The Ministry of the Environment

National Radiation Safety Development Plan 2008-2017

Tallinn 2008

Contents

Introduction

Ensuring radiation safety can be defined as regulation of radiation practices for the protection of people and the environment and arrangement of natural radiation source monitoring. In order to ensure radiation safety, it is necessary to determine which objectives must be achieved by the Estonian radiation protection.

The development of radiation safety in Estonia has mainly taken place within the last ten years, for which reason both the needs and future visions have changed radically by now. Accession to the European Union (hereinafter: EU) has granted us new possibilities, but also established requirements and limitations. By today, instead of monitoring over compliance with limit values, ensuring radiation safety has become a part of the radiation safety quality system. Long-term planning of ensuring radiation safety is difficult, but unavoidable in all fields of radiation practice. Radiation protection involves entirely different fields of activity: medicine, industry, preparedness for emergencies, environmental monitoring, etc. Constant and balanced development of all such domains is required for ensuring radiation safety.

The success achieved so far includes completed and ongoing projects associated with improvement of the safety of the Paldiski nuclear site and remediation of the Sillamäe tailings pond, as well as research into the field of natural radiation. In the last decade, the regulatory basis for ensuring radiation safety has been created in Estonia.

Successful arrangement of radiation protection has so far been impeded by lack of a plan specifying clear objectives and the measures to be applied for their achievement. For this purpose, in May 2006, the Ministry of the Environment commenced preparation of the "National Radiation Safety Development Plan 2008-2017" (hereinafter: NRSDP or Development Plan). The Development Plan has been prepared based on the Radiation Act and its implementing legislation. The Development Plan specifies priorities of radiation protection development until the year 2017 and the measures and guidance documents required for achievement of the established objectives.

The general objective of the Development Plan is ensuring radiation safety. Strategic sub-objectives of the Development Plan are as follows:

1) suppression of hazards associated with radioactive waste and its management;
2) ensuring preparedness for response to radiation emergencies;
3) improvement of the awareness of sources of elevated natural radiation;
4) ensuring optimised use of radiation in medicine;
5) creation of optimised radiation safety ensuring system in the Republic of Estonia.

Development of these fields is important at least in the perspective of the next 10 years. Under the sub-objectives, the current situation and provisions included in the Act of Accession of Estonia to the European Union and the EURATOM Treaty are analysed and the main problems considered.

1. Associations with strategies and development plans of other fields, participating institutions

1.1. Associations with strategies and development plans of other fields

The NRSDP is based on the strategy Sustainable Estonia 21; it is a radiation protection-related development of the Estonian Environmental Strategy 2030 and the National Environmental Action Plan for the years 2007-2013.

In parallel, the development plans and strategies of associated fields are taken into account.

1.2. Associations with international law

Obligations accepted both on the national and international level must be considered. The main obligations arise from the Act of Accession to the European Union and the EURATOM Treaty, as well as from certain conventions.

The following international legislation has served as the basis for Development Plan preparation:

- *Convention of Early Notification of a Nuclear Accident*
- *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*
- *Convention on the Physical Protection of Nuclear Material*
- *Joint Protocol to the Application of the Vienna Convention and Paris Convention*
- *Agreement between the Government of the Republic of Estonia and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons*
- *Subsidiary Arrangements under the Safeguards Agreement under NPT between the Government of the Republic of Estonia and the IAEA*
- *Additional Protocol to the IAEA Safeguards Agreement*
- *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*
- *Convention on Nuclear Safety*

In addition to the aforementioned, the following European Union Directives and international recommendations have been considered upon Development Plan preparation:

- Council Directive 98/83/EC
- Council Directive 96/29/Euratom
- Council Directive 97/43/Euratom
- Council Directive 2003/122/Euratom
- Council Directive 92/3/Euratom
- Council Directive 89/618/Euratom

1.3. Institutions participating in Development Plan preparation

1.3.1. Authors

Preparation of the Development Plan was organised by the Ministry of the Environment. The Development Plan was prepared in co-operation between the Ministry of Social Affairs, Ministry of Economic Affairs and Communications, Ministry of the Interior, and Ministry of Education and Research. In addition, the following were involved: AS Silmet, AS Ökosil, AS A.L.A.R.A., Estonian Society of Radiology, larger hospitals, University of Tartu, Tallinn Technical University and a qualified radiation expert.

Strategic environmental assessment was carried out regarding the Development Plan. In order to find the assessor of environmental impact, a public procurement was arranged, based on which experts from OÜ ELLE were selected. The positive and negative impact on human health and well-being, the environment and property of the activities intended for achievement of the Development Plan objectives and their possible alternatives were evaluated by sub-objectives of this Development Plan.

1.3.2. Persons and institutions who may have justified interest in the Development Plan

In the course of Development Plan preparation, in addition to the authors, other persons and institutions possibly having justified interest in the Plan were taken into account as well, and involvement of various stakeholders was considered important.

In addition to the institutions included in the work group, opinions of the following parties regarding the Development Plan and strategic environmental assessment were inquired:

- Ministry of Culture
- Ministry of Economic Affairs and Communications
- Ministry of Agriculture
- Ministry of Finance
- Harju County Environmental Service
- Ida-Viru County Environmental Service
- Association of Estonian Cities
- Association of Municipalities of Estonia
- Paldiski City Government
- Saue City Government
- Saue Rural Municipality Government
- Sillamäe City Government
- Veterinary and Food Board
- Health Protection Inspectorate
- Labour Inspectorate
- Estonian Council of Environmental NGOs.

Proposals received from interested persons and institutions are discussed in the Section “Disclosure”.

2. State of Radiation Protection in Estonia by 2008

2.1. Ensuring radiation protection

2.1.1. Bodies participating in radiation safety-related activities

Pursuant to the Radiation Act, the Ministry of the Environment organises the activities related to radiation protection through the Environmental Inspectorate and the Radiation Protection Centre (hereinafter: ERCP). Such framework was established by the Radiation Act that entered into force in 2004.

In addition to this, several other ministries and their divisions are involved in ensuring radiation safety.

- The Ministry of the Interior regulates planning of construction works and participates in crisis regulation in the case of radiological emergencies and incidents, as well as in elimination of emergencies through the Rescue Board (and its Explosives Removal Centre), the Police and, in cases associated with nuclear materials, the Security Police;
- The Ministry of Economic Affairs and Communications co-ordinates development of the field of power engineering (choices associated with utilisation of nuclear energy), regulates design and building of construction works and is able to exert significant influence on reduction of the harmful effect of natural radiation through requirements established for construction works. A.L.A.R.A, a state-owned public limited company involved in management of radioactive waste is included under the Ministry's jurisdiction;
- The objectives of the Ministry of Social Affairs is protection of public health, arrangement of health care, and ensuring of the availability of health care services and respective means in emergency situations. The Health Protection Inspectorate, a body involved in supervision over drinking water quality, inter alia, is within the jurisdiction of the Ministry. The jurisdiction of the Ministry of Social Affairs also covers the Health Care Board, a body that issues and verifies health care licences and to which hospitals are required to submit reports, for example, concerning existing medicines. Since medical services (hospitals and emergency medical care) are required to report to the Ministry of Social Affairs, the tasks of emergency medical staff and hospitals are discussed here as well. These are mainly associated with consequences of accidents and emergencies and assisting people in such situations, arrangement of additional resources and medical supplies to the accident site, information exchange between different hospitals, and transport of casualties;
- The Tax and Customs Board within the jurisdiction of the Ministry of Finance supervises carriage of goods over state borders and manages a network of radiation monitors at the entry points;
- The Veterinary and Food Board within the jurisdiction of the Ministry of Agriculture carries out monitoring of agricultural products and supervision activities associated with food safety;
- The Ministry of Defence participates in ensuring radiation safety mainly in the case of emergencies. The Ministry's jurisdiction includes the Defence Forces of Estonia (assists in emergency works) and the National Defence League (supports emergency works).

In 2005, IAEA arranged an audit for the analysis of the state infrastructure of Estonian regulatory radiation protection and submission of recommendations for development thereof. Special attention was paid to arrangement of supervision. The competent radiation safety authority must be independent in its decisions, incl. independent from other governmental

agencies and boards involved in promotion of the use of radiation and from persons targeted by the regulations. Pursuant to legislation in force (Government of the Republic Act, Environment Supervision Act), ERCP as a state agency was unable to fulfil all of the functions of the aforementioned competent authority. Because of this, the Ministry of the Environment was designated as the competent authority.

Weaknesses

The system in force today, in 2008, is not optimal. The auditors from IAEA reached the same conclusion. Many difficulties have become evident in connection with determination of the tasks and area of responsibility of institutions involved in radiation safety-related activities. This has resulted in partial overlapping of tasks, vagueness of radiation protection-related information and unbalanced development of the radiation domain.

Opportunities

Specification of the tasks of institutions participating in radiation safety-related activities through amendment of the Radiation Act and statutes of the institutions.

2.1.2. Issue of radiation practice licences

Issue of a respective radiation practice licence by the Ministry of the Environment is a precondition to engagement in a radiation practice. Compliance with the established conditions is supervised by the Environmental Inspectorate in co-operation with ERCP. Actual proceeding of applications for radiation practice licences is conducted by ERCP.

More than 500 radiation practice licences have been issued by the Ministry of the Environment. Pursuant to the Radiation Act and the Environmental Impact Assessment and Environmental Management System Act, provisions of open proceedings may be applied upon the proceeding of applications for radiation practice licences.

Weaknesses

1. It is difficult for radiation protection licence applicants to understand exactly with whom they are required to communicate. The role of the Ministry of the Environment in the radiation practice licence-related proceedings is not specified with sufficient clarity.

2. Excessive resources are spent on issue of low-risk radiation practice licences and arrangement of their supervision.

3. In the present situation, medical institutions are required to apply for practice licences both to the Ministry of the Environment (radiation practice licence) and the Health Care Board (licence for provision of health care services). This is not efficient from the applicant's point of view.

Opportunities

Specification of the tasks of institutions participating in radiation safety-related activities through amendment of the Radiation Act and statutes of the institutions.

2.1.3. Supervision over radiation safety

Supervision over radiation safety is conducted by the Environmental Inspectorate, but until May 2004 the supervision for the purposes of the Environment Supervision Act was complicated, since the radiation practice licences issued based on the former Radiation Act did not include the conditions of issue or additional information. By now, co-operation between ERCP and the Environmental Inspectorate has developed: in the last two years, information events have been arranged for the inspectors, with consideration of various types of radiation practices and sources, radiation safety, inspection safety, theoretical and practical aspects of radiation practice supervision, and use of dosimeters.

The IAEA audit report also noted that the inspection programme (work plan) requires revision and that supervision principles based on risk assessments must be developed. The 2007 radiation safety supervision work plan of the Environmental Inspectorate was prepared in close co-operation with ERCP and radiation sites are inspected together. For improvement of the radiation safety supervision, amendments need to be made in the currently valid legislation and supervision system.

Weaknesses

1. The activity of the Environmental Inspectorate is based on the Environment Supervision Act, for which reason it is difficult to explain why the Environmental Inspectorate is required to exercise supervision over medical institutions.

2. Although there have been attempts of applying supervision over radiation practice licences through the Environmental Inspectorate since the year 2002, these have not been successful.

3. The number of inspectors trained in the field of radiation protection is not sufficient. The special nature of radiation activities and fragmentation between different domains significantly increases the inspectors' work load.

4. The statutes of ERCP do not require ERCP to participate in supervision over radiation practice licences. Because of this, resources cannot be planned for the respective activity.

Opportunities

Specification of the tasks of institutions participating in radiation safety-related activities through amendment of the Radiation Act and statutes of the institutions.

2.2. Radioactive waste management

The main radioactive waste-related facilities in Estonia are the Paldiski nuclear site from the times of the Soviet Union, a radioactive waste storage site at Tammiku, which does not comply with modern requirements, and a tailings pond for waste containing natural radionuclides at Sillamäe. The volumes and activity of radioactive waste created today are low. Waste containing natural radionuclides is created in the process of producing rare earth metals by Silmet Grupp AS. Waste and materials polluted with natural radionuclides, which cannot always be classified as radioactive waste for the purposes of the Radiation Act, are sometimes also created in the course of buildings renovation.

In 2002, the Government of the Republic established an expert committee and tasked it with submission of proposals for preparation of national radioactive waste management strategy. The committee submitted the following proposals:

- The Ministry of the Environment is to be responsible for preparation and co-ordination of the radioactive waste management strategy.
- The Tammiku radioactive waste burial site must be decommissioned and the radioactive waste relocated to the Paldiski intermediate radioactive waste storage facility.
- For the purpose of safe keeping of the reactor sections of the Paldiski site until the time when the possibilities for reactor parts dismantling and storage and permanent burial of the resulting radioactive waste are established, the reactor sarcophagi must be reinforced and improved, as well as equipped with the necessary monitoring and ventilation systems;
- The main building and facilities of the Paldiski site must be reconstructed to smaller volume and the interim storage block located in the main building adjusted to long-term storage requirements;
- The management strategy of radioactive waste produced at the private enterprise (AS Silmet) must be prepared by the producer and co-ordinated with the Ministry of the Environment in order to be granted the respective activity licence;
- A fund must be established for covering the costs associated with proper management and permanent burial of radioactive waste created in the course of the production process.

Commencement of the preparation works required for construction of a permanent radioactive waste storage site has been planned since 1997. However, state decisions in the field of radioactive waste management are still lacking in Estonia.

Estonia has acceded to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, which stipulates that as long as this is made possible by management safety, permanent storage of radioactive waste must take place in the country in which they were created. Therefore, the work group that prepared this Development Plan is of opinion that the optimal solution is construction of a permanent radioactive waste storage facility in Estonia.

In addition to a permanent storage site, a state system for management and storage of radioactive waste containing natural radionuclides is lacking in Estonia. A suitable method for management of materials contaminated with natural radionuclides has not been found as well.

Weaknesses

1. Preparation of an activity plan for management of radioactive waste has not begun.

2. A system of financial guarantees ensuring constant availability of means for recovery of disused radiation sources is lacking.

3. A co-operation network of institutions for fast discovery, handling and storage of orphan sources is lacking.

4. The issue of follow-up management of materials contaminated with natural radionuclides has not been resolved. In most cases, these consist of metal scrap that needs to be recycled, but the companies involved in purchasing metal are unwilling to receive metal contaminated with radionuclides.

5. A final storage facility for radioactive waste is lacking and planning thereof has not yet commenced.

6. A state system for management and storage of radioactive waste containing natural radionuclides is lacking.

Opportunities

Preparation of an activity plan for management of radioactive waste must be commenced, with consideration of the aforementioned problems.

2.2.1. The former Paldiski nuclear site

The Paldiski site was transferred to Estonia in 1995. The site is administered and the decontamination works performed by AS A.L.A.R.A. The Russian Federation removed nuclear fuel from the reactors and dismantled the training rigs, leaving into the main building only both of the nuclear reactor-containing submarine sections, around which reinforced concrete sarcophagi were built. Nevertheless, subsequent research and evaluations have shown that the storage conditions of the former nuclear site's reactors were not in compliance with the safety criteria recognised by IAEA (The Principles of Radioactive Waste Management). In addition to the main building, the site's territory (29 ha) contains two storage facilities for (solid and liquid) radioactive waste, a liquid waste processing complex, a ventilation centre, a special facility for washing contaminated work clothing, a boiler house, and several other auxiliary construction works required for ensuring the nuclear reactors' operation. Since the transfer of the nuclear site, most of the radioactive and non-radioactive waste has been cleared and most of the construction works on the territory demolished.

The total activity of reactor sections amounts to 230 TBq, mainly on account of activation products ^{55}Fe, ^{60}Co, ^{63}Ni (in the reactor housing and structure materials) and ^{152}Eu, ^{154}Eu (reactor control rods). Also, it is known that the recovery unit of the Russian Federation closed into reactor sections some sealed radiation sources with total activity of 5 TBq.

In 1999, a European Commission project was launched for the purpose of determining the possible scenarios of sarcophagus management and establishing of the cost of the scenarios. According to initial recommendations, from the viewpoint of radiation protection it would be useful to wait at least 50 years (it excluded scenario 1.1) so that the main radionuclides would have time to decay. In the case of all scenarios, a storage place for radioactive waste produced in the course of section dismantling needs to be determined, since the interim storage facility located at the former Paldiski nuclear site is not large enough.

In 2005, within the framework of the European Union PHARE project 632.03.01 *Safe long-term storage of the Paldiski sarcophagi and related dismantling activities*, design and construction works commenced at the Paldiski site, the objective of which was to ensure safe storage of the reactors and radioactive waste for at least 50 years.

The radioactive decontamination works at the site until 2012 have been planned as follows:

- Design and construction works and owner supervision within the framework of the PHARE project 632.03.01 *Safe long-term storage of the Paldiski sarcophagi and related dismantling activities* (the works were completed by October 2006, the constructor's warranty period will end in November 2008);

- Deactivation works in the main building of the former Paldiski nuclear site – fulfilment of AS A.L.A.R.A's obligations within the framework of the PHARE project, incl. removal of radioactively contaminated materials from the former nuclear fuel cooling basin (the works were completed in 2006);
- Deactivation works of the radioactively contaminated former nuclear fuel cooling basin (the works will be completed in 2008);
- Radioactive waste management at the former Paldiski nuclear site. For the purpose of further reduction of the volume of radioactive waste, additional radiation research and decontamination of waste collected in the course of earlier Paldiski site radioactive waste management projects is envisaged (the works will be completed by 2012);
- Dismantling of ventilation and special sewer systems at the former Paldiski nuclear site (the works will be completed in 2012);
- Surveys preceding to dismantling of two reactor sections of the former Paldiski nuclear site in 2008-2012, incl. composition of EU project application;
- Participation in research preceding to construction of a permanent radioactive waste storage facility, incl. participation in project application composition.

Although an overwhelming majority of the decontamination works at the former Paldiski nuclear site should be completed by 2012 according to the plans, the works associated with final dismantling and ensuring safety will be performed in 2040-2050.

Weaknesses

1. Decisions have not been made regarding the fate of the reactor sections after the safe keeping period. Radioactive waste created upon dismantling will not fit into the existing Paldiski interim storage facility.

2. Surveys required for preparation for dismantling of the reactor sections at the Paldiski site are lacking. Information collection and development of the possible working methods is required.

3. A facility for permanent disposal of radioactive waste created in connection with dismantling of the former Paldiski nuclear site's reactor sections is lacking in Estonia.

Opportunities

Preparation of an activity plan for the management of radioactive waste must be commenced, with consideration of the aforementioned problems. Launching of surveys required for preparation for dismantling of the reactor sections at the Paldiski site.

2.2.2. Paldiski interim storage facility for radioactive waste

In 1997, an interim storage facility for radioactive waste was established at the main building of the former Paldiski nuclear site. The interim storage was designed for the purpose of containing all radioactive waste that may be created in connection with decommissioning of the Paldiski nuclear site (a training centre for the crews of Soviet nuclear submarines), with the exception of reactors. The storage facility is divided into two sections, both of which can hold 360 waste containers (dimensions 1.2 x 1.2 x 1.2 m). Similarly to the entire former nuclear site, the interim storage facility is administered by AS A.L.A.R.A.

Presently, one-third of the interim storage facility has been filled up, mainly with used

artificial sealed radiation sources, such as ^{90}Sr, ^{137}Cs, ^{60}Co and Pu-Be neutron sources with total activity of 1,000 TBq. There is no liquid radioactive waste at the interim storage facility.

Weaknesses

1. The interim storage facility is too small in order to hold all of the radioactive waste created in the process of dismantling the former Paldiski nuclear site's reactor sections.

2. A final storage facility for radioactive waste is lacking in Estonia and preparatory research has not been launched either.

Opportunities

Preparation of an activity plan for management of radioactive waste must be commenced, with consideration of the aforementioned problems. Initiation of surveys required for preparation of a radioactive waste final storage facility.

2.2.3. Tammiku radioactive waste storage facility

In Tammiku site there is a "Radon" type radioactive waste storage facility, constructed in the beginning of the 1960s. The burial site was used from 1963 to 1995, i.e. until it was transferred to AS A.L.A.R.A. In 1994, the Swedish Radiation Protection Institute prepared a safety assessment regarding the Tammiku waste disposal facility – according to this assessment the facility did not comply with modern safety requirements established for radioactive waste storage facilities. Because of this, the Paldiski interim storage facility is currently used for storage of radioactive waste.

By 1995, approx. 55% of the total volume (200 m^3) of solid waste storage facility was filled with unpacked and unsorted waste, the total activity being 76 TBq. Used sealed artificial radiation sources ^{90}Sr and ^{137}Cs make up the main part of the waste. However, a clear overview of the waste stored in the facility is lacking, for which reason there may be surprises in the course of its liquidation.

In the year 2001, liquid waste reservoir elimination works were completed. Further measures include preparation of an environmental impact assessment report regarding liquidation of the storage facility and dismantling works in the years 2006-2011.

Weaknesses

The Tammiku waste storage facility cannot be regarded as a permanent burial site for radioactive waste, since the safety assessment suggests that from the viewpoint of surrounding environment and human health, long-term safety of the waste deposited there is not ensured.

Opportunities

The waste storage facility must be decommissioned.

2.2.4. Radioactive waste containing natural radionuclides (incl. existing and future waste generated in AS Silmet)

Radioactive waste containing natural radionuclides is mainly generated in Sillamäe. In 1946-1995, besides uranium, the local enterprise No. P-6685 also processed other raw materials containing radioactive nuclides, such as loparite and chlorides of rare earth metals.

Since 1995, the waste containing natural radionuclides generated in the course of AS Silmet's operation is being stored in an interim storage facility at the territory of the company. In the long term, permanent storage of the waste or its recovery in some other way is required, but a suitable method is yet to be found.

There is also a tailings pond for uranium and rare earth metal processing waste in Sillamäe. The tailings pond contains approx. 12 million tons of processing waste and oil shale ashes. In summer 1997, a reorganisation project of the Sillamäe tailings pond was initiated by the Republic of Estonia and AS Silmet Grupp. The Sillamäe tailings pond is being rendered harmless by AS Ökosil, a company created for this purpose, which is based on both state and private capital. Remediation of Sillamäe tailing pond takes place with financial support from EL PHARE LSIF and the Nordic countries. At the time of Development Plan composition, the works are still ongoing.

Weaknesses

1. Issues associated with permanent storage of radioactive waste created in the course of the production process of AS Silmet have not been resolved.

2. A system for management and storage of radioactive waste and materials containing natural radionuclides is lacking.

Opportunities

Preparation of an activity plan for management of radioactive waste must be commenced, with consideration of the aforementioned problems. Creation of a system for management and storage of radioactive waste and materials containing natural radionuclides.

2.3. Radiological emergency

Depending on the extent and hazard level of their consequences, radiological emergencies can be divided into two groups: radiological emergencies of significant influence (in accordance with the definition of the Emergency Preparedness Act) and radiological emergencies (incidents) of insignificant influence which are not likely to develop into an emergency, but where the limit value of public exposure is exceeded.

In the first half of the 1990s, prevailing reasons for radiological incidents included privatisation and repeated re-selling of several industrial enterprises, interruption of their operation, uncontrolled dealing in scrap metal, poor control at entry points and inadequate monitoring over radiation safety. The results of these problems keep manifesting themselves up to the present day: from time to time, radiation sources not registered in the Radiation Source Register are discovered at scrap metal receiving centres or locations of casual nature. Since the beginning of 1990s, three grave accidents have taken place in Estonia:

- in 1994, some people broke into the Saku-Tammiku radioactive waste storage facility and removed a radiation source of high activity. One person died and several others were injured.
- in 1994, a radiation source of high activity was discovered at EMEX (scrap metal company).
- in 1995, a similar radiation source of high activity was discovered in Valgejõe, next to the St. Petersburg highway.

Within the last 10 years, approximately 30 incidents have taken place in Estonia. These include finding of orphan sources or materials containing radioactive components. The incidents have also often involved metallic objects slightly contaminated with natural radionuclides, fire alarms or luminescent paints containing radioactive substances, which pose no danger to people or to the surrounding environment. Orphan devices containing a radioactive source of radiation, mainly level sensors, are somewhat more dangerous.

Considering the distance of the greatest sources of nuclear hazard for Estonia – the nuclear power plants in Russia and Finland – from our borders, based on the forecast models research conducted at ERCP, exposure of Estonian population to airborne contaminants arriving from outside Estonia to such extent that evacuation is required as a protection measure is unlikely. At the same time, the need for small-scale evacuation may arise in connection with resolution of some local radiological emergencies. Application of long-term protection measures is regulated by Regulation No. 93 of the Minister of the Environment of 14 July 2004 "Intervention Levels and Action Levels, and Limits for Emergency Exposure in Case of a Radiological Emergency".

In accordance with the Emergency Preparedness Act, the Ministry of the Interior is the leading ministry in the field of crisis management, and the tasks of the Rescue Board subordinated to it include performance of rescue works and crisis regulation. Through ERCP, the Ministry of the Environment arranges environment and radiation protection, and environmental and radiation monitoring. ERCP possesses the following technical means for arrangement of radiation monitoring, discovery of possible radiological emergencies and prediction of their extent: an early warning radiation monitoring network consisting of 10 automatic stations (see Annex 2), a mobile radiation monitoring laboratory, radiation measuring equipment, and a programme for predicting the spread of pollution. The purpose of the early radiation hazard warning system is to detect arrival of possible transboundary radioactive pollution to Estonia. For this purpose, the level of gamma radiation in the atmosphere and radionuclide content of solid air particles and aerosols is measured in real time on open landscape.

Elimination of the consequences of major accidents and assistance to the population (if an emergency situation has not been declared) is managed by the crisis management committee of the Government of the Republic and the local authorities or teams and committees established by them. Rescue and restoration works are managed directly by the Rescue Works Staff. The communication channels used both for acquisition of monitoring information from the network of automatic stations and information exchange with other agencies include public telephone lines, fax mail, mobile communications and the Internet. Information on radiation hazard is transmitted to members of the public by television, radio and other means of mass communication in accordance with the crisis management committee's decision. The content of respective messages will be prepared by the committee's management group and transmitted by the management group's press centre. Content of the group's messages follows the guidelines for radiological emergencies prepared by ERCP. The Information and Analysis

Department of the Ministry of the Interior transmits the information to the management of the Ministry of the Interior and other services, if necessary, in accordance with the communication and notification scheme of the radiological emergencies resolution plan. For registration of radiological emergencies, ERCP utilises an electronic database accessible for the personnel of both ERCP and the Information and Analysis Department of the Ministry of the Interior. Tasks of the establishments involved in resolution of radiological emergencies have been presented in Annex 3.

The Republic of Estonia has joined several international conventions and concluded official agreements with Finland and Latvia regarding information exchange in the case of radiological emergencies. Estonia also participates in the radiation information exchange programme functioning within the framework of the Council of the Baltic Sea States. ERCP is the official information point in the databases of both the International Atomic Energy Agency and of the European Commission.

ERCP arranges training for state agencies and has instructed both the Rescue Board and Customs staff in matters related to radiation hazard monitoring. Experience is also acquired through participation in international training exercises.

Weaknesses

1. The responsibility of different bodies in the case of radiological emergencies requires specification. The legislation in force is controversial and does not establish unambiguously the responsibility of state agencies and the procedure for co-operation. Therefore, division of obligations and development of various procedures requires specification.

2. An integral overview of Estonia's capabilities and means for responding to radiological emergencies is lacking.

3. As regards technical means, the measuring equipment of both the Rescue Board and ERCP requires improvement, as well as the measuring and deactivation equipment of the AS A.L.A.R.A involved in performance of deactivation. The level of emergency response personnel must be improved as well.

4. In the case of radiation emergencies, the awareness of population is of significant importance – unfortunately, it leaves much to be desired.

5. In the recent years, the volume of common training courses for different agencies and practical training has been insufficient. Also, the instructions available are scarce – and the ones available are not co-ordinated between agencies.

Opportunities

Harmonisation of the instructions of different agencies for specification of their obligations, the need for resources and training, arrangement of training. Amendment of legislation.

2.4. Natural radiation and radiation awareness

2.4.1. Natural radiation

The average annual radiation dose to persons living in Estonia from natural sources is 2-3 mSv. The dose is caused by radon in residential buildings, radionuclides in drinking water, radioactivity of ground and construction materials, cosmic radiation and, to a smaller extent, man-caused pollution of the environment and radionuclides in food products. Human activities, mainly use of radiation and radionuclides in medicine, add only 20%.

The objective of the Radiation Safety Development Plan is to inform members of the public and enhance research in order to determine the extent of the problem.

Monitoring of ionizing radiation is arranged within the framework of national environmental monitoring.

Based on IAEA's recommendations, the following are examined:

- atmospheric particles and external gamma dose rate;
- surface water
- drinking water and domestic water;
- milk produced in Estonia;
- general average food intake.

The atmospheric radiation monitoring data are acquired from monitoring stations located in different areas of Estonia and measuring the gamma dose rate in real time. In three of the stations the radioactivity of various air particles is measured as well. The average annual gamma dose rates in the entire monitoring network have been relatively similar, ranging from 70 to 104 nSv/h in the past five years. The annual committed effective dose caused by this to the population does not exceed 0.6-0.9 mSv.

Once in three months, ERCP conducts surface water monitoring, in the course of which the activity concentration of ^{137}Cs in river water is measured. In connection with this, water samples are taken from the Pärnu River flowing into the Gulf of Riga and the Narva River flowing into the Gulf of Finland.

Within the framework of marine environment monitoring, the activity concentration of artificial radionuclides is determined gammaspectrometrically at five stationary stations. The ^{137}Cs circulating in marine environment mainly originates from Chernobyl; land-based amounts are currently negligible. The radionuclide content in seawater and fish is low and has been decreasing over the recent years.

Monitoring of radionuclides in daily food intake of the population is performed by ERCP twice a year. Artificial radionuclide content in a person's daily food intake is monitored. In addition to this, ERCP has analysed ^{137}Cs content in the berries and mushrooms picked mainly in the Ida-Viru County and from the meat of some salt-water fish and wild animals. Food products consumed on more extensive basis are also measured.

Monitoring of radionuclides content in milk is performed by ERCP once in three months. Combined samples of milk produced in different regions of Estonia are analysed and the content of artificial and natural radionuclides measured.

Drinking water

In the course of the accession negotiations, Estonia did not apply for transitional periods in the field of radiation protection – because of this, enforcement of the acquis communataire has been mandatory from the date of accession. Estonia has accepted the obligation of following the requirements established for the quality of water intended for human consumption by the Council Directive 98/83/EC (hereinafter: drinking water directive). Proceeding from the drinking water directive, in Estonia, the maximum allowed value of effective dose from drinking water is 0.1 mSv/a (hereinafter: reference level or limit value).

Generalisation of the results of groundwater radioactivity research carried out in 2005 showed that data regarding natural radionuclide content is available on 155 of the approx. 500 bore wells producing water from the Cambrian-Vendian acquifer complex. In approx. 80% of all bore wells examined the effective dose exceeded the reference level, i.e. 0.1 mSv/a. Since some of the analyses required cannot be conducted in Estonia, they are ordered from Finland.

The most resource-demanding way for ensuring compliance of drinking water with the requirements is reduction of the consumption of drinking water containing radionuclides by way of purification, dilution or replacement, which may increase the price of water for consumers. Upper groundwater levels should be preferred. Another possible solution would be extension of compliant existing water supply systems, thereby ensuring high-quality drinking water to a greater percentage of the population.

Due to the problem of drinking water radioactivity, the price of water may increase in connection with processing of the water by water supply operators in order to ensure its compliance with standards. Therefore, informing of the general public about the increase in price of water and the issue of drinking water radioactivity must be considered important – presently, such notification is minimal. The water supply operators do not inform the consumers of the quality indicators of water supplied and information materials are lacking as well. This must be taken into consideration when planning further activities.

Weaknesses

1. There are regions in Estonia where the inhabitants consume drinking water characterised by elevated radionuclide content.

2. Insufficiency of the data does not allow sufficiently precise assessment of the number of people consuming drinking water characterised by elevated radionuclides content and their expected effective doses per year.

3. It is impossible to estimate the expected annual effective doses from consumption of water with elevated radionuclide content and determination of the radionuclides that make up the dose component of drinking water by accredited methods in Estonia.

4. It is impossible to conduct reliable research on how and to what extent is the health of people living in Estonia influenced by drinking water with elevated radionuclide content.

5. If the allowed radionuclide content limit value in drinking water (0.1 mSv/a) is exceeded, the population should be provided with recommendations for safe consumption of such water.

6. Limited awareness of, and interest in, radioactivity of drinking water among drinking water suppliers.

Opportunities

Conduct of additional research and making decisions on its basis.

Radon

In Estonia, radon is responsible for approximately one-half of the radiation dose from natural sources, i.e. approx. 1 mSv per year. Although limit values of radon have not been established in Estonia by legislation, the standard "Internal Climate" has established 200 Bq/m3 as the radon content limit value in the living, working, and rest areas of buildings designed. However, as a regulatory document, a standard is often too 'light' in order for the radon content to be taken into account upon buildings construction.

One of the objectives of radon research carried out in Estonia was notification of residents, designers, builders and local authorities of the radon problem and the possibilities for its alleviation. In the course of research, seminars have been arranged where the problem and survey results were notified to the personnel of local governments, health protection and environmental protection specialists and planners. An information booklet intended for the inhabitants was composed and printed for mass circulation, in which the essence of the radon problem is discussed in a popular form. In addition to this, a publication "Radon-safe Residential Building" (*Radooniohutu elamu*) has been issued, which covers in comprehensible form the principles of the standard EVS 840:2003 "Design of Radon-safe Construction Works" (*Radooniohutu hoone projekteerimine*) and general requirements to construction of radon-safe residential buildings. Radon has often been discussed in the magazine "Keskkonnatehnika" (*Environmental Technology*). Relevant information can also be found at ERCP's home page. Members of the public should also be informed in the course of construction projects or detailed plan-related counselling.

Weaknesses

1. Although information events have been arranged, printed matters published and research results introduced to both officials and the general public, this has not been sufficient.

2. A specific radon content limit level has not been established for existing construction works; it is difficult for construction specialists and members of the public to make decisions regarding the level at which it would be expedient to take some kind of measures.

3. Auxiliary technical documentation regarding reduction of radon content in existing construction works is lacking.

4. The radon hazard is not taken into account when planning new dwelling areas and constructing buildings.

5. As regards radon content of ground air, availability of the data varies by region.

6. In Estonia, the radon content in indoors atmosphere has not been examined in several

regions.

Opportunities

Composition and spreading of relevant information.

2.4.2. Radiation awareness

The main direction is improvement of the awareness of Estonian population. According to the Development Plan, adequate in-service training must be ensured for exposed workers and specialists involved in the field of radiation.

In Estonia, the level of journalism covering radiation protection-related subjects remains below the level desired. Finding high-quality information is difficult, since the so-called secondary radiation information produced in Estonia is fragmented and of inconsistent quality. In the present situation, mere compilation of information would not be sufficient for improvement purposes – the information needs to be processed and interlinked as well.

Weaknesses

1. Lack of information and training possibilities.
2. Radiation safety-related information is fragmented and unconnected.
3. The related subjects are rarely covered by the media.

Opportunities

Media workers must be ensured convenient access to information and a possibility for consulting with true specialists. In order to arouse constant interest among members of the public with respect to radiation-related news and analyses, regularly published attractive columns must be established in the press that also include comments by experts. In order to improve the quality of radiation information, media-related training should be provided to potential producers-mediators of radiation-related news among the radiation protection personnel.

2.5. Medical exposure

The purpose of medical exposure is early detection of illnesses, diagnosis, prediction of patient's condition, and treatment. Each year, more than one million medical radiological procedures are performed on more than three hundred thousand people in Estonia. A questionnaire survey conducted in co-operation between ERCP and the Estonian Society of Radiology indicated that x-ray procedures make up almost 60% of all examinations carried out in one year. The equipment used is mainly more than 5 years old, with the exception of computed tomography.

2.5.1. Radiological safety of patients

In the process of application for radiation practice licences, attention is mainly paid to protection of exposed workers. At the same time, determination of the doses to which patients are exposed to and optimisation of the use of radiation is becoming increasingly more important. Unfortunately, as compared to other countries, Estonia's data in reports of UNSCEAR have been relatively scarce, which proves the need for development of patient dosimetry. To this day, systematic arrangement of patient dosimetry is lacking in Estonia. In 1993, the quality of x-ray equipment in Tartu and Southern Estonia was checked for the first time and the patient doses measured within the framework of a joint Estonian-Finnish project. Based on the results of these measurements, the patient doses sometimes exceeded the European average by up to five times. The main reason for this may be the low radiation sensitivity of the film screens used at the time.

General requirements to radiological safety of patients have been established by the Directive 97/43/EURATOM, application of which is mandatory for all EU Member States. With entry into force of the new Radiation Act (2004), a Regulation of the Minister of Social Affairs was repealed that established requirements to use of radiation in diagnosis and treatment of illnesses and requirements for protection of persons prone to medical exposure. Currently a new Regulation of the Minister of Social Affairs is being prepared, which establishes the requirements and criteria for the radiological personnel and equipment, radiation protection of patients and personnel, and radiological procedures.

Weaknesses

1. Patient dosimetry is not carried out systematically, i.e. only a few hospitals (and in them only a few diagnostics methods involving medical exposure) are covered. Based on the existing data, it is impossible to determine the annual dose load from medicine.

2. Thorough statistics on examinations carried out in Estonian health care institutions is lacking, as well as a database containing information on the medical radiation equipment, patients and doses to which patients are exposed.

3. Reference values of medical exposure associated with diagnostic procedures have not been established in Estonia.

4. Information materials for patients and those closest to them regarding procedures involving medical exposure (and radiation therapy-related guidelines) are lacking.

Opportunities

Co-operation between institutions engaged in activities involving medical exposure, in order to generate databases and statistics.

2.5.2. Training

Training of personnel is one of the most important measures ensuring radiological safety.

At the University of Tartu, the volume of medical exposure-related training within the framework of medical training is insufficient. In the field of radiology, residency lasts for 4 years, even though the European Association of Radiology and the radiology section of the

European Union of Medical Specialists have approved a 5-year residency study programme: "*European Training Charter in Clinical Radiology*".

An in-service training system is lacking, as well as instructors. Until now, the possibility of utilising in-service training arranged within the framework of IAEA technical co-operation projects has granted some relief.

Weaknesses

1. The existing education system does not allow training of a sufficient number of necessary specialists. Instructors are lacking as well.

2. Lack of possibilities for in-service training.

3. Medical radiological procedures-related instruction materials intended for the personnel are scarce or altogether lacking. Co-operation between agencies upon preparation of instruction materials is insufficient.

Opportunities

A balanced state education system must be developed.

2.5.3. Quality

The quality of diagnostic and therapeutic medical exposure must be ensured on many different levels. The examinations performed must be justified and use of radiation optimised. This will be supported by introduction of the national e-Health information system (which provides a quick overview of patients' diagnoses and treatment plan). The dose to which a patient has been exposed to must be indicated in the health history, and both the general practitioner and medical specialists must be able to consider it when planning further medical radiological procedures. The patient's dose must not exceed the established reference dose.

The European Council has established quality criteria for different fields regarding radiographs of adults and children, computed tomography and mammography.

The related activities are not co-ordinated in Estonia. Considering the increase in the number of computed tomography procedures that has taken place in the recent years, a need has emerged for guidelines regarding their assignment. Pursuant to the EURATOM 97/43 directive, such guidelines are mandatory for all EU Member States. At the same time, use of alternative methods should not be forgotten, in order to ensure that performance of medical radiological procedures is justified and optimised.

In the case of radiation therapy, the doses received by patients must be determined at the precision rate of 5% of the value established in the course of treatment planning. It is necessary to ensure that doses to normal tissues do not exceed their radiation tolerance. A genuine breakthrough has taken place in recent years in the field of radiation therapy planning. At the North Estonia Medical Centre Foundation, the medical cards of patients were updated in 2002. The doctor administering radiation therapy enters in the card a description of the radiation volume and the value of the absorbed dose and signs the entries. At the end of 2003, within the framework of IAEA technical co-operation programme, the radiation therapy departments of both the North Estonia Medical Centre Foundation and the Tartu University Hospital acquired a new treatment planning system allowing determination of radiation target

volume in the areas of the patient's body influenced by computer tomography, as well as three-dimensional dose accounting.

In the case of radiation-related activities, an independent auditor may be used – for example, clinical audits are arranged within the framework of IAEA technical co-operation projects. The objective is to arrive at a situation where the work results of both radiation therapy centres in Estonia comply with good practices of medical exposure application and requirements provided for by legislation.

Weaknesses

1. Although the requirement of quality system development has been specified in various laws and regulations, no systematic efforts have been made for this purpose. The need for the quality system must be realized by the management boards of medical institutions, since medical staff cannot create the system without their support.

2. A system for auditing application of medical exposure is lacking.

3. In Estonia, the cases where the benefits of preventive x-ray diagnostics for the society outweigh possible personal injury have not been specified.

4. Optimisation of patient doses requires additional examination.

5. The price of health care services often does not account for the costs associated with establishment and operation of a medical exposure quality system and ensuring radiation safety, for which reason there may be cases where radiation safety requirements are not followed.

Opportunities

Activities must be developed for elimination or alleviation of the aforementioned deficiencies.

3. Strategic Objectives of Ensuring Radiation Safety

This section establishes the strategic objectives of radiation protection. One of the main objectives is elimination of the deficiencies discussed in preceding Sections.

3.1. Strategic objective 1. Creation of an optimised radiation safety ensuring system in Estonia

Indicator No. 1: creation of additional jobs at ERCP and at the Health Care Board.
Target level for 2012: as compared to 2007, 4 additional jobs have been created.

Indicator No. 2: amendment of the Radiation Act.
Target level for 2009: the Radiation Act has been amended; it now provides for improved division of tasks between institutions involved in radiation safety-related activities.

Measures

3.1.1. Preparation of Act to Amend the Radiation Act

Activity

1. Establishment of a work group for preparation of Act to Amend the Radiation Act. The work group must include at least representatives of the same agencies that participated in composition of the NRSDP.

2. Development of policies for arrangement of the ensuring of radiation safety. Co-operation between the Ministry of the Environment, Radiation Protection Centre, Environmental Inspectorate and Health Care Board in order to ensure more efficient control over radiation practice licences. Co-operation between the Ministry of the Environment and Radiation Protection Centre for identification of the possibilities for combining the radiation practice licences and the licences for provision of health care services, thereby ensuring optimal use of available resources.

3. Composition of a draft Act to Amend the Radiation Act and submission thereof for approval.

Direct results

1. A work group for preparation of Act to Amend the Radiation Act is established in 2008.

2. Arrangement of ensuring radiation safety has been agreed by the end of 2008. ERCP and Health Care Board shall determine the possibilities for combining the radiation practice licences and health care services provision licences issued to medical institutions. If the decision is positive, amendments shall be made in the Radiation Act by 2009.

3. The draft Act to Amend the Radiation Act shall be ready by 2009.

4. The draft Act to Amend the Radiation Act shall include new provisions concerning issue of, and supervision over, radiation practice licences. From the year 2012, a radiation practice licence shall no longer be required for low-risk radiation practices.

5. The amended Radiation Act shall be submitted for approval in the first half of the year 2009.

3.1.2. Performance of works arising from amendment of the Radiation Act.

Activity

1. Amendment of the statutes of institutions involved in ensuring radiation safety.

2. Development of a radiation practices information system.

3. Composition of instruction materials both for agencies participating in ensuring radiation safety and radiation practice licence applicants and holders (for example, composition of guidelines regarding safe use of dental x-ray equipment for dentists within the framework of co-operation between the Estonian Dental Association, Estonian Society of Radiology, Estonian Society of Radiology Nurses, Faculty of Medicine of the University of Tartu, and Faculty of Physics and Chemistry of the University of Tartu. The guidelines must include requirements to equipment, facilities, employee competence, doses, reference dose level, quality management system, etc.).

4. Development of procedures for arrangement of supervision over radiation safety.

5. Implementation of a training programme for organisers of supervision.

6. Establishment of an in-service training system for exposed workers and officials.

7. Composition of the Regulation of the Minister of Social Affairs "Radiation Protection Requirements Set for Medical Radiological Procedures and Requirements for Protection of Persons Undergoing Medical Exposure".

8. Development of the working and measuring equipment stock.

9. Creation of additional jobs at ERCP and the Health Care Board.

Direct results

1. In 2009, the statutes of agencies are amended in compliance with amendments to the Radiation Act.

2. In 2009, a new procedure for notification of radiation practice is established.

3. Instruction materials are prepared on continuous basis from 2008 to 2010. By 2009, ERCP has prepared instruction materials regarding notification system.

4. Procedures for arrangement of supervision over radiation safety are developed by 2009.

5. In-service training system for exposed workers and officials is created by 2010.

6. The Regulation of the Minister of Social Affairs "Radiation Protection Requirements Set for Medical Radiological Procedures and Requirements for Protection of Persons

Undergoing Medical Exposure" is composed in 2008. The Regulation is adopted in 2009.

7. The working and measuring equipment stock is developed consistently.

8. By 2010, as compared to the base year (i.e., 2008), four additional jobs are created at the Health Care Board and ERCP.

9. By 2010, the radiation safety ensuring-related work organisation is optimal and high-quality public service is ensured to applicants for radiation practice licences.

10. By 2010, a system for determination of the quality of supervision over radiation practices is in use.

Limitations

Lack of qualified labour may interfere with creation of additional jobs: in Estonia, there are not enough people possessing radiation safety-related knowledge.

Possibilities for management

Creation of studying possibilities will help to solve the problem.

3.2. Strategic objective 2. Suppression of hazards associated with radioactive waste and its management

Indicator No. 1: renovation of the main building of the former Paldiski nuclear site and safe storage of reactor sections.
Target level for 2009: the main building of the former Paldiski nuclear site has been renovated and reactor sections safely stored.

Indicator No. 2: commencement of the research preceding to construction of a final storage facility and dismantling of the two reactor sections at the former Paldiski nuclear site.
Target level for 2011: research preceding to construction of a final storage facility and dismantling of the two reactor sections of the former Paldiski nuclear site has been initiated.

Indicator No. 3: establishment of a state system for management and storage of radioactive waste containing natural radionuclides.
Target level for 2013: a state system for management and storage of radioactive waste containing natural radionuclides is in operation.

Indicator No. 4: creation of a system of financial guarantees.
Target level for 2011: a system of financial guarantees exists.

Indicator No. 5: recovery of radioactive waste storage facilities that do not comply with the requirements.
Target level for 2013: full recovery and 100% closure of radioactive waste storage facilities that do not comply with the requirements.

Measures

3.2.1. Development of a radioactive waste management system

Activity

1. The Ministry of the Environment establishes a work group that will prepare the radioactive waste management activity plan (i.e., chooses the waste management method, specifies financing, e.g., covering of deactivation costs by the state).

2. In co-operation with AS A.L.A.R.A., the Ministry of the Environment shall prepare project applications for preliminary research concerning further management of radioactive waste (dismantling of the reactor sections and final storage facility) and submit these to the EU.

3. In co-operation with AS A.L.A.R.A., the Ministry of the Environment shall arrange commencement of preliminary research regarding the construction of a final storage facility.

4. The Ministry of the Environment shall initiate EIA for a processing centre and storage facility for radioactive waste containing natural radionuclides (incl. preparation of economic calculations).

5. The Ministry of the Environment shall initiate EIA for identification of the best alternative for a final storage facility (incl. alternative 0, i.e., the alternative where a storage facility is not constructed in Estonia).

6. AS A.L.A.R.A. shall arrange renovation of the main building of the former Paldiski nuclear site and safe storage of the reactor sections.

7. AS A.L.A.R.A. shall arrange deactivation of the radioactively contaminated former nuclear fuel cooling basin at the former Paldiski nuclear site.

8. AS A.L.A.R.A. shall arrange research preceding to dismantling of the two reactor sections of the former Paldiski nuclear site.

9. AS A.L.A.R.A. shall arrange radioactive waste management at the former Paldiski nuclear site.

10. AS A.L.A.R.A. shall arrange liquidation or terminal closure of the Tammiku radioactive waste storage facility based on the results of EIA.

11. AS Silmet shall compose a plan for storage or other recovery of its waste.

12. The Ministry of the Environment and AS Silmet shall implement long-term monitoring programme with respect to the Sillamäe tailings pond.

13. AS A.L.A.R.A. and the Ministry of the Environment shall establish state system for management and storage of radioactive waste containing natural radionuclides; a processing centre and a storage facility.

Direct results

1. By 2010, a radioactive waste management plan is completed, which also includes a decision on the method of permanent radioactive waste storage and choice of the final storage facility's location, with consideration of already stored, existing and future radioactive waste.

2. Project applications for preliminary research concerning further management of radioactive waste (dismantling of reactor sections and permanent storage site) are submitted to the EU in 2012.

3. Preliminary research associated with construction of a final storage facility for radioactive waste is initiated in 2011.

4. EIA for a processing and deactivation centre of natural radionuclides is initiated in 2009. The EIA is completed by 2010.

5. By 2012, at the latest, environmental impact assessment procedure is commenced with respect to a final storage facility.

6. The design and construction works within the framework of the PHARE project 632.03.01 *Safe long-term storage of the Paldiski sarcophagi and related dismantling activities* are completed in accordance with the specified volume and quality by 2009, with consideration of the project's objective – ensuring safe storage of the reactors and radioactive waste located at the main building of the former Paldiski nuclear site for at least 50 years, i.e. reconstruction or upgrading of the radioactive waste interim storage facility.

7. The radioactively contaminated former nuclear fuel cooling basin at the former Paldiski nuclear site is deactivated by 2009. The contaminated ventilation and special sewer systems at the former Paldiski nuclear site are dismantled by 2012.

8. The project application to be submitted to the EU regarding surveys preceding to dismantling of the two reactor sections at the former Paldiski nuclear site is prepared by 2010 and the surveys are initiated by 2011.

9. Management of radioactive waste until the year 2012 takes place in accordance with the requirements.

10. For the purpose of further reduction of the volume of radioactive waste at the interim storage facility in Paldiski, by the year 2012, additional research and (if possible) decontamination of waste collected in the course of earlier Paldiski nuclear site radioactive waste management projects are completed.

11. By 2011, the most suitable method has been applied for recovery of the Tammiku radioactive waste storage facility.

12. By summer 2008, AS Silmet has submitted a plan for storage or other recovery of its waste.

13. The long-term monitoring programme of the Sillamäe tailings pond has been approved by summer 2008.

14. A processing centre and a storage facility for radioactive waste containing natural radionuclides has been constructed by 2013, and a system for management and storage of such waste is in operation.

Limitations

Due to complexity of the field, not enough specialists and qualified workforce are available. In the case of some surveys, depending on the work schedules of existing experts, the deadlines may prove to be unachievable.

Possibilities for management

Long-term planning and preliminary agreements with specialists who will be performing the aforementioned works.

3.2.2. Creation of a radiation sources recovery system

Activity

1. The Ministry of the Environment as the responsible Ministry shall prepare the legislation amendments required for establishment of the fund.

2. In co-operation with institutions ensuring radiation safety, the Ministry of the Environment shall establish the basis for the fund's operation (for example, determine whether the contributions of radiation source owners shall depend on the number or activity of the sources).

3. In co-operation with institutions ensuring radiation safety, the Ministry of the Environment shall develop a system for recovery of orphan sources, which ensures precise distribution of tasks.

Direct results

1. Legislation exists that ensures existence of both the system of financial guarantees and the fund by 2009.

2. In 2009, Articles of Association of the fund exist that also identify the fund's administrator.

3. By 2009, clear departmental responsibility for recovery of orphan sources has been determined.

Limitations

The financial guarantee system cannot be applied with respect to companies already possessing sources. At the same time, owners of new sources cannot start financing the storage of orphan sources immediately.

Possibilities for management

Guarantees must also be found for sources not covered by the financial guarantees system.

3.3. Strategic objective 3. Ensuring preparedness for response to radiation emergencies

Indicator No. 1: trouble-free operation of the early warning system.
Target level for 2010: renewed early warning system is ensured.

Indicator No. 2: upgrading of the radiation emergency response measuring equipment and means required for deactivation.
Target level for 2010: the radiation emergency response measuring equipment and means required for deactivation have been upgraded and function in a sustainable manner.

Indicator No. 2: number of joint training exercises.
Target level for 2009: at least one training exercise per year.

Measures

3.3.1. Preparation of assessment of hazard caused by possible radiological emergencies

Activity

1. The institutions ensuring radiation safety shall compile the results of risk analysis for possible radiological emergencies into a single document. Such a document will allow better determination of the necessary aids and of whether more attention should be paid to transport or radiological accidents.

2. Based on a review of the existing situation, the Rescue Board and ERCP shall improve their measuring equipment and the measuring and deactivation equipment of AS A.L.A.R.A involved in performance of deactivation. For this, first of all, it needs to be specified what kind of means already exist and are potentially usable in case of emergencies. An overview of the means of the Environmental Inspectorate, radiation practice licence holders, the Border Guard, Tax and Customs Board, medical institutions, and research institutions must be prepared. It must be considered that in the case of an emergency it must be possible to conduct some simpler analyses in the city closest to the source of danger, in order to ensure availability of the most recent information for making of correct decisions (transportation of all samples would result in excessive loss of time). If possible, Estonia should be covered with primary emergency response means.

3. ERCP shall ensure renewal of the early warning system's detectors and connections, as well as backing up of the information (e.g., at the Ministry of the Interior), in order for the system to operate and data transmission take place even if the server of one of the institutions should fail.

Direct results

1. The institutions responsible have analysed the risks of radiological emergencies, consolidated the risk analyses of different institutions and determined the priorities in technical equipment acquisition by 2009.

2. By 2008, an overview exists of the technical means for response to radiological emergencies available in Estonia and of their condition. The plan for improvement of the measuring equipment of the Rescue Board and ERCP, as well as of the measuring and deactivation equipment of AS A.L.A.R.A involved in deactivation works is completed and acquisition of the necessary means commenced in 2008.

3. Early warning system detectors and connections are renewed by 2010. Backup system is ensured by 2012.

3.3.2. Preparation of an activity plan for emergencies together with determination of spheres of responsibility

Activity

1. Specification of the responsibility and possibilities of different agencies for improved arrangement of practical response to radiological emergencies and acquisition of an overview of the possibilities for medical aid.

2. The activity mentioned in Section 1 requires making amendments in legislation.

3. Organisation of joint training exercises in order to ensure better co-operation.

Direct results

1. By 2009, a detailed overview of the situation is available and the agencies responsible have acknowledged their areas of activity. The response plans to radiological emergencies of different agencies are combined by 2010.

2. Based on the overview mentioned in the previous Section, the deficiencies of legislation can be determined and the necessary amendments are made by 2011.

3. From 2009, at least one training exercise involving several agencies and, if possible, radiation practice licence holders is arranged annually.

Limitations

Shortage of qualified workforce.

Possibilities for management

Constant training of employees, implementation and application of a training programme for new employees.

3.3.3. Notification of people about possible dangers and correct behaviour in case of radiological emergencies

Activity

1. The institutions ensuring radiation safety shall launch regular work for prevention of radiological emergencies.

2. Instruction materials shall be compiled and published for informing of the general public regarding notification of orphan sources discovered (incl. phone numbers and correct behaviour in case of radiation hazard), principles of radiation protection and main rules to be followed in case of radiological emergencies.

3. Creation of additional jobs – above all, ensuring the availability of an information specialist at all institutions associated with radiological emergencies.

Direct results

1. By 2009, regular work is commenced for prevention of radiological emergencies and notification of members of the public of the principles of radiation protection and correct behaviour in case of an emergency.

2. Instruction materials are compiled and published for notification of orphan sources discovered (incl. phone numbers and correct behaviour in case of radiation hazard).

3. By 2011, at each institution associated with response to radiological emergencies, 1 additional job is created for an information specialist.

3.4. Strategic objective 4. Improvement of the awareness of sources of elevated natural radiation

Indicator No. 1: organisation of radon research.
Target level for 2017: as compared to 2007, at least 6 radon surveys or respective projects have been organised.

Indicator No. 2: number of indoors air and ground radon content measurement sites.
Target level for 2017: as compared to 2007, the number of measurement sites where the radon level has been determined increases by 500 each year.

Indicator No. 3: number of information event participants.
Target level for 2017: in all, at least 1,000 people have participated in information events.

Measures

3.4.1. Collection of additional information on natural sources of radiation

Activity

1. Preparation of a list of public water supplies producing drinking water with elevated

radionuclides content.

2. Composition of a health risk assessment based on the aforementioned list. The overview is ordered by the Minister of Social Affairs.

3. Research regarding ^{201}Po, ^{210}Pb and radon content of the Cambrian-Vendian groundwater (ordered by the Ministry of the Environment).

4. Accreditation of ^{228}Ra and ^{226}Ra measuring methods by ERCP.

5. In co-operation with ERCP, the Ministry of Social Affairs shall develop reference levels of radionuclides contained in drinking water based on the Directive 2001/928/EURATOM.

6. ERCP and Geological Survey of Estonia shall continue surveys regarding radon content of ground and indoors air.

Direct results

1. A list of public water supplies producing drinking water with elevated radionuclides content is prepared by the Health Protection Inspectorate by 2009.

2. By 2014, an overview is composed for provision of a health risk assessment regarding public water supplies producing drinking water with elevated radionuclides content.

3. By 2009, the Geological Survey of Estonia completes a survey on ^{201}Po and ^{210}Pb content and by 2010 on radon content in the Cambrian-Vendian groundwater, and the results are disclosed (the need arises from EC Recommendation 2001/928/EURATOM, EU Directive 98/83/EC).

4. By 2010, the ^{228}Ra and ^{226}Ra content in drinking water can be determined at ERCP's laboratory using an accredited method.

5. By 2012, in co-operation with ERCP, the Ministry of Social Affairs develops reference levels of radionuclides contained in drinking water based on the Directive 2001/928/EURATOM and EU Directive 98/83/EC.

6. In 2008-2017, 6 radon surveys or projects are arranged by the Ministry of the Environment, Radiation Protection Centre and Geological Survey of Estonia.

Limitations

A possible limitation is that there are too many small drinking water suppliers in Estonia incapable of fulfilling EU requirements.

Possibilities for management

Finding a solution for merging water suppliers.

3.4.2. Preparation of regulations regarding reduction of elevated natural radiation

Activity

1. In 2008, in co-operation with the Ministry of Social Affairs, the Ministry of the Environment shall amend the water permits-related provisions of the Water Act so as to ensure that upon selection of drinking water sources, the requirements to the drinking water quality, the costs arising from compliance with the requirements, and various possibilities for supply of appropriate drinking water to the population are taken into account. Upon selection of drinking water sources, the achievability of good drinking water quality and cost thereof must be taken into account or alternative possibilities for supply of drinking water identified.

2. The Ministry of Social Affairs shall make preparations for amendment of the Regulation No. 82 of the Minister of Social Affairs of 31 July 2001 "The Quality and Control Requirements and Analysis Methods for Drinking Water".

3. The Ministry of the Environment, Ministry of the Interior, and Ministry of Economic Affairs and Communications shall reach an agreement regarding legislation establishing radon limit values for both new and existing construction works and the ground, as well as ensure enforcement of the legislation.

Direct results

1. The water permit-related provisions of the Water Act are amended by 2009: upon application for a new permit, the water permit holders are required to determine the radiological indicators of the drinking water source, and the procedure for introduction of new drinking water sources is amended as well.

2. The Regulation of the Social Minister is amended by 2011.

3. An agreement regarding the amendments is reached and radon-related legislation amended by 2010.

3.4.3. Notification of people about possible dangers of natural radiation and danger reduction methods

Activity

1. ERCP and Ministry of Social Affairs shall prepare information booklets discussing drinking water quality, the radon hazard, possible health hazards and measures for their prevention intended for designers, water suppliers and members of the public, and the Ministry of the Environment in co-operation with ERCP shall compose and publish materials introducing methods for reduction of the radon hazard upon construction works renovation.

2. Institutions involved in ensuring radiation safety shall arrange radiation safety-related information events for the population, local governments, health protection services, media workers, etc.

3. Institutions involved in ensuring radiation safety shall make relevant information available on their home pages.

4. The Ministry of Education and Research shall supplement design and construction-related study programmes with hazards caused by natural radiation, above all, by radon, and methods for reduction of the hazard, in order to increase the awareness of the specialists involved in the field.

Direct results

1. Information booklets containing information on natural radiation and auxiliary technical documentation for reduction of the radon concentration in existing buildings are composed and published in 2009.

2. In 2008-2017, at least 30 radiation safety-related information events are organised.

3. Radiation safety-related information is always accessible through the home pages of relevant institutions.

4. Design and construction-related study programmes are supplemented by 2010.

3.5. Strategic objective 5. Ensuring optimised use of radiation in medicine

Indicator No. 1: possibility for assessment of patient doses.
Target level for 2013: application of patient dose assessment system in diagnostic radiology.

Indicator No. 2: improvement of the assessment of annual effective doses per inhabitant.
Target level for 2011: improved methods are used for assessment of effective dose level.

Measures

3.5.1. Establishment of diagnostic reference values

Activity

1. On the initiative of the Ministry of Social Affairs, a background survey shall be conducted. In its course the radiation source register shall be supplemented and information collected on procedures performed.

2. On the initiative of the Ministry of Social Affairs, development of the medical exposure quality management system and introduction of the e-Health information system shall take place.

3. Treatment guidelines shall be composed with co-ordination and support of the Ministry of Social Affairs.

4. ERCP and Ministry of Social Affairs shall prepare guideline materials that also contain description of modern procedures used in connection with medical exposure.

Direct results

1. A background survey conducted on the initiative of the Ministry of Social Affairs is completed by 2011.

2. On the initiative of the Ministry of Social Affairs, the medical exposure quality management system is improved and the e-Health information system introduced by 2013.

3. Treatment guidelines are completed by 2010.

4. ERCP and Ministry of Social Affairs have prepared guideline materials for high-quality performance of diagnostics procedures by 2011.

3.5.2. Involvement of medical physics specialists in procedures of nuclear medicine for therapeutic purposes and diagnostic nuclear medicine

Activity

1. Development of a balanced medical exposure-related national training system in co-operation between the Ministry of Social Affairs, Radiation Protection Centre and Ministry of Education and Research.

2. The Ministry of Social Affairs shall co-operate with the Health Insurance Fund for correction of the prices of health care services, in order to ensure that expenses associated with radiation safety are also taken into account.

Direct results

1. By 2015, a balanced medical exposure-related national training system is in use.

2. The Ministry of Social Affairs submits its proposals for correction of the prices of health care services by 2015, in order for the price of health care services to account for the expenses associated with ensuring radiation safety.

Limitations

The human resources required for organisation of training are limited.

Possibilities for management

Motivating people to choose the aforementioned field of work, so that in future there are more specialists capable of conducting training.

3.5.3. Creation of a system required for assessment of patient doses

Activity

1. Regulations associated with medical exposure shall be established by a Regulation of the Minister of Social Affairs. If necessary, the Radiation Act is to be amended.

2. In co-operation with ERCP, the Ministry of Social Affairs shall create a patient dose assessment system suitable for use in diagnostic radiology.

3. On the initiative of the Ministry of Social Affairs, a control system over use of medical exposure shall be created.

4. Development and implementation of methods for the assessment of annual effective doses per inhabitant.

5. Development of monitoring systems and enhancement of research.

Direct results

1. The Regulation of the Minister of Social Affairs is passed by 2009 and the Radiation Act is amended in 2009.

2. The system for patient dose assessment in diagnostic radiology is created by 2011.

3. The control system and monitoring are ensured by 2010.

4. In co-operation with the Ministry of Social Affairs, ERCP improves the methods for the assessment of annual effective dose per inhabitant by 2011 and the methods are applied.

5. Constant development of monitoring systems and enhancement of research by ERCP and the Ministry of Social Affairs.

4. Description of Management Structure

This chapter describes arrangement of Development Plan implementation, co-operation and division of roles for radiation protection purposes, arrangement of assessment of the efficiency of radiation protection policy, and feedback regarding the functionality and efficiency of measures used for implementation of the Development Plan.

4.1. Division of tasks between institutions participating in Development Plan implementation

The main task performers of the Development Plan are the Ministry of the Environment, ERCP, the Ministry of Social Affairs, the Ministry of the Interior and AS A.L.A.R.A., for which reason it is impossible to assign the chief institution responsible to each task. The Ministry of the Environment as the initiator of the Development Plan composition is responsible for general fulfilment of the Development Plan's tasks.

4.2. Assessment of Development Plan Efficiency

Once a year, the Ministry of the Environment organises assessment of the Development Plan's efficiency. For this purpose, with assistance of the work group members, an intermediate report is composed regarding implementation of the NRSDP, achievement of the objectives specified in the Development Plan and implementation plan, and efficiency of said plans. The Minister of the Environment submits the report composed to the Government of the Republic.

5. Estimated Cost of Development Plan

Pursuant to the Regulation "The Types of Strategic Development Plans, the Procedure for their Preparation, Amendment, Implementation and Evaluation and the Reporting Procedure", estimated implementation cost of a development plan must be indicated in the development plan.

The Development Plan provides over 60 activities for the next 10 years.

5.1. Calculation principles of the estimated cost of Development Plan

The estimated cost of activities arising from the NRSDP has been determined based on the following areas of activity, in compliance with the general structure of the Development Plan.

- Creation of optimised radiation safety ensuring system.
- Development of a radioactive waste management system.
- Creation of a radiation sources recovery system.
- Necessary preliminary activities for construction of a permanent radioactive waste storage facility.
- Radiological emergencies.
- Public exposure and natural exposure.
- Medical exposure.

5.2. Cost of the National Radiation Safety Development Plan in 2008-2017

The estimate is based on prices of the reference year 2008, since it was found that in the case of a development plan involving several institutions this is more expedient. All of the costs include VAT.

Table 1. Cost of the NRSDP in 2008-2011, by measure (th. kroons)

Nr	Strategic objective/Measure	Financing	Cost	2008	2009	2010	2011	Extra money is needed
Strategic objective 1	Creation of an optimised radiation safety ensuring system in Estonia	**MoE**	**150**	**150**	**0**	**0**	**0**	**0**
		ECRP	**3255**	**510**	**460**	**1225**	**1060**	**60**
		EI	**350**	**175**	**175**	**0**	**0**	**0**
		HCB	**2050**	**25**	**25**	**1000**	**1000**	**0**
		MoSA	**50**	**50**	**0**	**0**	**0**	**0**
		In all	**5855**	**910**	**660**	**2225**	**2060**	**60**

Measure 3.1.1.	Preparation of Act to Amend the Radiation Act	MoE	50	50	0	0	0	0
Measure 3.1.2.	Performance of works arising from amendment of the Radiation Act.	MoE	100	100	0	0	0	0
		ECRP	3255	510	460	1225	1060	60
		EI	350	175	175	0	0	0
		HCB	2050	25	25	1000	1000	0
		MoSA	50	50	0	0	0	0
		In all	5805	860	660	2225	2060	60
Strategic objective 2	Suppression of hazards associated with radioactive waste and its management	**MoE**	**5747**	**508**	**1858**	**1550**	**1830**	**1480**
		ECRP	**217**	**108**	**108**	**0**	**0**	**0**
		AS A.L.A.R.A.	**9440**	**2200**	**2530**	**1980**	**2730**	**0**
		FF	**3300**	**0**	**0**	**1000**	**2300**	**3300**
		MoI	**117**	**58**	**58**	**0**	**0**	**0**
		In all	**18820**	**2875**	**4555**	**4530**	**6860**	**4780**
Measure 3.2.1.	Development of a radioactive waste management system	MoE	5530	400	1750	1550	1830	1480
		AS A.L.A.R.A.	9440	2200	2530	1980	2730	0
		FF	3300	0	0	1000	2300	3300
		In all	18270	2600	4280	4530	6860	4780
Measure 3.2.2.	Creation of a radiation sources recovery system	MoE	216,6	108,3	108,3	0	0	0
		ECRP	216,6	108,3	108,3	0	0	0
		MoI	116,6	58,3	58,3	0	0	0
		In all	549,8	274,9	274,9	0	0	0

Strategic objective 3	Ensuring preparedness for response to radiation emergencies	**MoE**	**350**	**55**	**105**	**95**	**95**	**25**
		ECRP	**5710**	**1960**	**2010**	**670**	**1070**	**50**
		EI	**100**	**30**	**30**	**20**	**20**	**0**
		MoSA	**250**	**30**	**80**	**70**	**70**	**0**
		MoI	**3020**	**1115**	**1165**	**170**	**570**	**50**
		AS A.L.A.R.A.	**945**	**390**	**415**	**70**	**70**	**50**
		FF	**1380**	**690**	**690**	**0**	**0**	**1380**
		In all	**11755**	**4270**	**4495**	**1095**	**1895**	**1555**
Measure 3.3.1.	Preparation of assessment of hazard caused by possible radiological emergencies	MoE	80	20	20	20	20	0
		ECRP	4840	1900	1900	520	520	0
		EI	80	20	20	20	20	0
		MoSA	80	20	20	20	20	0
		MoI	2150	1055	1055	20	20	0
		AS A.L.A.R.A.	770	365	365	20	20	0
		FF	1380	690	690	0	0	1380
		In all	9380	4070	4070	620	620	1380
Measure 3.3.2.	Preparation of an activity plan for emergencies together with determination of spheres of responsibility	MoE	170	10	60	50	50	0
		ECRP	170	10	60	50	50	0
		EI	20	10	10			0
		MoSA	170	10	60	50	50	0
		MoI	170	10	60	50	50	0
		AS A.L.A.R.A.	75	0	25	25	25	25
		In all	775	50	275	225	225	25

Measure 3.3.3.	Notification of people about possible dangers and correct behaviour in case of radiological emergencies	MoE	100	25	25	25	25	25
		ECRP	700	50	50	100	500	50
		MoI	700	50	50	100	500	50
		AS A.L.A.R.A.	100	25	25	25	25	25
		In all	1600	150	150	250	1050	150
Strategic objective 4	Improvement of the awareness of sources of elevated natural radiation	**MoE**	**790**	**335**	**335**	**60**	**60**	**60**
		ECRP	**2260**	**690**	**690**	**690**	**190**	**190**
		MoSA	**900**	**275**	**275**	**200**	**150**	**150**
		MoI	**100**	**50**	**50**	**0**	**0**	**0**
		MoER	**200**	**0**	**0**	**100**	**100**	**0**
		In all	**4250**	**1350**	**1350**	**1050**	**500**	**400**
Measure 3.4.1.	Collection of additional information on natural sources of radiation	MoE	600	250	250	50	50	50
		ECRP	1700	550	550	550	50	50
		MoSA	100	50	50	0	0	0
		In all	2400	850	850	600	100	100
Measure 3.4.2.	Preparation of regulations regarding reduction of elevated natural radiation	MoE	150	75	75	0	0	0
		MoSA	200	75	75	50	0	0
		MoI	100	50	50	0	0	0
		In all	450	200	200	50	0	0
Measure 3.4.3.	Notification of people about possible dangers of natural radiation and danger reduction methods	MoE	40	10	10	10	10	10
		ECRP	560	140	140	140	140	140
		MoSA	600	150	150	150	150	150
		MoER	200	0	0	100	100	0
		In all	1400	300	300	400	400	300
Strategic objective 5	Ensuring optimised use of radiation in medicine	**ECRP**	**1900**	**500**	**450**	**450**	**500**	**400**
		MoSA	**2120**	**680**	**730**	**480**	**230**	**200**
		In all	**4020**	**1180**	**1180**	**930**	**730**	**600**

Measure 3.5.1.	Establishment of diagnostic reference values	ECRP	400	100	50	50	200	200
		MoSA	620	230	280	80	30	0
		In all	1020	330	330	130	230	200
Measure 3.5.2.	Involvement of medical physics specialists in procedures of nuclear medicine for therapeutic purposes and diagnostic nuclear medicine	Starts in 2012						
Measure 3.5.3.	Creation of a system required for assessment of patient doses	ECRP	1500	400	400	400	300	200
		MoSA	1500	450	450	400	200	200
		In all	3000	850	850	800	500	400

Total cost 2008-2011		MoE	7037	1048	2298	1705	1985	1565
		ECRP	13342	3768	3718	3035	2820	700
		EI	450	205	205	20	20	0
		MoSA	3320	1035	1085	750	450	350
		HCB	2050	25	25	1000	1000	0
		MoI	3237	1223	1273	170	570	50
		AS A.L.A.R.A.	10385	2590	2945	2050	2800	50
		MOER	200	0	0	100	100	0
		FF	4680	690	690	1000	2300	4680
		IN ALL	**44700**	**10585**	**12240**	**9830**	**12045**	**7395**

Abbreviations used in tables:

- SB – state budget
- FF– foreign financing (here, European Commission and IAEA funds)
- MOE – Ministry of the Environment
- MoSA – Ministry of Social Affairs
- MoEAC – Ministry of Economic Affairs and Communications
- MoI – Ministry of the Interior
- RB – Rescue Board
- ECRP – Radiation Protection Centre
- MoER – Ministry of Education and Research
- TKI – Health Protection Inspectorate
- HCB – Health Care Board
- EI – Environmental Inspectorate

In the field of radiation, several projects are being implemented or are intended with the help of foreign investments. Foreign financing has been shown on a separate line. The source of foreign financing depends on what will the planned projects be like – the sources mainly include structural funds of the European Commission and IAEA funds from which foreign financing is applied from. In the case of major projects and projects implemented with the help of foreign aid, use of self-financing is required, which is included in the budget of the performer of the respective project (e.g., Ministry of the Environment, AS A.L.A.R.A.). For a more detailed overview of the projects, see the implementation plan in the next subchapter.

Table 1 shows that during the period of validity of the implementation plan, from 2008 to 2011, the resources planned amount to 44,700,000 kroons.

Table 2. Division of the cost of NRSDP over the years and total cost from 2008 to 2017 (th. kroons)

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Kokku
10585	12240	9830	12045	12500	15500	15500	19000	20000	20000	147200

Table 2 shows that the estimated implementation cost of NRSDP from 2008 to 2017 amount to 147,000,000 kroons.

5.3. Implementation Plan 2008-2011 of the National Radiation Safety Development Plan 2008-2017

Upon planning of costs, ongoing activities and projects in the field of radiation safety and new initiatives that require financing at least during the present implementation plan, i.e., within 4 years, were taken into account. All of the costs include VAT.

The institution(s) responsible for performance of each activity planned and source(s) of financing (for example, state budget (Ministry of the Environment, Ministry of the Interior, Ministry of Social Affairs, etc.) and foreign projects) have been determined.

In accordance with the implementation plan, the estimated total cost of the Development Plan in the next four years (according to prices of 2008) is 44,700,000 kroons. The greatest percentage of planned and already existing resources shall be allocated to reduction of hazards associated with radioactive waste management, and application of several large-scale foreign aid projects is planned in this connection.

6. Strategic Environmental Assessment and Process Disclosure

6.1. Strategic environmental assessment

Strategic environmental assessment was carried out by OÜ ELLE operating in parallel with the work group involved in preparation of the NRSDP. The NRSDP work group received several proposals from SEA expert group, plus some important content-related comments that were included in the Development Plan.

6.2. Disclosure

One public hearing was arranged for discussion of the draft Development Plan.

In accordance with the KeHJ, disclosure of the strategic environmental assessment programme of the Development Plan and of the report was arranged together with a public discussion, at the same time with disclosure of the NRSDP, on 27 March 2007.

During the disclosure and public discussion, questions, proposals and comments were submitted regarding the environmental impact assessment programme, report and the Development Plan.

Upon disclosure of the Development Plan, a proposal was submitted for rewording and specification of the Development Plan's objectives. The Development Plan work group found that the objectives approved by the Government of the Republic are sufficiently specific, while rendering a possibility for consideration of all important aspects of radiation safety.

Proceeding from proposals and inquiries submitted at the public discussion, the Development Plan was amended as follows: an estimate was prepared on how many radiation sites will be established in the next ten years; aviation as an area of activity subjected to elevated natural radiation was considered; the division of natural radiation-related costs between the state budget and budgets of local government was specified.

Summary

This is the first development plan co-ordinating and ensuring radiation safety in the Republic of Estonia. The main value of the Development Plan is acquisition of an overview of the operation and development of institutions involved in different fields of radiation safety. This is necessary for optimal functioning and development of radiation safety in Estonia in the next 10 years.

Five areas were specified in the Development Plan, the development of which is important at least during the next 10 years. The current state of these areas has been analysed, together with presentation of the main weaknesses and opportunities. Five long-term objectives were established in the Development Plan, as well as indicators measuring achievement of the objective determined and the necessary actions planned in a more detailed manner.

With respect to all measures, a number of activities were planned and their direct results determined. Also, limitations that may interfere with implementation of the activities and solutions for their management were considered.

The Development Plan estimates the financial means required for completion of ongoing and new activities. For this, an estimate of Development Plan-related costs in 2008-2017 has been prepared, as well as a four-year (incl. reference year) implementation plan 2008-2011.

The estimated total cost of the Development Plan from 2008 to 2017 (based on prices of 2008) amounts to 147,200,000. Cost of the NRSDP from 2008 to 2011 is estimated at 44,700,000 kroons. The greatest percentage of planned and already existing resources shall be allocated to reduction of hazards associated with radioactive waste management, and application of several large-scale foreign aid projects is planned in this connection.

In compliance with the Environmental Impact Assessment and Environmental Management System Act and the Radiation Act, strategic environmental assessment of this Development Plan was carried out and disclosure of the Development Plan and SEA report arranged. SEA is mandatory, since activities planned based on the NRSDP are likely to have significant environmental impact. The NRSDP work group received several proposals from OÜ ELLE expert group, plus some important content-related comments that were included in the Development Plan. In the course of document disclosure and public discussion, relevant comments were received from parties interested, which were also taken into consideration upon preparation of both the Development Plan and SEA report.

Once a year, the Minister of the Environment shall submit to the Government of the Republic a report regarding the implementation of NRSDP, achievement of the objectives specified in the Development Plan and implementation plan, and efficiency of said plans. The objectives established in the Development Plan, activities and implementation results shall be reviewed after expiry of the Development Plan's implementation plan in 2011.

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