

6. Emergency Preparedness Organization and Principles for Protection of the Public

6.1 In the Visaginas Region

Protection of the resident population in the town of Visaginas is effected by Visaginas authorities based on corresponding emergency plan. This plan is developed by the regional Civil Defence Headquarters and is coordinated with the plan developed by the National Department of Civil Defence. There is local off-site emergency center with adequate communication capabilities in Visaginas. In case of accident notification of the residents of Visaginas is under remote control through cable communication lines between Ignalina NPP and Visaginas. Notification system of the residents of Visaginas includes:

- one-way loudspeaking communications network including 91 street loudspeakers installed all over the town and hooked up to the town radio center;
- automatic emergency warning sirens installed in the town;
- conference call cabinet whereas home telephones of the plant administration and top officials of town organizations are hooked;
- wire transmitting network consisting of town radio center and broadcasting receivers installed in apartments and organizations.

There is no shelter in Visaginas. The emergency plan provide for various actions to protect members of the public if required by conditions following a nuclear accident. Actions could be taken in the affected areas are:

- Sheltering: People would be advised to stay indoors and close doors and windows.
- Consuming stable iodine tablets: In release contained radioactive iodine, tablets containing ordinary potassium iodine would be given to people in the affected area. This would reduce the amount of inhaled iodine absorbed into the thyroid gland and thus reduce the risk of developing thyroid cancer.
- Evacuation: People would be advised to evacuate to temporarily areas close to the accident site, which are out of the path of radioactivity being blown by the wind.
- Control of food and water supplies: Experts from appropriate government departments would act to ensure that consumers are protected from consumption of food which is known or believed to be contaminated. Restriction on the consumption of local products (or water) might be introduced if necessary.

The Visaginas population including the plant personnel is evacuated by the decision of the Government in accordance with the plan of the Department of Civil Defence.

6.2 In Lithuania

In case of emergency residences of Lithuania will be protected in accordance with the "Plan for protection of the Lithuanian Republic population in case of accident at the Ignalina NPP" [16]. This plan was developed by the National Department of Civil Defence based on Lithuanian legislation and other regulations. Every year this plan is repeatedly approved by Governmental authorities. This plan obliges ministries, governmental services and authorities, town and municipal authorities to take specific actions in case of accident. The plan provides means of protecting the population and cattle, their scope, terms, assignment of responsibilities and implementation procedure. The plan is needed for organization and coordination of actions taken over by town and municipal authorities, ministries, governmental authorities and services for taking safety measures with regard to population and cattle, for arrangement of immediate response actions after the accident. The immediate actions of civil defence in case of an accident include:

- organization of warning and communication;
- management;
- radiation protection;
- evacuation;
- medical aid;
- protection of cattle and plants;
- fire protection;
- keeping the public order;
- logistics;
- civil security forces.

6.2.1 Legal Basis and Responsibilities of Different Institutions

The plan of protection of population is based on the Constitution of the Republic of Lithuania, district's management law of the Republic of Lithuania, municipal government law of the Republic of Lithuania, environment protection law of the Republic of Lithuania and temporary regulation of Civil Defence. According to the Governmental Decree assigned the Department of Civil Defence to operate as the main regulatory body in the area of civil security and determined its aims and functions. According to other Governmental Decree in case of the emergency situation in Lithuania residents should be informed via Lithuanian radio and TV. To

organize preventive activities for such situation, more operative accumulation of equipment, vehicles, material resources and forces of Emergency Situation Commission were set by Lithuanian Government. The said Decree defines tasks, rights and arrangement of activities of this Commission. To assure operation of civil security system under emergency conditions National reserves of civil protection assets has been formed. Separate Governmental Decree construe the procedure of the civil security training in the country, they determine involvement of air forces in liquidation of accident consequences and emergency situations, set out the list of national importance and risk.

The roles and obligations of different institutions in case of an accident at the Ignalina NPP are determined by numerous legislative deeds. One of the main institutions is the Lithuanian Nuclear Power Safety Inspectorate, VATESI which in n case of an accident shall:

- accumulate information on the situation in the Ignalina NPP;
- make analysis and prospect situation on the plant site, evaluate possible release of radioactive substances to the environment;
- inform the Prime Minister, the Department of Civil Defence, Ministries of Health and Environmental Protection, Nuclear and Radiation Safety Advisory Committee, other Governmental structures about conditions at the plant and radioactive release;
- inform and advise the Emergency Situation Commission;
- provide information to the public on the emergency situation occurred, run of liquidation activities;
- inform the International Atomic Energy Agency (IAEA) and neighboring countries as required by Convention and bilateral agreements.

Notification of management junctions and population in due time and maintenance of stable connection in organizing and carrying out of immediate actions are very important in the accident. This has to be assured by the Ministry of Communication. This ministry and its enterprises shall:

- ensure the activities of notification junctions and communications systems, immediate transmission of special-purpose telegrams "Lavina" to the addresses;
- provide interurban conversations according to password out of turn;
- organize supplemental direct telephone, telegraph and radio communications at the request of management bodies and installs additionally in their working places terminals, arrangement of sound-broadcasting equipment for premises and territory, appoint specialists for maintenance of emergency warning and communications equipment;
- organize centralized usage of official communications for the needs of emergency commissions;

- interact with town and municipal boards, emergency situations commissions, by transmitting signals and information to management junctions and residents.

One of the main authorities in protecting of the population in case of an accident is the Ministry of Health. This ministry shall:

- accumulate and keep in its custody medical protection means;
- render first professional and specialized medical aid for suffered people;
- organize medical aid and radiometric control for people in case of evacuation;
- organize preventive activities of stable iodine preparations;
- carry out medical supervision and laboratories control;
- organize and carry out hygienic control of food and drinkable water;
- control volume and efficiency of hygienic antiepidemiological assets;
- organize and carry out surveys and monitoring of radioactive contamination and evaluation of ionizing radiation sources and possible influence of radio-active substances for human health.

The Ministry of International Affairs shall ensure protection of 30 km zone, organize provisional control points in intermediate evacuation points, ensure public order in the places of concentration of people in case of evacuation and in sites of temporary accommodation, ensure protection of national and private property and public order in the settlements after the end of evacuation, carry out of evacuated people and provide information to the Address Informational Service. The Department of Fire Protection shall carry out radiological, chemical, engineering and other special inspection besides fire extinguishing activities. Basic support in the surveys of radiological level shall be given to the regional divisions of the Department.

The Ministry of National Defence and Lithuanian Army should assist civil defence forces in making radiological inspection from the air, sanitary decontamination of people in intermediate points within framework of protection measures of contaminated zone according to resolution of Governmental Emergency Situation Commission.

6.2.2 Criteria for Radiation Protection of Inhabitants

As described in subsection 5.1 the radioactive accidents at the Ignalina NPP are divided into three types: local, area and general accidents. In case radioactivity release to the atmosphere, there is possible the following:

- external exposure from passing radioactive cloud;
- internal exposure inhaling radioactive aerosols;
- contact exposure in case of radioactive materials are catch on open body or clothes;
- general internal exposure of people by radioactive substances, whose are fell on the ground, buildings and surfaces;
- internal exposure of people because of using food and local water contaminated by radioactive substances.

For forecast of radioactive consequences and planing protection of residents three phases of accident are distinguished:

- early phase - from the beginning of accident until finishing of radioactive substances release to the environment and formation of radioactive trail at the ground. This phase could last from several hours until several days. In this phase external exposure is cause by radioactive fallout's from passing radioactive clouds and internal exposure is caused by inhaling of radioactive substances being in clouds;
- intermediate phase - from formation of radioactive trail until all protection measures for residents are used. Depending from scale and nature of accident this phase could last from several days until one year. In this phase external exposure is caused by radioactive substances, which fell from clouds on the

ground and buildings, and formed radioactive trail. Radioactive substances are getting to the body by using contaminated food and water;

- late phase lasts until the time, when any protection measures are not necessary. All restrictions at the contaminated territory are recalled, but dosimetric monitoring is fulfilled. External and internal exposures are caused by the same reasons as in the intermediate phase.

Criteria for radiation protection of inhabitants are given in the Tables 6.1 and 6.2 for the early and intermediate phases of accident, correspondingly. These criteria were elaborated based on recommendations of International Radiation Safety Commission and approved by head physician-hygienist of the Republic of Lithuania. Nether of measures listed in Tables 6.1 and 6.2 are used if predicted dose are below of lower limits.

Measures could be postponed or taken depending from real radiological situation and local conditions, if predicted doses are between lower and upper limits. Measures listed in these tables must be taken necessary, if predicted doses are above of upper limits. Permanent and temporary permissible levels of radioactive contamination of food are given in the Table 6.3. Temporary permissible levels could be used only for contaminated food and not longer as 30 days from the beginning of accident.

Table 6.1 Radiation safety criteria for inhabitants at the early phase of accident [16]

Measures to ensure radiation protection of inhabitants	Prognostic dose for 10 days, mSv (R)			
	if all body is exposed		if lungs, thyroid gland or any other body are exposed	
	lower limit	upper limit	lower limit	upper limit
Sheltering, protection of respiration organs and all body	5 (0.5)	50 (5)	50 (5)	500 (50)
Iodine preventive measures:				
adults	-	-	50* (5)	500* (50)
children and pregnant women	-	-	50* (5)	250* (25)
Evacuation:				
adults	50 (5)	500 (50)	500* (50)	5000* (500)
children and pregnant women	10 (1)	50 (5)	200* (2)	500* (50)

* - Used only for thyroid gland

Table 6.2 Radiation safety criteria for inhabitants at the intermediate phase of accident [16]

Measures to ensure radiation protection of inhabitants	Prognostic dose for 10 days, mSv (R)			
	if all body is exposed		if lungs, thyroid gland or any other body are exposed	
	lower limit	upper limit	lower limit	upper limit
Limitation for use of drinking water and foodstuff	5 (0.5)	50 (5)	50 (5)	500 (50)
Evacuation of inhabitants	50 (5)	500 (50)	-	-

Table 6.3 Permanent and temporary permissible levels of radioactive contamination [16]

Type of food	Group of nuclides	Permanent levels, Bq/kg	Temporary levels, Bq/kg
Milk/babies food	Pu-239, Am-241	1	10
Other food		10	100
Milk/babies food	Sr-90, I-131	100	1000
Other food	Sr-90	1000	1000
Milk/babies food	Cs-134/137	1000	10000
Other food	Cs-134/137, I-131	1000	1000

6.2.3 Emergency Management

In case of general accident at the Ignalina NPP the Government of the Republic of Lithuania or the Governmental Emergency Situation Commission is responsible for elimination or mitigation of accident consequences, Figure 6.1 In the event of severe accident, when a danger arises for the health and life of majority of people, for the national economy and environment, the President of the Republic of Lithuania declares the emergency. The government determines the state of emergency conditions. If necessary the management group of the Governmental Emergency Situation Commission and operational group of the Department of Civil Defence going to the site of event. Working place for these both groups is selected near to accident site in Utena, Ignalina or Visaginas depending on the level of radiation. For evaluation of accident consequences and specification of necessary measures for elimination of accident consequences are enlisted emergency situation commissions and groups of experts and consultants. Information group should be established. In case of serious accident it is appeal to neighboring countries or international atomic organizations for help. During time of evacuation and elimination of accident consequences with aim to have a reliable management system on the main routs. The Department of Civil Defence should organize auxiliary management stations, enlisting local civil defence

experts. Auxiliary management stations should interact with intermediate evacuation points, whose during evacuation act at the same site. Local Civil Defence divisions should intensify operational duty and organize operation of management station according plan for actions. Town and municipal boards directly or through emergency situation commissions shall organize protection of inhabitants and actions for elimination of accident consequences.

6.2.4 Notification and Information System

In the event of a nuclear accident the managers of the Ignalina plant shall report the information about the situation occurred according to the approved scheme of initial information about radioactive accident, specifying the following:

- nature of accident, sources and duration of radioactive release;
- total amount of radioactive substances released from reactor;
- power of radioactive release source and its changes in time;
- distribution of radioactive concentration in different distances from the source of release;
- meteorological conditions at the moment of release.

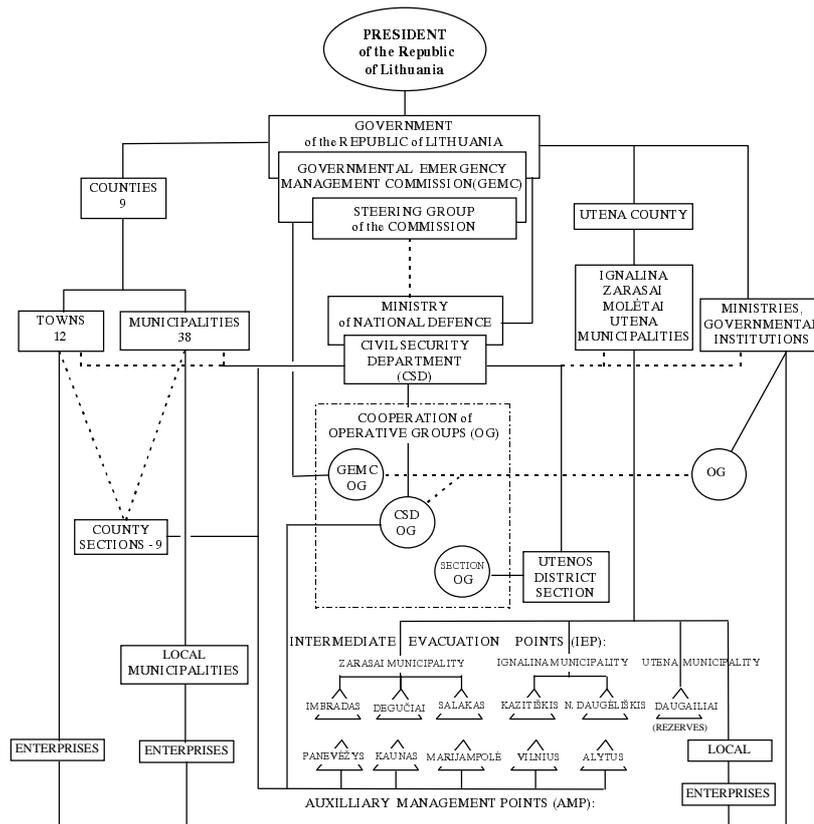


Fig. 6.1 Block diagram of notification and information system for citizens and management branches [17]

On October 13, 1994 Lithuania joined the 1986 IAEA Convention regarding operative information about nuclear accidents and established procedure of presenting such information. Ministry of Environmental Protection shall present to VATESI the following information:

- current and forecasted meteorological conditions;
- results of environment inspection;
- accepted or going to be accepted precautionary measures out of limits of the event site;
- actions during radioactive release.

VATESI shall present to IAEA and neighboring countries the following information:

- time;
- exact place and nature of the accident;
- possible or determined cause of the accident;
- general characteristics of radioactive release;
- quantity, composition and height of radioactive release.

In case of the nuclear accident the Department of Civil Defence shall inform all relevant ministries, government offices. The Department of Civil Defence shall present information to the municipal civil defence subdivisions about the accident at the Ignalina NPP via

automatic management and notification system "Signal", national means of communications (telegraph, phone and fax of general usage) and via additional direct phone, telegraph and radio channels that will be installed by the Department of Civil Defence. Civil defence signals and information for municipal boards of Ignalina and Zarasai could be transmitted via local emergency warning system serving the zone of nuclear impact, and by phone from the Ignalina NPP. The Department of Civil Defence shall transmit the signals, information about future behavior via automatic warning system "Signal", which is connected to 524 centralized emergency warning sirens, 126 street annunciators, 489000 wire radio broadcasting units and via the national radio and TV. Civil Defence municipal subdivisions shall transmit all the information received to town and municipal boards by telegraph, fax and via radio stations. Signals and information to local authorities, districts, enterprises and organizations shall be transmitted by town and municipal boards by existing means of communication and by couriers according to scheme prepared in advance and approved by mayors and local governors. Town councils and municipal boards shall transmit signals and information to population via automatic local information and notification systems, and population of those areas where no automatic information system are installed will be provided with information by police patrols or

vehicles of other authorities having sound reinforcement systems installed moving according to prior fixed routes. Employees of enterprises, organizations, residents of residential areas, settlements and rural areas shall be informed about danger by their managers or governors via all means of communications, local radio transmitting junctions, network with outdoor and indoor loudspeakers, 635 electric manual sirens, motor and enterprise loud signals, couriers according to schemes prepared and approved with town and municipal boards in advance.

Civil defence structures of neighboring countries, such as Latvia, Belarus, Kaliningrad region of Russia shall be informed about accident at the Ignalina NPP by the Department of Civil Defence using interstate means of communications, and civil defence structures of Latvia and Belarus also via local warning zone of plant serving 30 km.

In case of an accident Government, towns and municipalities emergency situation commissions, the Department of Civil Defence and its municipal subdivisions, town and municipal boards and other authorities which are dealing with organization and carrying out of rescue operations and immediate response actions shall use national means of communication: telegraph, subscriber's phone lines, urgent telegrams and those of special purpose "Lavina" shall be transmitted via interurban communication system "Quarz", or by ordering conversations using a password "Aidas", also using additionally installed direct phone, telegraph and radio channels. For this purpose will be used stationary and mobile means of communication belonging to Ministries of Communication, Transport and Energy, the Department of Civil Defence and other authorities. Organization of additional communication means will be overtaken by the Department of Civil Defence in conjunction with Communication Group under the Emergency Situations Commission. In case of the nuclear accident at the Ignalina NPP the Department of Civil Defence provides to inform additionally the public about the situation occurred, all decisions adopted and measures overtaken. Trying to inform Lithuanian residents in the best possible way about all actions in case of a nuclear accident special manual is being prepared which sets out procedure and recommendations of information transmission, also standards of behavior for population, after receiving of information about the accident, direct danger regarding radioactive contamination and having received the direct evacuation.

6.2.5 Measures for Radiation Safety

Depending on situation radiological protection is organized. The following measures, such as limitation for inhabitants to stay outdoors, temporary sheltering,

taking stable iodine tablets, protection of breathing organs, using individual protection means, evacuation of inhabitants, limitation or prohibition to use contaminated food, regulation of movement of inhabitants and transport into contaminated zone, people and ground decontamination, etc., are put into practice.

6.2.6 Radiation Monitoring System

The Department of Civil Defence organizes radiation monitoring in the country. Permanent radiation level monitoring system is used for this purpose. By using this system variations of radiation level in Lithuania, caused by transfer of radioactive substances from other countries or by radioactive substances release into atmosphere in case of accident at the Ignalina NPP are observed. In case of emergency situation the Department of Civil Defence is responsible for collection and analysis of radiation monitoring data as well as for delivering of summarized information to the Governmental Emergency Situation Commission.

Radiation level monitoring system consists of two units:

- unit for early detection of radioactive contamination;
- unit for extended monitoring of radiation level variations.

Unit for early detection of radioactive contamination acts permanently. Observation data about radiological level are received through automatic ionizing radiation measuring equipment by facilities of the Department of Civil Defence, Ministry of Environmental Protection and Ministry of Health. Measuring equipment operate in continuous automatic mode and has audible alarm which is activated if the radiation level exceeds the prescribed limit. Unit for extended radiation variations monitoring is activated in emergencies. Radiological level is observed by Interior Ministry troops of the National Fire and Border Police Departments.

Depending from predicted and actual radioactive contamination of the environment the system can work in three different modes: normal, intensified and extraordinary.

In case of normal working conditions subunits of the Department of Civil Defence will continuously monitor the radiation levels and report the radiation meter indications four times a day. Automatic radiation monitoring stations of the Ministry of Environmental Protection perform measurements continuously. Hydrometeorologic stations monitors radiation level in parallel with meteorological observations and once per day delivers summarized information to radiological monitoring data collection and analysis center. When the radiation level exceeds 0.3 $\mu\text{Sv/h}$, the government's authorities are immediately informed.

Intensified working conditions are announced in case of local or area accident at the Ignalina NPP or, if information about accidents at nuclear power plants or nuclear incidents in other countries are received, or radiation level exceeds 0.3 $\mu\text{Sv/h}$ at three nearby monitoring stations located in close proximity. In this case at all radiation monitoring stations' radiometric equipment operate continuously and its indications are reported every hour. If radiation level do not exceed prescribed limit, the data from the stations are collected in the normal way reporting only highest-registered radiation levels.

Extraordinary working conditions are announced in case of general accident at the Ignalina NPP or, if there is a real danger of transmission of radioactive substances. In this case the monitoring at all the station is carried out continuously and indications of meters are reported every hour. These data are delivered to emergency centers according to established procedure. In case of emergency situation working conditions for radiation level monitoring system is determined by the Department of Civil Defence and is broadcasted communicated via radio or TV, or transmitted by direct communication lines.

6.2.7 Radiation Surveillance

The prime objectives of the radiation surveillance are to determine radiation level in settlements and evacuation routes, take samples and deliver them for examination of radioactive contamination. Radiation surveillance of contaminated ground is organized and intensively performed in the early phase of a nuclear accident. During intermediate or late phases the radioactive contamination is monitored continuously and radiation surveillance is organized, if necessary. Radiation surveillance in 30 km radius zone should be organized by three routes. The Department of Civil Defence coordinate this activity and analyzes the obtained data.

6.2.8 Evacuation

The evacuation of local inhabitants is carried out by decision of the Lithuanian Government. The Governmental Emergency Situations Commission makes proposals with regard to evacuation based on actual situation, radiation forecast and inhabitant's protection criteria. The Governmental Emergency Situations Commission controls the evacuation through municipal administrations and the municipal emergency situation commissions. More than 53 thousands people should be evacuated from 30 km zone. Residents of Visaginas should be evacuated first. Taking into account predominate wind directions two evacuation routs are prepared, Tables 6.4 and 6.5. The first evacuation route will be in the western and north-western directions through Utena, Anykščiai, Molėtai,

Ukmergė, Kėdainiai, Pasvalis and Rokiškis districts as well as the city of Panevėžys, Figure 6.2. The second evacuation route will be in southern and south-western directions via Švenčioniai, Molėtai, Jonava, Kėdainiai, Kaišiadoris, Trakai and Vilnius districts as well as the Vilnius city, Figure 6.3. Near the 30 km zone boundary the intermediate evacuation points would be established.

Boards of Ignalina, Zarasai and Utena districts should set up and equip the intermediate evacuation points: Ignalina municipal board in Kazutiškės and N. Daugeliškės, Zarasai municipal board in Imbradė, Degučiai and Salakas, and Utena municipal board in Daugeliškės (alternate point). Management stations of the Department of Civil Defence would also be established in these points. Inhabitants would be evacuated by personal and public transportation. Depending on the radiation situation evacuation would be performed in two ways:

- when there is no radioactive contamination, by using the same transport as far as temporary living point;
- in the case of radioactive contamination, in two stages: from living point up to intermediate evacuation points by transport of Ignalina and Zarasai districts, and further - by transport of other districts or cities.

Activities of intermediate evacuation points are coordinated and controlled by municipal emergency situation commissions. Main purposes of intermediate evacuation points are to control departure from and arrival to contaminated territory, keep registration of evacuated inhabitants and transportation, fulfill radiometric control of people, animals and transportation means, ensure necessary medical aid, perform sanitary treatment of people and decontamination of engineering.

6.3 In Latvia

The largest nuclear facility in Latvia is a research reactor with power level of 5 MW located near Salaspils about 20 km away from Riga. The main concern is the Ignalina plant located near border of Latvia. It means that safety requirements and resources needed to meet these requirements are not less than if this plant would be located in the country [18].

A national emergency preparedness plan is under development [19]. The main purpose of this plan is to ensure coordinated-in-time national-wide emergency preparedness for and response to radiation and nuclear accidents that constitute a direct menace to health and safety of people as well as have a damaging impact on the environment or property. The national emergency preparedness plan assigns specific emergency support functions to all relevant governmental



Fig. 6.2 First evacuation route [16]

Table 6.4 Plan for inhabitants evacuation from 30 km zone: I alternative [16]

Cities, Districts	Intermediate evacuation point	Evacuation route	Settlement point
Ignalina district			
Workers of Ignalina NPP	Salakas	Visaginas, Salakas, Daugailiai, Utena	Utena
Visaginas inhabitants	Salakas	Visaginas, Salakas, Daugailiai, Utena, Kupiškis, Panevėžys	Panevėžys
Dukštas	Kazitiškis	Dukštas, Kazitiškis, Ignalina, Kaltinėnai, Utena, Anykščiai district	Anykščiai district
N.Daugėliškės district	N.Daugėliškės	N. Daugėliškės, Ignalina, Kaltinėnai, Molėtai district	Molėtai district
Kazitiškės district	Kazitiškis	Kazitiškis, Ignalina, Molėtai, Ukmergė, Kėdainiai district	Kėdainiai district
Rimšė district	Kazitiškės	Rimšė, Dukštas, Kazitiškis, Kaltinėnai, Molėtai, Ukmergė district	Ukmergė district
Zarasai district			
Zarasai	Imbradas	Zarasai, Imbradas, Antažavė, Obeliai, Rokiškis district	Rokiškis district
Zarasai district	Imbradas	Zarasai, Imbradas, Obeliai, Biržai district	Biržai district
Turmantas district	Imbradas	Turmantas, Imbradas, Antažavė, Rokiškis, Kupiškis district	Kupiškis district
Salakas district	Degučiai	Salakas, Degučiai, Utena, Kupiškis, Pasvalis district	Pasvalis district



Fig. 6.3 Second evacuation route [16]

Table 6.5 Plan for inhabitants evacuation from 30 km zone: II alternative [16]

Cities, Districts	Intermediate evacuation point	Evacuation route	Settlement point
Ignalina district			
Workers of Ignalina NPP	Kazitiškis	Visaginas, Kazitiškis, Ignalina, Švenčionys, district	Švenčionys district
Visaginas inhabitants	Kazitiškis	Visaginas, Kazitiškis, Ignalina, Švenčionys, Vilnius	Vilnius
Dukštas	Kazitiškis	Dukštas, Kazitiškis, Ignalina, Kaltinėnai, Molėtai, Širvintai district	Širvintai district
N.Daugėliškės district	N.Daugėliškės	N. Daugėliškės, Ignalina, Kaltinėnai, Molėtai district	Molėtai district
Kazitiškės district	Kazitiškis	Kazitiškis, Ignalina, Švenčionys, Vilnius, Trakai district	Trakai district
Rimšė district	Kazitiškės	Rimšė, Dukštas, Kazitiškis, Ignalina, Vilnius district	Vilnius district
Zarasai district			
Zarasai	Degučiai	Zarasai, Degučiai, Utena, Ukmergė district	Ukmergė district
Zarasai district	Degučiai	Zarasai, Degučiai, Utena, Ukmergė, Kėdainiai district	Kėdainiai district
Turmantas district	Degučiai	Turmantas, Zarasai, Degučiai, Utena, Ukmergė, Jonava district	Jonava district
Salakas district	Degučiai	Salakas, Degučiai, Utena, Ukmergė, Jonava, Kaišiadorys district	Kaišiadorys district

institutions in accordance with their competence, determines actions in case of a radiation or nuclear accident, provides a mechanism for mutual cooperation as well as ensures the provision of necessary resources and appropriate applications of these for the protection of health and safety of people. This plan encompasses:

- any radiation or nuclear accident of magnitude exceeding the emergency response capabilities of a particular local authorities and thereby demanding the assistance of one or a number of the governmental institutions and their mutual cooperation;
- any radiation or nuclear accident when the emergency response of the governmental institutions is necessary according to the national emergency preparedness plan.

The governmental institutions develop their own particular emergency plans, each correspondingly to their functional responsibilities. The local governments of the districts and major cities also develop their own emergency response plans for their particular administrative territories. These plans are reviewed and updated annually. They serve as a basis for devising an overall national plan.

6.3.1 Legal Basis and Responsibilities of Different Institutions

According to the law on International Agreements of the Republic of Latvia, the Conventions ratified by the Parliament have higher legal status if compared with national laws [20]. Therefore until new legislation is adopted, the Conventions have the status of national laws, or the provision of the Conventions have to be used if there are differences from the national laws. The following Conventions were ratified by the Parliament of Latvia: Convention of Early Notification of a Nuclear Accident, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, Radiation Protection Convention, Vienna Convention on Civil Liability for Nuclear Damage as well as Joint Protocol Relating to Application of the Vienna Convention and the Paris Convention.

A law on Radiation Safety and Nuclear Safety was passed by the Parliament and has been in force since 1995. It governs all activities relevant to radioactive or nuclear materials and other sources of ionizing radiation. The law establishes the basic requirements of radiation and nuclear safety. The law on Civil Protection in Latvia was adopted in December 1992. According to this law the Civil Defence Center was nominated as a main executive organization in the area of civil defence and set up the system of fast response forces. The most important new document will be the Basic Safety Regulations for Protection against Ionizing

Radiation, which contains chapters on public information on nuclear activities and early warning in case of nuclear or radiological incident.

The roles and obligations of different institutions in case of radiation and nuclear accident as well as their emergency response functions are determined by mentioned above laws and legislative deeds [19]. In accordance with the legislation the Civil Defence Center is a national level emergency management agency responsible for:

- developing, exercising and maintaining the national emergency preparedness plan;
- providing overall coordination of the planning process at the national and district/city level;
- alerting, notifying and providing information to the public on the national level;
- coordination of emergency response at the national level;
- providing for uninterrupted and reliable functioning of the emergency communication;
- coordination of international assistance;
- organization of radiation and nuclear emergency exercises at the regional and national levels, civil defence training of the population and the staff of the governmental and local authorities, enterprises and organizations.

One of the main authorities in protecting of population in case of an accident is the Ministry of Welfare. This ministry is responsible for:

- provision of emergency and specialist medical aid to the victims of radiation and nuclear accidents;
- coordination of the preventive stable iodine treatment and social care;
- working out proposals regarding the necessary medical outfit and equipment for the emergency response and rescue services personnel;
- development of a data base on the supplies of medical resources in health institutions as well as of proposals on the necessity to change or supplement the existing state reserves of the medical materials and equipment;
- assessment and forecasting of the harm inflicted by radiation and nuclear accidents;
- recommendation for the protection of the population and the environment against radiation ;
- dosimetric and radiometric control of the people, food-stuffs, potable water and surface waters at the places of recreation, means of transportation, etc.;
- hygienic and epidemic control at the places of the deployment of the emergency response services personnel, places of collecting and treatment of the victims, places of sheltering and temporary accommodation of the evacuees;

- a long-term population and environmental health monitoring development of the register of the radiation and nuclear accident victims;
- evaluation of the total radiation doses as well as those received by the certain individual organs of the victims.

The Ministry of the Environmental Protection and Regional Development is responsible for:

- early radiation warning;
- environmental radiation monitoring;
- assessment and forecasting of the meteorological and radiation situation;
- recommendations of protective measures to be undertaken;
- exchange of information with other countries and international organizations.

The Ministry of Communication shall ensure reliable functioning of the existing system of communications,

provide additional communication means and means of transportation for the needs of evacuation. The Ministry of Defence is responsible for public work, radiation reconnaissance, decontamination, maintenance of the public order, guarding of the contaminated areas, safeguarding of the public and private property in the course and after evacuation. The Ministry of Interior shall ensure firefighting and rescue, maintenance of order in public places, guarding of the contaminated areas, safeguarding public and private property in the course and after evacuation, making of the register of evacuees, decontamination, checking of the transit of radioactive materials and preventing the illegal transportation of these.

6.3.2 Criteria for Radiation Protection of Inhabitants

Initial protective action criteria for inhabitants are established on the basis of the IAEA recommendations [20]. These criteria are summarized in Table 6.6.

Table 6.6 Initial protective action criteria for inhabitants [20]

Basis	Default Criteria		Protective Action
Dose projections	Distance where projected dose > 50 mSv		Prepare population for evacuation and conduct monitoring
Gamma dose rate in plume	1 mSv/h		Evacuate
	Unreduced release	0.1 mSv/h	Take thyroid blocking (if available)
	Reduced release	1 mSv/h	
Gamma dose rate from deposition	1 mSv/h		Evacuate
	Measurements taken 2-30 days after accident 0.2 mSv/h		Consider relocating people
	1 μSv/h		Do not eat potentially contaminated food or milk from grazing cows or goats
Ground deposition I-131, kBq/m ²	General Food	Milk and water	Do not eat potentially contaminated fresh produce or drink milk from cows or goats grazing in area
	10	1	
Ground deposition Cs-137, kBq/m ²	General Food	Milk and water	Do not eat potentially contaminated fresh produce or drink milk from cows or goats grazing in area
	2	2	
Food and milk concentrations Cs-137, kBq/kg	General Food	Milk and water	Do not eat
	1	1	
Food and milk concentrations within 2 weeks of accident I-131, kBq/kg	General Food	Milk and water	Do not eat
	1	0.1	

6.3.3 Emergency Management

According to law on Civil Protection the emergency management system in Latvia has two national and local levels [18].

The responsibility for the operational management at the national level of the emergency situation caused by radiation and nuclear accident lies with the President of Ministers [19]. In order to implement the governmental functions of the emergency management, the President of Ministers sets up a State Emergency Operation Commission. The chairman of this Commission is either the President of Ministers or a person appointed by him, the deputy chairman is the director of Civil Defence Center. As a principal members of the State Emergency Operation Commission are included responsible representatives authorized to make decision from the Ministers of Defence, Foreign Affairs, Economics, Finance, Interior, Welfare, Agriculture, Communications, and Environmental Protection and Regional Development. The State Emergency Operation Commission is set up in advance, before an actual emergency has happened. Its staff is approved by the President of Ministers. The organizational basis for the work of the State Emergency Operation Commission is the headquarters of the Civil Defence Center.

The State Emergency Operation Commission sets up a mobile management team, a commission of experts and an operational information Center. Their staffs are approved by the chairman of the State Emergency Operation Commission. The mobile management team organizes the operational management of the emergency situation in conjunction with the local governments of the districts and cities. This team comprises representatives from Civil Defence Center, and the Ministries of Interior, Defence, Communications, Welfare, Agriculture, and Environmental Protection and Regional Development. The commission of experts analyses the causes and effects of the emergency, forecasts, the development of the emergency situation and works out appropriate recommendations with regards to necessary measures to protect people, domestic animals, and the environment. This commission comprises representatives from the Ministries of Welfare, Agriculture, and Environmental Protection and Regional Development as well as from the Civil Defence Center. The operational information Center collects and processes operational information, reports to the State Emergency Operation Commission, Parliament and other relevant national and local (municipal) authorities, issues press releases and bulletins for the mass media and population, call press conferences. The information Center comprises representatives from the Cabinet of Ministers, Ministries of Communications, Welfare, Interior, Environmental

Protection and Regional Development, Civil Defence Center as well as journalists from the press, radio, TV.

The responsibility for emergency planning and response at the local level rests with local governments [18]. Where appropriate, their capabilities may be augmented by mutual aid agreement with neighboring local governments. The head of a city or district government bears the responsibility for emergency preparedness and response in its administrative territory. Depending on the needs and capabilities, the local government may hire a single person or a number of civil emergency officers for planning and coordination work, or even create an Emergency Operation Center on a 24-hour basis with a larger staff. In rural districts there are usually one or two civil emergency officers, while the six largest cities have local Emergency Operations Centers, the biggest of which, except Riga, being in Daugavpils manned with 25 persons, mainly because of the proximity of the Ignalina NPP. It is clear that neither the head of local government nor civil emergency officers are in a position to solve all the problems relating to emergency preparedness and response. In this connection the law provides that an Emergency Operations Commission must be set up by a local government whose main responsibility is the overall emergency management and coordination of response operations in the case of an accident. This Commission is to be composed of senior civil emergency officers and representatives of services and organizations including utilities responsible for emergency preparedness and response in the city or district. In the districts and cities the main emergency response forces consist of the Fire and Rescue Service, State and Municipal Police as well as Disaster Medical Services. In their day-to-day activities the above services operate separately, coordinating their actions between themselves directly, as needed. In the case of an accident the overall management and coordination is taken over by the city Emergency Operations Center and if necessary, the Emergency Operations Commission of a district or city is convened. If an emergency overwhelm the capabilities of a district or city, or if several districts or cities are affected at the same time, a State Emergency Operations Commission may be convened whose responsibility is to coordinate response and rescue operations on a regional and national levels, the Civil Defence Center of Latvia acting then as the headquarters.

6.4 In Estonia

The situation with nuclear energy facilities in Estonia is quite different from those in Lithuania and even in Latvia. Estonia has no nuclear reactors of her own. There are no nuclear reactors within less than 70 km from Estonian border. Therefore, preparedness for nearest vicinity is not necessary and there is at least

30-minutes time [21,22]. Thus, emergency preparedness planning comprises the following items:

- environmental monitoring;
- activation of emergency management;
- informing the residents about possible hazards and the measures which can be taken to face these hazards;
- preparedness for evacuation or temporary sheltering in areas with higher radioactive contamination;
- recommendations to the inhabitants on how to protect themselves and how to arrange agricultural production in case of moderate radioactive contamination;
- contamination control of food and fodder.

6.4.1 Legal Basis and Responsibilities of Different Institutions

The legal basis for planning of emergency response actions in Estonia is as follows. The Parliament has passed laws that will operate in the case of emergency: Citizen Protection Act, Extraordinary Situation Act and Rescue Act. The citizen protection law lays for action in the case of emergency. According to this law the main tasks are to:

- prepare the contingency plan for the most probable emergency situation;
- train the personnel for emergency situation;
- help people to mentally survive emergencies;
- prepare resources and plans for protection and rescue in an emergency situation;

- form and maintain civil defence forces and their management for rescue work;
- establish monitoring, early warning and alerting system;
- guarantee the protection of food, water, cattle and plants.

The National Resources Act determines the creation and order of use of the mobilization resources which are at the disposal of the National security, Municipal and Military authorities, in case of a national or transboundary emergency. According to the existing laws and regulations, the responsibilities are divided between authorities as follows. The information about an accident can come from the own early warning system. These are automatic γ monitoring stations in the hydro-meteorological service system. The data are directed to the computer of the Radiation Protection Center and to the operative attendant of the Rescue Department. The international emergency information from IAEA and from neighbouring countries also is received there. These Estonian structures are cooperating with other early warning systems in the region, providing meteorological data and assessing the radiological situation in Estonia for the operational use and public information. The health protection system of the Ministry of Social Maintenance provides the control of food contamination, provides consulting in the rescue and decontamination activities, keeps records on overexposed or contaminated individuals, and distributes information on safe behavior in hazardous situations.

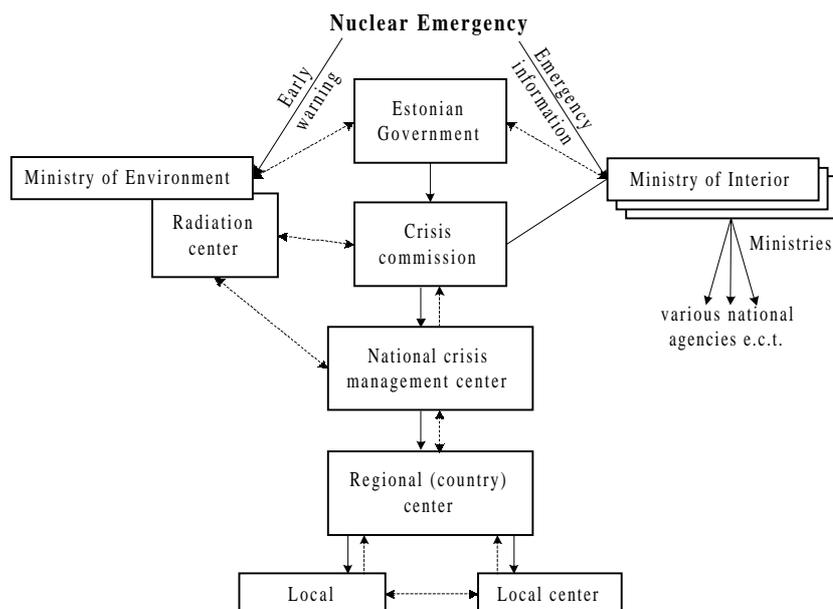


Fig. 6.4 Coordination between Estonian authorities in nuclear emergency [22]

The Ministry of Agriculture elaborates the strategy of agricultural production with regards to the existing radiological situation, establishes necessary restrictions on agricultural activities and organizes control of radioactivity in food and fodder. The Ministry of Social Maintenance organizes medical and psychological maintenance of evacuees. The Ministry of Transport and Communication organizes the transportation of evacuated people, as well as provides the emergency information and through the public TV and radio network. The Ministry of Internal Affairs organizes national crisis management center - a working body of National Crisis Commission. It also coordinates actions of it's own structures - police, rescue services of all levels and border troops, assists The Ministry of Environment to observe radiation conditions and to predict its development, sets up it's own operative center to the system of emergency management. The Ministry of Defence and the military defence forces would provide the personnel and material resources. Figure 6.4 provides a scheme of interaction between national authorities in case of emergency.

6.4.2 Emergency Management

All the activities in a nuclear emergency situation are divided into separate levels in accordance with relevant legal acts. Direct command is carried out by Emergency Operation Centers. These centers are supposed to operate according to a overall national emergency plan. Figure 6.5 gives an overview of the emergency management in Estonia. Under the command of National Crisis Commission there is the Emergency Operating Center, the structure of which include all necessary structures for management and organization of assistance, and which is activated when needed. Mobile centres of management on places can be formed, if they are needed there. The Commission is coordinated the activities of responsible ministries and offices on the national level. In the counties subcoordination reproduces the same scheme. The Chairman of the County Council is the head of respective local commission, while the head of local fire and rescue services is his deputy. The county rescue chief is formally empowered to lead and coordinate

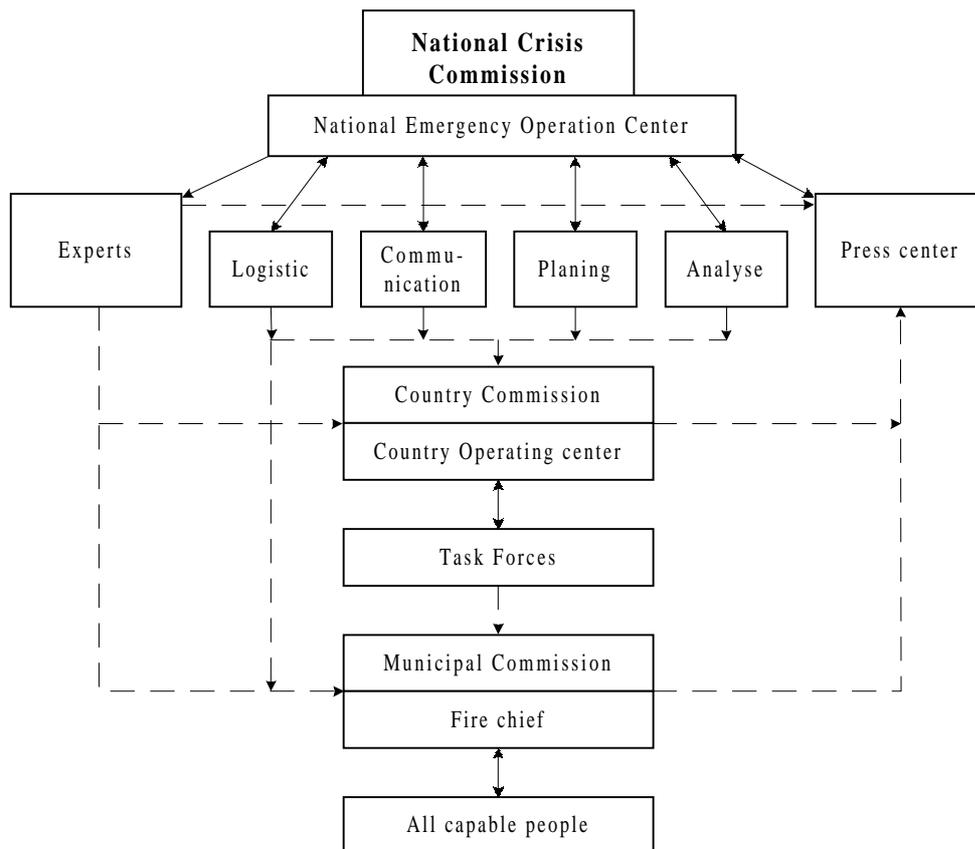


Fig. 6.5 Overview of emergency management in Estonia [22]

people and groups that can be used for civil defence. In municipalities the local Chairman and the fire-brigade chief are obliged to lead fire-fighting, rescue and civil defence activities. All formations and groups possibly involved in the case of emergency, can be divided into:

- specially trained task forces providing round-the-clock watch, including the fire-fighting and rescue team, rescue forces, mining rescue and the air forces;
- less specified formations without major special training, nevertheless available and effective in less specific cases, which are the police, the regular army forces, the Defence League;
- newly formed volunteer units as well as private security services;
- enterprises engaged in cleaning and repairing of constructions and roads;
- companies having sufficient experience and equipment for special tasks.

In the case of the local emergency local forces are used in the first place. If the local forces are unable to put the disaster under their control, high levels can be involved. All the levels have their emergency response plans, which in case of an actual emergency are to be referred to and applied as exactly as possible. In case of an international or cross-border emergency necessary information will be available also from the regional early warning system. At the next stage the National Emergency Commission should activate the Emergency Operation Centers, while the local structures can start their work even earlier, to correct their action plans and instructions in accordance with current radiological data. The National Radiation Center is established under the authority of the Ministry of Environment, in order to coordinate more effectively the radiation protection activities of various bodies.

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APPENDIXES