SSI report

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Twelve years of cooperation in the field of radiation protection

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Statens strålskyddsinstitut
Swedish Radiation Protection Authority

SSI's Activity Symbols

Ultraviolet, solar and optical radiation
Ultraviolet radiation from the sun and solariums can result in both long-term and short-term effects. Other types of optical radiation, primarily from lasers, can also be hazardous. SSI provides guidance and information.

Solariums
The risk of tanning in a solarium are probably the same as tanning in natural sunlight. Therefore SSI's regulations also provide advice for people tanning in solariums.

Radon
The largest contribution to the total radiation dose to the Swedish population comes from indoor air. SSI works with risk assessments, measurement techniques and advises other authorities.

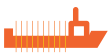
Health care
The second largest contribution to the total radiation dose to the Swedish population comes from health care. SSI is working to reduce the radiation dose to employees and patients through its regulations and its inspection activities.

Radiation in industry and research
According to the Radiation Protection Act, a licence is required to conduct activities involving ionising radiation. SSI promulgates regulations and checks compliance with these regulations, conducts inspections and investigations and can stop hazardous activities.

Nuclear power
SSI requires that nuclear power plants should have adequate radiation protection for the generalpublic, employees and the environment. SSI also checks compliance with these requirements on a continuous basis.

Waste
SSI works to ensure that all radioactive waste is managed in a manner that is safe from the standpoint of radiation protection.

Mobile telephony
Mobile telephones and base stations emit electromagnetic fields. SSI is monitoring developments and research in mobile telephony and associated health risks.



Transport
SSI is involved in work in Sweden and abroad to ensure the safe transportation of radioactive substances used in the health care sector, industrial radiation sources and spent nuclear fuel.

Environment
"A safe radiation environment" is one of the 15 environmental quality objectives that the Swedish parliament has decided must be met in order to achieve an ecologically sustainable development in society. SSI is responsible for ensuring that this objective is reached.

Biofuel
Biofuel from trees, which contains, for example from the Chernobyl accident, is an issue where SSI is currently conducting research and formulating regulations.

Cosmic radiation
Airline flight crews can be exposed to high levels of cosmic radiation. SSI participates in joint international projects to identify the occupational exposure within this job category.

Electromagnetic fields
SSI is working on the risks associated with electromagnetic fields and adopts countermeasures when risks are identified.

Emergency preparedness
SSI maintains a round-the-clock emergency response organisation to protect people and the environment from the consequences of nuclear accidents and other radiation-related accidents.

SSI Education
is charged with providing a wide range of education in the field of radiation protection. Its courses are financed by students' fees.

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TITLE/ TITEL: Twelve years of cooperation in the field of radiation protection/ Tolv års samarbete inom strålskyddsområdet.

SUMMARY: SSI has pursued an international cooperation program since 1992 within the field of radiation protection and emergency preparedness for radiation accidents with the three Baltic countries as main beneficiaries. As the Baltic countries are members of the EU since first of May 2004, this bilateral support will now be phased out and replaced with other forms of cooperation. During the years passed, a large number of activities have been launched with a total budget of some 14 million ECU. The Baltic radiation protection authorities have played a big role in the cooperation and Baltic ministries, universities, nuclear technology installations and other industries using radiation have also been engaged in the projects. SKI, SKB, Studsvik and the Swedish nuclear power plants should be mentioned as major cooperation partners on the Swedish side.

During autumn 2004 when such a large coordinated work program was coming to an end, SSI decided to hold a seminar with the purpose to follow up experiences from the work and discuss coming forms of cooperation. The seminar took place on the 18 of November 2004 and gathered some 80 participants, 29 of which from the Baltic countries. It was opened by Lars-Erik Holm, the SSI Director General, and the three Baltic countries then presented their views and impressions from the passed years of cooperation. The seminar was concluded with a panel discussion on "How to proceed from today's situation". The result was that SSI invited to a new coordination meeting during autumn 2005 to follow up and discuss coordination of radiation protection around the Baltic Sea together with the other Nordic radiation protection authorities.

SAMMANFATTNING: SSI har sedan 1992 bedrivit ett internationellt utvecklingssamarbete inom strålskyddsområdet och beredskapen mot strålningsolyckor med huvudinriktning mot de tre baltiska länderna. Eftersom de baltiska länderna sedan den 1 maj 2004 är EU-medlemmar fasas nu det bilaterala stödet till dessa länder successivt ut för att ersättas av normalt grannlandssamarbete. Under de gångna åren har samarbetet omfattat ett stort antal aktiviteter med en total omsättning på c:a 14 miljoner EUR. De baltiska strålskyddsmyndigheterna har haft en stor roll i samarbetet och berörda baltiska ministerier, universitet, kärntekniska anläggningar och andra industrier som använder strålning har också medverkat i projekten. På svensk sida kan SKI, SKB, Studsvik och de svenska kärnkraftverken nämnas som främsta samarbetsparter.

Under hösten 2004 när en så stor samlad arbetsinsats närmade sig sitt slut beslöt SSI att hålla ett seminarium för att följa upp erfarenheterna från samarbetet och diskutera kommande samarbetsformer. Seminariet ägde rum den 18 november 2004 och samlade ett 80-tal deltagare varav 29 från de baltiska länderna. SSIs generaldirektör Lars-Erik Holm inledde seminariet och de baltiska länderna presenterade sedan sin syn och sina intryck från de gångna årens samarbete. Seminariet avslutades med en paneldebatt med temat "Hur går vi vidare från dagens situation". Resultatet blev att SSI inviterade till ett nytt samarbetsmöte under hösten 2005 med syftet att följa upp och diskutera strålskyddssamarbetet runt Östersjön tillsammans med de övriga nordiska strålskyddsmyndigheterna.

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"We entered this cooperation as colleagues and came out as close friends"

Dr. Gendrutis Morkunas, RPC, Vilnius

The new SSI office at Solna Strandväg 96 north of Stockholm city. SSI moved in January 2004 from the old office on the premises of the Karolinska University Hospital to this modern and dedicated building with a nice view over Lake Mälaren.

The Swedish Radiation Protection Authority (SSI) is the regulatory and supervisory governmental authority that is responsible for radiation protection on a national level in Sweden. Activities involving radiation are regulated by a special Radiation Protection Act and, as of January 1, 1999, by a new Environmental Code. SSI's terms of reference and budget are decided by the Swedish parliament and the Government on an annual basis. However, like other authorities, SSI makes independent decisions with respect to individual regulatory actions.

SSI's radiation protection work covers a number of different areas, e.g.: sun, solariums, electromagnetic fields, lasers, radon, cosmic radiation, nuclear power, radioactive waste, accident preparedness and the application of radiation within the medical services, research and industry. Aside of all this, SSI has since 1991/92 operated a development cooperation mainly with the Baltic States. This work is summarised in this report, as it is now coming to an end due to the newly gained EU membership of these countries.

General Background

In 1991/92 SSI initiated bilateral cooperation programs with Estonia, Latvia and Lithuania that have now lasted for 12 years. It has involved Baltic and Swedish radiation protection and radiological emergency planning authorities, hospitals, universities, industries, contractors, consultants etc. Dozens of organizations and hundreds of persons in the four countries have been engaged in several hundred projects over the years. The Swedish funding channeled via SSI and its division SIUS amounts to a total of SEK 125 million. To this should be added funds and in-kind contributions by recipients and other participants in the program, probably representing a total value of at least the same amount.

The objectives have remained basically the same throughout the years; i.e., to

- review and update the radiation protection infrastructure
- improve the legal framework and implement EU directives
- solve acute radiation protection problems
- upgrade radiation protection in practical operations
- develop environmental control systems
- create regional communication and emergency planning networks
- educate and train staff, and introduce a modern western safety culture

Furthermore, in order to qualify for Swedish – Baltic cooperation the projects have to be

- of radiological protection importance
- of interest to all parties involved
- cost-effective
- in support of implementing international standards and the EU radiation protection legislation

The projects have been divided into the following areas:

- Legislation
- Authority upgrading
- Nuclear power and research reactors
- Emergency planning including automatic monitoring systems
- Radiophysics and radiochemistry laboratory equipment
- Radioactive waste management and environmental protection
- Natural radiation (especially radon)
- Radiation protection in medical, industrial and research applications

As a consequence of the above, a great number of miscellaneous activities were carried out throughout the years. This includes basic and advanced English studies; advanced radiation physics and radiation protection education; joint research projects and calibration and intercomparison exercises; participation in international conferences, seminars and workshops; study tours; networking and informal exchange of information; and many other small but equally important activities.

About the Seminar

The seminar took place on November 18, 2004, in the conference center of Länsförsäkringar in Solna, Sweden. One of the main objectives was to summarize and conclude the 12 years of Baltic – Swedish cooperation in radiation protection, emergency preparedness and waste management. Another important objective was to discuss the need and possibilities for continued cooperation. For a detailed program, please refer to Annex 1. The seminar gathered some 80 experts from Denmark, Estonia, Finland, IAEA, Latvia, Lithuania and Sweden. A full list of participants is found in Annex 2, whereas Annex 3 gives an explanation of the acronyms used in this report.

The participants gathered before the podium in the Länsförsäkringar conference hall.

The technical sessions were chaired by Dr. Lars-Erik Holm, Director General of SSI (the Swedish Radiation Protection Authority), and were divided into the following parts:

- National summaries of the cooperation (Estonia 5 presentations, Latvia 4, Lithuania 5)
- Summary Baltic reports on the emergency preparedness projects
- The IAEA Technical Cooperation program for the Baltic countries
- Panel discussion
- Closing ceremony, followed by a buffet dinner

Instead of having all countries report on all projects, it was decided to let each issue, such as radon, be covered by just one of the countries, offering the other two countries an opportunity to complement the total picture during Questions & Answers after each session. Emergency preparedness has been the largest and longest lasting of all projects with several subprojects and more involved staff and organizations than any other project. Hence, it was decided to have a separate session on this topic.

A very important but unplanned item on the agenda was a series of weather updates by Mr. Sten Grapengiesser. He was in charge of most of the planning and preparations before the seminar, and due to a sudden snowstorm he popped up as the seminar's private weatherman between presentations and sessions, in order to inform the participants on current developments and supplying information for decisions on when to leave for the airport, whether to reschedule flights etc.

This is the official SSI report on the seminar. It has been published in printed form and is available in an extended electronic version on www.ssi.se.

Welcoming Address

Dr. Lars-Erik Holm, Director General, SSI

In his welcoming address, the Director General of SSI out-lined the history of the Baltic – Swedish cooperation program in radiation protection. SSI began this work in the early 1990's with activities in radiation protection, emergency planning, and radioactive waste handling. The activities were directed to Central and Eastern Europe, with a strong focus on Estonia, Latvia and Lithuania. The objectives were to remedy acute radiation protection problems and to cooperate in improving radiation protection in formal, legal and practical forms. SIUS's activities have been carried out as different projects, each with its own defined objective and time plan. The project leaders were usually recruited among SSI staff, with a strive for multilateral coordination whenever suitable and possible. The priority criteria have been the general instructions from the Swedish Ministry for Foreign Affairs, as well as an expressed high priority in the country concerned.

It has been a very interesting period of collaboration. Dr. Holm personally has taken part in it the last 8 years. It has been useful for both parties, and SSI has encouraged all staff members to participate, since participation in projects of this kind is an excellent form of continuing education and training. The experiences from this work are valuable also for Sweden.

Dr. Lars-Erik Holm, SSI Director General, opening the Seminar

The collaboration has included projects aimed at helping to establish modern authorities and legislation, benchmarking and advice in areas involving the nuclear energy sector as well as in other fields, e.g., industries and medicine.

Now when the three Baltic countries are members of the EU, this kind of collaboration is coming to its end. The future cooperation between the countries therefore needs to find other forms. There is still a need for exchange of information and experience as regards legislation, norms and standards, improved techniques of licensing and inspection, information strategies. There is also a need for improved and trained emergency organizations, and work with the management of radioactive waste and spent fuel.

Today's seminar is intended to give an overview of the very broad scope of SSI's collaboration with its sister authorities and operators in Estonia, Latvia and Lithuania.

Introduction

Mr. B. Åke Persson, Director, SIUS

It was with great pleasure that Mr. Persson welcomed the participants to this follow-up seminar on Swedish bilateral assistance cooperation in the field of radiation protection and emergency planning. SSI and its Baltic counterparts have now been carrying out these operations for more than a decade. Now will follow reports from regulators and operators in Estonia, Latvia and Lithuania on their experiences of the bilateral cooperation program. For the first time all parties involved have a chance to share their different views on the planning, conduct and results of the work. The seminar is also intended to provide information to SSI's financiers, the Swedish International Development Agency (Sida), the Ministry for Foreign Affairs (UD) and the Ministry of Environment (MD). SIUS appreciates the fact that these organizations have given priority to attending this seminar. Finally, the presence of Dr. Jozef Sabol from IAEA's Technical Assistance Program is appreciated.

Mr. B. Åke Persson, Director of SIUS, while welcoming the participants during his introduction

It was in the autumn of 1989, after the collapse of the Soviet Union, that the Swedish Government initiated a general cooperation program for Central and Eastern Europe. In this initial phase, the main task involved providing support for the growth of democracy and for meeting the urgent needs for a fundamental political and economic stability. With this action, Sweden became one of the first countries to extend support to some of the new independent states.

A few years later, the economic and political reforms had laid the foundations for developments of a more long-term nature, such as regulatory infrastructure. As a result of this, the Swedish Government started allocating financial resources in 1991/92 for cooperation in radiation protection and radiological emergency planning. Estonia, Latvia and Lithuania became the main focus of Sweden and the SSI for bilateral cooperation.

The assistance program included support to official authorities and medical institutions as well as to the nuclear industry and some technical support organizations (TSO). A new division was created at SSI, responsible for these projects. Originally it was named Project Radiation Protection East but it is presently called the SSI International Development Cooperation section, abbreviated SIUS. Its activities are distinct from the normal supervisory responsibilities of the SSI, in its role as an authority. However, during the years, several experts on the SSI staff have been involved in the different projects organized by SIUS. When experts from the standard SSI staff participate in a SIUS project, SIUS provides full financial compensation to SSI. It is the same thing when external consults are involved in projects.

In the initial phase of the bilateral cooperation, the new independent states had to face several acute radiation protection problems, when the resources provided by the Soviet system had disappeared. At that time, urgent matters made up a substantial part of the program; for example, projects focusing on strong orphan radioactive sources; radioactive waste management; the lack of national laboratories for measurements; and early warning systems for radioactive releases in the event of a nuclear accident.

The various aspects of radiation protection as well as emergency planning cover a broad area of society. Thus, the cooperative assistance has focused on transfer of know-how, with providing of equipment as an integrated part in some cases. Important objectives of the cooperation have been to create a long-term capability in all fields of radiation protection, and to strengthen and broaden the national capability to plan, train and adopt suitable measures for informing and protecting the population in the event of a nuclear accident. Over the years, the Baltic countries have developed new radiation protection laws and regulations that take into account the requirements of EU Directives, and national radiation protection authorities have been established for licensing and supervising operations.

It is also important to mention that, apart from the Swedish bilateral projects, there have been substantial international efforts to support the countries. In some cases it has been very useful to coordinate international projects with the Swedish bilateral program. An example of this is that, in cooperation with the Finnish Safety and Radiation Protection Authority (STUK), SIUS has been the project leader of a Twinning Project, financed by the EU Phare program. The aim of this project was to develop and strengthen operations at the Lithuanian Radiation Protection Center (RPC) in Vilnius, and to support RPC with the implementation of the EC Directives (Acquis Communautaire) and their practical applications in the field of radiation protection into the national legislation. As part of this project, about 30 experts from the SSI and STUK have been on short-term duty in Vilnius. The project, with a budget of €750,000, was in progress for a period of 27 months, concluding in September 2004. In a related project, a further €1.7 million was allocated to the procurement of measurement instruments and laboratory equipment.

Mr. Persson then listed some fields of particular interest during the 12 years of cooperation:

Natural radiation
The Baltic countries soon singled out natural radiation, with special emphasis on radon, as a prioritized issue. All three countries have now acquired instruments for measuring radon in buildings and soil air. They have also become experienced in measurements, radon mapping, dose calculations and remediation of exposure to workers and the general public in dwellings.

Radiation protection in medical care
Apart from some early projects on quality control methods and patient dosimetry in radiotherapy, two different kinds of projects have been carried out so far. One set of projects involved training visits by already practicing physicists from the Baltic countries to the university hospitals in Huddinge, Malmö and Uppsala. Upon their return home, they are able to train new hospital physicists and other professional groups in the medical area in their own countries. Another purpose of this project was to contribute to the development of education programs for medical physicists at universities within the Baltic countries. As a result, there is for instance, a class of eight students at the newly established medical physics education program at Kaunas University.

In the second type of projects, common to all three countries, the aim was to introduce and assist, practically, in the work of setting up quality systems for medical radiology at a number of local hospitals. This would act as an example to other such hospitals. The Central Hospital in Växjö was the manager of this project.

Radiation protection and radioactive waste management in the nuclear power field
Ignalina Nuclear Power Plant (INPP) is the site of two of the world's largest reactors in operation. It is therefore only natural that Lithuania receives particular attention in this field. The fact that the two reactors are to be decommissioned due to EU demands makes the requirements on safety and radiation protection in radwaste management even stronger.

The SSI assistance to INPP has aimed at improving the radiation protection training program for workers in controlled areas and providing modern techniques for individual dose registration. A joint Swedish – Danish project has given training to laboratory personnel and provided a spectrometer to enable alpha emitting radionuclides to be measured in the laboratory at the plant. SSI and the nuclear power industry in Sweden have helped update INPP equipment for practical dose reduction, on-the-spot measurements (e.g., survey meters) and protection of workers (e.g., masks and protective clothing). Assistance has been given to the authorities for reviewing the environmental control program for the plant.

In addition to the comprehensive international support to Lithuania and INPP with regard to the management of radioactive waste, several Swedish bilateral projects have been carried out on strategy matters, such as the management, transportation, storage and disposal of radioactive waste. In addition to the SSI and SKI, the main organizations from Sweden participating in these projects have been SKB and Studsvik Nuclear AB.

Paldiski
The handling of radioactive waste and the decontamination work at the Paldiski plant in Estonia, where the Soviet navy trained their submarine crews, is another example of where Swedish support from the SKB, Studsvik and SSI has been quite extensive during the years. There will be more about that later.

Sillamäe
At Sillamäe, on the shore of the Gulf of Finland, uranium rich shale and ores were processed during the Soviet era. Environmental studies 1992-93 showed that there were releases from the tailings pond of both radioactive and non-radioactive pollutants, as well as increased radiation dose rates. The problems with the tailings pond are related to the huge amounts of material containing metals, chemical and radioactive substances such as uranium, thorium, radium and their radioactive decay products. The storage facility has an area of about 400 000 m^2. The Estonian Government has initiated an internationally financed project to isolate the material in the pond, including efforts to stabilize the pond dam seaside against failure. The project is now at the beginning of its last phase that means covering of the pond with several layers of soil.

Emergency planning
Regarding radiological emergency planning, it was obvious from the beginning that the old system from the Soviet era was in urgent need of being reviewed. Under the Bilateral Support Programs from Denmark and Sweden, the Baltic countries have been able to acquire their own national networks of measurement stations for early warning, along with filter stations for detecting airborne radioactive fallout.

In a joint SSI – SKI project, emergency planning at INPP was reviewed and upgraded. Several national exercises and training courses in Sweden and the Baltic countries have been organized, where the Swedish Rescue Service Agency (SRV) and the SSI were present in the role of advisers, instructors and evaluators. Viewed from an international perspective, the Bilateral

Cooperation Support Program for emergency planning can also be seen as a contribution to strengthening preparedness for international cooperation in the entire Baltic Sea region, with regard to communication and the exchange of information, should an emergency situation arise.

Conclusions
The total amount funded by SSI for the twelve-year assistance program in radiation protection and emergency planning directed at Estonia, Latvia and Lithuania is about SEK 125 million (or about €13.6 million). Since the Baltic countries are now EU members, this bilateral assistance will be phased out and replaced by other forms of bilateral and international cooperation programs. The SIUS program will, with a few exceptions, be finalized in 2004, and reports will be delivered to the financiers in the first half of 2005.

The aim and the ambition of this seminar are not only to report on past work but also to suggest how to proceed. This is the topic of the panel discussion, which will serve as a springboard to the beginning of our future cooperation in radiation protection, waste management and emergency planning in the four countries.

Presentations

Estonia

Estonian – Swedish cooperation in the past
Mr. Jaan Saar, Director, EMHI

Mr. Saar was one of the first persons to be contacted by SSI regarding planning for joint activities in radiation protection. Now, a dozen years later, he was the first speaker at the follow-up seminar to give a talk on his and his country's experiences of the cooperation. He started in a very personal and relaxed manner by outlining the situation in Estonia, such as it unfolded under the unknowing eyes of a people who had till then lacked insight into the situation, since everything of any importance (reactor safety, waste management and environmental issues) had been treated as classified information to Estonians – laymen and experts alike. Also, knowledge in this field was poor. Therefore, in the beginning of the 90's, the newborn nation had to start from scratch. The consequences of the Chernobyl accident had to be investigated, and EMHI performed environmental measurements and local laboratory studies. Nobody was at that time occupied with general radiation safety, and there was no national legislation in this field.

The SIUS team on its way to the Tallinna Madal lighthouse in 1993. Not only a serious risk for ship-wrecking…..

Then on a historical day the three musketeers, as Mr. Saar called them, arrived in Estonia: Jan Olof Snihs, Jan Nistad and Curt Bergman. They were on an exploratory mission to collect information and discuss the situation with their Estonian counterparts. It all took place in a very relaxed and friendly atmosphere. This trip was followed by several Estonian visits to Sweden. Subsequently, a cooperation program was outlined, including development of legislation, implementation of IAEA and international conventions, radioactive waste management and radon issues. With Swedish assistance some potential risk factors were eliminated. For example, a number of highly radioactive batteries in lighthouses were dismantled and disposed of following recommendations from SSI fact-finding missions to remote parts of the Estonian archipelago. The batteries were found in good technical shape but were ideal as a supply for terrorist activities.

…but also a radiation risk. This radioactive battery produced a dose rate of up to 1 mSv/h.

SSI also helped the recently established Estonian Radiation Protection Center by supplying software, training and know-how. Furthermore, SSI equipped two radiochemistry laboratories: one at ERPC and one at the University of Tartu.

Here it might be appropriate to mention that an accident happened Estonia in 1994 (the so-called Kisa accident) with lethal consequences. It was a strong source that had been stolen from Tammiku, a waste repository with spent radioactive sources from various uses: military, medical, industrial, research. Before the source was retrieved, it had killed one person and given a couple of other persons high radiation doses and thus an increased risk of late effects like leukemia. Thanks to the new ERPC and the equipment SSI had provided, a similar source that had also been stolen could be found and secured, without any harmful effects. This of course stresses the importance of Mr. Saar's ambitions to improve radiation safety, proper waste management and regulatory control.

At the end of his presentation, Mr. Saar in his usual jovial and diplomatic yet candid manner thanked Sweden for the computerized model for calculation of dispersion and fallout of radioactive contaminants from a plume passage due to a nuclear accident. In his opinion it is much simpler to use and superior to one provided by another country Estonia also cooperates with.

Over the years, the cooperation has helped solve problems of radwaste storages, radon measurements and modeling of spread of pollution; and various training courses have been arranged. Mr. Saar looks forward to continued cooperation in the same good spirit as always.

Cooperation between the authorities SSI and ERPC

Dr. Merle Lust, Director, ERPC

Dr. Lust, who was appointed director of ERPC about two years ago, started her presentation at the point where Mr. Saar finished, and informed on some of the more recent activities of

the Estonian – Swedish cooperation program. It has included a more thorough analysis of a number of problems:

Dr. Merle Lust, Director General of the Estonian RPC, concluded that a close cooperation would give the Baltic Sea states a stronger voice in EU

- Unnecessary high radiation doses to workers, patients and members of the public
- Absence of quality assurance programs, e.g., in the medical fields
- An elevated risk of radiation injuries and fatalities due to orphan sources
- Environmental contamination due to unsatisfactory management conditions and routines
- Deviations from EU directives
- Illicit trafficking of radioactive materials

With the establishment of ERPC followed the tasks to develop laws and regulations, reduce doses in medicine and other fields, evaluate and reduce the risk from radioactive materials in the environment, and strengthen accident preparedness. Three sites presenting potential risk to workers, the public and the environment were among the heritage from the former regime: Paldiski, Tammiku and Sillamäe. Work at those sites will be presented separately. The general fields of cooperation were, as for all Baltic countries, authority upgrading; radioactive waste; natural radiation (especially radon); radiation protection in medical, industrial and research applications; and other activities. The following key areas were identified:

- Upgrading of relevant authorities, mainly ERPC
- Support to authorities and companies as regards regulatory requirements and supervision related to radwaste strategies and management, and training in these fields
- Support for a nationwide program to identify "radon houses", promote education, training and information and introduce a mitigation program
- Support in developing regulation and supervision of ionizing radiation
- Education and information

The main Estonian counterparts in this cooperation were ERPC, ALARA, Ökosil, Silmet, hospitals, clinics, universities, and civil defense authorities (check Annex 3 for meaning of acronyms). The main idea has been to spread knowledge and information as much as possible to the respective actors. Thus, an essential part of the work has encompassed courses and training, seminars and workshops, transfer of know-how, preparation of legislation, review of documents, production of information material, QA projects and discussions on important themes. As for the future, with three Baltic and three Nordic countries being members of EU, perhaps we should join forces to have in total 39 parliamentary votes out of 321 in order to be heard. After having cooperated successfully for so long we now know each other and have formed professional and personal networks. We know each other now, and people tend to stay in this field for a long time. Therefore, Ms. Lust concluded, we should continue to work together.

Waste management and decommissioning projects at Paldiski and Tammiku

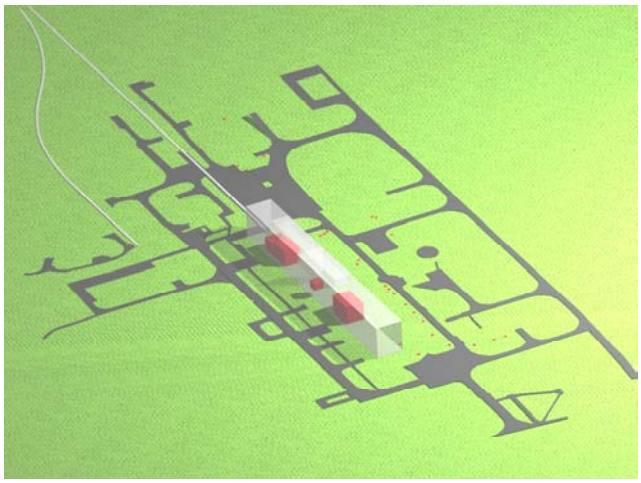
Mr. Henno Putnik, Managing Director, A.L.A.R.A. AS

Mr. Putnik started his presentation with a map of Estonia and pictures of two radioactive waste facilities: Paldiski and Tammiku. He also mentioned another important site, the former uranium processing plant in Sillamäe, which will be covered in a separate presentation.

The Paldiski site as it looked in 1995, with the function of all buildings indicated …

The Paldiski project is by far the largest and most complicated single project performed under the entire cooperation program with the Baltic countries. Paldiski used to be a Soviet training center for submarine crews, with two hulls containing fully equipped nuclear power reactors (70 and 90 MW, respectively), control room facilities etc. After the liberation, it was decided to decommission the plant and go for a greenfield solution if possible. But at that time Estonia lacked experience, staff and equipment and therefore requested international support. The reactors, which had been in operation since 1968 and 1983, respectively, were both shut down in 1989, but the fuel was shipped back to Russia only after a long period of political negotiations and technical discussions. Mr. Putnik conveyed his gratitude to the Swedish government for its initiative in support activities. Mr. Jan Olof Snihs of SSI quickly established PIERG, the Paldiski International Expert Reference Group with participants from Estonia (both experts from Paldiski, ERPC staff and other specialists), Russia, Sweden, USA and Finland among others.

The objective of PIERG was to promote the safe and timely decommissioning of Paldiski. This was to be achieved by advising and assisting the parties participating in the decommissioning work on technical, legal, organizational, financial, waste management and radiation protection matters. During PIERG's first period, 1994 – 1995, politics played an important role, with lengthy and difficult Estonian – Russian negotiations, since Estonia wanted the Russian staff to leave the site as soon as possible. The role of PIERG was at that time to act as an independent international technical advisory body, which reconciled the negotiating parties and tried to keep them in realistic, feasible and technically acceptable



…and a simulation of the site 2008 with only the Main Technological Building housing the two reactors in their sarcofagi (red) and between them a high level radwaste storage

frames. PIERG should also advise Estonian authorities in understanding the range of problems and offer support in elaborating future action plans. Finally, PIERG should also coordinate international assistance to Estonia in establishing both a regulatory authority and a waste management organization.

The Paldiski Conceptual Decommissioning Plan (PCDP), which was soon adopted, took into account both technical and non-technical conditions and constraints, such as Russian site control until September 30, 1995, until which time there was no possibility for Estonia to interfere with actions taken by the Russians. Other serious constraints were the absence of a clear Estonian policy on decommissioning and waste management, and lack of relevant legislation, infrastructure – and resources, although there was a growing international interest in PIERG work. The PCDP also included plans to rearrange the site to facilitate decommissioning and waste processing work, and dismantling of contaminated installations in auxiliary facilities such as the liquid waste treatment facility and the liquid waste store. As a consequence of this, an interim storage for radioactive waste was set up in the Main Technological Building.

Before the Estonian take-over of the site, their access to the site was limited. It turned out that the Russians had filled the reactor compartments with scrap that was not initially planned, and two sarcophagi were erected. Thanks to a Phare feasibility study and good work by the contractors (SKB and SGN), various dismantling options were evaluated. The liquid waste treatment facility was demolished in 2002. After purification and solidification of the liquid wastes (IVO, SKB and Studsvik RadWaste), the liquid waste store was dismantled in 2004.

Today, all that remains at the site are the Main Technological Building (MTB), the entrance building and a combined workshop, garage and store. Still some areas in the MTB need to be decontaminated, and there are still piping and ventilation ducts that need to be decontaminated and dismantled, which means work for about three more summer seasons.

After this thorough coverage of the problems, achievements and successful work done by Estonia and PIERG, Mr. Putnik went on to present the situation at Tammiku radioactive waste disposal facility. It is an old Soviet facility of the RADON type, found in many places in the former Soviet Union, containing conventional (non-nuclear) radwaste. It was taken into operation in 1963 and closed by the Estonians in 1995 after an accident in late 1994 ("the Kisa accident", please refer to the presentation by Mr. Saar). There are plans to retrieve and condition the waste and have it transferred to Paldiski in the period 2006 – 2008. The task is complicated by the high dose rates (approximately 1 mSv/h). Mr. Putnik closed by saying that he looks forward to continued cooperation with his Swedish partners. Dr. Holm thanked him and congratulated on this success story, with a range of difficulties in many fields, some of which are out of our normal bounds.

The Sillamäe uranium-processing site

Messrs. Tõnis Kaasik, Ph.D, Managing Director, and Anti Siinmaa, M.Sc., Project Engineer, EcoSil Ltd.

The Sillamäe site in 1996 before remedial actions were started. The steep dam wall and the undisturbed shoreline subject to erosion are clearly visible.

Internationally, the Sillamäe plant on the north coast of Estonia has been considered a major environmental threat to the Baltic Sea. Mr. Siinmaa started his presentation by some background information. The site was used as a Soviet uranium plant, which was opened in 1948. Black shale processing and uranium ore processing were followed by enriched uranium refining until the uranium processing equipment was dismantled in 1991. The plant has also been used for rare earth elements and rare metals ore processing since 1970. The tailings were dumped in a 400 000 m^2 pond. The pond is situated in the immediate vicinity to the sea, and the shoreline and the wall are subject to erosion and instability. The worst-case scenario is that the entire pond and its radioactive contents would slide into the sea. Environmental studies have showed that there were releases from the tailings pond of both radioactive and non-radioactive pollutants to the sea. A project was started to solve the problems, with participation from Sweden, Norway and Finland. The first phase of the project (1991 – 1997) was to identify the problem; the second phase (1997 – 1999) was to prepare for a solution; and the third phase (1999 – 2007) where we are now is implementation of the chosen solution.

As a part of phase 1, initial field studies were made, followed by a risk assessment and additional extensive fieldwork. Several reports were compiled with data on the magnitude of the problem. SSI was the main foreign aid coordinator. Other involved parties were STUK and the Royal Norwegian Ministry of Foreign Affairs. The contractors were Studsvik, NGI and IFE. When quantifying the problem, it was found among other things that the tailings (with a total volume of about 8 million m^3) contain some 1800 tons of uranium and 800 tons of thorium. There was a leakage to the sea of up to 30

A similar aerial view from 2004 over the Sillamäe site. The shoreline and the dam are reinforced and quite a lage part of the dam is now covered.

tons of pollutants per day. The spread of radioactive dust and radon gave a significant dose contribution to local inhabitants. The pond dam was confirmed to be unstable, with a possibility of dam failure and subsequent large spill.

In the beginning of phase 2, SIERG (Sillamäe International Expert Reference Group) was established in very much the same way as PIERG. It was a steering group of experts and financiers. It was the first broader international forum in preparation for project planning and implementation. Later it developed into a group of stakeholders – representatives of Estonian and Nordic governments plus the European Commission – that signed a Memorandum of Understanding on financing the project implementation. The international participation grew as USDOE performed an aerial survey and NATO organized an advanced Sillamäe workshop in cooperation with Los Alamos National Laboratory. The subject of the NATO workshop was "Turning a Problem into a Resource", but the conclusion was that it was technically difficult and economically not feasible to retrieve the wastes. Also, Estonia joined a couple of Phare projects under its Multi-Country Environmental Program. After a conceptual design by a German contractor, a number of activities have been carried out and were finished in 2003: tailings pond stabilization (by means of a shore protection construction and a double row of reinforced concrete piles); and inflowing water diversion (by means of a diaphragm wall construction).

A precondition for the remediation work was the closedown of the tailings pond, which was achieved by Silmet (the state company for remediation of the Sillamäe site) in 2003. Transfer of know-how also played an important role. SSI initiated several projects for Estonian capacity building in the field of NORM management (Naturally Occurring Radioactive Materials).

What now remains to be done is surface reshaping and covering activities. This multinational, Phare supported remediation project is worth a total of €20 million (of which the Phare contribution is €5 million) and is expected to be finished in 2007, with the whole area looking something of a super size football field. Anti Siinmaa and his co-author, Tõnis Kaasik, are optimistic about this time schedule for the green field solution and feel indebted to their cooperation partners.

Radon in Estonia

Ms. Lia Pahapill, Specialist, ERPC

Ms. Pahapill made reference to investigations showing that the main radon source in Estonia is soil. The first radon studies were made at the end of the 80's, and the Estonian Research Institute published a survey in which 400 houses were measured. The highest level found was 6 700 Bq/m³, and 4% of all houses exceeded 800 Bq/m³. The Estonian – Swedish cooperation in the field of radon investigations started in 1994 and was performed in four phases: a preparatory project; a national radon survey; further radon monitoring and, finally, the production of an Estonian General Radon Risk Map. In the preparatory project a system for indoor measurements was set up, training of staff took place, and an overview of the problems was made.

In total, radon levels in some 2 000 dwellings were measured during the National Survey and the further monitoring stage. The major radon risk areas of the country were identified, together with the housing construction types that tend to be associated with high radon levels.

Ms Lia Pahapill reported that the SSI radon project has already prevented high radon levels in hundreds of new Estonian dwellings

According to the results of the national survey, the average radon concentration in single-family houses is about 100 Bq/m³, in dwellings on the ground floor of apartment houses 80 Bq/m³, with an average of 60 Bq/m³ in all dwellings (single-family houses and all storeys of apartment houses). In 8 % of the dwellings the radon concentration exceeds 200 Bq/m³, the Swedish prescribed maximum level in dwellings. The Estonian average gives an estimated mean effective dose equivalent to residents caused by radon of 1 mSv/year (2 mSv/y in Sweden). When continuing the radon project, in cooperation with the Geological Survey of Estonia, the Geological Survey of Sweden and SIUS, a General Radon Risk Map of Estonia was produced with funding from the Estonian Environmental Fund and Sida. Within the project, several seminars have been arranged covering natural radiation and radon risks and mitigation activities. Brochures on radon and radon-safe houses have been published and information on radon problems has been made public.

As a result of this cooperation project, Estonia now has a system for long-term measurements and instruments for continuous measurements of indoors radon and radon in soil air. The staff has been trained and educated in mitigation of radon problems. Public information on radon risks is available and experience of radiation protection has been gained through participation in international conferences and study visits to Sweden. Some 2 500 Estonians know the radon concentration in their dwellings. Last but not least, Ms. Pahapill reported that high radon levels have been prevented in hundreds of new dwellings in radon risk areas.

In Latvia and Lithuania similar projects have been carried out. Also these projects have included national radon surveys in order to establish the level of radon exposure to the public. In Latvia the surveys have included some 800 dwellings and in Lithuania more than 2 500. As expected for geological reasons, radon levels there are not as high as in Estonia. However, in both Latvia and Lithuania the radon level in many homes exceeds the established radon limits. In all three countries the projects have included seminars, training, study visits to Sweden and participation in conferences. The Swedish Radon Book has been translated into Latvian and Lithuanian, and brochures describing the health risk and how to take remedial building actions against radon have been published. In addition to authority-operated laboratory facilities, a radon calibration and intercomparative facility, common for the Baltic countries, has been built in Salaspils in Latvia (see the presentation on the Latvian National Metrology Center below).

In Latvia, in addition to these activities, the use of radon baths and other kinds of medical treatments using inhalation of radon or drinking of radon water was stopped after joint investigations. In all three countries the projects have included information on and investigations of NORM (Naturally Occurring Radioactive Material). Experts from SSI have also been consulted in the drafting of new legislations on protection against natural radiation and radon.

Latvia

Achievements in the field of radiation safety in the perspective of the regulatory authority

Mr. Andrejs Salmins, Director, RDC

Mr. Andrejs Salmins, head of the Latvian RDC, saw the Swedish contribution as a catalyst in development of the regulatory infrastructure

Mr. Salmins has taken part in the cooperation program between Latvia and Sweden since the start and knows the program in detail. In his presentation he said that the main fields and topics of cooperation were very much the same as for the other countries. Sweden acted as a catalyst in developing a new regulatory infrastructure. The political decision to join EU also speeded up the process. Limiting factors in the bilateral activities were, among others, the available SSI funding; the capacity to provide and absorb the support; inherited structures, regulations and regulatory approaches in Latvia; lack of personnel; and the attitude of the government, which was not too active in the outset. Wide actions called for more efforts and resources than were at disposal. Latvia is now a member of both EU and IAEA, participates in numerous international projects, has acquired other donors than Sweden and has proved that it can use the support effectively. Both Sweden and Latvia has learned by doing. Under the coordination of the ministry, Latvia has gained experience in project management. The achievements so far are believed to impact on further support. Synergetic effects from past activities may serve as examples of the positive outcome of bilateral and international work:

- Development of a legal framework was initiated by SSI, with OECD/NEA, CEC and IAEA activities to build the expertise level
- Laboratory services at RDC were initially developed by SSI and later under IAEA TC projects
- Early warning systems were initiated by SSI, supplemented by STUK and upgraded by DEMA
- Safety in radwaste handling was assessed by SSI and further developed under EC and IAEA TC projects

Some of the achievements are legal and regulatory frameworks; an early warning system; laboratory capacity including SSDL and radon measurements; transfer of knowledge; resources for knowledge management; safety upgrades in, e.g., radwaste handling and medical applications; and quality aspects.

Cooperation between State Radioactive Wastes Management Agency and Swedish Radiation Protection Authority

Dr. Andris Abramenkovs, Director, RAPA

Salaspils is the site of an old research reactor that has now been shut down and is being decommissioned. However, since much of the infrastructure and safety installations are in place,

it could be used for other purposes. Consequently, it has been decided to use the facilities for the new regional SSDL – please refer to the next presentation.

Mr. Abramenkovs said that the cooperation with Sweden focused on three Salaspils oriented activities:

- Increased radiation security of the research reactor – by means of installing three stations for radiation control in the reactor building, together with an electronic personnel dosimetry system. ALARA principles have been incorporated in the normal work routines.
- Upgrading of equipment for decommissioning staff – including staff protection systems, wireless communication units and protective clothing to be used during the dismantling activities.
- Upgrade of staff radiation control systems at the radwaste disposal site. All old Russian equipment will be replaced. A new whole body contamination monitor has been delivered and will be installed later this year.

In summing up, Mr. Abramenkovs mentioned that dismantling activities in 2004 resulted in the following waste quantities: 100 ton of steel, 20 ton of concrete, 14 ton of paraffin and 6 ton of lead. Other results of the cooperation were preparations for an integrated security control system, and an upgrade of the staff radiation control system at the radwaste disposal site.

Radiation Metrology and Testing Center of the Latvian National Metrology Center

Dr. Antons Lapenas, Director, LNMC

The Salaspils research reactor site. The reactor is now closed but the facilities are used by the Radiation Metrology and Testing Center

One of the cornerstones of modern radiation protection is resources – equipment as well as manpower and know-how – for calibration and intercomparisons of instruments as well as radiation sources. Are we able to measure accurately, in compliance with internationally recognized standards and norms? Are our reference radiation sources well-defined? In order to create traceable and reliable procedures for measuring dose and activity there are international primary standards which can be used for calibrating secondary national or regional standards. These in turn can be used to calibrate local tertiary standards. For the region formed by the three Baltic countries there now exists such a joint calibration facility (Secondary Standard Dosimetry Laboratory, SSDL), on the premises of the research reactor in Salaspils, which is now being decommissioned.

Mr. Lapenas informed that the Radiation Metrology and Testing Center (RMTC) was founded in 1999 as a part of the Latvian National Metrology Center (LNMC) and with IAEA support. RMTC is accredited by the Latvian Accreditation Bureau. It includes two laboratories: the laboratory of activity measurements, and a SSDL. RMTC keeps two national standards: alpha,

beta and gamma spectrometers with reference sources, plus additional counters; and a calibration system for radiometers and dosimeters including various irradiators, X-ray units and check sources. The Laboratory of Activity Measurements performs, among other things, the following tasks

- calibration of alpha, beta and gamma spectrometers
- recalibration of radiation sources and solutions
- analysis of nuclear materials (uranium, plutonium)
- activity measurements and isotopic identification of radioactive isotopes in environmental samples, building materials, reactor materials and foodstuffs
- participation in national and international intercomparisons

The SSDL was established in cooperation with SSI. The intention was to create a facility that is shared between all three Baltic countries. Estonia and Lithuania make use of this opportunity about 25% of the available time. The SSDL is fully equipped for environmental, radiation protection and therapy level calibrations. It performs, e.g.,

- calibration of radiometers, dosimeters, pollution meters and personal dosimeters
- testing of radiation control devises (gates, pagers), radiation survey meters and X-ray units and premises (technological and medical)
- control of radioactivity levels in rooms

RMTC also has a so-called radon room with a fairly weak radium source for calibration purposes. Mr. Lapenas ended his presentation by acknowledging that the room has been created and equipped in cooperation with SSI and now serves as a secondary standard.

Galina Boka: Cooperation in the field of medical radiology

Dr. Galina Boka, Latvian Oncology Center

The cooperation includes diagnostic radiology, nuclear medicine and radiation therapy. Dr. Boka presented the major projects and the main achievements in these fields.

Dr Galina Boka informed that Quality Systems are in their final stage in three Latvian hospitals

- Two persons were trained at Uppsala University Hospital in Sweden to perform reference dose measurements, and the implementation of such measurements has started. A follow-up visit to Uppsala is planned. The concept of reference dose has been successfully introduced on an international scale to limit exposure and facilitate intercomparisons.
- Instruments for quality assessment and control (QA and QC) of diagnostic radiology equipment have been delivered and a study visit to Uppsala has been performed. QA and QC are other internationally accepted concepts that have received wide acclaim, not only in medical applications.
- Two persons have studied the practical implementation of periodic QA and QC of nuclear medicine equipment in Uppsala.

- Two persons were introduced in the daily work at the radiotherapy department in Uppsala, and two persons were trained in QA and QC of radiotherapy equipment and processes.

Implementation of quality systems in diagnostic radiology is in its final stage at two hospitals, and a quality system in radiotherapy and nuclear medicine is being finalized at one hospital. Work is in progress at one hospital. Swedish communities have donated five used linear accelerators with dosimetric equipment – a fact that has played a major role in the development of radiotherapy and medical physics in Latvia. Transfer of know-how as well as practical help and training were obtained from Uppsala University Hospital Medical Physics and Radiotherapy Departments. Dr. Boka said that the projects helped introduce a number of Latvian specialists into the field.

Similar cooperation projects on medical radiology have been carried out in Estonia and Lithuania, with similar results.

Lithuania

Overview of the Swedish – Lithuanian cooperation in radiation protection

Mr. Romualdas Sabaliauskas, Undersecretary, Ministry of Health

Mr. Romualdas Sabaliauskas started the Lithuanian presentations with a comprehensive review over the cooperation with SSI and its impact

The Undersecretary started by summarizing the consequences of more than a decade of great turmoil. After regaining its independence, Lithuania was facing many problems connected to the creation of a national infrastructure in economy, social system, environmental protection, health care and many other fields. All areas of life had to be reconstructed with the final aim to obtain the same standard as in developed and civilized countries. These efforts were intensified after the decision to join the European Union. Due to a lack of resources and qualified professionals, in combination with an imperfect legal system, problems arose along the way. Help arrived from countries that were interested in the development of Lithuania. Sweden was one of the first countries to volunteer.

Although radiation protection was not a top priority, the Lithuanian state was taking steps in order to ensure protection of its population from harmful effects of ionizing radiation. Also, the recommendations of the ICRP, requirements of the IAEA and the European Commission had to be implemented.

The Swedish – Lithuanian cooperation started with identification of the most problematic areas. Due to a flexible approach, new issues were included in the scope of cooperation, and it is very important to emphasize that the Swedish side was always open to Lithuanian needs, problems and wishes. The following fields were prioritized:

- Radiation protection in Ignalina Nuclear Power Plant
- Management of radioactive waste

- Preparedness for nuclear and radiological accidents
- Institutional strengthening
- Radiation protection in medicine
- Protection from natural radiation sources
- Many other fields, such as drafting of legislation; supplying expertise, training of Lithuanian professionals; production of publications; and support for attending important international events

Radiation protection and safety equipment, laboratory installations, equipment needed for everyday activities of Lithuanian institutions, software, etc., were provided by Sweden. It helped to achieve a high technical level of all the activities related to radiation protection.

However, the most important aspect of the Swedish – Lithuanian cooperation was human connections. Swedish traditions and experience in radiation protection are well known all over the world. For this reason Lithuanian radiation protection professionals were particularly happy when this cooperation started 12 years ago. Right from the beginning many informal contacts were established and used for solving many everyday problems. It is very important to note that SSI offered a possibility to get in touch with Swedish colleagues from nuclear power plants, industrial enterprises, hospitals, radiation protection related companies, etc.

The fact that the SSI was selected as one of the Twinning partners in the Phare project "Radiation Protection" should also be mentioned. SSI was selected because of the level of expertise, which it can provide. The positive results from earlier bilateral cooperation were also taken into account since it decreased effectively the time and efforts needed for the kick-off phase of the Twinning project. The project, which was implemented together with Finnish colleagues from STUK, was very successful, and a radiation protection regulatory authority at a European level was created.

When looking back at the Swedish – Lithuanian cooperation, the Undersecretary identified the following results:

- A radiation protection legislation is prepared, adopted and implemented
- A regulatory authority which fully complies with national needs and international recommendations and requirements, is in place and operative
- Many radiation protection aspects (e.g., quality systems in medicine) are implemented in places where sources of ionizing radiation are used
- Such areas as radiation protection in the nuclear field, emergency preparedness, radioactive waste management, medical radiation protection, protection from natural exposure, and assessment of exposure are of the level required from EU member states
- Trained radiation protection professionals are available
- The general public receives information on different radiation and radiation protection related issues

And, most important, the Lithuanian people might feel safe as regards ionizing radiation.

Radiation protection is an international discipline undergoing constant development. Only by joint efforts of many countries, their institutions and professionals we may resolve the complicated problems caused by ionizing radiation. Mr. Sabaliauskas expressed a hope that the cooperation continues. Probably, new forms and tools of this cooperation might be found. He suggested that the seminar should be finished by discussions, which will result in common future activities.

Cooperation between the authorities SSI and RPC

Dr. Albinas Mastauskas, Director, RPC

Dr. Mastauskas said that the main task of the cooperation was to help Lithuania create a national radiation protection infrastructure based on ICRP recommendations, IAEA recommendations and requirements and EU legislation. This infrastructure should meet national needs, social and economical conditions taken into account. In the process the Radiation Protection Center (RPC) was created. It is the regulatory authority regarding licensing, inspections, enforcement and drafting of legal documents. It also serves as an expert institution with respects to international and national programs and radiation protection expertise and advice. There are many similarities between RPC and SSI. The tasks, status in society and vision and strategy are similar, and the problems dealt with are the same (apart from non-ionizing radiation, which is not an RPC task). On the other hand, the experience and resources of RPC differs from those of SSI.

Dr. Albinas Mastauskas concluded that the SSI – RPC cooperation has been very effective and helped create a modern radiation protection infrastructure in Lithuania

The cooperation included hardware and software for laboratories and offices as well as transfer of know-how and support in publication activities and arranging conferences. Both sides were very flexible in order to adapt to the situation at hand and make optimum use of available resources. RPC took active part when deciding on what form of cooperation should be used at any given time. There were several areas of cooperation: general radiation protection, medical exposure, natural radiation, emergency preparedness, radwaste management and Ignalina related issues. One of the initial tasks was to strengthen RPC in its administrative and practical capacities, analytical techniques, information services and conferencing. Many areas were dealt with simultaneously, which made it possible to make use of the assistance in the most effective way. The help provided by SSI was essential in creating a modern radiation protection authority that is now capable of solving all problems arising in Lithuania or how to find advice in the most complicated cases.

The analytical equipment and methods were upgraded at an early stage and the laboratory personnel were trained at SSI. The cooperation was tailored to specific Lithuanian needs, since there are two nuclear power reactors in operation. As for public information, a number of brochures and books have been published in various fields (e.g., radon, waste, emergency preparedness). SSI assisted in training of staff and preparing the material. An important aspect of information is arranging or taking part in conferences. There experts can get together, expand networks and exchange experience, nationally, regionally and internationally, and proceedings are published. Thanks to this, the status of radiation protection and attitudes toward it are changing, Dr. Mastauskas claimed.

A very special project was the EU-Phare project "Radiation Protection", often referred to as the "twinning project". When RPC selected SSI and STUK as partners in the consortium (and with a Swedish project leader), experience from bilateral cooperation was taken into account. The duration of this project was two years. SSI experts participated in reviews of Lithuanian legislation, radwaste management, emergency preparedness and information issues. The evaluation of the project was very favorable.

All in all, Dr. Mastauskas stated, the SSI – RPC cooperation has been very effective and helped create a modern radiation protection infrastructure in Lithuania. The results are sustainable because good contacts between Swedish and Lithuanian institutions and persons have been established, and the initial goal of strengthening RPC has been fulfilled. Now it is time to discuss future actions.

Enhancement of radiological safety at Ignalina NPP within the framework of SSI cooperation projects

Mr. Oleg Miroshnik, Deputy Head, INPP

Mr. Oleg Miroshnik informed that the annual collective dose at Ignalina NPP decreased from 18 to 8 person-sievert 1997 – 2003 thanks to the Swedish cooperation

The Lithuanian – Swedish cooperation at INPP was launched at a historic start in 1992, Mr. Miroshnic said. It has since then focused on the most important issues. Over the years, a number of study tours have been made to Swedish NPPs, SSI, Studsvik/KSU and other organizations. A lot of Swedish assistance has involved upgrading of old Russian systems, like the personnel dosimetry system, radiation protection instruments and protective equipment of various kinds. But later transfer of knowledge and exchange of experience completed these initial hardware deliveries. ALARA principles have been introduced, educational aids and methods updated, the system and methods of environmental monitoring reviewed and upgraded as needed, and plant emergency preparedness has been improved (see a separate INPP presentation).

The personnel dosimetry system now includes a TLD system, electronic dosemeters, neutron dosimetry and internal dosimetry. Portal dose rate monitors are available and portal monitors have been installed. Filtered air masks, protective helmets with filtered airflow, portable airflow units and protective lead blankets have been supplied. As far as ALARA implementtation, staff training has taken place, ALARA groups have been appointed and an ALARA program developed. Work and QA routines have been revised, new lower dose limits established and the management of the total occupational exposure at the plan reviewed.

As a consequence of many study visits, seminars, workshops, training programs etc., a number of goals have been achieved:

- Improvement of the work-permit system
- Development of a new dose planning system
- Changed controlled area marking system
- Wide use of temporary biological shielding
- Development of a new radiation protection training program

- Preparation of a new computerized database with doses to staff and radiological information

The environmental monitoring system now includes strontium-90 measurements and alpha spectrometry. The educational efforts started with something as basic as English language courses to make communication between Lithuanian, Russian and Swedish staff possible. A training course in radiation protection was held and has later been translated to Lithuanian. Classroom and office equipment has been supplied.

It takes a long time to change people's attitudes to safety issues, and it has not been an easy task. But gradually the effects become obvious. For instance, the annual collective dose to INPP staff and contractors decreased from 18 to 8 person-sievert during the years 1997 – 2003 thanks to the cooperation with Sweden. With these words, Mr. Miroshnik ended his presentation.

Radioactive waste management

Mr. Dainius Janenas, Director, RATA

Mr. Janenas informed that the Radioactive Waste Management Agency (RATA) was established in 2001 as a state-owned company for long-term operation regarding radwaste management and handling. In 2002 the government approved the first three years of RATA activities, and licenses to perform institutional waste management were issued by RPC. According to the Law on Radioactive Waste Management RATA is responsible for the disposal of radwaste and serves as the operating organization of storage facilities and repositories, which are transferred to it. As a consequence of this, RATA took over the waste management facility and repository at Maisiagala from the Institute of Physics in 2002.

The main area of Swedish support has been institutional waste management. A long-term assessment of the safety of the Maisiagala facility was carried out by SKB in 1996 – 1998. Based on the findings of this study, a more comprehensive evaluation plus improvements have been initiated in form of an EC Phare project called "Safety assessment and upgrading of Maisiagala repository in Lithuania".

In 2004 a special training program for RATA staff was arranged. It included an introduction to supervision and licensing of nuclear and radiological activities in Sweden; transport and handling of institutional radwaste; and public information. The program included technical visits to Studsvik and SFR at Forsmark NPP. Mr. Janenas finished his presentation by showing pictures from those visits.

Education of medical physicists in Lithuania

Dr. Diana Adliene, KTU

In order for the audience to better understand the situation in Lithuania regarding medical physics and better appreciate the results of past and ongoing work, Dr. Adliene gave a background picture. The job as medical physicist was first defined and regulated in a law of 1992; but the professionals have not been licensed until recently. Formally, anyone holding a B.Sc. in physics or a degree in engineering or a similar education without adequate special education can be employed as medical physicist. Presently, 60% of all "medical physicists"

have a background in physics, 40% are electronic and mechanical engineers and mathematicians. Notwithstanding the somewhat lenient formal requirements, the number of "medical physicists" working in radiotherapy, nuclear medicine and radiology has been and still is insufficient.

Dr. Diana Adliene told that a 2 year MSc education in medical physics started 2003 in Kaunas and has now engaged the second generation of students

Hence, at the outset of the cooperation with Sweden there was an urgent need to start an education and training program for present and future medical physicists in Lithuania. It was also necessary to initiate a process for accreditation and licensing of persons employed as "medical physicists" without adequate education.

The legal basis for regulation of competence, duties, orders and responsibilities was created in 1995 – 2001. In the National Radiation Protection Program for 2000 – 2004 starting of education and training of medical physicists was foreseen. A M.Sc. study program was prepared at the Physics Department of Kaunas University of Technology (KTU) and approved by the Ministry of Education in 2003. The program was prepared in collaboration with SSI, universities in Sweden and UK, Kaunas Medical University and the Lithuanian Radiation Protection Center. The requirement is a B.Sc. degree, and after two years of studies in medical Physics the M.Sc. is scheduled to be completed.

The conditions when the program started in 2003 could have been better. There were no traditions in this field. The students were unmotivated, the laboratories poorly equipped, and the teachers were inexperienced. Lastly, there was no financial support. On the other hand, the collaboration with Kaunas Medical University was very good, the Swedish side provided assistance where the training possibilities were good, as were the contacts with Estonian and Latvian colleagues. And most important of all, the project leaders had a lot of enthusiasm. The main purpose is to find and attract the students; get them interested and motivated; and reach a sense of personal growth during the period of their studies. This is achieved through education and participation in research work, conferences, seminars and workshops. Swedish research partners are Malmö University Hospital and Sahlgrenska Hospital in Gothenburg. Thanks to all these measures the motivation of the students has increased significantly and influenced the results of their studies.

Dr. Adliene summarized some of the main results of the Lithuanian – Swedish cooperation:

- The M.Sc. program in medical physics was successfully started in 2003
- It has activated research possibilities in collaboration with Swedish universities and hospitals
- A research group in radiation protection dosimetry and collaboration with Lithuanian hospitals has been established
- Ph.D. studies in medical physics were initiated at KTU in 2004
- A number of articles have been published in scientific journals
- Two international conferences have been arranged (in Kaunas and Palanga), and Lithuanian specialists have participated in a number of international conferences

One lesson learned is that a well developed and functional system for financial support is necessary; another that a collaborative network in medical physics between the Baltic countries is needed at all levels. Dr. Adliene concluded that gathered experience should be disseminated all over the Baltic Sea area, and the collaboration should be expanded to Kaliningrad and St. Petersburg.

Emergency Preparedness

Exercise preparation, conducting and evaluation

Ms. Violeta Skarzinskiene, Rescue Service, Lithuania

Ms. Violeta Skarzinskiene emphazised the value of networks and human communication created during the cooperation

Numerous exercise and training activities have taken place as a part of the Baltic – Swedish cooperation in emergency preparedness. The exercises have been performed as large-scale exercises as well as tabletops or smaller-scale exercises designed to test a special function. A workshop for persons responsible for measurements during a radiation emergency situation has been arranged. This workshop was intended to serve as an example to be used for training at different organizations in the Baltic countries. An exercise in Riga revealed a need for more information staff. Some exercises have been tailored to train Ignalina NPP staff. It may also be added that all three Baltic countries participated in the international *in situ* operations called Barents Rescue, including air- and car-borne gamma search and mapping activities. In addition, the cooperation program with Sweden has included study visits and training courses. The extensive Lithuanian program for training and exercises now prescribes activities at three levels:

- State level: 1 training opportunity per year; 1 exercise per 3 years
- County level: 2 training opportunities per year; 1 exercise per 3 years
- Local level: 2 training opportunities per year; 1 exercise per 2 years

Ms. Skarzinskiene illustrated the above by referring to one particular tabletop decision making process during an exercise in Vilnius in 2002, involving top level decision makers from 15 state level institutions. The scenario was an accident at INPP, causing radioactive releases and requiring measures to protect the public. The purpose was to enhance the preparedness for an INPP accident and improve cooperation and coordination between state-level institutions. The exchange of information in accordance with the national plan was to be tested and evaluated. Specifically, the following tasks were to be tested: cooperation and coordination between national institutions; the decision making process on protective measures for the general public; and decision making regarding public information and media contacts.

A number of questions were to be answered by the players:

- What is your assessment of the situation?
- What actions will your organization take?
- Whom does your organization contact?

- What input from other organizations do you need?
- What output do you think other organizations expect from you?
- What output can your organization offer?
- What decisions do you suggest your organization should make?
- How will the public be informed? How would you like the public to react, and how do you propose to achieve these actions?

The exercise was evaluated at a workshop, after which emergency plans and procedures were improved, recommendations on exercise preparation published, a local level exercise arranged, and basic and advanced courses organized. At the time of this SIUS seminar the preparations for a Baltic exercise on November 24, 2004, are in a final stage. The scenario is a Swedish NPP accident, and IAEA as well as EC will participate. It will involve top-level Baltic decision makers, and the purpose is to check communication, cooperation and coordination between the three Baltic countries.

When summing up the main experiences and achievements of twelve years of cooperation, Ms. Skarzinskiene particularly stressed the following items:

- During the years, Lithuania has passed a long way from assistance to cooperation, from just receiving to also giving
- State – local level cooperation within the country as well as Baltic and international cooperation has been improved thanks to many common activities with assistance from Sweden
- The regional cooperation (Sweden and the three Baltic countries) has been very successful
- Emergency preparedness and management procedures have been harmonized between the Baltic countries
- So far, some 600 instructors have received basic level training, and about 60 have been trained at an advanced level
- Information to the general public is important; so is training courses for emergency staff at all levels
- Last but not least, the networks created and the human communication initiated under this cooperation program are valuable

As a background to Ms. Skarzinskiene's presentation it should be mentioned that emergency preparedness is of common interest to all countries involved and that all three Baltic countries have participated in emergency projects. Seminars and workshops on planning, conducting and evaluating exercises have been carried out for all three countries, although with Lithuania dominating because of their responsibility for the Ignalina NPP. It could also be added that within one of the projects an Emergency Operation Center has been built and equipped in the Lithuanian county of Utena close to Ignalina, and the Center staff has been duly trained.

Oleg Miroshnik: INPP emergency preparedness within the framework of Swedish cooperation projects

Mr. Oleg Miroshnik, Deputy Head, INPP, Lithuania

INPP has taken part in some of the emergency exercises that have been conducted in the Baltic area, and also arranged its own activities in this field. The cooperation with Sweden has included review, development and adaptation of the INPP Emergency Preparedness (EP) plan to international principles, standards and practices. The emergency response center has been

upgraded and an additional technical support center created. Accident recovery and rescue activities have taken place. After revision of the EP plan as regards organizational and staff issues in 1998 followed a period of staff training. Later, the plan was revised once again to ensure compliance with the INPP QA program. This was followed by a new period of training.

The Ignalina nuclear power plant in Lithuania

In late 1998 the reconstruction of the emergency response center was finished. According to Mr. Miroshnik it offers facilities for efficient emergency management and recovery work and facilitates feedback to state institutions and media. It has functioned well during training and exercises.

Following a visit to Forsmark in late 2000, with exchange of experience of technical support center activities, a new TSC was commissioned. It accommodates staff that performs analyses, follows and forecasts how the situation is developing, and gives advice and recommendations to the technical management of the plant.

In 2001 methodical assistance was received in planning for functional training at the emergency response center. The necessary equipment including some individual protection was supplied, and training was led by Swedish experts. In addition a number of other activities have been performed. An instruction for information to and communication with external organizations has been written, along with an INPP manual on Beyond the Design Basis Accidents. Also, emergency preparedness specifications have been completed for the coming decommissioning process. Finally, Mr. Miroshnik said, a workshop on "Communication of Information During a Critical Situation" should be mentioned.

Preparing for a radiological emergency in Estonia. Activities under the Swedish – Baltic cooperation program

Mr. Raivo Rajamäe, Head, Radiation Monitoring Dept., ERPC, Estonia

An essential part of the extensive cooperation in the field of radiation protection between Sweden and Estonia was the assistance in elaboration and technical development of the national system of preparedness in response to a radiological emergency. In Mr. Rajamäe's presentation only the main topics of cooperation were dealt with, such as establishing the national monitoring network for early warning, education and training of staff, and information to the public on radiological matters.

After achieving its independence in 1991, there arose in Estonia a need to formulate a new strategy for the environmental radiation monitoring network which at that time was focused on nuclear warfare purposes, and consisted of 16 manual stations equipped with old-fashioned low sensitivity portable devices. Due to the small area of the Estonian territory the main idea

Concerning emergency preparedness, Mr. Raivo Rajamäe stressed the importance of the large quantity of high quality education included in the cooperation

was to install modern automatic stations in the border areas and first of all in such sites which will potentially be exposed to releases from nuclear reactors in neighboring countries. It was a great chance for Estonian authorities that Sweden provided technical assistance in upgrading the network. Thus, in 1993 the AAM-95 system with four automatic stations was installed in Tallinn, Narva-Jõesuu, Võru and Kuressaare. The next step in the Swedish technical assistance was providing two filtering stations to monitor the radioactivity of airborne particles. These stations were installed in Narva-Jõesuu, the closest site in Estonia to the Sosnovy Bor NPP, and in Tõravere, in the southern part of Estonia. The automatic network and filtering stations proved to be very reliable, Mr. Rajamäe reported, producing precise data on atmospheric radioactivity. Though the data are used primarily for early warning purposes, they constitute a substantial part of a databank of the national radiation surveillance program.

A very important branch of the cooperation was education and training of responders to a radiological emergency. As Estonia practically lost its former civil protection structure in the beginning of the 90's, there was a lack of personnel having experience in radiological matters. It caused an urgent need to educate new, preferably young, persons in response organizations. Now over 100 persons have got knowledge, experience and practical skills through seminars and training courses arranged under this cooperation program. Education through high-level training courses was especially active during the last couple of years. This resulted in about 50 workers from different organizations being able to take on the role of instructor or being suited to participate in real emergency activities. In addition to this, under the support of SSI/SIUS more than 20 persons have participated in international exercises at different levels as well as in seminars dealing with preparation and conducting of exercises.

Mr. Rajamäe stressed the fact that public information is one of the key points in effective preparation to radiological emergencies. Information leaflets prepared in advance can reduce possible rumors and panic in actual emergency situation. In this respect there was a considerable gap in Estonia, since the booklets published so far had all been printed in very limited editions. Now we have a leaflet for the general public, introducing some basic facts on ionizing radiation and correct behavior in case of an emergency. It was printed in large numbers, 20 000 copies in Estonian and 10 000 in Russian. The teaching material for primary and secondary schools, which was translated and printed under the cooperation, is of great importance in education of the young generation.

Main results of twelve years of cooperation in the field of nuclear and radiological emergency preparedness in Latvia

Dr. Uldis Poris, Latvian State Fire and Rescue Service, Latvia

After Latvia regained its independence in 1992 a new system of civil protection was formed – one which was suited for a small nation instead of the old Soviet system based on contraposition of two political systems. Swedish assistance is gratefully acknowledged. The project

on emergency preparedness in the Baltic countries made it possible to form a new nuclear accident preparedness and response system and train people not having the necessary experience in this area.

The work can be divided into five main categories:

Improvement of nuclear and radiological emergency systems
Study tours were made to SSI and SRV at the central level, together with local visits. Workshops on emergency preparedness and response planning were arranged, and the parts of the National Civil Protection Plan that cover radiation emergencies and instructions for mobile dose rate measurement systems were evaluated. This resulted in revision of the civil protection plan and regulations from the Cabinet on preparedness and response to radiation accidents. Local level civil protection plans within the 100 km zone were revised, and SFRS got a mobile dose rate and accumulated dose measurement system to survey the 100 km zone from the nuclear power plant in Ignalina.

Improvement of the system for education and training
National and common Baltic workshops and courses on education and training systems development were arranged. Courses were held for a total of 55 SFRS, RDC and SBG (State Border Guard) instructors on radiation measurements with practical training in searching for lost sources. Also, workshops on decontamination methods and tactics were performed. All this has resulted in education programs and improved knowledge in these fields.

Assistance in preparing and conducting nuclear emergency exercises
Three workshops on exercise preparation and conduction methodology were combined with visits to Sweden to study NPP exercises. National exercises were prepared jointly at the central and local level. Four tabletop and command post exercises were conducted, including a common Baltic exercise planned for the week after this seminar. Latvia also received financial assistance to participate in two international OECD/NEA exercises, INEX-2 and JINEX-2000.

Information to the public
Workshops were held on the importance of fast, correct and relevant information in different forms to the general public. A leaflet on preventive actions for the population was printed in 30 000 copies, and a leaflet for physicians in 7 000 copies.

Equipment
The Daugavpils City Emergency Operative Center and the SFRS central communication center were upgraded, SFRS received dose rate meters, and RDC received an early warning gamma monitoring system.

On May 1, 2004, Latvia became member of the European Union. In EU great attention is paid to the development of regional cooperation. As preparedness against nuclear accidents is not included in the present EU program, it would be very useful to start planning for cooperation in this field, preferably also involving neighboring countries in the east: Russia and Belarus.

Contribution of the IAEA TC Program to Upgrading Radiation Protection Infrastructures in the Baltic Countries

Dr. Jozef Sabol, Regional Project Manager, Europe Section, IAEA

Dr. Sabol started by presenting the three statutory functions of IAEA:

- Peaceful applications of nuclear energy
- Nuclear and radiation safety and security
- Non-proliferation treaties and agreements

The Agency's functions in radiation safety are based on ICRP recommendations. The Agency's Fundamentals are given in Safety Series No. 120, its Regulation in No. 115 (BSS, Basic Safety Standards), and Guides in No.109. Dr. Sabol then talked about some model projects on upgrading radiation protection infrastructure during 1996 – 2004, aimed at achieving compliance with the Agency's safety standards; Estonia, Latvia and Lithuania all participated, among a total of 89 countries at the end of the period. The milestones were:

- Regulatory framework
- Occupational exposure control
- Medical exposure control
- Public exposure control
- Preparedness and response to radiological emergency

Dr. Jozef Sabol presented the IAEA regional cooperation in the field of radiation protection

Other model projects dealt with national regulatory control and occupational radiation protection programs; and development of technical capabilities for sustainable radiation and waste safety infrastructure. An ambitious series of Regional Training Courses (RTC) has been carried out for a large number of IAEA member countries, and some of the courses have been arranged in Vilnius and Riga. For the 2005 – 2006 TC program a project on upgrading radiation protection infrastructures in countries of central Eastern Europe and central Asia is planned, with Estonia, Latvia and Lithuania as participants. They have also signed up for a project on implementation of national strategies for regaining control over "orphan sources". There will also be a project on medical and public health preparedness for response to a radiation emergency as a result of nuclear terrorist events, open to all European member states.

The above is just a short review of the presentation, which is available in its entirety in the electronic version of this report.

Panel Discussion: How to Proceed from Today's Situation

Moderator: Prof. Sören Mattsson, Lund University and Malmö University

The presentations were followed by a panel discussion. The moderator introduced the six panelists: The directors of the four Radiation Protection Authorities – Merle Lust, Andrejs Salmins, Albinas Mastauskas and Lars-Erik Holm – together with Oleg Miroshnik from Ignalina Nuclear Power Plant and Åke Persson, director of SIUS.

In his introductory note, prof. Mattsson recognized the impressive series of presentations of the outcome of the Baltic-Swedish cooperation in the field of radiation protection. It has covered a broad range of areas – all highly important for our society. Practically all speakers expressed that the cooperation between the four countries has been beneficial and in fact a prerequisite for much of the work done previously and now discussed during the seminar. People from our four countries have also learned to know each other during the cooperation.

The panel listening to the moderator, prof. Sören Mattsson (left), leading the seminar into considerations about cooperation in the future. "What are the expectations?"

As Dr. Morkunas put it, we went into this cooperation as colleagues and came out as close friends. It is easy for close friends to contact each other when needed, and good friends are open-minded and constructive. So, to make this cooperation still better in the future, prof. Mattsson suggested that the panel should identify ways to improve it, what should be the future priorities etc. The first question to the panelists was therefore, "Which type of cooperation would you prefer in the future and what are your expectations"?

The conclusions of the unusually constructive and candid discussion that followed, both among the panelists and from the floor, may be divided into a number of areas.

Coordination of efforts in international fora

Several speakers commented on the format and organization of any future cooperation. It may incorporate other geographical areas, such as Russia, Belarus and Ukraine, since the Baltic countries feel that they are ready to support other countries. Sweden is already planning such assistance. We should aim at both bilateral, multilateral and international cooperation. Existing Nordic groups and organizations such as NEP, NKS and NSFS could form closer ties to the three Baltic countries in their work. By joining forces the Baltic and Nordic countries gain in strength and credibility, home and abroad, especially in fora like the 7th EU framework program, OECD/NEA, IAEA and CBSS activities. The three Nordic EU member countries plus the three Baltic countries would form an EU region of 3 + 3 countries, of great potential. A consortium for radiation protection research activities should be formed. Thus, the chances for EU funding of joint projects would increase. The Baltic and Nordic directors should continue with their summits.

General radiation protection
To save dose, we should focus on medical exposure. The ongoing establishment of reference doses is a step in this direction. Transfer of experience and knowledge from the old to the young generation is a serious problem. One answer could be on-the-job training and participation in international exchange of know-how. Advanced radiation protection courses should be arranged jointly since they may be too expensive for any single country but might prove cost-effective if done regionally. A joint expert pool should be maintained and databases in relevant fields should be shared. Benchmarking, exchange of experience, and networking are issues to pursue. Development of standards and quality criteria as well as harmonization of regulations, procedures and routines for licensing, inspections, enforcement and environmental monitoring are important aspects that need to be considered. Delegation of tasks among the Baltic and Nordic countries could be introduced in order to make better use of available resources, instead of setting up several parallel organizations. Production of information to the general public was mentioned as a good example of this.

Nuclear reactors
As regards nuclear power, it was suggested to cooperate more intensely with Russia. Expert support in various studies, e.g., safety analyses, is needed. Technical visits would allow exchange of experience and sharing of knowledge between specialists. A special field of interest to INPP and probably also Barsebäck would be decommissioning and radwaste issues. This might also be of interest to operators of small research and training reactors, e.g., Risø, IFE and Studsvik.

Funding
On the question of funding of future work it was concluded that it might be hard to get but must be obtained – it is a matter of priorities. IAEA could make no promises. DEMA will not receive any additional funding. Consortiums within the EU framework were suggested as a definite possibility. SSI will continue to rely on dwindling government funding, at least for the time being. Dr. Holm stated that he sees this seminar not only as a follow-up meeting but also as a kick-off for future joint work, and invited all countries present today to a new meeting on how to continue our cooperation. Next November in Sweden! And perhaps, it was suggested, the arrangements could be rotated between the countries in the future.

Closing of the Seminar

On closing the seminar, Dr. Holm conveyed his gratitude to the Ministry for Foreign Affairs, the Ministry of Environment and Sida, without whose funding this 12-year cooperation program would not have been possible. Thanks were also extended to EU and IAEA, and the many people in Estonia, Latvia, Lithuania and Sweden who carried out the hard work – it had been impressive to follow the presentations at the seminar. Among Swedish participants he especially mentioned the visionary Jan Olof Snihs, who initiated the cooperation program, and his successors, Gunnar Johansson and B. Åke Persson. They, together with a large number of other Swedes at SIUS, SSI and around the country, carried a heavy load. With these words, the seminar was closed.



From left, Mr. Jan Olof Snihs, who headed SIUS activities from the start in 1991 until 1997, Mr. Gunnar Johansson, who was in lead during the final 1990-ies and Mr. B. Åke Persson, who took over and still is the SIUS director.

Summary and Conclusions

The work reported during the seminar covered a wide range of important subjects, e.g.,

- Safety of nuclear power plants – and safety in the plants
- Decommissioning of training and research reactors
- Safe handling of radioactive waste from uranium mining, from reactors and from other sources
- Emergency preparedness, early warning and risk reduction
- Radiation in medicine and health care – the largest artificial source of our radiation exposure – with a great potential for dose reduction
- Natural radiation – especially from radon and radon daughters
- Need for education and training programs – which we nowadays also call continuous professional development, CPD – for all people involved in radiation protection – in authorities, in hospitals, in industries, in universities
- We have talked about the need to inform the public in a correct and understandable way
- Last but not least – the need to educate and train new young and talented persons in the field of radiation protection

After listening to the presentations and discussions at the seminar, SIUS concludes that the results of the 12 years of cooperation by and large are considered successful, relevant, cost effective and useful to all parties involved (both donors and recipients, regulators and operators, hospitals, universities and industries). What started as assistance ended up as long-term cooperation between equals. The focus quickly shifted from delivering hardware and setting up facilities, to transfer of knowledge and exchange of information and experience. Emergency planning, accident management, fallout monitoring and remediation of consequences have all been significantly strengthened in the entire region, thanks to this Baltic – Nordic cooperation. The work carried out has often lead to contacts between authorities and other organizations, both at a national and regional level, that previously had only sporadic contacts or – in some cases – previously never had cooperated at all.

Many bi- and multilateral projects have included other Nordic countries than Sweden (and international organizations as well), but the scope of this seminar was to focus on Swedish – Baltic relations. The recipient countries met the challenge of the cooperation program head-on, with enthusiasm and energy; nevertheless, the development of some of the projects was delayed due to lack of personnel and other resources at the receiving end. Now that the three Baltic and three of the Nordic countries are full EU members, it has been stated that perhaps it is time for all six countries to enter new cooperation programs and form new working groups – with other countries as beneficiaries. It will be necessary to redefine the format, objectives and means to continue the good work. The important networks and workgroups established throughout the years should be reviewed, updated and perhaps expanded. The participants should still consist of experts representing authorities as well as industrial complexes, companies, hospitals, universities and other end users. This mix of regulators and operators has proved highly successful and rewarding.

Finally SIUS acknowledges the financial support, countless working hours and personal efforts that have been put into this cooperation program from all sides, and without which none of all this presented herein would have been possible.

Annex 1:

"Twelve years of co-operation in the field of radiation protection"

Tentative programme for SIUS' follow-up seminar November 18th

Thursday November 18th

08:00 – 08:30	**Morning coffee and registration.**
08:30 – 08:40	**Opening of the seminar** (Lars-Erik Holm, SSI Director General)
08:40 – 09:00	**Introduction** (B. Åke Persson, SSI)

Estonia - a summary of the cooperation

09:00 – 09:10	Estonian – Swedish co-operation in the past (Jaan Saar)
09:10 – 09:30	Co-operation between the authorities SSI and ERPC (Merle Lust, ERPC)
09:30 – 09:50	Waste management and decommissioning projects at Paldiski and Tammiku (Henno Putnik, ALARA Ltd)
09:50 – 10:05	Sillamäe uranium process site (Tönis Kaasik and Anti Siinma)
10:05 – 10:15	Radon in Estonia (Lia Pahapill, ERPC)
10:15 – 10:25	Questions and final discussion
10:25 – 10:40	Short break. Fresh fruit is available

Latvia - a summary of the cooperation

10:40 – 11:10	Achievements in the field of radiation safety from prospective of regulatory authority (Andrejs Salmins, RDC)
11:10 – 11:30	Co-operation of State Radioactive Wastes Management Agency with Swedish Radiation Protection Authority (Andris Abramenkovs, RAPA)
11:30 – 11:45	Radiation metrology and testing centre of the Latvian National Metrology Centre (Antons Lapenas, LMNC)
11:45 – 12:00	Cooperation in the field of medical radiology (Galina Boka, Latvian Oncology Centre)
12:00 – 12:10	Questions and final discussion
12:10 – 13:10	Lunch

Lithuania - a summary of the cooperation

13:10 – 13:15	Overview of Swedish - Lithuanian cooperation in radiation protection (Romualdas Sabaliauskas, undersecretary, Ministry of Health)
13:15 – 13:35	Co-operation between the authorities SSI and RPC (Albinas Mastauskas, RPC)
13:35 – 13:55	Enhancement of radiological safety at Ignalina NPP in frame of SSI co-operation projects (Oleg Miroshnik INPP)
13:55 – 14:15	Radioactive waste management (Dainius Janenas, RATA)
14:15 – 14:35	Education of medical physicists in Lithuania: Lessons learned (Diana Adliene, Kaunas Technical University)
14:35 – 14:45	Questions and final discussion

Multilateral cooperation

14:45 – 15:00	Contribution of the IAEA TC Programme to Upgrading Radiation Protection Infrastructure in the Baltic Countries (Jozef Sabol, IAEA)
15:00 – 15:30	Coffee

Cooperation on emergency preparedness.

15:30 – 15:50	Exercise preparation, conducting and evaluation (Violeta Skarzinskiene, Lithuanian Civil Protection Department)
15:50 – 16:00	INPP Emergency preparedness in frame of Swedish co-operation projects (Oleg Miroshnik INPP)
16:00 – 16:10	Preparing to a radiological emergency in Estonia. Activities under the Swedish-Baltic co-operation program (Raivo Rajamäe, RPC)
16:10 – 16:20	Main results of twelve years of cooperation in the field of nuclear and radiological emergency preparedness in Latvia. (Uldis Poris, Latvian State Fire and Rescue Service)
16:20 – 16:30	Discussion and questions
16:30 – 16:45	Short break
16:45 – 17:45	**Panel discussion**. *"How to proceed from today's situation"*. (Moderator prof Sören Mattsson.)

Closing ceremony

17:45 – 18:00

19:00 – 21:00	**Buffet** SSI building Floor 3, Solna Strandväg 96

Annex 2:

"Twelve years of co-operation in the field of radiation protection"

Follow-up seminar in Stockholm 18 November 2004

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Annex 3: Acronyms Used in this Report

ALARA	As Low As Reasonably Achievable (ICRP definition)
A.L.A.R.A. AS	Estonian radwaste company in charge of decommissioning Paldiski and Tammiku, and of national radwaste management
B.Sc.	Bachelor of Science
BSS	Basic Safety Standards (issued by EU and IAEA)
CBSS	Council of Baltic Sea States
CEC	Commission of the European Communities
CPD	Continuous Professional Development
DEMA	Danish Emergency Management Agency
EMHI	Estonian Meteorogical and Hydrological Institute
EC	European Commission
EcoSil	Ecology of Sillamäe
EP	Emergency Preparedness
ERPC	Estonian Radiation Protection Center
EU	European Union
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IFE	Institute for Energy Technology (Norway)
INPP	Ignalina Nuclear Power Plant
IVO	Imatran Voima Oy (Finland; nowadays Fortum)
KSU	Nuclear Training and Safety Center (Sweden)
KTU	Kaunas University of Technology
LNMC	Latvian National Metrology Center
MAS	Malmö University Hospital
MD	Swedish Ministry of Environment
M.Sc.	Master of Science
MTB	Main Technological Building (Paldiski)
NATO	North Atlantic Treaty Organization
NEFCO	Nordic Environment Finance Corporation
NEP	Nordic Group for Nuclear Emergency Preparedness
NGI	Norwegian Geotechnical Institute
NKS	Nordic Nuclear Safety Research
NORM	Naturally Occurring Radioactive Material
NPP	Nuclear Power Plant
NRPA	Norwegian Radiation Protection Authority
NSFS	Nordic Society for Radiation Protection
OECD/NEA	/Nuclear Energy Agency
PCDP	Paldiski Conceptual Decommissioning Plan
Phare	Aid for Reconstruction of the Economy (EU program)
Ph.D.	Doctor of Philosophy
PIERG	Paldiski International Expert Reference Group
QA	Quality Assurance
QC	Quality Control
RADON	A type of old Soviet radwaste management facilities
Radwaste	Radioactive waste
RAM	Radioactive Material
RAPA	Latvian Radioactive Waste Management Agency
RATA	Radioactive Waste Management Agency (Lithuania)

RDC	Radiation Safety Center (Latvia)
RMTC	Radiation Metrology and Testing Center (Salaspils, Latvia)
RPC	Radiation Protection Center (Lithuania)
RTC	Regional Training Courses (IAEA)
SBG	State Border Guard (Latvia)
SEK	Swedish crowns (kronor; currency)
SFR	Final Repository for Radioactive Operational Waste (Sweden)
SFRS	Latvian State Fire and Rescue Services
SGN	Société générale pour les techniques nouvelles (France)
Sida	Swedish International Development Agency
SIERG	Sillamäe International Expert Reference Group
Silmet	State-owned company for remediation of the Sillamäe plant
SIUS	SSI International Development Cooperation
SKB	Swedish Nuclear Fuel and Waste Management AB
SMHI	Swedish Meteorological and Hydrological Institute
SRV	Swedish Rescue Services Agency
SSDL	Secondary Standard Dosimetry Laboratory
SSI	Swedish Radiation Protection Authority
STUK	Finnish Safety and Radiation Protection Authority
Tacis	Technical Assistance to the Commonwealth of Independent States (EU program)
TC	Technical Cooperation (IAEA)
TSC	Technical Support Center
TSO	Technical Support Organization
UD	Swedish Ministry for Foreign Affairs
USDOE	United States Department of Energy

SSI-rapporter 2005

SSI reports 2005

2005:01 Reports from SSI:s International Independent Expert Group on Electromagnetic Fields 2003 and 2004.
SSI's Independent Expert Group on Electromagnetic Fields 190 SEK

2005:02 (SKI 2005:02) International Peer Review of Swedish Nuclear Fuel and Waste Management Company's SR-Can interim report
Budhi Sagar, Lucy Bailey, David G Bennett, Michael Egan, Klaus-Jürgen Röhlig

2005:03 (SKI 2005:06) Granskning av SKB:s SR-Can interimsrapport:SKI:s och SSI:s bedömning av SKB:s uppdaterade metoder för säkerhetsanalys
Benny Sundström och Björn Dverstorp et. al.

2005:04 (SKI 2005:10) Concentrations of Uranium, Thorium and Potassium in Sweden
Bo Thunholm, Anders H. Lindén och Bosse Gustafsson 130 SEK

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SKI och SSI
Anders Wörman, Björn Sjögren och Lars Marklund

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Sten Grapengiesser och Torkel Bennerstedt 120 SEK

SSI report

STATENS STRÅLSKYDDSINSTITUT, SSI, är central tillsynsmyndighet på strålskyddsområdet. Myndighetens verksamhetsidé är att verka för ett gott strålskydd för människor och miljö nu och i framtiden.

SSI är ansvarig myndighet för det av riksdagen beslutade miljömålet *Säker strålmiljö*.

SSI sätter gränser för stråldoser till allmänheten och för dem som arbetar med strålning, utfärdar föreskrifter och kontrollerar att de efterlevs. Myndigheten inspekterar, informerar, utbildar och ger råd för att öka kunskaperna om strålning. SSI bedriver också egen forskning och stöder forskning vid universitet och högskolor.

SSI håller beredskap dygnet runt mot olyckor med strålning. En tidig varning om olyckor fås genom svenska och utländska mätstationer och genom internationella varnings- och informationssystem.

SSI medverkar i det internationella strålskyddssamarbetet och bidrar därigenom till förbättringar av strålskyddet i främst Baltikum och Ryssland.

Myndigheten har idag ca 110 anställda och är belägen i Stockholm.

THE SWEDISH RADIATION PROTECTION AUTHORITY, SSI, is the government reguatory authority for radiation protection. Its task is to secure good radiation protection for people and the environment both today and in the future.

The Swedish parliament has appointed SSI to be in charge of the implementation of its environmental quality objective *Säker strålmiljö* ("A Safe Radiation Environment").

SSI sets radiation dose limits for the public and for workers exposed to radiation and regulates many other matters dealing with radiation. Compliance with regulations is ensured through inspections.

SSI also provides information, education, advice, carries out its own research and administers external research projects.

SSI maintains an around-the-clock preparedness for radiation accidents. Early warning is provided by Swedish and foreign monitoring stations and by international alarm and information systems.

The Authority collaborates with many national and international radiation protection endeavours. It actively supports the on-going improvements of radiation protection in Estonia, Latvia, Lithuania, and Russia.

SSI has about 110 employees and is located in Stockholm.

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