

BREXATOM: The Consequences of the United Kingdom Leaving Euratom

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Introduction

Nuclear technology, including both peaceful and military, has been under development in the United Kingdom (UK) since 1940. As a result of these efforts, the UK successfully conducted its first nuclear test on 3 October 1953. There were multiple factors which influenced the UK's decision to pursue an indigenous nuclear weapons program but the most significant factor was the British government's decision to maintain its nuclear arsenal as a deterrent tool.¹ With regard to the nuclear non-proliferation regime, the UK is a nuclear-weapon State (NWS) under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Article IX.5 of the NPT defines a nuclear-weapon State as one "which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967."² The other four NWSs are the United States, France, Russia and China.

From the aforementioned countries, the UK possesses only approximately 1 percent of the total global stockpiles of nuclear weapons, according to official information published by the British Ministry of Defense. It has the smallest nuclear arsenal of all the NPT NWSs. In spite of possessing advanced nuclear capabilities, the UK has demonstrated serious commitment to nuclear disarmament by reducing its deterrent capability to a single nuclear weapon system (the Trident), and by dismantling its tactical nuclear capability.³

The principal purpose of the NPT was to prevent the spread of nuclear weapons to countries that did not already possess such a capability, referred to as "horizontal" proliferation. As a result, Article III of the NPT does not require NWSs to accept nuclear safeguards. It obliges only non-nuclear-weapon States (NNWSs) Parties to the NPT to negotiate and conclude such agreements with the International Atomic Energy Agency (IAEA) "for the exclusive purpose of verification of the fulfilment of its obligations assumed under [the NPT] with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear

¹ The aim of this paper is not to discuss these factors. For more details on the history of the UK's nuclear program see: Jeremy Stocker, *The United Kingdom and Nuclear Deterrence* (London: Routledge, 2013) or Nick Ritchie, "Relinquishing nuclear weapons: identities, networks and the British bomb," *International Affairs* (Royal Institute of International Affairs 1944-) Vol. 86, No. 2 (March 2010).

² *Treaty on the Non-Proliferation of Nuclear Weapons*, Article IX.5, United Nations Office for Disarmament Affairs, <http://disarmament.un.org/treaties/t/npt/text>.

³ "The UK's nuclear deterrent: what you need to know," Policy Paper issued by the Ministry of Defence, *gov.uk*, 19 February 2018, <https://www.gov.uk/government/publications/uk-nuclear-deterrence-factsheet/uk-nuclear-deterrence-what-you-need-to-know#uk-and-nuclear-disarmament>.

explosive devices.”⁴ Despite having no obligation to accept safeguards, NWSs have concluded safeguards agreements, albeit limited to those facilities which the State allows to be inspected. These agreements became known as *voluntary offer agreements* (VOAs). The very first NWS that concluded a VOA was the UK. It entered into force on 14 August 1978 as a trilateral agreement with the IAEA and the European Atomic Energy Community, also known as Euratom.⁵

Under the trilateral VOA (INFCIRC/263), the UK demonstrated its preparedness to “offer an opportunity for the application of similar safeguards in the United Kingdom subject to exclusions for national security reasons only.” Since the UK was at that time already a member of the European Communities (EC), it was also a State Party to the Treaty Establishing the European Atomic Energy Community (Euratom Treaty) which established Euratom. Euratom, referred to as ‘the Community’ in INFCIRC/263, was authorized under this agreement to ensure through appropriate safeguards “that civil nuclear materials are not diverted to uses other than those for which they are intended.”⁶ Since it is a *trilateral agreement*, nuclear safeguards are being applied jointly with the IAEA.

Euratom has been applying safeguards at all UK civilian facilities since the UK’s accession to the EC in 1973. With the likely and impending exit of the UK from the European Union, which would effectively sever it from Euratom, a number of questions about safeguards implementation have been raised.

During the referendum in June 2016 on the UK’s withdrawal from the EU, only a few people at the time realized the extent to which various sectors would be directly impacted by that decision. On 29 March 2017, Prime Minister Theresa May sent a six-page letter to European Council President Donald Tusk notifying the European Council “in accordance with Article 50 of the Treaty on the European Union of the intention to withdraw from the [EU].” In addition,

⁴ *Treaty on the Non-Proliferation of Nuclear Weapons*, Article III.1, United Nations Office for Disarmament Affairs, <http://disarmament.un.org/treaties/t/npt/text>.

⁵ John Carlson, “Expanding Safeguards in Nuclear-Weapons States,” *Nuclear Threat Initiative*, pp. 2, https://www.nti.org/media/pdfs/NWS_safeguards_carlson_fin.pdf?_id=1337718775?_id=1337718775.

⁶ *The Text of the Agreement of 6 September 1976 Between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/263, October 1978, IAEA, pp. 1, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263.pdf>.

the letter notified the Council on the UK's intention to withdraw from Euratom in accordance with the same Article 50 as applied by Article 106a of the Euratom Treaty.⁷

When negotiations on the UK's withdrawal started, it became clear that the UK's decision, now popularly called Brexit, will directly impact many critical areas, one of which is the application of nuclear safeguards in the UK. The decision to leave Euratom triggered an interesting debate focused on the political and legal perspectives of withdrawal. Many questioned the necessity to exit Euratom and examined the legal links between the EU and Euratom. Silke Goldberg, an expert on European law and nuclear power from Herbert Smith Freehills, argues that the decision of the UK government to announce an intention to withdraw from Euratom was primarily a political decision, not a legal one.⁸ She stresses that Euratom is a separate institution from the EU with a completely separate legal personality, although it uses some of the same bodies such as the European Council, European Commission, European Parliament (only consultations), and the European courts. In Goldberg's view, withdrawal from Euratom only reflects reluctance of the current government to accept jurisdiction of a non-UK institution.⁹

After it became clear that the UK intended to withdraw from Euratom, questions about whether the British government had a right to do so were raised. As Goldberg suggested, there are two questionable aspects to it. First of all, the question of leaving Euratom was not expressly put to the British people in the referendum held in June, and it does not seem to have been covered in the debates or explanatory paper issued to Parliament at the time of the referendum vote.¹⁰ Secondly, Goldberg argues that, from a legal point of view, the wording of the question was flawed since it was not clear whether the term 'European Union' referred to Euratom or had some narrower meaning.¹¹

⁷ Prime Minister's letter to Donald Tusk triggering Article 50, 29 March 2017, pp. 1, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/604079/Prime_Ministers_letter_to_European_Council_President_Donald_Tusk.pdf.

⁸ Some articles suggest that Article 50 of the Treaty on European Union (TEU) can be interpreted in two ways. Firstly, it could mean that a Member State is free to leave the EU but not Euratom - Article 50 is the exit route for leaving either body separately, or both of them together, as that Member State desires. Or alternatively, it could mean that if a Member State wants to leave the EU, it must also leave Euratom. For more details see: Steve Peers, "The UK Brexits Euratom: Legal Framework and Future Developments," *EU Law Analysis*, 30 January 2017, <http://eulawanalysis.blogspot.com/2017/01/the-uk-brexits-euratom-legal-framework.html>.

⁹ Silke Goldberg interviewed by the Florence School of Regulation, 12 February 2018, 2:30-3:00, available at: <http://fsr.eui.eu/brexit-euratom-treaty-silke-goldberg/>.

¹⁰ The referendum question was composed as following: "Should the United Kingdom remain a member of the European Union or leave the European Union?" For detailed analysis see: David Allen Green, "The tale of the Brexit referendum question," *Financial Times*, 3 August 2017, <https://www.ft.com/content/b56b2b36-1835-37c6-8152-b175cf077ae8>.

¹¹ Silke Goldberg interviewed by the Florence School of Regulation, 12 February 2018, 3:20-5:00, available at: <http://fsr.eui.eu/brexit-euratom-treaty-silke-goldberg/>.

Nonetheless, the UK reaffirmed its intention to exit from Euratom in the Draft Agreement on withdrawal from the EU and Euratom that was agreed at the negotiators' level on 14 November 2018. Articles 79-85 of the Draft Agreement cover Euratom-related issues. In accordance with Article 81, the UK should implement a safeguards regime that "shall apply a system offering equivalent effectiveness and coverage as that provided by [Euratom] in the territory of the United Kingdom in line with the Agreement [INFCIRC/263], as amended." The Draft Agreement also specifies ownership and rights of use and consumption of special fissile materials in the UK and covers the issues of equipment and other property related to the provision of safeguards.¹² Annex V to the Draft Agreement also sets out the categories of Community (Euratom) equipment and other property related to the provision of safeguards located in the UK under the Euratom Treaty "which shall become property of the United Kingdom at the end of the transition period." This part also specifies what should be reimbursed to the EU and how the value was calculated.¹³

Given the provisions on Euratom outlined in the Draft Agreement, how does Brexit impact the implementation of safeguards in the UK? First, the UK has to now establish a completely new system of safeguards. To start, a new IT system to track nuclear material must be implemented. This system must be up and running by the end of 2018, to run parallel with the European system, before being ready to take over in March 2019. Secondly, the UK's existing nuclear regulator, the Office for Nuclear Regulation (ONR), has to recruit and train additional safeguards inspectors and build additional institutional capacity. Another important point is to negotiate a new voluntary offer agreement with the IAEA and nuclear cooperation agreements (NCAs) with third countries. With regard to safeguards equipment, the UK government must ensure that all necessary equipment "will be in place to comply with its international obligations."¹⁴

Both the IAEA and Euratom are cooperating closely with the UK to ensure that the UK's nuclear sector is meeting its international safeguards obligations. Since the UK's safeguards are based on trilateral agreements, it will need to renegotiate a new arrangement with the IAEA.

¹² *Draft Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, as agreed at negotiators' level on 14 November 2018*, 14 November 2018, TF50 (2018) 55 – Commission to EU27, Articles 81-83, pp. 139-142, https://ec.europa.eu/commission/sites/beta-political/files/draft_withdrawal_agreement_0.pdf.

¹³ *Ibid.*, pp. 547.

¹⁴ *EU Energy and Environment Sub-Committee inquiry into Brexit: Energy Security, Department for Business, Energy and Industrial Strategy*, 29 March 2018, pp. 17-18, <https://www.parliament.uk/documents/lords-committees/eu-energy-environment-subcommittee/Brexit%20energy%20security/Gov-response-Brexit-energy-security-29-March-2018.pdf>.

This paper briefly explains how nuclear safeguards are currently implemented in the UK, what kinds of agreements are in force and which international bodies are authorized to carry out inspections on safeguards implementation. The structure of the paper is divided into three core sections. The first section looks closer at Euratom and its arrangements; the second chapter examines the role of the IAEA and its importance to the UK's future safeguards system; the last part talks about specific distinctions between the old and new safeguards regime in the UK.

I. The UK and Euratom: What is Euratom and why does it matter?

Purpose and history

Euratom is the European nuclear regulator whose main objective is to contribute to the formation and development of Europe's nuclear industry and to ensure security of supply. Established in 1957 by the Treaty establishing the European Atomic Energy Community (Euratom Treaty), the basic purpose and structure of Euratom is to "contribute to the raising of the standard of living in the Member States and to the development of relations with the other countries by creating the conditions necessary for the speedy establishment and growth of nuclear industries."¹⁵ The Euratom Treaty is one of the three founding treaties of the EU, the other two being the 1951 Treaty establishing the European Coal and Steel Community and the 1957 European Economic Community Treaty. While the other two treaties have either expired or been amended, the Euratom Treaty is largely unchanged. It is noteworthy that while Euratom is a separate legal entity from the EU, it is governed by the European Commission.¹⁶

The six founding Euratom States (Belgium, France, Germany Italy, Luxembourg and the Netherlands) aimed to create a common supranational nuclear organization that could serve as an instrument to share the high costs for investing in nuclear energy.¹⁷ Concerns about the shortage of conventional energy with the then-attractive aim to enhance European integration through a nuclear energy community was one of the key drivers behind this integration. As a result, the Euratom Treaty established a single market for trade in nuclear materials and technology by regulating the nuclear industry across Europe, safeguarding nuclear material, disposing of waste and carrying out research.¹⁸

¹⁵ *Consolidated Version of the Treaty establishing the European Atomic Energy Community*, 2012/C 327/01, Article 1, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012A%2FTXT>.

¹⁶ *European Atomic Energy Community (Euratom) – Structures and Tool*, Briefing, September 2017, pp. 2-3, [http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608665/EPRS_BRI\(2017\)608665_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608665/EPRS_BRI(2017)608665_EN.pdf).

¹⁷ Michel Gaudet, "Euratom," *Progress in Nuclear Energy*, Series 10, Vol. 1-2, 1959, pp. 145-147, <http://aei.pitt.edu/36275/1/A2487.pdf>.

¹⁸ *European Atomic Energy Community (Euratom) – Structures and Tool*, Briefing, September 2017, pp. 2-3, [http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608665/EPRS_BRI\(2017\)608665_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608665/EPRS_BRI(2017)608665_EN.pdf).

Tasks and tools

What are the specific tasks carried out by Euratom under the Euratom Treaty? Article 2 of the Euratom Treaty identifies eight core tasks for which Euratom is responsible:

- (a) promote research and ensure the dissemination of technical information;*
- (b) establish uniform safety standards to protect the health of workers and of the general public and ensure that they are applied;*
- (c) facilitate investment and ensure, particularly by encouraging ventures on the part of undertakings, the establishment of the basic installations necessary for the development of nuclear energy in the Community;*
- (d) ensure that all users in the Community receive a regular and equitable supply of ores and nuclear fuels;*
- (e) make certain, by appropriate supervision, that nuclear materials are not diverted to purposes other than those for which they are intended;*
- (f) exercise the right of ownership conferred upon it with respect to special fissile materials;*
- (g) ensure wide commercial outlets and access to the best technical facilities by the creation of a common market in specialized materials and equipment, by the free movement of capital for investment in the field of nuclear energy and by freedom of employment for specialists within the Community;*
- (h) establish with other countries and international organizations such relations as will foster progress in the peaceful uses of nuclear energy.¹⁹*

The tasks agreed upon in Article 2 are carried out by several separate institutions, namely the Euratom Supply Agency (ESA), the European Commission and the Euratom Safeguards Directorate. ESA focuses on enhancing the security of supply of users located in the EU and shares responsibility for the viability of the EU nuclear industry. More specifically, ESA is authorized to conclude supply contracts for nuclear material (ores, source material and special fissile material) in accordance with the Euratom Treaty, and has the option to purchase nuclear material produced in its Member States.²⁰ The European Commission develops research programs to foster nuclear research and development within the EU, while the Euratom

¹⁹ *Consolidated Version of the Treaty establishing the European Atomic Energy Community*, 2012/C 327/01, Article 2, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012A%2FTXT>.

²⁰ 'Mission Statement,' Euratom Supply Agency, <http://ec.europa.eu/euratom/mission.html>.

Safeguards Directorate was established to ensure that nuclear materials would not be diverted from their intended uses.²¹

Euratom and the IAEA

The Euratom Treaty does not differentiate between NWSs and NNWSs. All of the provisions are applied in a non-discriminatory manner in each of the States Party to the Euratom Treaty. As stated in Article 84, “the safeguards may not extend to materials intended to meet defense requirements which are in the course of being specially processed for this purpose or which, after being so processed, are, in accordance with an operational plan, placed or stored in a military establishment.”²² In practice this means that Euratom safeguards only apply to material and activities which are part of the civilian nuclear sector.

It is also important to remember that in 1957, the year the Euratom Treaty was concluded, there was no NPT. In 1968, the NPT was opened for signature, at which time all but one of the six founding States – France – signed the Treaty (the UK, although not a founding State of Euratom, became one of the three Depository governments of the NPT and also signed the Treaty in 1968). In signing the NPT, the five NNWSs – Belgium, Germany, Italy, Luxembourg and the Netherlands – indicated that they would ratify the NPT only after a “satisfactory agreement with the IAEA had been concluded.” On 5 April 1973, Euratom and the IAEA signed an agreement known as INFCIRC/193 – the Agreement between Belgium, Denmark, the Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands, the European Atomic Energy Community and the Agency in connection with the Treaty on the Non-Proliferation of Nuclear Weapons.²³ In May 1975, the five NNWSs deposited their respective instruments of ratification of the NPT, and the safeguards agreement was brought into force in 1977. Since then, every NNWS which has become a Member of the EU has ratified the NPT and become Party to INFCIRC/193.

In the EU, nuclear safeguards have been applied jointly by Euratom and the IAEA since 1977. Based on the document INFCIRC/193, Euratom undertook to cooperate with the Agency to ensure that nuclear material is not diverted “to purposes other than those for which they were intended,” and that the Agency should be able to verify the findings of Euratom’s system of

²¹ Patricia Lorenz, “The Euratom Treaty: Its Role and Functions,” paper published within the Joint Project “Risk and Public Control,” 2002, pp. 1-2, http://www.joint-project.org/upload/file/EURATOM_Paper.pdf.

²² *Consolidated Version of the Treaty establishing the European Atomic Energy Community*, 2012/C 327/01, Article 84, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012A%2FTXT>.

²³ David A.V. Fischer, “IAEA/Euratom Agreement – An Explanation,” *Division of External Relations, IAEA*, pp. 11-12, <https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull15-3/15303581016.pdf>.

safeguards.²⁴ The protocol to the Agreement establishes a legal framework for joint inspections which should be carried out simultaneously, however, without any duplication of safeguards activities. In implementing the Agreement, both bodies developed concepts such as the “Observation Regime” and the “Joint Team Regime” in order to optimize the utilization of resources and to avoid unnecessary duplication in facilities with a relatively high inspection effort, in such a way that each organization could draw its own independent conclusions. As a consequence of this active cooperation, in 1991 a Working Group was established to examine how the joint activities could be better coordinated. The Working Group initiated a New Partnership Approach (NPA) with the objectives to optimize safeguards by using commonly agreed approaches, methods and techniques; avoiding unnecessary duplication by performing inspection activities based on the principle of “one-job-one-person”; and sharing analytical capabilities in order to reduce the number of samples needed to be taken.²⁵ According to Dr. Piotr Szymanski, a former Director of Nuclear Safeguards at the European Commission, implementation of the NPA led to “significant reductions in IAEA and EURATOM inspection [efforts] while allowing both organizations to satisfy their respective obligations to reach independent conclusions and required assurances.”²⁶ Since the NPA was signed in 1992, the IAEA and EURATOM have come a long way in their inter-institutional cooperation.²⁷

Euratom’s role as SSAC

Under INFCIRC/193, as in other comprehensive safeguards agreements concluded by the IAEA, the States are required to establish a system of accounting for and control of nuclear

²⁴ INFCIRC/193 is an agreement concluded in 1973 exclusively between Belgium, Denmark, the Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons. Under the terms of this agreement, Euratom was obliged to gather all the relevant information about the nuclear materials entering and leaving the Community. This information then had to be passed to the IAEA. Under this agreement was established a Liaison Committee which meets as a High Level Committee and a Lower Level Committee. Its task is to examine means by which co-operation and co-ordination between Euratom and the IAEA in the implementation of INFCIRC/193 could be enhanced. For more details see the text of the INFCIRC/193: <https://www.iaea.org/sites/default/files/infirc193.pdf>.

²⁵ K. Murakami, G. Zuccardo-Labelarte, L. Bevaart, A. Tolba, “Beyond NPA and toward Integrated Safeguards in Countries of the European Union,” *IAEA – Department of Safeguards*, Vienna, Austria, IAEA-SM-367/11/07, pp. 2-3, <https://www-pub.iaea.org/MTCD/publications/PDF/ss-2001/PDF%20files/Session%2011/Paper%2011-07.pdf>.

²⁶ Piotr Szymanski, “The EURATOM regional safeguards system”, *Directorate for Nuclear Safeguards*, Directorate General for Energy, European Commission, Luxembourg, pp. 5, <https://www.iaea.org/sites/default/files/euratom211111.pdf>.

²⁷ The NPA agreement was signed in April 1992 by the IAEA Director General Hans Blix and Euroatom’s Commissioner Cardoso e Cunha in Brussels. Main objective of the NPA was to facilitate a cost-effective cooperation by optimization of the necessary practical arrangements and the use of commonly agreed safeguards approaches and inspection planning, procedures, activities, instruments, methods, and techniques. For more information see: Sven Thorstensen, Kaluba Chitumbo, “Safeguards in the European Union: The New Partnership Approach,” *IAEA Bulletin*, 1/1995, Regional Report, <https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull37-1/37102382528.pdf>.

material (SSAC). In relation to the IAEA, Euratom also serves as the States' system for all the EU countries. What is an SSAC and why is it so important? Whenever costly, dangerous or otherwise important material is used, an accounting and control system is necessary to keep track of it and to contribute to the detection of any loss or theft. This is why a State has to establish and maintain a system of accounting for and control over all nuclear material subject to safeguards under a specific agreement. Maintaining an adequate SSAC is important for achieving effectiveness and establishing credible IAEA safeguards. In practice it means that a State is responsible for keeping track of nuclear material that was "received, produced, shipped, lost or otherwise removed from inventory."²⁸ A country has to be aware of the movement of its nuclear material both in and outside of its territory. For that purpose, having in place procedures that can measure and evaluate a real amount of nuclear material that is part of the countries' activities is fundamental. All this information is kept in the form of records and reports that are submitted via EU inspectors to the IAEA.²⁹

The document on the systems of accounting for and control of nuclear material issued by the Agency specifies that, in regard to the SSAC, the basic idea was that "in each State a national organization would lay, [...], the foundations for international safeguards." This State system is directed against diversion of nuclear material to unauthorized uses by operators, individuals or groups. Therefore, the design of the SSAC is determined by governmental structures, national practices and the extent to which the nuclear fuel cycle exists in a country.³⁰

In the case of INFCIRC/193, Euratom operates, on behalf of the States, as a "regional system of accounting and control" (RSAC).

Euratom and the UK

The United Kingdom's current safeguards regime and its main international agreements on nuclear safeguards with the IAEA are underpinned by the UK's membership in Euratom. Euratom manages safeguards across the EU and reports to the IAEA on behalf of the EU under three different trilateral agreements: (1) the agreement between Euratom, the IAEA and the EU

²⁸ *IAEA Safeguards Glossary – 2001 Edition*, International Nuclear Verification Series No. 3, IAEA, Vienna 2002, pp. 28, https://www.iaea.org/sites/default/files/iaea_safeguards_glossary.pdf.

²⁹ For more information on the cooperation between Euratom and the IAEA see: *Protocol Additional to the INFCIRC/193*, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1973/infcirc193a8.pdf>.

³⁰ *Systems of Accounting for and Control of Nuclear Material*, iaea.org, pp. 18-19, <https://www.iaea.org/sites/default/files/17204801824.pdf>.

NNWSs;³¹ (2) the agreement between Euratom, the IAEA and France;³² and (3) the agreement between Euratom, the IAEA and the UK.³³ As indicated above, France and the UK have separate agreements with the IAEA – the VOAs.³⁴

Looking at the safeguards system as implemented in the UK, all these activities are currently being applied in accordance with the procedures established by the Euratom Treaty. Euratom can be seen as an inter-governmental organization that has been set up to cover the territory of the States under its jurisdiction. The Euratom Treaty also requires that the European Commission verify that civil nuclear material is not diverted from declared peaceful end uses, and that obligations related to material which has been supplied under international cooperation agreements are observed.³⁵

Withdrawal from Euratom

Euratom has conducted the majority of safeguards activities in the UK since 1973 when the UK became a party to the Euratom Treaty and joined the European Economic Community. The potential implications of the UK's withdrawal from Euratom are quite extensive. It could cause disruptions in its nuclear industry and in the import and export of nuclear and other radioactive materials, but also threaten nuclear research that is closely linked to Euratom. Developing a clear plan for a smooth transition became a top priority for the British government. In order to mitigate some of the possible negative consequences, the Nuclear Safeguards Act 2018 (NSA 2018) created the legal framework for a domestic nuclear safeguards regime to operate in the UK. It replaces the current legal framework for nuclear materials accounting and control and

³¹ *Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (Accession of Croatia)*, INFCIRC/193/Add.30, 16 May 2017, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1973/infcirc193a30.pdf>.

³² *Protocol Additional to the Agreement between France, the European Atomic Energy Community and the International Atomic Energy Agency for the Application of Safeguards in France*, INFCIRC/290/Add.1, 24 February 2005, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1981/infcirc290a1.pdf>.

³³ *Protocol Additional to the Agreement between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the International Atomic Energy Agency for the Application of Safeguards in the United Kingdom of Great Britain and Northern Ireland in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/263/Add.1, 24 February 2005, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263a1.pdf>.

³⁴ Caroline Joran, Ross Peel, "Brexatom – the Nuclear Impacts of Brexit on the UK," *Nuclear-21*, 26 March 2018, <https://nuclear-21.net/viewpoints/brexatom-nuclear-impacts-brexit-uk/>.

³⁵ *Guidance on International Safeguards and Nuclear Material Accountancy at Nuclear sites in the UK*, 2010 Edition, Revision 1, UK Safeguards Office, 13 June 2010, pp. 29, <http://www.onr.org.uk/safeguards/accountancy.pdf>.

will enable the country to meet international nuclear safeguards standards and engage in certain international civil nuclear activities, including trade, research and development.³⁶

Although this paper focuses primarily on the UK's nuclear safeguards system after withdrawal from Euratom, there are other areas of the nuclear sector which will be impacted as well, including nuclear investment and nuclear research. Euratom facilitates international nuclear trade and collaboration through the nuclear common market and nuclear cooperation agreements between Euratom and third countries. Setting up new agreements is therefore essential for the UK to avoid any disruption in nuclear supply chains. Would the UK eventually benefit from leaving Euratom when it comes to nuclear trade and investment? According to the *Électricité de France (EDF) Energy*, one of the largest integrated energy companies in the UK, there are no particular benefits. The company suggests that the UK's civil nuclear industry relies "on the EU Single Market for access to the people, goods and services it needs to support the operation of current operational nuclear power stations, waste and decommissioning activities and nuclear new build." Losing free access to the Single Market means losing access to a common market in nuclear materials, equipment, technology and services, losing free movement of workers across the nuclear industry and losing access to markets in nuclear materials, equipment, technology and services in third countries.³⁷

On the other hand, a report issued by the Business, Energy and Industrial Strategy (BEIS) Committee of the House of Commons argues that leaving Euratom provides the UK more flexibility. BEIS argues that exiting Euratom offers numerous opportunities for the country to expand nuclear trade, such as by enhancing decommissioning activities or investing in advanced nuclear technologies. As a result, the UK can develop its current supply chains and increase procurement of UK goods and services. According to the report, "departure from the Euratom Treaty would remove our Article 41 obligations, which require Member States to review investment projects for new-build nuclear activities," which would allow the UK to devote more time to its own projects and activities.³⁸

³⁶ *Nuclear Safeguards Bill – Explanatory Notes*, HL Bill 81-EN, pp. 2,

<https://publications.parliament.uk/pa/bills/lbill/2017-2019/0081/18081en.pdf>.

³⁷ *Memorandum from EDF Energy to the Business, Energy and Industrial Strategy Committee's inquiry on Brexit and the implications for UK business (Civil nuclear sector)*,

<http://data.parliament.uk/WrittenEvidence/CommitteeEvidence.svc/EvidenceDocument/Business,%20Energy%20and%20Industrial%20Strategy/Leaving%20the%20EU%20implications%20for%20the%20nuclear%20industry/written/70767.html>.

³⁸ *Leaving the EU: implications for the civil nuclear sector*, Second Report of Session 2017-2019, House of Commons – Business, Energy and Industrial Strategy Committee, 12 December 2017, pp. 15-16,

<https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/378/378.pdf>.

The third area impacted by the withdrawal is research. Euratom is responsible for the nuclear part of the EU collaborative research fund, currently called Horizon 2020. Nuclear researchers from the University of Manchester noted that, historically, the UK has received more funding than its contribution to EU research.³⁹ The report from the BEIS Committee similarly suggests that “there are clear advantages to collaborating on research and development via Euratom,” and the UK government is therefore looking for ways to extend its cooperation with Euratom after leaving the group.⁴⁰ Benefits of participation include, among others, access to high-cost facilities outside the UK, easy movement of research materials and intellectual talent and leverage for the funding of high-cost projects. According to another report by BEIS published in April 2017, the UK could lose access to new development projects in the nuclear energy research sector if new bilateral agreements are not set up in time, due to the large scale of nuclear energy research projects and the constant need to work with international partners.⁴¹

II. The UK and the International Atomic Energy Agency

In addition to Euratom, another international body is responsible for oversight of UK nuclear activities – the IAEA. As mentioned in the introduction, the UK is party to the NPT, which officially recognizes the UK as a NWS. While it is not obliged to accept IAEA safeguards, the British government decided to conclude a VOA by which it agreed to accept IAEA safeguards on all of its civilian nuclear facilities.⁴² This chapter explains the role of the IAEA in nuclear safeguards, how the UK’s VOA differs from other types of agreements such as comprehensive safeguards agreements (CSAs), and whether there are any differences among the VOAs concluded by the IAEA with other NWSs.

IAEA and nuclear safeguards

The IAEA was created in 1957 in response to the “deep fear and expectations generated by the discoveries and diverse uses of nuclear technology.”⁴³ A founding document, the Statute of the

³⁹ <http://blog.policy.manchester.ac.uk/posts/2017/02/euratom-and-leaving-the-european-union/>

⁴⁰ *Leaving the EU: implications for the civil nuclear sector*, Second Report of Session 2017-2019, House of Commons – Business, Energy and Industrial Strategy Committee, 12 December 2017, pp. 17, <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/378/378.pdf>.

⁴¹ *Leaving the EU: implications for the civil nuclear sector*, Fifth Report of Session 2016-2017, House of Commons – Business, Energy and Industrial Strategy Committee, 25 April 2017, pp. 31-32, <https://publications.parliament.uk/pa/cm201617/cmselect/cmbeis/909/909.pdf>.

⁴² *Treaty on the Non-Proliferation of Nuclear Weapons*, IAEA, INFCIRC/140, 22 April 1970, pp. 2, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1970/infcirc140.pdf>

⁴³ *International Atomic Energy Agency – History*, [iaea.org](https://www.iaea.org/about/overview/history), available at: <https://www.iaea.org/about/overview/history>.

IAEA, was approved in 1956 and set out the objective of the Agency to establish and administer safeguards to ensure that “special fissionable and other materials, services, equipment, facilities and information made available by the [IAEA] or at its request or under its supervision or control are not used in such a way as to further any military purpose [...]”⁴⁴

Why is it crucial for every country - whether it has developed a nuclear weapons program or not - to have an effective safeguards regime in place? Firstly, nuclear safeguards are fundamental in order to detect and deter the diversion of nuclear material by a State. Safeguards make it mandatory for users of nuclear material to keep records and to declare materials they hold and process to the relevant authorities. The specific objective is to verify, on a technical basis, whether nuclear material remains within the civil nuclear fuel cycle and is being used solely for peaceful purposes. Safeguards consist of various reporting and verification processes carried out by inspectors and operators, which assure and demonstrate that civil nuclear material is not diverted unlawfully into military or weapons programmes. These measures include, for example, reporting on nuclear material and activities and inspections of nuclear facilities and materials.⁴⁵

Placing a State’s nuclear activities and materials under safeguards contributes fundamentally to the non-proliferation regime. Since certain nuclear materials might provide important support to a State’s clandestine nuclear-weapons programme, it is important to have measures preventing the possible misuse of nuclear material for non-peaceful purposes. Safeguards are also important in the context of international nuclear trade because they provide States that export nuclear goods, services, technology and know-how with the assurances required to meet their nuclear non-proliferation objectives.⁴⁶ In other words, safeguards provide the international community with assurances that nuclear exports won’t be abused for the development of nuclear weapons capabilities in a NNWS. Effective export controls help constrain the supply key items which could be crucial for the acquisition of nuclear weapons before they are imported/exported abroad.

⁴⁴ *The Statute of the IAEA*, Article III.5, <https://www.iaea.org/about/statute#a1-3>.

⁴⁵ *Nuclear Safeguards: Draft Regulations, Consultation on the proposed regulations for a new domestic nuclear safeguards regime, following the UK’s withdrawal from Euratom*, Department for Business, Energy and Industrial Strategy, July 2018, pp. 15, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/723473/2018-07-09_Nuclear_Safeguards_Regulations_Consultation_Document_FINAL.pdf.

⁴⁶ *What role do nuclear safeguards play in international trade / collaboration*, burges-salmon.com, 26 June 2017, <https://www.burges-salmon.com/news-and-insight/legal-updates/what-role-do-nuclear-safeguards-play-in-international-trade-collaboration/>.

There are different plausible diversion strategies which are countered by safeguards. For instance, a State could decide to remove nuclear material from a peaceful facility for use in a clandestine program to by falsifying the records and reports of the nuclear material balance.⁴⁷ This would enable a nation to remove the fissile material needed for nuclear weapons from its commercial nuclear power systems. There are plenty of other sophisticated strategies as to how to obtain a critical amount of sensitive nuclear material. For example, it is possible to misuse research or power reactors for undeclared production of plutonium or uranium-233 or to produce high-enriched uranium using low enrichment nuclear facilities.⁴⁸ The main objective of safeguards is to detect such diversions and inconsistencies in advance, and to deter such diversion by the risk of early detection.

Comprehensive safeguard agreements and the Model Additional Protocol

The safeguards agreements concluded by the IAEA with NWSs party to the NPT are comprehensive safeguards agreements (CSAs). CSAs are of indefinite duration (tied only to the State's remaining party to the NPT). The scope of a CSA is not limited to nuclear material declared by a State but includes all nuclear material of the country. CSAs are based on a document referred to as INFCIRC/153, "The Structure and Content of Agreements between the Agency and States Required in Connection with the [NPT]", which states that such agreements "should provide the Agency's right and obligation to ensure that safeguards will be applied, in accordance with the terms of the Agreement, on all source or special fissionable material in all peaceful nuclear activities within the territory of the State, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices."⁴⁹ These CSAs

⁴⁷ Nuclear materials balance figures reflect differences between the inventory of nuclear material (plutonium, uranium and thorium) recorded in the nuclear materials accounts for a facility, and the inventory which is measured physically.

⁴⁸ Thomas Shea, K. Chitumbo, "Safeguarding sensitive nuclear materials: Reinforced approaches," *IAEA Bulletin*, No.3, 1993, pp. 24, <https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull135-3/35301052327.pdf>; In this regard, Iraq provides a very interesting case of a sophisticated strategy being used for developing a clandestine nuclear weapons program. Iraq misused a radiochemical laboratory and fuel fabrication plant to produce plutonium. For more details see: David Albright, Khidhir Hamza, "Iraq's Reconstruction of Its Nuclear Weapons Program," *Arms Control Today*, October 1998, <https://www.isis-online.org/publications/iraq/act1298.html>.

⁴⁹ *The Structure and Content of Agreements between the Agency and States required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/153, International Atomic Energy Agency, June 1972, pp. 1, available at: <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1972/infcirc153.pdf>.

differ from the earlier non-misuse safeguards agreements, which apply only to the items specified in the agreement and do not require the States to forswear nuclear weapons.⁵⁰

Since the nuclear field raises inherent national security concerns and often faces new emerging challenges, nuclear safeguards must stay ahead of the curve at all times. After Iraq was able to covertly develop a clandestine nuclear weapons program despite then-conventional facility-level IAEA verification activities, the Agency endeavored to develop an additional legal instrument for safeguards, which became the Model Additional Protocol. This document, on the basis of which the Agency now concludes additional protocols (AP) to existing CSAs (as well as to VOAs), aims to enable the IAEA inspectors to provide assurances about both declared and possible undeclared activities, and to get a more complete picture of a State's overall nuclear program. With an AP in force, the IAEA is granted expanded rights of access to information and locations within States.

Which specific measures in an AP improve the implementation of IAEA nuclear safeguards? Firstly, an AP guarantees the IAEA inspectors access to all parts of a State's nuclear fuel cycle as well as to any other location where nuclear material is or may be present. Under its provisions, States agree to provide information on and access to all buildings on a nuclear site. Secondly, inspectors are allowed to collect environmental samples at locations beyond declared locations when requested by the Agency. Moreover, States also give the IAEA the right to make use of internationally established communications systems, e.g. satellite systems.⁵¹ Finally, by accepting an AP, a State agrees to provide information on the manufacture and export of sensitive nuclear-related technologies.⁵²

In short, an AP grants expanded rights of access to information and locations by enabling the IAEA to obtain a much fuller picture of a State's nuclear program, plans, nuclear material holdings and trade. Furthermore, it increases the IAEA's ability to provide much greater assurances of the absence of undeclared nuclear material and activities in those countries

The UK's AP, INFCIRC/263/Add.1, entered into force in 2004 and is implemented in the UK under the Nuclear Safeguards Act 2000 and the accompanying Nuclear Safeguards

⁵⁰ Paul K. Kerr, Mary Beth D. Nikitin, "State's Obligation Under Additional Protocol to IAEA Comprehensive Safeguards Agreements," *Congressional Research Service*, 23 October 2017, pp. 1, available at: <https://fas.org/sgp/crs/nuke/statesob.pdf>.

⁵¹ *Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards*, INFCIRC/540, Article 14, IAEA, September 1997, Pp. 12, available at: <https://www.iaea.org/sites/default/files/infirc540c.pdf>.

⁵² *Additional Protocol*, Inventory of International Nonproliferation Organizations and Regimes, James Martin Center for Nonproliferation Studies, 13 June 2012, pp. 1-2, https://www.nti.org/media/pdfs/iaea_Additional_protocol_3.pdf?_id=1340826977?_id=1340826977.

(Notifications) Regulations 2004. The UK's VOA is intended to (a) contribute to increasing the IAEA's capability to detect undeclared nuclear activities in NNWSs and (b) improve the effectiveness or efficiency of IAEA safeguards at facilities in the UK which are designated for inspection.

The implementing regulations oblige individuals and entities that conduct research and development activities related to any nuclear activity carried out in cooperation with NNWS and that are not specifically authorized or controlled by the UK's government. Activities are specified as the following: the enrichment of nuclear material; the reprocessing of nuclear fuel; the processing of intermediate or high-level waste containing plutonium; high enriched uranium (HEU) or uranium-233.⁵³

In addition, the UK is obliged to provide the Agency with declarations at regular intervals containing the information which is specified in subparagraphs of Article 2 of its AP. For example, the UK has to submit activity reports specifying "the location of those nuclear fuel cycle-related research and development activities carried out anywhere that are funded, specifically authorized or controlled by, or carried out on behalf of, the United Kingdom, for or in co-operation with, or otherwise relevant to, a non- nuclear-weapon State."⁵⁴

Voluntary offer agreements

One of the most important differences between CSAs and VOAs is that, while under a CSA a State is required to *accept* IAEA safeguards on *all* nuclear material in *all* peaceful nuclear activities, under a VOA a State *offers* the IAEA with a list of facilities on which IAEA safeguards could be applied. The VOAs follow the same basic structure of the standard model agreement for NNWS, however, they recognize that NWSs continue to have nuclear activities outside the scope of IAEA safeguards. The Agency is therefore limited in its ability to apply IAEA safeguards on NWSs civil nuclear activities, as the scope of safeguards implementation is explicitly defined in the relevant VOA.⁵⁵

⁵³ UK additional protocol and regulations, onr.org, available at: <http://www.onr.org.uk/safeguards/additional-protocol.htm>.

⁵⁴ Protocol Additional to the Agreement between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the International Atomic Energy Agency for the Application of Safeguards in the United Kingdom of Great Britain and Northern Ireland in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, INFCIRC/263/Add.1, 24 February 2005, pp. 13, available at: <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263a1.pdf>.

⁵⁵ Guidance on International Safeguards and Nuclear Material Accountancy at Nuclear sites in the UK, pp. 29, available at: <http://www.onr.org.uk/safeguards/accountancy.pdf>.

The application of VOAs also differs from NWS to NWS. While the US and the UK's eligible facility lists encompass all the civilian facilities in these States, the French eligible facility list includes only those facilities containing nuclear material to which third parties require safeguards to apply. The Russian and Chinese VOAs are even more limited – Russia's list only includes facilities from which IAEA inspectors could gain safeguards experience, e.g. fast reactors or fuel fabrication. Similarly, China is also very careful with providing access to its facilities and it does so only at the request of a relevant supplier State. For instance, China has a bilateral agreement with Australia which requires facilities using supplied nuclear material to be included in the IAEA eligible facility list.⁵⁶

The UK's VOA entered into force in 1978 in the form of the trilateral UK/Euratom/IAEA agreement (INFCIRC/263) since the UK was already an EU Member State. One of the main objectives of its VOA was to “encourage widespread adherence to the Treaty [NPT] by demonstrating to non-nuclear-weapon States that they would not be placed at a commercial disadvantage by reason of the application of safeguards pursuant to the Treaty.” Under this agreement, the UK voluntarily accepted the application of IAEA safeguards “on all source or special fissionable material in facilities or parts thereof within the United Kingdom, subject to exclusions for national reasons only.” IAEA safeguards are applicable to “all source or special fissionable material in facilities or parts thereof within the United Kingdom, subject to exclusions for national security reasons only, with a view to enabling the Agency to verify that such material is not, except as provided for in this Agreement, withdrawn from civil activities.”⁵⁷

As mentioned above, the UK has provided a list of civil nuclear facilities and other locations to Euratom and to the Agency, exclusive of facilities containing nuclear material for national defense purposes. Under the VOA, the UK is entitled to delete any facility from the list for national security reasons by notifying both Euratom and the Agency in advance.⁵⁸

⁵⁶ John Carlson, “Expanding Safeguards in Nuclear-Weapon States,” *Nuclear Threat Initiative*, July 2011, pp. 2, available at: https://www.nti.org/media/pdfs/NWS_safeguards_carlson_fin.pdf?_id=1337718775?_id=1337718775. For more details see: *Australia-China Nuclear Material Agreement and Nuclear Cooperation Agreement*, Australian Government, Department of Foreign Affairs and Trade, available at: <https://dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/policies-agreements-treaties/Pages/australia-china-nuclear-material-transfer-agreement-and-nuclear-cooperation-agreement.aspx#3>.

⁵⁷ *The Text of the Agreement of 6 September 1976 between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, International Atomic Energy Agency, INFCIRC/263, October 1978, pp. 2, <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263.pdf>.

⁵⁸ *Ibid.*, pp. 2-3.

III. Establishing a new safeguards regime

On 7 June 2018, the UK and the IAEA signed a new bilateral VOA and AP that will replace the existing trilateral agreements between the UK, IAEA and Euratom. In November 2018 the new Agreement was ratified by the Parliament. This is a very important milestone since it ensures that the UK will have an internationally-recognized safeguards regime in place once the Euratom arrangement ceases to apply. The existing Euratom safeguards arrangements will continue to operate in the UK during the proposed implementation period after the UK leaves the EU, running from 30 March 2019 and ending presumably on 31 December 2020. The new VOA's entry into force is dependent on the political arrangements related to the official UK withdrawal agreement, which is still being negotiated. This chapter discusses the latest developments in the UK's exit from Euratom, identifies the key national bodies which are responsible for a smooth transition and analyzes the main differences between the UK's new and old VOAs.

Department for Business, Energy and Industrial Strategy (BEIS)

The Department for Business, Energy and Industrial Strategy was created by Prime Minister Theresa May in 2016 and it brings together responsibility for business, industrial strategy, and science and innovation with energy and climate change policy. BEIS has one of the largest Brexit portfolios of any government department. It is responsible for 22 of the 58 economic sectors the government says will be affected by Brexit, and 68 of the over 300 Brexit-related areas of work, or 'work streams', that departments need to complete as a consequence of the UK leaving the EU. To be ready for March 2019, the Department must plan for both a "negotiated" and a "no deal" scenario, by preparing the necessary secondary legislation and establishing new processes and systems, including building new IT systems.⁵⁹

BEIS reports quarterly to Parliament on the government's progress on the UK's exit from the Euratom Treaty and issues written ministerial statements whenever it is necessary to keep Parliament updated. As the Department in charge of energy, handling potential consequences of the UK's withdrawal from Euratom remains a major concern. It has therefore set up a new team that is involved in negotiations with the EU about establishing a nuclear co-operation

⁵⁹ *Exiting the European Union: The Department for Business, Energy and Industrial Strategy*, Thirty-Fourth Report of Session 2017-2019, House of Commons, Committee of Public Accounts, pp. 4, available at: <https://publications.parliament.uk/pa/cm201719/cmselect/cmpublic/687/687.pdf>.

arrangement with key partner States and establishing a new domestic nuclear safeguard arrangement.⁶⁰

For this purpose, BEIS has requested that the Office for Nuclear Regulation (ONR), which is an independent regulatory body, to provide support to BEIS in developing the new regulatory framework.⁶¹

Office for Nuclear Regulation

ONR monitors safeguards performance in the UK by “supporting and intervening as necessary with the international safeguards inspectorates of the European Commission and the IAEA and/or UK organizations that are subject to safeguards requirements.” It also fulfils the international and domestic safeguards-related reporting obligations that are the direct responsibility of the UK government and provides it with an informed independent assessment of the application of safeguards and UK compliance.⁶²

Office for Nuclear Regulation independently regulates nuclear safety and security at 36 nuclear licensed sites in the UK and is also responsible for regulating transport and ensuring that safeguards obligations for the UK are met.⁶³ Its role and responsibilities were strengthened when the UK Parliament adopted the Nuclear Safeguards Act 2018, which enabled the UK to set up a domestic safeguards regime. The Act specifically states that “the Secretary of State may by regulations authorize or require ONR to make payments towards compliance costs,” where the term ‘compliance costs’ means “costs of complying with nuclear safeguards regulations or with specified provisions of nuclear safeguards regulations.”⁶⁴ In practice, it provides ONR, which already has regulatory responsibility for nuclear safety and nuclear security, with a new safeguards function. The new safeguards regime will be run by ONR not only using its existing functions and powers, but also its new powers that were established under the Nuclear Safeguards Act 2018. ONR is currently in the process of developing an expanded safeguards function. To achieve full operational capacity, ONR is in charge of the recruitment of new inspectors, building additional institutional capacity and developing the necessary IT

⁶⁰ “UK seeks close energy relationship with EU after Brexit,” *World Nuclear News*, 3 November 2017, available at: <http://world-nuclear-news.org/Articles/UK-seeks-close-energy-relationship-with-EU-after-B>.

⁶¹ For more details see the official ONR’s website with the list of agreements concluded with BEIS with regard to the new safeguards regime: available at: <http://www.onr.org.uk/agency-agreements-mou.htm>.

⁶² *Nuclear Safeguards – ONR’s role*, Office for Nuclear Regulation, available at: <http://www.onr.org.uk/safeguards/index.htm>.

⁶³ Tom Greatrex, “Leaving Euratom”, *Energy Focus*, 25 July 2018, <https://energyfocus.the-eic.com/nuclear/opinion/leaving-euratom>.

⁶⁴ http://www.legislation.gov.uk/ukpga/2018/15/pdfs/ukpga_20180015_en.pdf pp.3

systems. ONR experts are discussing technical aspects of the new system with the IAEA to ensure that the Euratom responsibilities are transposed to ONR without any difficulties.⁶⁵

Nuclear Safeguards Act 2018

The UK has been committed to fulfil international standards on nuclear safeguards and non-proliferation once it leaves the EU. Therefore, the existing legislative domestic framework needed to be amended. For this purpose, the UK government adopted the Nuclear Safeguards Act 2018, which amends the Energy Act 2013. It is noteworthy that the Act from 2013 was the one that first established ONR as a new regulator.

What are the most significant amendments that are being implemented? Firstly, the Nuclear Safeguards Act 2018 created new powers for the Secretary of State to put in place regulations setting out the detail of the domestic safeguards regime. Chapter 2A on Nuclear Safeguards specifies that “the Secretary of State may by regulations [...] make provision for the purpose of ensuring that qualifying nuclear material, facilities or equipment are only available for use for civil activities [...]” It continues by explaining to what activities regulations are related, such as:

- a) *record-keeping or accounting;*
- b) *the provision or publication of information;*
- c) *inspection or monitoring;*
- d) *imports or exports;*
- e) *the design of qualifying nuclear facilities or equipment;*
- f) *the production, processing, use, handling, storage or disposal of*
- g) *qualifying nuclear material or equipment.*⁶⁶

Secondly, the Nuclear Safeguards Act 2018 creates a limited power for the Secretary of State to amend three existing pieces of legislation to update references to the new IAEA safeguards agreement by stating that “the Secretary of State may by regulations amend any of the following consequence of a relevant safeguards agreement – (a) the Nuclear Safeguards and Electricity (Finance) Act 1978; (b) the Nuclear Safeguards Act 2000; and (c) the Nuclear Safeguards (Notification) Regulations 2004 (S.I. 2004/1255).” The term ‘a relevant safeguards agreement’

⁶⁵ *Nuclear Safeguards Bill*, Written Evidence submitted by Dr. David Lowry, Institute for Resource and Security Studies, Cambridge, Massachusetts, USA, 14 November 2017, available at: <https://publications.parliament.uk/pa/cm201719/cmpublic/nuclear/memo/nsb06.htm>.

⁶⁶ *Nuclear Safeguards Act 2018*, Chapter 15, Section 76A – Nuclear Safeguards Regulations, 28 June 2018, pp. 1-2, available at: http://www.legislation.gov.uk/ukpga/2018/15/pdfs/ukpga_20180015_en.pdf.

refers to an agreement relating to nuclear safeguards to which the UK and the IAEA are parties.⁶⁷

The tools and rights which were provided to the key institutions, such as ONR, by amending domestic legislation allow the UK government to establish a fully functioning SSAC. Although the SSAC is still being developed, it is very likely to be similar to the current regime established by Euratom. According to BEIS, adopting domestic standards of nuclear safeguards of broad equivalence to those adopted by Euratom will ensure that sites to which safeguards apply remain subject to detailed oversight and that the UK continues to maintain the highest standards of nuclear safeguards.⁶⁸

Quarterly update from January to March 2018

In a written ministerial statement from 11 January 2018, BEIS presented its strategy for exiting Euratom. Greg Clark, Secretary of States for BEIS, stated that, in order to ensure a smooth transition BEIS would pursue a twofold strategy. The transition would be based, firstly, on negotiations with the European Commission geared primarily to seeking a close and effective association with Euratom. The second track to be pursued simultaneously will aim to put “in place all the necessary measures to ensure that the UK could operate as an independent and responsible nuclear State from day one.”⁶⁹

The ministerial statement also names the principles on which the strategy is based:

- *to aim for continuity with current relevant Euratom arrangements;*
- *to ensure that the UK maintains its leading role in European nuclear research;*
- *to ensure the nuclear industry in the UK has the necessary skilled workforce covering decommissioning, ongoing operation of existing facilities and new build projects; and*
- *to ensure that on 29 March 2019 the UK has the necessary measures in place to ensure that the nuclear industry can continue to operate.*⁷⁰

⁶⁷ *Nuclear Safeguards Act 2018*, Chapter 15, Section 76B – Nuclear Safeguards Regulations, 28 June 2018, pp. 4, available at: http://www.legislation.gov.uk/ukpga/2018/15/pdfs/ukpga_20180015_en.pdf.

⁶⁸ “UK regulator clarifies role for Nuclear Safeguards Bill,” *World Nuclear News*, 3 January 2018, available at: <http://www.world-nuclear-news.org/Articles/UK-regulator-clarifies-role-for-Nuclear-Safeguards>.

⁶⁹ *Energy Policy: Written statement - HCWS399*, made by Greg Clark (Secretary of State for BEIS), Department for Business, Energy and Industrial Strategy, 11 January 2018, available at: <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2018-01-11/HCWS399/>.

⁷⁰ *Energy Policy: Written statement - HCWS399*, made by Greg Clark (Secretary of State for BEIS), Department for Business, Energy and Industrial Strategy, 11 January 2018, available at: <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2018-01-11/HCWS399/>.

To what extent these arrangements are implemented is reported quarterly to the Parliament. The first quarterly update was issued by BEIS on 26 March 2018 and summarized the developments made from January to March 2018. The report talked about “substantial progress” in relation to the negotiation with Euratom and assured the Parliament that it was “moving swiftly to establish the legislative and regulatory framework for a domestic safeguards regime.” The report indicated that both sides had agreed on the continuation of the existing Euratom arrangements during the transition period, and that businesses would be able to trade on the same terms as currently exist until the end of 2020.⁷¹

The UK government has already notified the IAEA that the UK “will be taking legal responsibility for its own nuclear safeguards regime equivalent in effectiveness and coverage to that currently provided by Euratom.” It is also clear to both sides that “the new agreements should follow the same principles and scope as the current trilateral agreements.”⁷²

The report also highlights that the government is on track to “conclude and then to secure third country and UK ratification of all four of the priority Nuclear Co-operation Agreements (NCAs) with third countries in advance of March 2019.” These countries, which are especially critical for the UK, are Australia, USA, Japan and Canada. With regard to the NCAs, officials from BEIS have been regularly engaging with all of these countries and in total have taken part in more than 50 meetings or calls with these countries to discuss draft text, and to discuss the logistics for concluding new agreements.⁷³

The first quarterly update also informs the Parliament about financial arrangements that must be made in order to develop the new safeguards regime. As noted in the report, the cost of all Euratom exit-related preparatory work is being paid to ONR direct from the BEIS budgets. The Department will allocate to ONR the funding necessary to establish the UK’s SSAC.⁷⁴

Quarterly update from April to June 2018

The second quarterly update informed the Parliament that the UK and the EU had each agreement on all Euratom related articles of the draft Withdrawal Agreement. In addition, the

⁷¹ *Quarterly Update to Parliament on the Government’s Progress in the UK’s Exit from the Euratom Treaty*, Department for Business, Energy and Industrial Strategy, 26 March 2018, pp. 2-3, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/694766/first_quarterly_update_to_Parliament_on_Euratom.pdf.

⁷² *Ibid.*, pp. 2.

⁷³ *Ibid.*, pp. 4.

⁷⁴ *Quarterly Update to Parliament on the Government’s Progress in the UK’s Exit from the Euratom Treaty*, Department for Business, Energy and Industrial Strategy, 26 March 2018, pp. 5-6, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/694766/first_quarterly_update_to_Parliament_on_Euratom.pdf.

UK signed the new VOA and AP with the IAEA on 7 June 2018. This ensures that the UK will have an internationally-recognized safeguards regime in place when Euratom arrangements cease to apply in the UK.

Another important agreement concluded in this period was the NCA with the USA on 4 May 2018, which “ensures uninterrupted cooperation and trade in the civil nuclear sector.” It was drafted on the same principles as the US-Euratom NCA, putting in place robust assurances on all civil US-origin nuclear items present on UK territory, and civil UK-origin nuclear items present on US territory, including in relation to nuclear safeguards, security, retransfers, storage, enrichment and reprocessing. Because the US ratification process is the lengthiest of the ratifications that are required for new nuclear agreements, the NCA with the US had to be finalized and signed as the first such agreement.⁷⁵

With regard to establishing a new domestic safeguards system, during this timeframe the Nuclear Safeguards Act 2018 received Royal Assent and ONR was awarded an IT contract for a Safeguards Information Management and Reporting System (SIMRS) in May.⁷⁶ The report stated that “the ONR is confident that the system will be operable by the end of 2018.” In addition, the government made a further £4.63 million available as an advance from its contingencies fund to support ONR’s preparations for a domestic civil nuclear safeguards regime.⁷⁷

Quarterly update from July to September 2018

The latest update on the government’s implementation of its Euratom exit strategy is from October 2018. The next report is planned for January 2019. The report refers to an important document that was presented to Parliament by Prime Minister Theresa May on 12 July 2018, the so-called “White Paper” discussing the future relationship between the UK and the EU. With regard to the civil nuclear sector, the White Paper stresses that the UK will be seeking a close association with Euratom through the negotiation of an NCA which “would be more comprehensive and broader[er] than any existing agreement between Euratom and a third country and would help ensure the UK’s standing as a leading and responsible civil nuclear State is maintained.” The primary aim of this NCA is to have a “mutually-beneficial civil

⁷⁵ *Quarterly Update to Parliament on the Government’s Progress in the UK’s Exit from the Euratom Treaty*, Department for Business, Energy and Industrial Strategy, 28 June 2018, pp. 4-5, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/720496/Second_quarterly_report_to_Parliament_on_Euratom_progress_final_1.pdf.

⁷⁶ SIMRS is a complex safeguards IT system which, once fully developed and implemented, will assist ONR with the functionality of its system of accountancy and control.

⁷⁷ *Ibid.*, pp. 5.

nuclear relationship” and to establish “a close cooperation mechanism between ONR and Euratom.” It would involve actions such as technical information exchanges; joint studies and consultation on regulatory or legislative changes; and minimizing barriers and simplifying export control arrangements in the trade and transfer of sensitive nuclear materials, equipment and technology between the UK and the Euratom.⁷⁸

The report noted that, during this period, the UK also made progress on NCA negotiations with other countries. On 21 August 2018, it signed a new bilateral NCA with Australia, which is required as the current Euratom-Australia NCA will no longer apply in the UK when Euratom arrangements no longer apply to the UK. Good progress had also been made in discussions with Canada and Japan.⁷⁹

With regard to the new domestic safeguards regime, ONR has made progress on the SSAC. This was emphasized by Dr. Mina Golshan, Senior Responsible Officer at ONR, when she gave evidence to the House of Lords Select Committee on 11 July.⁸⁰ ONR is currently developing a regulatory framework and operating model for the SSAC and has also successfully recruited and trained new safeguards inspectors. Particularly critical for ONR was setting up the aforementioned SIMRS which enables it to manage and process nuclear material accountancy reports. In regard to the finances, the funding arrangements for the future domestic safeguards regime were under review.⁸¹

The last quarterly update also included a reference to a Technical Notice on civil nuclear regulation in case no withdrawal agreement is in place after March 2019. The Notice explains to the civil nuclear industry and stakeholders how the sector will be affected if the UK leaves the EU and Euratom with no agreement in place.⁸² “No-deal” contingency planning is critical

⁷⁸ For more details see: *The Future Relationship between the United Kingdom and the European Union*, Presented to Parliament by the Prime Minister by Command of Her Majesty, July 2018, pp. 45, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725288/The_future_relationship_between_the_United_Kingdom_and_the_European_Union.pdf.

⁷⁹ *Quarterly Update to Parliament on the Government’s Progress in the UK’s Exit from the Euratom Treaty*, Department for Business, Energy and Industrial Strategy, 10 October 2018, pp. 6, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/747214/Euratom-third-quarterly-update.pdf.

⁸⁰ For more details see: *Select Committee on the European Union: Energy and Environment Sub-Committee*, Corrected oral evidence: The Office for Nuclear Regulation’s Brexit preparedness, 11 July 2018, <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-and-environment-subcommittee/the-office-of-nuclear-regulations-brex-it-preparedness/oral/86771.pdf>.

⁸¹ *Quarterly Update to Parliament on the Government’s Progress in the UK’s Exit from the Euratom Treaty*, Department for Business, Energy and Industrial Strategy, 10 October 2018, pp. 7-8, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/747214/Euratom-third-quarterly-update.pdf.

⁸² For more details see: “Guidance: Civil Nuclear regulation if there’s no Brexit deal,” *Department for Business, Energy and Industrial Strategy*, 23 August 2018, available at:

for the government, so it is prepared for all possible scenarios, including “the unlikely outcome that [the UK] leaves the EU without any deal in March 2019.”

The July to September 2018 report referred to another important document – the draft Nuclear Safeguards Regulations. This document reflects debates on nuclear safeguards in Parliament and incorporates feedback from the nuclear industry and wider stakeholder community.⁸³ Based on these consultations, a draft item entitled *The Nuclear Safeguards (EU Exit) Regulations 2018* has been issued and is currently waiting for approval in both Houses of Parliament. This document sets out the detailed legal framework for the UK’s new civil nuclear safeguards regime. It consists of 14 parts and covers the new regime in detail referencing safeguards provisions, accountancy and control plans, export and imports regulations, ores, civil activities, communications and other areas.

For example, Part 11 of the Regulations explains what the specific tasks of ONR are and how it ensures compliance with the requirements of the Regulations. For instance, ONR is authorized to “examine the records kept by an operator in accordance with the requirements of these Regulations,” or “make independent measurements of any qualifying nuclear material.” The term ‘operator’ is defined as “a person or undertaking setting up, operating, closing down or decommissioning a qualifying nuclear facility for the production, processing, storage, handling, disposal or other use of qualifying nuclear material.”⁸⁴

According to the Regulations, ONR must publish on its website all information related to both withdrawals of qualifying nuclear material from safeguards applications and updated information on civil plutonium and uranium stockpiles in the UK at the end of each calendar year. In addition to ONR, the role of the Secretary of State is equally critical since ONR “must provide an annual report to the Secretary of State setting out how these Regulations have been applied [...]” ONR also provides that information to the IAEA.⁸⁵

<https://www.gov.uk/government/publications/civil-nuclear-regulation-if-theres-no-brexit-deal/civil-nuclear-regulation-if-theres-no-brexit-deal>.

⁸³ https://beisgovuk.citizenspace.com/civil-nuclear-resilience/nuclear-safeguards-regulations/supporting_documents/20180709%20Nuclear%20Safeguards%20Regulations%20Consultation%20Document%20FINAL.pdf

⁸⁴ *Draft Regulations laid before Parliament under sections 113(2)(a), (aa) and (c) and 113(3)(a) and (c) of the Energy Act 2013 and section 2(5) of the Nuclear Safeguards Act 2018, for approval by resolution of each House of Parliament*, 2018, pp. 6, available at:

http://www.legislation.gov.uk/ukdsi/2018/9780111175545/pdfs/ukdsi_9780111175545_en.pdf.

⁸⁵ For more details see: *Draft Regulations laid before Parliament under sections 113(2)(a), (aa) and (c) and 113(3)(a) and (c) of the Energy Act 2013 and section 2(5) of the Nuclear Safeguards Act 2018, for approval by resolution of each House of Parliament*, 2018, pp. 20-21.

It is important to emphasize that these Regulations do not apply to any defense activities.

The new VOA and AP

The new VOA and AP are substantially in the same form as the trilateral agreement and AP which entered into force in 1978 and 2005. The most noticeable amendment to the VOA is the removal of the definition of “Community” which referred to Euratom. It was removed altogether with the protocol included in INFCIRC/263 that specified Euratom’s role and its legal obligations towards the UK and the IAEA.⁸⁶

The second major amendment is the removal of Article 3 of INFCIRC/263 which referred to Euratom’s role in the UK safeguards regime. According to this article, Euratom was required to co-operate with the IAEA “in applying its safeguards on the source or special fissionable material [...],” while the IAEA should take into account “the effectiveness of the [Euratom’s] system of safeguards” when applying its safeguards.⁸⁷ Since there is no role for Euratom under the new VOA, this article was deleted. The new Article 3 is formulated as following: “the United Kingdom and the Agency shall co-operate to facilitate the implementation of the safeguards provided in this Agreement.”⁸⁸

Similarly, Articles 18 and 19 of INFCIRC/263, which provide that “the Board may call upon the United Kingdom or the Community, in so far as either party is individually concerned, to take the required action without delay, irrespective of whether procedures have been invoked pursuant to Article 22 for the settlement of a dispute” has been modified to remove references to Euratom. Any discussions on measures in relation to verification will be held only between the UK and the IAEA.⁸⁹

Besides these two significant changes there are various minor amendments which do not constitute significant substantive changes.

⁸⁶ *The Text of the Agreement of 6 September 1976 Between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/263, October 1978, IAEA, pp. 31-35,

<https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263.pdf>.

⁸⁷ *Ibid.*, pp. 3.

⁸⁸ *Agreement between the United Kingdom of Great Britain and Northern Ireland and the International Atomic Energy Agency for the Application of Safeguards in the United Kingdom of Great Britain and Northern Ireland in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, 7 June 2018, Vienna, pp. 7, available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/754735/MS_1_3.2018_VOA_Agreement.pdf.

⁸⁹ *Ibid.*, pp. 12.

In the case of the AP, the definition of the “Community” has been removed together with references to “outside of the Community” from Article 18 on definitions. In addition, the reference to Annex III, which specified how the measures in the Protocol would be implemented by Euratom and the UK, has been deleted.⁹⁰

Annex I contains the list of activities referred to in Article 2.a.(iii) of the AP, which says that “a description of the scale of operations for each location engaged in the activities specified in Annex I to this Protocol, where these involve links with fuel cycle operations in a NNWS,” remains unchanged. Similarly Annex II, which contains the list of specified equipment and non-nuclear material for the reporting of export and imports according to Article 2.a. (viii), remains unchanged.⁹¹ In practice, this means that the UK will be cooperating with the IAEA in the same scope as it has done under the old VOA and AP.

Conclusion

In spite of the complexities that surround the Brexit negotiations, the UK government has made good progress in connection with issues regarding its nuclear sector. Negotiating simultaneously with Euratom and the IAEA, the UK is trying to ensure that the transition from the old safeguards regime, which was built on the Euratom safeguards system, to the new one, is as smooth as possible. The first part of negotiations with the EU have covered a set of legal and technical issues related to nuclear material and waste, safeguards obligations and equipment. The second phase of discussions has been focused on the UK’s future relationship with Euratom. Both parties are trying to achieve a close relationship from which they can mutually benefit. This is being demonstrated especially by the UK’s efforts to negotiate an NCA with Euratom that would establish a close cooperation mechanism between ONR and Euratom. The UK is also profoundly interested in maintaining its engagement in Euratom research and training programs, the Joint European Torus.

The UK is in the process of establishing a legislative and regulatory framework for a domestic safeguards regime that should be operable by March 2019. ONR has successfully recruited and trained new safeguards inspectors, and it continues developing the new SSAC.

⁹⁰ *Protocol Additional to the Agreement between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the International Atomic Energy Agency for the Application of Safeguards in the United Kingdom of Great Britain and Northern Ireland in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/263/Add.1, 24 February 2005, pp. 13, available at: <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc263a1.pdf>.

⁹¹ *Ibid.*, pp. 3-5.

The UK's top priority is to have a safeguards regime in place which is equivalent in effectiveness and coverage as that currently provided by Euratom. Minor amendments which have been made to both the VOA and AP demonstrated the willingness of the UK to continue to contribute to the non-proliferation regime. Given the current political uncertainties, the UK's nuclear sector is trying to be prepared for all possible scenarios including a no-deal contingency plan. This approach assures all relevant parties that the UK intends to maintain its position as a reliable partner in nuclear trade and research.