CONTROLLED WASTE STORAGE AND MONITORING IN THE NON-HAZARDOUS WASTE LANDFILL IN GHIZELA COMMUNE

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Abstract. *Nowadays, the need of efficient methods of waste disposal and further treatment are required most than never, due to high rate of worldwide usage of primary matter and resulting waste. This matter is also strongly linked to the ecosystem challenges and healthcare problems, raising serious challenges all around the world. The negative impact on the environment and human health still represents a risk to human health as a result of waste disposal related to inappropriate methods and technologies for waste handling, Sustainable development is conditioned by environmental protection and waste management plays an important role in the concept of sustainable development. Even if waste does represent one of the most important source of pollution, but properly managed, it can also be used as a source for secondary raw materials, with the proper management. By landfill we mean a site for the final disposal of waste by landfill or underground. Final disposal of waste, if the waste cannot be recovered, it must be disposed of safely for the environment and human health, with a strict monitoring program. At EU level, municipal waste is treated by landfill (38%), incineration (22%), recycling (25%) and composting (15%). Actual situation in Romania, still has to deal with storage as the dominant method for waste disposal. Controlled storage is widely used in the world and remains the main system for storing and neutralizing household waste until processing systems for the selection and recovery of materials and potential energy will develop and gain priority in their application. The current legislation on the development of waste storage, leads to the progressive reduction of recyclable waste.. This paper describes the activity of controlled waste storage and monitoring system in the landfill of non-hazardous waste in Ghizela commune, Timiș county.*

Keywords: *controlled storage, landfill, storage cells, geotextile, geomembranes, leachate, monitoring*

INTRODUCTION

Improper waste disposal, including landfill dumping and unregulated incineration, poses severe environmental threats. Landfills contribute to soil and water pollution, emitting harmful gases and leachate that can contaminate groundwater (HOORNWEG, D., BHADA-TATA, P., & KENNEDY, C., 2013).

As result for being a part of European Union, Romania has the responsibility adopt and apply European Union legislation regarding waste and infrastructure alignment at a similar stage to other member states, in order to improve the quality of life but also the protection of the environment. Regarding the obligations of Timiș County, they were analyzed and clarified in documents governing waste management: the Waste Management Plan for Development Region 5 West, the National Waste Management Plan and the Master Plan for Waste Management in Timiș County.

The transformation of waste into resources is an essential and fundamental process of the circular economy. Readaptation and the implementation of EU waste legislation requires implementation and application of the waste hierarchy, which prioritizes preparation for reuse and recycling and places municipal waste disposal as the last preferred waste treatment option. EU targets for treating municipal diseases and packaging waste was established to ensure concerted efforts in all Member States to climb the waste hierarchy.

Improving performance in waste management will accelerate the transition to a circular one economy and contribute to the objectives of the circular economy action plan for a

cleaner and a more competitive Europe to double the rate of use of circular materials in the EU significantly reducing total waste generation and halving the amount of residual municipal waste by 2030.

In addition, proper waste management is essential to prevent the negative impact of waste generation on the environment and health and to achieve zero pollution goals action plan on waste and marine debris. (REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, Brussels, 8.6.2023)

Regarding Glass, paper, card, plastics, cans and other metals suitable for recycling that would commonly have been disposed of as domestic waste in the past, in the present time, however there has been a legislative requirement for producers of domestic waste (other than occupiers of domestic properties) to segregate this waste (source-segregated recyclates) at source since 1st January 2014. (SAUNDERS S.)

In Timiș County, it has been established the Timiș Waste Intercommunity Development Association (ADID) trough County Counsil together with 99 other local councils aiming to achieve the integrated waste management system, having responsibilities in organizing, monitoring and managing the sanitation service. ADID organizes, monitors and manages the sanitation service of the localities within the competence of the member administrative-territorial units.

The integrated waste management system in Timiș County is a project funded by the Sectoral Environmental Operational Program (SOP Environment 2007-2013) whose objective is to protect and improve the quality of the environment and support integrated waste management projects that highlight the policy European Union. The project was completed in May 2016. The total value of the project is 162,201,736 lei, of which 112,867,811 lei from the European Regional Development Fund (ERDF) through the Sectoral Environmental Operational Program, 25,395,258 lei from the budget state and 23,938,667 lei from the Timiș County Council.

The implementation of an integrated waste management system ensures the improvement of the infrastructure for the collection, transport, storage and treatment of municipal waste but also the observance of the obligations assumed by the transposition of the EU directives in the field of waste management. At the same time, the integrated waste management system brings a number of advantages by increasing the quality of life, a healthy and clean environment throughout the county as well as creating new jobs. Through this project, the general strategy for municipal solid waste over a 30-year horizon was established.

The central warehouse in Ghizela commune is funded by the Sectoral Environmental Operational Program, and it is an objective of major importance for Timiș County. The landfill provides the local public authorities with the necessary infrastructure for the proper treatment of waste for recycling but also the diversion from landfill. In this way, the amount of waste stored is reduced, thus contributing to increasing the use of waste.

Arranged within the integrated waste management system, the Ghizela central landfill was put into use in 2012 and serves the entire county of Timiș. The owner of the activity is the Timiș County Council and the operator is S.C. RETIM Ecologic Service S.A. Regarding the landfill of waste, the activity takes place exclusively within the landfill of non-hazardous waste Ghizela. At present, all non-compliant landfills that have served Timiș County have been closed. The Ghizela non-hazardous waste landfill is located at a distance of approximately 49 km from the Municipality of Timișoara, in the suburbs of Ghizela commune, Timiș county. The access to the warehouse area is made through a 2.5 km road connected to the county road DJ 609A, in Șanovița locality.

Depending on the nature of the waste deposited, the landfills, according to H.G. no. 349/2005 (art. 4), are classified as follows:

a) Landfill for hazardous waste;

b) Landfill for non-hazardous waste;

c) Landfill for inert waste.

The Ghizela landfill is classified in class b-landfill for non-hazardous waste, CAEN code: 3821 -treatment and disposal of non-hazardous waste.

Waste accepted in the landfill must meet a number of conditions, namely:

• To be included in the list of waste accepted for storage, according to the integrated environmental permit;

• To be accompanied by the necessary documents;

• To be delivered by authorized carriers.

MATERIAL AND METHODS

The reception check is performed upon receipt of the shipment, which consists of checking the documents accompanying the shipment of waste, quantity of waste, source of origin, nature of waste, analysis bulletins if applicable and data about the carrier. A visual inspection of the waste takes place in order to comply with the transported waste with the accompanying documents, therefore the weighing of the waste and the taking of samples for the control analysis which is carried out quickly in the case of non-hazardous waste. Upon receipt of the waste, the landfill operator directs the transport to the storage area, the visual inspection being repeated when unloading the waste. Upon receipt of the waste in the landfill, the provisions of Law 211/2011 on the waste regime will be observed.

The following types of waste are stored at the Ghizela site:

• Residual waste from area 0 Ghizela, area 2 Jimbolia, area 3 Deta, area 4 Făget;

• Refusal from the Retim sorting station;

• Refusal of the Timișoara composting station;

• Refusal of the sorting and composting station within the Ghizela site;

• Stabilized material, resulting from the mechano-biological treatment of waste, intended to cover the landfill;

• Sludge from sewage treatment plants, stored only in a mixture with municipal household waste.

There are also some prohibitions regarding the following categories of waste:

• Liquid waste;

• Explosive, corrosive, oxidizing or flammable waste;

• Hazardous medical waste or hazardous waste from medical or veterinary units;

• All types of used tires;

• Any other type of waste that does not comply with the acceptance criteria, according to the provisions of annex no. 3 of GD 349/2005.

Regarding waste resulted from electronic devices as well as batteries and accumulators, it is also prohibited for those to be disposed on Ghizela site.

The main features of the landfill are:

• Total fenced area: 59.8 ha;

• Total usable area of the site (five storage cells): 35.14 ha;

• Total capacity of the landfill: 5,131,300 m³.

The landfill consists of the following areas:

• Technical area;

• Waste storage area;

• Leach retention area from the storage area;
• Rainwater retention area in the area of future waste storage cells, including the gravitational discharge pipe;
• Rainwater retention area from the technical area;
• The area of the conventionally clean water pumping station in the Timiș river, with the discharge pipe in the Timiș river;
• Temporary storage area for glass waste.

Figure 1. General view of the Ghizela non-hazardous waste landfill
Source: S.C. RETIM Ecologic Service S.A.

The technical area includes:
• The entry/exit weighing area of the trucks, composed of two weighing platforms with a maximum capacity of 60 t;
• Compost maturation and shipping area;
• Dry waste reception, sorting and shipping area;
• Wet waste reception and sorting area;
• Coating material maturation area;

- Waste biostabilization area;
- Truck traffic area;
- Truck wheel washing area;
- Administrative building, laboratory and weather station;
- Equipment intervention area;
- Indoor /outdoor sewerage and pumping of contaminated water from the site;
- Transformation post;
- Water household, which includes: water supply drilling, treatment and chlorination station, storage tank and drinking water and fire pumping station;
- Sewage treatment plant from the administrative building and the localities of Ghizela and Șanovița.

The storage area was divided into five cells delimited by separation dams. The lifespan of the first cell is 5 years while the lifespan of cells 2-5 is 9 years each. The warehouse has an estimated maximum useful life of 41 years.

In the first phase, cell no. 1 was built, with an area of 7.01 ha and a storage capacity of 623,000 m³. In the initial phase only this cell was used for waste storage. The future cells, with a service life of approximately 9 years, will have a storage capacity of approximately 1,127,000 m³. The total capacity of the warehouse is 5,131,300 m³.

According to the geometric, geotechnical and hydrological characteristics of the site, the solution of making the deposit in the filling was adopted. The foundation level was established taking into account the aquifer. The waste storage area is surrounded by a dam with a height of about 3.8 m and serves as a waterproofing of the inner slopes to the landfill cell.

Storage cell no. 1 has a slope of 1% in the longitudinal plane and 3% in the transverse plane, the final slopes of the dams have a slope of 1:3 both inside and outside.

The storage cell is provided with a waterproofing system and a leachate collection system consisting of:

- Geological barrier, with a thickness of 0.5 m;
- Artificial waterproofing layer - geomembrane made of high density polyethylene;
- Protective geotextile;
- Drainage layer of gravel, with a thickness between 0.5 - 0.75 m;
- Drainage and collection pipes made of high density polyethylene;
- Separation geotextile.

The waterproofing system covers both the base of the storage cell and the inner slopes that delimit the cell.

The geological barrier made of clay is made of two layers with a thickness of 0.25 m. The geomembrane is arranged over the geological barrier and has the role of waterproofing the landfill cell. For waterproofing, the high density polyethylene geomembrane has a thickness of 2 mm. The protection of the geomembrane is done with the help of a protective geotextile over which the pipe and the drainage layer are laid. Geotextile is made of non-woven fibers of polyethylene, polypropylene or polyester stable to the action of sunlight or other climatic factors.

The site is characterized by the presence of a thick layer of clay, followed by a layer of clayey sand, which constitutes the aquifer, with a low yield coefficient.

In terms of storage requirements, waste is deposited in such a way that it has no influence on the environment and man over its entire period of operation.

Correct and orderly waste disposal consists of:

- Technical organization of storage areas;
- Visual inspection of waste delivered for unloading;

- Waste storage as compact as possible;
- Control of storage areas regarding settlements, gas emissions.

Waste that does not come from households such as sludge, dusty waste or industrial waste, is deposited only mixed with household waste, the sludge being deposited mixed with household waste in a proportion of 1:10.

The waste can only be unloaded according to the operator's instructions, all waste is visually inspected at the entrance to the landfill and at the unloading. The waste is deposited in thin layers and then compacted and when the dusty waste is discharged, it is moistened and immediately covered with other waste.

In the case of class b landfills, unloaded and compacted waste is periodically covered to avoid unpleasant odors, to avoid light scattering by wind and to avoid the appearance of birds and insects.

The purpose of covering the waste / storage cell is also to improve the appearance of the landfill. The material used for the coating may consist of solid waste, such as earth, construction and demolition waste, with a maximum thickness of 0,2 m or compost, resulting from the mechano-biological treatment of waste considered as a wet fraction resulting from the dual collection of to the population.

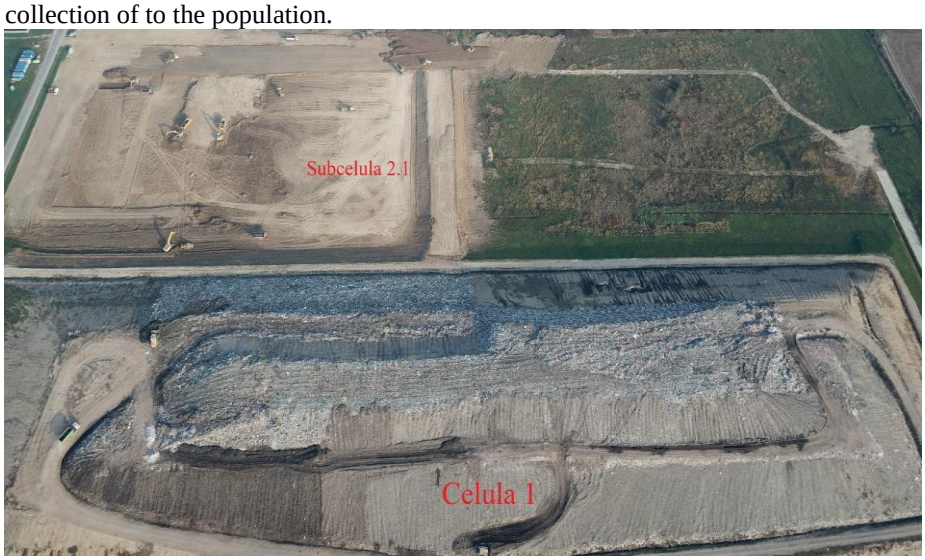

Figure 2. Storage of waste in separate cells
Source: S.C. RETIM Ecologic Service S.A.

After complete filling, the storage cell is leveled and then the waterproofing layer is applied immediately. For non-hazardous landfills, a temporary cover is first provided, during the period when the highest settlements take place (3-5 years). As for the soil layer, it must have a thickness between 30 and 50 cm and it looks like grass.

Currently, storage cell no. 1 is in the closing procedure. Design and execution of cell no. 2 has the deadline for completion in April 2018. In cell no. 2, subcell 2.1 was designed, completed and received, which can be used for waste storage, which allows the start of the procedures for closing the storage cell no.1. Due to the closure of storage cell no. 1, a biogas recovery plant resulting from the landfill would be required.

RESULTS AND DISCUSSIONS

For this specific site, Ghizela non-hazardous waste landfill is intended for the storage of household and other similar waste types from the entire territory of Timiș County.

During 2015, the following types of waste were received at the landfill of non-hazardous waste, with the related quantities according to the following table:

Table 1

Quantities of waste at the level of 2015

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	408,84	542,08	403	496,9	555,4	478	1326	1136	875	906	875	1205
170504	396,78	494,16	491,9	507,4	636,2	410	531,4	891	945	834	674	1876
190112	18,30	12,4	9,64	10,6	10,38	10,2	10,36	15,42	10,44	13,58	16,34	16.4
190805	293,98	370	503,5	382,7	503,2	574	522,8	471	462	324	397,7	451
191212	313,12	799,28	1209,4	2033	1901	1504	2284	1477	1951	1764	959	415
190703	0	0	0	0	0	0	0	0	0	0	25,9	8,26
200139	4,52	7,44	4,52	0	0	0	0	0	0	0	0	0
200138	0	0	35,98	20,62	19.64	0	19,6	0	0	0	20,84	0
200128	7,62	0	10,18	12,56	0	10,24	12,44	0	9,8	0	9,52	0
200111	0	0	0	0	0	0	0,20	0	0	0	0	0
200302	57,92	65,44	61,44	57,46	53,38	59,84	56,6	62,58	51,26	68,98	53.78	55,7
200303	1192,8	1229,5	4759,9	2054	2433	2696	2411	3545	3037	4188	3231	3088
200301	11855	11876	10049	9575	9428	11007	10948	10467	9887	9769	10562	13012
200399	0	0	0	5,32	5,28	12.68	5,86	0	5,52	5,44	0	4,66

Source: S.C. RETIM Ecologic Service S.A.

During 2016, the following types of waste were received at the non-hazardous waste landfill, with the related quantities according to the following table:

Table 2

Quantities of waste at the level of 2016

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	550	740,02	1362,3	1336,3	1267,7	1002,2	1285,3	1351,3	1258	1368	1248	790
170504	417	504,2	517,88	1531,6	1054,1	911,5	1301	1310,2	1296	863,5	804,6	979
190112	10,76	17,62	17,3	16,72	112,94	2,18	24,38	13,66	13,8	2,28	34.94	19,48
190703	55,46	56,82	30,78	39,92	127,2	204,18	198,46	64,12	42,16	33,44	41,86	31,18
190805	400,9	412,32	571,36	501,6	389,5	399,24	399,1	480,16	447	371,4	314	31,80
191212	576,44	472,04	1427	1393	1021,7	878,68	236,6	35,9	1221	1345	1334	610
200108	10,54	0	0	0	0	0	0	0	0	0	18,68	36,1
200128	0	0	0	0	0	14,26	0	0	14,42	8,78	0	0
200138	0	0	0	13.18	0	0	0	0	43,76	0	17	0

200201	0	0	0	0	0	0	28,02	0	0	204,2	133,5	0
200301	11943	12415	12079	11215	12975	13870	16187	17697	12613	11742	12781	12794
200302	27,44	38,96	41,6	40,58	65,74	69,74	36,98	45,26	14,92	56,92	58,58	57,44
200303	549,58	702,62	1203,4	4841,8	764,35	2065,7	1971,6	2267	2029	2930	3654	2556
200399	5,28	5,52	5,16	5,5	5,64	6,08	99,4	231,32	103.1	114,94	40	109,2

Source: S.C. RETIM Ecologic Service S.A.

During 2017, the following types of waste were received at the non-hazardous waste landfill, with the related quantities according to the following table:

Table 3

Quantities of waste at the level of 2017

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	693,06	1219,6	1449,4	387,96	1026,7	1659,6	1705,1	1661	1244,8	1545	1022	1020,6
170504	136,9	689,92	1287	1553,2	1493,3	668.8	839,5	898	560,4	920,5	1036,2	409,28
190112	15,2	27,34	15,14	20,64	12,06	10,44	7,86	10,26	12,86	11,52	7,9	8,54
190703	0	0	0	0	0	0	0	0	0	0	0	0
190805	13,84	167,66	351	278,5	380	248,52	208.86	83,56	34,76	69,06	0	0
191212	574,04	761,86	866,38	159	974	1374,2	1215,5	1175,9	423,46	1033	959,74	1020,8
200108	17,14	22,54	3,62	0	0	0	0	0	0	0	0	0
200128	0	0	0	0	4,96	0	13	0	0	0	0	0
200138	0	0	0	17,2	0	23,38	19,84	0	10,92	10,86	0	0
200201	11,36	39,6	99,68	0	0	25,58	8,14	0	0	0	9,74	0
200301	10082	10525	14540,6	14503	13304	10923	12949	14577	15690	12984	13100	13324
200302	45,5	28,48	12,22	8,5	8,38	7,94	9	26,52	11,36	25,28	7,1	18,34
200303	501	1448,2	1885,8	2156	1146,2	919,34	795,4	949	931,5	3790	3190,8	941,6
200399	0	0	85,92	0	0	0	0	0	90,54	0	0	0

Source: S.C. RETIM Ecologic Service S.A**.**

In the following tables are some estimations made for 2020 – 2022 period, as the interval is much closer to present situation. Due to the lack of information from 2017 until present, the following values presented in tables below are approximated with 10% less than the last official data during 2015 – 2017. The estimation is made on the basis of last census performed in 2022. As a conclusion, according to the last census performed in 2022, the number of people living officially in Timis county and mostly in Timisoara (the biggest city in Timis county) has been lessened, according to www.tion.ro and I quote:" For Timiș county, the situation is not pleasing. The county lost 33,007 inhabitants compared to the 2011 Census" and also "From a population of 319,279 inhabitants in 2011, Timișoara now officially has only 250,849 inhabitants." (source: www.tion.ro).

Therefore, the first year of reference is 2020, and the following types of waste that were received at the landfill of non-hazardous waste, with the related quantities, are displayed in the following table:

Table 4

Quantities of waste at the level of 2020

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	367.95	487.87	362.7	447.21	499.8	430.2	1193	1022	787.5	815.4	787.5	1085
170504	357.10	444.74	442.71	456.66	572.6	369	478.3	801.9	850.5	750.6	606.6	1688.
190112	16.47	11.16	8.676	9.54	9.342	9.18	9.324	13.87	9.396	12.22	14.706	14.76
190805	264.58	333	453.15	344.43	452.8	516.6	470.5	423.9	415.8	291.6	357.93	405.9
191212	281.80	719.35	1088.4	1829.7	1710	1353	2055	1329	1755	1587	863.1	373.5
190703	0	0	0	0	0	0	0	0	0	0	23.31	7.434
200139	4.068	6.696	4.068	0	0	0	0	0	0	0	0	0
200138	0	0	32.382	18.558	17.67	0	17.64	0	0	0	18.756	0
200128	6.858	0	9.162	11.304	0	9.216	11.19	0	8.82	0	8.568	0
200111	0	0	0	0	0	0	0.18	0	0	0	0	0
200302	52.128	58.896	55.296	51.714	48.042	53.856	50.94	56.322	46.134	62.082	48.402	50.13
200303	1073.5	1106.5	4283.9	1848.6	2190	2426	2170	3190	2733	3769	2907.9	2779
200301	10669	10688	9044.1	8617.5	8485	9906	9853	9420	8898	8792	9505.8	11711
200399	0	0	0	4.788	4.752	11.41	5.274	0	4.968	4.896	0	4.194

During 2021, the estimations are as follows:

Table 5

Quantities of waste at the level of 2021

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	495	667	1226.1	1202.7	1141	901.98	1156.8	1216.2	1132	1231.2	1123	711
170504	375.3	453.9	466.1	1378.	948.69	820.35	1170.9	1179.2	1166	777.15	724.1	881.1
190112	9.684	15.86	15.57	15.048	101.65	1.962	21.942	12.294	12.42	2.052	31.45	17.532
190703	49.914	51.13	27.702	35.928	114.48	183.76	178.61	57.708	37.94	30.096	37.67	28.062
190805	360.81	371.1	514.22	451.44	350.55	359.32	359.19	432.14	402.3	334.26	282.6	28.62
191212	518.796	424.8	1284.3	1253.7	919.53	790.81	212.94	32.31	1099	1210.5	1200	549
200108	9.486	0	0	0	0	0	0	0	0	0	16.812	32.49
200128	0	0	0	0	0	12.834	0	0	12.98	7.902	0	0
200138	0	0	0	11.862	0	0	0	0	39.38	0	15.3	0
200201	0	0	0	0	0	0	25.218	0	0	183.78	120.15	0
200301	10749	1117	10871	10094	11678	12483	14568	15927	11352	10568	11503	11514.6
200302	24.696	35.06	37.44	36.522	59.166	62.766	33.282	40.734	13.43	51.228	52.72	51.696
200303	494.62	632.4	1083.1	4357.6	687.92	1859.1	1774.4	2040.3	1826	2637	3289	2300.4
200399	4.752	4.968	4.644	4.95	5.076	5.472	89.46	208.19	92.79	103.45	36	98.28

For year 2022, the estimations are as follows:

Table 6

Quantities of waste at the level of 2022

Waste code	Tons / month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
170107	623.75	1097.6	1304.46	349.16	924.03	1493.	1534.6	1494.9	1120.3	1391	919.8	918.54
170504	123.21	620.93	1158.3	1397.9	1344	601.92	755.55	808.2	504.36	828.5	932.58	368.352
190112	13.68	24.606	13.626	18.576	10.854	9.396	7.074	9.234	11.574	10.37	7.11	7.686
190703	0	0	0	0	0	0	0	0	0	0	0	0
190805	12.456	150.90	315.9	250.65	342	223.67	187.97	75.204	31.284	62.15	0	0
191212	516.64	685.67	779.742	143.1	876.6	1236.8	1094	1058.3	381.11	929.7	863.77	918.72
200108	15.426	20.286	3.258	0	0	0	0	0	0	0	0	0
200128	0	0	0	0	4.464	0	11.7	0	0	0	0	0
200138	0	0	0	15.48	0	21.042	17.856	0	9.828	9.774	0	0
200201	10.224	35.64	89.712	0	0	23.022	7.326	0	0	0	8.766	0
200301	9073.8	9472.5	13087	13053	11974	9830.7	11654	13119	14121	1169	11790	11991.6
200302	40.95	25.632	10.998	7.65	7.542	7.146	8.1	23.868	10.224	22.75	6.39	16.506
200303	450.9	1303.4	1697.22	1940.4	1031.6	827.41	715.86	854.1	838.35	3411	2871.3	847.44
200399	0	0	77.328	0	0	0	0	0	81.486	0	0	0

In Romania, the current legislation is structured in many government decisions and various acts of law regarding environment matters. The way of management for waste is regulated in H.G. no. 856/2002 and applied also at Ghizela waste storage site. Waste types that are regulated in above legislation and approved for Ghizela site are as follows:

- 17 01 07 mixtures of concrete, bricks, tiles and ceramic materials;
- 17 05 04 earth and stones;
- 19 01 12 burning ash and slag;
- 19 07 03 leached from landfills;
- 19 08 05 sludges from urban wastewater treatment
- 19 12 12 other wastes (including mixtures of materials) from mechanical treatment of waste;
- 20 01 08 biodegradable waste from kitchens and canteens;
- 20 01 28 paints, inks, adhesives and resins;
- 20 01 38 wood;
- 20 02 01 biodegradable waste;
- 20 03 01 mixed municipal waste;
- 20 03 02 waste from markets;
- 20 03 03 street waste;
- 20 03 99 municipal waste, without other specification.

For the monitoring of the landfill, two types of actions are taken into account, namely: supervision by the competent bodies with control attributions, as well as self-monitoring.

Self-monitoring involves monitoring emissions and the quality of environmental factors, technological monitoring and post-closure monitoring of the landfill, the responsibility of the company that must own this well-developed system and bear its costs.

Regarding emissions, the process is strictly supervised by accredited laboratories or even through laboratory existing on Ghizela site.

On site, permanent access to groundwater sampling and monitoring points is ensured through three monitoring boreholes, as well as waste storage areas.

The actual condition and operation of the landfill, is verified through technological processes, aiming to determine the degree of settlement and stability of the landfill, the behavior of slopes and dams, but also the application of measures to prevent loss of stability by proper disposal of waste.

Environmental factors regarding quality, are monitored depending on the nature of the indicators followed and the way of monitoring:

- Meteorological data are monitored daily;
- Leaching is monitored monthly;
- Possible gas emissions at atmospheric pressure, monitored monthly;
- Groundwater level and composition, monitored every six months;
- The topography of the warehouse is monitored annually.

All recorded results are processed and submitted to the competent authorities for environmental protection in order to verify compliance with the operating conditions but also to comply with the established limit values.

Lifespan for Ghizela non-hazardous waste landfill regarding storage capacity, is of approximately 41 years. The post-closure follow-up period is at least 30 years provided that the deposit is stable and does not present a risk for environmental factors.

Romania in legislation also requires post-closure monitoring according to Annex no. 4 of H.G. 349/2005, including:

- Quantitative and qualitative determination of leachate;
- Quantitative and qualitative determination of storage gas;
- Recording weather data (precipitation, temperature, wind);
- Groundwater analysis from monitoring wells;
- Analysis of discharged rainwater;
- Determining the concentrations of specific indicators in the ambient air in the area of influence of the deposit;
- Determination of specific soil pollutants in the area of influence.

At half-yearly intervals, inspections of the decommissioned warehouse will be performed and the condition of the vegetal layer and the state of the drainage system will be monitored.

The results of the post-closure monitoring activity are kept in the Operating Register throughout the program and its closure according to the legal provisions.

CONCLUSIONS

- The need for improving everyday life quality and to provide actual protection for environment is really important and Romania must implement the European Union legislation on waste and align its infrastructure with the other Member States;
- For Timiș County, it has been established the Timiș Waste Intercommunity Development Association (ADID) trough County Counsil together with 99 other local councils established aiming to achieve the integrated waste management system, having responsibilities in organizing, monitoring and managing the sanitation service;
- The integrated waste management system that was established, in Timiș County the necessary infrastructure was provided for the collection, transport, storage and proper treatment of waste, as well as the diversion of recyclable waste;

• The Ghizela landfill for non-hazardous waste was put into use in 2012, it is made through the integrated waste management system and financed by the Sectoral Environmental Operational Program;

• The compliant, ecological landfill from Ghizela is classified in class b-non-hazardous waste landfill, the waste storage activity in the county being carried out exclusively within it, having an estimated exploitation time of approximately 41 years;

• Through the rigorous methods of waste handling, such as orderly storage, compaction and periodic coverage, the landfill did not raise any problems on the environment and human health;

• For deposited waste on Ghizela site, it can be noticeable that there is a decrease in overall quantities for year 2017 compared to 2015-2016, which highlights the efficiency of implementing an integrated waste management system and selective collection;

• For 2020-2022 period, based on the estimations made taking into account the recent Census in 2022, the situation is not far from similar, highlighting the fact that in 2022 the amount of overall deposited waste was a bit lessened that 2020-2021 period, concluding again that Ghizela still has an efficient way for waste handling.

• For non-recyclable waste or waste which cannot be energetically exploited, it needs to be implemented the controlled disposal method, continuously reducing the quantities.

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