies to a wider range of nuclear installations than the Convention. This Directive applies to any civilian nuclear installation subject to a licence as defined in Article 3(4)[80], and at all stages covered by this licence (including the decommissioning stage). This means that the Nuclear Safety Directive applies to nuclear power plants, enrichment plants, nuclear fuel fabrication plants, reprocessing plants, research reactor facilities, spent fuel storage facilities and also to storage facilities for radioactive waste that are on the same site and are directly related to the abovementioned nuclear installations.

2. ARTICLE 7: LEGISLATIVE AND REGULATORY FRAMEWORK

(1) Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.

(2) The legislative and regulatory framework shall provide for:

i. The establishment of applicable national safety requirements and regulations;

ii. A system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;

iii. A system of regulatory inspection assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;

iv. The enforcement of applicable regulations and the terms of licences.

This section summarizes the existing legislative system affecting the safety of nuclear installations in the Member States and includes statements with regard to the adequacy and effectiveness of that system.

[80] All references here to articles under Council Directive 2009/71/Euratom as amended by Council Directive 2014/87/Euratom refer to the consolidated version of the text available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1408542850618&uri=CELEX%3A02009L0071-20140814.

2.1. Article 7(1) - The legislative and regulatory framework governing the safety of nuclear installations

This section introduces the legal system of the European Atomic Energy Community (hereinafter referred to as 'Euratom') and its relationship to the national laws of the Member States of the European Union. It gives an overview on the legislative procedure on the basis of the Euratom Treaty.

2.1.1. *The Euratom Treaty*

The Treaty establishing the European Atomic Energy Community (hereinafter: Euratom Treaty) provides the legal framework for the competences and activities of the European Atomic Energy Community. The signatories of the Euratom Treaty stated in the Preamble to the Treaty that they were in particular:

- Anxious to create the conditions of safety necessary to eliminate hazards to the life and health of the public;
- Desiring to associate other countries with their work and to cooperate with international organisations concerned with the peaceful development of atomic energy.

These statements are in complete accordance with the objectives of the Convention, as set out in Article 1 thereof.

There are three types of Euratom law: The primary law is the Euratom Treaty. The secondary law are regulations, directives, decisions, recommendations and opinions on the basis of the Treaty adopted by the EU Institutions (the Commission or the Council, which are also Euratom Community Institutions). The final source of law is the case law including interpretation of treaties and institutional acts carried out by the Court of Justice of the European Union. The whole body of EU and Euratom law is jointly referred to as the "*acquis*".

Under the institutional provisions of the Euratom Treaty, Euratom possesses its own mechanisms to control the compliance of the national laws of all Member States with the relevant Community legal acts. This includes the possibility to accordingly obtain a judgement by the Court of Justice of the European Union, based in Luxembourg.

The relationship between the legal acts adopted by Euratom and national legislation of the Member States of the European Union (hereinafter referred to as 'Union') is as follows according to Article 288 of the Treaty on the Functioning of the European Union (TFEU):

> *"To exercise the Unions competences,* the institutions *shall* adopt *regulations, directives, decisions, recommendations or opinions.*
>
> *A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States.*
>
> *A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods.*
>
> *A decision shall be binding in its entirety. A decision which specifies those to whom it is addressed shall be binding only upon them.*
>
> *Recommendations and opinions shall have no binding force."*

Member States must take all appropriate measures, whether general or particular, to ensure the fulfilment of the obligations arising out of the Euratom Treaty or resulting from action taken by the institutions of the Community. They have to facilitate the achievement of the Community's tasks and abstain from any measure which could jeopardize the attainment of the objectives of the Euratom Treaty (Art. 192 Euratom).

With effect of 1 January 2010, Article 13 of the Treaty on the European Union establishes the common institutional framework for both the European Union and Euratom. In accordance with Article 106a paragraph 1 of the Euratom Treaty, Articles 223 to 287 of the Treaty on the Functioning of the European Union describe the methods, responsibilities and measures of the individual institutions which are available for both Euratom and the European Union with more detail.

With the Lisbon Treaty, the European Council[81] – commonly known as "EU Summit" – officially gains the status of an EU institution, thus being separated from the Council of Ministers or Council of the European Union. The European Councils task is to define the general political direction and priorities of the European Union. It is composed of the heads of state or government of the Union's Member States along with the (nonvoting) President of the Commission. The new position of a long-term (2½ years term) President of the European Council has been introduced with the Lisbon Treaty to represent the European Union to third countries. The High Representative of the Union for Foreign Affairs and Security Policy has been established to a united position on EU policies. The conclusions of the European Council are referred to as "European Council Presidency Conclusions".

The Council[82] exercises the legislative and - together with the European Parliament - the budgetary functions, as well as policy-making and coordinating functions. It consists of the respective ministers of national governments of each Member State**.** The Council shares with the European Parliament only the responsibility for passing general EU laws and taking general EU policy decisions. Under the Euratom Treaty the Council only consults the European Parliament and then decides alone on the legislation proposed by the Commission, The Lisbon Treaty has established the use of qualified majority voting in the Council as the ordinary voting procedure in almost every policy area[83]. Such legislative procedural meetings that include debate and voting in the Council of Ministers must now be ***made*** in public (televised). The Council meets in different configurations and is assisted by the General Secretariat. Each Member State presides over the Council for a six-month period. In addition a "Triple Presidency" is formed by three consecutive Presidencies in order to provide more continuity to their conduct.

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81 Articles 15 and 18 TEU and 235 to 236 TFEU.

82 Articles 16 TEU and 237 to 243 TFEU.

83 Taking effect in 2014, the definition of a qualified majority ***has changed***: A qualified majority is reached when at least 55% of all Member States, who comprise at least 65% of EU citizens, vote in favour of a proposal. When the Council of Ministers is acting on a proposal neither of the Commission nor of one of the High Representative QMV requires 72% of the Member States while the population requirement remains the same. To block legislation, at least 4 countries (representing at least 35% of the EU population) have to vote against the proposal. Hence, the voting powers of the Member States are based on their population, and are no more dependent on a negotiable system of voting points. The current rules for QMV, as set in the Treaty of Nice, require a majority of countries (50% / 67%), voting weights (74%), and population (62%). This rule ***remained*** in place until 2014. Between 2014 and 2017 a transitional phase ***took*** place where the new QMV rules ***applied***, but where the old Nice treaty voting weights ***could*** be applied when a member state wishe***d*** so. Moreover, from 2014 a new version of the 1994 "Ioannina Compromise" will ***took*** effect, which allows small minorities of EU states to call for re-examination of EU decisions.

The Members of the European Parliament[84] represent the citizens of the EU Member States. They are elected by direct universal suffrage for five years. The plenary sessions of the Parliament are held in Strasbourg, others in Brussels. Together with the Council of the European Union it exercises legislative and budgetary functions and functions of political control and consultation. In the framework of the Euratom Treaty, however, the Parliament has only a consultative role, although the Parliament and the Council share responsibility for approving the EU annual budget.

The Commission[85] is responsible for promoting the general interest of the Union and take appropriate initiatives to this end. It ensures the application of the Treaties and of measures adopted by the institutions. As the "Guardian of the Treaties" it oversees the control of Union and Euratom law under the control of the Court of Justice of the European Union, by initiating proceedings against Member States which did not implement Euratom law. It executes the budget and manages and has coordinating, executive and management functions. In its role as the manager and executor of common policies and of international trade relationships the Commission manages the EU budget, implements the agreed policies and programmes of the Communities, ensures the external representation of the EU and Euratom (with the exception of the common foreign and security policy) and negotiates external agreements with other countries on behalf of the EU. According to the Euratom Treaty, the Commission concludes also international agreements (Art. 101 of the Euratom Treaty). The Commission is independent of national governments and represents and upholds the interests of the Communities as a whole. In carrying out its duties the Commission is responsible to the European Parliament. While the Council and the Parliament may request legislation, the Commission is the only body that can formally propose new legislation. Having heard the opinion of consultative bodies provided for by the Euratom Treaty, the Commission presents the new proposals to the Council. The 28 Commissioners together form the Commission, or so called 'College', the Commission decision making body.

[84] Articles 14 TEU and 223 to 234 TFEU.
[85] Articles 17 TEU and 244 to 250 TFEU.

The Court of Justice of the European Union[86], including the Court of Justice and the General Court of the EU, ensures that the law is observed in the interpretation and application of the Treaty on the European Union, the Treaty on the Functioning of the European Union, the Euratom Treaty, binding international agreements entered into by the Union and/or Euratom and of the provisions laid down by the competent EU institutions. The Court of Justice has competence, inter alia, as regards actions against Member States for failure to fulfil obligations, references for a preliminary ruling and appeals against decisions of the General Court. It adjudicates most commonly on matters of interpretation of European Union law, raised by:

- Claims by the Commission that a Member State has not implemented a EURATOM Directive or other binding legal requirement, in the framework of an infringement procedure.

- Preliminary references made by national courts in the EU Member States asking the Court of Justice questions about the meaning or validity of a particular piece of EU law. The Court of Justice gives its ruling on the interpretation of the law, which is binding on the national court.

The General Court rules in principle on applications for annulment or actions for failure to act brought by a Member State, an institution or natural or legal persons if the latter are directly and individually concerned. A natural or legal person may also institute proceedings against a regulatory act which is only of direct concern to them and does not entail implementing measures.

[86] Articles 19 TEU 251 to 281 TFEU.

The legislation procedure for acts of secondary law (regulations, directives, decisions, recommendations and opinions) is laid down in the Euratom Treaty itself. For matters related to radiation protection and safety relevant to this convention, the Commission receives guidance from a group of scientific experts established under Article 31 of the Euratom Treaty[87], which then ***may lead*** to a Commission proposal for a Council Directive, Regulation, Decision or Recommendation. The proposal is submitted first to the Economic and Social Committee. Upon incorporation of all or a part of the observations of this Committee, the proposal is transmitted to the Council of the European Union, which has to consult the European Parliament before adoption. The European Parliament then may propose amendments to the Commission proposal, which the Council may examine and take into consideration. In the end, under the terms of the Euratom Treaty, the act is adopted by a qualified majority by the Council.

Member States are obliged to transpose or implement the existing binding Euratom legal acts within a certain period of time, as detailed in the Act itself. A directive needs to be transposed into national legislation; regulations and decisions are directly applicable in the Member States.

The Euratom Treaty provides for a number of mechanisms to ensure that the relevant legislation is complied with by all Member States.

Under Article 33 of the Euratom Treaty, *"each Member State shall lay down the appropriate provisions, whether by legislation, regulation or administrative action, to ensure compliance with the basic standards"* (paragraph 1), which cover, according to the case-law, comprehensive and systematic safety assessments in the sense of Article 14(I) of the Convention. To this extent, *"the Commission shall make appropriate recommendations for harmonizing the provisions applicable in this field in the Member States"*. Member States must notify to the Commission all national legislation in the areas covered by the Euratom Treaty, both:

[87] Group of Scientific Experts Referred to in Article 31 of the Euratom Treaty, Rules of Procedure, approved by the Group of experts at the meeting on ***30 June 2017***: ***https://ec.europa.eu/energy/sites/ener/files/documents/rules_of_procedure_article_31_group_of_experts_as_adopted_30_june_2017.pdf***.

- before adoption, ***in draft form***, so that the Commission can formulate, as the case might be, appropriate recommendations in order harmonise the implementing national provisions throughout the European Union according to Article 33 of the Euratom Treaty and

- After adoption, so that the ***completeness and*** conformity of the final measures can be controlled.

Whenever the Commission in its role as "Guardian of the Treaties" considers that a Member State is infringing the Euratom provisions, for example if a Member State did not transpose a directive into national law within the given deadline, the Commission requests information from the authorities of the Member State concerned and, if explanations are not satisfactory, it can initiate proceedings against Member States. A proceeding can imply lodging an application before the Court of Justice of the European Communities. If the Member State does not take the necessary measures to comply with the ruling of the Court of Justice, the Court can decide to impose a lump sum or penalty on the Member State. In case of urgency, the Commission is entitled to directly hold the Court of Justice (Article 38 of the Euratom Treaty)[88]; though this situation has never occurred.

The Commission ***checks*** the implementation in practice through verifications of the environmental monitoring facilities on the basis of Article 35 of the Euratom Treaty[89] and through the examination of plans for the disposal of radioactive waste submitted to the Commission for opinion on the basis of Article 37 of the Euratom Treaty[90].

In addition, the Commission contributes in achieving a high level of harmonization in Europe by (non-binding) actions including

- Non-binding Commission Recommendations in the areas of the Euratom Treaty[91].

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88 See Article 38 of the Euratom Treaty.

89 See below chapter 10.2.4, Verification of environmental radiological surveillance facilities.

90 ***See below chapter 12.1, Description of the licensing process, including summary of laws, regulations and requirements relating to the siting of nuclear installations.***

91 See Annex 3.

- Other non-binding guidance documents, such as

  – "Radiation Protection Series" Publications of the Commission;

  – Recommendations of Advisory Groups of the Commission [92]

2.1.2. *Uniform Safety Standards to protect the health of workers and the general public*

Article 2 of the Euratom Treaty states that in order to perform its task, the Community shall, as provided for in the Treaty, in particular, establish uniform safety standards to protect the health of workers and of the general public and ensure that they are applied.

Title Two, Chapter 3, Health and Safety, sets out a number of detailed provisions intended to establish, give effect and apply the basic standards mentioned in Article 2(b) of the Euratom Treaty. A substantial corpus of Euratom legal acts[93] has been adopted and updated in the course of the years and is completed by a set of legal instruments of different binding nature, covering a wide range of aspects such as:

- operational protection of workers (including outside workers) and population,
- natural radioactive sources,
- high activity sealed sources and orphan sources,
- emergency preparedness,
- nuclear safety,
- medical applications,
- control and supervision of shipments of spent fuel and radioactive waste,
- as well as a number of regulations establishing provisions on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power plant, aimed at safeguarding the health of consumers of such products.

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[92] ***See above, chapter 3.8 Experts Groups of the Commission***

[93] See Annex 3.

2.1.3. *EU framework for the nuclear safety of nuclear installations*

Nuclear safety remains an absolute policy priority for the EU.

The Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations[94] (the "Nuclear Safety Directive") was unanimously adopted by the Council on 25 June 2009, subsequent to a very large support expressed by the European Parliament and the European Economic and Social Committee.

The Nuclear Safety Directive created a solid and flexible legal framework that defines basic obligations and principles governing nuclear safety throughout the EU. It is based on Chapter 3 of the Euratom Treaty, (articles 31 and 32) in order to achieve the objective established in Article 2b, which provides for the establishment of uniform safety standards to protect the health of workers and of the general public[95]. That Directive has been amended[96] following a mandate in March 2011 from the European Council "to review the existing legal and regulatory framework for the safety of nuclear installations" and propose any improvements that may be necessary in the spirit of continuously improving standards to enhance nuclear safety in the Union.

The Nuclear Safety Directive supplements the basic standards referred to in Article 30 of the Euratom Treaty as regards the nuclear safety of nuclear installations and is without prejudice to the Basic Safety Standards Directive. It does not prevent Member States from taking more stringent safety measures in the subject-matter covered by this Directive, as long as they are compatible with Euratom law. It is built upon the nuclear safety requirements of the Convention on Nuclear Safety and of the Safety Fundamentals established by the IAEA.

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94 Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172, 2.7.2009.

95 First Recital of the Nuclear Safety Directive 2009/71/Euratom, OJ L 172, 02/07/2009, p. 18.

96 Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, OJ L 219, 25.7.2014.

The Nuclear Safety Directive recognizes the principle of national responsibility, the principle of continuous improvement of nuclear safety, and the principle of prime responsibility of the licence holder for the nuclear safety of a nuclear installation under the supervision of its national competent regulatory authority. Licence holders are required to undertake systematic and verifiable safety assessments, including the verification of "defence-in-depth" measures. The Directive aims to enhance these principles and to reinforce the role and independence of the competent national regulatory authorities. The goal of the Nuclear Safety Directive is to maintain and promote the continuous improvement of nuclear safety and to ensure that a high level of nuclear safety is provided by EU Member States to protect workers and the general public against dangers arising from ionizing radiations from nuclear installations.

While the Member States have already implemented measures enabling them to achieve a high level of nuclear safety within the Community, the Nuclear Safety Directive requires Member States to establish and maintain a national legislative, regulatory and organisational framework governing the safety of nuclear installations. As stated in the recitals, Member States may decide on their energy mix in accordance with relevant national policies. When developing the appropriate national framework under this Directive, national circumstances will be taken into account.

The national framework should be improved when appropriate, taking into account: operating experience, insights gained from safety analyses for operating nuclear installations, development of technology, and results of safety research. In addition, periodic safety assessments of their national framework and competent regulatory authorities shall be organised by the Member States, supplemented with international peer reviews, including the verification of "defence-in-depth" measures. In keeping with the commitment to maintain and improve safety, Member States should take those factors into account when extending their nuclear power programme or deciding to use nuclear power for the first time.

The abovementioned Nuclear Safety Directive was amended in 2014, with modifications to:

- strengthen the independence of national regulatory authorities;
- set up a European system of peer reviews on specific safety issues every six years (the first one ***was finalised in 2018);***

- increase transparency on nuclear safety matters by informing and involving the public; and
- promote an effective nuclear safety culture;
- introduce high-level EU-wide safety objectives ***in order*** to prevent accidents and***, should an accident occur, mitigate its consequences and avoid early and large*** radioactive releases.

As regards the safety objective for nuclear installations, Member States shall ensure that the national nuclear safety framework requires that nuclear installations are designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents ***and, should they occur, mitigating their consequences***[97]***.*** It applies to nuclear installations for which a construction licence has been granted for the first time after 14 August 2014. Moreover, the safety objective is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations.

The Directive provides for regular safety reassessments of nuclear installations, to be carried out by the licence holder under the supervision of the competent regulatory authority, to identify further safety improvements, taking into account, inter alia, ageing issues***, using as a reference the aforementioned nuclear safety objective.***

The high-level EU-wide safety objective are in line with the set of principles and implementation mechanisms to improve and enhance the safety of nuclear power plants as enshrined in the Vienna Declaration on Nuclear Safety adopted in 2015.

2.2. Article 7(2) – requirements for the legislative and regulatory framework

2.2.1. *Article 7(2) i – establishment of applicable national safety requirements and regulations*

Article 4(1) of the amended Nuclear Safety Directive on the legislative, regulatory and organisational framework states that Member States shall establish and maintain a national legislative, regulatory and organisational framework (hereinafter referred to as the 'national framework') for nuclear safety of nuclear installations that allocates responsibilities and provides for coordination between relevant state bodies. The national framework shall provide in particular for:

[97] Article 8a (1) of Council Directive 2009/71/Euratom.

(a) the allocation of responsibilities and coordination between relevant state bodies;

(b) national nuclear safety requirements, covering all stages of the lifecycle of nuclear installations;

(c) a system of licensing and prohibition of operation of nuclear installations without a licence;

(d) a system of regulatory control of nuclear safety performed by the competent regulatory authority;

(e) effective and proportionate enforcement actions, including, where appropriate, corrective action or suspension of operation and modification or revocation of a licence.

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

2.2.2. *Article 7(2) ii - system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence*

The Member States are responsible for the establishment and maintenance of the national legislative, regulatory and organisational framework, which allocates responsibilities for the provision of a system of licensing and prohibition of operation of nuclear installations without a licence (Article 4(1) c of the amended Nuclear Safety Directive).[98]

Article 28(b) of the ***revised BSS*** provides that: "Member States shall require licensing for…. (b) the operation and decommissioning of any nuclear facility and the exploitation and closure of uranium mines".

[98] See Article 4(1) of the Directive, as cited above under 2.2.1.

Article 65 of the revised ***BSS*** reads as follows:

"Article 65 - Operational protection of members of the public"

1. Member States shall ensure that the operational protection of members of the public in normal circumstances from practices subject to licensing shall include, for relevant facilities, the following:

(a) examination and approval of the proposed siting of the facility from a radiation protection point of view, taking into account relevant demographic, meteorological, geological, hydrological and ecological conditions;

(b) acceptance into service of the facility subject to adequate protection being provided against any exposure or radioactive contamination liable to extend beyond the perimeter of the facility or radioactive contamination liable to extend to the ground beneath the facility;

(c) examination and approval of plans for the discharge of radioactive effluents;

(d) measures to control the access of members of the public to the facility.

2. The competent authority shall where appropriate establish authorised limits as part of the discharge authorisation and conditions for discharging radioactive effluents which shall:

(a) take into account the results of the optimisation of radiation protection;

(b) reflect good practice in the operation of similar facilities.

In addition, these discharge authorisations shall take into account, where appropriate, the results of a generic screening assessment based on internationally recognised scientific guidance, where such an assessment has been required by the Member State, to demonstrate that environmental criteria for long-term human health protection are met.

3. For practices subject to registration, Member States shall ensure the protection of members of the public in normal circumstances through appropriate national regulations and guidance."

2.2.3. *Article 7(2) iii – system of regulatory inspection assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences*

The Member States are responsible for the establishment of the national framework, which must establish the responsibilities for the adoption of national nuclear safety requirements, the provision of a system of nuclear safety supervision and enforcement actions, including suspension of operation and modification or revocation of a licence (Article 4(1) c and e of the Nuclear Safety Directive).

2.2.4. *Article 7(2) iv - enforcement of applicable regulations and the terms of licences*

In addition to the national responsibility of Member States for the enforcement of national regulations and terms of licences, it is the supranational nature of EU and Euratom law that makes the Nuclear Safety Directive a milestone in international and regional nuclear law. The ***EU/Euratom Treaties*** attributes a number of powers to the Commission, and more importantly, to the Court of Justice of the European Union.

The Commission as the Guardian of the Treaty ensures that EU legislation is applied correctly by the Member States. It can start infringement procedures if not satisfied with a Member State's ***transposition or*** implementation of the Directive and refer the matter to the Court of Justice of the European Union. As a last resort the Court may impose a lump sum or penalty payment on the Member State, which fails to fulfil its obligations (Art. 143 Euratom Treaty, repealed by Lisbon Treaty and replaced by Article 260 of the Treaty on the Functioning of the European Union - TFEU).

2.3. **Summary of laws, regulations and requirements affecting the safety of nuclear installations, the licensing system and the inspection, assessment and enforcement process**

See Annex 3.

3. ARTICLE 8: REGULATORY BODY

(1) Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.

(2) Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organisation concerned with the promotion or utilization of nuclear energy.[99]

National responsibility of Member States for the nuclear safety of nuclear installations is the fundamental principle on which nuclear safety regulation has been developed at the international level, as endorsed by the Convention on Nuclear Safety. The Nuclear Safety Directive aims to reinforce the role and the independence of the competent national regulatory authorities by building on their competences. It recognises the fundamental principle that only independent and strong regulators can guarantee the safe operation of the nuclear installations in the EU.

3.1. Article 8(1) – Establishment of a Regulatory Authority

Article 5 of the amended Nuclear Safety Directive obliges Member States to establish a competent regulatory authority, which is equipped with the required legal power (=authority), human and financial resources.

A 'competent regulatory authority' is defined as an "authority or a system of authorities designated in a Member State in the field of regulation of nuclear safety of nuclear installations as referred to in Article 5."[100]. Member States must make arrangements for the education and training for their staff having responsibilities related to the nuclear safety of nuclear installations so as to obtain, maintain and to further develop expertise and skills in nuclear safety and on-site emergency preparedness[101]. This applies both to operators and to regulators.

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99 Not applicable (according to the Declaration of Competences, Annex 1).
100 See Article 3(3) of the amended Safety Directive.
101 See Article 7 of the amended Safety Directive.

3.2. Article 8(2) – "Independence" of the regulatory authority

Article 5(2) of the amended Nuclear Safety Directive requires Member States to ensure that the competent regulatory authority "is functionally separate from any other body or organisation concerned with the promotion or utilisation of nuclear energy, and does not seek or take instructions from any such body or organisation when carrying out its regulatory tasks".

The provisions on independence have been reinforced in the amended Nuclear Safety Directive, notably with a new requirement on the prevention of conflicts of interest. Article 5 of the amended Nuclear Safety Directive contains a series of criteria that define the status of the regulatory authorities (Article 5(2) from (a) to (f) of the amended Nuclear Safety Directive).

4. ARTICLE 9: RESPONSIBILITY OF THE LICENCE HOLDER

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets [his] responsibility[102].

The prime responsibility of licence holders for nuclear safety, as endorsed by the Convention, is explicitly recognised by the amended Nuclear Safety Directive in its Article 6(a) that states that "the prime responsibility for the nuclear safety of a nuclear installation rests with the licence holder. That responsibility cannot be delegated and includes responsibility for the activities of contractors and sub-contractors whose activities might affect the nuclear safety of a nuclear installation."

Art. 3 (5) of the amended Nuclear Safety Directive defines ‘licence holder’ as a legal or natural person having overall responsibility for a nuclear installation as specified in a licence. A. ‘licence’ is defined by any legal document granted under the jurisdiction of a Member State to confer responsibility for the siting, design, construction, commissioning and operation or decommissioning of a nuclear installation (Article 3(4) of the amended Nuclear Safety Directive).

EU Member States are obliged to ensure that the prime responsibility for nuclear safety of a nuclear installation rests with the licence holder.

[102] Not applicable according to the Declaration of Competences (Annex 1).

5. ARTICLE 10: PRIORITY TO SAFETY

Each Contracting Party shall take the appropriate steps to ensure that all organisations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.[103]

Article 6 (b) of the amended Nuclear Safety Directive provides that "when applying for a licence, the applicant is required to submit a demonstration of nuclear safety. Its scope and level of detail shall be commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site".

Moreover, Article 6 (d) of the Nuclear Safety Directive obliges Member States to ensure that the national framework in place requires licence holders to establish and implement management systems which give due priority to nuclear safety and are regularly verified by the competent regulatory authority.

6. ARTICLE 11: FINANCIAL AND HUMAN RESOURCES

(1) Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.

(2) Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.[104]

The amended Nuclear Safety Directive in Article 5(2)(c) and (d) obliges Member States to ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework described in Article 4(1) with due priority to safety.

[103] Not applicable according to the Declaration of Competences (Annex 1).
[104] Not applicable according to the Declaration of Competences (Annex 1).

Likewise, Article 6(f) of the amended Nuclear Safety Directive requires Member States to ensure that the national framework in place requires licence holders to "provide for and maintain financial and human resources with appropriate qualifications and competences, necessary to fulfil their obligations with respect to the nuclear safety of a nuclear installation. Licence holders shall also ensure that contractors and subcontractors under their responsibility and whose activities might affect the nuclear safety of a nuclear installation have the necessary human resources with appropriate qualifications and competences to fulfil their obligations".

7. ARTICLE 12: HUMAN FACTORS

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.[105]

Article 7 concerning 'Expertise and skills in nuclear safety' holds that Member States "shall ensure that the national framework requires all parties to make arrangements for the education and training for their staff having responsibilities related to the nuclear safety of nuclear installations so as to obtain, maintain and to further develop expertise and skills in nuclear safety and on-site emergency preparedness".

8. ARTICLE 13: QUALITY ASSURANCE

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.[106]

Pursuant to the amended Nuclear Safety Directive, Member States shall ensure that the national framework requires that the competent regulatory authority and the licence holder take measures to promote and enhance an effective nuclear safety culture (Article 8(b)).

[105] Not applicable according to the Declaration of Competences (Annex 1).
[106] Not applicable according to the Declaration of Competences (Annex 1).

9. ARTICLE 14: ASSESSMENT AND VERIFICATION OF SAFETY

Each Contracting Party shall take the appropriate steps to ensure that:

(1) Comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

(2) Verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of the nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

9.1. Article 14 (1) - Safety assessments

Nuclear safety assessments carried out in installations based in the EU Member States are a responsibility of the Member State where the installation is based. The amended Nuclear Safety Directive requires regular nuclear safety supervision, carried out by the regulatory authority and the licence holder throughout the whole lifetime of nuclear installations (Article 5(3) a, b, c, d). Member States must ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess and verify and continuously improve, as far as reasonably achievable, the nuclear safety of their nuclear installations in a systematic and verifiable manner (Article 6(c)). Any grant of a licence to construct or operate a nuclear installation is based upon an appropriate site and installation-specific assessment, comprising a nuclear safety demonstration with respect to the national nuclear safety requirements based on the nuclear safety objective of accident prevention and mitigation. The licence holder is also required to re-assess, at least every 10 years, the safety of the nuclear installation (Article 8c***(b)***).

In order to strengthen the powers of European regulatory authorities, the Directive provides for extended regulatory powers in the interest of safety, by clearly spelling out their right to suspend the operation of a nuclear installation, if safety cannot be fully guaranteed. These internal verifications should be supplemented with periodic international peer reviews of the relevant segments of the Member States' national nuclear safety frameworks and/or their authorities.

The amended Nuclear Safety Directive requires the licence holder under the regulatory control of the competent regulatory authority, to re-assesses systematically and regularly, at least every 10 years, the safety of the nuclear installation. That safety reassessment aims at ensuring compliance with the current design basis and identifies further safety improvements by taking into account ageing issues, operational experience, most recent research results and developments in international standards. In addition, there are obligations for international peer reviews of the national framework, involving the competent regulatory authority. Member States shall also ensure that arrangements are in place to allow for a first topical peer review to start in 2017 ***(and achieved in 2018),*** and for subsequent topical peer reviews to take place at least every six years thereafter.

9.2. Article 14(2) - Verification programmes

Licence holders are required to undertake systematic and verifiable safety assessments. Nuclear safety verification programmes carried out in installations based in the EU Member States are a responsibility of the Member State where the installation is based. This principle of national responsibility for nuclear safety assessment is also confirmed in the amended Nuclear Safety Directive.

10. ARTICLE 15 - RADIATION PROTECTION

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

10.1. Summary of laws, regulations and requirements dealing with radiation protection as applied to nuclear installations[107]

Article 2(b) of the Euratom Treaty requires Euratom to establish uniform safety standards to protect the health of the workers and of the general public and to ensure that they are applied. Article 218 of the Treaty underlines the importance for Euratom of the basic standards as these had to be determined within one year of the entry into force of the Treaty. They were first established in 1959 and have regularly been amended (in the years 1962, 1966, 1976, 1980, 1984, 1996 and 2013), taking account of the latest scientific findings and recommendations. The latest safety standards are set out in Council Directive 2013/59/Euratom of 5 December 2013 (the Basic Safety Standards (BSS) Directive)[108].

[107] See Annex 3.

[108] Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, Official Journal of the European Union (OJ L13, 17.01.2014, p. 1 -73).

The BSS Directive modernises and consolidates European radiation protection legislation taking account of progress in radiation protection science, technological development, and operational experience. The BSS Directive repeals five Directives – the Basic Safety Standards Directive[109], the Medical Exposure Directive[110], the Outside Workers Directive[111] , the Public Information Directive[112] and the High Activity Sealed Sources Directive[113], and had to be transposed into Member States' laws, regulations and administrative provisions by 6 February 2018.

The BSS is consistent with the International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources, sponsored and issued by the International Atomic Energy Agency and jointly sponsored by five other international organisations with competence in radiation protection.

10.2. Implementation of applicable laws, regulations and requirements relating to radiation protection

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109 ***Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation, Official Journal of the European Communities, Series L, No. 159, 1996.***

110 ***Council Directive 97/43/Euratom of 30 June 1997 on health protection of individuals against the danger of ionizing radiation in relation to medical exposure, Official Journal of the European Communities, Series L, No. 180, 1997.***

111 ***Council Directive 90/641/Euratom of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas, Official Journal of the European Communities, Series L, No. 349, 1990.***

112 ***Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency, Official Journal of the European Communities, Series L, No. 357, 1989.***

113 ***Council Directive 2003/122/Euratom of 22 December 2003 on the control of high-activity sealed radioactive sources and orphan sources, Official Journal of the European Communities, Series L, No. 346, 2003.***

10.2.1. *Radiation dose limits*

The BSS Directive sets out dose limits for exposed workers, for apprentices and students and for members of the public. The relevant Articles of the Directive are as follows:

"Article 9 - Dose limits for occupational exposure"

"1. Member States shall ensure that dose limits for occupational exposure apply to the sum of annual occupational exposures of a worker from all authorised practices, occupational exposure to radon in workplaces requiring notification in accordance with Article 54(3), and other occupational exposure from existing exposure situations in accordance with Article 100(3). For emergency occupational exposure Article 53 shall apply.

2. The limit on the effective dose for occupational exposure shall be 20 mSv in any single year. However, in special circumstances or for certain exposure situations specified in national legislation, a higher effective dose of up to 50 mSv may be authorised by the competent authority in a single year, provided that the average annual dose over any five consecutive years, including the years for which the limit has been exceeded, does not exceed 20 mSv.

3. In addition to the limits on effective dose laid down in paragraph 2, the following limits on equivalent dose shall apply:

(a) the limit on the equivalent dose for the lens of the eye shall be 20 mSv in a single year or 100 mSv in any five consecutive years subject to a maximum dose of 50 mSv in a single year, as specified in national legislation.

(b) the limit on the equivalent dose for the skin shall be 500 mSv in a year, this limit shall apply to the dose averaged over any area of 1 cm^2, regardless of the area exposed;

(c) the limit on the equivalent dose for the extremities shall be 500 mSv in a year."

"Article 11- Dose limits for apprentices and students"

"1. Member States shall ensure that the dose limits for apprentices aged 18 years or over and students aged 18 years or over who, in the course of their studies, are obliged to work with radiation sources, shall be the same as the dose limits for occupational exposure laid down in Article 9.

2. Member States shall ensure that the limit on the effective dose for apprentices aged between 16 and 18 years and for students aged between 16 and 18 years who, in the course of their studies, are obliged to work with radiation sources, shall be 6 mSv in a year.

3. In addition to the limits on effective dose laid down in paragraph 2, the following limits on equivalent dose shall apply:

(a) the limit on the equivalent dose for the lens of the eye shall be 15 mSv in a year;

(b) the limit on the equivalent dose for the skin shall be 150 mSv in a year, averaged over any area of 1 cm^2 , regardless of the area exposed;

(c) the limit on the equivalent dose for the extremities shall be 150 mSv in a year.

4. Member States shall ensure that the dose limits for apprentices and students who are not subject to the provisions of paragraphs 1, 2 and 3 shall be the same as the dose limits for members of the public as specified in Article 12."

"Article 12 - Dose limits for public exposure"

"1. Member States shall ensure that the dose limits for public exposure shall apply to the sum of annual exposures of a member of the public resulting from all authorised practices.

2. Member States shall set the limit on the effective dose for public exposure at 1 mSv in a year.

3. In addition to the dose limit referred to in paragraph 2, the following limits on the equivalent dose shall apply:

(a) the limit on the equivalent dose for the lens of the eye shall be 15 mSv in a year;

(b) the limit on the equivalent dose for the skin shall be 50 mSv in a year, averaged over any 1 cm^2 area of skin, regardless of the area exposed."

It is worth noting that Article 9 provides that dose limits for occupational exposure apply to the sum of annual occupational exposures of a worker from all authorised practices, radon at workplaces requiring notification, and occupational exposure from existing exposure situations. This may imply that for a worker who is exposed to several of the mentioned sources, the contribution of each source can only be a fraction of the annual dose limit defined.

The limit on the effective dose for occupational exposure shall now be 20 mSv in any single year.

The limit on the equivalent dose for the lens of the eye has been considerably lowered from 150 mSv/year to 20 mSv/year

As far as dose limits for public exposure are concerned, ***it is worth noting,*** the dose limits for public exposure shall now "… apply to the sum of annual exposures of a member of the public resulting from all authorised practices". With this, Member States need to evaluate all authorised practices which may contribute to the exposure of an individual member of the public and ensure that the sum of exposures remain below the dose limit.

10.2.2. *Fulfilment of conditions for the release of radioactive materials*

As regards practices involving a risk from ionising radiation for the population, Article 65 of the BSS requires Member States to apply the fundamental principles governing operational protection of the population. In particular, Article 65 provides:

> "Article 65 - Operational protection of members of the public
>
> 1. Member States shall ensure that the operational protection of members of the public in normal circumstances from practices subject to licensing shall include, for relevant facilities, the following:

(a) examination and approval of the proposed siting of the facility from a radiation protection point of view, taking into account relevant demographic, meteorological, geological, hydrological and ecological conditions;

(b) acceptance into service of the facility subject to adequate protection being provided against any exposure or radioactive contamination liable to extend beyond the perimeter of the facility or radioactive contamination liable to extend to the ground beneath the facility;

(c) examination and approval of plans for the discharge of radioactive effluents;

(d) measures to control the access of members of the public to the facility.

2. The competent authority shall where appropriate establish authorised limits as part of the discharge authorisation and conditions for discharging radioactive effluents which shall:

(a) take into account the results of the optimisation of radiation protection;

(b) reflect good practice in the operation of similar facilities.

In addition, these discharge authorisations shall take into account, where appropriate, the results of a generic screening assessment based on internationally recognised scientific guidance, where such an assessment has been required by the Member State, to demonstrate that environmental criteria for long-term human health protection are met.

3. For practices subject to registration, Member States shall ensure the protection of members of the public in normal circumstances through appropriate national regulations and guidance."

10.2.3. *Steps taken to ensure that radiation exposures are kept as low as reasonably achievable*

The general principles of radiation protection, justification, optimisation (ALARA), and dose limitation are enshrined in Council Directive 2013/59/Euratom.

Article 5 "General principles of radiation protection" reads:

"Member States shall establish legal requirements and an appropriate regime of regulatory control which, for all exposure situations, reflect a system of radiation protection based on the principles of justification, optimisation and dose limitation:

(a) Justification: Decisions introducing a practice shall be justified in the sense that such decisions shall be taken with the intent to ensure that the individual or societal benefit resulting from the practice outweighs the health detriment that it may cause. Decisions introducing or altering an exposure pathway for existing and emergency exposure situations shall be justified in the sense that they should do more good than harm.

(b) Optimisation: Radiation protection of individuals subject to public or occupational exposure shall be optimised with the aim of keeping the magnitude of individual doses, the likelihood of exposure and the number of individuals exposed as low as reasonably achievable taking into account the current state of technical knowledge and economic and societal factors. The optimisation of the protection of individuals subject to medical exposure shall apply to the magnitude of individual doses and be consistent with the medical purpose of the exposure, as described in Article 56. This principle shall be applied not only in terms of effective dose but also, where appropriate, in terms of equivalent doses, as a precautionary measure to allow for uncertainties as to health detriment below the threshold for tissue reactions.

(c) Dose limitation: In planned exposure situations, the sum of doses to an individual shall not exceed the dose limits laid down for occupational exposure or public exposure. Dose limits shall not apply to medical exposures."

The optimisation principle thus requires that radiation protection of individuals subject to public or occupational exposure shall be optimised with the aim of keeping the magnitude of individual doses, the likelihood of exposure and the number of individuals exposed as low as reasonably achievable, economic and societal factors taken into account. To further emphasise the importance of optimisation, the 2013 Basic Safety Standards Directive requires the introduction of the new concepts "dose constraints" and "reference levels" for the purpose of optimisation of protection. The transposition and implementation of these new concepts in the area of protection of workers and protection of the public may be a challenge to Member States, competent authorities and operators.

10.2.4. *Verification of environmental radiological surveillance facilities*

In line with the implementation of Article 14 (ii) of the Convention, Article 35 of the Euratom Treaty provides:

> "Each Member State shall establish the facilities necessary to carry out continuous monitoring of the level of radioactivity in the air, water and soil and to ensure compliance with the basic standards.
>
> The Commission shall have the right of access to such facilities; it may verify their operation and efficiency."

The result of the checks carried out by the Member States under Article 35 of the Euratom Treaty are periodically communicated to the Commission under Article 36 of the Treaty. Commission Recommendations 2000/473/Euratom[114] and 2004/2/Euratom[115] aim at ensuring uniformity, comparability, transparency and timeliness of the data reported, respectively for levels of radioactivity in the environment and for discharges of radioactive effluent. The Commission regularly publishes summaries of the data reported by Member States[116]. It also exercises its right of access conferred on it by Article 35 of the Euratom Treaty.

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114 OJ L 191 of 17.07.2000 p. 37.
115 OJ L 2 of 6.1.2004, p. 36.
116 See http://ec.europa.eu/energy/en/topics/nuclear-energy/radiation-protection/monitoring-radioactivity.

Taking into account previous bilateral protocols, a Commission Communication has been published in the Official Journal on 4 July 2006[117] with a view to define some practical arrangements for the conduct of "Article 35 verification visits" in Member States. These may be amended as needed.

The primary objective of the "Article 35 verifications" is to establish the efficiency of the facilities installed for the measurement of environmental radioactivity and of radioactive discharges, and to establish the adequacy of the environmental monitoring programme. The efficiency and adequacy are assessed in relation to the overall approach developed at national level to ensure the protection of members of the public in compliance with the Basic Safety Standards.

Verifications are initiated:

- where and when the Commission estimates it to be appropriate
- on request (invitation) of national authorities
- on request of the European Parliament
- on request of a Member State (to verify a neighbouring Member State)

Verifications may extend to all installations discharging radioactive substances into the environment such as:

- nuclear fuel cycle installations (mainly power stations and reprocessing facilities)
- research reactors,
- radioactive isotope production facilities,
- users of radioactive isotopes (i.e. hospitals),
- Naturally Occurring Radioactive Material (henceforth: NORM) industries discharging effluents containing enhanced levels of natural radioactivity.

[117] Verification of environmental radioactivity monitoring facilities under the terms of Article 35 of the Euratom Treaty - Practical arrangements for the conduct of verification visits in Member States (2006/C 155/02), OJ C-155 of 04.07.2006 p. 2.

Verification activities cover all facilities and provisions for monitoring/sampling of:

- discharges of radionuclides into the environment (airborne and liquid effluents)
- environmental radioactivity around installations discharging radionuclides;
- environmental radioactivity as part of a national network (regional, national level).

Environmental monitoring includes:

- routine measurement of radioactivity in air, water, soil and biota;
- provisions in case of radiological emergencies (alarms and data collection, but not emergency response planning)

Verification activities basically cover:

- Monitoring/sampling devices (operation and efficiency)
- Monitoring/sampling procedures (methodologies and representativeness).
- Data handling and management procedures (reporting and archiving).
- Consistency of source data (operational records) with values reported under Articles 36 and 37 of the Euratom Treaty.
- Quality control and assurance programmes applied to the above fields of activity (working instructions, peer review, inter-comparison and accreditation).

Since 1999, about ***90*** verification reports pursuant to Article 35 of the Euratom Treaty have been made publicly available with consent of the competent authorities of the Member States concerned[118]. The official results of a verification visit are laid down in a document referred to as the Main Conclusions. A Technical Report is annexed to it. The Main Conclusions are based on the observations and recommendations detailed in the Technical Report, but without the technical elements.

[118] https://ec.europa.eu/energy/en/verifications-radiation-monitoring-eu-countries.

Data reporting under Article 36 also encompasses information on the discharge of radioactive effluents. Nuclear sites, in particular nuclear power stations and reprocessing sites, may discharge airborne and liquid radioactive effluents into the environment on condition that these discharge operations abide by regulatory conditions and restrictions as defined in the their respective operating licenses.

It is a recognized practice in the framework of Article 35 verifications[119] that the environment starts where radioactive discharges leave operational control i.e. at the last measurement points that quantify these discharges. Consequently these discharge measurement points are deemed to be environmental monitoring devices, the results of which shall be communicated to the Commission. In 2004 the Commission issued Recommendation 2004/2/Euratom providing guidance to Member States as to this type of reporting. The Commission's Radioactive Discharges Database (RADD), publicly accessible on the EUROPA web site (http://europa.eu/radd/), presents airborne and liquid radioactive discharge data from nuclear power stations (with a capacity greater than 50 MWe) as well as from nuclear fuel reprocessing sites. In order to provide a useful time span the database contains information from 1995 onwards. For new Member States, information is present starting from the respective accession years: 2004 or 2007.

10.2.5. *Regulatory control activities*

Not applicable.

11. ARTICLE 16 - EMERGENCY PREPAREDNESS

(1) Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.

For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.

[119] Commission Communication "Verification of environmental radioactivity monitoring facilities under the terms of Article 35 of the Euratom Treaty — Practical arrangements for the conduct of verification visits in Member States", OJ C55 of 04.07.2006, p. 2–5.

(2) Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.

(3) Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.

The primary responsibility of protecting the general public in the event of a nuclear or radiological emergency lies with the Member States' authorities. However, Euratom has some legislative competences regarding emergency preparedness and emergency response. In addition, the Commission contributes in this work by initiating and participating in international systems for radiological emergency preparedness[120].

The ***European*** Union Civil Protection Mechanism has continued to contribute to reinforcing Europe's preparedness to nuclear incidents. ***The key instrument in force today in the area of civil protection is Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (UCPM) as recently amended by Decision (EU) 2019/420 of the European Parliament and of the Council of 13 March 2019, for which further rules are laid down in the Commission Implementing Decision 2014/762/EU[121], and the Commission Implementing Decision (EU) 2019/570[122].***

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120 See Chapter 11.3 International arrangements, including those with neighbouring countries, p. 79.

121 ***Commission Implementing Decision 2014/762/EU of 16 October 2014, laying down rules for the implementation of Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism and repealing Commission Decisions 2004/277/(EC, Euratom) and 2007/606/(EC, Euratom.***

122 ***Commission Implementing Decision (EU) 2019/570 of 8 April 2019 laying down rules for the implementation of Decision No 1313/2013/EU of the European Parliament and of the Council as regards rescEU capacities and amending Commission Implementing Decision 2014/762/EU.***

The aim is to support, coordinate and supplement the actions of the Member States in the field of civil protection in improving the effectiveness of systems for preventing, preparing for and responding to natural and man-made disasters of all kinds within and outside the Union. Specific objectives include (a) to achieve a high level of protection against disasters by preventing or reducing their effects and by fostering a culture of prevention (b) to enhance the Union's state of preparedness to respond to disasters (c) to facilitate rapid and efficient emergency response interventions in the event of major disasters.

The Commission follows an all-hazard approach, including preparedness and response measures related to nuclear /radiological emergencies.

To improve further the effectiveness of response to major emergencies and to enhance preventive and preparedness measures for all kinds of emergencies, the latest legislative amendments reinforce the UCPM by establishing, in collaboration with Member States, an additional reserve of capacities to respond to disasters (rescEU). Such capacities will initially include firefighting planes, and later other means to respond to situations such as medical emergencies and chemical, biological, radiological and nuclear incidents. Furthermore, under the new legal framework the Union financial support for both rescEU capacities and those registered in the European Civil Protection Pool has increased.

As regards preparedness, the inter-operability of Member States' disaster response capabilities has been greatly improved through the development of pre-defined civil protection "modules" for which the main types of response capacities' minimum conditions have been defined and agreed at EU level. Exercises for modules are also conducted and financed under the EU Civil protection Mechanism.

As regards response to emergencies, at any time an affected state can turn to the EU Civil Protection Mechanism for expert support and assistance. The European Civil Protection Mechanism offers a framework for the mobilisation of Participating States' assistance in response to such emergencies that overwhelm the response capacities of individual states. Any Member State or third country affected by natural and man-made disasters, including nuclear or radiological events, can make a request for response teams, experts or in-kind assistance (items) through the Commission's Emergency Response Coordination centre (ERCC), which will then facilitate the coordination and deployment of Participating States' offers of assistance.

11.1. General description of laws, regulations and requirements for on-site and off-site emergency preparedness

Under the amended Nuclear Safety Directive, there is a requirement for more specific arrangements for accident management and on-site emergency response addressing the prevention and mitigation of accidents. The licence holder should provide for procedures, guidelines and arrangements that address accidents and severe accidents, that could occur in all operational modes, including full power, shutdown and transitional states, including those simultaneously affecting several units, ensuring consistency and continuity between all such procedures and arrangements, and ensuring that they are exercised, reviewed and updated. The licence holder is required to provide for sufficient staff, equipment and other necessary resources.

An organisational structure with clear allocation of responsibilities, and coordination amongst response bodies should be provided, and the arrangements should be in accordance and without prejudice to the relevant provisions of the Directive 2013/59/Euratom. (Article 8d). This provision is intended to ensure complementarily of the measures taken between the two Directives, as the amended Nuclear Safety Directive contains enhanced measures for emergency preparedness and response which concern on-site aspects, whilst the provisions in the BSS Directive apply to both on-site and off-site aspects.

Council conclusions on Off-site nuclear emergency preparedness and response, adopted on 15 December 2015 invites Member States and the Commission to further strengthening cross border cooperation with the aim of coherent protective measures along adjacent national borders to protect populations against the effects of ionising radiation in case of an emergency.

11.1.1. *Council Directive 2013/59/Euratom*

The ***BSS*** Directive contains strengthened provisions on emergency preparedness and response (EP&R). As the revision of the BSS Directive was underway at the time of the Fukushima accident in Japan in 2011, some of the lessons learnt as a result of the accident were taken into account.

The BSS follows the situation-based approach to radiation protection recommended by the International Commission on Radiological Protection (ICRP), distinguishing between existing, planned and emergency exposure situations. With regard to the management of emergency exposure situations, the current approach based on intervention levels is replaced by a more comprehensive system comprising an assessment of potential emergency exposure situations, an overall emergency management system, emergency response plans, and pre-planned strategies for the management of each postulated event.

The essential elements to be included in an emergency management system (prior assessment emergency exposure situations, allocation of responsibilities, efficient coordination, cooperation and communication measures etc.) and in an emergency plan (reference levels for exposure, optimised protection strategies, pre-defined generic criteria, default triggers or operational criteria etc.) are specified.

The need for efficient management of an emergency with cross-border consequences is recognised through provisions for enhanced cooperation between Member States in emergency planning and response. The BSS requires Member States to cooperate with other Member States and with third countries which may be involved or are likely to be affected by an emergency, with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using bilateral or international information exchange and coordination systems.

The emphasis on optimisation, using reference level, in emergency and existing exposure situations expands the earlier use of optimisation from planned activities to all exposure situations. To achieve optimised protection strategies, accounting for the effects of ionising radiation as well as other societal criteria, is of particular importance in an accident and a post-accident phase.

It should also be mentioned that the BSS incorporates provisions of Council Directive 89/618/Euratom on informing the general public about measures to be taken in the event of a radiological emergency.

General description of ***the relevant*** provisions in the BSS Directive:

i. Emergency management system

Member States are required to take account of the fact that emergencies may occur on their territory and that they may be affected by emergencies occurring outside their territory. The BSS Directive requires the establishment of a national emergency management system and adequate administrative provisions to maintain such a system. The management system ***is to*** be designed to be commensurate with the results of an assessment of potential emergency exposure situations and be able to respond effectively to these emergency exposure situations.

For the various types of emergency identified by the above mentioned assessment, facility-specific or activity-specific emergency response plans need to be established in advance. These plans need to be tested, reviewed and, as appropriate, revised at regular intervals, taking into account lessons learned from past emergency exposure situations and the results of the participation in emergency drills at national and international level. The emergency response plans shall also include provisions for the transition from an emergency exposure situation to an existing exposure situation.

Annex XI of the new BSS Directive provides detailed elements which need to be covered by the national emergency management system and emergency response plan.

Amongst the preparation measures, members of the public likely to be affected by an emergency should be given prior information about health protection measures they should take in the event of an emergency.

ii. International cooperation

The BSS Directive contains strengthened requirements on international cooperation in case of an emergency (in an EU MS) which may affect other Member States or third countries, in order to facilitate the organisation of radiological protection in all countries affected. In case of an emergency, this cooperation shall allow to promptly establish contacts with countries likely to be affected, share the assessment of the exposure situation, coordinate protective measures and inform the public by using bilateral and international information exchange and coordination systems. Member States shall also cooperate in the transition from an emergency exposure situation to an existing exposure situation.

iii. Emergency response

The installation or undertaking concerned is required to notify the competent authority immediately of any emergency in relation to the practice for which it is responsible and to take all appropriate action to mitigate the consequences. The undertaking is also responsible for making an initial provisional assessment of the circumstances of the emergency and to assist with protective measures.

In case of such an event, the authorities in the Member State concerned are responsible for the protective measures to be taken with regard to the radiation source, to reduce or stop the radiation, including the release of radionuclides, with regard to the environment, to reduce the exposure of individuals resulting from radioactive substances through relevant pathways, and with regard to individuals, to reduce their exposure.

Further requirements concern the provision of medical treatment of those affected, if the situation requires. In case of a real emergency, the public actually affected must be informed without delay about the facts of the emergency and the protection measures to be taken.

iv. Reference levels for public exposures in an emergency situation

The BSS introduced the concept of "reference levels" for emergency and existing exposure situations. It allows for the protection of the individual as well as consideration of other societal criteria in the same way as dose limits and dose constraints for planned exposure situations.

v. Protection of emergency workers

Special emphasis has been put on the protection of emergency workers. The ***BSS*** contains specific requirements on the information and training to be provided to emergency workers prior to an accident and in case of a real event. Emergency occupational exposure shall remain, whenever possible, below the dose limits for occupational exposure. For situations where this is not possible, reference levels for emergency exposures of maximum 100 mSv shall be set, however in exceptional circumstances this may be set up to 500 mSv. In these cases, emergency workers shall be subject to appropriate radiological monitoring and special medical surveillance.

The provisions related to emergencies and the recovery from such emergencies, are enunciated in five of the main Chapters of the Directive (Chapters III, IV, VI, VIII, and IX) and related annexes (Annexes I, XI and XII), and split according to the different emergency exposure situations and corresponding existing exposure situations.

vi. Informing the public

The BSS also contains provisions on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency.

It requires that members of the public likely to be affected by an emergency are given information beforehand about health protection measures applicable to them and the action they should take. The Directive includes Annex XII that lists the minimum type of information to be provided.

In a similar way, it is required that when an emergency occurs, the members of the public actually affected (which need not be the same group as the public who have received prior information) are informed of the emergency and of the protective actions required. The information to be provided includes the type of emergency, its prognosis, and advice on protection. Such information must be provided without it being solicited. It should also be regularly updated and distributed, including after significant changes.

11.1.2. *Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency*

Council Decision 87/600/Euratom sets out arrangements for the early exchange of information between competent authorities in the event of a radiological emergency (ECURIE). These arrangements "apply to the notification and provisions of information whenever a Member State decides to take measures of a wide-spread nature in order to protect the general public in case of a radiological emergency" (Article 1 of the Decision). A radiological emergency may be declared either due to an accident at a facility where a significant release of radioactive material occurs or is likely to occur, or due to detection of abnormal levels of radioactivity in the environment.

Article 2(i) of this Decision sets out the actions to be taken by the Member State that initially decides to take measures as referred to in Article 1 of this Decision as follows:

> *(a) Forthwith notify the Commission and those Member States which are, or are likely to be, affected of such measures and the reasons for taking them;*
>
> *(b) Promptly provide the Commission and those Member States which are, or are likely to be, affected with available information relevant to minimising the foreseen radiological consequences, if any, in those States.*

Member States notify without delay their "intention to take measures as referred to in Article 1". The Decision also specifies the nature of the information that shall be provided and requires that the initial information is supplemented at appropriate intervals. The Commission makes available the information it receives from a Member State to all the Member States.

The Decision applies to the Member States of Euratom[123]. It also applies to Switzerland, Norway the Republic of ***North*** Macedonia***, and Montenegro*** following an agreement between Euratom and these Countries. The Decision is broadly compatible with the Convention on Early Notification of a Nuclear Accident, as demonstrated by several exercises carried out in co-operation with the IAEA and the States participating in such exercises.

The work to adapt both the Web-ECURIE and IAEA USIE (Unified system for Information Exchange in Incidents and Emergencies) systems to make them compatible ***has been completed but still needs to be implemented. The alignment allows*** information appearing on one ***system to*** appear on the other. In this way, ***once deployed,*** Member States with obligations under both arrangements ***will be able to*** satisfy both requirements without duplication of effort***, which strengthens the set-up of a European Regional Hub. The Commission finalised its part of the work which will be completed by implementation on the IAEA side.***

[123] ***The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

*11.1.3. Regulations laying down maximum permitted levels of contamination of contamination of food- and feeding stuffs for use or sale (for future accidents/**radiological emergencies**)*

Following the Chernobyl accident a set of Euratom regulations[124] laying down maximum permitted levels of radioactive contamination of foodstuffs and feeding stuffs following a nuclear accident or any other case of radiological emergency were put in place.

These pre-established maximum permitted levels could be made immediately applicable through the adoption of a regulation by the Commission if the latter receives official information about an accident through the ECURIE system (Council Decision 87/600/Euratom) indicating that these levels are likely to be reached or have been reached.[125]

On the basis of the experience gained the Commission proposed to the Council in 2014 a revision of the existing legislation establishing maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other radiological emergency.

In January 2014 the Commission adopted its final proposal for a Council Regulation, after having received the opinion of the Article 31 Group of Experts and of the European Economic and Social Committee. Technical agreement was reached in the Working Party on Atomic Questions (WPAQ) of the Council at the end of 2014. The opinion of the European Parliament was received on 9 July 2015. Council Regulation (Euratom) 2016/52 was then adopted on 15 January 2016[126].

The revised Regulation:

- ***c***onsolidates existing Euratom legal acts for future accidents;

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124 Council Regulation No 3954/87 of 22 December 1987, OJ L-371 of 30.12.1987 p. 11, as amended by Council Regulation No 2218/89 of 18 July 1989, OJ L-211 of 27.07.1989 p. 1; Commission Regulation No 770/90 of 29 March 1990, OJ L-83 of 29.03.1990 p. 78; Commission Regulation No 944/89 of 12 April 1989, OJ L-101 of 13.04.1989 p. 17; ***These regulations are now repealed.*** Council Regulation No 2219/89 of 18 July 1989, OJ L-211 of 22.07.1989 p.4.

125 See Annex 3.

126 ***Council Regulation (Euratom) No 2016/52 of 15 January 2016 laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency, and repealing Regulation (Euratom) No 3954/87 and Commission Regulations (Euratom) No 944/89 and (Euratom) No 770/90.***

- ***b***rings the procedure in line with the new Comitology system;

- ***p***rovides more flexible procedures allowing specific reactions to any nuclear accident or radiological emergency in the EU, in the vicinity of the EU or in a remote country.

11.2. Implementation of emergency preparedness measures, including the role of the regulatory body and other entities

11.2.1. *Classification of emergency situations*

Not applicable.

11.2.2. *Overall emergency preparedness scheme*

Not applicable.

11.2.3. *On-site and off-site emergency plans of research reactors, including supporting agencies and schemes*

Not applicable.

11.2.4. *Measures for informing the public about emergency preparedness in the vicinity of the nuclear installations*

Not applicable.

11.2.5. *Conduct of emergency exercises*

The Commission organises radiological emergency preparedness exercises within the framework of the ECURIE (European Community Urgent Radiological Information Exchange) arrangements. This is normally done once per year.

The ECURIE system may on request also be used as an information exchange tool for national exercises.

In addition, the Commission participates in selected international exercises organised by the Member States, the IAEA or the OECD-NEA such as the ConvEx or the INEX series using the capabilities of the ECURIE system as well as - if deemed necessary - the activation of the radiation protection unit's emergency team. The ConvEx series ranges from tests of reaching the contact point to full scale exercises with a hypothetical large accident scenario. The INEX series is mainly a tool to help develop/enhance appropriate systems for emergency preparedness on national and international levels and is normally on a table-top basis.

11.3. International arrangements, including those with neighbouring countries

11.3.1. *ECURIE (European Community Urgent Radiological Information Exchange)*

ECURIE is a 24*/7* rapid alert and information exchange system. The system notifies the competent authorities of the participating States (currently EU Member States[127], Switzerland, Norway, the Republic of ***North*** Macedonia ***and Montenegro***) and the Commission in case of a major nuclear accident or a radiological emergency. During an emergency, the system provides a platform for the participating States in order to ***exchange information in relation to*** the current and foreseeable status of the accident, meteorological conditions, national countermeasures taken, etc.

The legal basis for participation in ECURIE by the EU Member States is the EU Council Decision 87/600/Euratom and the Agreement between Euratom and non-member States of the European Union on the participation of the latter in ECURIE[128]. The Commission is responsible for ECURIE management and development and maintains a 24/7 preparedness service in order to activate the system in the event of a nuclear or radiological emergency[129].

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127 ***The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

128 OJ C 102 of 29.4.2003, p. 2.

129 For more information on the ECURIE system see https://ecurie.jrc.ec.europa.eu.

There is an ongoing effort between ***the Commission and IAEA*** services on the issue of having compatible technical systems for the ECURIE ***Member States*** for notification purposes which would deal with ECURIE messages as well as the IAEA's Emercon messages. With the latest generation of the ECURIE notification software it is possible to send a notification to both the Commission and the IAEA simultaneously. ***From a technical point of view this has been implemented by the Commission and has been successfully tested during joint international exercises. The IAEA continues its work to implement the solutions on the actual USIE system. It is expected that this functionality will be implemented by the IAEA during 2019.***

The representatives of the ECURIE Competent Authorities were invited to Luxembourg in 2018 by the Commission to participate in a training course on the ECURIE arrangements. The training was appreciated by the national authorities and the Commission was encouraged to consider further courses in the future.

11.3.2. *EURDEP (EUropean Radiological Data Exchange Platform)*

EURDEP is both a standard data format and a network for the exchange of environmental radiation monitoring data between European countries in real-time which is managed by the Commission's Joint Research Centre in cooperation with DG ENER. Participation of the EU Member States is based on the Council Decision 87/600/Euratom. Participation of the various non-EU countries is on a voluntary basis.

Currently, EURDEP gathers and presents data from 41 networks in ***39***[130] European countries, totalling about 5500 automatic monitoring stations. The data servers are currently hosted by the JRC services in Italy, DG ENER services in Luxembourg and the Bundesamt für Strahlenschutz (BfS) in Germany.

[130] ***Including Greenland, although the data is reported via Denmark. The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

Countries which make their national radiological monitoring data available to EURDEP have access to the data from all the other participating countries. The system is continuously operating in routine mode (i.e. for gamma dose rate hourly; weekly for air concentration). During an emergency the rate of data exchange in case of air concentration is increased to a daily basis[131]. ***The data is also available to the public.***

11.3.3. IACRNE

The Commission participates in the Inter-Agency Committee on Response to Nuclear Emergencies (IACRNE) and is a co-sponsor of the Joint Radiation Emergency Management Plan of the International Organisations (J-Plan) which seeks to lay out how the associated International Organisations should interact in the event of a major radiological emergency.

11.3.4. Other activities

Other radiological emergency preparedness activities in the Commission include training of national authorities, assistance to research activity co-ordination, regular preparedness exercises and co-operation with other international organisations and other Commission emergency services. Additionally the Commission provides an INES (the International Nuclear Event Scale) liaison officer and organises regular meetings of Member States radiological emergency preparedness authorities.

12. ARTICLE 17 – SITING

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

i. For evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

ii. For evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

[131] For more information on the EURDEP system see ***https://remon.jrc.ec.europa.eu/About/Rad-Data-Exchange***.

iii. For re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation:

iv. For consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the like safety impact on their own territory of the nuclear installation.

This section of the Report describes the relevant Euratom legal acts which affect the siting of a nuclear facility.

12.1. Description of the licensing process, including summary of laws, regulations and requirements relating to the siting of nuclear installations

Under Article 37 of the Euratom Treaty, the Community possesses competence as regards "any plan for the disposal of radioactive waste in whatever form" if the implementation of that plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State. That fact provides sufficient grounds to conclude that Euratom possesses competence in the field covered by Article 17 of the Convention.[132]

Section II 3.8.3 of the present report describes the process followed by the expert group of art.37, resulting in an opinion of the Commission that, notably, covers art.17 (i) and (ii) of the Convention.

Article 65 of the Council Directive 2013/59/EURATOM provides that operational protection of members of the public in normal circumstances from practices subject to licensing shall include, for relevant facilities, the following:

[132] Judgment of the Court of 10 December 2002, *Commission of the European Communities v Council of the European Union*, C-29/99, ECLI:EU:C:2002:734.

(a) examination and approval of the proposed siting of the facility from a radiation protection point of view, taking into account relevant demographic, meteorological, geological, hydrological and ecological conditions;

(b) acceptance into service of the facility subject to adequate protection being provided against any exposure or radioactive contamination liable to extend beyond the perimeter of the facility or radioactive contamination liable to extend to the ground beneath the facility;

(c) examination and approval of plans for the discharge of radioactive effluents;

(d) measures to control the access of members of the public to the facility.

2. The competent authority shall where appropriate establish authorised limits as part of the discharge authorisation and conditions for discharging radioactive effluents which shall:

(a) take into account the results of the optimisation of radiation protection;

(b) reflect good practice in the operation of similar facilities.

In addition, these discharge authorisations shall take into account, where appropriate, the results of a generic screening assessment based on internationally recognised scientific guidance, where such an assessment has been required by the Member State, to demonstrate that environmental criteria for long-term human health protection are met."

The amended Nuclear Safety Directive contains a reference to the licence holder's responsibility for siting, by defining the term "licence" as "any legal document granted under the jurisdiction of a Member State to confer responsibility for the siting, design, construction, commissioning and operation or decommissioning of a nuclear installation" (Art. 3(4) of Directive 2009/***71/***Euratom).

In addition, Article 6(2) sets up a general obligation for licensees: "Member States shall ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as reasonably achievable, the safety of their nuclear installations in a systematic and verifiable manner. That shall include verification that measures are in place for the prevention of accidents and mitigation of the consequences of accidents, including the verification of the application of defence- in-depth provisions;"

Furthermore, under the ***amended Nuclear Safety*** Directive, a high-level safety objective has been introduced covering all stages of the lifecycle of nuclear installations (siting, design, construction, commissioning, operation, decommissioning), with the aim of preventing accidents and, should an accident occur, mitigating its consequences and avoiding early and large radioactive releases. In particular, this objective calls for significant safety enhancements in the design of new reactors for which the state of the art knowledge and technology should be used, taking into account the latest international safety requirements.

12.1.1. *Criteria for evaluating all site-related factors affecting safety*

There are no detailed applicable Euratom legal acts currently in force which set out criteria for the siting of nuclear installations.

12.1.2. *Criteria for evaluating the nuclear safety impact of the nuclear installations on the surrounding environment and population:*

Not applicable

12.2. Implementing provisions for fulfilment of the above mentioned criteria

Not applicable

12.3. Activities relating to maintenance of the continued safety acceptability of the nuclear installation, taking account of site-related factors

Not applicable

12.4. International arrangements, including those with neighbouring countries, as necessary

Not applicable

13. ARTICLE 18 – DESIGN AND CONSTRUCTION

Article 18: Each Contracting Party shall take the appropriate steps to ensure that:

(a) The design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;

(b) The technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

(c) The design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

This section of the Report describes the relevant Euratom legal acts which affect the design ***and*** construction of a nuclear facility.

In this regard, there are no detailed Euratom legal acts currently in force. The design ***and the*** construction of nuclear installations lie within the competence of the national authorities. However, in its Judgement of 10 December 2002 the Court held that "*the measures required by Articles 18 and 19 of the Convention concerning the design, construction and operation of nuclear installations can be the subject of the provisions which the Member States lay down to ensure, in accordance with the first paragraph of Article 33 of the Euratom Treaty, compliance with the basic standards. However, the Commission has competence to make recommendations for harmonising those provisions, as is clear from the second paragraph of Article 33 of the Euratom Treaty, interpreted in the light of the considerations set out in paragraphs 75 to 83 of the present judgment. The Member States are required to assist in drawing up those recommendations through the communications referred to in the third paragraph of Article 33 of the Euratom Treaty*"[133].

[133] Judgment of the Court of 10 December 2002, *Commission of the European Communities v Council of the European Union*, C-29/99, ECLI:EU:C:2002:734, para. 105.

Corresponding to Article 18 (1) of the Convention on Nuclear Safety, the amended Nuclear Safety Directive provides in Article 6(c) that licence holders are to regularly assess, verify, and continuously improve, as far as reasonably practicable, the nuclear safety of their nuclear installations in a systematic and verifiable manner. This shall include verification that measures are in place for the prevention of accidents and mitigation of the consequences of accidents, including the verification of the application of defence-in-depth provisions.

Furthermore, under the Directive, a high level safety objective has been introduced covering all stages of the lifecycle of nuclear installations (including design and construction), with the aim of preventing accidents and, should an accident occur, mitigating its consequences and avoiding early and large radioactive releases. In particular, this objective calls for significant safety enhancements in the design of new reactors for which the state of the art knowledge and technology should be used, taking into account the latest international safety requirements. This objective shall also be used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the scope of periodic safety reviews.

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

Article 37 of the Euratom Treaty and its practical implementation as laid down in Commission Recommendation 2010/635/Euratom directly affect***s*** national nuclear licensing processes.

Article 37 provides that "Each Member State shall provide the Commission with such general data relating to any plan for the disposal of radioactive waste in whatever form as will make it possible to determine whether the implementation of such plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State." and that "The Commission shall deliver their opinions on planned disposal of radioactive waste within six months, after consulting the group of experts referred to in Article 31."

The "disposal of radioactive waste" within the meaning of Article 37 covers any planned or accidental release into the environment of gaseous, liquid or solid radioactive substances.

The Member State should submit general data to the Commission whenever possible one year but not less than six months before the intended granting of a radioactive waste discharge authorisation or, before the intended start-up of a nuclear operation for which no such authorisation is foreseen. The Member State is not entitled to grant the discharge authorisation (or the start-up of an operation for which no such authorisation is foreseen) without the Commission having delivered its opinion on the submitted general data.

Commission opinions, since Article 37 is part of Chapter III of the Euratom Treaty on "Health and Safety", are in essence statements about the significance from the point of view of health of potential radioactive contaminations of the water, soil or airspace of another Member State (the potential trans-boundary radiological health impact of planned operations).

A non-binding Commission opinion under Article 37 is formally notified to the submitting Member State and is published in the Official Journal of the European Union. In the years 2012-2018, the Commission delivered sixty-two opinions. It is noteworthy that the opinions delivered are increasingly concerned with decommissioning and dismantling plans as well as radioactive waste management plans. In this period, the Commission delivered only three opinions that concerned new build of power reactors. Units 1+2 (two EPR reactors) at the Hinkley Point C site in the United Kingdom[134] and Units 3+4 (two VVER reactors) at the Mochovce site in Slovakia (both in 2012). Units 1+2 (two UK-ABWR reactors) at the Wylfa Newydd site in the United Kingdom (in 2018).

The Commission periodically reports to Council and European Parliament on the application of Article 37 of the Euratom Treaty.

[134] ***The UK was a Euratom Member State at the time of the preparation of this Report. Hence, the report covers the UK for the reporting period. The UK withdrew from the Euratom on [X].***

14. ARTICLE 19 – OPERATION

Article 19: Each Contracting Party shall take the appropriate steps to ensure that:

a) The initial authorisation to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

b) Operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

c) Operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;

d) Procedures are established for responding to anticipated operational occurrences and to accidents;

e) Necessary engineering and technical support in all safety related fields is available throughout the lifetime of a nuclear installation;

f) Incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body

g) Programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organisations and regulatory bodies;

h) The generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

The operation of nuclear installations lies within the competence of the national authorities. However, ***as explained above,*** Court ***of Justice clarified*** that the measures required by Article 19 of the Convention can be the subject of the provisions which the Member States lay down to ensure, in accordance with the first paragraph of Article 33 of the Euratom Treaty, compliance with the basic standards[135]. ***T***he Commission has competence to make recommendations for harmonising those provisions ***and*** Member States are required to assist in drawing up those recommendations through the communications referred to in the third paragraph of Article 33 of the Euratom Treaty[136].

Under the amended Nuclear Safety Directive, when applying for a licence, including for operation, the applicant is required to submit a demonstration of nuclear safety, the scope and detail commensurate with the potential magnitude and nature of the hazard (Article 6b). Licence holders are also required to regularly assess, verify, and continuously improve in a systematic and verifiable manner the nuclear safety of their nuclear installations. This shall include verification that defence in depth provisions are applied and that measures are in place for the prevention of accidents and mitigation of the consequences (Article 6c).

Under the amended Nuclear Safety Directive, a high level safety objective has been introduced covering all stages of the lifecycle of nuclear installations (including operation), with the aim of preventing accidents and, should an accident occur, mitigating its consequences and avoiding early and large radioactive releases. In particular, this objective calls for significant safety enhancements in the design of new reactors for which the state of the art knowledge and technology should be used, taking into account the latest international safety requirements. This objective shall also be used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the scope of periodic safety reviews.

This provision also corresponds to the Article 4(2) of the amended Nuclear Safety Directive. Results of operating experience, insights gained from safety analyses for operating nuclear installations, development of technology and results of safety research, when available and relevant should be used by Member States for updating and improving their national nuclear safety framework.

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135 Judgment of the Court of 10 December 2002, *Commission of the European Communities v Council of the European Union*, C-29/99, ECLI:EU:C:2002:734, 102-103.

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

"Declaration by the European Atomic Energy Community pursuant to Article 30 paragraph 4 (iii) of the Nuclear Safety Convention"

The following States are members of the European Atomic Energy Community ***at the time of the preparation of this report***: the Kingdom of Belgium, the Czech Republic, the Kingdom of Denmark, the Federal Republic of Germany, the Republic of Estonia, the Hellenic Republic, the Kingdom of Spain, the French Republic, Ireland, the Italian Republic, Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Republic of Austria, the Republic of Poland, the Portuguese Republic, the Republic of Slovenia, the Slovak Republic, the Republic of Finland, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland[137].

The Community declares that Articles 1 to 5, Article 7 and Articles 14 to 35 of the Convention apply to it.

The Community possesses competences, shared with the abovementioned Member States, in the fields covered by Article 7 and Articles 14 to 19 of the Convention as provided for by the Treaty establishing the European Atomic Energy Community in Article 2(b) and the relevant Articles of Title II, Chapter 3, entitled "Health and Safety".

[137] ***The UK withdrew from the Euratom on [X].***

Rapporteur's Report for EURATOM of 29 March 2017 in the 7th Review Meeting under the Convention on Nuclear Safety

(1) Highlights

- ***3 out of 3 Challenges and 2 out of 2 Suggestions from the 6th Review Meeting have been closed***
- ***Adoption of the amended NS Directive on 8 July 2014***
- ***Introduction of a system of peer reviews on specific safety issues at a six year interval***

(2) Challenges

- ***Complete the implementation of the topical peer review process.***
- ***Complete the follow-up assessment and facilitation of consistent implementation of the Nuclear Safety Directive (so that it is consistent in both schedule and content) and report at the next review meeting.***

(3) Good Practices

- ***The 1st Topical Peer Review was launched in a proactive manner, even before date for transposition of the NSD by EU MS.***
- ***The implementation of the Instrument for Nuclear Safety Co-operation Program for assisting non-EU countries.***

(4) Suggestions

- ***No suggestions were identified.***

(5) Areas of Good Performance

- ***The safety objective for nuclear installations and the fundamental factors for achieving a high level of nuclear safety and its continuous improvement is made legally binding under the amended NSD.***

- ***The Publication of a Nuclear Illustrative Programme (PINC), which provides an overview of MS' plans in terms of investments in the EU for all the steps of the nuclear lifecycle, includes investments related to post-Fukushima safety upgrades and those related to the long-term operation of existing nuclear power plants, and will contribute to an informed debate on the associated investment needs and the management of nuclear liabilities.***

ANNEX 3

List of the ***key*** *acquis* on the basis of the Euratom Treaty
(new legal instruments in ***bold italics***)

1. Nuclear Safety

Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, Official Journal L 172, 2.7.2009.

As amended by:

Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.

2. Radioactive Waste

Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L 199 of 2.8.2011, p. 48–56.

3. Radiation protection

Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption, Official Journal L 296, 7.11.2013, p. 12–21

Commission Recommendation 2010/635/Euratom of 11 October 2010 on the application of Article 37 of the Euratom Treaty, Official Journal L-279 of 11.10.2010, p. 36.

Communication 2006/C/155/02 from the Commission *on Verification of environmental radioactivity monitoring facilities under the terms of Article 35 of the Euratom Treaty — Practical arrangements for the conduct of verification visits in Member States*, Official Journal C-155 of 4 July 2006, page 2.

Commission Recommendation 2004/2/Euratom of 18 December 2003 *on standardised information on radioactive airborne and liquid discharges into the environment from nuclear power reactors and reprocessing plants in normal operatio*n, Official Journal L-002 of 6.1.2004 page 36.

Commission Recommendation 2000/473/Euratom of 8 June 2000 *on the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole*, Official Journal L-191 of 27.7.2000, page 37.

Commission Recommendation 91/444/Euratom of 26 July 1991 *on the application of the third and fourth paragraphs of Article 33 of the Euratom Treaty*, Official Journal L-238 of 27.8.1991 page 31.

4. Basic Safety Standards

Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, Official Journal L13, 17.1.2014, pages 1 - 73)

5. Outside workers

Council Directive 90/641/Euratom of 4 December 1990 *on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas*, Official Journal L-349 of 13.12.1990 page 21.

6. Information

Commission Communication 91/C103/03 *on the implementation of Council Directive 89/618/Euratom*, Official Journal C-103 of 19.4.1991 page 12.

Council Decision 87/600/Euratom of 14 December 1987 *on Community arrangements for the early exchange of information in the event of a radiological emergency*, Official Journal L-371 of 30.12.1987 page 76.

7. Contamination of foodstuffs and feeding stuffs - Post-Chernobyl

Commission Regulation (EC) No 1635/2006 of 6 November 2006 *laying down detailed rules for the application of Council Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station*, Official Journal L-306 of 7.11.206 page 3.

Commission Recommendation (EC) No 274/2003 of 14 April 2003 *on the protection and information of the public with regard to exposure resulting from the continued radioactive caesium contamination of certain wild food products as a consequence of the accident at the Chernobyl nuclear power station*, Official Journal L-99 of 17.4.2003 page 55, amended by corrigendum published in Official Journal L-109 of 1.5.2003 page 27.

Commission Regulation No 1609/2000/EC of 24 July 2000 *establishing a list of products excluded from the application of Council Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station*, Official Journal L-185 of 25.7.2000, page 27.

Council Regulation (EC) No 1048/2009 of 23 October 2009 amending Regulation (EC) No 733/2008 *on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station*, Official Journal L-290 of 6.11.2009, page 4.

Council Regulation (EC) No 733/2008 of 15 July 2008 *on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station* (codified version), Official Journal L-201 of 30.07.2008, page 1.

8. Future accidents

Council Regulation (Euratom) 2016/52 of 15 January 2016 laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency, and repealing Regulation (Euratom) No 3954/87 and Commission Regulations (Euratom) No 944/89 and (Euratom) No 770/90, Official Journal L 13, 20.1.2016, pages 2–11).

Council Regulation No 2219/89/EEC of 18 July 1989 *on the special conditions for exporting foodstuffs and feeding stuffs following a nuclear accident or any other case of radiological emergency*, Official Journal L-211 of 22.7.1989 page 4.

9. Shipments of radioactive waste and substances

Council Directive 2006/117/Euratom of 20 November 2006 *on the supervision and control of shipments of radioactive waste and spent fuel between Member States and into and out of the Community*; Official Journal L-337 of 5.12.2006 page 21.

Council Regulation No. 1493/93/Euratom of 8 June 1993 *on shipments of radioactive substances between Member States*, Official Journal L-148 of 19.6.1993 page 1.

Commission Communication 2009/C41/02 concerning Council Regulation (Euratom) No 1493/93 on shipments of radioactive substances between Member States, Official Journal C 41 of 19.2.2009, page 2.

10. Control of radioactive sources

Council Directive 2003/122/Euratom of 22 December 2003 *on the control of high-activity sealed radioactive sources and orphan sources,* Official Journal L 346, 31.12.2003 pages 57–64.

11. Safeguards

Commission Regulation (Euratom) No 302/2005 of 8 February 2005 *on the application of Euratom safeguards*, in: O.J. L 54 of 28 February 2005, page 1 – 70.

Commission Recommendation of 15 December 2005 *on guidelines for the application of Regulation (Euratom) No 302/2005 on the application of Euratom safeguards*, in: O.J. L28 of 1 February 2006, pages 1 – 85.

12. Euratom Supply Agency

Council Decision of 12 February 2008 *establishing Statutes for the Euratom Supply Agency* (2008/114/EC, Euratom), O.J. L 41 of 15 February 2008, pages 15 – 20, as amended by Council Regulation (EU) No 517/2013 of 13 May 2013 (O.J. L 158 of 10 June 2013, pages 1–71), namely the Annex thereof, under "8. Energy", point 2.

Commission Regulation (Euratom) No 66/2006 of 16 January 2006, exempting the transfer of small quantities of ores, source materials and special fissile materials from the rules of the Chapter on supplies (O.J. L 11 of 17 January 2006, pages 6-7).

Rules of the Supply Agency of the European Atomic Energy Community determining the manner in which demand is to be balanced against the supply of ores, source materials and special fissile materials (of 5 May 1960) (O.J. L No 32, 11.5.1960, p. 777 - English special edition Series I Volume 1959-1962, pages 46 - 47), as amended by the Regulation of the Supply Agency of the European Atomic Energy Community of 15 July 1975 (O.J. L 193, 25.7.1975, pages 37–38) [corrected, for the English version, by the Consolidated text of corrigenda to instruments published in Special Editions 1952-72, p. 3 (511/60)].

13. Euratom loans

Council decision 94/179/Euratom of 21 March 1994 amending decision 77/270/Euratom, to authorize the Commission to contract Euratom borrowings in order to contribute to the financing required for improving the degree of safety and efficiency of nuclear power stations in certain non-member countries, O.J. L 112, 3 May 1990, page 26.

14. Research and Training

Council Regulation N° 2018/1563 of 15 October 2018 on the Research and Training Programme of the European Atomic Energy Community (2019–2020) complementing the Horizon 2020 Framework Programme for Research and Innovation, and repealing Regulation (Euratom) No 1314/2013. O.J. L 262, 19.10.2018, pages 1-19.