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Marko Hämäläinen (ed.)

Säteilyturvakeskus
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Summary

This report describes safeguards implementation in Finland in 2006. The report covers the legal basis for safeguards, activities of license holders, the inventories of the nuclear materials, the inspections performed by STUK, the International Atomic Energy Agency, IAEA, and the European Union, the implementation of the Additional Protocol, the safeguards for final disposal and finally, the statement of the Finnish nuclear safeguards during the year 2006.

Contents

1 Introduction

The peaceful use of nuclear materials has to be guaranteed by the most credible way. The national nuclear safeguards system has been established for this purpose: to ensure that the nuclear materials, equipment and technology are used only for the declared, peaceful purposes. The national safeguards system cooperates with the Euratom safeguards system and with the IAEA.

The Finnish safeguards system comprises the authorities and licence holders. Functioning of the national system is subject to international control. Undistributed responsibility on safety, security and safeguarding of its nuclear materials is on the licence holder. It is the responsibility of the competent state authority to ensure that the licence holders comply with the requirements of the safeguards agreement.

Nuclear materials safeguards apply to:
- nuclear materials (special fissionable material and source material)
- other nuclear items (components, equipment, materials suitable for producing nuclear energy or for nuclear weapons, agreements and technology)
- licence holders' activities, expertise, preparedness and competence
- R&D activities related to the nuclear fuel cycle
- the manufacturing and the export control of the dual use equipments,
- nuclear security, and
- the safeguards for the final disposal.

2 Finnish national safeguards system

2.1 Legal basis

The basis of the national safeguards is comprised of the Finnish Nuclear Energy Act and Decree. By virtue of the Act STUK issues detailed regulations (YVL Guides) that apply to the safe use of nuclear energy. The main guides related to safeguards are:

- Control of nuclear fuel and other nuclear materials required in the operation of nuclear power plants (Guide YVL 6.1)
- The national system of accounting for and control of nuclear materials (Guide YVL 6.9)
- Reports to be submitted on nuclear materials (Guide YVL 6.10).

Finland was the first state where the INFCIRC/153-type safeguards agreement with the IAEA entered into force (INFCIRC/155, February 9, 1972). This agreement was suspended after Finland joined to the European Union and the agreement between the non-nuclear weapon States of the EU, the European Atomic Energy Community (Euratom) and the IAEA (INFCIRC/193) entered into force in Finland on October 1, 1995.

The national safeguards system was maintained after Finland joined the EU and to the Euratom safeguards system on January 1, 1995. The basic motivation for maintaining the national system has to do with the responsibilities assumed by the state following the NPT. The Euratom safeguards is based on the Euratom Treaty and the Commission Regulation No. 302/2005, which came into force in 20 March 2005. Reporting format of the Commission Regulation No. 3227/76 is still used by Finnish operators.

Finland signed the Additional Protocol in Vienna, 22 September 1998, with the other EU member states and ratified it in August 2000. The AP entered into force in April 30, 2004 after all the EU countries ratified it.

Finland has several bilateral agreements in the area of peaceful use of nuclear energy. Upon joining to the EU, the agreements with Australia, Canada and the USA were partly substituted by the Euratom agreements with these states. Also the agreements with Sweden and the UK have partly been expired. The old agreement made with the Soviet Union was continued for five years in 1999 and the negotiations with the Russian Federation about new agreement have been started.

2.2 Parties of the Finnish safeguards system

2.2.1 Ministries

The Ministry for Foreign Affairs is responsible for non-proliferation policy and the international agreements. The Ministry of Trade and Industry is responsible for highest management and control of nuclear energy in Finland. It is responsible for legislation related to nuclear energy and it is also the competent safeguards authority mentioned in the Euratom Treaty. Also other ministries, such as the Ministry of the Interior and the Ministry of Defence are contributing to the efficient function of the national safeguards system.

2.2.2 STUK

According to the Finnish nuclear legislation, STUK is responsible to maintain the national safeguards system in order to prevent the proliferation of nuclear weapons. It regulates the license holders' activities and ensures that the obligations of international agreements concerning peaceful use of nuclear materials are met. Regulatory control of STUK is directed at the possession, manufacture, production, transfer, handling, use, storage, transport, export and import of nuclear material and other nuclear items.

STUK takes care of the approval of the IAEA and the consultation of Commission inspectors for Finland. STUK shall approve an inspector if his activities are not considered to endanger the safe use of nuclear energy or the prevention of the proliferation of nuclear weapons. If STUK can not approve an inspector, it shall assign the approval to the Ministry of Trade and Industry.

The safeguards implementation by STUK covers all the typical measures of the State System of Accounting for and Control of Nuclear Materials (SSAC). In addition, STUK has its own independent audit and verification programme particularly for the spent nuclear fuel to ensure the completeness and correctness of the operator data. The safeguards implementation in national level is closely linked with other functions like export/import control, customs and border control, transport safety, preventing of illicit trafficking, physical protection and certain measures of the Comprehensive Nuclear Test Ban Treaty (CTBT).

The transportation of nuclear and other radioactive materials are very closely linked to the safeguards objectives. In Finland, STUK's safeguards section is responsible to regulate the radioactive material transportations and acceptance of the transport packages. Finland, being the eastern border of the EU, has an important role taking care of the prevention of illicit trafficking of nuclear materials. STUK cooperates closely with the Finnish Customs and offers its expertise to develop the monitoring of radioactive materials on the borders, and also to train the Custom officers.

In 2006 STUK has set up an interdivisional Nuclear Security Task Group in order to improve our internal coordination on this topic and to act as the focal point at STUK for issues dealing with nuclear security, counter-terrorism and radiological risk reduction.

At STUK, safeguards duties belong to the Nuclear Waste and Materials Regulation Department (see organization chart, Figure 1). The department has 22 staff members and the following duties: nuclear waste management, national data centre for the CTBT (Comprehensive Nuclear-Test-Ban Treaty), and nuclear materials regulation, including transportation of radioactive materials. The director of the department is Mr Tero Varjoranta. In addition to the Nuclear Materials Section, two key staff members deal with safeguards: Ms Arja Tanninen, deputy director, is responsible for licensing issues related to nuclear materials; Mr Juha Rautjärvi coordinates the nu-

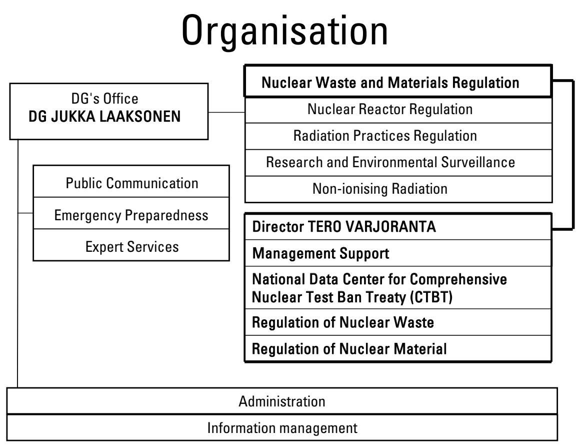

Figure 1. Nuclear Materials Section in the organisation of STUK.

clear safeguards co-operation programme with the Russian Federation, and contributes to the non-proliferation issues.

Eight experts were working in the Nuclear Materials Section and one expert was working for NDC in 2006:

Figure 2. Staff of Nuclear Materials Section: front Jaakko Tikkinen, Anna Lahkola, Marko Hämäläinen and Paula Karhu, behind Arto Isolankila, Elina Martikka, Olli Okko and Tapani Honkamaa. Out of the picture Kauko Karila.

- Ms Elina Martikka, Section Head (national system, Additional Protocol (AP) implementation)
- Mr Tapani Honkamaa, Senior Inspector (Non-Destructive Analysis (NDA), coordinator of FIN SP to IAEA safeguards)
- Mr Marko Hämäläinen, Inspector (inspections, AP implementation)
- Mr Kauko Karila, Inspector (reporting, documentation); retired 1.11.2006
- Mr Olli Okko, Senior Inspector (research and development (R&D), final disposal)
- Mr Jaakko Tikkinen, Senior Inspector (transportation, illicit trafficking); on leave 9.1.2007 to 31.12.2007
- Ms Anna Lahkola, Inspector (reporting, transportation)
- Ms Paula Karhu, Inspector (nuclear security, new verification methods)
- Mr. Arto Isolankila, Senior Inspector (NDC).

2.2.3 Operators

An essential party to the national safeguards system are the operators. The operators perform a key function of the State's safeguards system with regard to nuclear material accountancy at the facility level and to control of the authentic source data of the nuclear materials. The operators have to prepare a Nuclear Material Handbook that covers all the information on how the safeguards in their facility are implemented. The Handbook, which is also a part of the facility's quality system, is approved by STUK.

3 Themes of the year

3.1 Safeguards and security

In today's world nuclear security is more important than ever. In 2006 STUK has set up an interdivisional Nuclear Security Task Group in order to improve our internal coordination on this topic and to act as the focal point at STUK for issues dealing with nuclear security, counter-terrorism and radiological risk reduction. Safeguards contributes to security, through established accountancy and reporting systems as well as the technical verification and surveillance methods. In 2006 strategic work was started in order to integrate nuclear security considerations to our safeguards and transport control duties – we will look for synergies between existing systems, such as registers of materials and sources vis-à-vis emergency preparedness procedures. Safeguards and our related tasks with transport and border control as well as import and export control are also tied to the fulfilment of our obligations set by international agreements such as the UN Security Council Resolution 1540.

STUK cooperates with the Finnish Customs in order to prevent illicit trafficking of radioactive and nuclear material into Finland. In the 1990's there were several shipments for which the entry into Finland was denied due to undeclared radioactivity in the cargo. The cause for denial was typically contaminated material or orphan sealed sources among recycled metal. The denials peaked in 1997 at 23 shipments being returned. Thanks to enhanced border monitoring, especially at the Russian side, the number of such cases reduced to zero by 2001 and has stayed zero since. Cooperation programmes in prevention of illicit trafficking have been established with neighbouring countries.

STUK continues to participate and develop its activities in the international fora for enhancing nuclear security and for preventing illicit activities related to radioactive and nuclear materials. In 2006 STUK participated in the eleventh annual meeting of the International Technical Working Group of Nuclear Smuggling (ITWG), which addresses the technical means to detect illicit trafficking, organisational preparedness for response in detected cases, exchange of information and attribution of detected materials through nuclear forensic analysis. STUK participated in a seminar organised jointly by the Finnish EU Presidency, the incoming German Precidency and the European Commission as part of the European Radiological Risk Reduction Programme. The seminar concentrated on the detection of illicit trafficking at key transit nodal points. STUK organised the second informal national meeting on nuclear security – we enjoy an atmosphere of good cooperation between different authorities.

3.2 National strategy for nuclear material verification

STUK began programmatic NDA (Non-Destructive Analysis) verifications at Olkiluoto Spent fuel storage at the end of 1980's. The work is ongoing. In 2006 STUK wrote down the strategy for nuclear material verification for the years 2007–2011.

3.2.1 Strategic objectives

The strategic objectives of measurement program are:

- to systematically verify that the data provided by the operator is correct and complete.
- to maintain national preparedness for verification
- to minimise the risk of mismanagement
- to increase the motivation of the operator to its own NMAC (Nuclear Material Accountancy and Control)
- to increase the confidence of international community in the Finnish national system
- to prepare for final disposal of spent fuel by collecting independent experimental radiological data from spent fuel assemblies as a function of time.

Table 1. STUK's Non-Destructive Analysis measuring equipment for safeguards.

	Method	Characteristics/device	Note
1	GBUV (Gamma Burn-Up Verifier)	Portable, relative eff. 20%, HPGe (High Purity Germanium detector) placed behind 3 mm slit in spent fuel pool. Ortec Detective X acquired in 2006 can be also used for this purpose.	Only Olkiluoto has slits in the pool walls.
2	eFORK (enhanced FORK detector)	Traditional FORK (Neutron/Gamma Ray Verification) equipped with 20 mm³ CdZnTe spectrometer	Transferable. Can be used in Olkiluoto and Loviisa.
3	Olkiluoto SFAT (Spent Fuel Attribute Tester)	Completely underwater (NaI detector inside watertight cover). Moving telescope.	Operation with Olkiluoto fuel transfer machine.
4	Loviisa SFAT (new storage)	Completely underwater (detector inside watertight cover). No moving parts inside.	Operation with Loviisa fuel transfer machine.
5	Loviisa SFAT (old storage)	Pipe and supporting structure. The detector can be either 20% HPGe or NaI detector.	Pipe has a holder for separate detector above water level. HPGe or NaI detectors have been used.
6	Additional detector	2 portable HPGe detectors with measurement electronics (see row 1). Canberra UPu detector (LEGE detector-based).	Will be used for verification of fresh fuel and characterisation of special items.

- to maintain the competence in STUK
- to support the development of measurement methodologies
- to verify not only NMAC related but also nuclear safety related issues.

The proposed strategy will promote these objectives. The numerical goal is to measure annually so many assemblies that the risk of unobserved diversion of one significant quantity of nuclear material is less than 10% during over 20 years time of programmatic measurements.

3.2.2 Present operational verification tools and methodologies

List of the methods and tools is presented in Table 1. The characteristics of different measuring equipment are described in more detail in various technical reports. An overall view of STUK's measuring activities can be obtained from the reference [Honkamaa T, Hämäläinen M, *How STUK verifies spent fuel – and why? Proceedings of ESARDA, 25th Annual Meeting, Stockholm, May 2003*, available on CD, ISBN 92-894-5654-X]. Additionally, in 2006 STUK acquired an Ortec Detective. It is an electrically cooled portable HPGe detector and analyser, which is also an excellent tool for Spent Nuclear Fuel verifications. In 2007 STUK plans to use it in some of the activities. Otherwise the measuring systems are the same as in the year 2005.

The verification toolbox is adequate to run the regular measuring programme typically consisting of two inspections per nuclear power plant per year and all types of fuel.

3.2.3 Assembly types and locations

The strategy will take into account the different types of assemblies. In Olkiluoto 1–2 BWR's older types of assemblies can be verified with the present SFAT device without fuel movements. New types of assemblies should be measured with another technology, such as a FORK detector or the GBUV method, which require fuel assembly movements. However, at first STUK aims to upgrade its present SFAT device to improve its detection capability with a better large size CdZnTe-detector. The present system employs a NaI detector.

In Loviisa all regular assemblies can be verified with the SFAT detector, which is a quick method. However, the so called fuel followers can not be verified with the SFAT. Therefore, it is proposed to verify these assemblies with the eFORK detector, available for this purpose. The eFORK device has a CdZnTe, PIC and fission chamber detectors.

Spent fuel assemblies from Olkiluoto 3 are not in the scope of this strategic period, since the operation of the plant is not expected to start before 2011.

The main verification points will be at the spent fuel storages. However at the Olkiluoto 1–2 the reactor hall contains many storage positions and some assemblies stay there over a long period of time. Therefore some campaigns are proposed to take place at the reactor hall. In Loviisa facilities the storage capacity in the reactor halls is very

Table 2. Suggested spent fuel verification activities at the Finnish NPPs for 2007–2011. For Loviisa power plant another day is suggested, since spent fuel storage had no C/S system. However the situation is changed, since some pools are now sealed.

Year	Loviisa Spent fuel storage	OL1/2/Spent fuel storage	Inspection days
2007	SFAT: 33 SFAs (1–2 day) eFORK 6 SFAs (1–2 days)	SFAT (Spent fuel storage): 45 SFAs (2 days) GBUV (OL1/2): 45 SFAs (3 days)	7–9
2008	SFAT: 33 SFAs (1–2 days) eFORK 6 SFAs (1–2 days)	SFAT (Spent fuel storage): 45 SFAs (2 days) GBUV (OL2/1): 50 SFAs (4 days)	8–10
2009	SFAT: 36 SFAs (1–2 days) eFORK 7 SFAs (1–2 days)	SFAT (Spent fuel storage): 45 SFAs (2 days) GBUV (Spent fuel storage): 54 SFAs (4 days)	8–10
2010	SFAT: 39 SFAs (1–2 days) eFORK 7 SFAs (1–2 days)	SFAT (Spent fuel storage): 45 SFAs (2 days) GBUV (OL1/2 reactor hall): 59 SFAs (5 days)	9–11
2011	SFAT: 42 SFAs (1–2 days) eFORK 8 SFAs (1–2 days)	SFAT (Spent fuel storage): 45 SFAs (2 days) GBUV (OL2/1 reactor hall): 63 SFAs (5 days)	9–11

limited, hence there is no acute need to perform measurements there.

3.2.4 Suggested spent fuel verification campaigns

The strategy suggests the number of campaigns, which needs to be performed in order to achieve the numerical objectives. Since different types of assemblies will be verified with different methods, and during one campaign only one method is customarily used, the strategy foresees two campaigns annually per facility. For the years 2007–2011 the following measurement campaigns are suggested by the objectives (Table 2).

3.2.5 Other nuclear material

STUK will also verify other nuclear material in addition to spent fuel. Fresh nuclear fuel is, according to some studies, even higher proliferation risk than spent fuel. The strategy foresees annual fresh fuel verification in some of the Finnish reactor facilities.

3.2.6 Databases

An important part of the measurement strategy is the documentation of measurement data and results. The NDA database has been in use in STUK from 1999. In 2007 a new database system, based on the Linssi database structure (http://linssi.hut.fi) will be taken into use in Linux environment.

3.2.7 Training and resources

The new strategy does not change the need for resources in the short term. The amount of verification activities will slightly intensify because of the increase in the amount of nuclear material. The main effort with regard to resources is the establishment of a new database. The in-depth verification expertise needs to be spread among more inspectors during the strategy period.

Table 3. Spent fuel measurements in Finland in 2006.

Location	Date	Measured assemblies	Method
Loviisa spent fuel storage	27.–28.3.	3 (+ 19 dummy items)	eFORK
Olkiluoto spent fuel storage	26.–29.6.	25	GBUV
Loviisa spent fuel storage	1.–2.11.	55	SFAT

3.3 Environmental sampling

A national environmental sampling and analysis activity was initiated in 2006. Swipe samples were collected at all sites. The programme aims to enhance the system of nuclear materials inspections by providing evidence on the completeness of declarations on nuclear materials and activities as well as on absence of undeclared activities. A swipe sample from a nuclear facility (past or present) contains millions of particles, among them a few from nuclear materials, such as nuclear fuel. The composition of those particles provide the analyst with information on what the materials are (for), where they are from and what processes they have been subjected to and when. This information is examined to see if the findings are consistent with the declarations. In addition to the needs and objectives of the State safeguards system, a level of understanding of the environmental sampling and analysis techniques and their findings is essential also in order to facilitate efficient implementation of safeguards in Finland by the IAEA.

4 Safeguards implementation

Most of the nuclear material in Finland (see Fig. 3 and 4) is used as a fuel for the Finnish nuclear power plants (NPPs). The main areas relevant to the nuclear materials safeguards during 2006 were the supply of the nuclear fuel, import, transportation, storing, handling and use of it. The decision to build the fifth Finnish power reactor in the Olkiluoto NPP area, beginning in 2005, has also been taken into account in the plans of the safeguards activities.

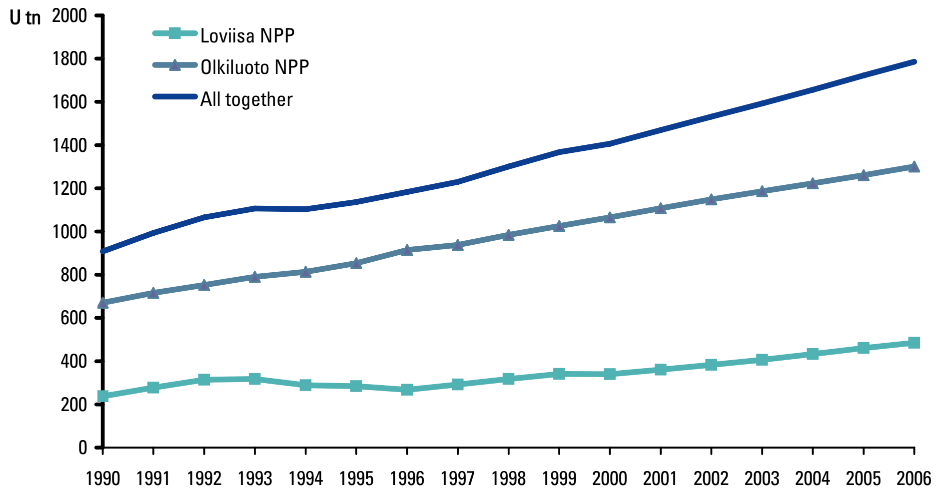

Figure 3. Uranium amount in Finnish nuclear power plants in 1990–2006.

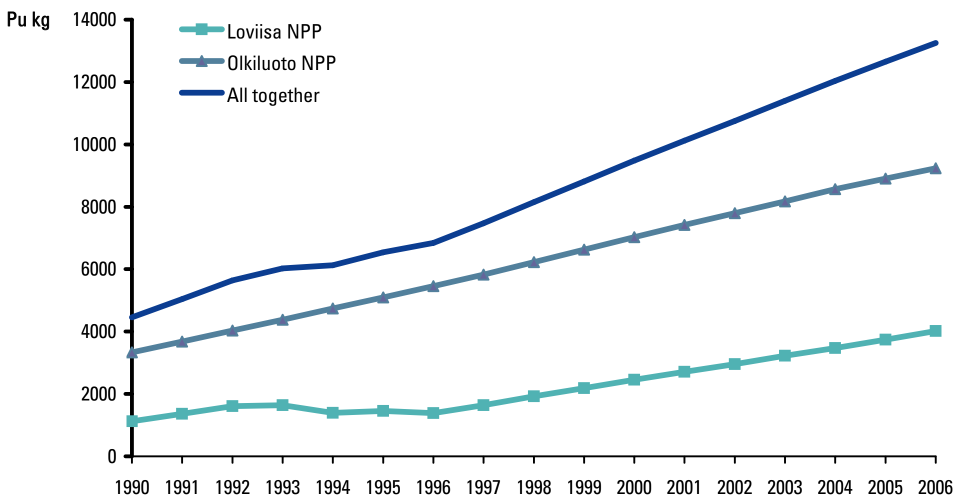

Figure 4. Plutonium amount in Finnish nuclear power plants in 1990–2006.

4.1 Additional Protocol (AP)

Additional Protocol came into force in the European Union on 30 April 2004. The objective of the AP is to assure the IAEA of the absence of undeclared nuclear material and activities. The main part of this work is the declarations concerning activities carried out in the state.

There are three different sets of declarations concerning Finland, depending on who is responsible for preparing and submitting a declaration: state, (European) Commission or both.

In Finland, the state has delegated its responsibility for the declarations to STUK. STUK collects, inspects, reviews and then submits the information of those matters for which the state is wholly or partly responsible. In other words, STUK prepares and submits the declarations under articles 2a(i), 2a(iv), 2a(viii), 2a(ix), 2a(x), 2b(i) to the IAEA. As a "site representative" STUK prepares the site declarations under article 2a(iii) to be submitted to the Commission, which forwards them to the IAEA. The Commission prepares and submits the declarations under articles 2a(v)–2a(vii) to the IAEA. Depending on the aforementioned responsibilities, STUK and Commission prepare answers to any IAEA questions. STUK participates also to all IAEA safeguards activities in Finland. The Additional Protocol activities so far were:

2004

- Initial declarations:
  - STUK submitted the initial declarations to IAEA and Commission 8 July 2004,
  - Commission submitted initial declarations to IAEA 22 September 2004,
- Complementary Access at HYRL site (University of Helsinki, Radiochemistry Laboratory), 24 h notice, 21 December 2004.
- STUK has submitted 2.a.(ix)(a) declarations to IAEA and Commission on a quarterly basis.

2005

- Annual updates:
  - STUK provided the updated site declarations to Commission 31 March 2005,
  - STUK submitted updated declarations to IAEA 4 May 2005,
  - Commission submitted updated declarations to IAEA 13 May 2005,
- 2.c questions:
  - IAEA submitted three sets of questions to STUK and Commission (one for state, one for Commission and one for both) 15 July 2005,
  - STUK answered to IAEA questions 8 September 2005,
  - Commission answered to IAEA questions 13 December 2005 and 24 January 2006,
- Complementary Access at Olkiluoto site, 2 h notice, 13 September 2005,
- Complementary Access at STUK site, 24 h notice, 7 December 2005,
- STUK has submitted 2.a.(ix)(a) declarations to IAEA and Commission on a quarterly basis: reported exports have concerned autoclaves exported to the Russian Federation by Fortum Nuclear Services.

2006

- Annual updates:
  - STUK provided the updated site declarations to Commission 30 March 2006,
  - STUK submitted updated declarations to IAEA 10 May 2006,
  - Commission submitted updated declarations to IAEA 12 May 2006,
- Complementary Access at Loviisa site, 2 h notice, 17 November 2006,
- STUK has submitted 2.a.(ix)(a) declarations to IAEA and Commission on a quarterly basis: reported exports have concerned autoclaves exported to the Russian Federation by Fortum Nuclear Services.

In 2006 STUK and the Commission submitted to the IAEA 18 declarations concerning Finland. All together, 54 declarations have been submitted to the IAEA to date. STUK has provided all the information that the IAEA has requested in the given submission times.

STUK has actively taken part to the experts meetings on the topic of AP – the Atomic Questions Group meetings, IAEA technical meetings and the Commission meetings organised for member states as well as ESARDA meetings. An example is IAEA/VATESI Regional Technical Meeting on Additional Protocol Implementation hold in Vilnius, 28 August to 01 September 2006. The main topic there were to harmonise the state level approaches as well

Table 4. Summary of nuclear materials receipts and shipments in 2006.

To	From	FA	LEU (kg)	Pu (kg)
WOL1	Spain	116	20 543	–
WOL2 (1/3)	Sweden	60	10 162	–
WOL2 (2/3)	Sweden	60	10 163	–
WOL2 (3/3)	Sweden	6	1 016	–
WOLS	WOL2	41	6 894	62
WOLS	WOL2	41	6 892	62
WOLS	WOL2	41	6 894	62
WOLS	WOL1	41	6 746	60
WOLS	WOL1	41	6 742	60
WOLS	WOL2	41	6 748	60
WLOV	Spain	108	13 533	–
WLOV	Russia	102	12 234	–

WOL1, WOL2 & WOLS = Olkiluoto NPP, WLOV = Loviisa NPP, FA = fuel assembly; LEU = Low-enriched uranium.
Note: WOL1 and WOLS shipments are marked only once in to table as WOLS receipts.

as share out the experiences gained so far. In 2006, STUK also organised, within the Finnish Support Programme for the IAEA Safeguards, one Complementary Access training course in Finland for the IAEA safeguards inspectors. The related on-site training exercises were organised at Loviisa, VTT and STUK sites.

The site declarations are to be verified by the authorities. Although, STUK has access to the Finnish nuclear facilities, the declarations generated by the operators need to be verified for their completeness and correctness. In order to confirm the comprehensiveness of the site maps they are compared with optical satellite imagery. Satellite imagery provides also a tool to monitor activities at the ground level remotely. STUK has participated in national research project to evaluate the applicability of commercial satellite radar and optical imagery in safeguards purposes.

4.2 The Loviisa NPP

Fortum is one of the biggest energy companies in Scandinavia. In the past, Fortum was a state-owned company formed from Imatran Voima and Neste. Fortum has electric power plants of many types: nuclear, gas, coal, oil, among others.

The nuclear power plant of Fortum Power and Heat is located in Loviisa in eastern Finland, where there are two nuclear power reactor units with common spent fuel storages (material balance area WLOV). The electricity generated in Loviisa NPP – ca. 10% of the whole electricity production in Finland – is used as a primal supply source in Finnish electrical network.

Table 5. Fuel assemblies in nuclear power plants on December 31, 2006.

MBA	FA/SFA *)	LEU (kg)	Pu (kg)
WLOV	4 191/3 380	485 407	4 015
WOL1	1 104/522	188 156	756
WOL2	1 142/574	192 881	862
WOLS	5 412/5 412	919 744	7 621

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

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

Fortum has earlier purchased the fuel for reactor units Loviisa 1 and 2 mainly from the Russian Federation as complete assemblies. Nowadays about half of the fuel assemblies are imported from the Russian Federation and the remaining half from Spain. The most of uranium is of Russian origin. Until 1996 the spent fuel was returned back to the Russian Federation. Due to the change in the Finnish nuclear legislation the spent fuel has been stored in the interim storage since 1996.

In 2006, STUK granted licenses to import fresh fuel from Spain. Based on granted import licences, in total 210 fuel assemblies containing 25.8 tons of uranium were imported to the Loviisa NPP: 102 fuel assemblies (average uranium enrichment 4%) from the Russian Federation and 108 fuel assemblies (3.8%) from Spain. The receipts of fuel assemblies are stated in Table 4, and total amounts of nuclear materials are presented in Tables 5 and 6.

Table 6. Nuclear material amounts in Finland on December 31, 2006.

MBA	U-Natural (kg)	U-Enriched (kg)	U-Depleted (kg)	Plutonium (kg)	Thorium (kg)
WL0V	–	485 407	–	4 015	–
W0L1	–	188 156	– [a)]	756	–
W0L2	–	192 881	–	862	–
W0LS	–	919 744	–	7 621	–
WRRF	1 511	60.1	0.002	–	–
WFRS	44.7	1.4	823	0.003	2.5
WKK0	2 419	–	–	–	–
WHEL	40.4	0.3	20	0.003	2.5
Others[b)]	0.0135	~0	817	~0	0.134

WRRF = VTT FiR-1/VTT Processes; WFRS = STUK; WKK0 = OMG Kokkola Chemicals; WHEL = Helsinki University's laboratory of radiochemistry.

a) TVO has ca. 10.3 kg DU samples for training and exhibition purposes in Olkiluoto.
b) Others means the small laboratories and minor NM holders listed in Table 7

The refuelling and maintenance outage of Loviisa 1 was performed during 29.7.–24.8.2006, and that of Loviisa 2 during 26.8.–1.10.2006. In Loviisa 1 refuelling 102 and in Loviisa 2 refuelling 102 fresh fuel assemblies were loaded into the cores. Before closing of each reactor, STUK, the IAEA and the Commission identified the fuel assemblies in the reactor cores and verified the fuel assemblies in the loading ponds. Loviisa 1 was inspected on August 6, 2006 and Loviisa 2 on September 19, 2006. Four routine inspections were performed together with the IAEA and the Commission in February May, September and December. In addition, during the inspection in September 1, the IAEA also inspected empty container going out in Loviisa reactor 2 hall. This inspection was launched because the transfer of container was during the maintenance break and core was open. In 13 and 17 November the pond in new spent fuel storage were covered and inspected. In addition to this inspection, 2 h CA was performed in 17 November. STUK's measurements in Loviisa are reported in Chapter 3.2.

Fortum reported to STUK about its international uranium transfers. On the basis of its verification and assessment, STUK has concluded that Fortum has complied with its safeguards obligations.

4.3 The Olkiluoto NPP

Teollisuuden Voima (TVO) is a private company owned by Finnish industrial and power companies to whom it provides electricity at cost price. TVO owns and operates two nuclear power plant units and an interim spent fuel storage in Olkiluoto, in the municipality of Eurajoki on the west coast of Finland. Olkiluoto NPP produces ca. 16% of whole electricity production in Finland. In Olkiluoto there are three material balance areas (W0L1, W0L2 and W0LS).

TVO uses uranium of Australian, Canadian, Russian and Chinese origin. Uranium is enriched in the Russian Federation or in the EU. The fuel assemblies are manufactured in Germany, Spain and Sweden.

In 2006, STUK granted two import licences for nuclear fuel to TVO. In total, 242 fuel assemblies containing 40.9 tons of uranium (~3.5%) was imported to the Olkiluoto NPP, 116 from Spain and 126 from Sweden. The receipts and shipments of fuel assemblies are stated in Table 4, and total amounts of nuclear materials are presented in Tables 5 and 6.

The refuelling and maintenance outage of Olkiluoto 1 was performed during 7.5.–30.5.2006 and that of Olkiluoto 2 during 4.6.–12.6.2006. In Olkiluoto 1 refuelling, 110 fresh fuel assemblies and in Olkiluoto 2 refuelling, 116 fresh fuel assemblies were loaded into the core. Before each of the reactors was closed STUK, the IAEA and the Commission identified the fuel assemblies in the reactor cores and verified the fuel assemblies in loading ponds. Olkiluoto 1 was inspected on 25.–26.5.2006 and Olkiluoto 2 on 9.–10.6.2006. STUK, the IAEA and the Commission verified the physical inventory in Olkiluoto Spent Fuel Storage on December 15, 2006. Four routine inspections were performed by STUK, the IAEA and the Commission (for each MBAs) in Olkiluoto: in February–March, June, September and December 2006. STUK's measurements in Olkiluoto NPP are reported in Chapter 3.2.

TVO reported to STUK about its international fuel contracts, fuel transfers and shipments. On the basis of its verification and assessment, STUK has concluded that TVO has complied with its safeguards obligations.

The Finnish Government granted the licence for constructing a new nuclear power plant, Olkiluoto 3, on 17.2.2005. In this connection, the constructor's plan for arranging the necessary measures for preventing the proliferation of nuclear weapons was approved by STUK. Construction of the reactor vessel and related internal parts of the reactor continued in Japan. The Ministry for Foreign Affairs of Finland gave to the Embassy of Japan the NSG assurances on the fuel channels to be shipped to Finland by December 31, 2010.

4.4 VTT FiR 1 research reactor

Small amounts of nuclear materials are located on other facilities than nuclear power plants. The most significant of those is VTT research reactor (MBA WRRF) in Otaniemi, Espoo. STUK, IAEA and Commission safeguards inspectors verified the nuclear material inventory of VTT on 27 June, 2006. The nuclear material inventory was found to be correct. The nuclear material accountancy and control were acceptably performed by VTT. The inventory of nuclear materials in the end of 2006 is presented in Table 6.

4.5 Minor nuclear material holders

The locations outside facilities are STUK (WFRS), the Laboratory of Radiochemistry at Helsinki University (WHEL) and OMG Kokkola Chemicals (WKK0). The amounts of nuclear materials in the end of 2006 are presented in Table 6.

STUK's nuclear activities are mainly storing of nuclear materials. STUK has the Central Interim Storage for Small-User Radioactive Waste ("Small-Waste Storage") located in the NPP waste cave in Olkiluoto and the small radionuclide storage at STUK.

At moment the Laboratory of Radiochemistry of Helsinki University has no nuclear activities excluding store of minor amount of nuclear material. Anyhow it is possible that they will continue the research work with nuclear materials in the future.

The only activity of OMG Kokkola Chemicals concerning nuclear materials is storing process by-products. While obtaining clean cobalt, they are getting sodium uranate solution among other substances. This sodium uranate solution has been timely shipped to Comurhex in France. In 2006 there were no shipments. OMG Kokkola Chemicals has an operation license to store max 20 000 kg of uranium in this solution.

In the end of 2006, there were ten other nuclear material holders, mostly having some minor amounts of nuclear materials, mostly exempted materials. Almost all of them have nuclear materials in the form of depleted uranium shieldings. Only three holders, Geological Survey of Finland (GTK), Metorex International and University of Jyväskylä (Department of Physics) have some other nuclear materials. GTK has ca. 1.17 g of HEU to be used as a spike material in geological studies and for mass spectrometry calibrations. Metorex has ca. 10 g of natural uranium that they use as calibration material for radiation monitoring gates. University of Jyväskylä (Department of Physics) uses small amounts of NM as a material for manufacturing targets or sources or directly to be used as targets irradiated with accelerator ion beams or as radiation sources in calibration of radiation detectors for basic research of nuclear structure. A list of minor nuclear material holders including close down locations is presented in Table 7.

4.6 Other nuclear items

The Finnish Nuclear Energy legislation regulates also nuclear items other than nuclear material. Possession, transfer, imports and exports of those items requires a licence or at least a notification to STUK. In 2006, STUK granted to Fortum Power and Heat licenses to import neutron detectors from German and in-core sensors from Canada as well as to export parts of control rod drive mechanism and technology to German. STUK also granted to TVO four licences to import control rods (2 licences) and zirconium tubes (2) and two licences to export zirconium tubes. In addition STUK granted an export and import licence to VTT research reactor for control rod drivers to be serviced in USA. The Ministry of Trade and Industry granted to Fortum

Table 7. Amounts of nuclear material at minor nuclear material holders.

Company	Nuclear material (kg)						MBA + use of NM
	U-dep	U-nat	U-Leu	U-Heu	Pu	Th	
Geological Survey of Finland (GTK)	–	–	–	0.001174	–	–	SF 0293 CA, Minor NM activities
Finnair Engineering	15.5	–	–	–	–	–	SF 0302 CA, DU radiation shielding
Rautaruukki, Raahe Works	163	–	–	–	–	–	SF 0303 CA, DU radiation shielding
Inspecta	304	–	–	–	–	–	SF 0304 CA, DU radiation shielding
Outokumpu Stainless	100.98	–	–	–	–	–	W0KU, DU radiation shielding
Centre for Technical Training, Metal and Machinery	15	–	–	–	–	–	DU radiation shielding
Polartest	163.2	–	–	–	–	–	WF1P. DU radiation shielding
MAP Medical Technologies	55	–	–	–	–	–	SF 0325 CA, DU radiation shielding
Metorex International	–	0.0105	–	–	–	–	U-nat standards
University of Jyväskylä, Dept. of Physics	–	0.003	–	~0	~0	0.134	WDPJ, Basic research

Nuclear Services a license to export APROS software to Libya. It also granted to Fortum Power and Heat a licence to import neutron detectors from France and to Radiochemistry Laboratory of Helsinki University to import U-235 sample from the Russian Federation.

4.7 Geological repository

Underground facilities for final disposal of spent create a new challenge to the safeguards society. The main concern is that after safe disposal in the subsurface, there is still a need to have a credible assurance about the absence of safeguards-relevant activities, although the nuclear materials are not accessible or re-verifiable using the traditional safeguards technologies. In order to facilitate the IAEA's State level analysis about the absence of undeclared nuclear activities, the implementing company was obligated to produce timely safeguards-relevant documents covering the whole lifetime of the repository. The implementation was commenced with the underground excavation, before of the traditional time lines for conventional nuclear facilities.

In summer 2004, the first concrete step in the Finnish final repository was taken as the underground excavation of the geological site characterisation premises called ONKALO begun. The first access tunnel to ONKALO most probably will be a part of the final repository in the future as one of the access routes. In connection with this, the implementing company Posiva Oy appointed a person responsible for nuclear non-proliferation control of the ONKALO and prepared a Safeguards Manual to be applied in the similar manner as the Nuclear Material Handbook of a licensed material holder already in the pre-nuclear phase of the repository. The updated version of the Safeguards Manual was approved by STUK in summer 2006.

During the year 2006 STUK carried out 6 safeguards inspections to verify the as-built design information describing the excavated rock volumes. In addition, STUK carried out 26 inspection activities to ensure the sustainability of the long-term safety analysis of the planned repository. Two IAEA inspectors participated in one of these inspections as observers (fig. 5). In addition, STUK carried out

Figure 5. IAEA inspector visiting in ONKALO as an observer of STUK's ONKALO inspection.

one inspection to analyse the performance of the safeguards system elements at Posiva in order to improve the National Safeguards System.

The annual report of Nuclear Safeguards in Finland in 2005 (Hämäläinen 2006) including the repository issues was submitted to the IAEA in May 2006. Safeguards System for the final disposal was presented by Martikka et al. (2006) at the IAEA Safeguards Symposium. The safeguards elements in DIV and area monitoring contain new type geodetic, geophysical and remote sensing techniques that have to be adjusted and applied according to the geological site and facility type. The present methodology to use laser scanning, surveying, seismic monitoring and satellite imagery was demonstrated by the Finnish Support programme (Okko & Rautjärvi 2006) and discussed in the ASTOR group meetings that assist the IAEA to develop its approaches and methodologies to safeguard geological repositories.

4.8 IAEA safeguards

The IAEA safeguards in Finland is based on the Safeguards Agreement (INFCIRC/193) between the non-nuclear weapon states of the EU, the European Atomic Energy Community and the IAEA. The IAEA and Euratom safeguards have agreed on co-operation (New Partnership Approach, NPA) with the aim of reducing the undue duplication of effort. In Finland this has not decreased the number of inspection days. There is still overlap with the Commission and IAEA activities. In 2006 the IAEA safeguards activities were carried out without significant changes compared with the previous year.

The facility attachments (FA) according to the Safeguards Agreement (INFCIRC/193) were not in force in 2006 in Finland. This situation is not appreciated but it has not negatively influenced the implementation. Moreover, drafting of "Safeguards Agreement for the Finnish geological repository" was initiated with the IAEA in 2004. Consequently, a meeting between the IAEA, Posiva and STUK was organised at the Agency in September 2005 to establish formal safeguards approach between the State and the Agency already in the pre-nuclear phase of the repository. The implementation of the IAEA safeguards at the repository is, however, not yet formally implemented.

STUK is responsible for the approval of the IAEA inspectors for Finland. After receiving the information about the new inspector candidates, STUK sends the requests for comments to those nuclear material holders who hold construction and operating licenses for nuclear facilities. In 2006, all proposed inspectors (altogether 28) were approved to inspect Finnish nuclear installations. According to the information STUK has, altogether 327 IAEA inspectors had the inspection rights in Finland at the end of 2006.

Inspections and inspection person days of STUK, IAEA and Commission are presented in figures 6 and 7. In 2006 STUK has received 27 statements by the IAEA concerning the inspections it has carried out in Finland and 8 conclusions concerning activities during material balance period.

4.9 Euratom safeguards

The Treaty of the European Atomic Energy Community (Euratom Treaty) and the EU Safeguards Regulation (No 302/2005) based on the Treaty form the foundation for the Euratom safeguards. Nuclear material holders and producers of ores that contain uranium or thorium have the responsibility to maintain the nuclear material accountancy system and submit reports and other data to the Commission in Luxembourg. The copies of the reports and other data have to be sent to STUK.

Based on Basic Technical Characteristics provided by the operators the Commission prepares particular safeguards provisions (PSPs) for each material balance area. For the Loviisa NPP and the VTT Research reactor (FiR 1 reactor) the PSPs came into force in 1998. The Commission has asked for and got the comments on the PSPs from STUK and TVO in 2001 and again 2006, but the PSPs concerning the Olkiluoto NPP are still not in force.

STUK is responsible of the consulting (Euratom Treaty, article 81) of the Commission's inspectors for Finland. STUK has sent the requests of the Commission safeguards inspectors for comments to the nuclear material holders. In 2006, altogether six new Commission safeguards inspectors were appointed to inspect Finnish nuclear installations. 181 Commission inspectors had the inspection rights in Finland on January 1, 2007.

Inspections and inspection person days of STUK, IAEA and Commission are presented in figures 6 and 7. The IAEA statements were sent to the Commission, and the Commission amended its own conclusions to the statements before providing them to the State. The conclusions by the Commission were in line with the IAEA remarks – there were no outstanding questions at the end of 2006.

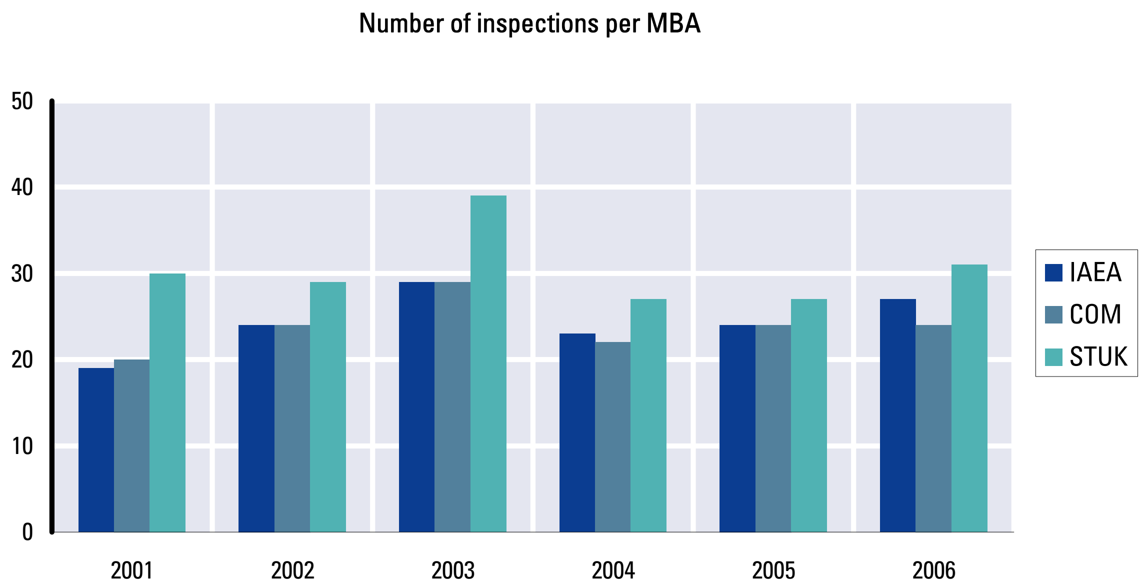

Figure 6. Number of inspections (incl. CA) carried out by the Commission, IAEA and STUK at Finnish facilities 2001–2006.

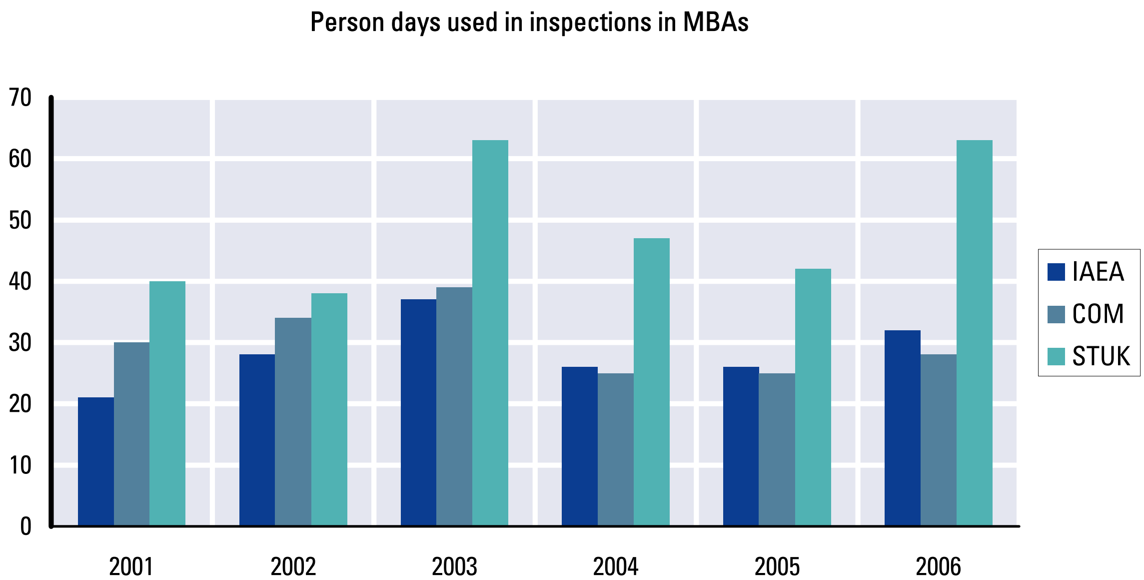

Figure 7. Number of inspection person days during inspections (incl. CA) carried out by the Commission, IAEA and STUK at Finnish facilities 2001–2006.

5 Transport and border control of radioactive and nuclear materials

The requirements for transport of radioactive and nuclear material are given in the regulations regarding transport of dangerous goods. The purpose of these regulations is to prevent the possible hazard that the transport of dangerous goods may cause to people, environment and property. Based on the regulations STUK is the competent authority regarding radioactive material transport. The consignor has the biggest responsibility concerning the transport of radioactive material; also other actors involved in transport, such as the carrier and the consignee, share the responsibility regarding the safety of the transport.

In addition to the dangerous goods transport regulations, transport of nuclear material is subject to licence as stipulated in the Nuclear Energy Act. These licences are usually granted for a longer period and no new transport licences were granted in 2006. Before a package can be used for fissile material transport, the package design must be approved by STUK. In 2006 STUK approved four package designs by validation of a foreign certificate. Every nuclear material transport needs an approved plan from STUK. A physical protection plan and a certificate of nuclear liability insurance must also be delivered to STUK before the transport takes place. Import and export of radioactive and nuclear material is subject to licence. In 2006 STUK approved three transport plans for import of fresh nuclear fuel to Finland from Spain, Sweden and Russia. The fuel from Sweden and Spain was transported on trucks or trailers which were shipped by sea to a Finnish harbour and driven by road to the power plant. The fuel from Russia was transported by rail over the border to Vainikkala, where it was loaded onto trucks and driven to Loviisa power plant.

For radioactive material other than nuclear material no separate transport licence or approval of transport plan is obligatory. The transport of such radioactive material is under safety licence that is needed for the use of radiation and granted by STUK. Approximately 20 000 transports of radioactive material are performed per year. According to Radiation Act the licensee shall assure that both the package and the mode used for the transport fulfil the safety requirements, and that the carrier has all the information and instructions necessary for safe transport. In addition the regulations concerning transport of dangerous goods shall also be followed. In some specific cases when the requirements can not be met, STUK may grant a license for transport with special arrangements based on separate application. In granting such licence STUK must however be able to confirm that the required safety level is achieved.

6 The Comprehensive Nuclear Test-Ban Treaty (CTBT)

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is an important part of the international regime on the non-proliferation of nuclear weapons. It bans any nuclear weapon test explosions in any environment. This ban is aimed at constraining the development and qualitative improvement of nuclear weapons, including also 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 September 24, 1996. The Treaty 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: International Monitoring System (IMS), consultation and clarification process, On-Site Inspections (OSI) and confidence-building measures.

Finland has signed and ratified the CTBT. In addition to complying with the basic requirement of the Treaty not to carry out any nuclear weapon tests, Finland takes part in the international monitoring network aimed at verifying compliance with the obligations of the Treaty in a global scale.

In the CTBT framework, the National Authority is the Ministry for Foreign Affairs. STUK has two roles: STUK operates both the Finnish National Data Centre and one of the radionuclide laboratories designated in the Treaty. The main tasks of the National Data Centre are to analyse data received from the International Monitoring System and to inform the National Authority about the results. The radionuclide laboratory contributes to the International Monitoring System by providing support in the radionuclide analyses and in the quality control of the radionuclide station network. Other national collaborators are the Institute of Seismology and the Ministry of Defence.

During 2006 the National Data Centre participated in the meetings of the working group of the Preparatory Commission for the CTBT Organization, which is a policy making organ for the technical development of the verification regime. The National Data Centre provided a training course for National Data Centre managers from developing countries (Fig. 8). The course was funded by the Ministry for Foreign Affairs. The National Data Centre continued developing its own routine monitoring system for the data received from the international verification network.

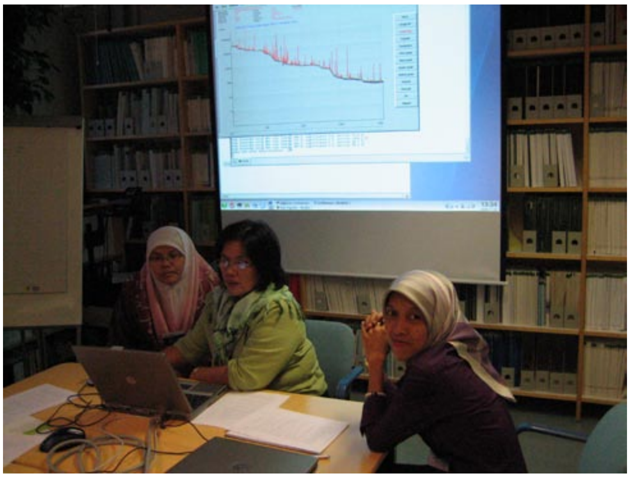

Figure 8. Hands-on gamma spectrum analysis.

The nuclear test conducted by North Korea on 9 October 2006 was detected by the seismological monitoring stations of the International Monitoring System. The test was carried out underground, which minimizes or blocks the radioactive releases. While the test could not be detected by the certified aerosol stations of the IMS, radioactive traces of xenon that could have been connected to the test were observed at one of the noble gas monitoring test installations, not yet certified. This underlines the importance of completing the installation and certification of the IMS network, so that the verification system may be fully functional upon Entry into Force of the Treaty.

7 International safeguards cooperation

7.1 Safeguards co-operation in the neighbour areas

The safeguards co-operation with the neighbouring areas is motivated by the need for continuing enhancement of the regional security environment. Accordingly, Finland had a safeguards support programme for Estonia, Latvia and Lithuania as well as continue its co-operation with Russian Federation in this area. The focus during this year has been on the cooperation with the Russian authorities and collaboration with Ukraine in search for mutually beneficial areas for future cooperation.

The resources of about 150 000 Euros made available by the Foreign Ministry were, during the year 2006, used within the Co-operation programme with Russian Federation. The projects covered review of six regulations, dealing for example with quality assurance of some fuel cycle activities and accountancy and control of radioactive sources, substances and waste. Both are of particular importance. The first one documents a change in the role of the authority of the Russian administration. The authority is required to put out the requirements for the industry to comply with – not instructions to be followed. The authority is also required to inspect to ensure compliance. Thus, the administrative philosophy is in transformation from instruction oriented to performance oriented one. Challenge is unprecedented. Long term support is required. The new regulation in the area of control of radioactive materials other than nuclear represents something unique in the world. The principles and practices from nuclear material accountancy have been applied in this area in a practical way. The required work has been already accomplished in Nuclear Power Plants. The big challenge is now the establishment of the initial inventories in all areas of national economy. It is expected that technical, expert and financial support will be required by Russia so as to be in a position to accomplish the work with a credible outcome.

The spent fuel measurement device (SFAT) for the demonstration purposes at Kola NPP was constructed in STUK workshop and its functions tested at Loviisa NPP. The documentation, certification and the demonstration and delivery to the Rostechnadsor for its use is planned to take place in 2007.

STUK and the Finnish Customs Authority visited St. Petersburg Customs Academy and the sea port. The impressive facilities and work done by the Russian Customs contributed to the changes in the Course provided by the Finnish Customs Authority and STUK for the Russian Customs Officers. The Course was given to the satisfaction of the audience. Also IAEA considered that the course as such will fit to its Material Security Programme's deliverables. Subsequently, the new bilateral Course between Finland and Russia as well as the Regional Course in the Baltic Area was included to the IAEA Programme for 2007. The bilateral course agenda is further enhanced, including the first part on theory and learning exercises in the Helsinki harbour and at the Vaalimaa boarder station. The second part will focus on technical and practical exercises at the St. Petersburg Customs Academy, Sea Port and at the adjacent air port.

Various visits were conducted to occasions in Ukraine to assess the situation and identify the relevant parties and, to the extent possible, also determine the areas of interest. These interactions led to the understanding that Ukraine is clearly committed to transformation of its regulatory culture towards the one like we have in Finland. Relevant capacity has been developing during the past year of collaboration. This is however not directly available for the regulatory authority's use. The related issues must be clarified at the governmental policy-making level. Immediate support Finland and STUK may provide in the area of the implementation of the Additional Protocol obligations. Ukraine and IAEA is hoping that ex-perts of STUK can be made available to help. In such a case that Finland is willing and able to make more significant contributions to the security of materials and facilities in Ukraine, STUK and the two nuclear services as well as other relevant industrial actors should be provided with an opportunity to get acquainted with some of the key projects among the 40 presented by the Regulatory Authority SNRC of Ukraine.

7.2 Finnish support programme to the IAEA safeguards

For 2006 the Ministry for Foreign Affairs allocated 190,000 Euros for the Finnish Safeguards Support Programme to the IAEA (FINSP) which was implemented under the coordination of STUK. The key areas of the programme in 2006 were training of the IAEA inspectors and development of verification methods.

In 2006 FINSP organised one training course for IAEA inspectors concerning implementation of the Additional Protocol. During the course the trainees went through simulated Additional Protocol Complementary Access. The course was held at STUK headquarters, VTT Research Reactor site and Loviisa NPP. The help of VTT and Loviisa NPP personnel is acknowledged.

In addition STUK launched together with the IAEA training section a project to produce training video for the IAEA inspectors. The product will be ready in 2007 and will support the training section in its efforts for years.

In development of verification methods FINSP had two major tasks, which continue in 2006. Firstly, VTT developed a methodology to produce quality assurance samples for IAEA laboratories. During the work two sets of standardised uranium particles were produced. The ultimate objective of this task is to introduce these particles to QA samples in known amounts. Secondly, FINSP took part in joint task of EC, Sweden and Hungary to develop new type of verification device for IAEA use. This device, known as Passive Gamma Emission Tomographic Verifier, is expected to be capable to detect single missing pin inside PWR assembly. The prototype is expected to be ready for testing in 2007. The project was presented in 2006 IAEA safeguards symposium in Vienna (Honkamaa et al. Prototype tomographic partial defect tester, Symposium on International Safeguards, Addressing verification challenges, Vienna, Austria 16–20, October 2006, Book of Extended Synopses, IAEA-CN-148/171P).

7.3 Activities in ESARDA

STUK is a member of the European Safeguards Research and Development Association (ESARDA), and has nominated Finnish experts to committees and most of the working groups. In addition, STUK participated in ESARDA's working groups, especially the Integrated Safeguards working group (IS WG). STUK contributed to the ESARDA's symposium in Luxembourg. STUK participated in the ESARDA Executive Board meetings and STUK's representative was chosen to a next Vice-President of ESARDA (Figure 9).

Figure 9. President Göran Dahlin (SKI) and Vice-President Elina Martikka (STUK) of ESARDA for the years 2007–2008.

7.4 Namibian IAEA trainee working in STUK

Safeguards expert Ms. Helena Itamba from Namibia worked at STUK from August to October as an IAEA fellowship visitor (Fig. 10). Ms. Itamba is the deputy director of Controlled Minerals and Minerals Development Division (Directorate of Mines) within the Ministry of Mining and Energy in Namibia. Purpose of the visit was to come and learn from STUK as Namibia is in the process to establish institutional framework under the Atomic Energy and Radiation protection Act for report and control of Nuclear material, meet obligations under international treaties an conventions within the scope of IAEA mandate and to strengthen safeguards and ensure the safety and security of our country and citizens as more mines are foreseen to open in the near future and safeguards activities are going to increase. Nuclear activities in Namibia consist mainly of uranium mining.

Figure 10. Ms. Helena Itamba from the Ministry of Mining and Energy in Namibia discussing with Juha Rautjärvi (STUK).

7.5 Other international activities

During Finland's EU Presidency, the second half of the year 2006, STUK organised the Meeting of the Safeguards Experts for the Atomic Questions Group in Finland. In the meeting the main topic was to clarify the roles and responsibilities in the Euratom safeguards; Member States, Commission and relations to the IAEA safeguards. Also the Commission's paper "Implementing the Euratom Treaty Safeguards, IETS" was discussed. In the end of November the Safeguards Experts met in Luxembourg, and the Commission's IETS-paper was finished by the Member States.

8 Conclusions

All the actions including nuclear materials and other nuclear items were carried out according to the Finnish nuclear legislation and regulations. Also the requirements of the international agreements have been fulfilled. Based on results of STUK's regulation it is possible to conclude that the nuclear materials and other nuclear items were used for intended, peaceful, use.

Figure 11. The STUK's safeguards staff on its self assessment seminar.

9 Publications in 2006

Hämäläinen M (ed.). Nuclear Safeguards in Finland 2005. STUK-B-YTO 245. STUK, Helsinki 2006.

Honkamaa T, Turunen A, Levai F, Larsson M, Berndt R, Lebrun A. Prototype tomographic partial defect tester. Symposium on International Safeguards Addressing verification challenges, Vienna, Austria, 16–20 October 2006. Book of Extended Synopses, pp. 331–332. IAEA 2006.

Martikka E et al. Education on nuclear safeguards for European engineering students. Symposium on International Safeguards Addressing verification challenges, Vienna, Austria, 16–20 October 2006. Book of Extended Synopses, p. 265. IAEA 2006.

Martikka E, Okko O, Honkamaa T. Safeguards for final disposal of spent fuel in Finland. Symposium on International Safeguards Addressing verification challenges, Vienna, Austria, 16–20 October 2006. Book of Extended Synopses, pp 59–60. IAEA 2006.

Okko O, Rautjärvi J. Evaluation of monitoring methods available for safeguards use at Olkiluoto geological repository. Report on Task FIN C 1572 of the Finnish Support Programme to IAEA Safeguards. STUK-YTO-TR 216. STUK, Helsinki 2006.

Saksa P, Heikkinen E, Lehtimäki T, Okko O. Ground penetrating radar method for safeguards: examples at Olkiluoto spent fuel disposal site in Finland. Safeguards for final disposal of spent fuel in Finland. Symposium on International Safeguards Addressing verification challenges, Vienna, Austria, 16–20 October 2006. Book of Extended Synopses, pp. 47–48. IAEA 2006.

ANNEX 1 International agreements

A list of valid legislation, treaties and agreements concerning safeguards of nuclear materials and other nuclear items at the end of 2006 in Finland (reference to Finnish Treaty Series, FTS).

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

2. 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 1334/2000 setting up a Community regime for the control of Exports of dual-use items and technology as amended.

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.

ANNEX 2 IAEA, Commission and STUK safeguards inspections in 2006

General information			Inspections			Inspection person days		
MBA	**Date**	**Inspection type**	**IAEA**	**COM**	**STUK**	**IAEA**	**COM**	**STUK**
WOL1,WOL2, WOLS	21–22 Feb.	Routine inspection	3	3	4	3	3	8
WLOV	(20+) 24 Feb.	Routine inspection	1	1	1	2	2	3
WOL2	20 March	Extra inspection	1		1	1		1
WLOV	27–28 March	eFORK [IAEA observer]	1		1	2		4
WLOV	23 May	Routine inspection	1	1	1	1	1	1
WOL2	25–26 May	PIV	1	1	1	2	2	4
ONKALO	31 May	DIV [IAEA visitors (2)]	1		1	2		2
WOL1,WOL2, WOLS	8–10 June	Routine inspection + OL1 PIV	3	3	3	4	4	8
WOLS	26–29 June	STUK GBUV (+ES)			1			8
WRRF	27 June	PIV	1	1	1	1	1	2
WOL1	29 June	OL1 POST PIV	1	1	1	1	1	1
ONKALO	4 July	DIV			1			1
WLOV	6 Aug.	Loviisa 1 core verification	1	1	1	1	1	1
ONKALO	16 Aug.				1			1
WLOV	1 Sep.	Cask inspection in Loviisa 2	1		1	1		1
WLOV	19 Sep.	Loviisa 2 core verification + PIV	1	1	1	1	1	1
WOL1,WOL2, WOLS	21–22 Sep.	Routine inspection	3	3	3	3	3	3
WLOV	10 Oct.	Loviisa POST PIV	1	1	1	1	1	1
WFRS	11 Oct.	"PIV"	1	1	1	1	1	1
ONKALO	26 Oct.				1			1
WLOV	1-3 Nov.	STUK SFAT (+ES)			1			6
WLOV	13+17 Nov.	Covering of ponds in KMPH	1	1	1	2	2	2
WHEL	14 Nov.	STUK ES			1			2
WLOV	17 Nov.	CA	1	1	1	1	1	1
ONKALO	11 Dec.	DIV + system inspection			1			4
WLOV	12 Dec.	Routine inspection	1	1	1	1	1	1
WOL1,WOL2, WOLS	14–15 Dec.	Routine inspection	3	3	3	3	3	3
TOTAL			**28**	**24**	**36**	**34**	**28**	**72**

Note: In Olkiluoto, inspections are counted per MBA. DIV = Design Information Verification, PIV = Physical Inventory Verification, ES = Environmental Sampling, CA = Complementary Access