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Safeguards Inspection Regime in Belgium and its evolution over the past three years

BAMOHAMED Asma, MRAD DALI Walid and GREGOIRE Olivier - Belgian Federal Agency for Nuclear Control (FANC)

ABSTRACT

While the Comprehensive Safeguards Agreement (INFCIRC/193) entered into force in Belgium by the law of 14th of March 1975 and thereafter, by the law of 1st June 2005, the Protocol Additional (INFCIRC/193/Add.8) entered into force, Belgium is currently complying with amongst the most stringent safeguards references and practices. Today, Belgium has a wide range of installations and activities where nuclear material is customarily used: amongst others, nuclear power reactors, research centres, a medical isotope production facility, storage facilities and universities. This extended nuclear industry involves unsurprisingly a high number of international verification activities conducted by both Euratom and the International Atomic Energy Agency that form a fundamental pillar of the Belgian safeguards regime.

Looking at the national organisation in Belgium, it is worth mentioning that there are no national inspections regarding safeguards. In general, many safeguards related duties have been delegated to the European Commission. The Federal Agency for Nuclear Control, the nuclear regulatory body in Belgium involved in safety, security and safeguards matters, has, in terms of safeguards, a facilitator role between the Belgian operators and the international inspectors. It also plays an active role in negotiating the international implementing texts and safeguards strategies, in proposing new laws and regulations, and in defining the strategic orientation Belgium can follow at the international level.

The purpose of this paper is to describe the safeguards inspection regime in Belgium and, more precisely, to describe the different types of safeguards inspection and verification activities in place, depending on the type of facility where these activities are conducted, while underlining the changes in these activities over time, and especially over the years 2017, 2018 and 2019. This paper fits into the context of the analysis of the different safeguards inspection models that are applied in Euratom Member States and in other major nuclear countries, conducted by the ESARDA Implementation of Safeguards Working Group. The results lined out in this paper are mainly based on the analysis of the data that were provided by the Federal Agency for Nuclear Control to the questionnaire elaborated by the Implementation of Safeguards Working Group in the framework of the aforementioned analysis.

INTRODUCTION

It is of paramount importance for a worldwide comprehensive non-proliferation and safeguards regime to address inspections in different countries on a coherent basis. The feedback generated from case studies in a given country can bring benefit to others. In order to address those two aspects in the quest for an ever-improving process, the 2021 joint INMM-ESARDA annual meeting has dedicated a special session to the “Safeguards Inspection Regimes in Different Countries” theme.

In this framework, Belgium is an interesting example. With two nuclear power plant (NPP) sites, a world-class research institution developing first-of-a-kind nuclear projects, an industrial-scale producer of radio-isotopes and radiopharmaceuticals, an important waste management facility and a EU Joint Research Centre, the Belgian nuclear sites present a wide range of characteristics and challenges. If we add to this international transportation hubs, academic, industrial and medical research centres, legacy industrial sites and former processing and storage facilities, the range and variety of sites in which nuclear monitoring is, or can potentially be, taken into account are considerable. The types of safeguards inspections and verification activities will be outlined in this paper.

The evolution of these inspections and verification activities has been influenced by several factors over the last few years, besides the COVID crisis which, as it will be commented, had most likely a marginal impact. The evolution of the nuclear activities, the State-Level Approach (SLA) update performed beginning 2017 in our country as well as the introduction of new safeguards tools and technologies approaches, had impacts on the whole Belgian safeguards regime and especially on the inspection and control regime. This is an interesting subject to analyse in order to determine trends and to eventually compare those in the future with the situations and their evolutions in other states (whether the concerned countries are under the EURATOM regime or not). In this perspective, the evolution over the last few years of the amount of inspections carried out, per type of inspection, is presented in the following chapters and the identified trends are analysed and discussed. This paper is focusing on 2017, 2018 and 2019 as at the moment of the aforementioned national questionnaire filling, all the data for 2020 were not available. Nonetheless, as the International Atomic Energy Agency Safeguards Implementation Report (SIR) of 2020 [7] was available at the end of this study, data from 2020 are also included and commented. The tendency between 2017 and 2020 will be compared with figures from the preceding three years, from 2014 on. Finally, a tentative inference of the expected level of those activities in the coming years will also be provided.

Overall, this paper fits into the context of the analysis of the different safeguards inspection models that are applied in Euratom Member States and in other nuclear countries conducted by the ESARDA Implementation of Safeguards (IS) Working Group (WG). The results lined out in this paper are mainly based on the processing of the data that were provided by the Federal Agency for Nuclear Control (FANC) to the questionnaire elaborated by the IS WG in the framework of the aforementioned analysis.

BELGIUM SPECIFIC CONTEXT

Belgian safeguards history

The history of non-proliferation and safeguards in Belgium is part of the history of the second half of the twentieth century. On March 25, 1957 in Rome the Ministers of Foreign Affairs of France, West Germany, Italy, Belgium, the Netherlands and Luxemburg signed the treaties establishing the European Economic Community (EEC) and the European Community for Atomic Energy (Euratom). The six countries thereby took a step further in the direction of economic integration, and the peaceful application of nuclear energy in the member states would be regulated. The Euratom Treaty entered into force in Belgium on 1st of January 1958.

From the beginning of the 1960s, in the midst of the Cold War, the international community then decided to arm itself with the legal means to stop the proliferation of nuclear weapons and to encourage nuclear disarmament. In 1964, the negotiations started. They were long and difficult and it was not until June 10, 1968 that the United Nations General Assembly adopted

the text of the Non-Proliferation Treaty (NPT). Then the instruments of ratification were deposited on 2nd of May 1975.

By the law of 14 March 1975, Belgium ratified the Comprehensive Safeguards Agreement. Thereafter the Additional Protocol (INFCIRC/193/Add.8) was signed on 22nd of September 1998. The application law was enacted the 1st June 2005.

Belgian safeguards legal and regulatory framework

Any person or company producing, separating, storing or using source materials or special fissile materials on Belgian territory must comply with the provisions of Chapter 7 "Safeguards" of the Treaty establishing the European Atomic Energy Community (Law of 2 December 1957) and its implementing regulations, in particular the Commission Regulation (Euratom) No. 302/2005 of 8 February 2005 on the application of Euratom safeguards. According to this regulation, operators of nuclear facilities have to comply with numerous provisions related to the safeguards needs in Belgium, including relating to the need to deliver Basic Technical Characteristics, to nuclear material accountancy obligation and to specific obligations when transfers between states are expected. Operators must also allow and facilitate verification and inspection activities by the IAEA and Euratom in conformity with the international agreement between the non-nuclear weapons states (NNWS) of the European Union, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of paragraphs 1 and 4 of Article III of the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193).

In addition, the Law of 20 July 1978 lays down the national modalities relating to the conduct of the IAEA international safeguards inspections on Belgian territory. The Law of 20 July 1978 provides the operators with the conditions and obligations allowing the IAEA inspectors to carry out activities of monitoring and verification under the safeguards agreements. As an example, IAEA safeguards inspections have to be performed at the same time as, and in conjunction with, Euratom inspections (art2.) while IAEA and Euratom inspectors can be accompanied by nuclear inspectors of the FANC (art10.).

The Law of 15 April 1994 on the protection of the public and the environment against the hazards of ionising radiation and on the FANC as amended by the laws of 2 April 2003, 30 March 2011 and 13 December 2017 (hereafter known as the 'FANC law') forms a legal basis for the arrangements on safeguards. In this law the role and responsibilities of FANC relating to the safeguards are defined.

On 22nd September 1998, the Additional Protocol (AP) to the international safeguards agreement, as mentioned above, was signed by Belgium. The national legal instrument implementing the AP in the Belgian territory is the Law of 1st June 2005. According to the annex III of the AP, Belgium decided to entrust to the Commission of the European Communities implementation of certain provisions which under the AP are the responsibility of the State.

National organisation

Belgium is a federal state composed of three regions (the Flemish, Walloon and Brussels Capital Regions) and three communities (the Dutch, French and German communities). The main national regulatory authority for the safeguards of nuclear facilities and nuclear activities is the FANC (Federaal Agentschap voor Nucleaire Controle - Agence fédérale de Contrôle

nucléaire – FANC/AFCN). FANC is an autonomous public institution with legal personality. The Agency is supervised by the Federal Minister of the Interior.

The FANC was established by the FANC law. This law grants the FANC broad independence, which is indispensable for the impartial carrying out of its responsibilities. FANC's mission is to ensure that the public and the environment are effectively protected against the hazards of ionising radiation. In this context, it may propose laws and decrees but it also has i.a. to implement laws and decrees on the nuclear field, to review and control nuclear licence applications to ensure compliance with the regulatory provisions and the licence conditions, and to propose or to grant licences. In this perspective, one of the areas in which FANC is involved is non-proliferation and safeguards. In the safeguards field, FANC plays an active and major role at the strategic national level but also at the international level when new strategies applicable at the national level have to be defined considering the demands of IAEA and Euratom (It has an active role in negotiating the international implementing texts and safeguards strategies, in proposing new laws and regulations, and in defining the strategic orientation Belgium follows at the international level. This also includes the discussions and implementation of new or adapted safeguards approaches), as well as a facilitator role between the operators and the international inspectorates.

About the practical application of some provisions to comply with at the national level, it is worth noting that many safeguards related duties have been delegated to the European Commission. As an example, FANC does not perform safeguards inspections on its own and does not directly control the accountancy of the operators and the safeguards measures applied in the field as Belgium delegated those responsibilities to Euratom. However, FANC has the ability to react on these points when specific problems are identified as for example accountancy issues. Also, FANC performs the accompaniment of some international safeguards inspections and complementary accesses when it assesses that it is needed.

Finally, FANC is responsible for the transmission to Euratom of some national declarations to be performed under the provisions of the AP.

Belgian nuclear industry and facilities

In Belgium a strong nuclear industry is present. The site of the Doel NPP is located in the north of the country whereas the site of the Tihange NPP is located in the south-east. In the north-east, the Mol/Dessel region is a historical place where several important nuclear facilities are located: one research centre using three research reactors and hosting active laboratories, the SCK.CEN, and one storage and treatment facility, Belgoprocess. The Joint Research Centre of the European Commission is also located in the same area. This place was also known in the past for hosting the fuel fabrication plants of FBFC International and Belgonucleaire. Indeed, FBFC International, a division of the industrial group Framatome AREVA, operated a nuclear fuel fabrication plant in Dessel. The UOx production part of the fuel fabrication facility was shut down in 2012 and the MOX production ceased at the end of 2015. Decommissioning of FBFC will be finalised in 2021. The Belgonucleaire facility, specialised in the past in MOX fuel production, stopped its activities in 2006 and the decommissioning of the site started in 2010. Conventional demolition was completed in 2019. Lastly, in the west, near Fleurus, is located the IRE, an isotope separation facility. Beside, Belgium also has a high-density flow of nuclear transports.

The Belgian NPPs totalise a number of seven power reactors currently in operation, four in Doel and three in Tihange. Having been connected to the grid between 1974 and 1985, they have an average age of 40 years. The total reactors power is currently at Doel and Tihange

NPPs sites each of approximately 3 GWe for a total power in Belgium of approximately 7 GWe.

On 30 September 2020, Belgium's new federal government approved an agreement reaffirming its policy to phase out nuclear power in the country by 2025. Under the plan, Doel 3 and Tihange 2 will be shut down respectively in 2022 and 2023. Doel 1, 2 and 4 as well as Tihange 1 and 3 will be shut down by 2025.

Following a moratorium on reprocessing, the necessity arose for greater intermediate spent fuel storage capacity at the Doel and Tihange sites. An interim spent fuel dry storage building (SCG) at the Doel site and a wet storage building (DE) at the Tihange site were developed and constructed by Electrabel, in line with the resolution adopted by the House of Representatives in December 1993. Due to the long-term operation (LTO) of some of the reactors, the existing storage capacity was not sufficient anymore, this necessitated planification for the construction of two new interim storage facilities. Complementary to the SCG building in Doel and the DE building in Tihange, the dry storage option has been chosen for both sites. The fuel elements will be placed in dual purpose casks that will be stored in buildings that will be constructed at both sites (the SF2 project).

SCK.CEN (Studiecentrum voor Kernenergie – Centre d'étude de l'énergie nucléaire), the Belgian Nuclear Research Centre, is one of the largest research institutions in Belgium. Its developments have already resulted in a long list of innovative and forward-looking applications for the medical word, industry and the energy sector. SCK.CEN is a Foundation of Public Utility and its work concerns three main research topics: the safety of nuclear facilities, the well-considered management of radioactive waste, and human and environmental protection against ionising radiation. The Nuclear Research Centre in Mol contains the air-cooled and graphite moderated reactor BR1, the material test reactor BR2 and the VENUS research reactor.

In 1971, the "Institut des Radioéléments" (IRE) was built in Fleurus. IRE is a major worldwide producer of radioelements used for diagnoses and therapeutics in nuclear medicine. The institute's main activity is the production of Molybdenum-99 which decays into metastable Technetium-99. Another important isotope produced at the IRE is iodine-131.

To ensure that the general public and the environment would be effectively protected from the potential hazards arising from radioactive waste, the ONDRAF/NIRAS was created. ONDRAF/NIRAS is responsible for the general management of all radioactive waste and enriched fissile materials in Belgium. Along with this, Belgoprocess, the operation daughter of NIRAS/ONDRAF, is a private company founded in 1984. It offers integrated waste management, interim storage of conditioned waste and decommissioning services.

Overall, Belgium has a wide range of installations where nuclear materials are customarily used, nuclear power reactors, research centres, a medical isotope production facility, storages, facilities, universities, …. Regarding the implementation of safeguards inspection regimes, Belgian is therefore an interesting example.

SAFEGUARDS ACTIVITIES

Over the last years, the inspection regime has substantially changed in Belgium. This is mainly due to the shutdown of some nuclear facilities, the implementation of an Unannounced Inspection (UI) regime and new concepts and technologies intended to enhance and strengthen the safeguards effectiveness and efficiency, as well as the revision of the SLA in Belgium which was also intended to take into account all the aforementioned factors and the important

changes in the nuclear fuel cycle, as there are no declared active fuel fabrication capabilities anymore in the country.

As the revision of the SLA was completed early 2017 and that we can consider this step as an important one in the evolution of the safeguards inspection regime in Belgium, we will hereafter explain the major orientations before (Inspection scheme 1) and after this step (Inspection scheme 2) while also taking into account, in the second scheme, the contribution of other changes brought later in 2019 and 2020, as for example the introduction of an effective UI regime which was under negotiation during the 2017 SLA revision. Finally, we will provide some insights on the evolution of the safeguards inspection statistics.

Inspection scheme 1 (Pre-2017)

This inspection scheme, the basis of which has been defined under the Integrated Safeguards in 2009, can be described in the following way for the most important points: all facilities are submitted to yearly Physical Inventory Verifications (PIV)/PIVs equivalent and Design Inventory Verifications (DIV), and to Random Interim Inspections (RII) or Interim Inventory Verifications (IIV) depending on the facility type. For the RIIs and IIVs, the frequencies are depending on the facility. The DIVs are organised usually in conjunction with the PIVs.

Of course, specific inspections relating to the need to perform transfer verifications are also conducted.

Inspection scheme 2 (Post-2017)

Regarding the SLA revision, it is worth noting that major changes brought to the regime were relating to the triggering of PIV equivalent inspections performed with a closed core under seal, except for one specific MBA as, before the revision, there were systematically PIV equivalent inspections with closed cores. Also, for one specific facility, only one PIV per year is now conducted while in the past IIVs were also conducted. For two fuel fabrication plants MBAs, which were facilities under decommissioning at the time of the revision process, the number of PIVs to be conducted has been changed from once a year to once every four years, and the IIVs/RIIs inspections have been cancelled for all the MBAs relating to the fuel fabrication plants. Also, for other facilities PIVs are no longer organised on a yearly basis. No major changes have been brought to the inspection regime applicable for the Location Outside Facilities (LOF). DIVs associated frequencies were also changed for some MBAs in line with the changes brought to the PIVs associated frequencies.

It is however important to mention that many modifications associated to the SLA update were relating also to important changes that happened before beginning 2017. In this perspective, the discussions relating to the implementation of UI in Belgium, more precisely at three SCK.CEN MBAs, launched in 2014-2015, led to the replacement in 2019 of randomly scheduled inspection without advance notification to Belgium by UI inspections. Nevertheless, before that, the UI option has been under discussion and implementation during many years and is still discussed for a further implementation in Belgium. The SCK.CEN site has been chosen in the past to launch the implementing process. Hence, over the past years, the UI scheme in this facility has evolved from a pilot testing phase, under the form of *randomly scheduled inspection without advance notification to Belgium*, to an effective phase since mid-2019 with effective UI. Before that, in 2017, the randomly scheduled inspection without advance notification to Belgium performed on a lower frequency replaced the IIVs (this change was actually brought in November 2016). The introduction of the randomly scheduled

inspection without advance notification to Belgium to replace the IIV formerly performed at the SCK.CEN, as a preparatory phase to the introduction of the UI, contributed in 2017 to a significant decrease of the number of safeguards inspections performed per year in Belgium. The UI are currently performed with the same frequency as in the previous format of the randomly scheduled inspection whereas the activities performed during the UI remained basically the same as the ones performed during the former IIV while they are now led with different verification levels in order to achieve the detection probabilities goals of the Agency.

Regarding the introduction of the randomly scheduled inspection without advance notification in 2017, it is important to note that the change to the regime was brought just approximately one year after the MOX production facility of FBFC was shut down and that, at a similar period, important activities at Belgoprocess relating to the transfer and treatment of wastes coming from Belgonucleaire ceased. It was therefore expected that the inspection effort would be reasonably considerably reduced in Belgium from 2017 on, at the moment of the SLA update during which all those important factors were taken into account.

The discussions relating to the UI were conducted and are still conducted in parallel to the modernisation of Containment and Surveillance (C/S) measures at some sites, including the SCK.CEN and the Doel NPP sites, but also in parallel to the implementation of new concepts and technologies including the 3D laser technology, the 2D Laser Curtain for Containment (LCCT) advance technology, the Remote Data Transmission (RDT) and the transfer of safeguards measures managing responsibilities to the operators (e.g. for the replacement of seals in the absence of the international inspectorates). The discussions are also taking into account the implementation of a more modern MailBox System (MBS) in order to cope with the new safeguards systems and approaches in Belgium.

On the opposite, the many safeguards-related projects currently ongoing in Belgium and the new activities performed on nuclear material are also contributing to an increase in the number of inspections. Especially, we have noted that the projects relating to the implementation of new safeguards concepts and technologies in Belgium (e.g. UIs, new C/S measures, RDT, …) could temporarily lead to the conduction of supplementary inspections and activities that could have a significant impact on the total number of safeguards inspections performed per year. There is also an evolution of the number of inspections related to many changes in the activities of some facilities and the associated projects. Finally, the numerous ongoing projects relating to new facilities and the associated activities are leading to new types of inspections (e.g. to address new swap campaigns and shipments of uranium and the need to maintain the Continuity of Knowledge when the material is transferred in different container types and locations in order to be later processed).

Inspection regime statistics

From the explanations provided in the previous titles, we understand that it was expected to observe over the last years substantial changes in the regime and possibly even a decrease in the number of safeguards inspections in Belgium for the following reasons:

- During the 2015-2016 period, the operational activities at FBFC ceased completely.
- At the same period, specific efforts-consuming inspection activities at Belgoprocess connected to the transfer and treatment of wastes coming from Belgonucleaire ceased.
- The implementation of an UI strategy did bring some major changes in the inspections frequency at the SCK.CEN by lowering the number of inspections to be conducted.

Except for the aforementioned points, the revision of the SLA itself did not bring major changes to the regime even if a slight decrease in verification activities was foreseen. FANC mentioned in August 2018 in its letter relating to the feedback on the implementation of the state-level safeguards approach in Belgium that "Concerning the changes in field activities, it is still difficult to evaluate what is related to the SLA review and what is the consequence of the thorough UI discussions ongoing since 2015 and that already brought significant changes in the safeguards scheme in Belgium."

On the contrary, safeguards related projects currently ongoing in Belgium and the new activities performed on nuclear material should also contribute to an increase in the number of inspections.

For the year 2020, the impact of the COVID-19 crisis has still to be formally evaluated, even if we assess that it is of minor importance. Indeed, the Agency was able for this year to draw the broader conclusion that all nuclear material remained in peaceful activities and Belgium has been able to put into place very quickly at the beginning of the crisis the necessary mechanisms to ensure that both safeguards and sanitary provisions and measures could be properly ensured. All the Agency inspections have been performed in a timely manner and in compliance with its international obligations.

From the figures displayed in Table 1 [1-7], we can see that the number of IAEA inspections (it is worth mentioning that the number of Euratom inspections and IAEA inspections are very similar as they are in the vast majority of the cases conducted jointly), IAEA person-days of inspections (PDI) and IAEA calendar-days in the field for verification have significantly decreased from 2017 on, while it is worth noting that 2019 displays a higher number of inspections and related activities compared to what is observed for years 2017 and 2018. These higher numbers in 2019 are related to the many safeguards-related projects currently ongoing in Belgium and the new activities performed on nuclear material (a significant increase of shipments was noted for this year). The data provided in the SIR 2020 show a move back to the previously highlighted tendency, even if the total number of inspections is still higher than the level in 2017 and 2018, and seem to confirm a general trend that supports the idea that the broader conclusion can be drafted for Belgium whereas the number of inspections decreased. This decrease is not only due to the contribution of the operational activities that have ceased these last years, and which is somehow balanced by the introduction of new activities performed on nuclear material, it is also due to the positive contribution of the UI policy in Belgium.

Concerning the Complementary Accesses (CA), an increase of their frequency from 2018 on is noted. Although we do not have a clear explanation for this trend, many assumptions could be made to explain it, e.g. the SLA update, the new UI regime, the increasing capabilities of the IAEA to analyse the nuclear material and equipment, international flows and the R&D nuclear related activities conducted worldwide, and as a consequence its need to complete and check the information at its disposal.

TABLE 1: IAEA Safeguards Inspection Statistics in Belgium for years 2014 to 2020 [1-7].

Year	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Facilities under safeguards	23	23	22	22	24	22	22
MBA containing LOFs under safeguards	8	9	9	9	9	9	9
Number of facilities and LOFs inspected	22	22	23	22	21	20	22
Total number of inspections	133	136	109	63	69	93	77
Number of CAs	0	1	1	1	3	3	3
Person-Days of Inspection	186	183	138	116	97	141	105
Calendar-days in the field for verification*	244,5	281	223,5	212,5	195,5	233,5	168,5

*Calendar-days in the field for verification (CDFVs) comprise calendar-days spent on performing inspections, complementary accesses, design information verifications at facilities and information verifications at LOFs and on the associated travel and rest periods.

CONCLUSIONS AND WAYS FORWARD

The main evolutions of the inspection regime these last years are due to (1) the introduction of a new UI policy in Belgium which is under discussion since 2014-2015, and which contributed to introduce new inspection types at the SCK.CEN realised with a lower frequency since 2017 and replaced in 2019 by effective UIs, (2) the shutdown of numerous nuclear related activities connected to the former fuel fabrication plants of Dessel, (3) from 2017, to the last SLA update, though, except for the aforementioned points, the revision in itself did not lead to major changes in terms of inspection numbers while it brought some modifications to the inspections activities, and finally (4) to the numerous projects still currently ongoing and that we are conducting in Belgium. These projects may lead temporarily to an increase in terms of inspection activities, but it can end up with a significant improvement of the safeguards effectiveness and efficiency, which leads e.g. indirectly to a lessening of the inspection burden on the operators while a strong confidence on the material staying under safeguards control is maintained.

Concerning the CAs, an increase of their frequency from 2018 on is noted. Although we do not have a clear explanation for this trend, many assumptions could be made to explain it.

Regarding the other figures, the numbers from years 2017 to 2020 tend to show that the increase of safeguards supplementary activities has led to a maximum in 2019 (as a matter of fact the numbers of 2019 are still less important than the pre-2017 numbers despite the high numbers of nuclear related projects ongoing, including the safeguards related project). That increases our confidence in the fact that the introduction of modern and well-implemented safeguards tools as the UIs could contribute at the end of the process to better safeguards regimes where the safeguards goals are properly met whereas the energy and efforts needed to achieve these goals are reduced.

This is also the reason why we are convinced at the FANC that new safeguards concepts and tools have to be discussed for new projects in Belgium, in a Safeguards by Design (SbD) vision. It is the case for the SF2 project at Tihange and Doel, the purpose of which is the increasing of

the nuclear spent fuel capacities at both sites, but also for the RECUMO project for the recuperation and conversion of uranium from the Molybdenum 99 production and for the MYRRHA project relating to the construction of a multi-purpose hybrid (accelerator-driven) research reactor for various high-tech applications.

The goal of our approach at the FANC is now to maintain, improve and strengthen the safeguards effectiveness and efficiency while coping with the new challenges that include also the NPPs decommissioning policy in Belgium. Indeed, the decommissioning policy may lead in the future to an important build-up in terms of nuclear spent fuel transfers. An important factor will be also to keep the burden on the operators at an acceptable level. In this perspective, the RDT implementation should be effectively used for the first time in Belgium in 2021 at the NPP Doel site at its dry storage facility and also highly likely at the SCK.CEN site. This should allow Belgium to achieve this goal. But also this goal could be better achieved in the future by considering the other possibilities of implementing new C/S technologies and inspection schemes. For this last point, extending the number of facilities in Belgium where the UI could be performed, could be a solution to consider, especially if it would lead to an improvement and strengthening of safeguards effectiveness and efficiency while leading to a decrease in the number of inspections needed compared to a situation without UI possibilities, although other factors should be considered before extending the UI regime, those factors being currently discussed with Euratom and IAEA.

From the analysis performed here, we are convinced that the positive changes brought to the safeguards architecture in Belgium are leading us to an improved and enhanced system.

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[1] "The Safeguards Implementation Report for 2014", IAEA Board of Governors GOV/2015/30 (6 May 2015), Appendix II, Table II.3

[2] "The Safeguards Implementation Report for 2015", IAEA Board of Governors GOV/2016/22 (3 May 2016), Appendix II, Table II.3

[3] "The Safeguards Implementation Report for 2016", IAEA Board of Governors GOV/2017/23 (12 May 2017), Appendix II, Table II.3

[4] "The Safeguards Implementation Report for 2017", IAEA Board of Governors GOV/2018/19 (3 May 2018), Appendix II, Table II.3

[5] "The Safeguards Implementation Report for 2018", IAEA Board of Governors GOV/2019/22 (6 May 2019), Appendix II, Table II.3

[6] "The Safeguards Implementation Report for 2019", IAEA Board of Governors GOV/2020/9 (29 April 2020), Appendix II, Table II.3

[7] "The Safeguards Implementation Report for 2020", IAEA Board of Governors GOV/2021/23 (11 May 2021), Appendix II, Table II.3