1. INSTITUTIONAL FRAMEWORK

OBJECTIVES

- Through appropriate procedure before the Government, to provide guarantee that decisions and long-term strategic planning affecting the environment, and, through it, human health, are taken not merely in relation to economic factors, but also with full consideration of potential environmental health consequences, and in accordance with the requirements of sustainable development.

- Through similar mechanism, to ensure that decisions on economic development at local level are made in absolute agreement with with their possible environmental implications and potential health risk, through an effective consultation process involving not only local authorities and entities to gain financial benefits from the relevant project, but also the population that will be affected by the positive or negative effect of the decision.

BASIS FOR ACTION

1. Public health protection and improvement, by improving environment components, requires adoption of joint solutions and decisions by both competent sectoral institutions and all those that affect the environment, directly or indirectly.

2. The policy on environmental protection and its relation with human health is basically implemented by the Ministry of Environment (MEnv) and Ministry of Health (MH),
respectively. They should be adopting joint decisions, involving other sectors as well, regarding demands directed towards natural resources, to meet the needs of agriculture, energy, industry, urbanization, tourism, etc. The policies of the two Ministries are carried out both at national and municipal levels by the relevant Ministries and their inspection services: Republican Inspectorate for Environment and Nature Protection and Improvement (RIENPI) and the Republican Sanitary and Health Inspectorate (RSHI); their central subordination is a precondition for attaining unity in the implementation of the policy on environment and health.

3. The principle of shared responsibility and efficient cross-sectoral cooperation constitute the basis for the prevention of negative impacts of the environment on human health.

4. The policy on the public health protection, related to the quality of the environment (environmental health), is carried out by Institutes for Health Protection (IHPs) with reference to infectious and mass non-infectious diseases, as well as diseases caused by factors of and changes in the environment, in cooperation with RIHP. Both of these activities are coordinated by Assistant Minister of Health, responsible for preventive medical activities.

5. The policy on environment control aimed at preventing potential consequences on public health is carried out by the Agency for Environment and Nature Protection and Improvement (AENPI), in cooperation with Republican Inspectorate of Environment and Nature Protection and Improvement (RIENPI). The activity of these two structural units is coordinated by the Assistant Minister of Environment.

6. The variety of matters related to environmental and health issues requires inter-sectoral and inter-departmental cooperation, involving both competent institutions and entities affecting the environment, directly or indirectly, as well as non-governmental organizations (NGOs), especially ecological societies and other associations the scope of activity of which is related to the health related quality of environment and nature, organized both at national and municipal levels.

7. The MEnv, based on legal provisions, established the Fund for Environment and Nature Protection and Improvement; funds are provided by the central government, by polluters in a form of “eco-taxes” on the basis of the “polluter pays” principle, from taxes and credits, from collection of taxes and fines and from charges paid for vehicles registration. The MH provides financial resources through the Fund for Health and from the central government for specialized environmental health programmes.

8. The implementation of the policy on environment and human health at regional and local levels is legally based mainly in the laws of the local self-government, environment, health, etc. The application of an integrated approach towards environment and health risk management requires close cooperation of leading sectors - Public Health and Environment, with target acting sectors - urbanization, industry, energy, agriculture, transportation, tourism, etc. (Figure 1).
9. All activities proposed in the NEHAP should be treated as an open system for realistic changes in the environment, as well as for changes taking place with regard to the legislation, management and financing.

PRIORITIES

- Development of inter-sectoral cooperation on issues related to environmental health, with an accent on the approximation of the legislation in the preventive medical segment of the health with the new legislation in the area of environment
- Introducing changes in the health legislation as a basis for environmental health services reform
- It is proposed that the Environmental Fund includes a representative of the MH to participate in the evaluation of health aspects of environmental projects;
- Establishment of an Environmental Health Fund within MH, the initial resources of which will be provided from penal activity of the Health and Sanitary Inspection
- Coordination and adjustment with reference to the environmental health policy implementation at national, regional and local levels
- Environment and health protection to become guiding principles while elaborating development programmes in all economic sectors
- Establishment of conditions for an effective delegation of responsibilities from central to local level.

Figure 1. Integrated approach towards environmental health processes management - Planning and implementation of strategies
BASIC CONCEPT: environmental health, health ecology, health aspects of the environment: public health risk management related to the state and changes in the environment.

ACTIONS

10. Strengthening of the cooperation between MH and MEnv with regard to issues related to the policy on environmental health management, including information exchange.
   Deadline: 1999
   Actors: MH in cooperation with MEnv

11. Elaboration of municipal action plans regarding environmental health in accordance with the basic principles contained in the NEHAP, with an accent on preventive aspects and indication of required financial resources and their sources.
   Deadline: constant
   Actors: municipalities

12. Monitoring, analysis and evaluation of the NEHAP implementation by Intersectoral Environmental Health Board.
   Deadline: constant
   Actor: Management of the Intersectoral Board

2. ENVIRONMENTAL HEALTH RISKS MANAGEMENT TOOLS

2.1. INFORMATION SYSTEMS

<table>
<thead>
<tr>
<th>HFA Target 19: Environmental health management</th>
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<tr>
<td>By the year 2000, there should be effective management systems and financial resources in all Member States for putting policies on environment and health into practice.</td>
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</table>

OBJECTIVES

* To improve the relevance, quality and availability of data on various aspects of the environment related to health, in order to analyse the existing states and trends, as well as for the national environmental policy development and evaluation.
* For the same purpose, to improve the utilization of mortality and morbidity data by:
  - limitation at the lowest suitable levels of geographic or administrative aggregation;
- To develop specific environmental indicators, as basis for defining priorities for action and reporting on the progress.
* To understand specific indicators of the environmental health state, as a basis to define priorities and report on the progress. [EPAE, Art. 73-104]

BASIS FOR ACTION

1. Recognition of the link between indicators of morbidity and mortality and exposure to environmental health hazards is an important instrument in the environmental health impact management. It is necessary to establish health indicators with standardized diagnostic criteria, as basis to the morbidity monitoring system, which may identify environment related health issues. This will facilitate both broadcasting of health impacts and identifying the sources and their contributions to overall exposure, as well as selection of priorities for action.

2. Basic precondition to optimize the usefulness of the information system is to obtain relevant information in the environment-health chain. For example, the use of chemicals and their emission in the environment, ambient concentrations, relationships between exposure-dosage-health effect, eco-toxicology, etc.

3. In the Country, there are some information on the relation between the state of the environment and the one of the human health, but these data are insufficient to be used for accurate conclusions making. Their use would be facilitated if an integrated geographical system for the environmental health complex is established (Environmental Health Geographical Information System - EHGIS, or appropriate national programme on environmental health monitoring). The establishment of this system as a basic management tool will make it possible to identify the priority problems in a most efficient manner, and support the process of administrative decision-making at national, regional and local levels.

PRIORITIES

* To provide appropriate mechanisms in order to identify the relationship between environmental pollution and health status of the population (optimal methodology for health risk assessment);
* To improve opportunities for better understanding of health effects from environmental pollution and sources of such pollution;
* To update and improve the decision-making process in the area of environmental health.

ACTIONS

4. Establishment of the environmental health geographical information system (EHGIS), or appropriate national programme on environmental health monitoring, integrating all environmental health information at national level, including all horizontal and vertical structures participating in the environmental health monitoring.
5. Review of the existing databases on environmental state and evaluation of its usability relative to the negative effects on human health assessment.
   Deadline: 2000
   Actors: MH, in cooperation with MEnv

6. Development of relevant and methodologically adjusted and feasible parameters of the environmental health monitoring system, as basis for the adoption of appropriate regulation and recommendations.
   Deadline: 1999
   Actor: MH, in collaboration with MEnv

7. Development of quality control with regard to the monitoring system data (supervision).
   Deadline: 2000
   Actor: MH, in collaboration with MEnv

2.2. ASSESSMENT OF HEALTH-RELATED ENVIRONMENTAL HAZARDS

OBJECTIVE

- To ensure that effective mechanisms exist for the identification and assessment of environmentally determined health hazards.

BASIS FOR ACTION

1. Assessment of environment related population health risks is an essential element of the environmental management and important precondition for proper priorities setting-up for actions aimed at environment improvement.

2. The assessment of environmental health risk is still insufficiently efficient, due to the inadequacy of available information on the types and levels of pollutants in the environment and population exposure, as well as complexity of interactions in case of multimedia multiple exposures. The assessment of the cost-benefit indicators in risks rehabilitation planning is difficult, too.

3. The environment related health risk assessment is additionally complicated with the existence of vulnerable population groups, such as children, chronic diseases suffering people, aged people, pregnant women, genetic predisposition, poor nutrition, poor social and economic living conditions, etc. The location and size of such groups is usually difficult to determine. The clear identification of these groups and the extent of additionally required health protection thereof will become priority activity in the policies of the two relevant sectors.
4. The assessment of environment related health impacts is partially regulated by binding legal documents; but, in some cases, their development applies different methodological approaches and is insufficiently synchronised with the health aspects of the environment, most frequently in a form of elaborates or studies on the sites intended for developing new or reconstructing the existing industrial and craftsmanship facilities and activities, analyzing their local impact on the environment and, through it, on human health. Partial assessment is provided in the framework of the existing Spatial Plan of the Republic of Macedonia, and in the National Environmental Action Plan (NEAP).

**PRIORITY**

* Establishment of criteria for health risk assessment, as a tool for decision-making both in the systems of MH and MEnv, as well as in other governmental sectors at national, regional and local levels.

**ACTIONS**

5. Development of methodological guidelines for the purpose of identifying the existing state of pollution (fonts and human conditioned concentrations of pollutants or negative factors) and elaboration of vocational documentation (elaborates, studies, reviews, etc.), that should be compulsory in all cases of reconstruction of existing buildings and facilities or construction of new ones.

   Deadline: 1999
   Actor: MEnv

6. Identification, registration and study of pollutants present in the environment, in order to determine the levels of population exposure and assess the possible health risks thereby, giving priority to the studies involving vulnerable population groups - children and young people, pregnant women, chronically ill and elderly people.

   Deadline: constant
   Actor: MH

7. Identification of the most threatened sites, so called “hot spots” and periodical review and re-evaluation of the extent of the environmental health risk and the results from undertaken measures.

   Deadline: constant
   Actor: MEnv, in collaboration with MH

**2.3. CONTROL MEASURES**

**OBJECTIVES**

* To develop adequate control mechanisms and instruments with regard to the outcomes from preventive or rehabilitation measures applied with the purpose of environment improving and human health protecting; these mechanisms and instruments will be used by the competent institutions and governmental bodies.
National Environmental Health Action Plan

To apply control measures with reference to projects and activities recognized as the most hazardous for the environment and human health.

BASIS FOR ACTION

1. The existing legislative base, concerning environment pollution control, the control coordination mechanisms between relevant sectors, professional training, the existing material and equipment conditions do not allow an effective integrated control on environmental pollutants.

2. Environmental pollution control is still centralized. Local authorities do not control local pollution sources and do not apply sufficient administrative activities aimed at prevention and/or limitation of environment pollution, although the said activities are provided for with the Law on Local Self-Government.

3. The operation of a number of pollutors has not been adapted to the existing standards for environment quality concerning specific segments thereof (water, air, noise, etc.). These standards for environment quality are difficult to achieve in this stage of development with many facilities - sources of pollution. This implies the need for adopting emission standards, which would provide for step by step achievement of emission standards.

4. Many of the industrial facilities operating in the field of metallurgy, energy, chemical, oil, cement and other industries, do not have efficiently established systems to control and monitor emissions of different pollutants.

5. The State should adopt regulations that are going to be feasible; those regulations should provide for a valid control over the applied measures.

PRIORITIES

* To provide regulatory, administrative, technical and organizational conditions for an effective control of the quality of the environment.
* To introduce control decentralization over the environment pollution.
* To adopt emission standards and develop internal control systems, before all in major polluting industrial facilities.
* To define a priority list of facilities and sites in which environment quality control measures should be undertaken, and a priority list of internal control with industrial facilities.

ACTIONS

6. Review, updating and adaptation of the existing system for monitoring, control, evaluation and information on the state of environment with reference to new regulations and outcomes of rehabilitation measures.
7. Ensure that relevant control over small sources of pollution is carried out by control authorities in municipalities.
   Deadline: 1999
   Actor: MEnv, in collaboration with MH

8. Development of methodology for emission standards in the so called "hot spots", with reference to production or local sources of pollution, including recreation and tourist zones.
   Deadline: 1999
   Actor: MEnv

9. Development of regulatory basis and organization aimed at establishing an internal control for emissions with individual polluting substances in major companies.
   Deadline: 1999
   Actor: MEnv

2.4. ECONOMIC AND ADMINISTRATIVE INSTRUMENTS
- SANCTIONS AND INCENTIVES -

OBJECTIVES

* To include environment and health protection and improvement in the costs of production, in the use of produced goods and removal and final disposal of waste, in the framework of the functioning of market mechanisms in the private and public sectors.
* To introduce a combination of legal, fiscal and technical changes, especially with regard to the energy use control and reduction of the level of air, water and soil pollution.
* To encourage, through financial incentives, investments in environmental health.

BASIS FOR ACTION

1. There is a system of different administrative, control, registration and other procedures in the Country, treating the environmental impact assessment, as well as economic procedures as regulators of the environmental behaviour of citizens, and economic entities (taxes, charges, sanctions, release from certain financial obligations, incentives, etc.).

A reasonable balance between administrative regulation and market-oriented economic instruments may often direct the activities of citizens and owners towards environment, natural resources and biological diversity protection. However, the economic and political transition, increased need for covering the costs for the social welfare and other social services are obstacles to the efficient environment and health protection. There is a need to stimulate, rather than prevent, production of such material goods that, in medium or long run, will provide financial resources for environmental health improvement.
2. In the present circumstances, the application of sanctions against environment pollution is necessary, as it is one of the most powerful tools for forcible application of standards for environmental behaviour. The “eco-tax”, provided for in the Law, has not been fully effectuated yet, due to the insufficient accuracy of regulations which should specify the permissible emissions for each potential polluter and the amount payable by the polluter. Low fines, taxes and charges in the past, such as those for the use of subsidized fuels in different areas (industry, central heating), proved economic instruments ineffective or even counterproductive with regard to the environmental control.

3. Among other highly efficient economic instruments, pricing by which certain market behaviour is limited or stimulated, is very important. The system of “cost-benefit” analysis has not been applied in our Country yet, and so is not the “polluter pays” principle, with regard to the environment pollution - health risk relation. This would direct the available resources towards specified goals. In the planning of production and pricing in private and public sectors, the costs for environmental health should be calculated, too.

4. The State, through its authorities and legislation, does not provide a sufficient extent of incentives for business entities, aimed at environment friendly behaviour, by applying preferential custom duties and various taxation and other types of incentives for environmental raw materials or technologies, application of recycling of secondary raw materials, provision of soft loans, etc.

5. Except for the case of use of electricity, where the differences between day-night and summer-winter prices stimulate consumers to save energy (which, on the other hand, is highly productive in ecological terms), the philosophy of economic stimulation of consumers (citizens) aimed at improving the quality of their environment, water consumption through the quality of drinking water, the use of environment friendly wrap up materials, application of measures for selection of wastes in households aimed at their reuse as a secondary raw materials for recycling, etc., is not applied.

**PRIORITY**

* To establish a system of economic instruments in order to ensure market behaviour through sanctions and incentives towards business entities and users of goods and services, that favour environment protection and improvement, and, through that, protection and improvement of human health.

**ACTIONS**

6. Updating and completion of taxation legislation, by introducing tax and other types of alleviations for activities related to environment and human health protection.
   Deadline: 1999
   Actor: MF in collaboration with MH and MEnv

7. Development of methodology for financial evaluation of adverse health effects resulting from increased morbidity caused by environment pollution.
8. Development of regulations which, through environmentally oriented charges and sanctions, will reduce the pressure on natural resources and increase the interest for recycling of secondary raw materials and introducing environment and health safe technologies.

Deadline: 1999
Actor: MEnv

2.5. ENVIRONMENTAL HEALTH SERVICES
(HEALTH RISK ASSESSMENT IN THE EXISTING STATE OF THE ENVIRONMENT)

OBJECTIVES

1. To strengthen the environmental health services (present public health institutes) at national, regional and local levels, and create appropriate mechanisms to implement the policies on supervision, prevention of adverse impacts and improvement of the quality of the environment and protection of the health.

2. Taking into account the multi-dimensional nature of environmental health, different mechanisms to support these services are required, and not only by the health, but also by the economic, political, legislative, scientific and educational sectors in the Country.

[HAPE, Art. 116-121]

BASIS FOR ACTION

1. The cooperation between MH and MEnv is of vital importance for the proper conception and implementation of environment - human health relation policy. Environmental health services should act as direct links between those that adopt and implement the relevant policies and those that are subject thereof. These services should also be in direct communication with the public for the purpose of meeting their needs and complaints. Such services should be independent, positively responsive to the needs of the public. At the same time, they should represent positions and interests of competent authorities at local, regional and national level.

2. Services that deal directly with environmental health matters are public health organizations - Republic Institute for Health Protection and 10 regional institutes for health protection, under the responsibility of MH, as well as 34 local offices of the RSHI distributed in the former municipalities of the Republic; the RIENPI and AENPI are under the responsibility of MEnv. Certain professional matters in the area of environment and nature protection and improvement can be carried out by scientific and professional organizations and other legal entities registered for such activities, based on the authorisation allocated by the Government of the Republic of Macedonia upon proposal by MEnv.
3. The new social and economic conditions in the country require reorganization of structures and acquisition of new knowledge and skills by specialists working in the field of environmental health, accompanied by adoption of new or upgrading of the existing regulations and approximation thereof with the recommendations of the EC and WHO. The Republic of Macedonia expects assistance and support by European and international organizations and financial institutions functioning in the areas of environment and health.

PRIORITIES

* Reforming activities in the health sector aimed at reorganizing the environmental health services.
* To ensure organizational, financial, technical and staff strengthening of environmental health services.
* Strengthening and extending the role of municipalities in implementing environmental health policy.

ACTIONS

4. Inclusion, within the overall reforming activities aimed at health system reforming, of actions – strategy for reforming the preventive medical segment in the area of environmental health.
   Deadline: 1999
   Actor: MH

5. Development of programme for training and qualification of environmental health professionals and modernization of the material and technical conditions, including provision of software and hardware as a precondition for their effective connection to the information system and quick transmission of information.
   Deadline: 1999
   Actor: MEnv in collaboration with MH

6. Provision for coordinated action while implementing activities aimed at environment protection and activities aimed at health protection, by establishing inter-sectoral infrastructures that will involve governmental institutions and organs, as well as municipalities, major producers-polluters, non-governmental organizations, public, etc.
   Deadline: constant
   Actor: MEnv, in collaboration with MH

2.6. PROFESSIONAL TRAINING AND EDUCATION

OBJECTIVE

* To provide educational and training programmes at all levels of educational system, in order to create professional staff and teams of environmental health professionals in issues related to the linkage between environment and human
health, who will facilitate implementation of programmes aimed at improving the health of the population related to environmental factors.

BASIS FOR ACTION

1. The lack of specialists with appropriate qualifications required for carrying out activities related to environmental health management is the major obstacle to the effective functioning. Capacity building of environmental health professionals qualified for implementation of specialized programmes for environment and health protection requires specialized training. Such programmes and their implementation should take account of the geographical, cultural, economic and political characteristics of the state of environment and health.

2. The employees in this area have different educational backgrounds - medicine, biology, architecture, civil engineering, mechanical engineering, agriculture, physics, chemistry, technology, etc. Their education involved, to a various extent, items related to environment protection and mitigation of health risks related to environmental factors. Additional training in multifaceted aspects of environment and health unites in a suitable manner medical and technical knowledge, as well as biology and technology, social policy, management and computers, etc.

3. The concept of environmental management for the purpose of health improvement is relatively new and reflects the need for appropriate education, either in the form of supplementary professional education or specialized educational degrees. The assessment of environmental health risk and the recognition of diseases occurrence associated with environmental impacts requires additional education of Doctors of Medicine. In this context, there is a need to extend the scope of the existing specialties in hygiene and environmental health, occupational health, sanitary engineering, medical physics, radiological physics, etc.

PRIORITY

* To implement educational courses for environmental health professionals who should be able to respond to the needs for diagnosing of the environment status and to the needs for environment management.

ACTIONS

4. Implementation of knowledge and skills in the area of environmental health within the existing system of medical staff education and training.
   Deadline: 2000
   Actor: MH

5. Introduction of educational curricula with environmental health in higher educational institutions for all other professions, except medicine, such as architecture and urban planning, physics, chemistry, economics, social activities, etc.
   Deadline: 2000
2.7. PUBLIC INFORMATION AND ENVIRONMENTAL HEALTH EDUCATION

OBJECTIVES:

- To ensure public participation at the earliest stage of environmental health planning, during priority setting and programmes implementation. Such participation should be based on the principle of openness and partnership of all participants.
- To offer the necessary knowledge on the environment and health to the public by effective health-related educational programmes using the most suitable mass-media, in order to make the public an active participant in the programmes planning and implementation.

EHAPE, Art. 134-139

BASIS FOR ACTION

1. In order to involve the public into the decision-making processes in the domain of environmental health, not as an observer or accuser, but as an equal participant in problems solving, the following is necessary:

- good public information and health education, by means of integration and coordination between MH and MEnv, as a united competence and joint responsibility;
- partnership at all levels and sharing of responsibilities and competencies at the level of authority, including local level (MH, MEnv, RSHI, RIENPI, municipalities);
- observation of the right to accurate and timely information of local public, informal (non-governmental) organizations, public information media and acquisition of feedback information on the threat to the environment, as well as to consumers, i.e. users of products and services on the impact of such products and services on the environment and on human health;
- using of good information and health education as a regulatory instrument in the area of environment and human health protection.

2. Public education with reference to environmental health matters aimed at ensuring that the public (individuals and organizations) is able to understand the degree of environment related health risks properly and to direct their requirements to major polluters of the
environment, to responsible authorities, to scientific community and controlling institutions, significant investments are necessary.

3. The sufficient and appropriate information of and participation by the public in environmental problems solving is an essential element of the environmental education policy. To this end, it is necessary to ensure that the majority of students closing their education are capable to understand scientific information on environment and health; the media (radio, TV, press) also play a key role in the public awareness increasing and creating a positive attitude towards environment and human health protection.

4. Public should take an active part in the planning, decision-making and environmental health policy implementation, which is a precondition for satisfactory results achievement. The success, on the other hand, depends on the approach towards good information; otherwise, social resources could be committed to a wrong priority. Public perceptions are often predetermined by local experiences, based on proper or inadequate and insufficient information. These local experiences therefore have a significant role in the creation of public opinion with regard to health risks.

5. Public institutions in the area of education, in their educational programmes and curricula, should envisage topics aimed at acquiring knowledge and developing an active attitude towards environment and nature protection and improvement, in primary and secondary school education, health, informatics, culture and science, etc., as well as topics on the risks resulting from environmental impacts on human health.

6. Responsible environmental management and allocation of public resources require public that can help in the development of a well elaborated analysis of the severity of problems and the cost of problems solving, as well as potential benefits of alternative investments. Relevant information on these analysis should be made available to particularly interested population groups, non-governmental organizations, journalists from the radio, TV and press, etc. The following are important issues calling for solutions:

   - to ensure, through educational curricula at different levels, that scientific information on environmental health are understandable and meaningful;
   - to provide means by which public opinion will be expressed in public information media;
   - to develop measures for control over the information addressed to the public, in order to avoid distortion or misinterpretation thereof.

Taking into account that television, radio, press, and other types of publicity are the main sources of information for the population, and they inform rather than reflect public opinion, they play a key role in the enhancement of the understanding and creation of positive attitude of the public towards environment and health conservation. Public information media are entitled to an accurate and appropriate information to be transmitted to the public.

The interactions among individual participants in the occurrence, transmission and receipt of relevant information is shown on the following scheme:
Figure 2. Mutual interactions between environmental health information and health education of the public

Municipalities
Environmental Health Services
Citizens
Interest Groups
NGOs

Priorities

* To observe the principles of the legal state concerning the right of the public to have an access to information and environmental health education and training.
* To introduce legal instruments in order to ensure public participation in the environment and health decision-making process.

Actions

7. Development and strengthening of the communication between governmental and non-governmental organizations and involvement thereof in the competent bodies dealing with projects and their implementation, regarding environmental health problems.
   Deadline: 1999
   Actor: MEnv, in collaboration with MH

8. Through establishment of public relations policy - continuous information of public information media with regard to environmental health issues.
   Deadline: 1999 and constant
   Actor: MEgov in collaboration with MH

9. Introduction of educational methodological units on environmental health in primary and secondary schools.
   Deadline: 1999 and constant
   Actor: MEd

10. Development and introduction of educational programmes on environmental health in higher education institutions.
    Deadline: 1999 and constant
    Actor: MEd in collaboration with the SU and BU

2.8. Research and Technological Development

Objectives
1. Research should be conducted not only with reference to the identification of technology-related impacts on environment and health, but also in technological and economic areas in order to develop environment friendly technologies, and find out to what extent their likely higher cost will be compensated with environmental health benefits (cost-benefit), expressed in monetary terms.

2. The following are particularly important researches:

- identification and quantification of environmental health indicators, by improving the methods for hazard identification and risk assessment;
- more detailed research of the interactions among dosage-time-effect;
- assessment, in particular, of the risks from low-level long-lasting exposure, and complex exposures from various sources, and interactions between environmental agents and socio-economic and lifestyle factors;
- identification of vulnerable groups of the population and mechanisms causing adverse effects in general and with vulnerable groups in particular.

3. The knowledge required for sustainable environment management can be acquired through systematic, well planned researches directed towards the achievement of sustainable health solutions; to this end, the following is needed:

- researches with reference to existing and creation of new technologies that are friendly to the environment and human health;
- development of methods to evaluate the "benefit-detriment" ratio concerning application of technologies that are health supportive, which will provide for comparison between the cost for preventive action and the expected benefits;
- encourage technologies minimizing the waste, involving recycling of the waste and secondary raw materials, provision of low-cost monitoring food, water and air quality and safety of products intended for general consumption.

PRIORITIES

- To create conditions that will stimulate scientific researches on the basis of which hazard impact of the environment on human health will be assessed.
- To create conditions that will stimulate scientific researches on the basis of which minimum environment affecting technologies will be adopted.

ACTIONS
4. Identification of environmental health indicators and criteria for friendly environment.
   Deadline: 2000
   Actor: MEnv

5. Identification of indicators and criteria for health risks, development of methodology for recognizing early manifestations of adverse effects, including social conditions and lifestyle factors.
   Deadline: 2000
   Actor: MH

3. ENVIRONMENTAL PROTECTION BASED ON MEDIA AND NEGATIVE IMPACT FACTORS

3.1. WATER

**HFA TARGET 20: Water quality**

By the year of 2000, all people should have an access to adequate supplies of safe drinking-water and the pollution of ground water sources, rivers, lakes and seas should no longer pose a threat to health.

**OBJECTIVES**

- Reduction and minimization of health risks from population by adequate supply of drinking-water for each citizen, safe in terms of health, in sufficient quantities, with guaranteed micro biological, organoleptical and chemical composition in accordance with national regulations and recommendations of the WHO, as well as waters for sports and recreation, and safe food production.
- Reduction of exposure on toxic chemicals through water, originating from agriculture and industry.

**BASIS FOR ACTION**

1. The state of water resources in the Republic of Macedonia concerning the ground waters and surface waters in upper river flows (which run mainly through mountain areas) indicates that they are relatively clean and fit within the limits for water categorization; in middle and lower rivers flow and accumulations, the water quality depends on the treatment of waste waters, generated by settlements, industry, agriculture, tourist economy, etc. In the past, the main causes for water-borne diseases were intestinal infectious diseases, the most frequently recorded being diarrhea, intestinal typhus and
paratyphoids, infectious hepatitis A; in systematic medical examinations of school-aged children, there were cases of carriers of intestinal parasites (worms). In this area, there were cases of water-related diseases, communicated by means of contact with water containing infectious carriers, such as leptospirosis, as well as diseases in which the water represents a medium to the development of vectors of certain diseases, such as malaria (water-associated diseases). These diseases occurred in epidemic, endemic and hyperendemic form. Non-infectious diseases, resulting from the inadequate physical and chemical composition of water, manifested in endemic form, in addition to the tooth caries, which is widely present throughout the Republic and individual endemic areas of fluorosis, have not been recorded in terms of other geochemical and endemic focuses of infections, or acute or chronic intoxications. In the past, there used to exist areas with endemic goiter, which had been eliminated by applying iodined salt. Nitrates, which represent serious health problem in many parts of Europe, do not pose significant health threat in our Country, except with several smaller, individual water supply facilities in some flat villages.

2. The quality of surface waters is regularly monitored by the Republican Hydrometeorological Institute (RHMI) at 60 measuring points; 51 measuring points of this are positioned on river courses on the territory of the Republic of Macedonia, while 9 measuring points are placed on the three big natural lakes - Ohrid (5 measuring points), Prepa (2 measuring points) and Doyran (2 measuring points), which partially belong to the neighbouring countries: the Lake of Ohrid is shared with Albania, the Lake of Prepa with Albania and Greece, and the Lake of Doyran with Greece. The RHMI, in accordance with the Law on Waters ("Official Gazette of SRM" No:6/18) is responsible to the Ministry of Agriculture, Forestry and Water Economy. The quality of surface and ground waters is evaluated on the basis of the existing Decree on Water Classification into 4 classes ("Official Gazette of SRM" No: 9/84).

3. The quality of surface waters used for sports and recreation purposes and tourism, on the shores of the Lakes referred to in item 2 above, is monitored by the relevant IHPs depending on the territorial distribution (Ohrid - IHP Ohrid; Prepa - IHP Bitola; and Doyran - IHP Veles). The quality of waters in river beaches is monitored with reference to the River of Vardar by the IHP-Skopje; the existing covered and opened swimming pools are monitored by the competent IHPs, depending on the territorial position; the entire monitoring is carried out in cooperation or upon approval by the RHIP-Skopje.

4. The present status of the quality of surface water is unsatisfactory. There is an evidence on water pollution with micro biological and organic substances. What is more, certain water courses have been polluted with hazardous substances, such as chromium, iron, cadmium, lead and zinc. Doyran Lake is potentially polluted with cyanide toxins.

5. Certain rivers, because of the immense pollution of water sections following the receipt of waste waters have turned into waste water collectors (dead rivers), such as the River of Dragor downwards from Bitola and the River of Kumanovka after Kumanovo (significant deficit of dissolved oxygen, big amount of sediment and high values of BOD5, increased quantities of phosphorus substances, etc.); the quality of water in the rivers of Vardar, Cma Reka, Strumena and Bregalnica, after the receipt of communal and industrial waste
wastes from the cities of Tetovo, Skopje, Veles (Vardar), Prilep, Bitola (Crna Reka), Kocani, Ship (Bregalnica), and Strumica (Strumesnica) declines and in unfavorable hydrometeorological conditions reaches a class that is beyond the prescribed water quality. In the course of the last several years, the situation has been slightly improved, which is due not to the measures undertaken for waste waters treatment, but rather to the reduced industrial production resulting from the social and economic transition and declined production as a result of economic and political reasons (blockade, embargo, lost markets and business cooperation, etc.).

6. The urban sewerage systems, collecting communal and industrial waste waters, and in some settlements storm waters as well, and industrial sewerage systems which are not connected to the urban sewerage systems, but are discharged untreated directly into the recipients, are the main polluters of surface and ground waters. In the Republic, with an exception of the developed collection systems with waste water treatment plants for the cities of Ohrid-Struga, Resen and Doyran, and low number of industrial facilities, no other town has any waste water treatment system. There are designs in this regard for Skopje, Bitola, Strumica and Prilep, but, due to the lack of financial resources, these projects have not been implemented yet. The most severe polluters of waters, regardless of whether they are connected to the urban collection systems or have their own discharging outlet in surface waters, are the chemical, food processing, leather, metal processing and metal (ferrous and non-ferrous metallurgy) industries. Major potential polluters are regarded the mining flotation of lead and zinc ores in Kamenica and Probistip, and livestock, especially hog farms.

7. Major non-compliance with the water quality prescribed by the Decree on Waters Classification by individual parameters, for the period between 1988-1997, is noted with reference to the content of nitrates, mainly in the rivers of Bregalnica and Crna Reka; then BOD5 - in the same water courses; the parameter dissolved oxygen is most unfavorable in the River of Crna Reka, at the measuring points Novaci and Skocivir, as well as in the Rivers of Kumanovska and Dragor, after the receipt of waste waters from Kumanovo and Bitola, respectively. Nitrates in examined water courses are within the prescribed limits, according to the Decree. The lead was found in all analyzed surface waters within limits of ambient concentrations, except for one increased value in the River of Vardar downwards Veles, but not beyond the values prescribed for class I and II; in the rest of analyzed rivers, concentrations are within ambient values. The zinc, as well as the lead, is recorded in analyzed waters in ambient concentrations, except in the River of Vardar downstream from Veles, but again, the increase of values is within the limits prescribed for classes I and II, according to the mentioned Decree. Cadmium is present in ambient concentrations in all examined locations; increased concentrations exceeding the standards prescribed with the said Decree have been occasionally found at measuring points in the River of Vardar, downstream from Veles, in upper river flow of Bregalnica and in the Lake of Tikvesh, which belongs to the watershed of the river of Crna Reka. Chromium has been detected in ambient concentrations in almost all measuring points - some increase has been detected in the River of Vardar, after the facility of Jugohrom, but again it is within the prescribed limits.
8. Central water supply in the Republic has been provided for the entire urban population of about 1,160,000 inhabitants and about 160,000 rural inhabitants, connected to urban water supply systems. The total number of about 1,320,000 inhabitants (64% of the total population in the Republic of Macedonia, which is 2,050,000 inhabitants) is supplied by central water supply from own water intakes for about 520,000 rural inhabitants (58% of the total rural population which is about 890,000 inhabitants), while about 210,000 rural inhabitants (23% of the total 890,000 inhabitants) are supplied by local water supply facilities. Out of the total number of the population in the Republic, about 62% are supplied with water from karstic springs, about 22% from surface waters, and about 16% take water from ground waters, through wells. The control over drinking water safety is carried out by the relevant IHPs, in cooperation with the RHs.

9. According to the quality and safety, waters originating from karstic springs and accumulations (more than 80% of the water used for water supply of settlements) belong mainly to the I and II class, according to the Decree for Waters Classification, although there are some pollutants of natural origin, such as sediments, phosphorus matters, iron occasionally, etc. Bacteriological pollution is caused mainly by saprophytic bacteria originating from the soil or surface waters. Watersheds of these types of springs (large protected zones) are located mainly in high mountainous areas, without any industrial polluters or significant population; possible bacteriological pollution can be caused by extensive livestock breeding during the summer periods and by the life processes in the upper layer of the soil; tourist activities in those zones are insignificant in size and do not pose serious sanitary and hygienic hazard. The contents of nitrates in these waters is low, with an average of 1 mg/l.

10. The natural composition of waters with reference to the total mineralization, contents of iron, manganese and other micro-elements varies in wide range. Almost all karstic and surface waters, and significant amount of well waters, are notably short in fluor, from the teeth caries prophylaxis point of view. In some of the intakes of well waters, problems are caused by the increased contents of iron and manganese (Veles, Shtip, Kocani and certain rural settlements). Nitrates in such waters range between 1 - 5 mg/l only in the cases of some wells, used for seasonal water supply for the city of Prilep (in the summer period when the inflow from the karstic springs of Studenci is reduced), and some of the wells used for water supply for the town of Radovish, the content of nitrate is above 10 mg/l, but never exceeds 15 mg/l; both well areas are situated in regions where lands are intensively used for agricultural purposes. Toxic parameters, such as lead, arsenic, chromium, cadmium, etc., have not been detected in concentrations above those prescribed by the existing regulations or recommendations of the WHO and EC. Indicators of pollution of organic origin, such as phosphorous compounds (ammonia, nitrite, nitrate), KMnO₄ demand, with an exclusion of insignificant number of water supply facilities in some rural settlements, do not represent an issue from sanitary and hygienic point of view. Radiological pollution and pollution by organochloric and organophosphorous pesticides, according to the data from investigations carried out until now, can not be regarded as a problem in sanitary or hygienic terms in the Republic. Investigations against herbicides have not been carried out so far.
11. With water supply systems taking water from karstic springs or ground water from wells, as well as those applying treatment of surface waters, micro-biological and biological composition of drinking water in central urban water supply facilities complies with the existing regulations; health safety of these waters is controlled by professional communal utilities, and they are regularly controlled by the relevant IHPs, in cooperation with RIHP. Central water supply facilities using own water intakes in rural settlements are under the responsibility of local communities, where the professional status of operation with water supply facilities is inadequately regulated; the control over these facilities is insufficient compared to urban water supply facilities. The percentage of bacteriologically unsafe findings is significant if compared to the recommendations of the WHO and EC, i.e. over 5% in analysed samples; the most unfavorable condition is noted with the water in individual (private) water supply facilities, where investigations proved that the percentage of bacteriologically unsafe findings is the highest compared to the previously mentioned water supply facilities.

12. During the last 20 years, from 1970 to 1997, several water based epidemics were recorded, caused both by local and urban water supply facilities. The epidemics were caused by serious distortions of water safety in intakes or distribution networks, or in sanitary protection zones of water intakes. Recorded micro biological causes were the following: dysentery and other carriers of different types of diarrhea, intestinal typhus, paratyphoids, infectious hepatitis A. Epidemics ending with highest morbidity were those registered in: the village of Velebrdo in 1978 - intestinal typhus, Debar in 1978 - infectious hepatitis of A type, Kratovo in 1980 - infectious hepatitis of A type, Skopje in 1988 - dysentery, Veles in 1990 - infectious hepatitis of A type, Shtip in 1991 - dysentery, and other carriers of diarrhea, Probistip in 1993 - infectious hepatitis of A type, the village of Zrnovci - enterocolitis.

13. With reference to ground waters, which are insufficiently thoroughly examined, potential polluted areas resulting from chemical and oil industry are regarded those situated downstream from the industrial zone of the City of Skopje, and upstream from the refinery in Bujkovci; both sites are placed on the left and right river bank of Vardar, downstream from the urban zone of Skopje.

14. The state of thrihalomethanes and other halogenized hydrocarbons is insufficiently studied. It is estimated that waters originating from karstic springs and ground waters intake through wells have low potential for creation thereof, in the course of applying chlorination for disinfecting purposes. Waters from accumulations contain slightly higher quantity of organic substance, as a precursor of those compounds; possible problems could be expected in smaller accumulations. Based on analysis done so far, chloroform was detected in chlorined waters in Berovo and Sveti Nikole, in a quantity of 40-50 µg/l, while other thrihalomethanes are beyond the detection limit of apparatuses (gas chromatographer).

15. There is a significant number of springs of mineral, and thermal mineral waters. Most of these springs are used, depending on their natural characteristics, for sanatorium treatment and sanatorium tourism, for business tourism and bottling for sale on the market, as mineral drinking water. On the basis of past examinations of these waters' quality and safety, no chemical toxic or radio toxic findings exceeding permissible limits have been detected,
according to the existing standards applied to drinking water and WHO recommendations (Codex Alimentarius). In some artesian wells, used as primary springs for water supply purposes in certain number of villages, among sanitary and hygienic problems, apart from the high mineralization, one can note the possible presence of iron, manganese, ammonia of inorganic origin.

PRIORITIES

* Approximation with the legislation on the quality of ambient waters and drinking water with the recommendations of WHO and EC;
* Introduction of fluoridation of drinking water as the most efficient and the least costly means for dental caries prophylaxis;
* Establishment of zones for sanitary protection concerning areas around springs used for water supply, in order to prevent human caused pollution;
* Construction of communal and waste waters treatment systems.
* Monitoring the quality of surface and ground waters, especially at places with drinking water intake, places used for sports and recreation and places used for water intakes for irrigation; monitoring the discharged untreated and treated communal and industrial waste waters treatment, in accordance with the recommendations of WHO and EC.

ACTIONS

16. Observation of the provisions of the Law on Waters with reference to the development and review of the water base of the Republic of Macedonia, in accordance with the space planning and the level of social and economic development, and approximation of documents on water resources protection and improvement in terms of quantity and quality, with the recommendations and directives of EC.  
Deadline: 2003 and constant  
Actor: MAFWE, in collaboration with MEnv

17. Provision of monitoring for the surface and ground waters quantity and quality, status and approximation with the recommendations of EC.  
Deadline: 2000  
Actor: MAFWE, in collaboration with MEnv

18. Categorization of waters on the basis of their vulnerability by human originating pollution.  
Deadline: 2000  
Actor: MAFWE, in collaboration with MEnv

19. Approximation of criteria on water quality and methods for drinking water examination with the recommendations of EC.  
Deadline: 2000  
Actor: MH

20. Provision, through regulation instruments, of professional management of water supply, including as great as possible coverage of rural settlements and provision of measuring and billing of consumed water.  
Deadline: 2000  
Actor: MAFWE
21. Introduction of fluoridation of drinking water as the best, most comprehensive and least costly method for dental caries prevention in the periods of milk and permanent dentition.
   Deadline: 2000 and constant
   Actor: MH

22. Establishment of a computer environmental health software based monitoring system in order to apply uniformed forms for issuance of laboratory findings from completed analysis of drinking-water, as basis of the national information monitoring system on drinking waters.
   Deadline: 1999
   Actor: MH

23. Conducting targeted epidemiological studies aimed at assessing health risks, that are due to the breach of regulations on chemical parameters in places with human or natural based impacts.
   Deadline: 2000
   Actor: MH

24. Limitation of environmental health risks of environment pollution with waste waters (communal, industrial, etc.), by developing appropriate waste water treatment plants.
   Deadline: constant
   Actor: MEnv, in collaboration with MEc

25. Health education activities directed to the population, especially for the school-aged population, concerning drinking water, surface waters and waste waters, as well as the significance of measures undertaken for the purpose of water heritage of the Republic of Macedonia protection and improvement.
   Deadline: 1998 and constant
   Actor: MH, in collaboration with MEd

3.2. AIR

**HFA Target 21: Air quality**

By the year 2000, air quality in all countries should be improved to a point at which recognized air pollutants do not pose a threat to public health.

**OBJECTIVES**

* The quality of air in the breathing zone, in urban and other environments in the Republic of Macedonia to be improved to a point of undetectable health effect on the relation recognized air pollutants - non-specific respiratory diseases (acute and chronic) and lungs cancer, by establishing an integrated environmental and health monitoring of the actual situation, undertaken measures and achieved results by sectors involved in air protection against pollution and population health.

   **EHAPE, Art. 168**
BASIS FOR ACTION

1. The Republic of Macedonia covers a territory of 25,713 km², 80% of which are hilly and
mountainous areas, and 20% are plane areas, valleys and water areas. Out of about 2
million inhabitants, almost entire population, as well as industrial and other activities
representing sources of various polluting substances in the atmosphere, are situated in plane
areas and valleys. Climate and meteorological and topographic characteristics of the
mentioned 20%, together with errors made in the process of urbanization and space
planning, in some areas support the lower layer air pollution, creating conditions both for
winter and summer smog. Critical areas in this regard are urban and periurban
environments in Veles, Skopje, Tetovo and Bitola, with a total number of about 900,000
inhabitants, which is about 45% of the total population.

2. The monitoring of the air quality in lower atmosphere layer (immission monitoring) is
carried out by the RHMI, RIHP and 10 IHPs, the Agency for Environment and Nature
Protection and Improvement and the lead and zinc smelting company in Veles. Polluting
substances monitored in Skopje are smoke and SO₂, total suspended particles, O₃, NOₓ,
CO₂, lead, iron and manganese in suspended and fluttering particles of respirable dimensions
(under 10 µm); in Tetovo - smoke, SO₂, and suspended particles; in Veles - smoke, SO₂,
lead and cadmium; in Kavadarci - nickel and iron; in Bitola, Kumanovo, Ohrid, Strumica
and Ship only the suspended particles are measured. The number of parameters and
measuring points, as well as equipment used for sampling of air have been changing
through the time. Since 1974, when the Law on Air Protection against Pollution was
adopted, examinations were limited to SO₂, smoke and suspended particles, with manual
sampling in Skopje, Veles, Bitola and Kumanovo. In time, the network of measuring points
has been extending, as well as the number of parameters, and the manner of monitoring has
been improving; in certain towns, the classical methods of measuring are still applied, while
in Skopje and Veles, in addition to classical methods, automatic modern systems using
computerized data processing, were introduced. In 1998, the immission monitoring has
covered 12 settlements with 92 stationary points and 1 mobile station; 7 of them are
automated, 4 stationary and 1 mobile in Skopje, and 2 stationary in Veles. Smog
situations of first and second degree were noted in Skopje, in December 1989 and January
1993, the direct cause being exceeded MPC for smoke and SO₂. Meteorological conditions
were characterized by absence of wind, temperatures beyond 0 °C, strong temperature
inversion and increased emission of sulphur oxides.

Systematic monitoring of radon in the atmosphere of settlements (outdoor air pollution) and
in dwellings (indoor air pollution) is not carried out.

The indoor air pollution (housing, business premises, premises for vacation and recreation,
etc.) with regard to the above mentioned polluting substances of the imission monitoring
(smoke and SO₂), pollution caused by smoke of cigarettes, as well as potential pollution by
construction materials, is not carried out by immission monitoring.
3. In the period following 1991, a significant decrease of industrial emissions of air pollutants has been noted. This is not a result of any measures undertaken, but due to the reduction of industrial activities in the period of social and economic transition. However, the installed industrial and other facilities, in case of economic revival, could compromise the ambient air quality again, if we fail to undertake strict measures for emissions control, by applying new approaches and mechanisms for emissions and immissions monitoring, timely information of public and authorities managing the measures aimed at air protection against pollution and the enforcement of required measures. The most serious potential polluters - stationary sources in the Republic are the following: "Jugohrom" - Jegunovce, "Fenimak" - Kavadarci, MHK "Zletovo" - Veles, REK "Bitola" - Bitola, "Steelworks" - Skopje, OHIS-Skopje, G.F. Refinery "Okta" - Skopje, Heading Company "Tabak" - Skopje, MZT - Skopje, Cement works "Usje" - Skopje, "Feteks" - Tetovo, "Silika" - Gostivar. In the Republic, there are no active radioactive ores deposits, nor nuclear power plants; the only possibility for radioactive air pollution is the transboundary one that might origin from the territories outside our Country.

4. The total emitted quantity of SO2 from solid and liquid fuels used in industrial facilities, as well as in the processing of sulfide ores of iron, lead and zinc in the period between 1992 and 1995, was estimated at about 10,000 tons/year, or 15,720 kg/hour. The quantity of emitted SO2 in the period after 1991 was estimated to be declining. The estimated emission of particles in 1993 was 8,666 kg/hours.

5. Specific pollutants are possible, depending on the type of industrial processes involved - gas chlorine, acrylonitril, ammonia, etc. in OHIS; ammonia, potassium oxyde, fluorocarbon, phosphorus-penta-oxide, etc.; in the Factory for mineral fertilizers at MHK Zletovo; lead, zinc, cadmium in the Smelting Company "Zletovo" in Veles; sulfur-carbon, volatile hydrocarbons in the refinery "Okta"; particles from the cement production process in the cement factory "Usje", etc. it is not possible to register the quantity of those specific air pollutants both in terms of emissions and immissions, because of the lack of appropriate equipment, with an exception of individual industrial facilities. Some industries contain particles treatment devices - liquid filters (Steel Works, Skopje, Factory for mineral fertilizers at MHK "Zletovo"), cyclones and electrostatic precipitators (Cement producing company - Skopje, Fenimak - Kavadarci, REK - Bitola, Smelting Company "Zletovo" - Veles, Factory for paper and cellulose - Kocani).

6. The average immission suspended particles in Skopje for 1996 was 180 mg/m², in Veles - 132.5 mg/m², Bitola - 149.8 mg/m². The topography and height distribution of emitted particles is the main reason for the appearance of the so called "dust hat" in certain valleys or urban areas - Skopje, Veles, Bitola. The origin of such particles is both from industrial sources and inadequately maintained public communications on transportation routs on which intensive road traffic takes place during the entire year. Local traffic is the most intensive in urban centers; an advantage in this regard is the fact that inter-city, especially cargo, transportation is resolved by transit routs outside urban centers, or by the so called "fast" traffic routes at the level of a highway.
7. The average annual concentration of SO₂, in mg/m³ of air in 1996, in Skopje, amounts to 0.0369 mg/m³, with 54 samples (from seven measuring sites) of concentrations over the MPC, in Veles 0.070 mg/m³ and 10 samples (from two measuring sites) over the MPC, Tetovo 1.35 mg/m³. The distribution of SO₂ shows increased values in the industrial zone (Cement Company, Brewery) and in the central urban area, while the smoke notes diffuse distribution all over the urban area, regardless of whether it is housing or industrial zone. Both pollutants (smoke and SO₂) manifested notable seasonal trends: concentrations are the lowest in spring-summer period, while highest in late autumn and winter, as a consequence from topographic, climatic and meteorological conditions, but also from the increased emissions by diffuse sources of pollution (heating in individual housing buildings that are not connected to the central heating network), in areas where the sources of these pollutants are stationary industrial or thermal power plants (Jugohrom, REK-Bitola, Smelting Company “Zletovo”, Veles, etc.) seasonal nature is not so notable as it is in Skopje.

8. The use of leaded petrol containing 0.6 g/l (the standard in EC prescribes 0.15 g/l) poses serious health risk. The estimated lead emission from road traffic in 1993, for the whole Republic, was 310 tons/year, while in Skopje it was 83 tons/year. In the course of 1995, 327,269 motor vehicles were registered in the Republic, 285,907 of which were passenger, 19,546 freight, 2,541 buses and 19,275 unspecified vehicles; 40% of the total number of vehicles were registered in Skopje. The average age of vehicles is estimated at 7-8 years, with an increased emission of CO, NOₓ, SO₂ (1% of S in diesel fuels). The emission of NO₂ by vehicles only in 1993 was estimated at 11,438 tons for the whole Country, 2,600 tons out of which were recorded in Skopje.

9. In 1996, in Skopje, an inventory of ambient air pollutants was established; the total quantity of waste gases was estimated at: total emission of 32,329,451 Nm³/h; CO - 11,415 kg/24h; SO₂ - 11,395 kg/24h; NOₓ - 4,948 kg/24h; dusts - 2,042 kg/24h. The main central heating plants in Skopje (“Istok” and “Zapad”) use crude oil, with an average contents of S of 1.4%. The total number of potential polluters is 153 facilities, 33% of which are industrial; only few of them posses waste gases treatment devices. Home heating boxes and some small enterprises often use poor quality fuels, mainly in the northern part of the City, representing severe sources of ambient air pollution in heating periods.

10. In the village of Lazaropole, the acidity of falls, as an indicator of transboundary transportation of acid rains, is measured. Based on the past measuring, we can conclude that acid rains are phenomena in the western parts of the Republic.

11. The Republic of Macedonia is Signatory to the Montreal Protocol on the Ozone Layer Protection. In the Republic, efforts have been made to remove from use substances depleting the ozone layer of the stratosphere. The current consumption of such substances in the Republic has been estimated at 600 tons/year.

12. There is a trend of increasing of the motor vehicles stock, including all types of vehicles, especially passenger vehicles. The concentration of vehicles is highest in urban centers,
causing increase of NO\textsubscript{2}, CO and Pb in ambient air (Skopje, Bitola, Veles, Kumanovo, Tetovo, etc.).

13. The morbidity of respiratory diseases holds the top position in the structure of morbidity in the Republic of Macedonia in 1996 with 47%, and particularly with children, with an average rate of 500.5%. In the cold period of the year, this rate reaches 700 %, and in Skopje and Veles even 1000 %. In Ohrid, with relatively clean ambient, this rate in winter periods is beyond 500%. The rates of illnesses of non-specific respiratory diseases in the last three years with pre-school and school-aged children (0-6 and 7-14 years old) show higher morbidity in urban than in rural areas, and higher seasonal morbidity in heating period both in urban and rural areas. The highest number of acute respiratory illnesses of upper respiratory organs is noted in Skopje, Veles, Bitola, etc. According to the study carried out by pharmaceutics information system, 32% of all prescribed drugs in the course of one year are drugs for respiratory diagnosis.

14. The majority of epidemiological researches of polluted air related to health have been carried out in Skopje: in 1973-1977; 1989-1993; and 1994-1997, by pediatrics and preventive medical institutions. In statistical terms, significant positive correlation between average monthly concentrations of smoke and SO\textsubscript{2} and increased morbidity of chronic respiratory diseases, especially with children (0-6 and 7-14 years old) was detected, with significant percentage of bronchopneumopathies of recedive nature. During the recorded smog-situations in Skopje, in December 1989 and January 1993, a statistical analysis was carried out with regard to emergency medical interventions; it was concluded that interventions because of cardio-vascular diagnosis made 20%, and those for bronchitis-asthma-emphysema 16-17% of all interventions, which is much higher than in periods with ambient air-pollution within the permissible limits, according to the MPC. Most frequent causes for death were diseases of the circulatory system with 55,3% of all deceased; diseases of respiratory system hold 4th position with 4,8% of all deceased, while the top position among respiratory diagnosis is held by chronic lungs obstructive disease.

15. One of the "hot spots" in the Republic is the Smelting Company for lead and zinc in Veles, which was put into operation in 1973 and has been operating without interruption until now. The smelting company pollutes the ambient air by zinc, lead, cadmium and SO\textsubscript{2}.

Potential environmental and human health hazards originate from the direct impacts of emissions of pollutants in the air in the vicinity of the Smelting Company, and indirect impacts through soils pollution and consumption of agricultural products grown on such soils (so called multi-medial exposure). In the period between 1978 and 1997, examinations were made at several occasions, with regard to the contents of lead and metabolites, as indicators of exposure on lead with non-professionally exposed population; there was also a control group in the village of Ivankovci, in the vicinity of Veles. Spirometric examinations of respiratory function with non-professionally exposed population were carried out in Veles and control settlement in Ivankovci. With examined individuals from different age groups, depending on the objective of each project, different types of examination were applied, such as tests for determination of lead and zinc in the blood; mobilization of the lead from
tissue depots; lead in fixed tissue depots (hair); changes in the red blood structure; concentration of delta aminolevulic acid in urine; Spirometric tests. Findings of lead intoxications were not proved, but, in statistical terms, those findings were significantly higher with tested individuals in Veles compared to the control settlement, especially with regard to recorded anemia.

16. In the vicinity of the largest thermal power plant in the Republic TPP-Bitola, among those exposed to fine particles near the facility, significant number of cases of latent bronchial obstructions with adults were registered. The examination of primary school children, gravitating to the industrial zone of Bitola, compared to the same age group in the relatively clear part of the city - Nova Bitola, showed that there was a correlation between the occurrence of bronchitis and exposure to air pollution. Higher morbidity of acute pharyngitis, tonsillitis and tracheitis, compared to other settlements was registered in the industrial air polluted areas in Veles, Probistip, Tetovo and Kratovo.

17. Examinations are insufficient with reference to emissions, pollution level of ambient air and soil in the vicinity of, and direct health impacts by the existing major facilities of chemical, oil processing, construction industries, metal works, ferrous and non-ferrous metallurgy, thermal power systems generating electricity and heat, and other facilities in industrial zones of urban and periurban environments.

18. The morbidity of other acute, and particularly chronic non-communicable illnesses of various organs, systems and tissues related to air pollution, has not been proven statistically. Also, from statistical point of view, no positive correlation has been proven between reasons for mortality and air pollution, except of above mentioned cases during the smog episodes in Skopje.

PRIORITIES

* To round off and update the legislation and necessary administrative and legal instruments for the purpose of air pollution reducing, in settlements and environment in general, by adopting emission and immission standards harmonised with the standards and recommendations of WHO and EC, as well as measures required for their gradual implementation;
* To adopt best technologies and rehabilitate the existing ones, in terms of reducing and limiting the emissions of harmful matters in the ambient;
* To upgrade the existing monitoring system in order to monitor the immission of harmful matters in ambient air, for the purpose of undertaking technical and technological and regulatory and administrative measures in urgent, medium and long term;
* To introduce strict control over emissions, by applying internal monitoring and supervision thereof by competent professional institutions;
* To improve the system for environmental health risks assessment, resulting from harmful impacts of air pollution;
To adopt regulations and undertake regulatory and administrative measures for public health protection from indoor sources of pollution, in housing and business premises, particularly with reference to smoking.

**ACTIONS**

19. Development, updating and approximation with international recommendations of regulations for MPC for harmful matters present in the Republic, as well as appropriate acts for emergency situations and measures; harmonisation of methods for polluting matters monitoring with the recommendations of WHO and EC.
   
   Deadline: 1999 and constant
   
   Actor: MEnv in collaboration with MH and MEc

20. Urgent putting into operation of the gas system as a substitute for other energy sources, except the electricity.
   
   Deadline: 1999 and constant
   
   Actor: MEc

21. Harmonisation of monitoring methods on emissions from facilities, and immission monitoring for ambient air, with the recommendations of EC. Information system, based on this monitoring, should be accessible to all possible users of its database.
   
   Deadline: 1999
   
   Actor: MEnv in collaboration with MH

22. Review of the existing specified sanitary protected zones of facilities considered to be potential polluters of the ambient air; development of elaborates for sanitary protected zones for industrial, economic and craftsmanship facilities that do not have such zones specified so far, with proposed measures for reduction and limitation of emissions of harmful matters in ambient air.
   
   Deadline: 1999 and constant
   
   Actor: MEnv in collaboration with MH

23. Review of the existing urban plans in terms of reducing and limiting the harmful impacts of industrial air pollution and pollution generated by road traffic; measures for electrification of the public urban transportation (priority: Skopje), unloading the road traffic from urban centers, provision of conditions for transit transportation, etc.
   
   Deadline: 1999 and constant
   
   Actor: MEnv in collaboration with MEc

24. Establishment of customs, tax and other financial incentives for transfer to the use of unleaded petrol and application of catalysts in order to reduce the harmful impacts of exhaust gases generated by the road traffic and gradually reduce or eliminate the use of solid and liquid fuels with high contents of sulfur.
   
   Deadline: 1999 and constant
   
   Actor: MEnv in collaboration with MF and MEc

25. Reduction and elimination of the production and trafficking and application of substances depleting the ozone layer in stratosphere, in accordance with the obligations deriving from Montreal Protocol.
   
   Deadline: 1999 and constant
   
   Actor: MEnv in collaboration with MEc
26. Development and establishment of National Environmental Health Information System based on health indicators and hygienic quality of ambient air, as a basis to undertake administrative, regulatory, technical and technological measures.
   Deadline: 2000
   Actor: MH in collaboration with MEnv

27. Conducting targeted epidemiological researches of the health status of, before all, vulnerable population groups in areas with health risks due to the air pollution (ferrous and non-ferrous metallurgy, chemical and oil processing industry, thermal power generation, etc.).
   Deadline: 1999 and constant
   Actor: MH

28. Training specialists in environmental health with the ability to assess and manage health risks and measures for protection against indoor air pollution and outdoor air pollution.
   Deadline: 1999 and constant
   Actor: MH

29. Development of LEHAPs of risk from air pollution containing urban environments - Skopje, Veles, Kumanovo, Bitola, Tetovo, Gostivar, and others and Ohrid as control area.
   Deadline: 1999
   Actor: MH in collaboration with MEnv

30. Intensifying the cooperation between governmental institutions and professional and scientific organizations, on one side and ecological and other non-governmental organizations and mass-media on the other, for the purpose of providing relevant and sufficient information to the public on the environmental and health significance of air pollution and active public participation in the improvement of their own living conditions. Priority action is information on the use of unleaded petrol and vehicles with catalyst.
   Deadline: 1999 and constant
   Actor: MEnv in collaboration with MH

### 3.3. FOOD

**OBJECTIVES**

- To establish as comprehensive as possible health control over the quality and safety aspects during the production, processing and trading of food products, of domestic origin before all, as well as the trade of imported food products;
- To minimize the risk from infections due to consuming biologically contaminated food and the risk from chemical contaminants incidence;
- To monitor the biological value of food products in terms of sufficient daily intake of energetic, structural and protection macronutrients with all age and gender categories.

**HFA Target 22: Food quality and safety**

By the year 2000, health risks due to microorganisms or their toxins, to chemicals and radioactivity in food should have been significantly reduced in all Member States.
biological population groups, especially vulnerable, with an accent on the prevention of deficiency diseases;
* To approximate and update the existing national regulations with the recommendations and directives of WHO, FAO and other international institutions and establish conditions for more efficient cooperation between health, veterinary and agricultural sectors;
* To improve proper information of primary food producers, food processors and distributors on the food safety requirements in view of biological and chemical contamination;
* To increase public awareness on food and nutrition safety

**BASIS FOR ACTION**

1. The transition from extensive individual towards modern intensive agricultural production, accompanied by massive application of agrotechnics and agrochemistry in the primary production, increasing environmental pollution and increasing practice of industrial production of food products of plant and animal origin, created conditions for more significant food contamination by biological contaminants - bacteria, parasites, fungi and products thereof - mycotoxines, as well as by chemical contaminants - heavy metals, residues of pesticides, hormones, antioxidants, preservatives, colors and other types of additives or deliberately added contaminants.

2. There is no efficient monitoring system in the Country to monitor soil contamination as a basic resource of primary production, in view of heavy metals, artificial fertilizers, residues of pesticides, radio nuclides, etc., as well as of irrigation waters in view of secondary contamination of the soil. The available statistical data for the period between 1986 and 1996 indicate reduction in the quantity of supplied pesticides from 2173 to 556 tons; in the total reduction, the share of insecticides is for 8 times, and fungicides for 3 times. Examinations of pesticides in the soil are rare and insufficient to reach relevant conclusions. The quantity of consumed artificial fertilizers was reduced from 18.835 tons in 1986 to 3.409 tons in 1996. The most frequently used fertilizers are nitric and complex fertilizers, while phosphoric and potassium fertilizers only are used in rather low quantities. The reduction in the use of pesticides and fertilizers is due to the negative social and economic developments in the Country.

3. Among toxic metals in the soil, lead and cadmium have been examined; on the basis of limited data, one can conclude that the contents of lead in 5 areas in Skopje ranges between 17.6 and 61 ppm; in the soil of rice fields in the vicinity of Kocani, the lead ranges from traces to 10.15 ppm (the layer at 20 - 40 cm has an average of 4.76 ppm, while surface layers an average of 6.11 ppm). The contents of lead in the soil around the lead and zinc smelting company in Veles and in the vicinity of the lead and zinc ore flotation in Toranica, is in much higher concentrations. The rice soils in the vicinity of Kocani contain cadmium up to 0.1 ppm; concentrations of zinc are within permissible limits.

4. The state of monitoring soil contamination is rather complex and difficult to accomplish, because over 80% of the productive agricultural land is in private ownership, in rather small
pieces of parcell professional assistance by advisory agricultural extensions with regard to the use of agrochemical matters is satisfactory, and professional supervision over the pesticides trafficking is in accordance with the relevant legislation, and, with the adoption of the new Law on Plants Protection conditions have been created for even more efficient control over these matters application. Relevant authorities are not sufficiently equipped, in terms of methodology and apparatuses to be able to monitor contaminants in primary production.

5. Secondary production is characterized by high number of new, small enterprises, facing insufficient equipment with the required apparatus, premises and staff; the tendention towards rapid profit gaining leads to a situation in which many of them apply technological procedures that are professionally insufficient, thus causing direct impact on the food safety. The use of additives above the permissible quantity is frequent, and there are cases of using of non-permitted additives, in order to cover for the poor quality, products falsification or hiding of insufficieny of the technological process takes place.

6. Chemical contamination was examined in 1997 on 40.000 samples, 15.000 of which were of domestic production and 25.000 imported; in 14.503 samples, heavy metals were examined, in 10.199 pesticides, in 2.253 mycotoxines, in 4.109 antibiotics, in 577 hormones, and in 7.796 additives. Chemical analysis of contaminants were carried out mainly against imported products, and only with 5% of tested products were of domestic origin. Among heavy metals, lead and cadmium were examined; the number of false findings was only 0,15%. Average concentrations of lead in products of plant origin are about 10 times lower than MPC, while in animal products, average concentrations in meat are 14%, in milk 34% and milk products 38% of MPC; compared to the findings obtained by WHO-FAO, findings obtained in our examinations are within the average ranges for individual products in Europe. Deviations from the Republican average are recorded in tested samples of early vegetable products and fruits in the vicinity of Veles, where 20% of the samples contained concentration higher than the MPC, which, compared to other production areas, is 2 to 8 times higher. In rice produced in the area of Kocani, the concentration of lead in relatively clean areas is 0,1 mg/kg in average, near factories it is 0,34 mg/kg and closely to roads - 0,42 mg/kg. Detectable concentrations of cadmium were proved in 10% of the tested samples of the groups of milk, milk products, fish, wheats, vegetables, fruits. Average concentrations in milk and milk products are for 10 times, and in plant products for 50 times lower than the MPC, compared to the data of WHO-FAO, our findings are much lower.

7. In food products, with regard to pesticides, only organochloric and organophosphoric insecticides are monitored; carbamonic insecticides and herbicides has been tested in limited number of rice samples taken in the area of Kocani. In totally tested 10-12.000 samples/year with reference to the presence of insecticides, concentrations above MPC were found in 0,01%. Among organochloric insecticides, the presence of lindane and HCH was detected. Detected concentrations of lindane compared with the MPC in plant products are very low, ranging between 0,2 and 2,6%; in milk, those concentrations are 17%, in milk products 24%, in meat 7% and meat products 4,8% of the MPC. Contamination with HCH compared with the MPC in milk is for 5 times lower, in milk products for 6 times, in meat and meat products for 20 times, in fruit for 10 times, and in vegetables for 3 times. Tested
rice samples from the area of Kocani showed 10-100 times lower concentrations than the MPC for lindane, and 2 to 20 times lower concentrations of HCH. An area under threat can be regarded the one around OHIS, in the region of the village of Lisice, where in 10% of the tested samples concentrations of HCH for twice higher than the MPC were detected. Among annually tested 10-12,000 samples, in none was detected presence of organophosphoric pesticides. In tested herbicides, results showed presence of propanil with an average concentration of 0.01 mg/kg and molinate of 0.1 mg/kg, which is significantly lower than the MPC, while carbanil was not detected at all.

8. The annual amount of tests on mycotoxines is between 1,500 and 2,000 samples, out of which only 100-200 are taken from the domestic traffic. In analyzed wheats, flour, coffee, tea, spices, in analyzed herbs, milk, meat products, eggs, fats, honey, were tested samples proved absence of such residues in the annually tested 600 samples of animal origin, no residues of hormones were identified.

9. According to the available information, about 6,000 different additives are used in the world, such as colours, preservatives, antioxidants, emulsifiers, stabilizers, thickeners, etc. Such a broad choice poses a difficulty in terms of additives controlling; they are used both in domestic production and in the growing number of imported food products. Products most frequently containing preservatives are meat products, vegetables’ products, soft beverages, conditory products, oils, butter, mayonnaise and salads containing mayonnaise, and many others. Colours are most frequently used in the contents of refreshing beverages, sweets, chewing gums, creams, puddings, conditory products, etc. The use of sweeteners is growing, in fruit juices, non-alcoholic beverages, ice-creams, jams, chocolates, cookies and other confectionary products.

Annually, about 6-8,000 samples of additives go through testing, out of which only 1000 samples are of domestic products. With imported products, 2% of tested products are prohibited for sell, due to the presence of prohibited additives, or presence of higher than permitted quantities of certain additives. In the case of domestic producers, additives related problems usually arise with small enterprises, due to the non-professional treatment, the most frequently found violations are in refreshing beverages, meat products, artificial sweeteners in conditory products and in ice-creams in particular.

10. Microbiological contamination of food here and in the world is recognized health hazard. It can be of plant or animal origin, in primary production (ill or infected animals, contaminated plant products consumed as fresh), during the processing, storage and distribution of food. The high number of private farmers and small production enterprises, as well as enormous number of small trade and catery firms make the legal control very difficult. Due to the inpreciseness of laws, a lot of those entities do not possess appropriate premises, equipment, staff, professional skills and standard hygienic conditions. The sell on traditional markets is carried out in extremely poor hygienic conditions. In catery activity, the most risk posing are the so called fast food shops; the most frequent violations by many
trade and catering shops are connected with the use of groceries of susceptible, unchecked origin, inadequate thermal treatment, non-observance of prescribed low temperatures for food storage, insufficient level of training of the employees in those shops. Other risk-carrying circumstances are the occurrence of new products, such as semi-cooked products and products with longer usability term, insufficient level of public awareness of the hygienic aspects of food preparation and storage.

11. Sanitary and hygienic control in enterprises for food production and distribution is further complicated because of their high number. Based on the examinations undertaken by the professional sanitary and health inspection service in 9687 facilities for production and trade of food products during 1998, insufficient sanitary and hygienic quality was reported in 46% of those facilities, as follows: 66% with big size production facilities, 43% with medium and small production facilities, with 42% of trade facilities, with 45% of restaurant type of facilities and 37% of facilities for social nutrition. The state of 20% of examinations in 200 facilities (kinder-gardens, schools, work organizations) in 1997, undertaken by relevant IHPs was reported unsatisfactory. Out of 1000 smears sampled from those facilities, microbiological contamination was detected in 25%.

12. About 25,000-28,000 samples annually are tested against microbiological safety, 40% of which are of imported foods and 60% from domestic production. Defects in imported foods were found in 1-2% of the tested samples; with domestic production, defects in tested samples were found in 4-6% cases of industrial origin, 10-14% from small enterprises, and 8-10% in distribution. Risk posing foods, according to the number of false findings, are: ice-cream with 20-23%, milk with 8-10%, meat with 6-18%, meat products with 8%, confectionary products with 9-12%, ready-made meals with 6%.

13. The estimated dietary daily intake of lead through food and drinking water (data for 1996) with adult population amounted to 100-110 µg, which, compared to the tolerable daily intake (TDI=1 µg/day) is 21-24%. With the population age group between 15 and 19 years, this percentage is 16.4% for 1995 and 9.6 for 1997. The estimated daily intake of cadmium through food (in drinking water the contents of cadmium is less than 1 µg/l), with adult population, is 1.9 for 1990 and 6.9 µg for 1996 (TDI=57.71 µg), which is close to the data on Finland, Sweden, Turkey, Hungary, Austria, and lower than in some other countries of EC. With the population of age between 15 and 19, the percentage of cadmium intake is 4.3% of the TDI. Organochloric insecticides in food do not pose health risk for the population in the Republic of Macedonia. The estimation of daily input for HCH is from 6.6 for the adult population, to 9.3 µg for the age group of 15 to 19 (TDI=700 µg); the same estimation for lindane is 13.9 for adults and 11.3 for young people between 15-19, which, compared to the TDI is 1.5% and 1.34%, respectively.

14. Health statistics on malignant diseases are not significant enough to cause relevant assumptions for the causal interdependence between individual contaminants in the total daily intake (food and water) and incidence of those diseases. Targeted epidemiological researches in this regard have not been conducted.
15. Present infectious diseases that can be communicated orally (so called intestinal infectious diseases) on the territory of the Republic are the intestinal typhus and paratyphoids, diarrhoea of bacterial, viral and parasitic etiology, infectious hepatitis of A type, brucellosis. The illnesses in which the main way of disease communication is the water (water-borne diseases) have significantly declined as a result of the improved water supply; diseases communicated mainly through unsafe food and/or unclean hands (food-borne diseases, direct fecal-oral contamination), although in a trend of declining, still cause high morbidity - infectious hepatitis A, salmonellosis, brucellosis, diarrhoea.

16. The existing legislation in the area of food is not updated and properly coordinated, i.e. harmonized in accordance with numerous parameters: the food quality and safety with international recommendations and standards; competencies and coordination between individual responsible ministries and executive organs thereof, and professional institutions; financial incentives to the low-cost and high-quality primary and secondary agricultural production; logistical support to farmers, by providing raw materials and guidelines on the use of agrotechnical and agrochemical measures and materials; monitoring of the food quality and population nutrition. Scientific research activity can not be regarded as such that follows sufficiently the current developments in terms of food production, processing, distribution and consumption, by assessing priority health risks and providing recommendations for undertaking appropriate measures by competent services and institutions.

PRIORITIES

* Approximation of the national legislation with relevant international standards and recommendations for safe food. * Strengthening, rationalization and definition of competencies and responsibilities in the system of food control; * Establishment of proper conditions for safe food production, processing, distribution and consumption; * Cooperation with non-governmental organizations with regard to safe food and nutrition.

ACTIONS

17. Establishment of a modern pattern of a system for food control, by means of adopting laws and other legal acts, approximated with international recommendations, regulations and standards (Codex of the WHO/FAO; EC, ISO, etc.), by clearly delegated responsibilities between relevant ministries; establishment of an inter-sectoral service for fast and effective control over health safety of the food - inspectorate on food, with full interdisciplinary staffing; completion of equipment in diagnostic laboratories and additional training of existing and employment of new staff, on the basis of defined sectoral competencies.

Deadline: 2000 and constant
18. Establishment of a common information (monitoring) system, that would include: the soil as basic resource in the primary production; the entire chain of food production, processing and distribution and detection of all possible components in such a chain; diagnosing of health (infectious and non-infectious diseases, especially with vulnerable population groups) and environmental risks; all undertaken professional and regulatory measures and results achieved.
Deadline: 2000
Actor: MH in collaboration with MAFWE and MEc

19. In the proposed monitoring system, in the section on the primary production, accent should be placed on the control of the application of pesticides, application of antibiotics, biological stimulants and other existing factors posing health risks.
Deadline: 2000 and constant
Actor: MAFWE in collaboration with the MH

20. In the secondary production and distribution, accent should be placed on conditions required for proper production procedure, to be verified by competent institutions and further supervised by competent inspection services.
Deadline: 2000 and constant
Actor: MH in collaboration with MAFWE and MEc

21. Development of programmes aimed at educating producers in the sector of primary production (agriculture) and secondary production and processing (industry and small businesses), food distributors, caterers, as well as programmes for professional training of laboratory staff in the area of diagnostics of food quality and safety, professionals in the area of health risks assessment (infectious diseases, allergic illnesses, malignant diseases and other chronic non-infectious diseases), professionals in the area of regulatory supervision and control. Through mass-media, NGOs and educational system, to inform and educate the public on the safe food and nutrition, and risks from contaminated food and diseases of dependence in the nutrition.
Deadline: 1999 and constant
Actor: MH in collaboration with MAFWE and MEc

3.4. SOIL AND WASTES

HFA, Target 23: Waste and soil contamination management
By the year of 2000, health risks caused by solid and dangerous wastes should be efficiently controlled in all Member States.

3.4.1. SOIL

OBJECTIVE

- To minimize soil contamination and, through that, reduce the health risks from contaminated soils; to start gradual recultivation of affected soils.
BASIS FOR ACTION

1. The soil, as a natural resource, comprises aspects of the eco-sphere, techno-sphere and socio-sphere; it represents, inter alia, basic resource for the primary agricultural production. The quality of produced food depends on the quality of the soil, and it may cause potential impact on the quality of ground and surface waters, from the broadest ecological point of view, as well as in terms of drinking water use. At the same time, individual sites of the soil are places of occasional or permanent disposal of communal, industrial and other types of wastes.

2. The major soil pollution sources are agricultural chemisation, irrigation with polluted water, disposal of wastes from different origin, damaging pollution from stable sources or transported hazardous substances and aerogenetic deposits from industrial, nuclear and other origin. In the Republic, the annual losses of cultivated soil of 6-8,000 ha are noted, due to the soil degradation because of erosion, as well as because of the improper fertilization.

3. In the Republic, detailed health-related study of soil have been carried out in the vicinity of Lead and Zinc Smelting Company in Veles, recording increased concentrations of lead, zinc, and cadmium from industrial sources; relevant examination of agricultural products grown on such soils noted increased concentrations of those matters, too. Other research took place in rice producing areas in the vicinity of Kocani, in order to determine the quality of soil for infants' food production. However, the control over the herbicides in the Republic is insufficient.

4. In the soil and produced fodder, examinations take place with regard to radionuclides from natural and artificial origin.

5. The health authorities do not receive relevant interdisciplinary, health related data on the quality of soil by other sectors that have competence in the relevant areas, i.e. agriculture, livestock breeding and water economy. No health organization is legally obliged to keep records on soils polluted by agrochemicals.

PRIORITIES

* Improvement of national legislation in the area of soil protection from contamination;
* Establishment of monitoring of the quality of soils of agricultural, economic and health interest;
* Regeneration, recultivation or replanning of agricultural soils based on the data on possible adverse effects on health;
* Targeted epidemiological investigations of health risks in recorded polluted areas.

ACTIONS
6. Introduction of MPC of polluting substances for soils with diagnostic methodology for the most significant pollutants (heavy metals, organic compounds originating from industry, etc.) and establishment of a monitoring system for polluting and inventory of polluted soils.
Deadline: 2000
Actor: MAFWE

7. Identification of soil pollutants according to the type and quantity of pollutants and evaluation of health risks.
Deadline: 1999
Actor: MAFWE, in collaboration with MH

3.4.2. WASTES

OBJECTIVES

- To establish a modern institutional base for solid wastes management, by adopting relevant laws and other legal acts;
- To provide, in a manner safe for the population and employees, collection, transportation, neutralizing and final disposal of communal, medical and industrial solid wastes;
- To identify existing disposal sites and assess environmental health risks in order to reduce or eliminate them.
- To minimize waste production, encourage wastes selection and recycling as a secondary raw material and energy source, by applying financial mechanisms and incentives;

BASIS FOR ACTION

1. The current state of production, collection, transportation, recycling, treatment and final disposal of solid wastes can be considered unsatisfactory from environmental and health point of view, as well as from the point of view of the market economy and natural resources conservation (energy and mineral raw materials). The non-completed legislation and lack of tradition for wastes selection and lack of financial incentives for the purpose of their reuse (recycling) by the population, economic and non-economic activities are the main reasons for such state.

2. In the case of wastes produced in settlements (communal wastes) dust and construction wastes are predominant (25%), then paper (24%), plastics (11%), food wastes susceptible to fermentation (20%). The waste disposal is carried out in disposal sites that lack proper sanitary and technical protection measures. Such disposal sites have a status of temporary disposal sites. The threat to the environment consists of the possibility for waters pollution, erosion of toxic and explosive gases, communication of infectious diseases via insects, rodents or unauthorized persons looking for secondary raw materials at disposal sites. In the Republic, 25 such disposal sites have been recorded and they are managed by communal companies. In the Republic, there are a lot of unregulated small disposal sites (so called
"illegal disposal sites") for the needs of rural settlements, tourist and catering facilities, etc., some of which are situated even in the existing national parks.

3. A big number of those disposal sites are situated in water permeable alluvial terraced sediments or karstic limestones, representing direct threat to springs used for water supply, such as the spring of Shum near Struga, disposal site of Gostivar which is located above the river of Sushica, or represent danger for surface waters - Ohrid with disposal sites drained in Koselska river, or the swamp of Studencica near Gevgelija, with potential draining of the disposal site into the river of Vardar, etc. There are records on disposal sites for solid wastes threatening or destroying areas of high natural values or resources.

4. At present, wastes from health institutions are disposed at communal disposal sites without any prior selection at the spot of their production (health organizations) and without proper treatment, with an evident epidemiological risk. It is estimated that the annual generation of waste in the Republic ranges between 8 to 10.000 tons of waste from health institutions, 12-15% of which is potentially ineffective or toxic waste, and the rest is general (non-medical) waste. There is no relevant regulation to be binding for medical workers and assistant personnel with regard to the primary selection and disposal in special wrapping material and in separate premises, up to the moment of transfer for transportation to the disposal site. According to the available data, only CVU - Skopje possesses incinerator for medical waste; there are no data on other institutions allover the Republic. Another negative feature is that many health institutions temporarily dispose the unselected medical waste in the containers of the city communal utility in their own area or together with the waste from neighboring housing buildings in the case of smaller health units. The transportation from the disposal spot to the final disposal is carried out by the same vehicles and in the same manner as with the remaining communal solid waste. Within the waste disposal sites, there are no identified micro-locations for the waste from health institutions.

5. The waste from economic entities - industry, mining, energy, agriculture, etc., represent a serious problem because of the quantity, as well as potential harmful effects on the environment and health of the population. Pollution may be done by air pollution, ground and surface waters pollution, soil pollution. Hazardous wastes of industrial origin are: mining deposits and separational flotation mullock; slag and dust from electric filters of ferrous and non-ferrous metallurgy (iron, manganese, zink, lead, cadmium, nickel, ferrous alloys); wastes from the production of fertilizers and pesticides; wastes from chemical industry; deposits from metal-processing industry. Hazardous wastes from epidemiological point of view are wastes from livestock breeding and slaughter industry (about 8.000 tons annually). No market conditions have been so far established with regard to the waste treatment, such as taxation and other incentives in case of introducing measures for recycling and other types of environmentally safe treatment or application of forcible measures for polluters (charges, taxes, fines).

6. No market behaviour has been established with regard to the waste treatment, such as tax releases in case of introduction of measures for recycling or other ecologically safe treatment or application of forcible measures against polluters (charges, taxes and fines).
7. There is no established monitoring and control over communal, health, industrial, mining, energy, agricultural and other wastes in a form of ecological monitoring. The available data on the quantity and structure of solid communal wastes in our country are insufficient, thus the estimated wastes quantity and the period of use of active disposal sites should be considered indicative only.

8. In the Republic, although we have recognized the need for appropriate waste disposal site for industrial hazardous waste long time ago, no specific steps have been undertaken so far in this regard.

PRIORITIES

* Adoption of legal, financial, administrative and organizational regulations and documents, regulating the management of all types of solid wastes in a manner that will not affect the environment and health of the population and will contribute to the conservation of national resources, especially non-renewable ones;
* Development of an inventory of polluters and catalogue of wastes;
* Development of legal and technical conditions for establishment of a central disposal site for industrial and other types of dangerous wastes;
* Establishment of an environmental monitoring on collection, transportation (possibly processing) and final disposal of solid waste;
* Adoption of a policy of economical incentives for the population and economy aimed at minimization of all types of waste and maximal utilization of waste matters as secondary raw materials.

ACTIONS

9. Development of a national programme for recording and managing all types of wastes, adoption of laws and other legal types in this area.
   Deadline: 1999
   Actor: MEnv in collaboration with MEc and MF

10. Preparation and establishment of monitoring system for the quantities and composition of solid wastes, on the basis of which analysis and estimation of possibilities for recycling and reuse of wastes as secondary raw materials will be made.
    Deadline: 1999
    Actor: MEnv in collaboration with MEc

11. In the legislation, to provide for customs duties, taxation and other incentives for organizations dealing with collection, transportation, treatment and recycling of wastes.
    Deadline: 1999
    Actor: MEnv in collaboration with MF

12. To develop standards and relevant legislation for waste management by health institutions.
    Deadline: 1999
13. To develop standards and relevant legislation for small facilities producing waste and for small disposal sites, especially in protected areas and tourist and sport and recreational sites.

Deadline: 1999
Actor: Menv

3.5. IONIZING AND NONIONIZING RADIATION

3.5.1. IONIZING RADIATION

OBJECTIVE

- To minimize unnecessary population exposure to radiation on the basis of the overall strategy and policy for radiation protection.

BASIS FOR ACTION

1. The Republic of Macedonia does not possess nuclear power plants, nuclear reactors and accelerators, which makes a distinction between the state of our population exposure to ionizing radiation with the related state in the countries in possession of such facilities.

2. The exposure of the population in the Republic is limited to 5 types of sources of ionizing radiation:
   - Application of sources of ionizing radiation in medical, economic and scientific institutions, posing impact on patients or professionally exposed persons;
   - Exposure to natural sources of ionizing radiation:
     - radon in dwellings and working environment, construction materials, soil;
     - radon in thermal power plants using coal - the processing of coal contributes to the concentration of radon and other naturally radioactive elements in waste materials;
   - in the factory of Chemical Industry Veles, low-energy beta-emitter in Veles, in the process of artificial fertilizers production;
   - The increase of illegal traffic and unauthorized possession of radioactive materials contributes to the potential hazards from exposure to radiation;
   - The exposure to radioactive elements present in the environment resulting from the disaster in the nuclear power plant of "Chebren" in 1986 is still on;
   - There is a potential danger of exposure to radiation due to the absence of properly developed radioactive waste disposal site and lack of enforcement of protection measures in institutions and companies while using open sources of ionizing radiation;
   - The evidence on exposure levels to radiation in medical sector, industry and scientific institutions has been regularly kept with reference to professionally exposed persons and effectively received levels.
The established monitoring on environment contamination provides for monitoring of annual input of radionuclides of artificial origin in organisms and for monitoring the levels of exposure to radiation with the population in the Republic of Macedonia. The radiation in the Republic is monitored in the basic media - air, water, storm waters, soil, fodder of herbal origin. Investigations are carried out with regard to the cesium-134, cesium 137 and strontium-90.

In both segments of exposure to radiation, appropriate measures aimed at reducing the radiation hazard are applied.

PRIORITIES

* To construct permanent disposal facility for radioactive wastes
* To plan housing and other business buildings at locations in which the radon levels comply with the ones prescribed by WHO, and apply correction and protection measures
* To increase the extent of protection in practice and control the protection implementation
* To encourage public participation, through adequate information, in decision-making processes related to the hazards resulting from radiation.

ACTIONS

4. Promotion of the quality of the existing monitoring system on the environment; establishment of methodology and measuring network to determine radon contents in the living and working environment (mines, thermal power plants, air, waters, minerals, etc.).

5. Permanent measuring of radiation gamma-phone and identification of areas with increased gamma-phone.

6. Investigation of the content of radon in natural radionuclides in the environment and in organisms of various population groups.

7. Improvement of relevant protection in practice.
   Deadline: for items 4, 5, 6, and 7 constant
   Actor: RIHP

   Deadline: 2000
   Actor: MEnv, in collaboration with MH and MEc

   Deadline: constant
   Actor: MI

    Deadline: 2000
    Actor: MH

Deadline: constant
Actor: MI

3.5.2. NON-IONIZING RADIATION

OBJECTIVE

To reduce and limit the health risk from non-ionizing radiation

ERAPE, Art. 211

BASAIS FOR ACTION

1. Non-ionizing radiation are insufficiently studied factors of the environment with a negative impact on human organism. No investigations have been carried out with regard to major sources of non-ionizing radiation - radar and radio transmitters.

2. Potential health risk related to non-ionizing radiation exists with:

* the staff employed in the fields of energy, electrotechnics, telecommunications, informatic equipment, computers, radar systems, etc.
* non-professional exposed to low and medium frequency fields from electric devices in dwellings, radio and TV receivers, working with personal computers at home, etc.
* radiation from natural sun light outdoors, UV-radiation in specific working conditions, other types of radiation during therapeutic, cosmetic and other interventions with non-ionizing radiation.

PRIORITIES AND ACTIONS

3. Adoption of standards and legal regulations to control the non-ionizing radiation in accordance with internationally recognized recommendations in this field, and health risks assessment.

Deadline: 2000
Actor: MH in collaboration with MEnv

4. Monitoring establishment at national level, recording of major sources of non-ionizing radiation.

Deadline: 2000
Actor: MH in collaboration with MEnv

5. Information of the population, employees and employers on possible health risks from non-ionizing radiation in all every-day living or working conditions.

Deadline: 1999
Actor: MH
6. To define conditions for building of housing and business facilities near strong sources of non-iodizing radiation.

3.6. NOISE

OBJECTIVE

* To reduce health risk from noise pollution through measures aimed at reducing noise to the limits recommended by WHO.

BASIS FOR ACTION

1. Non-professional exposure of the population to harmful impacts from the noise in settlements, vacation and recreation centers, is present in our Country, too. Acoustic ambient in urban centers of major cities in the Republic, as well as near the highways within and outside settlements gives rise to concern, due to the constantly increasing noise load. This is a consequence from the growing number of motor vehicles, as well as from mistakes done in the process of urbanization which have not been eliminated yet, due to the lack of proper application of urban solutions for protection against out-doors (street) and in-doors noise because of the insufficient internal sound insulation. Noise ambient in the settlements can be disordered by the noise originating from business facilities, such as major industrial plants and small craftsmanship shops and other facilities.

2. Although there is a national Law on Noise, it is poorly enforced in practice. The basic reasons for the law ineffectiveness is the lack of certain regulations to derive from the law, such as those on: maximum permissible levels of noise in various living and resting conditions for citizens, in accordance with ISO standards and WHO recommendations; the methodology for measuring individual noisy events and systematic measuring of the noise ambient (noise map) in settlements, dwellings, places for vacation and recreation; competent authorities and services that should carry out measuring and undertake regulatory and administrative measures against violators are not defined; there are no required preconditions for involvement of competent institutions in the processes of urban planning and designing of individual buildings, who would envisage measures for out-doors noise protection (urban planning measures) and in-doors noise protection (interior sound insulation); the types and quality of noise measuring instruments are not legally defined, so as to enable comparison and interpretation of outcomes on the basis of the above mentioned ISO and WHO standards and recommendations; adequate financing of this activity is not provided for.

3. Health effects from urban noise is due to its capability of affecting many organs and systems and impeding vital human functions in every-day living, working and resting.

PRIORITIES

* Completion of regulatory base;
4. Modernization of industrial enterprises and activities, by rehabilitating the existing and introducing new solutions aimed at noise reduction;

* Improvement of urban planning in housing areas in terms of reducing noise pollution caused by traffic (external noise sources) and internal sources in housing and other types of premises;

* Assessment of the effectiveness of measures for protection from noise in working environments, in places of residence, vacation and recreation;

identification of priority buildings that require acoustic protection, as well as methods and means of protection.

**ACTIONS**

4. Adoption of laws and other regulation acts for national standards for a maximum permissible noise levels, approximated with the recommendations of WHO, methodology and apparatus resources for measuring individual noisy events and for determining the acoustic ambient (noise map) in settlements, education and training institutions, resorts and sanatorium sites and other sensitive buildings.

   Deadline: 2000
   Actor: MH in collaboration with MEnv

5. Provision of staff, training and equipment for the services in charge of controlling the noise in inhabited places; development of a national monitoring system for the state of noise and relevant measures undertaken (dynamic noise map).

   Deadline: 2000
   Actor: MH in collaboration with MEnv

6. Development of regional and local programmes aimed at reducing noise and vibrations, generated by industry and transport.

   Deadline: 2000
   Actor: MEnv in collaboration with MEc

7. Complex research of noise related health risks in a form of targeted clinical and epidemiological examinations of vulnerable population groups in threatened areas.

   Deadline: 1999 and constant
   Actor: MH

**3.7. NATURAL DISASTERS, INDUSTRIAL AND NUCLEAR ACCIDENTS**

**HFA Target 11: Accidents: By the year of 2000, disability and death cases resulting from accidents to be reduced at least for 25%**

**OBJECTIVES**

* To limit the consequences of natural disasters, prevent or minimize the occurrence of industrial accidents by means of long-term broadcasting and spatial planning, and undertake measures for proper functioning of technological systems.
**National Environmental Health Action Plan**

* Responsible governmental institutions to ensure preparedness for early response in cases of occurrence of natural disasters or industrial accidents

**BASIS FOR ACTION**

1. Natural disasters that can contribute to the occurrence of industrial accidents in our Republic are the following: earthquakes, floods, soil erosion, high summer temperatures accompanied by forest fires, and, occasionally, electrical discharge in the atmosphere and strong winds.

2. In the Republic, in the post-war industrial development, there is no evidence on accidents in industrial facilities that could threaten the health and life of the population living in the near or distant vicinity of chemical and toxic, suffocating, explosive and/or inflammable effects. There are some data on incidental poisoning of the living stock in waste water recipients downstream from Skopje, Veles and other settlements, reflected in fish pestilence.

3. The accident at the Chernobyl nuclear power plant in 1986 had an impact on the territory of the Republic of Macedonia, causing deposition of radionuclides J-131, Cs-134 and Cs-137, Sr-90, etc. According to the investigations carried out in the Country, the estimated average annual dose of fission products solely, for the period 1986-1997 (12 years) amounts to 0.244 mSv/individual. The dose was highest in 1986, amounting to 1.23 mSv/individual of the population, then in 1987 - 0.67, in 1988 - 0.37, in 1989 - 0.23, and in all successive years between 1990 and 1997, it was 0.09 mSv/individual of the population.

**PRIORITIES AND ACTIONS**

4. Elaboration and creation of programmes and mechanisms for early assessment of health and environmental risks from natural disasters and industrial accidents, by appropriate organization and preparedness for responding by trained, mobile and equipped interdisciplinary teams at national and regional levels.

   **Deadline:** 1999
   **Actor:** MEnv in collaboration with MH, MEc

5. Establishment of a national information system for early assessment and detection of damages caused by disasters and accidents and for public and business entities information on the necessary measures for self-assistance.

   **Deadline:** 2000
   **Actor:** MEnv

6. Establishment of a database on facilities, activities, quantities and risk-bearing substances and registries of risk-bearing facilities and sites, and development of guidelines for the behaviour of the staff in those facilities, including required measures and actions in case of disaster or accident.

   **Deadline:** 2000
   **Actor:** MEnv in collaboration with MEc
4. LIVING AND WORKING ENVIRONMENTS

4.1. LIVING ENVIRONMENTS

OBJECTIVE

To improve environmental, social and physical living conditions settlements for the purpose of improving the quality of life and reducing diseases

EHAPE, Art. 245

BASIS FOR ACTION

1. In the beginning of the 20th Century the present territory of the Republic of Macedonia was inhabited by 800,000 people, 80% of whom were rural population; today, the number of population is about 2,050,000 inhabitants, 60% of whom is urban and 40% rural inhabitants. After the II World War, the cities experienced rapid demographic and economic growth, intensive construction of housing infrastructure accompanied by appropriate communal infrastructure, attracting high number of inhabitants from rural areas. Presently, urban settlements in the Republic of Macedonia are the main consumers of natural, energy and human resources. Issues related to the quality of urban environments refer not only to human health, but to the protection of natural resources as well.

2. The quality of living environment in settlements is determined by the quality of its components, both individually and totally (air, soil, water, waste, noise, etc.). The concentration of population and production activities on relatively small territories of urban settlements causes constant pollution, especially of air and soils. Another issue is the reallocation of agricultural land for housing construction purposes, as well as conservation of the existing green areas in housing zones. The level of pollution is higher in closed valleys, due to the specific climatic, meteorological and topographic conditions and existence of urban and industrial sources of pollution - the Valleys of Skopje, Veles, Polog (especially the downstream part), vicinity of mining and power combine REK Bitola, mining and power combine Osomej, where there are natural conditions for occurrence of temperature inversions, which, in combination with urban-industrial pollution create favourable conditions for smoke generation.

3. As major polluters of the environment, industrial complexes are situated mainly in the vicinity of cities, giving raise to the creation of the so called “hot spot”, such as eastern and western industrial zone of the Valley of Skopje, the Refinery “Okta”, “OHIS” (organic chemical industry), chemical and power combine “Jugohrom” in Polog Valley, metallurgical and chemical combine “Zletovo” near Veles, industrial zone in Bitola and REK “Bitola” in Pelagonija Valley, REK “Oslomej” in Kichevo Valley and other smaller
industrial complexes in Tetovo, Gostivar, Kumanovo, Shtip, Ohrid, Strumica, etc. There are no appropriate studies on these industrial zones and certain industrial facilities, and no appropriate sanitary zones are defined because majority of those facilities had been constructed before the adoption of relevant legislation in this area. The possible preventive and rehabilitation measure in service of population health and environment protection would be the implementation of detailed examination of emissions of polluted air, waste waters and solid wastes from those facilities, assessment of the possible environmental and health impact and proposing and enforcing rehabilitation and protection measures.

4. There is a need in the Republic, identified 2-3 decades ago, to establish a central disposal facility for industrial and hazardous waste. Presently, part of this waste is stored in the yards of industrial facilities, while other part is deposited at urban communal disposal sites.

5. Another factor burdening the living environment is the traffic, especially in the centers of bigger cities with noise and air pollution. This pollution is further increased by the improperly planned structure of housing zones and traffic routes, old and worked-out motor means of transportation (MMS), and the state of pavement areas. The development and implementation of urban plans for bigger cities, as well as for smaller towns and population active rural settlements do not comply with the modern needs, and so in urban and rural centers road traffic dominates to the detriment of residents and safe use of certain functions of settlements, such as pre-school and regular education, daily supply with groceries, use of health services, PTT services, administrative and trade services, vacation and recreation within urban green and park areas and children's outdoors playing grounds, etc. Comparatively, air traffic is less developed and does not pose environmental hazard; rail vehicles (railway), with partially electrified routes and relatively low intensity of utilization, do not pose particular environmental risk.

6. In general, the complex evaluation of the quality of environment in small urban environments and rural settlements in the Republic is better than the one of big cities. Problems requiring solutions are: solid waste disposal facilities; settlements that have fecal sewerage systems should in perspective solve the issue of waste water treatment, prior to its discharge into the external environment. The problem with the road traffic is similar as the one in bigger cities, only the intensity is smaller.

7. All urban settlements in our Country experience population increase, due to migration processes (unnatural) and birthrate (natural). Situation in villages is diverse depending on the region, ethnic and religious composition of the population: in the western part of the Republic, there is an intensive population growth resulting from the high birthrate, while major part of the central, eastern and southern regions low birthrate and emigration trends cause demographic stagnation or regression of many villages.

8. There are urbanized (so called “planned”) week-end settlements in the Republic. However, many municipalities also contain unurbanized (so called “spontaneous”) week-end settlements. Urbanized settlements possess satisfactory infrastructure, with regard to the communication network, water supply; waste waters transportation, excluding parts of Ohrid and Doyran shore line, is done through absorption pits, while solid wastes are
disposed on local disposal sites managed by communal or communal and tourist organizations. Water supply, waste waters transportation and solid wastes disposal in the so-called spontaneous (illegally developed) week-end settlements is local and uncontrolled.

9. The health status of the population in settlements is reflected in the structure of morbidity, mortality and demographic trends in circumstances of political, social and economic transition in our Country. Detailed social-health and epidemiological investigations concerning the inter-dependence between living conditions in urban areas and certain chronic and degenerative illnesses (malignant and cardiovascular illnesses, illnesses of the nervous system and psychological disorders, illnesses of blood producing organs, illnesses of digestive organs, diabetes, allergic illnesses, etc.) have not been carried out, except of previously mentioned investigations concerning acute consequences from smog occurrence in Skopje and impacts of air pollution caused by the smelting company for zinc and lead in Vode on school children.

10. The spatial planning should represent a powerful instrument of the public policy that would provide for sustainable development of settlements towards healthy living environments, which would contribute to the accomplishment of the Target 24 of the WHO Strategy “Health for All by the year of 2000”: “Cities, towns and rural communities throughout the Region should offer physical and social environments supportive to the health of their inhabitants”.

PRIORITIES

* Coordination between relevant sectors concerning solutions of problems related to the management of housing environment and population health;
* Updating and approximating the legal basis of the policy for healthy cities with the policy of the EC and WHO;
* Improvement of social conditions and physically developed urban areas, especially with regard to those parts of the population which are economically decayed; limitation and reduction of morbidity and stress causing factors, related to the activity of factors present in the living environments, especially noise, air pollution, high density of the population and alienation among residents in collective dwellings, impacts from unpleasant odors, disordered aesthetic values in some settlements, etc.
* Involvement of residents and non-governmental organizations in the development and implementation of the policy for healthy cities.

ACTIONS

11. To define, in the Spatial Plan of the Republic, national strategy for settlements development in all terms, including environmental health ones.
   Deadline: 2000
   Actor: MEnv in collaboration with MH
12. To develop mechanisms for inter-sectoral participation in the processes of defining, adopting, implementation and supervision over the implementation of the National strategy for settlements development.
   Deadline: 2000
   Actor: MEnv in collaboration with the Inter-sectoral Council

13. Inclusion of the Republic of Macedonia in the European “Healthy Cities Project” and “Sustainable Development”.
   Deadline: 2000
   Actor: MEnv in collaboration with MH, MD, MEc

14. Development and implementation of programmes aimed at improving social conditions in physically developed living environments, especially with regard to economically decayed population.
   Deadline: 2000
   Actor: MEnv in collaboration with MH and MLSP

15. Environmental quality assessment indoors and establishment of the relevant legal grounds in order to overcome the existing disadvantages and achieve further sustainable development.
   Deadline: 2000
   Actor: MH in collaboration with MEnv

16. Development of a programme for re-cultivation of abandoned lands, renewal of damaged landscapes, promotion of areas intended for sports and recreation activities.
   Deadline: 2000
   Actor: MEnv

17. Involvement and provision of an active participation by municipalities, population and NGOs in the development of local EHAPs in the domain of housing, as well as planning of settlements and environments in populated areas.
   Deadline: 2000
   Actor: MEnv

18. Public information at national and local levels, through mass-media and educational curricula in primary and secondary schools, concerning the importance of healthy living environment in populated areas and indoor space, especially in terms of indoors air pollution (smoking) and noise in housing and business premises.
   Deadline: 1999
   Actor: MEnv in collaboration with MH and MEd

### 4.2. OCCUPATIONAL HEALTH AND PROTECTION AT WORK

<table>
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<tr>
<th>HFA Target 25: Health of people at work</th>
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<tr>
<td>By the year of 2000, the health of workers in all Member States should be improved by making work environments more healthy, reducing work related disease and injury, and promoting the well-being of people at work.</td>
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</table>
OBJECTIVES

**To establish and develop high quality, efficient and cost-effective occupational health service, that will cover the entire working population, in order to promote, preserve and improve human health and create healthy working environment, as an integral and principal element of the general health strategy for the working population in the European Region.**

**To provide for realistic monitoring, reduction (according to the frequency of incidence and severity), as well as prevention of occupational diseases, work-related diseases and injuries at work; to reduce disproportion between countries and occupations with high and low risk, by undertaking broader, concrete and specific measures and activities, using positive experiences acquired through the practice all over the world.**

**To provide for appropriate activity of the occupational health service, in accordance with the currently defined risks at which workers are exposed, with an accent on workers at highest risk from work-related diseases and injuries.**

BASIS FOR ACTION

1. Present social and economic changes, the process of transition of the system, stagnation of all economic activities and development of market economy are certainly reflected in the state of working environments, work conditions and protection at work, as well as health status and working ability of exposed workers. According to the last official data, the number of employees in the Republic of Macedonia is about 350,000 people, 40% of which are workers involved in jobs containing increased risk of diseases and injuries, and, according to the same statistics, 250,000 were unemployed (leaving the issue of the reliability of these data open, in terms of recording, registration in the private sector, etc.) by December 1997.

The environmental occupation specific health risk in the Republic of Macedonia, related to environmental determinants of working environments, is present in several economic branches and activities. In this regard, particular importance is attached to the ferrous and non-ferrous metallurgy, mining, chemical industry (organic and inorganic), as well as construction, textile, leather, food-processing (milling and baking industry, candy, sugar, starch, leaven, bear production, etc.) industries, tobacco, wood industries, agriculture.

2. The control and supervision over the working environments is insufficient, and there is a lack of environmental health risks assessment with affected population. This is supplemented with the inappropriate identification and quantification of specific environmental parameters of the working environment, old, but still in force environmental health standards and referential values in this area; lack of equipment, apparatuses, inability to apply modern, sophisticated methods leading to inadequate environmental monitoring of working environments. Additional burden is posed by the presence of numerous old technologies, using old, worked-out equipment and machines, as well as inappropriate enforcement of protection measures at work. Even more threatening is the introduction of
new technologies carrying unidentified, unknown hazards, especially in private small and medium size enterprises. The negative image is completed by the absence of a registry of occupational hazards, absence of registry of workers at risk exposed jobs related to the branch or activity or area.

3. Another worrisome problem is the inadequate monitoring and assessment of health condition of exposed workers. There is a lack of an assessment of occupational health risk, as well as application of measures aimed at reducing or eliminating the environment-related occupational health risk; the health protection of workers mainly refers to diagnostics and therapy of general, non-specific diseases, neglecting the specific occupational pathology. At the same time, the issue of health condition of persons that are no longer regularly employed, laid-off workers because of bankruptcy, workers laid-off because of the present surplus, etc. remains open, bearing in mind the prolonged and irreversible impact of certain occupational hazards, such as cadmium, free silicate dioxide (SiO$_2$), asbestos, etc. These agents, even after the occupational exposure, continue to make harmful effects on the health of formerly exposed workers. Additional difficulty is presented by the insufficient data on the health indicators in this area (occupational diseases, injuries at work, absence from work, etc.), which makes the realistic assessment of the health protection of workers in our country impossible, due to the lack of targeted programmes in this area, inappropriate organizational set-up of the service (activity) dealing with occupational health, despite the recommendations given by WHO.

4. It is extremely difficult to assess toxic or malignant effects of chemical hazards in our environment, in circumstances of lack of ambient and biological monitoring, lack of registry of occupational chemical hazards, and lack of modern environmental health standards. According to the poll conducted by the Ministry of Health of the Republic of Macedonia, since few years ago, there has been an evidence on numerous chemical hazards in observed industries, with possible toxic effect on exposed workers: vinyl-chloride, acrylonitril, mercury, phosphor-amide, etc. (over 50 types of hazards) in chemical industry (OHIS); in metallurgy - cadmium, lead (smelting company in Veles), nickel, nickel-argonil (Fenimak), chromium and chromium compounds (Jugohrom), etc. Possible side products in certain technologies (hydromonoxyde, nitric gases, etc.) represent additional toxic risk. Despite the incomplete presentation of environmental health effects, there are certain indicators of the hazardous effects of individual chemical toxines: there are records on kidney diseases in workers occupationally exposed at cadmium or mercury, blood distortions in pharmaceutical workers, acute intoxications with CO with metallurgical workers, etc.

We should also point out the application of unfamiliar, undefined chemicals in some activities (construction), without clear declaration and with possible toxic effect. The application of pesticides, artificial fertilizers in agriculture, especially uncontrolled and improper use of strongly toxic remedies, exceeds the occupational risk and, through eco-media contamination, becomes growing problem at the level of general population.
There is no official recording of occupational cancerous agents, with reference to their application, and even less with reference to their specific harmful effects on the health of the exposed population. Partial and insufficient information exist on certain bio-dose-metering cytogenetic effects in some segments of the chemical industry. There is no official statistics on occupational cancer. Eventual data, found in the registry established few years ago on cancer incidence, or from the hospital morbidity records, do not reflect the real state, and in the field of environmental health this issue has not been resolved yet.

5. Inorganic particles represent frequent occupational risk, present in technological processes in metallurgy, metal-processing and cement industry, mining, construction, etc. The risk containing geological composition of soil causes an additional eco-load on the environment, adding to the industrial sources of air pollution. The high level of particles above the MPC, with high share of free SiO₂ (3-10%) present in various technological processes in working environments, is specific risk for pneumoconiosis incidence. Thus, in the fields of construction and mining, the predominance of silicosis ranges between 9,7 and 23,3%, in different stages of evolution and with characteristics of non-typical disease. This is regarded as resulting from new technologies (eg: “pumped concrete” in the construction – mineral particles combined with chemicals), causing pneumoconiosis, further complicated with lung cancer. Due to the inappropriate diagnostics and recording of occupational diseases in general, one can not form a real picture of pneumoconiosis in our environment. Particularly severe is the potential risk related to azbestos, which is a cancerous agent (in azbestos-cement industry, construction, etc.), which could make a wide environmental effect if not monitored and controlled. A clear sign for the harmful effects of azbestos on the respiratory system of exposed workers is reflected in the recorded specific RTG changes of lungs and pleura with 50,9% out of 97 employees in the azbestos-cement industry, in the framework of preventive medical checkups.

6. Organic particles are present in eco-technological processes, making impacts on the respiratory system of exposed workers, both by specific and non-specific, above all, immunological effect. In examined working environments, over 60% of monitored work places contained particles in levels above MPC (tobacco, milling, rice industries, spices processing, waste paper, wood industry) indicating high environmental health risk from incidence and evolution of certain diseases. Thus, in targeted epidemiological studies, a predominance of allergic alveolitis of 14% was recorded with tobacco workers, occupational bronchial asthma with predominance of 5,7% with rice workers. Acute effect of organic particles was registered through functional lungs monitoring, with reduced ventilation registered with 23-30% of exposed workers. An indicator of sensitization effect and the level of exposure at specific hazards is the high predominance of cutaneous sensitization (by skin allergy-tests), which, depending on the agent, method and manner of interpretation, ranges between 18 and 63%.

7. The eco-technology of numerous production processes often involve physical factors, such as production noise, general and local vibrations, ionizing and electromagnetic waves, unfavourable micro-climatic factors, posing occupational environmental risk for high number of exposed persons.
Among the above mentioned risks, the production noise is present in mining, metallurgy, metal industry, wood, textile and construction industry – at all places in which machinery, pneumatic tools, instruments, compressors, ventilators, circulators, etc. are used. The measured levels of noise are: in textile industry - 88-110 db; metal - 96-115 db; metallurgy - 87-118 db; mining - 80-123 db. Harmful effect of the noise was recorded with 37% of exposed workers in metallurgy, 49.2% with workers employed in tunnel-construction, and even 76% with workers engaged in production halls of textile industry.

Local and general vibrations are present at significant number of workplaces in the textile industry, metallurgy, tunnel-construction, mining, forestry, transportation, etc., with measured vibrations above the recommended standards according to ISO. Thus, for example, in the activity of forms tamping by manual vibrating tools in the industry for construction materials, local vibrations with frequency of 10-32 hertz were measured, with significantly higher acceleration than the prescribed one, as well as in the activity of drilling in a rock in tunnel-construction, by applying manual vibrating pneumatic machines, during which rather complex vibrations were registered, within the frequency range of 5-25 hertz and with higher vibration acceleration than the permissible one. With tunnel workers, handling manual vibration tools, changes in vascular, nervous and bones joint systems were detected, in a form of hand-arm vibration syndrome (HAVS), with 22% of exposed workers or even with 44% workers in wood industry, using motor saw.

With reference to ionizing radiation, among many profiles of workers exposed at this environmental risk, we can point out the employees in health sector. According to the last available data, 672 workers in the health sector work in conditions of occupational exposure at ionizing radiation; the monthly absorbed doses, measured during the obligatory dose-measuring control with these workers, range between 0.10 - 2.73 microgray, which is within the permissible limits for occupationally exposed persons, but with an evident environmental health risk of work. With reference to the sources of different types of electromagnetic waves, despite of the expected health risk with occupationally exposed persons, there are no reliable measuring in working environments, by means of appropriate environmental standards. There is also an absence of evaluation of health conditions of exposed individuals, the number of whom is constantly growing, as they are work with computer technology and video-terminals.

Unfavourable micro-climatic factors, in terms of non-observance of prescribed eco-standards, are part of the reality in a high number of eco-technological processes, such as in metallurgy, mining, ceramical, food-processing industry (baking and milling, slaughter, meat processing industries, as well as the industry for alcoholic and non-alcoholic beverages), leading to the risk of health damage of workers exposed at extreme temperatures, heat-radiation, etc.

8. The improper ergonomic design, often forcible position of the body, routine repetitive movements, imposed rhythm of working, intensive physical effort, load lifting or carrying in conditions of unadjusted ergonomic relations, cause psycho-motoric or psycho-sensor overloading, present in many eco-technological processes.
New, modern technologies, with unidentified risks, are additional reasons for health damage. Computer technology represents a new challenge for environmental health services, in terms of changes in the sense for sight, overloading of locomotoric system with exposed workers, resulting from improper ergonomic solutions. This problem has already been identified in our environment, with PTT workers, bank officers, etc. Psycho-social stress with incidence of psycho-somatic diseases, are more and more present with workers in the field of transportation (flight control, flight operations, road vehicles drivers), health (emergency service, surgery, etc.), in mining and energy, etc. The anxiety characteristics of the above mentioned work places (fear for one’s own or somebody else’s life, the need to make a decision, responsibility, etc.) are further complicated with the present social and economic conditions (fear for the job, lack of motivation, bad inter-personal relations, uncertainty - social and financial), manifested through disturbances of the psychical health and emotional status.

9. The improper life styles include more and more individual risk factors, such as smoking, alcohol consumption, psycho-pharmatics, poor nutrition; over-weight of the body or shortage in important nutritive substances in the food (due to the limited financial resources - lack of meat, milk, fruit, etc. input), lack of physical activity. According to our own epidemiological studies, 50-60% of employees in the industry are smokers, which is particularly significant with reference to such work places, at which smoking represents additional risk factor for respiratory system damaging (asbestos industry, tunnel-construction, milling industry, etc.). The decreased tolerance of physical effort and inadequate patterns of behaviour pose additional risk for cardio-vascular diseases.

10. Occupational risk from biological agents is specific problem, especially important for health workers today (hepatitis-B, AIDS). Despite certain undertaken preventive measures for health workers employed in high risk containing health activities, through targeted epidemiological studies, predominance of hepatitis-B with 26.6% was registered, and HBsAg, as a specific serum marker, was identified with 19.2% out of 120 tested health workers, imposing the need for continuous dynamic monitoring of the issue of environmental health risk from biological agents with all occupationally exposed workers.

11. Official data on the occurrence of occupational diseases in the Republic of Macedonia are missing, despite the numerous possibilities and risks for their occurrence with high number of exposed workers. The official registry for occupational diseases does not function properly, appropriate verification, reporting and recording of occupational diseases is missing. Therefore, we do not have a real presentation of the state, because unrecorded occupational diseases do not imply that they do not participate in the specific morbidity. On the contrary, we deal with great, so far unsolved problem. This is a consequence of the inadequate legislation (the existing list of occupational diseases is in full anachronism with and unadjusted to the relevant European documents), inadequate organizational and functional setting up of occupational health activity, also including inadequate specific, preventive protection of workers, lack of targeted epidemiological studies, non-coverage of big number of workers under threat with preventive medical examinations, especially in small and medium enterprises, impossibility of assessment of the health condition of
exposed workers. Occasionally reported cases of occupational disease most frequently refer to diseases of respiratory system, then occupational intoxication, hearing impediments, etc.

12. The last data are from 1991 (Republic Institute for Health Protection) with a total duration of sick leaves for 3 083 242 days, 59% of which refers to sick leave lasting up to 30 days, 41% over 30 days, with an average duration of a sick leave of 0.23 days per active worker and average duration of a sick leave resulting in working inability is 28.5 days. The structure of sick leaves by reasons is: because of disease - 84%, nursing family member - 9.6%, injury at work - 5.9%; isolation and accompanying - 0.2% and occupational disease - 0.3%.

13. The number of applications for assessing the working ability is in permanent increase, as a reflection of deep social and economic changes, unsecured resources for survival, modified working conditions, uncertain earning for living, unemployment, etc.: 1994 - 17020; 1995 - 18 179; 1996 - 18 606. The percentage of acquired disability pensions in 1994 was 26.9% (compared to the applications); in 1995, this percentage was 24.2% and in 1996 it was 29.2%. Lost working ability was detected in 2,619 cases (21.4%) and in 1996 in 3,007 cases (28.7%), indicating the growing trend of awarded disability pensions. Majority of positive decisions against applications for disability pensions are based on the following reasons: disease and injury at work (the information was taken from the Fund for Pension and Disability insurance of Macedonia, November 1997), bearing in mind that the data on the reasons for disability are inadequate and insufficient, incorrectly processed by medical doctors preparing the medical documentation for expert investigation, the reporting and recording of injuries at work and occupational diseases, so the real reasons for disability are not registered at all. There is only a clear fact that the number of pensioners because of disability in our Country keeps growing.

14. In the period between 1987 and 1996 a drop in the total number of occupational traumas was noted, from 12,691 (1987) to 3,909 (1996), but it reflects the decrease of the total number of employees, inadequate reporting and recording. Otherwise, in the last years, the rate of injuries at work has been about 12 per 1000 employees (1993 and 1994). Injuries at work, according to the records, occur more frequently with men (82% with men and 12% with women in 1995), resulting from the type and nature of work and potential risk posed by the work position. The most risk posing economic branches, with greatest number of injuries at work, are construction, mining, agriculture, ferrous metallurgy.

15. The current legislation in the area of occupational health and protection at work is in a critical stage - a lot of legislative projects are in a stage of elaboration or adoption, undergoing long-lasting procedures, with difficulties in enforcement, and not always harmonised with the requirements of the EC, nor with the adopted documents of WHO and International Labour Bureau, or with the provided guidelines or recommendations. There is an insufficient adjustment and updating of environmental health standards in this area, with reference to the European legal base. Unfortunately, even the adopted legal regulations are not adequately enforced. Also, the functioning of the penalty system with regard to those that do not observe the envisaged standards is not efficient.
**PRIORITIES**

* Establishment of adequately organized environmental health service and adjustment of the infrastructure thereof towards integral implementation of health protection with regard to works exposed at all levels, and development of National Programme for occupational health;
* Establishment of an efficient system of control and supervision over the conditions at work, establishment of registry of all occupational hazards in the country, by type of activity and by area, as well as registry of workers exposed at increased risk from occupational diseases and injuries at work;
* Approximation of the legislation in the field of workers health protection and control and supervision over the working environments with the documents of WHO and MOT, in accordance with the requirements of EC;
* Development of inter-sectoral cooperation and social cooperation between workers, employers and the state, in the field of health protection at work.

**ACTIONS**

16. Implementation of Convention 161 and Recommendation 171 of the MOT for the occupational health services, as well as Convention 81 for inspection of labour.  
Deadline: 1999  
Actor: MH and MLSP

17. Development of a programme for replacement of asbestos and products containing asbestos with asbestos-free products.  
Deadline: 1999 and constant  
Actor: MH, in collaboration with MEc and MEnv

18. Development of national registry of dangerous chemical substances.  
Deadline: 2000  
Actor: MH in collaboration with MEnv

19. Development, updating and approximation with international recommendations, standards and regulations on maximum environmental health values in the field of occupational health and protection at work, in accordance with the requirements of the European system for standardization.  
Deadline: 2000 and constant  
Actor: MH, MEc, MLSP

20. Assessment of occupational risk and incidence of occupational diseases and occupation-related diseases in certain high risk containing economic branches: mining, metallurgy, chemical industry, etc., by developing measures aimed at reducing and removing identified occupational risks.  
Deadline: 2000  
Actor: MH, in collaboration with MEc and MLSP

21. Elaboration and adjustment to European standards and documents and legislation on occupational diseases and injuries at work.  
Deadline: 1999 and constant  
Actor: MLSP, in collaboration with MH

22. Adoption of a law on chemical substances.
   Deadline: 1999
   Actor: MH, in collaboration with the MLSP

24. Establishment of national registry of occupational hazards (recognized and suspected), by territory and by economic branches, through identifying the extent of health risk posed by those hazards, as well as registry of working population with an increased risk for occupational diseases and injuries at work.
   Deadline: 2000
   Actor: MH, in collaboration with the MLSP

25. Updating, completion and approximation of the legislation relevant to workers' health protection and protection at work with the directives of EC and documents of WHO and M.O.T.
   Deadline: 1999 and constant
   Actor: MLSP, in collaboration with the MH

26. Organization and provision of proper functioning of occupational health services, to cover not less than 25% of the active population.
   Deadline: 2000
   Actor: MH, in collaboration with the MLSP

27. Introduction and compulsory requirement for classification, packaging and marking of dangerous chemical substances, in accordance with European standards.
   Deadline: 1999 and constant
   Actor: MH, in collaboration with MEnv and MEc

28. Development of methods for an integrated inspection procedure and control over the meeting of legal obligations in the field of workers' health protection and protection of working environments in all activities, through joint activities of sanitary and labour inspections.
   Deadline: 1999
   Actor: MLSP, in collaboration with MH

29. Organization and implementation of continuous education for the staff working in the activity of occupational health, on modern methods and procedures application, in the field of workers' health protection.
   Deadline: 1999 and constant
   Actor: MH

30. Elaboration of standards and establishment of permanent supervision over the professional work and control over the quality of workers' health protection (occupational health services) at the national level.
   Deadline: 1999
   Actor: MH

31. Preparation of measures for workers' health status improvement, by developing targeted preventive programmes, as well as programmes for health at work promotion.
   Deadline: 1999 and constant
   Actor: MH

32. Development and distribution of information materials on the problems of occupational health risks, with measures for their reduction and prevention, with working population
employed in certain risk containing occupations, as well as proper information of the general public on certain aspects of this issue.
Deadline: 1999 and constant
Actor: MH, in collaboration with MLSP

33. Introduction of national information system for environmental monitoring in working environments and occupational health damages.
Deadline: 2000 and constant
Actor: MH, in collaboration with MLSP