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Implementing nuclear non-proliferation in Finland

Regulatory control, international cooperation and the Comprehensive Nuclear-Test-Ban Treaty

Annual report 2013

Olli Okko (ed)

Säteilyturvakeskus
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Executive summary

The regulatory control of nuclear materials (nuclear safeguards) is a prerequisite for the peaceful use of nuclear energy in Finland. In order to uphold the Finnish part of the international agreements on nuclear non-proliferation – mainly the Non-Proliferation Treaty (NPT) – this regulatory control is exercised by the Nuclear Materials Section of the Finnish Radiation and Nuclear Safety Authority (STUK).

The results of STUK's nuclear safeguards inspection activities in 2013 continued to demonstrate that the Finnish licence holders take good care of their nuclear materials. There were no indications of undeclared nuclear materials or activities and the inspected materials and activities were in accordance with the licence holders' declarations. STUK remarked on the nuclear safeguards accountancy system and procedures of one of the stakeholders in 2013, setting required actions to comply with procedures.

Safeguards are applied to nuclear materials and activities that can lead to the proliferation of nuclear weapons or sensitive nuclear technology. These safeguards include nuclear materials accountancy, control, security and the reporting of nuclear fuel cycle -related activities. The main parties involved in a state nuclear safeguards system are the facilities that use nuclear materials – often referred to as “licence holders” or “operators” – and the state authority. A licence holder shall take good care of its nuclear materials and the state authority shall provide the regulatory control to ensure that the licence holder fulfils the requirements. The control of non-nuclear technology holders and suppliers, to ensure the non-proliferation of sensitive technology, is also a growing global challenge for all stakeholders. In Finnish legislation, all these stakeholders are dealt with as users of nuclear energy.

Finland has significant nuclear power production, but the related nuclear industry is rather limited. Most of the declared nuclear materials (uranium, plutonium) in Finland reside at the nuclear power plants in Olkiluoto and Loviisa. Additionally, there are the VTT research reactor in Espoo and a dozen minor nuclear material holders in Finland. Nuclear dual-use items and instrumentation for the third reactor under construction at the Olkiluoto site are being imported and installed. The import licences are reviewed as applicable to ensure the peaceful use of the technology. The International Atomic Energy Agency (IAEA) and the European Commission made their site visits to the construction site prior to the installation of safeguards instrumentation and fuel delivery.

The planning and design of the fourth reactor at the Olkiluoto power plant and at a new nuclear power plant site Hanhikivi in Pyhäjoki, were authorised in 2010. The safeguards systems for these new reactors will be designed together with facility design and development. Similarly to the Olkiluoto 3 reactor that is under construction, the import licences for the new facilities are reviewed as applicable to ensure the peaceful use of the technology and sensitive information. The operators have submitted the preliminary Basic

Technical Characteristics to the European Commission and obtained Material Balance Area codes for the future reactors before the vendor companies were selected. In December 2013, Fennovoima announced that the Hanhikivi reactor will be supplied by Rusatom Overseas. This was not included as option in the application of 2009, and thus the re-evaluation of the conditions for the old authorisation was initiated.

Uranium production at the Talvivaara mine got approval from government according to the nuclear energy legislation in March 2012 as uranium may be economically extracted as one of the by-products of nickel, because the bioheapleaching technique developed for large nickel deposits makes the extraction of other metals from low grade ore economically viable. In 2013, the company constructed the uranium extraction plant, but the Supreme Administrative Court rescinded the approval owing to claims of environmental and economical issues in December 2013 before the commissioning of the plant. Currently, uranium residuals are extracted from the nickel at Harjavalta Nickel Refinery.

STUK maintains a central national nuclear materials accountancy system and verifies that nuclear activities in Finland are carried out in accordance with the Finnish Nuclear Energy Act and Decree, European Union legislation and international agreements. These tasks are performed to guarantee that Finland can assure itself and the international community of the absence of undeclared nuclear activities and materials. In addition to this, the IAEA evaluates the success of the state safeguards system and the European Commission participates in safeguarding the materials under its jurisdiction.

The number of the routine inspection days of the international inspectorates has been reduced significantly due to the state-level integrated safeguards approach for Finland, which has been in force since 2008. The number of international inspection days per year is approximately 25. Neither the IAEA nor the Commission made any remarks nor did they present any required actions based on their inspections during 2013. By their nuclear materials accountancy and control systems, all licence holders enabled STUK to fulfil its own obligations under the international agreements relevant to nuclear safeguards. STUK continues with 40 annual inspections and 60 inspection days.

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is one of the elements of the global nuclear non-proliferation effort. STUK has two roles in relation to the CTBT: STUK operates the Finnish National Data Centre (FiNDC) and one of the radionuclide laboratories (RL07) in the CTBT International Monitoring Network (IMS). The main task of the FiNDC is to inspect data received from the International Monitoring System and to inform the national authority, the Ministry for Foreign Affairs, about any indications of a nuclear weapons test. The FiNDC falls under the non-proliferation process in STUK's organisation, together with the regulatory control of nuclear materials.

A major goal of all current CTBT-related activities is the entry into force of the CTBT itself. An important prerequisite for such positive political action is that the verification system of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is functioning and able to provide assurance to all parties that it is impossible to make a clandestine nuclear test without getting detected. The FiNDC is committed to its own role in the common endeavour so that the verification system of the CTBTO can accomplish its detection task.

The human resources development at the Nuclear Materials Section during 2013 was focused on nuclear materials control, in particular at the back end of the fuel cycle. This was partly due to the need to regulate the construction of the final disposal facility for spent nuclear fuel at the Olkiluoto repository site. The application for the licence for the disposal facility, which consists of the encapsulation plant and the geological repository, was submitted to the government in December 2012. In addition, STUK contributed to educational workshops and training courses for authorities who represent nuclear newcomers: countries that aim at uranium production or nuclear power in co-operation with the IAEA. STUK and Finnish Customs continued the joint multi-year border monitoring development project. The project covers customs officers training and the updating of technical equipment and of operational procedures.

Contents

1 Nuclear non-proliferation implementation in Finland

Nuclear non-proliferation is a prerequisite for the peaceful use of nuclear materials and nuclear energy globally. In order for Finland to have a nuclear industry, most of which consists of nuclear energy production, it must be ensured that nuclear materials, equipment, and technology are used only for their declared peaceful purposes. The basis for nuclear safeguards is the national system for the regulatory control of nuclear materials and activities. Nuclear safeguards are an integral part of nuclear safety and nuclear security and are applied both to large- and medium-size nuclear industry and to small-scale nuclear material activities. Along with the safeguards, the regulatory process for nuclear non-proliferation includes transport control, export control, border control, international cooperation and conventions, and monitoring compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

In Finland, STUK is the competent authority regarding the implementation of nuclear non-proliferation. On 30 November 2012, a new STUK strategy for the period 2013–2017 was announced, and the organisation was renewed to support the implementation of the new strategy. The new strategy will not affect much the mandatory implementation of non-proliferation control at STUK, but it gives a good framework for the interaction between nuclear safety, security and safeguards. In parallel to this, STUK regulations were under renewal and were finally issued on 1 December 2013. In the new STUK safeguards regulation, the requirements concerning nuclear material accountancy, safeguards procedures and the implementation of the Additional Protocol are merged in one updated regulation, the YVL regulatory guide D.1 Regulatory Control of Nuclear Safeguards. This instructs all stakeholders in the Finnish nuclear field in how to comply with the current national and international safeguards regulations. The new regulations will be implemented in 2014.

1.1 International safeguards agreements and national legislation

Nuclear safeguards are based on international agreements, the most important and extensive of which is the Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT). The Treaty Establishing the European Atomic Energy Community (Euratom Treaty) is the basis for the nuclear safeguards system of the European Union (EU). Finland is bound by both of these treaties, and also has several bilateral agreements in the area of the peaceful use of nuclear energy. When Finland joined the EU, the bilateral agreements with Australia, Canada and the USA were partly substituted with the corresponding Euratom agreements (see Appendix 3 for the relevant legislation).

Finland was the first state where an INFCIRC[1]/153-type comprehensive nuclear Safeguards Agreement with the IAEA entered into force (INFCIRC/155, 10 February 1972). When Finland joined the EU (1 January 1995), this agreement was suspended and subsequently the Safeguards Agreement between the non-nuclear weapon Member States of the EU, the Euratom, and the IAEA (INFCIRC/193) entered into force in Finland on 1 October 1995. Finland signed the Additional Protocol (AP) to the INFCIRC/193 in Vienna on 22 September 1998 with the other EU Member States, and ratified it on 8 August 2000. The Additional Protocol entered into force on 30 April 2004, once all the EU Member States had ratified it. The scope and mandate for Euratom nuclear safeguards are defined in the European Commission Regulation No. 302/2005.

1 INFCIRC = IAEA Information Circulars

After Finland joined the EU as a Member State and therefore joined the Euratom nuclear safeguards, a comprehensive national safeguards system was still maintained and further developed. The basic motivation for this is the responsibility assumed by Finland for its nuclear safeguards and nuclear security under the obligations of the NPT, and also to take care of the fulfilment of the Euratom requirements.

The national nuclear safeguards derive their mandate and scope from the Finnish Nuclear Energy Act and Decree. These were amended during 2008 as a result of the general constitution-based renewal of the Finnish nuclear legislation system. The operator's obligation to have a nuclear material accountancy system and the right of STUK to oversee the planning and generation of design information for new facilities was introduced from STUK regulations to the Decree.

As stipulated by the Act, STUK issues detailed regulations on safety, security and safeguards (the YVL Guides) that apply to the use of nuclear energy. STUK's safeguards requirements for all users of nuclear energy in all phases of the nuclear fuel cycle are set in YVL Guide D.1 Regulatory Control of Nuclear Safeguards. Areas covered include the obligations and measures stemming from the Additional Protocol for the Safeguards Agreement and recent developments. All stakeholders have to describe their own safeguards system in written form (as a nuclear materials handbook or safeguards manual) to ease their task of fulfilling their obligations and to guarantee the effective and comprehensive function of the national safeguards system. In the new guide, there are also specific national requirements for the final disposal of spent nuclear fuel in a geological repository.

The new YVL Guide D.1 Regulatory Control of Nuclear Safeguards entered into force in 1 December 2013. Nuclear materials control applies to:

- nuclear material (special fissionable material and source material)
- nuclear dual-use items (non-nuclear materials, components, equipment and technology suitable for producing nuclear energy or nuclear weapons as specified in INFCIRC/254, Part 1)
- licence holders' activities, expertise, preparedness and competence
- R&D and other activities related to the nuclear fuel cycle as defined in the Additional Protocol
- design and construction of new nuclear facilities.

1.2 Parties of the Finnish nuclear safeguards system

The main parties involved in the Finnish nuclear safeguards system are the authorities and the licence holders. Undistributed responsibility for the safety, security and safeguards of the use of nuclear energy is on the licence holder. It is the responsibility of STUK as the competent state authority to ensure that the licence holders comply with the requirements of the law and the nuclear safeguards agreements. To complement the national effort, international control is necessary to demonstrate credibility and the proper functioning of the national safeguards system.

1.2.1 Ministries

The Ministry for Foreign Affairs (MFA) is responsible for national non-proliferation policy and international agreements. The MFA is responsible for the export licensing of nuclear materials and other nuclear dual-use items including sensitive nuclear technology. The Ministry of Employment and the Economy (MEE) is the highest authority for the management and control of nuclear energy. MEE is responsible for the legislation related to nuclear energy and it is also the competent authority mentioned in the Euratom Treaty. Also other ministries, such as the Ministry of the Interior and the Ministry of Defence contribute to the efficient functioning of the national nuclear safeguards system.

1.2.2 STUK

As per the Finnish nuclear legislation, STUK is responsible for maintaining the national nuclear safeguards system in order to prevent the proliferation of nuclear weapons. STUK regulates the licence holders' activities and ensures that the obligations of international agreements concerning the peaceful use of nuclear materials are met. Regulatory control by STUK includes the possession, use, production, transfer (national and international), handling, storage, transport, export and import of nuclear materials and nuclear dual-use items. STUK is in charge of Finland's approval and consultation process for IAEA and European Commission inspectors. STUK approves an inspector as long as there are no such issues related to the person in question that might adversely affect nuclear safety or security at Finnish facilities or the non-proliferation of nuclear weapons. The new inspector requests are sent for comments to the operators that hold construction or operating licences for nuclear facilities. If STUK cannot approve an inspector, it assigns the approval process to the Ministry of Employment and the Economy.

Nuclear safeguards by the Nuclear Materials Section of STUK cover all typical measures of a State System of Accounting for and Control of Nuclear Materials (SSAC), and many other activities besides. STUK reviews the licence holders' reports (operational notifications, inventory reports), inspects their accountancy, facilities and transport arrangements on site, and performs system audits. Office work constitutes 90% of the inspection effort. Most of the working hours are chargeable to the users of nuclear energy (see Figure 10 for the distribution of the compiled working days). STUK runs a verification programme for nuclear activities to assess the completeness and correctness of the declarations by the licence holders. Nuclear safeguards on the national level are closely linked with other functions of nuclear materials control and non-proliferation: licensing, export control, border control, transport control, combating illicit trafficking, the physical protection of nuclear materials, and monitoring compliance with the Comprehensive Nuclear -Test-Ban Treaty (CTBT). Nuclear safety and particularly nuclear security objectives are closely complemented by safeguards objectives. Therefore, the research, development and regulatory units in the fields of safety, security and safeguards at STUK cooperate under the non-proliferation framework. STUK issued a new strategy and consequently a new matrix organisation in 2013. The scope of non-proliferation work of the Nuclear Materials Sections is linked with many organisational units of STUK (Figure 1). In the new organisation, the competences in non-proliferation control were split into several organisational units. Only the core competences were maintained in the Nuclear Materials Section of the Nuclear Waste and Material Regulation. Consequently, interaction and cooperation between the reorganised units had to be activated. This is described more precisely in Chapter 4 Human Resources Development.

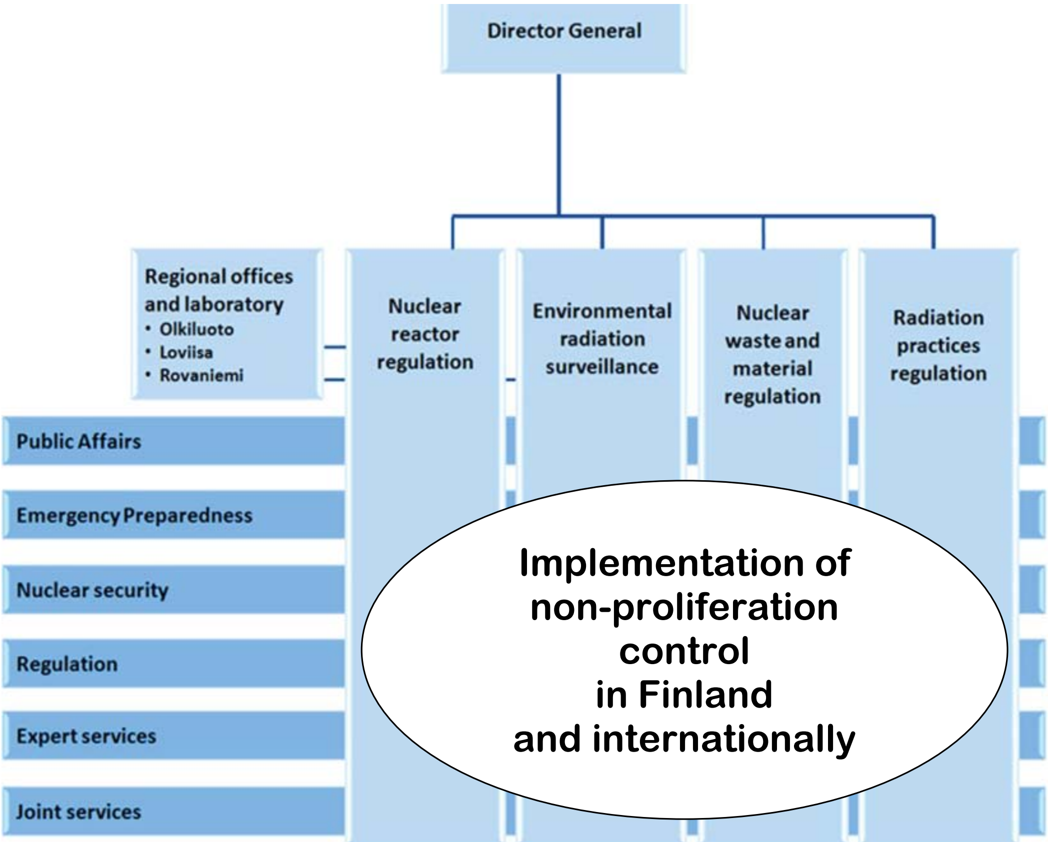

Figure 1. Non-proliferation framework covers most of the operational areas of STUK.

1.2.3 Licence holders and other users of nuclear energy

The essential parts of the national nuclear safeguards system are the licence holders, in nuclear terminology often called the operators. They perform key functions of the national safeguards system: control of the authentic source data of their nuclear materials and accountancy of nuclear materials at the facility level for each of their material balance areas (MBA). Each licence holder has to operate its safeguards system in accordance with its own nuclear materials handbook. The requirements of the Additional Protocol are integrated in the handbook to facilitate safeguards implementation at the site including the material balance areas. The handbook is a part of the facility's quality system and is reviewed and approved by STUK.

With the basic technical characteristics (BTC) submitted by a licence holder as groundwork, the European Commission adopts particular safeguards provisions (PSP) for that licence holder. PSPs are drawn taking into account operational and technical constraints and in close consultation with both the person or undertaking concerned and the relevant member state. Until PSPs are adopted, the person or undertaking shall apply the general provisions of the Commission regulation No 302/2005. A facility attachment (FA) is prepared in cooperation with the IAEA for each facility to describe arrangements specific for that facility. Status of the regulatory documents for the Finnish Material Balance Areas at the end of 2013 is shown in Infobox.

99.8% of all nuclear materials in Finland reside at the nuclear power plants (NPP). The amounts of nuclear materials (uranium, plutonium) in Finland in 1992–2013 are presented in Figures 2 and 3.

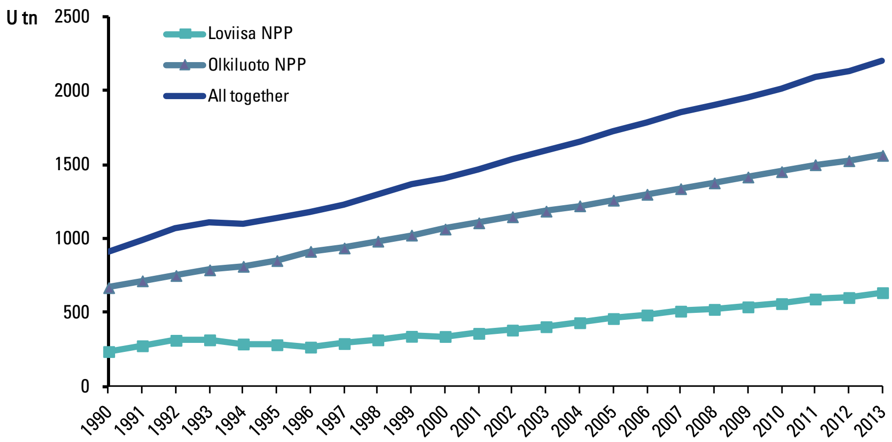

Figure 2. Uranium accumulation in Finland in 1990–2013.

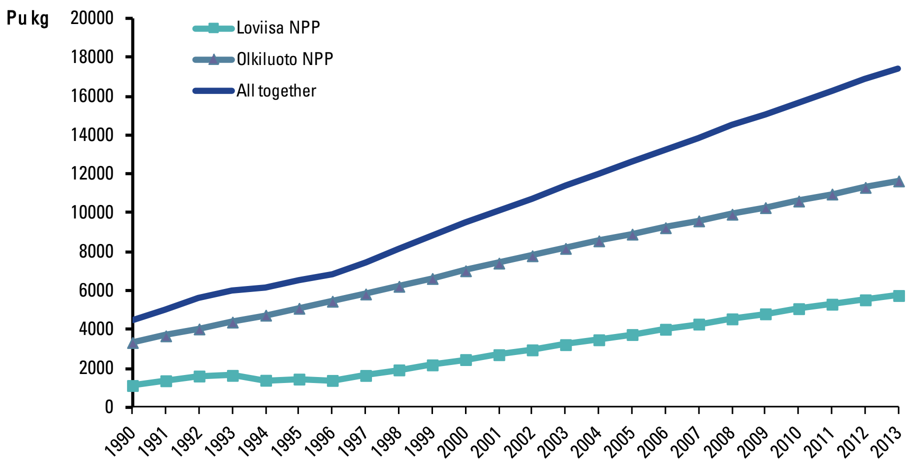

Figure 3. Plutonium in spent nuclear fuel in Finland in 1990–2013.

MBA, location	*BTC, last upd.*	*Site (AP), founded*	*PSP, in force*	*FA, in force*	*Licence / DiP, in force (from / until)*	*SG Manual, upd.*
WL0V, Loviisa	*31.1.2012*	*S SF L0V1, 8.7.2004*	*Yes, 4.5.1998*	*No*	*Operation, LO1 until 31.12.2027 LO2 until 31.12.2030*	*Yes, 30.11.2012*
W0L1, Olkiluoto	*20.12.2012*	*S SF 0LK1, 8.7.2004*	*Yes, 7.6.2007*	*No*	*Operation, until 31.12.2018*	*Yes, 4.12.2012*
W0L2, Olkiluoto	*20.12.2012*	*S SF 0LK1, 8.7.2004*	*Yes, 7.6.2007*	*No*	*Operation, until 31.12.2018*	*Yes, 4.12.2012*
W0LS, Olkiluoto	*24.9.2013*	*S SF 0LK1, 8.7.2004*	*Yes, 7.6.2007*	*No*	*Operation, until 31.12.2018*	*Yes, 4.12.2012*
W0L3, Olkiluoto	*11.4.2013*	*S SF 0LK1, 8.7.2004*	*No*	*No*	*Construction, granted 17.2.2005*	*Yes, 4.12.2012*
W0L4, Olkiluoto	*12.11.2012 (prel. DI)*	*S SF 0LK1, 8.7.2004 (add. 2013)*	*No*	*No*	*DiP, 1.7.2010*	*No*
W0LE, Olkiluoto	*27.6.2013*	*S SF POS1, 31.3.2010*	*No*	*No*	*DiP, 1.7.2010 (last upd.)*	*No*
W0LF, Olkiluoto	*27.6.2013*	*S SF POS1, 31.3.2010*	*No*	*No*	*DiP, 1.7.2010 (last upd.)*	*Yes, 29.8.2012*
WFV1, Pyhäjoki	*4.7.2013 (prel. DI)*	*No*	*No*	*No*	*DiP, 1.7.2010*	*No*
WRRF, Espoo	*1.7.2010*	*S SF VTT1, 8.7.2004*	*Yes, 9.7.1998*	*No*	*Operation, until 31.12.2023*	*Yes, 31.3.2011*
WFRS, Helsinki	*12.4.2013*	*S SF STUK, 8.7.2004*	*No*	*No*	*Not required (for STUK)*	*No*
WHEL, Helsinki	*8.11.2006*	*S SF HYRL, 8.7.2004*	*No*	*No*	*Operation, until 31.12.2017*	*No*
WKK0, Kokkola	*30.5.2013*	*No*	*No*	*No*	*Operation, until 31.12.2019*	*No*
WNNH, Harjavalta	*16.11.2010*	*No*	*No*	*No*	*Operation, until 31.12.2019*	*No*
WTAL, Talvivaara	*29.11.2010*	*No*	*No*	*No*	*No*	*No*
WDPJ, Jyväskylä	*14.5.2012*	*No*	*No*	*No*	*Operation, until 31.12.2014*	*No*

Finnish material balance areas and their status. MBA (material balance code), BTC (Basic Technical Characteristics, i.e. Design Information), AP (the Additional Protocol), PSP (Particular Safeguards Provisions set by the European Commission), FA (Facility Attachment prepared by the IAEA), DiP (Decision-in-Principle, date of Parliament approval, in force 5 years).

Fortum (MBA WL0V)

Fortum is a partly state-owned energy company, one of the largest in the Nordic countries. Fortum operates power plants of several types including nuclear.

The nuclear power plant of Fortum Power and Heat is located on the Hästholmen Island in Loviisa on the south-east coast of Finland. This first NPP to have been built in Finland hosts two VVER-440 type power reactor units, with a current net electrical output of 496 MW for each of the units, Loviisa 1 and Loviisa 2. Loviisa 1 started its electricity production in 1977 and Loviisa 2 in 1980. These two units share common fresh and spent fuel storages and, for nuclear safeguards accountancy purposes, the whole NPP is counted as one material balance area (MBA code WL0V). The electricity generated by the Loviisa NPP constitutes about 10% of the whole electricity production in Finland.

Most of the fuel for the Loviisa NPP has been imported from the Soviet Union/Russian Federation. The spent fuel of the Loviisa NPP was returned to the Soviet Union/Russian Federation until 1996 and since then it has been stored in the interim storage due to a change in Finnish nuclear legislation, which today forbids, in general, the import and export of nuclear waste including spent fuel.

The Loviisa NPP site (SSFLOV1), as per the requirements of the Additional Protocol, comprises the entire Hästholmen Island and extends to the main gate on the mainland. Particular Safeguards Provisions for the Loviisa NPP, which define the European Commission's nuclear safeguards procedures for the facility, have been in force since 1998. The Facility Attachment of the Safeguards Agreement INFCIRC/193 has not been prepared for the Loviisa NPP.

Teollisuuden Voima (MBAs W0L1, W0L2, W0LS and W0L3)

Teollisuuden Voima Oyj (TVO) owns and operates a nuclear power plant on the Olkiluoto Island in Eurajoki on the west coast of Finland. The Olkiluoto NPP consists of two nuclear power reactor units, Olkiluoto 1 and Olkiluoto 2, and an interim spent fuel storage. Olkiluoto 1 was connected to the electricity grid in 1978 and Olkiluoto 2 in 1980. These units have been upgraded to the current output of 880 MW. The Olkiluoto NPP contributes about 17% of all electricity production in Finland. At the Olkiluoto NPP, there are three active material balance areas (MBA codes W0L1, W0L2, W0LS).

Presently, the uranium in TVO's nuclear fuel is mainly of Australian, Canadian and Russian origin. This uranium is enriched in the Russian Federation or in the EU and the fuel assemblies are manufactured in Spain and Sweden.

The Finnish Government granted a licence for constructing a new nuclear reactor, Olkiluoto 3, on 17 February 2005. As a part of the licensing process, TVO's plan for arranging the necessary measures to prevent the proliferation of nuclear weapons was approved by STUK. The construction and assembly work of the reactor unit is under way. The European Commission has assigned the MBA code W0L3 for Olkiluoto 3.

New nuclear facilities were granted by the government on 6 May 2010. One of these was the Olkiluoto 4 reactor. The selection of the vendor and the supply organisation will take place in the near future. Although the reactor type has not been specified yet, TVO submitted the preliminary basic technical characteristics (BTC) in November 2012 in order to obtain the MBA code W0L4 for future correspondence.

TVO owns most of the area of the Olkiluoto Island, but the NPP site (SSFOLK1), as per the requirements of the Additional Protocol, currently comprises the fenced areas around the reactor units, the spent fuel storage and the storage for low and intermediate level waste as well as the Olkiluoto 3 construction site. Particular Safeguards Provisions for the Olkiluoto NPP have been in force since 2007. The Facility Attachment of the Safeguards Agreement INFCIRC/193 has not been prepared for the Olkiluoto NPP.

VTT FiR1 research reactor (MBA WRRF)

Small amounts of nuclear materials are located at facilities other than nuclear power plants. The most significant of those facilities is the VTT research reactor FiR1 (MBA code WRRF), located in Otaniemi, Espoo. The research reactor was the first nuclear reactor built in Finland at the Technical Research Centre of Finland (VTT). It reached criticality on 27 March 1962. On 12 July 2012 the Ministry of Employment and the Economy and VTT announced the plan to close down the reactor and to start the decommissioning process. A new building for experimental nuclear research will, however, be built at the Espoo premises of VTT. Both these decisions will have long-lasting effects, due to the need for permits, contracts and environmental impact assessment. This also affects safeguards, as the nuclear materials have to be kept under the control of competent personnel at both facilities.

Particular Safeguards Provisions that define the European Commission's nuclear safeguards procedures for the facility have been in force for VTT FiR1 from 1998. The Facility Attachment of the Safeguards Agreement INFCIRC/193 has not been prepared for the research reactor.

The VTT FiR1 site (SSFVTT1), as per the requirements of the Additional Protocol, consists of the whole building around the research reactor, although there are non-nuclear companies and university premises in the same building.

STUK (MBA WFRS)

Small quantities of nuclear materials are stored by the Finnish Radiation and Nuclear Safety Authority (STUK), mainly materials no longer in use and hence taken into STUK's custody. STUK was founded in 1958 and has been located at its current premises in Roihupelto, Helsinki since 1994. The STUK MBA (WFRS) consists of the STUK headquarters and the "Central interim storage for small-user radioactive waste" at the Olkiluoto NPP site.

The STUK site (SSFSTUK), as per the requirements of the Additional Protocol, consists of the whole building where STUK's headquarters are located in Helsinki, but non-STUK premises in the building are excluded. The storage at Olkiluoto is included in the NPP's site declaration.

The University of Helsinki, Laboratory of Radiochemistry (MBA WHEL)

The Laboratory of Radiochemistry at the University of Helsinki (HYRL) uses small amounts of nuclear materials. HYRL is located at the Kumpula university campus in Helsinki.

The HYRL site (SSFHYRL), as per the requirements of the Additional Protocol, comprises the whole building that hosts the laboratory.

Freeport Cobalt Oy (MBA WKK0)

The by-products of the Kokkola Chemicals facility's cobalt purification process contain uranium, which qualifies these by-products as nuclear material. Thus, the Kokkola Chemicals has an operating licence to produce, store and handle nuclear material. In March 2013, Freeport-McMoRan Copper & Gold Inc acquired the ownership of the OM Group. The operator is Freeport Cobalt Oy, and the facility is located in Kokkola on the west coast of Finland.

Norilsk Nickel Harjavalta (MBA WNNH)

Norilsk Nickel Harjavalta Oy operates the nickel refining plant at Harjavalta in western Finland. The plant was commissioned in 1959, expanded in 1995 and again in 2002. Norilsk Nickel Finland became a part of the Russian-based Norilsk Nickel as a result of the OM Group's nickel business acquisition in 2007. The refinery of Norilsk Nickel Harjavalta employs a technique of sulphuric acid leaching of nickel products. Uranium residuals will be extracted from the nickel products from the Talvivaara mine. In March 2010, STUK granted a licence to extract less than 10 tonnes of uranium per year. The Norilsk Nickel Harjavalta company submitted the basic technical characteristics (BTC) to the European Commission in December 2010.

Other nuclear material holders

There are about ten minor nuclear material holders in Finland. One of them is an actual material balance area: the University of Jyväskylä, Department of Physics (JYFL, MBA code WDPJ), but in fact the nuclear material at JYFL has been derogated and exempted by the European Commission and the IAEA. Other minor nuclear material holders are members of a Catch-All-MBA (CAM), for the purposes of international nuclear safeguards. Most of these have depleted uranium as radiation shielding material.

New operators

On 9 February 2010, the Talvivaara Sotkamo Ltd mining company announced its interest in investigating the recovery of uranium as a separate product from its sulphide ore body. The Talvivaara deposits in eastern Finland comprise one of the largest known sulphide nickel resources in Europe. The bioheapleaching technique developed for the deposits makes the extraction of metals from low-grade ore economically viable. Therefore, in addition to nickel, zinc, copper and cobalt, uranium may also be economically extracted and processed at the site. The environmental impact assessment was carried out in 2010 and, according to nuclear energy legislation, the licence to recover uranium was granted by the government in March 2012. The Basic Technical Characteristics (BTC) was submitted to the European Commission in 2010, and the MBA code WTAL is assigned to the future uranium extraction plant that is constructed as a separate part of the mineral processing plant. The production of uranium was expected to start during 2013. However, the claims concerning the uranium extraction licence were approved by the Supreme Administrative Court on 5 December 2013 and the processing of the licence application to extract uranium was returned to the government.

On 5 October 2011, Fennovoima announced its decision to locate its new nuclear power plant on the Hanhikivi peninsula at Pyhäjoki on the coast of the Bay of Bothnia. Fennovoima started preparatory works with several vendor candidates. In 2011 Fennovoima submitted invitations to tender to Areva and Toshiba and the bids were received in January 2012. The preliminary Basic Technical Characteristics (BTC) was submitted to the European Commission in summer 2013, and the MBA code WFV1 was assigned to the future material balance area. However, after negotiations with the two possible vendors and a new candidate, Fennovoima announced on 21 December 2013 that the plant supplier will be Rusatom Overseas. The construction licence application is expected to be submitted within five years of the ratification of the Decision-in-Principle in summer 2010. Owing to the changes in ownership and reactor type described in the ratified application, the reassessment of the Decision-in-Principle started in 2013. The Hanhikivi site will be declared stepwise as the construction proceeds from a virgin green site to the nuclear power plant.

Posiva (MBA W0LF)

Posiva Oy is the company responsible for the final disposal of spent nuclear fuel in Finland. It is owned by TVO and Fortum. Posiva has been excavating an underground rock characterisation facility called "Onkalo" at Eurajoki since 2004, and thus preparing for the construction of the final disposal facility. While neither a nuclear licence holder nor a nuclear material holder yet, Posiva and its activities are highly relevant to the national safeguards system because Posiva is seen as developing a new type of facility, the geological repository, where the nuclear material cannot be re-verified once it has been encapsulated and emplaced. In the IAEA safeguards approaches, it has been suggested that the geological formation should be under safeguards during the whole lifetime of the underground facility. Therefore, Posiva has been required to develop a non-proliferation handbook, such as a nuclear materials handbook, to describe its safeguards procedures and reporting system already before becoming a nuclear material holder. By the end of 2012, Posiva submitted to the government an application to construct the final disposal facility, which will consist of the encapsulation plant and the geological repository. Based on the updated drawings in the application, the preliminary BTCs were prepared for both facilities separately and submitted to the Commission on 27 June 2013. The MBA codes assigned for the future facilities are W0LE for the encapsulation plant and W0LF for the geological repository. As the geological repository will be under continuous development, it has been suggested that the BTC for the underground part will be updated annually. However, the Facility Attachments of the Safeguards Agreement INFCIRC/193 have not been prepared for these new facilities. The installation without nuclear materials but having the two BTCs for these future Material Balance Areas constitutes a site according to the Additional Protocol. The Posiva site (SSFPOS1) covers the fenced area around the buildings supporting the construction of the facilities.

Other stakeholders

Non-nuclear technology holders and suppliers that serve nuclear and other industry are obliged to take care that non-proliferation sensitive technology does not get into the hands of unauthorised actors and thereby contribute to nuclear proliferation. The introduction of the Additional Protocol (1996) extended the scope of safeguards to the non-proliferation control of nuclear programmes and fuel cycle-related activities. Additionally, the United Nations Security Council Resolution 1540 (April 2004) requires every state to ensure that export controls, border controls, material accountancy and physical protection are efficiently taken care of and calls all states to develop appropriate ways to work with and inform industry and the public regarding their obligations. The control of non-nuclear technology holders and suppliers to ensure the non-proliferation and peaceful use of sensitive technology and dual-use items is a growing global challenge for all stakeholders.

Nuclear safeguards are commonly seen as the traditional nuclear material accountancy and reporting system, the main stakeholders of which are the international, regional and local authorities and the operators. In accordance with the extended non-proliferation regime and the amendments to the Finnish legislation, the companies that have activities defined in the Additional Protocol are under reporting requirements and export control. These stakeholders as users of nuclear energy are required for the preparation of nuclear safeguards manual and to nominate responsible persons for nuclear safeguards arrangements.

1.3 IAEA and Euratom safeguards in Finland

The IAEA and the European Commission nuclear safeguards both have their separate mandates to operate in Finland. These two international inspectorates have agreed on cooperation, which aims to reduce undue duplication of effort. 2009 saw the introduction of a significant change from the traditional safeguards procedures in Finland as the implementation of integrated safeguards began on 15 October 2008. The IAEA has annually drawn conclusions confirming its confidence that all nuclear activities and materials are accounted for and are in peaceful use in Finland.

Integrated safeguards include traditional nuclear safeguards as per INFCIRC/193, and safeguards activities in accordance with the Additional Protocol, fitted together. While this should not lead to an increase in inspections, it should enable the IAEA to assure itself of the absence of undeclared nuclear activities in a state. In practice, the number of IAEA routine interim inspections decreases. In contrast to this, the IAEA additionally performs 1–3 unannounced or short-notice inspections per year in a state that has a number and type of nuclear installations that resemble the situation in Finland.

The operators report to the Commission as required by Commission Safeguards regulation No 302/2005. It is the Commission's task to audit the licence holders' accounting and reporting systems. Both the Commission and STUK have increased preparedness for short-notice and unannounced inspections and complementary access (abbreviated SNUICA). Every weekday, one of STUK's inspectors is prepared to attend a possible IAEA inspection.

The number of IAEA and Euratom routine inspections decreased significantly in 2009, as defined in the state-level safeguards approach for Finland, which was negotiated during 2007 and 2008. The time difference between the unannounced inspections at the two spent fuel storages (i.e. 2 hours for Loviisa and 48 hours for Olkiluoto) was due to the difference in the surveillance at the storages and reasonable access time for a STUK inspector. At the trilateral meeting (IAEA/EC/STUK) in September 2013, STUK was informed that no unannounced inspections with only 2 hours notice time would be performed in Finland after the beginning of 2014, but this has not yet been formally announced by the IAEA. STUK continues with annual routines with approximately 40 inspections, which enable the reduction in the effort of the international inspectorates.

IAEA regular inspections:

Facilities at nuclear power plants (NPP):

- *Physical Inventory Verification (PIV) / Design Information Verification (DIV) 1/year*
- *Random Interim Inspection (RII) at 24 h notification (at least 1/year)*

Spent fuel storages at NPPs

- *PIV/DIV 1/year*
- *RII at 2h i.e. Unannounced Inspection (UI)/48 h notification (at least 1/year)*

Research reactor and locations outside facilities (LOF)

- *PIV/DIV 1/4–6 years*

New reactors, under construction

- *DIV and PIV later like at the NPPs*

Repository (Onkalo), under construction

- *PIV/DIV most likely as at spent fuel storages*

Complementary accesses at 2/24 h notification to verify declared activities or to detect undeclared activities.

1.4 Verified declarations for state evaluations

A state's declarations on its nuclear materials and activities are the basis for the state evaluation by the IAEA under the obligations of the Additional Protocol. In Finland, the state has delegated its responsibility for these declarations to STUK. STUK has been nominated a site representative, as per European Commission regulation No 302/2005. STUK collects, inspects and reviews the relevant information and then submits the compiled declarations in timely fashion to the Commission and the IAEA.

In Finland, there are currently six sites in the sense of the Additional Protocol: the two nuclear power plant (NPP) sites in Loviisa and Olkiluoto respectively, the geological repository site in Olkiluoto, and three minor sites: the Technical Research Centre of Finland (VTT), the Radiation and Nuclear Safety Authority (STUK) and the Laboratory of Radiochemistry at the University of Helsinki (HYRL). STUK reviews and verifies the correctness and completeness of the information about the sites provided by the stakeholders.

STUK annually reviews the information about research and development activities that might be eligible for declaration, as well as activities specified in Annex I of the Additional Protocol. STUK maintains the information on general plans related to the nuclear fuel cycle for the next 10 years and keeps account of the exports of specified equipment and non-nuclear materials, as listed in Annex II of the Additional Protocol.

Technical analysis methods are one tool for a state nuclear safeguards system to ensure that nuclear materials and activities within the state are in accordance with the licence holders' declarations and that there are no undeclared activities. Such methods can provide information on the identity of the nuclear materials and confirm that licence holders' declarations are correct and complete with respect to, for example, the enrichment of uranium, the burn-up and the cooling time of nuclear fuel. The technical analysis methods in use are non-destructive assay (NDA), environmental sampling and satellite imagery.

STUK employs three NDA methods to verify spent nuclear fuel. One method lends itself to rapid scanning, as the detector is mounted on the fuel transfer machine and the fuel elements can be measured from above the fuel pond without moving the elements. The other two methods, on the other hand, allow confirming with greater confidence the correctness of the declared burn-up and the cooling time. With the most precise method, the absence of a fuel pin or pins from a fuel element can be discovered. STUK reports to the Commission and the IAEA about the NDA measurement campaigns.

All nuclear materials leave traces of their identity, source of origin and treatment. Safeguards environmental samples (ES) are used to investigate these traces, which provide further information for establishing whether the nuclear activities are in accordance with the declarations. In the Finnish nuclear safeguards system, environmental samples are collected as surface swipes. The IAEA may collect independent environmental samples during its complementary access type of inspections.

Satellite imagery is applied to verify the site declaration in accordance with the Additional Protocol. Timely imagery is used to monitor different kinds of activities at the sites or elsewhere in Finland. STUK contributes to the work of the satellite image analysts of the IAEA and the Commission.

1.5 Licensing and export/import control of dual-use goods

As per the Finnish Nuclear Energy Act, in addition to nuclear materials other nuclear fuel cycle-related activities are also under regulatory control. A licence is required for the possession, transfer and import of non-nuclear materials, components, equipment and technology suitable for producing nuclear energy (nuclear dual-use items). The list of these other items is based on the Nuclear Suppliers' Group (NSG) Guidelines (INFCIRC/254 Part 1). The licensing authority is STUK. The Ministry for Foreign Affairs is responsible for granting NSG Government-to-Government Assurances (GTGA) when necessary. The ministry usually consults with STUK before giving the assurances. The licence holder is required to provide STUK with a list of the above-mentioned items annually. Moreover, the export, import and transfer of such items must be reported to STUK.

Mining and mineral processing operations that aim to produce uranium or thorium are also under nuclear safeguards and regulatory nuclear safety control. In order to carry out these activities, a national licence and an accounting system to keep track of the amounts of uranium and thorium are required. A national licence is also required to export and import uranium or thorium ore and ore concentrates. These activities are also controlled by the Euratom Supply Agency and the European Commission. Mining and milling activities and production of uranium and thorium must be reported to STUK, the Commission and the IAEA.

Finland's export control system is based on EU Council Regulation (EC) No 428/2009 of 5 May 2009, which sets up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. The export of Nuclear Suppliers' Group (NSG) Part 1 and Part 2 items is regulated by the Finnish Act on the Control of Exports of Dual-use Goods. An authorisation is required to export dual-use items outside the European Union and also for EU internal transfers of NSG Part 1 items, excluding non-sensitive nuclear materials. The licensing authority is the Ministry for Foreign Affairs. Before granting an export license, it takes also care of NSG Government-to-Government Assurances. The ministry asks STUK's opinion on all applications concerning NSG Part 1 items.

1.6 The regulatory control of transport covers nuclear materials

The requirements for the transport of radioactive material are set in the Finnish regulations on the transport of dangerous goods. The requirements are based on the IAEA safety standard Regulations for the Safe Transport of Radioactive Material, SSR-6, and their purpose is to protect people, the environment and property from the harmful effects of radiation during the transport of radioactive material. Based on these regulations, STUK is the competent national authority for the regulatory control regarding the transport of radioactive material.

In addition to the dangerous goods transport regulations, the Finnish Nuclear Energy Act sets specific requirements for the transport of nuclear material and nuclear waste: generally a licence granted by STUK is needed for such a transport. Usually the transport licences are granted for a fixed period, typically for a few years. A transport plan and a transport security plan approved by STUK are mandatory for each transport of nuclear material or nuclear waste. A certificate of nuclear liability insurance must also be delivered to STUK before transportation. Furthermore, a package may be used for the transport of fissile nuclear material only after the package design has been approved by STUK.

1.7 STUK's contribution to international safeguards development

Nuclear non-proliferation is, by its nature, an international domain. STUK therefore actively participates in international nuclear safeguards-related cooperation and development efforts. The practices obtained at the current construction projects in Olkiluoto have emphasised the need to bring in the safeguards requirements at an early stage of facility design. In order to improve and facilitate the future implementation of safeguards at new facilities, STUK joined the Safeguards by Design Support Programme of the IAEA and initiated negotiations with all stakeholders to have the 3-S (safety, security, safeguards) concept included in the design requirements of new facilities. The experience has been shared with the IAEA, several international fora and also in bilateral co-operation with several countries.

STUK is a member of the European Safeguards Research and Development Association (ESARDA), and has nominated Finnish experts to its committees and most of the working groups. STUK participates in the ESARDA Executive Board meetings and in several working groups.

Upon request by the IAEA, STUK's experts have contributed to the IAEA's international missions. The current experience obtained from the planning, design and construction of new nuclear facilities in Finland has increased the number of requests to participate in different kinds of international co-operation.

STUK keeps close contacts with the respective Nordic authority organisations. The development of the final disposal of spent nuclear fuel in geological repositories is deepening cooperation between Finland and Sweden.

The Finnish Safeguards Support Programme to the IAEA Safeguards, FINSP, was established in 1988. The aim of FINSP is to provide the IAEA with educational and technical support in the field of non-proliferation of nuclear weapons. FINSP is funded by the Ministry for Foreign Affairs and implemented by STUK.

1.8 The Comprehensive Nuclear-Test-Ban Treaty

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is an important part of the international regime for the non-proliferation of nuclear weapons. The CTBT bans any nuclear test explosions in any environment. This ban is aimed at constraining the development and the qualitative improvement of nuclear weapons, including the development of advanced new types of nuclear weapons.

The CTBT was adopted by the United Nations General Assembly, and was opened for signature in New York on 24 September 1996. It will enter into force after it has been ratified by the 44 states listed in its Annex 2. These 44 states participated in the 1996 session of the Conference on Disarmament and possess nuclear power or research reactors.

A global verification regime is being established in order to monitor compliance with the CTBT. The verification regime consists of the following elements: the International Monitoring System (IMS), a consultation and clarification process, on-site inspections and confidence-building measures. The IMS is almost 90% ready, and is providing data from almost 300 measuring stations all over the world to more than 1200 organisations in more than 120 countries. In addition to monitoring compliance with the treaty, the data from IMS is used in disaster mitigation. The CTBTO is actively providing data to the global Tsunami Warning System and, since 2012, the CTBTO has been a member of the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) and a co-sponsor of the Joint Radiation Emergency Management Plan of the International Organisations (JPLAN) led by the IAEA. Within this framework, the CTBTO is responsible for gathering and providing close to real-time radionuclide monitoring data to the IAEA and other participating organisations.

Finland signed the CTBT on its day of opening in 1996 and ratified it less than three years later. In addition to complying with the basic requirement of the CTBT of not carrying out any nuclear weapons tests, Finland actively takes part in the development of the verification regime.

In the CTBT framework, the Finnish national authority is the Ministry for Foreign Affairs. STUK has two roles: it operates the Finnish National Data Centre (FiNDC) and one of the 16 radionuclide laboratories in the IMS (RL07). The most important task of FiNDC is to inspect data received from the IMS and inform the national authority about any indications of a nuclear test explosion. The radionuclide laboratory contributes to the IMS by providing support in the radionuclide analyses and in the quality control of the radionuclide station network. The third major national collaborator is the Institute of Seismology at the University of Helsinki, which runs an IMS seismology station (PS17 in Lahti), and provides analysis of waveform IMS data (Figure 4).

Comprehensive Nuclear-Test-Ban Treaty (CTBT) Status (31 December 2013)

- *CTBT Member States* 183
- *Total Ratifications* 161
- *Annex 2 Ratifications* 36

1.9 Nuclear safeguards and security

STUK is the national authority for the regulatory control of nuclear and radiological safety, security and safeguards. All these three regimes have a common goal: the protection of people, the society, the environment and future generations from the harmful effects of ionising radiation. As nuclear security aims to protect nuclear facilities, nuclear material and other radioactive material from unlawful activities, it is clear that the majority of the activities that aim at non-proliferation of nuclear weapons, nuclear materials and sensitive nuclear technology contribute to nuclear security. Physical and information security measures at nuclear facilities and for nuclear materials also contribute to non-proliferation by providing detection and delay of and response to security events. On the other hand, nuclear material accountancy and control measures may supplement security measures through a deterrence effect.

The Finnish regulatory system for nuclear security was audited by an IPPAS mission in 2009, followed by an IPPAS follow-up mission in 2012. One of the recommendations arising from the audit, namely the need for more detailed security requirements for minor holders of nuclear materials, was in the Nuclear Materials Section's area of responsibility. As a result, the new YVL Guide D.1 on regulatory control of nuclear safeguards contains more detailed security requirements for these minor holders. YVL Guide D.1 complements YVL Guides A.11 Security of a Nuclear Facility and A.12 Information Security Management of a Nuclear Facility. STUK safeguards and security sections are working in close co-operation to set detailed requirements for all the users of nuclear energy and to verify that requirements are complied. This ensures that both safeguards and security in all use of nuclear energy are taken care of as well as possible and national and international requirements can be fulfilled.

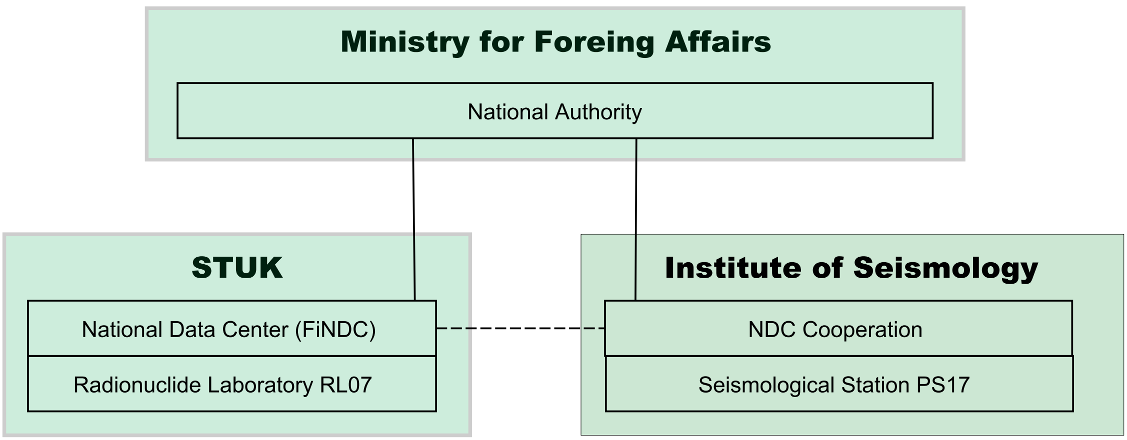

Figure 4. The Finnish CTBT organisation.

2 Themes of 2013

2.1 New STUK regulations

As part of the extensive reformation work on the YVL guides, the safeguards requirements in former YVL 6.9 and YVL 6.10 have been compiled while also taking into account changes in safeguards since the late 1990s. New areas covered include the obligations and measures stemming from the Additional Protocol for the Safeguards Agreement and recent developments in the area of nuclear safeguards. The need for the revision of STUK regulations was recognised when applying the existing regulations to the construction of the new reactor Olkiluoto 3. During the reformation work, the international reviews and stress tests preformed after the Fukushima accidents were also taken into account. The nuclear safeguards requirements were addressed mainly stemming from the Olkiluoto 3 experiences by fitting the safeguards, security and safety interfaces of a new nuclear facility into the bidding phase. The early interaction (often referred as safeguards-by-design) between the different disciplines (often referred as the 3-S concept) was included in the high-level YVL Guide A.1 Regulatory Oversight of Safety in the Use of Nuclear Energy. The YVL Guide D.1 Regulatory Control of Nuclear Safeguards covers obligations and requirements to all users of nuclear energy in all phases of the nuclear fuel cycle. All stakeholders will have to describe their own safeguards system in written form (as a nuclear materials handbook or safeguards manual) to ease their task of fulfilling their obligations and to guarantee the effective and comprehensive function of the national safeguards system. In the new guide, there are also specific national requirements for the final disposal of spent nuclear fuel. The YVL Guide D.1 on nuclear safeguards was issued together with the other STUK regulations on 15 November and entered into force on 1 December 2013. The stakeholders are requested to review their safeguards procedures during 2014.

2.2 Declarations on research and development activities

The continuous improvement of nuclear safety is one key requirement in Finnish nuclear legislation. The utilities are required to analyse their experiences and to contribute to research and development work. Any kind of applied research into nuclear safety would not be possible without foundations built upon the continuous existence and development of basic research in the field.

The fuel cycle-related research and development (R&D) work in Finland has lately been addressed by the IAEA. The IAEA and STUK have had a different interpretation of the requirements to report state-financed R&D work as defined in the Additional Protocol. The issue has been being discussed for the past ten years between various parties at the IAEA and STUK. It was recognised with the IAEA before the provision of the initial declarations under AP in 2004 after the careful analysis of R&D projects at the Technical Research Centre of Finland that most of the nuclear-related research is financed by the utilities and thus not a subject of declaration under the AP 2a(i). The state is financing the basic and scientific research to support the improved maintenance of the nuclear facilities that is also excluded from the declarations. As agreed ten years ago for transparency reasons, the two major nuclear R&D programmes – the National Research Programme on NPP Safety (SAFIR) and the National Research Programme on the Nuclear Waste Management (KYT) have been declared under Article 2a(x) in order to provide the IAEA with information about research activities that are required in legislation.

During 2012 and 2013, the IAEA contacted

STUK about Finnish participations in current international co-operation projects that are declared only by some participating states. In summer 2013, STUK contacted research organisations participating in those projects indicated by the IAEA. STUK replied in a letter and expressed concern about the uncertainty concerning how to declare international nuclear fuel cycle-related R&D, which reviews challenges to harmonise the declarations for large projects that are authorised and financed by, for example, the EU or OECD, not the state itself. The role of the national support may vary from state to state and also the scope of research in different countries and participants. In addition to this, the IAEA pointed out that the on-going projects are not to be declared under 2a(x) as a long term plan, but under 2a(i), thus the Finnish declarations are to be revised in 2014.

2.3 Licensing

Licensing is a key element of regulatory control in nuclear safeguards. According to the Nuclear Energy Act, the use of nuclear energy is prohibited without a licence. A licence is required for nuclear facilities and for the possession, production, manufacture, transfer, handling, use, storage and import of nuclear material and for the possession, transfer and import of non-nuclear material, components, equipment and technology suitable for producing nuclear energy (nuclear dual-use items) as well as for mining and milling activities for producing uranium or thorium. The licensing body is STUK. The research and development work is excluded from licensing, but the stakeholders are required to report annually to STUK.

In 2013 an internal audit was carried out to evaluate the licence procedure of nuclear material and other nuclear dual-use items. The main findings were that more experts should be involved in the procedure and their responsibilities should be clearly determined. The new experts should also be trained properly. The relevant guide should be updated to include the handling of confidential information and make the text more specific.

2.4 Introduction of remote data transmission

Remote Data Transmission (RDT) means unattended transmission of information generated by IAEA containment and/or surveillance or measurement devices from the facilities to the IAEA headquarters. The IAEA right to use the attended and unattended transmission of information is based on the Additional Protocol to the Safeguards Agreement. This also stipulates the IAEA right to make use of internationally established systems of direct communication. Details of the implementation shall be specified in the Subsidiary Arrangements and at facility level in the Facility Attachments.

STUK was informed about IAEA's interest in having RDT in use in Finland in October 2010 during IAEA director Muroya's visit Finland. The first official meeting with all the counterparts (the IAEA, European Commission, STUK and facilities) was held in Helsinki in May 2011. After this meeting, official letters to implement RDT in Finnish facilities were received from the IAEA and the Commission. It was soon noticed that implementation of RDT is not only a matter of safeguards, but also that safety and security measures must be taken care of in the proper manner. Therefore, STUK submitted a letter to the IAEA and EC in January 2013 in order to take into account the national 3S approach and requirements set for the facilities while implementing RDT. Consequently, the IAEA-EC-STUK-facilities meeting in which facilities security persons were also requested to participate and present their concerns was held in June 2013. It is expected that all necessary steps and tasks concerning the use of RDT will be completed and RDT can be implemented in the Finnish facilities in 2014.

3 Safeguards activities in 2013

3.1 The regulatory control of nuclear materials

STUK continued with national safeguards measures as in the past. Nuclear material inventories at the end of 2012 are shown in Tables 2 and 3 in Appendix 1. The development of inspections and inspection person days per Material Balance Area (MBA) is presented in Figures 5 and 6. Inspections by STUK, the International Atomic Energy Agency (IAEA) and the European Commission in 2013 are presented in Appendix 2.

The application of integrated safeguards began in Finland on 15 October 2008. Thus, in 2009 the number of IAEA inspections was reduced from approximately 30 person days to 15. Similarly, the Commission reduced its inspection activities significantly. In 2010, the number of inspection days rose somewhat due to the first inspections at the geological repository site, additional inspection days at the Loviisa Nuclear Power Plant (NPP) and the increased number of random inspections in Finland. Since 2010, the number of regular inspections has remained at the same level, i.e. the current number of annual IAEA inspection days is around 25 person days in Finland.

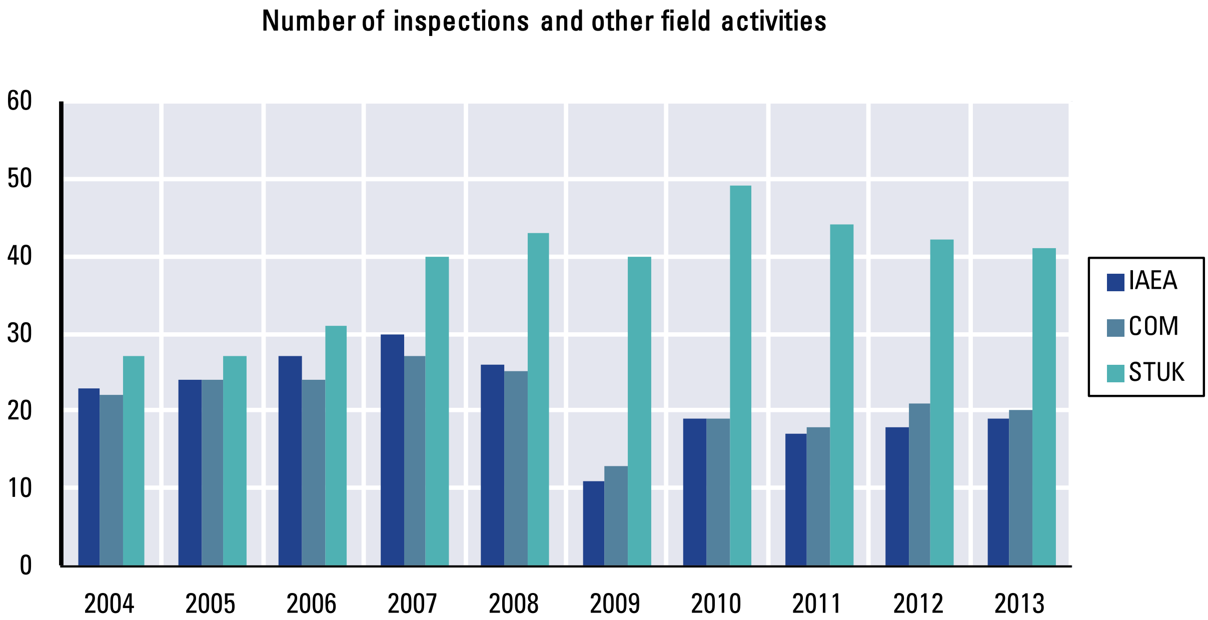

Figure 5. The number of inspections from 2004 to 2013.

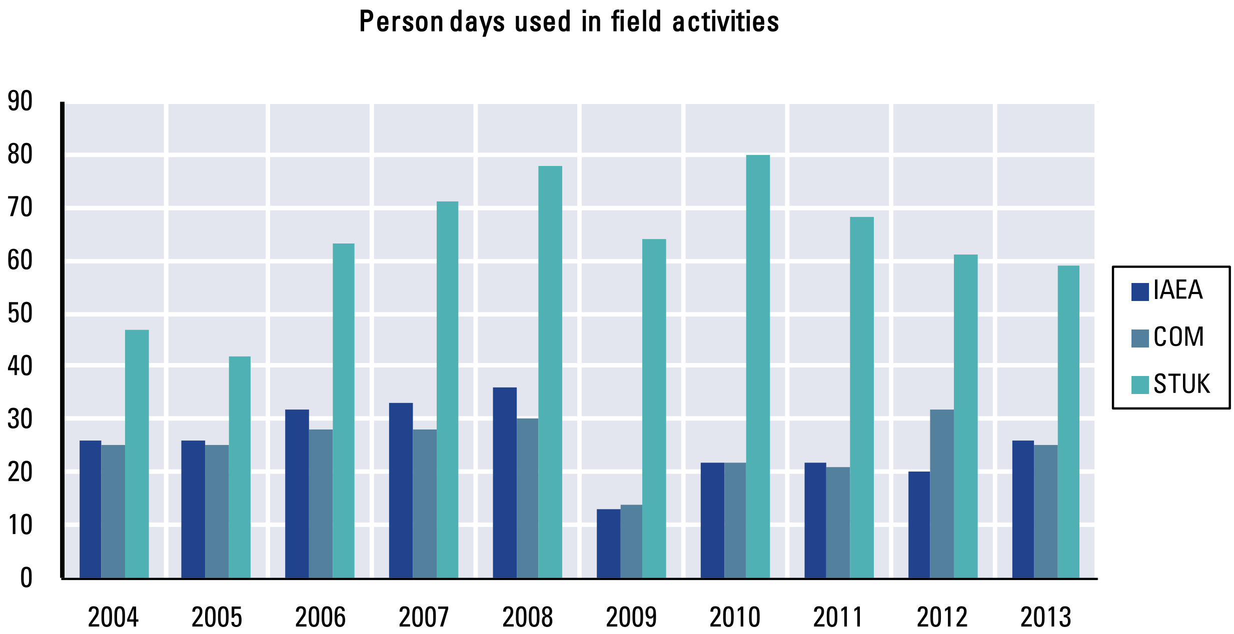

Figure 6. Inspection person days from 2004 to 2013.

3.1.1 Declarations and approvals of new international inspectors

All the relevant licence holders sent their updated information for the national declaration, which is compiled by STUK, in time by 1 April Regulatory Control of Nuclear Safeguards 2013. STUK submitted Finland's annual declaration updates to the IAEA on 15 May 2013 as required. Additionally, STUK submitted the quarterly declarations on exports in February, May, August and November.

In 2013, altogether 15 IAEA and 12 Commission new inspectors were approved to perform inspections at nuclear facilities in Finland.

3.1.2 The Loviisa nuclear power plant site

In 2013, STUK granted the operating company Fortum two import licences for a device used in a nuclear reactor.

The routine refuelling outage of the Loviisa 1 reactor unit, took place in the period 18 August–6 September 2013, and the outage of the Loviisa 2 reactor unit in the period 7–13 September 2013. The IAEA and the Commission performed a Physical Inventory Taking (pre-PIT) inspection with STUK before the outage, on 13–14 August 2013. Temporary surveillance cameras were installed in the reactor halls for the outage period, and removed during the Physical Inventory Verification (PIV) carried out after the outage, on 2–3 October 2013. During the outage and before the closing of each reactor, STUK identified the fuel assemblies in the reactor cores and item counted fuel assemblies in the loading ponds. The Loviisa 1 core was inspected on 25 August 2013 and the Loviisa 2 core on 15 September 2013. In addition to the PIV and the core controls, STUK carried out one routine inspection and the IAEA one unannounced inspection (UI) at the spent fuel storage and, together with the Commission, one short-noticed random inspection (SNRI) at Unit 2 and the fresh fuel storage. STUK attended both these inspections. Both Loviisa units experienced maintenance outages due to control rod problems and, because there was a possibility that the plant would have needed to transfer fuel during one of these outages, the IAEA, the Commission and STUK performed two extra inspections on 16–17 October 2013 and 12 November 2013. On the basis of its own assessment as well as that of the IAEA and Commission inspection results, STUK concluded that Fortum's Loviisa NPP complied with its nuclear safeguards obligations in 2013.

3.1.3 The Olkiluoto nuclear power plant site

In 2013, STUK granted to TVO eight import licences, and two import and possession licences. These covered the import of fresh nuclear fuel and nuclear dual-use items, i.e. technology and instrumentation for the operating units and equipment for the new units under construction and design.

The refuelling and maintenance outage of the Olkiluoto 1 reactor unit took place in the period 12 May–20 May 2013 and that of the Olkiluoto 2 reactor unit in the period 26 May–14 June 2013. The PIV was carried out after the outage on 18–19 June 2013 in the two reactor units. The spent fuel storage PIV was carried out separately on 15 August.

During the refuelling and maintenance outage, STUK identified the fuel assemblies in the reactor cores and verified and item counted in the loading ponds before the reactors were closed. The Olkiluoto 1 reactor was inspected on 17 May 2013 and the Olkiluoto 2 reactor on 9 June 2013.

STUK carried out two additional routine inspections at the Olkiluoto site and the material balance areas (MBA) at the Olkiluoto NPP. For the first time since the beginning of the spent fuel storage enlargement project in 2010, spent fuel was transferred from the reactor buildings to the spent fuel storage in autumn 2013. During the enlargement project the spent fuel ponds were covered and the containment and surveillance measures were applied to ensure the continuity of knowledge (Figure 7).

Design information verification inspection in the Olkiluoto 3 unit was carried out together with a surveillance meeting for follow-up of the containment and surveillance instrumentation plans on site.

TVO submitted the preliminary BTC to the Commission on 1 November 2012 and proposed the MBA code W0L4 for the new unit. This was confirmed by the Commission on 8 January 2013 although the decision for the reactor type and the vendor organisation is still pending. During 2013, the precautions for the information security for the licensed documents and data for the new unit were regulated.

On the basis of its own assessment as well as the IAEA and Commission inspection results, STUK concluded that TVO's Olkiluoto NPP complied with its nuclear safeguards obligations in 2013.

Figure 7. The Olkiluoto spent fuel storage after enlargement (courtesy of TVO).

3.1.4 The Hanhikivi nuclear power plant project

The Government approved a Decisions-in-Principle in 2010 for the new operator Fennovoima to construct a new nuclear power plant at a new site. The applicant was requested to submit its nuclear construction licence application within 5 years and to submit a plan for its nuclear waste management within 6 years. In 2011, Fennovoima announced its decision to build the new nuclear power plant on Hanhikivi peninsula in Pyhäjoki. STUK initiated negotiations with the operators and the Commission and the IAEA in 2011 to prepare for the implementation of safeguards in good time, together with the facility development. As a consequence, the company could request the vendor organisations to facilitate safeguards implementation, for example to improve proliferation resistance, and to facilitate nuclear material verification and surveillance at the future plant. In 2011, Fennovoima submitted invitations to tender to Areva and Toshiba and the bids were received in January 2012. However, in 2013 Fennovoima announced that it had decided to continue bid discussions only with Rosatom, and finally on 21 December 2013 Fennovoima announced that the supply contract would be signed with Rusatom Overseas CJSC. In the meantime, Fennovoima created an organisation for safeguards and prepared for the implementation of safeguards.

One of the first steps in the construction process is the control of nuclear technology, such as sensitive information obtained from the bidding companies. During 2013, STUK granted to Fennovoima one licence for the import and possession of nuclear technology and another license to transfer that technology. The nuclear materials handbook is under preparation. STUK and Fennovoima met in October 2013 and discussed the draft version that is focused on the current needs to control the nuclear technology and dual-use equipment.

Fennovoima submitted the preliminary design information about the new facility to the Commission on 5 July 2013. The Commission assigned MBA code WFV1 to the Fennovoima facility on 2 October 2013. Fennovoima's site declaration is expected to be prepared and submitted within the progress of the project. The master plan for the land use in Pyhäjoki municipality was revised in 2013 to allow nuclear construction in the future. As the option of having Rosatom as a vendor candidate was not included in the application ratified in 2010, the re-assessment of the already approved application begun in 2013 for technical and organisational had changed since the Decision-in-Principle. From the safeguards point of view, the safeguards procedures have improved and important experience has been gained at the new stakeholder during the bidding phase.

Based on the meetings on the implementation of safeguards and the control of nuclear technology with Fennovoima's staff, STUK concludes that awareness and preparedness for safeguards procedures are at an adequate level in the new organisation preparing for the new project.

3.1.5 The VTT FiR1 research reactor site

In 2013, there were two major changes at the Technical Research Centre of Finland, VTT. The preparations for decommissioning the research reactor and those for the new nuclear safety centre building continued. STUK reviewed the plans for safety, security and safeguards arrangements and made two statements to the Ministry of Employment and the Economy. In the meanwhile, the responsible person for nuclear materials accountancy retired in summer 2013 and STUK approved the successor and his deputy during the year.

In 2013 STUK carried out three interim inspections to the research reactor site of VTT. The nuclear material accountancy, site declaration and activities and internal control systems were reviewed on 7 February 2013 by STUK. Owing to some minor inconsistencies in the accountancy, STUK and the European Commission carried out an additional inspection on 27 February 2013. STUK and the Commission verified the nuclear material inventory of VTT on 1 October 2013. The nuclear material inventory was concluded to be correct during the inspection. After the inspection, the reporting of small amounts and exchanges of small samples between research organisations was addressed by STUK and the Commission.

On 4 September 2013 STUK's and VTT's responsible persons met and discussed future actions to ensure appropriate safeguards procedures for the future. As a consequence, the joint nuclear history of the university and the research centre in Otaniemi, and the current possession and location of old reactor fuel including reactor graphite were reviewed. The supply chain and safeguards requirements for the nuclear building were also discussed. These projects highlight how safeguards implementation requires continuous communication between the regulator, the operator and the other stakeholders in the nuclear fuel cycle. The procedures for continuous exchange of information and training for the newly appointed safeguards staff were agreed.

3.1.6 The STUK site

STUK Nuclear Materials Section verified the physical inventory, and inspected the site declaration and basic technical characteristics during the inspection on 4 October 2013. In addition, the KMP C of STUK located in central Finland was inspected by STUK Radiation Practices Regulation on 4 November 2013 as a user radioactive material. Thus, it can be concluded that the operating unit at STUK fulfils the requirements for national safeguards arrangements.

3.1.7 The University of Helsinki site

STUK carried out its inspection to the University of Helsinki site on 28 November 2013 to verify the site declaration and the inventory.

On the basis of its assessment and inspection results, STUK concluded that the University of Helsinki complied with its nuclear safeguards obligations in 2013.

3.1.8 Minor nuclear material holders

In 2013, a few STUK inspections were focused on the minor nuclear material holders in order to ensure that the capabilities and procedures are adequate. As a routine, STUK inspected the reports from the minor nuclear material holders, and three inspections at their premises were carried out. In 2013, two new minor holders reported their activities, and one holder reported the termination of possession of nuclear material.

On the basis of its assessment and inspection results, STUK concluded that the minor nuclear material holders complied with their nuclear safeguards obligations in 2013.

3.1.9 Front-end fuel cycle operators

The operators at Harjavalta and Kokkola are reporting monthly to the Commission and STUK. The extraction of uranium from industrial purification processes is considered to be pre-safeguards activities and therefore not under IAEA safeguards. With the entry into force of the YVL Guide D.1 imminent, the operators are preparing their procedures to fulfil the new requirements. In particular, the nuclear safeguards manual are to be incorporated into the quality managements systems. During the year 2013, STUK reviewed the draft versions of the manuals prepared by Norilsk Nickel Harjavalta and Talvivaara Sotkamo.

During early 2011, STUK evaluated the licence application of Talvivaara Sotkamo Ltd to begin uranium production as a by-product at the Talvivaara nickel mine. On 1 March 2012, the Finnish government granted a licence in accordance with the Finnish nuclear legislation to Talvivaara Sotkamo Ltd for the extraction of uranium from the Talvivaara mine. According to the licence conditions, STUK must ensure that all relevant arrangements are in place, including the nuclear safeguards manual and responsible persons for nuclear materials accountancy before the plant is commissioned. During 2011–2013 the uranium extraction plant was built as a new unit in the mineral processing complex. Progress in uranium extraction was halted on 5 December 2013 when the Supreme Administrative Court revoked the permit of 1 March 2012 to extract uranium for reassessment by the Finnish government. According to the Supreme Administrative Court, there were several changes in the operations of Talvivaara Sotkamo Ltd following the permit decision, including corporate reorganisation. Before the ruling, the government must reassess the permit application documentation and, if needed, obtain additional information on the economical and safety-related requirements set forth in the Nuclear Energy Act.

3.1.10 The final disposal facility site for spent nuclear fuel

After the submission of the nuclear construction licence application in 2012, several meetings were arranged between STUK, the Commission and the IAEA during 2013 in order to clarify and facilitate safeguards measures for the final disposal of spent nuclear fuel. These meetings focused on the verification issues prior to spent fuel encapsulation. This issue was discussed in Luxembourg on

19 November 2013 with Posiva's design managers, because it is important that designers are aware of the safeguards measures to be adapted at the facility at an early phase of facility development. Also the technical measures needed for the verification of the underground premises were addressed in the inspection of the preliminary BTC documents on 5 June 2013. In order to clarify the inspection procedures in the future repository, on 17 June 2013 STUK sent a letter to the IAEA with an official invitation to discuss the details. Posiva submitted the Basic Technical Characteristics (BTC) on 27 June 2013, and the underground premises were confirmed to correspond to the drawing in the BTC document and the excavation drawings available at the site during the Design Information Verification inspection carried out on 3–4 December 2013, although no response to the June letter was received. During 2013, STUK carried out two interim inspections at the underground premises.

3.1.11 Verification of spent fuel

In 2013, STUK's efforts in non-destructive assay (NDA) were concentrated on testing the prototype of a Passive Gamma Emission Tomography (PGET) device (Figure 8). The PGET is designed to be able to detect even single-pin diversions from spent nuclear fuel. The PGET technology is a strong candidate for the NDA verification of spent nuclear fuel before the fuel is placed in the final repository. There is a special need for good verification at that stage, as the fuel becomes impossible to reach for verification once it has been deposited deep in the bedrock. One successful test was performed at the Olkiluoto NPP, where five fuel elements were measured with promising results. The small number of elements was due to technical inefficiencies in the electronics of the prototype device, which leads to measuring times that are tens of times longer than would be achieved with a more developed version. In addition to STUK and TVO staff, technical experts on the device and observers from the IAEA and the Commission participated in the campaign. All measured fuel elements were verified to hold spent nuclear fuel in a pin configuration corresponding to operator data. Water single pins were clearly visible from the produced images, and water channels detected (Figure 9). The test at Olkiluoto showed that the detection capability of this device far exceeds any NDA methods currently in use by the IAEA.

The Olkiluoto test measurements showed some technical problems of the prototype PGET, that where resolved during the autumn of 2013. Because of this, the NDA measurement campaign planned at the Loviisa site was delayed until January 2014.

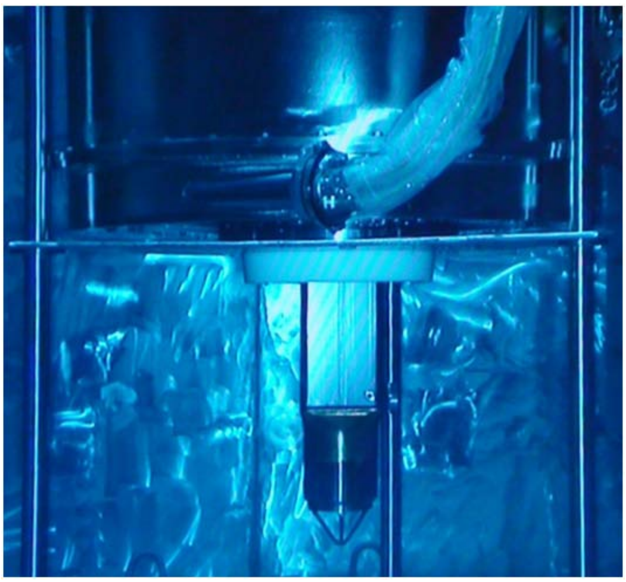

Figure 8. The PGET device in the pond at Olkiluoto NPP with a fuel element in the measurement position.

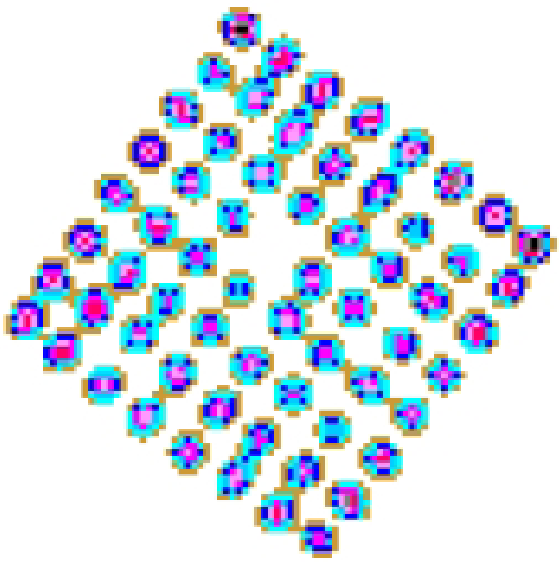

Figure 9. 8x8 fuel element with a single pin-sized water channel, as imaged with the PGET device during the Olkiluoto campaign.

3.1.12 Nuclear dual-use items, export licences

In 2013, the Ministry for Foreign Affairs issued 18 export licences for NSG part 1 items: six licences for exporting nuclear process modelling software to China, Croatia, Germany (2), Hungary and Slovakia, two individual licences to France and Germany and 10 global licences for exporting nuclear technology (nuclear information) for a nuclear power plant.

3.1.13 Transport of nuclear materials and nuclear waste

In 2013, fresh nuclear fuel was imported to Finland from Germany, Sweden and the Russian Federation (Table 1). In relation to these imports, STUK approved three transport plans and three transport package designs. Furthermore, STUK granted one certificate for non-objection for nuclear shipping. In addition, STUK approved plans and permits for transport with specific arrangements in category 7 materials and nuclear waste treatment outside Finland.

STUK inspected fresh nuclear fuel transports according to inspection plan (two inspections). The inspections were performed in cooperation with the police. In late 2013, on the request of the Defence Forces, STUK participated in one joint preparatory meeting related to nuclear waste transport vessel safety.

3.1.14 International transfers of nuclear material

In 2013, TVO reported to STUK about its international fuel contracts, fuel transfers and fuel shipments. STUK carried out an on-site inspection where TVO's nuclear material accountancy on the fresh fuel imported in 2013 was verified against the original shipment documents, which cover international transfers. The accountancy of the natural uranium in TVO's possession but stored outside the Olkiluoto NPP site was also inspected. Based on the findings, STUK concluded that TVO has complied with its safeguards obligations when purchasing the nuclear fuel and managing its international nuclear material transfers. The other operators purchase fuel as an end-product and thus their accountancy does not need to cover the purchase chain abroad.

3.2 The Finnish National Data Centre for the Comprehensive Nuclear-Test-Ban Treaty

3.2.1 International cooperation is the foundation of CTBT verification

During 2013, the Finnish National Data Centre (FiNDC) participated in meetings of the Working Group B (WGB) of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). WGB is a policy-making organ for the technical development of the verification regime. By participating in the work of WGB and its subsidiaries (workshops and expert groups), the FiNDC can provide technical expertise to the CTBTO, while also attending to Finnish national interests.

3.2.2 The analysis pipeline is a well-established daily routine

The FiNDC continued developing its own monitoring system for the data received from the International Monitoring System's network (IMS). The FiNDC routinely analyses all radionuclide measurement data generated at the IMS radionuclide stations across the world. The IMS network is still developing, and the number of installed air filter stations was 66 at the end of 2013 (in the final stage there will be 80). The analysis pipeline is linked to the LINSSI database and equipped with an automated alarm system, to enable efficient and fully automated screening of the data.

The number of IMS stations equipped with radioxenon measurement capabilities was 30 at the end of 2013. 18 IMS radioxenon systems were certified by the CTBTO at the end of 2013. Radioxenon measurements are especially important for CTBT verification, because xenon, as a noble gas, may also leak from underground tests, which seldom release particulate matter. The operatingonal stations generated more than 1000 gamma and beta-gamma spectra per day for the FiNDC analysis pipeline to handle. The particulate pipeline is well-established and has been running stably for many years, while FiNDC still needs some refinement of its xenon analysis capabilities.

3.2.3 The DPRK nuclear test

North Korea performed its third underground nuclear test at 02:58 (UTC) on 12 February 2013. As with the previous tests, the signal was immediately picked up by the seismic monitoring network of the CTBTO. Within two hours of the event, the Executive Secretary of the CTBTO sent out a press release, and shortly thereafter the Institute of Seismology provided its preliminary analysis of the event. In the initial phase of an event like this, the main role of the FiNDC is to gather information and provide assessments of the situation to the Ministry of Foreign Affaires and other affiliations.

In early April about 50 days after the tests, radioxenon was measured in Japan, with characteristics that did not fit well with what is normally measured at the station. Careful analysis of gas composition and atmospheric transport indicates a fair probability that the measured xenon originated from a very late release of gases from the February test.

3.3 International co-operation

The implementation of safeguards in Finland was addressed at several meetings with the IAEA and the Commission. In addition, STUK continued its participation in the ESARDA working groups, executive board and the steering committee meetings. The head of STUK's Security Technology Laboratory continued his term as the chairperson of the ESARDA Novel Approaches/Novel Technologies Working Group. A STUK expert was invited to the IAEA SSAC course organised by the Oak Ridge National Laboratory, Tennessee in the USA. The IAEA organised the workshop on synergies between safety, security and safeguards especially for the nuclear newcomer states, and the STUK expert recounted experiences of existing and new Finnish nuclear programmes. STUK experts also made many presentations at the INMM annual meeting. The contributions by STUK experts were highly recognised in international fora.

The progress at the Olkiluoto 3 unit, which has been under construction since 2003, and the more current authorisation of the new nuclear facilities in 2010 have given STUK practical experience in implementing safety, security and safeguards for new nuclear facilities. Owing to this, STUK experts have been invited on several occasions to present guidance and share their experiences. Some of this activity has been facilitated via the Finnish Support Programme to the IAEA, but there have also been other mechanisms available to contribute to the worldwide co-operation. In addition, the new facilities at the front- and back-ends of the fuel cycle, i.e. the extraction of uranium in mining and milling and the development of the geological repository, have widened the capabilities and scope of the Finnish national safeguards system.

Finland's bilateral cooperation programmes in the area of non-proliferation are directed mainly towards our neighbouring countries outside the EU and are motivated by the continued need to enhance the regional security environment. Accordingly, STUK continued its cooperation programme with the Russian Federation. The activities in the action plan for 2013 agreed between STUK and Rostechnadzor and as relevant to the material control and accountancy and to physical protection were not undertaken during 2013 due to other priorities occupying the resources of both parties. Collaboration with Ukraine in mutually beneficial areas was re-established in 2008 and an agreement about a programme was made between STUK and the State Nuclear Regulatory Committee of Ukraine, since 2011 the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU). As per this agreement, capacity building at the SNRIU was continued in 2013.

3.3.1 Support programme to the IAEA

The Finnish Support Programme (FINSP) is financed by the Ministry for Foreign Affairs and coordinated by STUK. The FINSP was established in May 1998, and celebrated its 25th anniversary in 2013. The history of FINSP was described at the INMM meeting in 2013. The total cumulative budget over these 25 years is approaching €10M.

Politically, the FINSP can be seen as a support to the NPT verification regime and as a demonstration of strong commitment to non-proliferation. Signing NPT and the Comprehensive Safeguards Agreement means an engagement to an undertaking, to cooperate in order to enable efficient implementation of the IAEA safeguards system. A State Support Programme is an excellent voluntary mechanism to that end. However, from the technical point of view, FINSP helps the IAEA to develop its safeguards concepts and technologies.

Many of FINSP tasks are joint tasks. Work is done in collaboration with the other Member States' support programmes and their experts and also the experts of the IAEA. Their fruitful cooperation and participation in joint tasks is acknowledged.

FINSP has a light administration structure but a network of experts at its disposal. These experts come from STUK, research institutions and universities and from the private sector. The FINSP funding does not allow initiating new projects and tasks easily, but FINSP is in the process of learning how to use other funding instruments to support the R&D needs for the IAEA safeguards. FINSP will take a more coordinating and facilitating role in the future.

The most demanding task in recent years has been the JNT A 1510 Proto-type Tomographic Spent Fuel Detector System. Its goal is to develop a passive gamma emission tomographic verifier. In 2012–2014 three successful campaigns were conducted. The first was held in Ispra in June 2012, the second in Olkiluoto in March 2013 and the third in Loviisa in Jan 2014. It has now been shown that the prototype system is able to generate a cross-sectional activity map of a spent fuel item and is able to detect a single missing pin inside a VVER-440 fuel assembly.

Another task worth mentioning is the Newcomers Task: FIN B 1939, Support for Newcomers States Pursuing a Nuclear Power Programme. Many new states want to join the "Nuclear Family" and are planning their nuclear power programmes. For the IAEA safeguards, this is a challenge and source of extra workload. Under the task B 1939, Finland provides peer support to the newcomers and tries to provide answers to their practical questions. Our experiences are relevant, because in Finland there are nuclear power reactor construction projects going on. Regulatory Authority STUK and nuclear operators are all involved in the task and in the issues of Nuclear Safety and Security in the internal workshops. However, "One size does not fit all" and replicating Finnish system all around the globe as such is most likely not the correct solution. What FINSP can do is to show how the operator-authority interface works in Finland.

FINSP has also been busy organising NDA training for the IAEA inspectors. A Spent Fuel Verification Training Course was held in Loviisa NPP on 28–31 Oct 2013.

FINSP also supports developing new and novel technologies for the IAEA safeguards. Remote Alfa-detection is one promising technique, which may also have Safety and Security applications. In December 2013, a measurement campaign was organised in JRC, Karlsruhe in collaboration with the European Commission Support Programme. FINSP also looks closely at how indoor navigation technologies are developing. Finland has many industrial and institutional research groups, which are active in this area.

3.3.2 Final disposal programme and the ASTOR group

The programmes for a geological repository for spent nuclear fuel in Sweden and Finland have reached the licensing phase, and the safeguards measures must be agreed to by all parties: facility designers, operators and the inspectorates. Thus, the IAEA and the Commission presented their safeguards approaches at the last Application of Safeguards to Geological Repositories (ASTOR) group's meetings. In 2013, the group of experts met in Pori and Olkiluoto on 3–5 June. There were almost 50 participants attending the meeting and an excursion to the Olkiluoto geological repository was organised. The next ASTOR meeting will be hosted by Sweden in 2014.

A new task force consisting of the IAEA, the Commission and Finnish and Swedish authorities and operators was established at the 2012 ASTOR meeting. The first Lower Level Liaison Committee (LLLC) Encapsulation Plant and Geological Repository (EPGR) Liaison Group meeting was scheduled for January 2013 to discuss the draft versions for Basic Technical Characteristics of the encapsulation plant and the geological repository. The Committee did meet officially during 2013, but IAEA and the Commission representatives commented on the preparation of the BTC documents during spring 2013 as described in Item 3.1.10.

3.3.3 Cooperation with the Rostechnadzor, Russia

Cooperation between Finnish and Russian authorities, technical support organisations, industrial partners and the status of the cooperation programme were reviewed at the meeting in July. The demonstration of the spent fuel attribute tester

(SFAT) measurement device for the Rostechnadzor was successfully carried out in 2008 at the Kola nuclear power plant. Since then a new computer has been obtained for the system, software installed and further steps taken to organise the shipment to the Ozersk Office of the Rostechnadzor in 2012. The SFAT was delivered from STUK for use by the inspectors of the Ural Regional Office at Mayak (in January 2014). To successfully complete the project, STUK is ready to provide training for Russian inspectors and operators in PO Mayak in the use of SFAT. This bilateral work complements the work done within the EU-financed TACIS project, which aims at improving the supervision and control of the handling of nuclear materials at the Mayak reprocessing plant.

During 2013, the planning of two seminars continued: one on transport aimed at enhancing control of radiation-contaminated scrap metal consignments and the other at knowledge-sharing on maritime transportation of nuclear and other radioactive materials in the Baltic Sea region. In addition planning continues on sharing experience in issues related to nuclear security during major public events. STUK announced its collaboration project between national authorities for establishing and implementing a national nuclear security. A short public brochure about this project has been made available for Rostechnadzor for information.

3.3.4 Capacity building in Ukraine

From 2009 to 2010, the focus of the programme with Ukraine was on manufacturing and delivering a mobile laboratory vehicle for the use of the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU). The mobile measuring laboratory called Sophisticated ON-site Nuclide Identification (SONNI) enables the identification and analysis of radioactive sources and nuclear materials in the environment, at industrial facilities and in cases of threatening situations. The laboratory includes measuring, sampling, positioning and communication systems. Data can be transmitted in real time to the control centre, where it can be entered into a map system, thus providing real-time information for the management of the operations. At locations where the vehicle cannot have access, a portable application with the same functionality can be used. The capacity building in this area is financed by the Ministry for Foreign Affairs.

The modern radiation measuring vehicle together with the portable application unit was donated to the IAEA and further to SNRIU in Kiev in December 2010. Two one-week long educational sessions were organised in autumn 2011 to train the new crews and a field exercise was conducted in December 2011. The work continued during 2012 and 2013 with field exercises and the provisioning of additional equipment and measurement devices. As continuation to this training, a new project was approved by the Commission to strengthen SNRIU's capabilities to provide independent radiation monitoring using the mobile laboratory. The practical exercises in 2013 focused on territories with medical institutions that use radiation and nuclear technologies, and around uranium mining and milling facilities. Special emphasis was given to the use of the mobile laboratory as part of normal regulatory activities.

In addition, another EU project was implemented to enhance border control functions by provisioning conventional radiation detectors and new technical means for protection against chemical, biological, radiological and nuclear (CBRN) threats. At the selected border stations between Poland and Ukraine, training was arranged for border control officers in November 2012. This EU funded project was completed during 2013 and all equipment is certified for official use by the authorities.

3.4 Radiation monitoring at border crossing stations

STUK and Finnish Customs have a joint project for the radiation border monitoring of Finnish border crossing stations. Upgrading project RADAR continues until 2014. In 2013, the ports of Kotka and Hamina were equipped with radiation portals. Border monitoring has several aims: it helps to find sources, which are out of regulatory control, and is also a part of the detection architecture combating the illicit trafficking of radioactive and nuclear materials, proliferation of weapons of mass destruction and nuclear terrorism.

STUK was also involved in the development of nuclear detection architecture together with other authorities like customs, the police, border guard, etc. This also has an international dimension in the Baltic region as described above in Item 3.3.3.

4 Human resources development

Nuclear safeguards by the Nuclear Materials Section of STUK cover all typical measures of a State System of Accounting for and Control of Nuclear Materials (SSAC), and many other activities besides. The nuclear fuel cycle-related activities such as research and development activities not involving nuclear material or the manufacture of certain equipment as defined in the Additional Protocol have extended the scope of traditional safeguards. Nuclear safeguards on the national level are closely linked with the other functions of nuclear materials control and non-proliferation: licensing, export control, border control, transport control, combating illicit trafficking, the physical protection of nuclear materials and monitoring compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT). The continuous analysis of the developments in the involved fields of both technology and politics is a daily, multidisciplinary task at the STUK Nuclear Materials Section. Most of the experts working in Nuclear Materials Sections have also been reserved to work for STUK's Emergency Preparedness in case of emergency. That is a good overall view of the whole scale work of STUK, and continuous training keeps experts in touch.

The personnel's competence is systematically developed, taking into account the needs of the organisation and the wishes of individuals. Those aiming at an expert's career are valued as highly as those interested in managerial duties. In 2013, one of the staff members finalised his participation in the specialist qualification for management and leadership organised for state officials. The participants came from the Ministry of Social Affairs and Health and agencies under its supervision. Most of the education and training to develop management and leadership skills took place at the workplace. One of the inspectors attended the Euratom training course on European Nuclear Safeguards in Luxembourg. Nuclear material section has developed its activities in workshops. In 2013, one workshop was held on an effective and healthy working community.

STUK launched a new strategy in 2013 and began the implementation of the consequent matrix organisation. It is not always easy to work in a matrix, having many task managers and supervisors besides the line organisation responsible for resources and financing, and having the aim of making fences as low as possible between each of the units. In the Nuclear Materials Section, in spite of the reduced resources during the reorganisation, there exists quite good knowledge about the work in the other units and departments, one benefit of participating in the emergency preparedness and other common duties done by STUK. Thus, when implementing the new strategy, it is important to start a new kind of cooperation with other STUK units to optimise the use of skills and resources.

The forming of a support group for the Nuclear Materials Section was one new aspect of cooperation in 2013. The group provides the head of the Section with information and knowledge gathered by the group members during the years they have spent working in other organisations like the IAEA. This enables discussion of important questions from different perspectives. The support group members are the directors of the Nuclear Waste and Material Regulation and four senior experts from different organisational units of STUK. The group meets once a month with a specific agenda set beforehand, or with an acute issue requiring immediate action. The arrangement also aims at competence-sharing not only in the Nuclear Materials Sections but also within the group itself.

The cooperation with other units is based on exchange of information, and consequent motivation and training. The Nuclear Materials Section held meetings with other STUK units to allocate synergies and activities which might be implemented in cooperation. There are several activities rationale to start immediately. For example, the spent fuel verification measurements are in the current organisation carried out by the staff of Environmental Radiation Surveillance. In this unit there are experts on measurements and analysis, and they also play an important role in Emergency Preparedness because they prepare estimations of how the radioactivity from a reactor will disperse. It is also a challenge for them get familiar with the fuel and nuclear power plants. In addition, STUK Radiation Practices Regulation carries out regular inspections of organisations that use radioactive sources and small amounts of nuclear materials. During such inspections, it is possible to make nuclear safeguards inspection according to the training and check-list pre-viewed by the Nuclear Materials Section. Nuclear security and safeguards may have different aspects to the control of nuclear materials. Therefore, it is necessary to have close cooperation between these two units. Cooperation and good communication between different departments and units improve nuclear safety, security and safeguards in general.

The distribution of the working days of the Nuclear Materials Section in the different duty areas is presented in Figure 10. Most of the working days are chargeable to the stakeholders. As seen in Figure 10, the duty areas are divided into those of direct oversight and inspections (basic operations), support functions including maintenance, development work for the regulatory functions and consultancy including e.g. international cooperation financed by the Ministry for Foreign Affairs or the EU, and to the RADAR project, which supports Finnish Customs. Organisationally the project was relocated in the expert services of the Environmental Radiation Surveillance in May 2013, so the percentages in Figure 10 are not equally accounted for the whole year. However, the state budgetary funding constitutes less than 10% of the total funding of the Nuclear Materials Section.

The staff of STUK Nuclear Materials Section. All section staff participate in the core safeguards tasks. Additionally, each person has some special areas of expertise to focus on.

Ms. Elina Martikka	Section Head	Management
Ms. Ritva Kylmälä	Assistant	
Mr. Timo Ansaranta	Inspector	Control of operators' competence at facilities, inspections, declarations
Mr. Marko Hämäläinen	Senior Inspector	Safeguards relation, Inspection coordination, Additional Protocol-related matters
Mr. Tapani Honkamaa	Senior Inspector	FINSP ot the IAEA safeguards
Mr. Mikael Moring	Senior Inspector	Finnish National Data Centre for the CTBT, safeguards for final disposal
Mr. Olli Okko	Senior Inspector	Safeguards for geological repository, Additional Protocol-related oversight of R&D activities

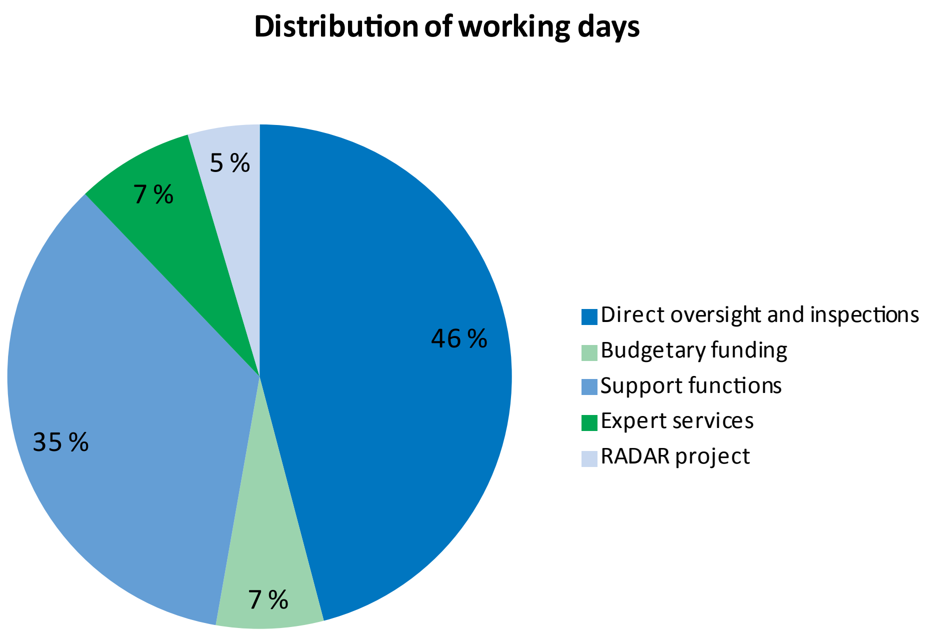

Figure 10. The distribution of the working days of the Nuclear Materials Section in the different duty areas.

5 Conclusions

STUK continued with national safeguards measures and activities with 59 inspection days and 41 inspections. The implementation of the International Atomic Energy Agency (IAEA) integrated safeguards began in Finland on 15 October 2008. Since 2010, the number of IAEA and European Commission inspections annually has been close to 20. The implementation of the IAEA integrated safeguards reduces the total number of annual routine inspections days of the international inspectorates, but includes short-notice random inspections. In order to be present at all of the short-notice IAEA inspections, STUK has had a daily on-call inspector.

In 2012, STUK performed 27 safeguards inspections at the Finnish nuclear power plants (NPP), 11 at the Loviisa NPP and 16 at the Olkiluoto NPP. The Commission and the IAEA took part in 16 of these inspections. The number of inspections at Loviisa was higher than usual due to unscheduled outages with precautions for possible core openings. STUK performed one non-destructive assay measurement campaign at the Olkiluoto NPP; the IAEA and the Commission participated in this campaign as observers. In 2013, STUK carried out three inspections of the new minor nuclear material holders. At other facilities, the Commission took part in the accountancy inspection and physical inventory verification at the VTT research reactor, and together with the IAEA twice in the BTC and design information verifications of the geological repository at the final disposal site at Olkiluoto. The total number of safeguards inspections in 2013 was 42 for STUK, 20 for the Commission, and 19 for the IAEA. The IAEA sent its safeguards statements to the Commission, which amended them with its own conclusions and forwarded them to STUK. The conclusions by the Commission were in line with the IAEA's remarks as well as with STUK's own findings; there were no outstanding questions by the IAEA or the Commission at the end of 2013.

The results of STUK's nuclear safeguards inspection activities continued to demonstrate that the Finnish licence holders take good care of their nuclear materials. There were no indications of undeclared materials or activities and the inspected materials and activities were in accordance with the licence holders' declarations. However, the number of inspections at the VTT research reactor was higher than usually because of some discrepancies in the accounting. Also the precautions for decommissioning and new buildings as well as the retirement and consequent appointments of new personnel responsible for safeguards increased the work load at this facility. Neither the IAEA nor the Commission made any remarks nor did they present any required actions based on their inspections. By their nuclear materials accountancy and control systems, all licence holders enabled STUK to fulfil its own obligations under the international agreements relevant to nuclear safeguards and non-proliferation.

In 2013, STUK's Nuclear Materials Section cooperated closely with the IAEA in order to share experiences and train authorities' staff in countries that are aiming at nuclear programmes, i.e. uranium production or nuclear energy. STUK cooperated with Finnish Customs to offer expert advice in the development of radiation monitoring at borders, including training for Customs officers.

A major goal of all current Comprehensive Nuclear-Test-Ban Treaty (CTBT) related activities is the entry into force of the CTBT itself. To reach this goal, major steps have to be taken in the political arena, and an important prerequisite for positive political action is that the verification system of the CTBTO is functioning and able to provide assurance to all parties that it is impossible to make a clandestine nuclear test without getting detected. The FiNDC is committed to its own role in the common endeavour so that the verification system of the CTBTO can accomplish its detection task. While still incomplete, the verification system has already demonstrated its ability to detect nuclear tests.

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7 Abbreviations and acronyms

ADR
European Agreement concerning the International Carriage of Dangerous Goods by Road

AP
Additional Protocol to the Safeguards Agreement

AQG
Atomic Questions Group of the Council of the European Union

ASTOR
Application of Safeguards to Geological Repositories

BTC
Basic Technical Characteristics

CA
Complementary Access

CBRN
Chemical, biological, radiological and nuclear (such as in "protective measures taken against CBRN weapons or hazards")

CdZnTe
Cadmium zinc telluride

CTBT
Comprehensive Nuclear-Test-Ban Treaty

CTBTO
Comprehensive Nuclear-Test-Ban Treaty Organization

DIQ
Design Information Questionnaire

DIV
Design Information Verification

DU
Depleted uranium

eFORK
enhanced FORK with a CdZnTe-gamma spectrometer (see FORK)

ES
Environmental Sampling

ESARDA
European Safeguards Research and Development Association

EU
European Union

FA
(1) Facility Attachment according to the Safeguards Agreement (INFCIRC/193), (2) Fuel Assembly

FiNDC
Finnish National Data Centre for the CTBT

FINSP
Finnish Support Programme to the IAEA Safeguards

FORK
Spent fuel verifier with gross gamma and neutron detection

GBUV
Gamma Burnup Verifier

GICNT
Global Initiative for Combating Nuclear Terrorism

HEU
High-enriched uranium

HPGe
High-Purity Germanium

IAEA
International Atomic Energy Agency

IMS
International Monitoring System (of the CTBTO)

ITU
Institute of Transuranium Elements in Karlsruhe

INFCIRC
Information Circular (IAEA document type, eg. INFCIRC/193, Safeguards Agreement, or INFCIRC/140, the Non-Proliferation Treaty)

IPPAS
International Physical Protection Advisory Service

IS
Integrated Safeguards

ISSAS
International SSAC Advisory Service

ITWG
International Technical Working Group for combating illicit trafficking of nuclear and other radioactive materials

JRC
The Joint Research Centre

KMP
Key Measurement Point

LEU
Low-enriched uranium

LINSSI
an SQL database for gamma-ray spectrometry

MBA
Material Balance Area

MEE
Ministry of Employment and the Economy

MFA
Ministry for Foreign Affairs

NDA
Non-Destructive Assay

NM
Nuclear Material

NPP
Nuclear Power Plant

NPT
The Treaty on the Non-proliferation of Nuclear Weapons (INFCIRC/140, “Non-Proliferation Treaty”)

NSG
Nuclear Suppliers’ Group

NRC
U.S. Nuclear Regulatory Commission

OECD/NEA
Organisation for Economic Co-operation and Development /Nuclear Energy Agency

Onkalo
Underground rock characterisation facility (for the final disposal of spent nuclear fuel)

PIT
Physical Inventory Taking

PIV
Physical Inventory Verification

PSP
Particular Safeguards Provisions

PTS
Provisional Technical Secretariat (to the Preparatory Commission of the CTBT)

Pu
Plutonium

RL07
Radionuclide Laboratory in the CTBT IMS network hosted by STUK (FIL07)

SA
Subsidiary Arrangements

SFAT
Spent Fuel Attribute Tester

SNRCU
State Nuclear Regulatory Commission of Ukraine

SNRI
Short Notice Random Inspection

SNRIU
State Nuclear Regulatory Inspectorate of Ukraine

SNUICA
Short notice, unannounced inspection, complementary access, on-call inspector

SSAC
State System of Accounting for and Control of Nuclear Materials

SSM
Swedish Radiation Safety Authority

Th
Thorium

U
Uranium

UI
Unannounced Inspection

UNSC
United Nations Security Council

VTT
Technical Research Centre of Finland

WGB
Working Group B (of the CTBTO)

APPENDIX 1 Nuclear materials in Finland in 2013

Table 1. Summary of nuclear fuel receipts in 2013.

To	From	FA	LEU (kg)
Olkiluoto 1, WOL1	Germany	110	19 168
Olkiluoto 2, WOL2	Sweden	106	18 324
Loviisa NPP, WLOV	Russian Federation	270	33 908

FA = fuel assembly; LEU = low-enriched uranium.

Table 2. Fuel assemblies at 31 December 2013.

MBA	FA/SFA *)	LEU (kg)	Pu (kg)
Olkiluoto 1, WOL1	1236/650	211 218	1022
Olkiluoto 2, WOL2	1255/685	208 905	1014
Olkiluoto, spent fuel storage, WOLS	6761/6761	1 143 651	9609
Loviisa NPP, WLOV	5469/4 669	635 919	5752

MBA = material balance area, FA = fuel assembly, SFA = spent fuel assembly

*) Fuel assemblies (FA) in the core are accounted as fresh fuel assemblies (Loviisa NPP 313 FAs and Olkiluoto NPP 500 FAs per reactor)

Table 3. Total amounts of nuclear material at 31 December 2013.

MBA	Natural U (kg)	Enriched U*) (kg)	Depleted U (kg)	Plutonium (kg)	Thorium (kg)
WOL1	–	211 263	–	1023	–
WOL2	–	208 951	-	1014	–
WOLS	–	1 143 651	–	9609	–
WLOV	–	635 920	–	5752	–
WRRF	1511	60.098	0.002	< 0.001	0.044
WFRS	0.574	0.537	369.0	~ 0	0.199
WKKO	2709.7	–	–	–	–
WNNH	2623.55	–	–	–	–
WHEL	49.716	0.293	20.010	0.003	2.942
Minor holders	0.230	0.00116	1179.2	~ 0	0.363

MBA = material balance area, WRRF = VTT Research Reactor, WFRS = STUK, WKKO = Freeport Cobalt Oy, in Kokkola, WNNH = Norilsk Nickel Harjavalta, WHEL = Laboratory of Radiochemistry at the University of Helsinki, U = uranium. *) Less than 150 g of high-enriched uranium, mainly used in detectors.

APPENDIX 2 IAEA, European Commission and STUK safeguards field activities in 2013 in Finland

Table 4. IAEA, Commission and STUK safeguards inspections on site.

General Information			Inspections			Inspection Person Days		
MBA/Location	**Date**	**Inspection type**	**IAEA**	**COM**	**STUK**	**IAEA**	**COM**	**STUK**
Nukliditekniikka	4 January	Inspection	0	0	1	0	0	3
Avatron	23 January	Inspection	0	0	1	0	0	1
WRRF	7 February	System inspection	0	0	1	0	0	3
WOL1, WOL2, WOLS	11 February	Interim inspection, site check	0	0	3	0	0	3
WOLF	12 February	As built DIV	0	0	1	0	0	3
WLOV	13 February	SNRI (LO2+Fresh fuel storage)	1	1	1	1	1	1
WRRF	27 February	Accountancy verification	0	1	1	0	1	1
WLOV	28 February	Interim Inspection, EC camera & seals maintenance only	0	1	1	0	1	1
WOL1,WOL2, WOLS	7–8 May	Pre-PIT	3	3	3	3	3	3
WOL1	17 May	OL1 core verification	0	0	1	0	0	1
WOLF	5 June	BTC document inspection	1	1	1	1	2	1
WOL2	9 June	OL2 core verification	0	0	1	0	0	1
WOL1, WOL2	18–19 June	PIV, BTC review	2	2	2	2	2	2
WLOV	9 July	Interim inspection	0	0	1	0	0	2
WLOV	13–14 August	Pre-PIT	1	1	1	1	1	1
WOLS	15 August	PIV, DIV	2	2	2	1	1	1
WLOV	25 August	Lo1 core verification	0	0	1	0	0	1
WLOV	15 September	Lo2 core verification	0	0	1	0	0	1
WRRF	1 October	PIV	1	1	1	1	1	1
WLOV	2–3 October	Post PIT, DIV	2	2	2	2	2	2
WFRS	4 October	PIV, BTC verification	0	0	1	0	0	3
TVO, Helsinki Headquarter	16 October	International NM transfers, accountancy and control	0	0	1	0	0	2
WLOV	16–17 October	Ad hoc, due to unscheduled outage and possible core opening at Lo2	1	1	1	4	2	2
WFRS, KMP C (in Lakiala)	4 November	Inspection	0	0	1	0	0	2
WLOV	12 November	Ad hoc, due to unscheduled outage and possible core opening at Lo2	1	1	1	1	1	1
WOL3	14 November	DIV	1	1	1	1	1	1
Aalto University	21 November	PIV, System inspection	0	0	1	0	0	1
WLOV	21 November	Unannounced inspection (UI)	1	0	1	2	0	1
HYRL	28 November	PIV, site check	0	0	1	0	0	1
WOLF	3–4 December	DIV	1	1	1	2	2	1
WOL1, WOL2, WOLS	12 December	Interim inspection	0	0	3	0	0	3
NDA MEASUREMENTS								
WOL1	11–14 March	PGET (also as equipment test, IAEA and EC as observers)	1	1	1	4	4	8
TOTAL			**19**	**20**	**41**	**26**	**25**	**59**

Note: At the Olkiluoto NPP, inspections are counted per MBA. MBA = material balance area, PIV = Physical Inventory Verification, CV = Core Verification, CA = Complementary Access, ES = Environmental Sampling, NM = nuclear material, SFAT/eFORK/GBUV = methods of non-destructive assay.

APPENDIX 3 International agreements and national legislation relevant to nuclear safeguards in Finland

Valid legislation, treaties and agreements concerning safeguards of nuclear materials and other nuclear items at the end of 2013 in Finland (Finnish Treaty Series, FTS):

1. The Nuclear Energy Act, 11 December, 1987/990 as amended.

2. The Nuclear Energy Decree, 12 February, 1988/161 as amended.

3. The Treaty on the Non-proliferation of Nuclear Weapons INFCIRC/140 (FTS 11/70).

4. The Agreement with the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in Implementation of Article III, (1) and (4) of the Treaty on Non-Proliferation of Nuclear Weapons (INFCIRC/193), 14 September 1997. Valid for Finland from 1 October 1995.

5. The Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of 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 Non-Proliferation of Nuclear Weapons, 22 September 1998. Entered into force on 30 April 2004.

6. The Treaty establishing the European Atomic Energy Community (Euratom Treaty), 25 March 1957:
   - Regulation No 5, amendment of the list in Attachment VI, 22 December 1958
   - Regulation No 9, article 197, point 4 of the Euratom Treaty, on determining concentrations of ores, 2 February 1960.

7. Commission Regulation (Euratom) No 302/2005, 8 February 2005.

8. Council Regulation (EC) No 428/2009 setting up a Community regime for the control of exports, transfer, brokering, and transit of dual-use items.

9. The Agreement with the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Republic of Finland for Co-operation in the Peaceful Uses of Atomic Energy (FTS 16/69). Articles I, II, III and X expired on 20 February 1999.

10. The Agreement with the Government of the Russian Federation (the Soviet Union signed) and the Government of the Republic of Finland for Co-operation in the Peaceful Uses of Atomic Energy (FTS 39/69). Articles 1, 2, 3 and 11 expired on 1.12.2004.

11. The Agreement between the Government of the Kingdom of Sweden and the Government of the Republic of Finland for Co-operation in the Peaceful Uses of Atomic Energy 580/70 (FTS 41/70). Articles 1, 2 and 3 expired on 5.9.2000.

12. The Agreement between Sweden and Finland concerning guidelines on export of nuclear materials, technology and equipment (FTS 20/83).

13. The Agreement between the Government of Republic of Finland and the Government of Canada and Canada concerning the uses of nuclear materials, equipment, facilities and information transferred between Finland and Canada (FTS 43/76). Substituted to the appropriate extent by the Agreement with the Government of Canada and the European Atomic Energy Community (Euratom) in the peaceful Uses of Atomic Energy, 6 October 1959 as amended.

14. The Agreement on implementation of the Agreement with Finland and Canada concerning the uses of nuclear materials, equipment, facilities and information transferred between Finland and Canada (FTS 43/84).

15. The Agreement between the Government of Republic of Finland and the Government of Australia concerning the transfer of nuclear material between Finland and Australia (FTS2/80). Substituted to the appropriate extent by the Agreement between the Government of Australia and the European Atomic Energy Community concerning transfer of nuclear material from Australia to the European Atomic Energy Community.

16. The Agreement for Cooperation with the Government of the Republic of Finland and the Government of the United States concerning Peaceful Uses of Nuclear Energy (FTS 37/92). Substituted to the appropriate extent by the Agreement for Cooperation in the Peaceful Uses of Nuclear Energy with European Atomic Energy Community and the USA.

17. The Comprehensive Nuclear-Test-Ban Treaty (FTS 15/2001). This treaty was ratified by Finland on January 15, 1999, but will not enter into force before it is ratified by all 44 states listed in Annex II of the treaty.