STUDY ON MANAGEMENT METHODS OF THE MASSAGE WASTE

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Abstract: *Waste management is one of the major issues facing Romania in terms of environmental protection. This concerns the collection, transport, treatment, recovery and disposal of waste. Responsibility for waste management activities lies with their generators, according to the "polluter pays" principle or, as the case may be, with producers in accordance with the "producer responsibility" principle. The activities of waste management must be carried out in compliance with environmental protection standards that reflect the requirements of European legislation. European Directives transposed into Romanian legislation have led to a new approach to the waste problem, paying attention to the need to protect and save natural resources, reduce management costs and find effective solutions to reduce pollution.*
Keywords: Waste management, environmental protection, Targu-Jiu municipality

1.Introduction

The sanitation service includes the following activities: pre-collection, collection and transport of municipal waste, including hazardous toxic wastes from household waste, except for special waste; sorting municipal waste; disinsectisation and deratization. This service is coordinated and monitored by the Tg-Jiu Technical Department, the Community Administration and Management Department, which is subordinated to the Municipal Local Council. In Tg-Jiu Municipality, this service is provided by S.C. POLARIS M. HOLDING S.R.L. and S.C. PUBLIC EDILITAR S.A., by well-defined sectors. The two sanitation operators store the garbage at the only warehouse according to the Ecological Waste and Manufacturing Waste Barssești, administered by S.C. POLARIS M HOLDING S.R.L. Generated municipal waste is collected at the level of the localities by the municipalities and they have this responsibility (Law No. 139/2002 for the approval of Emergency Ordinance No. 87/2001 on public services for sanitation of localities).

The Tg-Jiu Waste Warehouse is located in the western part of the city, at the point named Calului Dealul, about 4 km from the city. The warehouse was put into operation in 2009 (first cell). According to GD no. 349/2005 on waste disposal, the Tg-Jiu household waste deposit is part of the "b" category, being allowed to store non-hazardous waste, including municipal and assimilable waste. The area of the warehouse has adjacent hardwood forests administered by the Tg-Jiu Silvic Occident to the north, south and west, and towards the East land belonging to the Tg-Jiu Local Council and CF Barsseşti Technical Station.

The strict construction project will be implemented in several stages:

- Stage I: Compartment 1, the service area served by the warehouse and the environmental protection infrastructure;
- Stage II: plant for crushing construction waste;
- Stage III: compartment 2 and sorting station and compost;
- Stage IV: compartment 3;
- Stage V: final closure of the warehouse;
- Stage VII: installation for the capture and treatment of biogas, respectively

power generation or flame burning if the gas production will not justify an installation for cogeneration.

The stages of construction and filling of the landfill are as follows: compartment 1 (C1) on the base surface of 28550 [m²] to the height of 17.80 [m]; compartment 2 (C2) with waste disposal on the surface of 37240 [m²] up to the height of 19 [m]; compartment 3 (C3) on the surface of 41910 [m] up to the height of 20 [m], raising the deposit by another 20 [m] over compartments 1,2 and 3 (compartments C4, C5, C6) at a waste column height of 40 [m], close to the natural slopes of the old clay exploitation.

The deposit is placed on a thick layer of clay and marl, the drillings made in this way revealing layers of clay and marl to depths of 20-30 [m]. Earthworks have cost the excavation and modeling of the deposit base, and the resulting land will be used for perimeter and subdivision dams. Perimeter dams are dikes in the ground, with heights of h = 2 [m]. The estimated length of the dams is 1011 [ml], of which for compartment 1-370 [ml]. Subdivision dams will be made of large, sand-filled tires and placed on 2-3 rows of pyramid trunks over which the geomembrane stretches. Its length is 344 [ml].

The natural waterproofing layer will be completed with a polymeric layer consisting of geomembrane, geotextiles and drainage layers, so that the waterproofing of the deposit vault will have a structure of the type shown in figure 1.

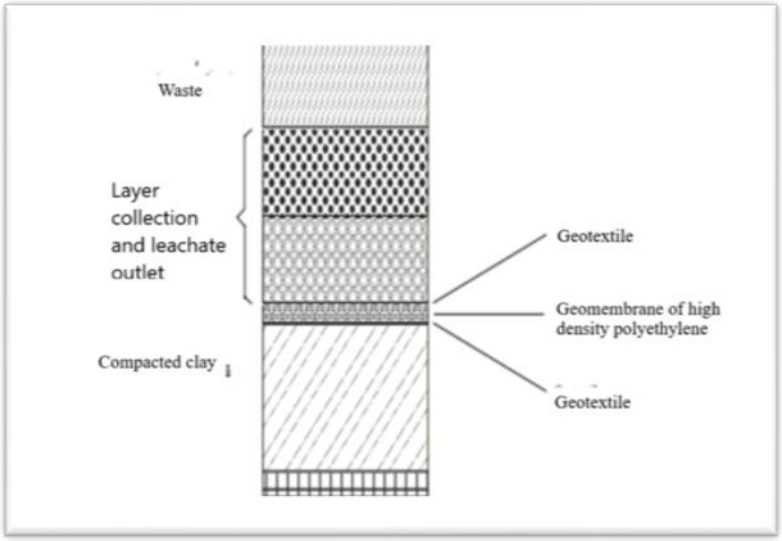

Figure 1. The scheme of waterproofing of a landfill

The perimeter dig will be made of well compacted clay layers. The base of the deposit will be shaped in the hills and with corresponding slopes (minimum 3% to the absorbing drains and 2 [%] to the collection and pumping area) to allow optimal operation of the drainage system for the leachate. At the base of the external slopes there will be made a guard channel, which will have a trapezoidal section and will be sealed with concrete tire. For compartment 1 the guard channel is located on the eastern and northern sides of the storage enclosure and has a length of 400 [m]. Sealing of the storage enclosure is done as follows: Internal grooves and base of the HDPE geomembrane with g = 2 [mm]; geotextile with m = 1000g / m2, respectively with UV-resistant geotextile on the slope.

The levigate will be collected with a drainage system consisting of drainage drains and drainage collector, close to a non-flooded drainage gravel layer, 0.50 [m] thick over the

upper generator and between the drains. Absorbent drains are PEHD slit pipes with Dn 250 [mm] spaced 30 [m]. The total length of these drains is 4050 [m], of which for compartment 1-1317 [m]. The drains are located on the platform of the enclosure designed for this purpose in the form of cross-sectional ridges and the continuous slope in the longitudinal section. The collector drain is positioned at the base of the outer ditch of the perimeter dike on the eastern side of the site. It has Dn = 250 [m] and a length of 383 [m], of which for compartment 1-195 [m]. On the drain collector were located intersection and circular viewing rooms, of which high density polyethylene with Dn = 1400 [mm] in 12 pieces, of which for the compartment 1-4 pieces.

One of the most common problems in designing landfills is that of leachate, which is generated by the accumulation of obsolete waste water.

According to the Order of the Ministry of Environment and Climate Change no. 757/2004 for the approval of the Technical Standard on Landfill "leachate is a liquid waste generated by: the penetration of meteoric waters into / through the body of the deposit, the separation of the water contained in the stored waste and the decomposition of the deposited waste". Levinate has various organic and inorganic compounds found in water or suspension. Regardless of the nature of its compounds, leachate raises great problems of soil, groundwater and surface water pollution. Leachate is formed when obsolete water is accumulated in waste in the storage cell. Precipitation may come from rain, snow melting, or waste. For example, when the area of the landfill site is under the influence of heavy rainfall, a larger amount of leachate will be generated. Also, the quantity and quality of the leachate also depend on the amount of waste stored and their composition.

The factors that influence the composition of the leachate are: the types of waste deposited, the climate of the area where the deposit is located, the construction of the deposit must take into account the pH, temperature, humidity and climate, the amount of precipitation.

In rainy periods the amount of leachate increases and in the drought period decreases. In the beginning of the storage, organic substances are readily biodegradable, then the age of the deposit predominates the ones that are hardly biodegradable and toxic.

Methods that can be used to treat leachate, namely: biological: aerobic and anaerobic; chemical; separation through membranes; absorption on active carbon; evaporation; combined technologies.

The most common method for treating leachate resulting from household waste dumps is reverse osmosis. This procedure was used to treat (leaching) the leachate resulting from the Tg-Jiu household waste repository. Osmosis is the natural physical process consisting in the spontaneous passage of water from a dilute solution to a more concentrated one through a semipermeable membrane. The force exerted by the solution on the membrane is its osmotic pressure. The osmotic pressure is based on the concentration of the solution, which is shown in Figure 2.

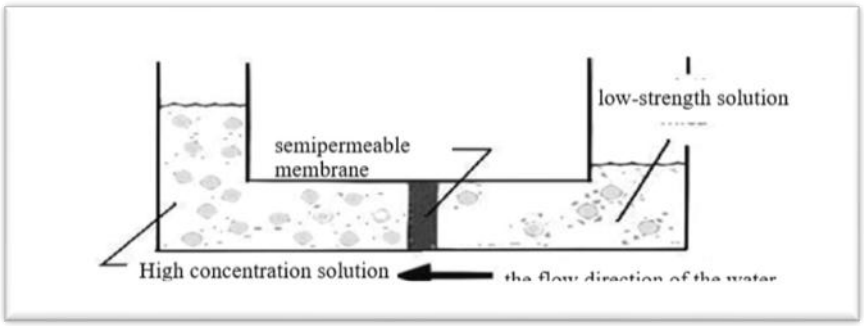

Fig. 2. The normal osmosis process

Reverse osmosis is the process by which the osmotic flow is reversed. Reversal is achieved by applying a pressure above the osmotic pressure to a concentrated solution. In this way only the water will pass through the membrane (however the water contains a quantity of dissolved salts), which is shown in figure 3. Thus, the reverse osmosis process allows the removal of the dissolved salts in the water and the possible impurities in the range of 90-99 [ ].

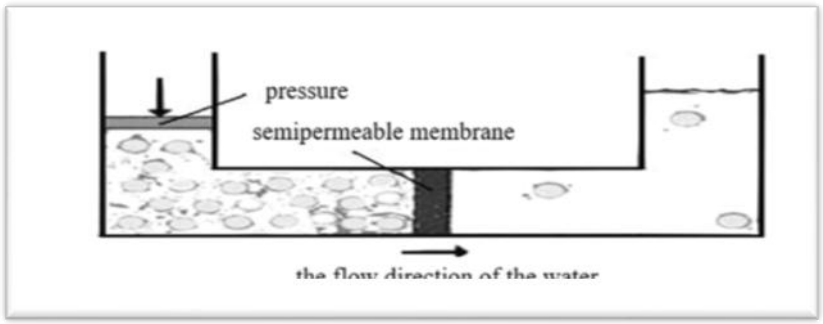

Figure 3. Reverse osmosis process

The advantages of this method are: allow the elimination of a wide variety of organic and inorganic pollutants; yields high purity cleaning and low concentrations after treatment.

Disadvantages are: non-destructive technique; requires prior treatment; is efficient for processing low-flow effluents containing highly toxic pollutants (such as leachate); investment and operating costs are relatively high; the volume of waste produced can be raised (1% to 25% of the volume treated).

2. Results and interpretations

In order to determine the degree of pollutant loading of the leachate resulting from the Tg-Jiu household waste dumps, two sets of analyzes were carried out during 2017 from the samples taken before discharge into the emissary (Pârâul Calului). The treated levigated samples were taken and analyzed at six-monthly intervals in 2015, respectively in the periods March - April and September - October. The results of the analyzes performed are presented in Table 1. They were taken from the Sanitary Waste Society S.C. POLARIS MEDIU S.R.L. TG Jiu.

Table 1. Values determined for treated leachate

Current number	Indicator name	Determined value [mg/l]		C.M.A. [mg/l]
		Sample I	Sample I	
1.	Suspensions	52	57	59,0
2.	CCO_{Cr}	51,99	52,00	124,0
3.	CBO_5	22,9	23,6	20,9
4.	Ammonium	2,90	22,30	1,9
5.	Nitrates	5,19	3,80	24,0
6.	Chloride	12,850	219,799	499,0
7.	Nickel	0,063	0,0769	0,4
8.	Copper	0,0090	0,0359	0,1
9.	Cadmium	0,00017	0,00036	0,2
10.	Lead	0,0097	0,0226	0,2
11.	Zinc	0,156	0,702	0,3

Interpretation of the results was done according to NTPA 001/2005. Normative on the establishment of limits for pollutant loading of industrial and urban waters to evacuation to natural receptors. The values of these limit concentrations are for momentary samples. When determining the admissible limit values for heavy metals, it must be taken into account that although the individual maximum permitted concentration may be the norm, when more heavy metals (eg Pb, Cd, Ni, Cr, Cu, Zn, Hg) their total concentration in water must not exceed 2 [mg / dm3].

Analyzing the values determined for certain indicators and comparing them with the limits stipulated by NTPA 001/2005, 81,8 [%] of these cases were below the maximum admissible concentration. Regarding the leachate collection system includes: leachate drainage state, leachate drainage ducts, leachate collection ducts, dormitories, pumping station, storage tank, leachate removal pipeline and leaching plant, in case of treatment on another site. The leachate huts are located outside the waterproof storage area and are constructed of concrete lined with a layer of protection against corrosive action of the leachate. The inside diameter of the leachate hearths should be at least 1 [m] and the installations shall be located so as to allow control and cleaning of collection and disposal lines. Underground tanks are made of concrete, which is lined with a protective layer resistant to the corrosive action of the leachate. The over-floors are made of concrete or steel and are lined with a layer of corrosion protection against the leachate. Outer tanks are isolated from the outside against frost. The leachate treatment facilities depend on the drainage and evacuation system consisting of a gravel layer and a system of drainage and collecting drains.

The characteristics of the leachate drainage system (slope, pipeline distance, etc.) will be determined by the designer, on a case-by-case basis, depending on the specific conditions of each site (relief, precipitation regime, type of waste). Areas for the storage of waste will be fenced with guard ditches for collecting the meteoric waters; they will be treated and / or removed from the site along with the leachate. The leachate treatment facilities are designed to bring leachate indicator values within admissible limits for evacuation into sewage or surface water systems. Depending on the specific local conditions and the characteristics of the leachate (whether or not they fall within the limits set by current legislation), it can be discharged directly or collected locally and then transported to the influences of a municipal wastewater treatment plant. The quantitative and qualitative characteristics of the leachate vary over time and depending on the nature and amount of waste stored, and the design and

construction of treatment facilities must take these aspects into account.

Upon receipt of a shipment of waste, a series of checks will be carried out - on-site inspection, verification of the analyzes provided - depending on the nature of the waste, the mode of transport, etc. Depending on the results of these preliminary checks, the operator will direct shipping to the download platform. The warehouse operator will record the data on the quantity and characteristics of the waste received, the source, the delivery date and other information considered relevant.

Regarding the specific mode of operation used by the operator of the landfill, it depends on the nature of the waste accepted and must take into account: the physical state of the waste; weather conditions from storage; special requirements to avoid risks.

For urban waste storage, the technological process is as follows:

- weighing on the electronic weighing platform located at the entrance;
- visual inspection of the composition of the waste;
- unloading at the place of storage;
- spreading and compacting waste to reduce volume;
- Laying of coatings, periodically;
- weighing out of the garbage without the load.

Municipal waste disposal methods are surface storage - a relatively horizontal platform whose maximum height usually does not exceed 2.5 [m] is formed by unloading and compacting the waste. Discharged waste will be immediately flattened and compacted, with several advantages: creates the possibility of storing a larger amount of waste in the unit of volume; reduces the impact of scattering on different surfaces, the proliferation of sectors, animals and birds and the occurrence of fires; minimizes short field compaction.

The storage will be in 25 [m] length and 15 [m] widths, in compact layers of 1.5 [m], over the entire length of the deposit. The length of 25 [m] was chosen to ensure efficient operation of the spreading and compacting machines and the width of 15 [m] is imposed by the width of the bulldozer blade. The daily storage area and daily storage cell will have a surface area of approx. 375 [sqm], width approx. 1.5 [m] of compacted landfill and a volume of 562 [mc]. The optimum compaction rate will reach approx. 0.8 + 0.9 [t / mc]. In order to ensure the best stability of the body of the deposit and to allow infiltration of precipitation water to the drainage system, the layout of the cells will be interwoven, such as bricks in a masonry.

Closure of the deposit is carried out in stages, as it is exploited. The closure plan of the warehouse will be as follows:Temporary closure of outdoor slopes as a compartment has reached the fill rate by covering with a layer of earth (high permeability or inert waste from shredded constructions). Access berms on a 10 to 10 [m] height deposit will be made; After completing the filling phases II and III and when the final filling quota has been reached, the deposit is permanently closed.

The final closure technology will go through the following stages: energetic compaction of the last litter; laying the shape layer; laying of sealing layers; the implementation of the horizontal transport system for biogas; sowing the entire surface with a mixture of perennial herbs; installation of warning signs.

Conclusions

1. Waste management is one of the major issues facing Romania in terms of environmental protection. This concerns the collection, transport, treatment, recovery and disposal of waste.
2. SC POLARIS M HOLDING S.R.L. - is a privately owned company, which carries out

services for collecting and transporting household and inert waste from the population, economic agents and institutions, street sanitation, serving the municipality of Tg-Jiu.
3. The characteristic of household waste is heterogeneity, with large variations from one locality to another, depending on the season, geographical location, degree of development, specificity and level of living.
4. The Tg-Jiu household waste deposit is located in the western part of the city, at the point named *Head of the hill* at a distance of about 4 km from the city.
5. Waste treatment is a set of physico-mechanical, thermal, chemical or biological processes related to the processing of waste in order to reduce environmental risk factors, to reduce storage facilities and to exploit them. Household waste is used for biological treatment.
6. In Romania, incineration of waste is not a common practice for the treatment or disposal of household waste, currently incinerators for thermal treatment of solid household waste are not in operation.

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