

THEORETICAL CONSIDERATIONS ON THE METHODS OF FINAL WASTE DISPOSAL

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ABSTRACT

The present work touches the most important aspects regarding the final waste management in general. It highlights the general priorities regarding the approach of waste management and also the objectives included into the National Waste Management Strategy and into the Regional and Local Plans regarding some waste flow.

1. INTRODUCTION

The National Waste Management Plan was elaborated and materialized legislatively as a consequence of the European laws in the field and also as a consequence of elaborating the National Waste Management Strategy which included sectorial strategies of the ministries involved. For a more focused management at municipal level, were made the Municipal Waste Management Strategies which follow mainly the guiding lines imposed by the National Waste Management Strategy and which are individually implemented for each municipal.

On the basis of the municipal plans, the National Waste Management Plan was elaborated later and was adopted and legislated by the Governmental Decision no.123/2003. These national documents regarding waste management are periodically amended by some enlarged work groups made of representatives of the central authorities, of professional associations, of local authorities, of universities and ONGs, and also German, French, English and Japanese experts, involved in Phare Twinning Projects or SOP Environment or in the Technical Assistance Program of JICA.

The methods of residential and industrial waste disposal are the following:

- STORAGE
- INCINERATION
- COMPOSTING

	STORAGE %	INCINERATION %	COMPOSTING %
EU	60	33	7
USA	79.2	20.3	0.5

2. RESIDENTIAL/HOUSEHOLD WASTE STORAGE

Nowadays waste storage still is the most used method in most of the European Union States, and worldwide. The tendency in most of the states of the European Community is to minimize this process of waste final neutralization/elimination through waste final disposal.

Solid household waste from urban areas varies between 0,5 – 0,9 kg/person per day, which leads to an average of 8.700 tons of waste/day, from which about 5% are incinerated at the present day, the rest being stored into historical landfills which don't respect the environmental laws



Fig. 2.1. Inaccurate household waste landfill

In 2002 in Romania were inventoried 951 industrial waste landfills (83 dangerous waste landfills) and 303 urban landfills which occupied a total area of 13 222 ha of the entire surface of the country, excepting the rural landfills which hadn't made the object of waste statistics in Romania, because they are hard to monitorize given to the inexistence of public salubrity services in parishes and villages.

Rural waste differs in composition and quantity from the urban waste. Waste quantity generated in rural residencies was estimated to approximately 0, 3 kg/person - day. Therefore we may estimate an average of 1 million tons of household waste generated by a rural population of 10 million inhabitants.

In order to minimize the national area occupied by landfills, Governmental Decision no. 349/2005 modified and completed in 2008, brings waste disposal under regulation by establishing the legal frame for the operation of waste disposal, both for realizing, exploiting, monitorizing, closing and after closing follow-up of the new landfills and **for exploiting, closing and after closing follow-up of the existing landfills, in conditions of protecting the environment and the health of population.**

A measure adopted in conformity with the Governmental Decision previously mentioned was that of rehabilitating **the landfills in the rural area by the 16th of July 2009 through the salubrisation of the area and its reintroduction in the natural circuit, this** being totally accomplished in Cluj County.

Urban landfills represent about 25% of the entire national landfills, occupying an area of approximately **1236 hectares**, which represents about 9% of the surface affected by waste land filling.

The same Governmental Decision no. 349/2005 modified and completed in 2008 establishes the interruption of waste disposal on the inaccurate landfills, interruption which is supposed to progress annually in the period between 2005 – 2017.

After a national inventory in 2002, were registered 951 **industrial landfills** which occupy an area of more than 11.000 ha. The most of the landfills -354- don't have facilities or concrete platforms; there is also a great number of mine dump-material – 251- and skimming ponds – 209 – which have some specific facilities.

As a consequence of the lack of facilities and of defective exploitation, landfills are generally acknowledged as objectives which generate hazards and impact on the environment and on the public health. Due to these hazards, the Governmental Decision no. 349/2005 lay on the interruption of waste disposal on the industrial landfills of great industrial platforms. Landfills closure will be made according to the closure agenda included in Appendix V of the present Governmental Decision.

Problems generated by inaccurate disposals:

- unpleasant, persistent smell;
- the burst of isolated fires due to the mixt waste collection, without separating the fermentable part => generating air pollution + other dangers;
- soil and water supplies contamination due to the inexistence of a passive constructive barrier, respectively the lack of an impermeable membrane at the basis of the landfill;
- the wind carriage of pieces of disposed waste (papers, bags, constructions waste, etc);
- accumulations of biogas generated by the decomposition of organic substances;
- free access of persons and animals due to the absence of fences;
- source of contamination with pathogen agents which generate infectious diseases, a phenomena stimulated by the presence of various carriers: flies, rosarials, birds, domestic animals;
- geo-physic instability of the entire landfill area.

Possible solutions of restraining the impact of inaccurate landfills:

- ✓ The securement of a daily couverture of ground of 20-22 cm above the waste
- ✓ The presence of extinction facilities on the landfill; enclosure and security
- ✓ Isolation: natural (an argillaceous layer) or artificial: clay, geo-textolite membrane,

the treatment of discharges in waste-water purifying plants, a protection section between the landfill and the water sources of 500-1000 m;

- ✓ The immobilization of dust from various types of waste through cementing
- ✓ The introduction of biogas collecting pipes
- ✓ The projection of the esthetic profile of the enclosed landfill by vegetal furnishing
- ✓ Respecting a minimal distance (protection section) from human settlements - about 200 meters, enclosure, daily coverage



Fig.2.2. Isolation system of a future landfill with geomembrane

✓ The geotechnical study of the disposal area, the exploitation of the landfill into disposal units/cells. The assurance of stability by reprofiling escarpments which should decrease the angle formed between the waste and the horizontal. These works involves hazards due to instability the final recommended angle being of 30 degrees.

✓ The levigat contains a mixture of polluting substances with a variable composition, depending first of all on the type of waste disposed on the landfill. The collection can be made with the help of a system like draining pipes which are introduced at the base of the landfill and which permit the collection of the liquid fraction resulted from the biological activity of fermentable waste. The treatment of levigat is made in a waste-water purifying plant or it may be collected into an insulated basin/cesspool and transported later to another waste-water purifying plant in the area by cesspits.

In order to minimize the quantity of waste disposed on landfills the selective collecting at source is needed, and also a high degree of exploiting potential waste.



Fig.2.3. Selective waste collection in urban communities

Therefore was implemented the selective waste collection system in urban communities and were placed dumpsters for the three main categories of recyclable waste.

3. WASTE INCINERATION

The incinerating disposal method (especially the incineration of household waste) raises a series of problems, the advantages and disadvantages being still very discussed by specialists. The composition of waste, its humidity and its caloric power are factors that influence greatly this process.

The caloric power of waste in Romania is about 500-600 kcal/kg compared to 1500-2000 kcal/kg in developed countries. Due to this inconvenient caused by the absence of a rigorous and extended in rural communities, the waste incinerators are inexistent in our country.

It was observed that in countries like Holland or Canada the incineration plants release into the air important quantities of dioxins and furans, however, the number of EU incinerators is increasing.

The incineration of hazardous industrial waste and especially of hazardous biological waste (medical waste) has known a national increase beginning with 2005. At the moment about six waste incineration plants authorized by the Regional Environmental Protection Agencies are in use. One of the waste incineration plants authorized from the environmental point of view is **HOVAL MULTIZON**, with two ovens and a total incineration capacity of 750 kg/hour.



Fig. 3.1. Waste incineration installation type HOVAL MULTIZON

4. COMPOSTING THE FERMENTABLE PART OF THE HOUSELHOLD WASTE

It is process that is has been known and applied for a long while. The waste which contains a high level of organic substances is decomposed due to the activity of



Fig. 4.1. Compost sorting plant

microorganisms. The process develops accompanied by heat elimination (over 50°C), most of the microorganism are destroyed, the result being a compost (with variable characteristics – depending on the type of waste), inodorous, which may be used in agriculture.

The composting process (especially of the vegetal fraction) can be realized through aerobic methods using installations of sorting and minimizing waste.

Municipal biodegradable waste

represents the biodegradable part of household and assimilable waste collected together, and also the biodegradable function of municipal waste collected separately, including the vegetable waste remained after the modeling the tree branches in parks and gardens.

According to the environment report of the European Environment Agency “Biodegradable municipal waste management”, the biodegradable part of the municipal waste is represented by alimentary and garden waste, paper and carton waste, textiles, wood, and also other biodegradable waste contained by the collected waste.



Fig. 4.2. Biomass

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