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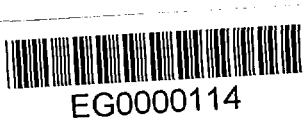

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Integrated Coverage of Radioactive and Hazardous Waste Issues in Developing Countries - Lessons Learned and Current Development -

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ABSTRACT

The perception of the sustainable development concept is quite different in countries with a different level of development. Rather limited resources allocated for environmental problems in developing countries should be used in the most pragmatic way. Setting up and operating two separate national systems for management of r - dioactive and hazardous waste is not the best example to be followed by developing countries with relatively small quantities of radioactive and hazardous wastes. This paper reviews existing practice of radioactive and hazardous waste management in Croatia and discusses advantages of joint waste management system.

Key Words: Waste Management System/Radioactive Waste/Hazardous Waste

INTRODUCTION

The Republic of Croatia proclaimed its independence in 1991. Country is currently undergoing significant political and economic changes. Political priorities put the emphasis on the development of democracy, privatization, social welfare and a market oriented economy. During the 1991-1994 period Croatia went through a period of war and aggression. The war-related events contributed to the present economic crisis. Structural problems (overcapacity in industry and processing, excessive protection and support given to the inefficient state enterprises, and inadequate incentives for the private sector) contributed to a fall of GNP (25%) and industrial production (50%) during 1990 1993 period. In 1995 per capita GNP rose to US$ 3.604, and the annual inflation rate has since been rather low (4-6%). The privatization process is a critical component of the Croatian economic transition.

Countries choosing sustainable development as a model of growth are founding their economic development plans on the principles of rational use of non-renewable natural resources and environmental protection. This requires essential changes towards waste generation and management. Furthermore, sustainable development as a concept imposes the need for co-operation among all social factors. This is in particular pronounced for environmental protection where interaction between industry, infrastructure, service companies and trade businesses is needed in order to balance opposite economic forces.

However, the perception of the sustainable development, particularly regarding protection of environment through better waste management, is different in countries with different overall economy levels. E.g. priority given to environmental problems in developing counties is often not very high as compared to many other more pressing needs. Therefore, rather limited resources allocated for environmental problems in developing countries and countries in transition should not be used for simple importing of ideas and technologies but efficiently, respecting local circumstances and in the most pragmatic way.

This paper will review practice of radioactive and hazardous waste management in Croatia. It presents key problems and points out main technologies used for waste disposal. Optimization in establishing and operating waste management systems in Croatia in support of sustainable development concept, can be of some interest to small countries which produce relatively small quantities of both types of wastes and have restricted resources at their disposal. In the first part of the paper, types and quantities of wastes produced and present status of waste management in Croatia are presented. In the second part joint radioactive and hazardous waste management approach and plans for the future are discussed.

THE CROATIAN WASTE MANAGEMENT SYSTEM

Industry is the primary economic activity in Croatia, followed by agriculture, forestry and tourism. Metal, chemical, textile, food, wood and shipbuilding are respectively the most important branches of the industry. Croatia produces some 2 million tons of oil annually and processes approx. 6 million tons. In 1997 HEP national electricity company produced 12,7 GWh of electricity in hydro and thermal power plants.

A) Radioactive Waste Management

Croatia has no nuclear power plant on its territory, and surel
Nevertheless, Croatia must handle and dispose of considerable quantities of radioactive waste. Although there is no NPP on the territory of Croatia itself, as a part of the former Yugoslavia, Croatia financed with the Republic of Slovenia, the construction of the Krsko NPP, a 600 MW PWR plant in operation since 1982. Krsko NPP is sited near the Croatian-Slovenian border, in Slovenia, on the Sava river, about 40 km upstream from the Croatian capital, Zagreb.

It is estimated that approx. 18 000 m^3 of L/ILW will be generated during the lifetime of the Krsko NPP and the subsequent decommissioning and dismantling process. The waste is processed in the Krsko radwaste processing unit, placed in 208 or 864 l steel drums, provided with additional protection according to the activity, and stored in the temporary storage. By the end of 1997 there were approx. 1990 m^3 in temporary storage, with a total activity of 4.2×10^{13} Bq. Drums with evaporator bottoms make up the majority (73%) of this waste, followed by spent resins (10%), supercompacted waste (7.5%), compactible waste (7.0%), other wastes (1.5%) and spent filters (about 1%). Because Krsko temporary storage is almost full, and the situation is threatening to stop NPP operation, a supercompaction campaign was carried out during 1995. Almost 90% of the existing drums were supercompacted and put into new overpacks. The overpack is a steel tube type container, licensed as an IP-2 IAEA package type. A detailed characterization of each drum, including radionuclide inventory, was carried out before compacting. The storage facilities were reconstructed at the same time. [1]

Radwaste in Croatia is also generated in various nuclear applications - diagnostic and therapeutic procedures in medicine, measurement and processing techniques in industry, ionizing lightning rods and smoke detectors - and in research and similar activities. Some 500 institutions are authorized to handle radiation sources. The total amount of waste generated up to now is about 80 m^3 with a gross activity of about 2.3×10^3 GBq. Radionuclides represented are ^{152,154}Eu from lightning rods, ^{241}Am from smoke detectors, ^{192}Ir, ^{90}Sr and ^{85}Kr from measurement and processing in industry, and ^{137}Cs, ^{60}Co and ^{226}Ra (approx. 300 needles and tubes) from medical applications. There are 31 users of open radiation sources in medical institutions producing liquid waste, in which only ^{3}H and ^{14}C cause disposal problems. The total quantity of waste generated from all of these sources is at most 3 m^3 per year.[2]

Presently, short lived waste generated in industry, medicine and research is stored at the place of origin until its activity falls to background level, after which it is considered as nonradioactive waste;

spent radiation sources are returned to the producer, or transferred to and stored at one of two temporary storage facilities, both in Zagreb, at two national research institutes. Two interim radwaste storage eds for the next decade.[3]

Radwaste management strategy was drafted in 1992 and updated in 1994, but has not yet passed through the necessary Parliamentary procedure. Radioactive waste management is regulated by the 1984 Law on Protection from Ionizing Radiation and Special Safety Actions in Nuclear Energy Implementation. Seventeen regulations and codes of practice had been based on this law. Waste categories, activity limits, the definition of a repository as a nuclear facility, and other basic definitions and management requirements are set out in these regulations. Several other laws and regulations, e.g. the Law on Health Protection and the Law on the Transport of Dangerous Goods, are also relevant for radioactive waste management.

The national radwaste regulatory framework in Croatia is rather complicated. The Ministry of Health, Sanitary Inspectorate Section, is the competent national authority for radiation protection issues, including many aspects of radwaste management. The ministry is the responsible body for issuing all types of licenses and permits for use, handling, transport, export-import of radioactive materials and radwaste and of all similar activities. Nuclear Safety Department in the Ministry of Economy, is the competent national authority in the field of nuclear facility siting, construction, startup, operation and closure; this competence extends to matters related to the planned L/ILW repository. The State Directorate for the Protection of Nature and Environment is competent body for issues related to radwaste repository siting regarding potential environmental damage, environmental restoration actions, cleanup of contaminated sites, environmental impact studies, etc. The Ministry of Planning, Construction and Housing as well as Ministry for Internal Affairs have responsibilities for specific radwaste management activities such as transport of radwaste, import-export, release of effluents and transport and facility safety planning. Problems common to all the ministries are the lack of expert staff and very limited budgets for regulatory tasks.

The construction of a final repository for L/ILW in Croatia may be a possible or even a necessary solution in order to accommodate half of the L/ILW generated in Krsko NPP. Croatia has been working on the L/ILW repository project for several years, preparing preliminary proceedings and background materials required for repository construction. First steps have been taken in all the main fields of activity, from siting procedure and repository design to the very important issue of public acceptance.

The following actions have been taken so far in connection with the repository project:

- APO-Hazardous Waste Management Agency was established in 1991 as a central managing and execution organization for the project with the principal task of preparing all preliminary proceedings related to the construction of a repository for L/ILW in Croatia. A preliminary schedule was prepared for project implementation, in which the proposed duration of each activity and the roles of involved organizations were defined.[4]
- A two stage site selection process has been applied, with a stepwise approach based on the verification of each step. The process began with a survey of the entire territory of the country and ends with the identification of candidate sites. The process is based on the application of both exclusionary and comparative criteria. Criteria for site selection have been prepared by group of experts, verified by the Croatian Government, passed through the necessary parliamentary procedures, and presented to the public. Two potential sites meeting the exclusionary criteria have been identified and published.[5]
- Characterization of radwaste in the two temporary storage facilities has begun, and characterization and radionuclide inventory of the Krsko wastes have been done already. Conceptual and/or preliminary designs for tunnel and subsurface disposal, including assessment of the investment

costs, have been prepared. New designs, corresponding to the new Krsko radwaste packing, are in preparation. A preliminary safety assessment study was prepared utilizing preliminary project d - sign and generic site parameters.[6,7]

- Considerable effort has been put into the creation of a positive public climate in terms of understanding, and facts acceptance. A proposal on a legal act on incentives for the local community (at the repository site) has been prepared. There is continuous dialogue with the press, providing complete and honest information to the public.

There are other radwaste management projects, such as maintaining a waste inventory, encouraging public relations and education, collecting radiation sources from war affected areas, defining potentially radioactive contaminated areas and preparing risk assessment studies for such areas.

The importance of international co-operation and assistance in reviewing repository project were recognized at the very beginning. Help was received through International Atomic Energy Agency as technical assistance for different phases of the repository project, such as evaluation of siting criteria, public relations strategy and preliminary project design evaluation. The transfer of know-how through fellowships, scientific visits, working groups and conference attendance has been a very important part of the international assistance.[8]

B) Hazardous Waste Management

Until 1995 a waste generator was under no obligation to keep records on the generated waste, or to refer the existing data to the regulatory body. As a consequence there is no reliable database on the waste quantities, types and place of generation. Since these data are indispensable for planning and establishment of a modern waste management system, there have been numerous attempts by different institutions applying different methods to come up with a rough estimate as a substitute for the real data. Assessments have been made on the basis of: a) data from waste questionnaires filled in by largest companies in the capital city (Zagreb); b) studies on waste quantities in the Dalmatian region and some others big cities; c) differences between the consumed raw-materials and final products; d) the national income of Croatia; e) data of national/regional organizations (UNEP, OECD, Alpe-Adria waste quantities for similar countries.

Total amount of waste generated in 1991 was estimated to be 6.720.000 t. Break down of this fi - ure by the generation source (the classification is made according to "EUROSTAT" European statistics) is as follows: a) agriculture - approx. 1.400.000 t; b) mining - approx. 789.000 t; c) industry - approx. 3.181.000 t; d) households - approx. 1.350.000 t. It was estimated that 350.000 tons (5%) is ha - ardous waste. The largest amounts of hazardous waste in Croatia are generated in inorganic and organic chemical industry, during the extracting and processing of oil and natural gas, in coal power plants, in wood processing and production of paper, in leather industry and manufacture of metal products and in the application of lubricants and cooling emulsions. In addition, there are considerable quantities of hazardous waste (approximately 2%) within household waste. The most important hazardous waste streams were estimated (revised for 1996) and presented in the table 1.[9]

Croatia is party to a number of major international environmental conventions and treaties. The following have the most bearing on hazardous waste management: a) Law on Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; b) Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft (Barcelona Convention); d) Montreal Protocol on Substances that Deplete the Ozone Layer; and e) European Agreement Concerning the International Carriage of Dangerous Goods by Road.

The following are the key national legislation regarding hazardous waste:

- Law on the Environmental Protection
  issues in view of reducing health risk to people, of providing and improving quality of life, preserving natural goods and insuring a rational use of natural resources and energy as a fundamental condition of sustainable growth. The law respects the principles of international laws, the generally accepted principles of environmental protection, taking into account scientific achievements and best international practices. The law provides a framework within which the waste management system will be elaborated and regulated.
- Law on Waste outlines the main waste management principles; classifies types of waste; delegates rights, duties and responsibilities of physical and legal persons, as well as the state administration and local units of self-government and administration; sets the principal goals to be achieved in the waste management. Specific articles are addressing hazardous waste. The Law defines the framework for the waste handling and treatment as well as the binding obligations of a waste producer, collector and treater in terms of taxes. Import of hazardous waste is forbidden. However, it is permitted to import certain types of waste which can be used as a secondary raw material. Export is permitted in keeping with the provisions of the Basel Convention.
- Code of Practice on the Types of Waste with the Waste Catalogue (1996) is the most important implementing act, stipulating strict obligations upon each and every subject in the waste management, including the enforcement mechanisms, penalties and fines. The Code of Practice defines obligatory management schemes for particular types of waste; waste management data reporting; analysis methods of chemical and physical properties of hazardous waste; waste sampling procedures; registration and the accompanying form for hazardous and inert industrial as well as for municipal waste.
- Related to hazardous waste there are recently passed Code of Practice on the Inventory of Emi - sion in the Environment and Code of Practice on the Environmental Impact Assessment.

code	DESCRIPTION OF PROPERTIES AND ORIGINS OF WASTE TYPE	t/year
03 00 00	Wastes from wood processing and the production of paper, cardboard, pulp, panels and furniture	15 000
04 00 00	Wastes from the leather and textile industries	11 000
05 00 00	Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal	65 000
06 00 00	Wastes from inorganic chemical processes	23 500
07 00 00	Wastes from organic chemical processes	32 000
08 00 00	Wastes from the manufacture, formulation, supply and use of coatings, adhesive and printing inks	980
09 00 00	Wastes from the photographic industry	30
10 00 00	Inorganic wastes from thermal processes	37 000
11 00 00	Inorganic wastes with metals from metal treatment and the coating of metals; non-ferrous hydrometallurgy	18 500
12 00 00	Wastes from shaping and surface treatment of metals and plastics	10 700
13 00 00	Oil wastes	55 000
14 00 00	Wastes from organic substances employed as solvents	350
16 02 01	Transformers and capacitors containing PCB or PCTs	50
16 06 00	Batteries and accumulators	3 500
18 00 00	Wastes from human or animal health care and/or related research (infectious wastes)	6 500
	TOTAL: HAZARDOUS WASTE	**279 110**

Table 1. Estimated quantities of the most important hazardous waste streams in Croatia

The body responsible for waste management policy making at the state level is the Parliamentary Committee on Environmental Protection. Along with providing the basic guidelines, the Committee provides considerations and recommendations for all the environmental proposition (and therefore, for waste management) submitted to the Parliament for adoption. However, the Committee has not any executive obligations and responsibilities in the implementation of waste management measures. The role of the Government of the Republic of Croatia is to establish Environmental Protection Strategy, Programme for Physical Planning, and to give guidelines and criteria for hazardous waste management activities. The regulatory authority is the State Directorate for the Protection of Nature and Environment. Among its responsibilities are drafting of laws, issuing of regulations on waste management, as well as issuing of all type of licenses and permits, and enforcement of legislation and regulations. At the local level, County Offices for Physical Planning, Housing, Municipal Affairs, Civil Engineering and Environmental Protection are authorized for some of the key activities in hazardous waste management, such as maintaining the waste inventory. Counties are obliged to establish their hazardous waste collection programmes. In addition to those there are several other state governmental bodies authorized for specific hazardous waste management activities.

Out of the estimated 280.000 t of hazardous waste in 1996, only a small part (approx. 3 - 4 %) underwent on-site processing, approx. 5 % was processed off-site, while the rest was accumulated in producer stores, deposited at inappropriate disposal sites together with municipal waste, incinerated in facilities without combustion control and flue gases cleaning or drained into sewage system. It means that approximately 90% of hazardous waste is far from being managed in a satisfactory way. Although there are not many purposely built hazardous waste treatment facilities in Croatia, there are many possibilities for treatment of specific hazardous waste streams based on using the existing industrial, processing or power generation facilities.[10]

Incineration is a practice which takes place in several types of existing facilities:

- All power generation facilities, with power greater than 3 MW, (more than 20 in the Republic of Croatia), are allowed to incinerate waste oils. This way of management has been used in Croatia, although not to the satisfactory extent. Up to now, collection and incineration system for liquid waste oils has been established for few of the greatest Croatian counties and 5 of the thermal power plants have been already included in that successful management system.
- Cement industry: Incineration of different types of hazardous waste in cement kilns has a number of advantages: there are savings on fuel for cement kilns, the temperature in the incinerator is 1.400 - 1.500 °C with the retention time of 6-10 seconds which is higher than in the hazardous waste incinerators and the cement quality and properties are not affected. Therefore, there should be a great deal of interest in replacing conventional fuels with certain types of hazardous waste - waste oils, sludges, old medicines, tires etc. In Croatia there are five cement kilns with a nominal daily capacity from 9.100 tones upwards. So far, although there have been some negotiations with the representatives of the cement industry, no agreement has been reached, mostly due to the opposition of the management as well as the local community. In January 1997 APO published the

  the advantages of cement kilns over incineration plants. It also shows the high potential and importance of cement industry in the Croatian hazardous waste management system.
- "in-house" incinerators: There are some companies with in-house low capacity incinerators for the incineration of their own waste. Only exceptionally they will offer services to others. The total c - pacity of all the existing incinerators in the Republic of Croatia, calculated on the basis of an-eight-hour-working-day, is approximately 10 tons per day (3.000 tons per year), which is far b - low current needs.

Disposal into brick products of inorganic sludge containing heavy metals by mixing small quantities of sludge into raw-materials, is an established practice at several brickyards in Croatia. They are mixing inorganic sludge from galvanization, electro-plating, surface metal and plastic working, etc. into their products. Up to now more than 100 t of such sludge has been disposed of in brick products.

Regeneration of solvents, neutralization of acids and alkali, although practices at several small capacity devices for regeneration of halogenated solvents are still insufficiently used, mostly due to the nature of solvents offered for regeneration (most frequently mixtures of various solvents), as well as the poor regenerator quality (acidity is increased due to the decomposition), which hampers their use.

Disposal, the largest part of industrial waste (inert and hazardous) has been deposited on municipal i-

mately 700 municipal waste landfills, only 4 of which have been properly engineered and licensed. Dumps located in suburban areas are a specific problem. According to some estimates there are about 300 larger or smaller dumps in Zagreb area. The main city landfill Jakusevac was opened 30 years ago as a temporary dump and is still operating without the license. All types of wastes have been disposed of there without any prior treatment. Very extensive remediation process is under way. Also the Registry of Waste Landfills which has been established recently with the aim of describing the actual state in the area of landfilling in Croatia will contribute towards exerting better control over current disposal practices. Through application of GIS tools the registry provides more accurate data which are geographically applicable.

Export of waste that can be treated in the territory of the importing country in an environmentally sound manner is permitted and regulated by the "Law on the Basel Convention on the Control of

Protection of Nature and Environment is issuing licenses and permits for exports of waste in keeping with all the requirements of the Basel Convention. Small quantities of PCB waste have been exported for incineration to France since there are no facilities for the appropriate treatment of such hazardous waste type in the country. Up to now 120 tons of PCB contaminated equipment have been exported, most of it during the last two years. Small amounts of other types of hazardous waste have also been exported, but in view of the expenses incurred this is still not a very attractive treatment option. Import of hazardous waste for disposal is against the Croatian law.

Institutions and companies are expected to obtain approval for the implementation of hazardous waste management activities. A number of companies have already been registered and since hazardous waste management activities are still being developed, more specialized companies are expected to apply for authorization. One of the authorized companies is APO-Hazardous Waste Management Agency which is the one of the national operational organizations in the area of hazardous waste management.

JOINT APPROACH TO RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT

Croatia has experienced a number of serious environmental problems as a result of past improper waste management. Some of the identified problems include: numerous dump sites across the territory even in the very specific Karst area out of any control or protective measures; uncontrolled hazardous

of hazardous wastes; specific environmental problems related to war damages in Croatia, such as areas contaminated with PCBs spilled from condensers and transformers, destroyed during the war, etc.

Faced with the challenge of improving the existing and/or setting up new waste management infr - structure for hazardous waste, Croatia tried to answer that challenge by

- preparing new waste management strategy,
- establishing new administrative/organizational structure; and
- implementing the joint approach to radioactive and hazardous waste management.

Croatia is facing a challenge of setting up new and efficient infrastructure for both hazardous and radioactive waste management. As a relatively small country, with poor financial and human resources, establishing a joint institutional framework (infrastructure) for both radioactive and hazardous waste management is under consideration. There are some benefits to that approach, the main being putting limited national resources into optimal use by avoiding the dual system establishment.[11]

The aim of joint approach is to accomplish protection for people and environment through cost effective and efficient management for both radioactive and hazardous waste. General ideas behind hazardous and radioactive waste management are highly similar:

- to reduce quantities of waste as much as possible and to reuse or recycle waste if economically sensible or to dispose it in a safe and acceptable way;
- final disposal for both types of wastes is conceived with maximum protection of our and future generations in mind; and
- openness and communication with public are indicated in both of the management systems.

There is experience and know-how in radioactive waste management which was accumulated over years during radioactive waste repository project. Establishing radioactive waste repository was done under frequent reviews of experts from international radioactive waste community and in particular from the International Atomic Energy Agency. Strict methodology for site selection process, site characterization, design development and particularly long term performance assessment were successfully implemented aiming at assurance of general public as well as regulators into long term safety of the repository.

This could be put in a good use by implementing joint approach to waste management system in Croatia and is based on the following:

- Same basic legislation. Assuming that radioactive waste is type of hazardous waste, same basic legislation could be prepared.
- Same operational organization, same experts. APO-Hazardous Waste Management Agency was established under a name Radioactive Waste Management Agency to be operational organization for radioactive waste management. Operational structure of Agency having departments for: a) siting; b) waste treatment and disposal technology; c) safety analysis; d) quality assurance; and e) public relations was well suited for expansion of activities to the management of hazardous waste and change of name to APO-Hazardous Waste Management Agency without affecting internal organization which is well suited for projects regardless of the type of waste with the same experts and procedures;
- Same site selection procedure. Exclusion two stage site selection process for both radioactive and hazardous waste repositories was almost similarly set up. One of the preferential sites for LL/IL radioactive waste repository was already included into the Regional Plan of Croatia based upon the site selection procedure described earlier. Same site is bound to meet the requirements for ha - ardous waste treatment and disposal facility. Demanding and detailed site characterization for radioactive waste repository approval meets all the criteria required for hazardous waste repository.

- Similar public involvement. Joint actions could be conceived in public relations and educational programmes. Some of the activities carried out in that direction lately: a) popular publications with integral approach on hazardous and radwaste topics; b) press-clippings on radioactive and hazardous waste problems in public domain are collected and distributed to extensive mailing list containing *inter alia* all NGOs; c) permanent communication with schools, general public and media on both hazardous and radwaste topics is maintained.

Instead of developing two separate and parallel systems on the national level with two operational organizations, joint system with single operator for both types of wastes could be established using accumulated knowledge and expertise as well as internationally developed methodology.

Associating radwaste management with the management of hazardous wastes, enables comparison and correlation of both problems. Considering disposal of hazardous waste, experience in site selection process, design and performance assessment for radwaste repository could be indispensable. In addition there are experts and workgroups with understanding of the problems associated with the safe disposal of hazardous materials and development of barrier systems needed to protect people and environment for centuries to come. Furthermore, already accumulated results in radwaste project, particularly during site selection and preliminary site characterization could be directly used for hazardous waste disposal purposes. Once the site for radioactive waste disposal has been accepted, due to the strict and thorough process of site selection and chosen properties, it can eventually be used for hazardous waste disposal. One of the advantages of selecting joint site for both repositories could be significantly simplified public acceptance process for both facilities. It could be stressed also that important benefit, especially for small countries with high population density, could be optimized use of the territory. Normally, some ten hectares needed for the facilities would be utilized, but it is not only that land that is affected. Land use in the vicinity of waste facilities, even when there is no scientific justification for such restrictions, is seriously limited. Joint site for both facilities saves downgrading of considerable surrounding areas.

In Croatia some steps directed towards efficient waste management have been already made. Analysis of status and problems, review of the existing legislation, preparing draft proposals for new legislation documents, enforcement of communication and cooperation with the responsible state authorities, as well as with public and local communities, preparation of waste types/quantities database, etc. have been initiated, and some of them are well under way.

CONCLUSIONS

Faced with the challenge of setting up waste management infrastructure for both - radioactive and hazardous waste, Croatia has tried to answer by applying the new - joint approach to the issue. The idea of common segments of infrastructure enables optimization of limited national resources and si - nificant time and money savings. Common operational organization has been established and first projects have been set off.

APO-Hazardous waste Management Agency is responsible for establishing and implementing an efficient system for the management of both hazardous and radioactive waste. It is also authorized by the Government to organize and perform some specific environmental restoration and human health protection actions.

The initial steps have brought positive experiences. However, main tasks in developing infrastructure are still ahead, e.g. following:

- defining the legal system as transparently as possible, i.e. establishing a clear framework of duties and responsibilities for involved ministries and responsible bodies;
- establishing the mechanism for financing the national waste management programme;
- encouraging and strengthening all kinds of public relations and education;
- developing contacts with the international waste management community.

Basic activities in all main fields of hazardous waste management have already started: from establishment of management system to operational activities. The first results can be positively assessed. However, further activities on joint approach are required.

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