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Uralsk municipal solid waste disposal

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Abstract. Currently, there is an increase in household waste due to the large population growth. To effectively manage the generation of solid domestic waste, it is necessary to know the rate of waste generation and their composition. According to these parameters, the test site of the city of Uralsk was investigated. The study proposed alternative solutions to the problem of solid waste disposal using new technologies.

1. Introduction

Environmental issues associated with waste generation are part of social change in which household waste plays an important role [1]. Waste discharged into a municipal solid waste management system can be managed in several different ways: it can be directly disposed of, recycled, reused, or treated before being disposed of, recycled or reused [2-3]. Recycling includes recycling waste for use in the manufacture of a new product. Reuse either of waste means reusing it directly or after repair or improvement. Finally, source reduction includes first the elimination of waste. Humans have been disposing of waste since the creation of the species. Initially, this meant dropping the object now when it became a retreat, in time and space. Where human settlements developed, disposal became more and more difficult. The waste had to be disposed of by incineration and / or sedimentation at a remote location.

In our time, high population density, high waste generation and characteristics of toxic waste have led to the need for complex technologies [4-6]. Growing concern for the environment, food and feed shortages, and rising oil prices have stimulated interest in new ways of producing more bioenergy. Interest is growing rapidly in converting agricultural and industrial waste into commercially valuable products. Waste disposal and environmental pollution, especially in recent years, are inextricably linked. In the early stages of combating the formation of solid waste, efforts were directed towards harmless treatment (disposal of solid waste by recycling, composting, converting waste to energy and sanitary disposal). Recently, according to scientists, with the rapid economic growth and urbanization in China, the production and management of municipal solid waste (MSW) are becoming one of the main social and environmental problems [7-14]. Since the reform and opening in 1978, per capita income in China has increased every year. However, pollution and waste generation are also on the rise. According to the Chinese statistical Yearbooks, the volume of solid waste production in 1997 was about 109 million tons, and in 2011, it reached about 164 million tons, an increase of almost 50% [15].

The current problems in developing countries are in the choice of the most suitable territory for the disposal of solid household waste [16]. Increased urbanization and increased use of single-use products in recent decades have resulted in spontaneous landfills. Currently, world cities generate about 1.3 billion tons of solid waste per year [17]. It is expected that by 2025 this volume will increase



to 2.2 billion tons, and by 2050 - up to 3.40 billion tons annually [18]. All over the territory of Kazakhstan, landfills are subject to space monitoring. The Ministry of Energy has signed an agreement with JSC "NC "Kazakhstan Garysh Sapary" on space monitoring of natural dumps in the country. For example, on the territory of Uralsk and two adjacent districts, 503 spontaneous dumps were recorded by space imagery. From 2019 in accordance with Art. 301 of the Environmental Code, it is prohibited to dispose of plastics, plastic, polyethylene, waste paper, cardboard, waste paper, mercury-containing lamps and cullet devices, scrap non-ferrous and ferrous metals, lithium, lead-acid batteries, electronic and electrical equipment at landfills for solid waste (solid household waste).

From January 1, 2021, a ban on the disposal of food and construction waste on solid waste will be introduced. "A year ago, the tariff was approved, which was calculated for 2016. During this time, everything has risen in price. 195 tenge is now the tariff in Uralsk for one person. In Almaty, for example, 550 tenge per individual. Only with a good tariff, you can build this business," the entrepreneur concluded [19]. The biggest headache for local authorities is the village dumps. According to the Department of Ecology, there has never been any project documentation for their construction. As a rule, this is not a fenced or bounded plot of land to which household waste is disposed of. Disposal technology is not followed, there are no own quarries of soil. At the same time, out of 318 official solid waste landfills in the region's districts, only 247 have permission from akimats to allot land plots. The operators of the landfills are the district utilities, but they do not have technicians to service these facilities. Landfills are trying to transfer to a competitive environment, but entrepreneurs bypass them due to its economic disadvantage. It is necessary to build at least three new landfills in the region, and this task is still entrusted to the local executive bodies - to organize measures to reduce biological waste, including measures for composting them, and producing biogas. The way out is to give all the landfills to the business.

In European countries, already at the stage of packaging production, a waste management system begins to work. The manufacturer is initially responsible. It includes the cost of disposal in the cost of packaging, and the state obliges the manufacturer to dispose of this packaging. That is, the company manufactures goods and already plans and knows how it will dispose of this packaging or how it will be accepted by the population. Thus, solid waste and its disposal is one of the major problems in developing countries that require environmentally friendly processing methods.

2. Materials and methods

The following main works are used at the landfill: reception, storage, compaction and isolation of waste. Waste is received in an unconsolidated state. Waste storage method is applied - "thrust". With this method, waste is stacked in layers; the height of waste storage should not exceed 2 meters. The shifting and compaction of waste is carried out by a heavy bulldozer weighing 12-16 tons. Compaction of waste is carried out in layers of 0.5 m and is achieved by two-, four-fold passage of the bulldozer in one place, i.e. each subsequent track of a caterpillar overlaps the previous one by $\frac{3}{4}$ of the track width. The compacted layer of waste is isolated with a layer of soil 0.25 m high.

The procedure for the acceptance and classification of wastes accepted for disposal are established by the landfill owner and agreed with the authorized body in the field of environmental protection ("Environmental Code of the Republic of Kazakhstan" dated 09.01.2007, No. 212-III LPK).

3. Results

To effectively plan the infrastructure for solid waste management, it is necessary to know the amount of generated waste and its composition. This article presents the results of a study carried out in the city of Uralsk in order to determine the rate of generation of solid household waste and the composition of waste based on scientific research, as well as to determine the corresponding socio-economic parameters.

Waste incineration is not allowed on the landfill site, measures must be taken to prevent spontaneous combustion of waste. The organization of work on the reception, storage, compaction and

isolation of waste is determined by the technological scheme and the operating schedule of the landfill, approved by the director of the enterprise.

Waste storage is carried out in specially equipped places (sites, warehouses, storages) for the period established by the design documentation for each type of waste for the purpose of subsequent disposal, recycling or final disposal. Landfills for solid waste disposal belong to the 3rd class. Waste disposal is carried out at specially equipped landfills.

The place of long-term storage of waste is the place of its permanent placement with possible subsequent movement and (or) with the need for constant monitoring of their impact on the environment. Long-term waste storage facilities are subject to environmental requirements that are established for landfills, while the technical capability for their extraction, transportation, subsequent disposal or final disposal must be provided.

Disposal of wastes containing persistent organic pollutants provided for by international treaties of the Republic of Kazakhstan on persistent organic pollutants is prohibited. The export and import of such waste is permitted only for the purpose of its destruction.

So much municipal solid waste (MSW) has accumulated in Kazakhstan that since 2019, the authorities have banned the disposal of plastic, paper and glass at landfills without preliminary sorting. With this measure, the Department of Energy is trying to increase the level of waste recycling and introduce separate waste collection among the population (table 1).

Table 1. The rate of formation and composition of solid waste in Uralsk.

Name	Formation rate, kg / day	Average density, t / m ²	amount	
			%	t / year
Paper, cardboard	4.7	0.06-0.09	35	40700
Food waste	3.1	0.31-0.5	28	26400
Wood, branches, wooden packaging	0.6	0.17-0.19	6.9	5390
Metals	0.5	0.18-0.39	2.4	4830
Leather, rubber	0.2	0.18-0.23	1.5	1650
Textile	0.7	0.17-0.22	5.5	6050
Glass break	0.7	0.37-0.52	6.5	6050
Polymer materials	0.7	0.01-0.1	5.3	5830

There are no plastic products in the composition of MSW, since at present special metal containers are installed to collect this waste. The largest percentage of solid waste is in paper and food waste.

In Uralsk, the construction of a waste recycling plant began, but due to a lack of funds, construction was suspended, only a waste sorting workshop is operating on the territory of the landfill, where 300 jobs are involved.

The solid waste landfill in Uralsk was transferred to the trust management of ICNRecycling LLP for a period of 10 years. On February 16, 2019, a waste sorting line was launched at the landfill. The cost of the project is -1.7 billion tenge (investor funds). The project implementation period is 2017 - 2023. There are 16 private business enterprises in the region (OralTazaService LLP, Talap JSC, Antey LLP, TuranPromResurs LLP, Guber FE, Kama Center LLP Glukhova FE, Kuksova FE, Borisov ", LLP" Gamma Real ", LLP" Arctur ", IP VTS-Uralsk", IP "Usenova", LLP "Mega-Zhazira", LLP "Fostiss XXI"). Activities: acceptance of waste paper, cardboard and other types of paper waste, polyethylene waste, waste automobile oils and liquids, waste air and fuel filters, rubber (car tires), batteries, mercury-containing lamps and devices. According to the system of separate collection, information and explanatory work with the population is carried out on an ongoing basis with the participation of public organizations, enterprises of collectors and processors.

Currently, the approaches to resource assessment of municipal solid waste have changed. Municipal solid waste is no longer a simple mixture of different materials. This is a more complex flow of various items.

While organic components predominated in the urban waste, their disposal was not a big problem. Organic waste undergoes natural decomposition in nature, does not have toxic substances. Therefore, organic waste was not a threat.

The development of civilization changed the composition of household waste. More non-degradable components appeared: glass, ceramics, metals, rubber, plastics. More and more poisonous substances appeared: mercury, batteries, expired drugs, etc.

4. Discussion

Today, one of the alternative solutions to the problems of solid waste is the Eco-Evolution Project, which was proposed by the deputy chairman of the NGO of the Turkestan region V. Golyarko. The idea of the project is based on the sale of waste by the townspeople themselves. Entrepreneurs involved in the processing of household waste will themselves buy the sorted waste from citizens. Pilot projects have already been launched in some cities of the country, and the money raised is used by residents to improve their courtyards, and the residents' interest will be compensated for by improving the environmental situation.

5. Conclusion

Thus, the following conclusions can be drawn from the research results:

- In the context of this study, we tend to believe that it is necessary to promote the separate collection of waste. We do not have any signs or billboards anywhere that you cannot throw, for example, batteries or mercury lamps in the general trash. Although it is very dangerous. It is necessary to speak and educate ecological self-awareness from kindergartens and schools. Rely on a new generation of eco-responsible people.
- We also came to the conclusion that determining the rate of waste generation leads to the need for sorting solid waste.
- The results of the study showed that the problem of garbage, especially in large settlements, can be solved and the use of preventive measures, accompanied by administrative measures and the infusion of necessary investments with the support of local authorities, in the disposal of garbage will help reduce the formation of spontaneous dumps.

References

- [1] Al-Khatib I A, Monou M, Abu Zahra A S F, Shaheen H Q and Kassinos D 2010 Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district e Palestine. *Journal of Environmental Management* **91** 1131–1138.
- [2] Melosi M V 2005 Garbage in the cities: refuse, reform, and the environment. *University of Pittsburgh Press* **25** 103
- [3] Vesilind P A, Worrell W and Reinhart D 2002 Solid waste engineering. *Brooks/Cole, Pacific Grove* **35** 259
- [4] Iriarte A, Gabarrell X and Rieradevall J 2009 LCA of selective waste collection systems in dense urban areas. *Waste Manag* **29** 903–914
- [5] Hackett S 2006 Environmental and natural resource economics: theory, policy, and the sustainable society. *M.E. Sharpe, Inc., Armonk* **36** 468-481
- [6] Municipal solid waste generation, recycling, and disposal in the United States: facts and figures for 2008. *USEPA 2009 United States Environmental Protection Agency* **35** 530
- [7] Li Z, Yang L, Qu X and Sui Y 2009 Municipal solid waste management in Beijing City. *Waste Management* **29**(9) 2596–2599
- [8] Chen X, Geng Y and Fujita T 2010 An overview of municipal solid waste management in

- China. *Waste Management* **30**(4) 716–724
- [9] Cheng H and Hu Y 2010 Municipal solid waste (MSW) as a renewable source of energy: current and future practices in China. *Bioresource Technology* **101**(11) 3816–3824
- [10] Zhang D, Tan S K and Gersberg R M 2010 Municipal solid waste management in China: status, problems and challenges. *Journal of Environment Management* **91**(8) 1623–1633
- [11] Abduli M A, Naghib A, Yonesi M. and Akbari A 2011 Life cycle assessment (LCA) of solid waste management strategies in Tehran: landfill and composting plus landfill. *Environmental Monitoring and Assessment* **178**(1–4) 487–498
- [12] Ghanbari F, Sharee F A, Monavari M and Zaredar N 2012 A new method for environmental site assessment of urban solid waste landfills. *Environmental Monitoring and Assessment* **184**(3) 1221–1230
- [13] Che Y, Yang K, Jin Y, Zhang W, Shang Z and Tai J 2013 Residents' concerns and attitudes toward a municipal solid waste landfill: integrating a questionnaire survey and GIS techniques. *Environmental Monitoring and Assessment* **185**(12) 10001–10013
- [14] Song M, Zhang W and Wang S 2013 Inflection point of environmental Kuznets curve in Mainland China. *Energy Policy* **57**(C) 14–20
- [15] U.S.EPA 2013 Non-hazardous waste management hierarchy Retrieved from: <http://www.epa.gov/osw/nonhaz/municipal/hierarchy.html>
- [16] Kharlamova M, Mada S Y and Grachev V 2016 Landfills: Problems, solutions and decision-making of waste disposal in Harare (Zimbabwe). *Biosciences, Biotechnology Research Asia* **13**(1) 307
- [17] Orhorhoro E and Oghoghorie O 2019 Review on solid waste generation and management in sub-Saharan Africa: A case study of Nigeria. *Journal of Applied Sciences and Environmental Management* **23**(9) 1729–1737
- [18] *Solid waste management* Retrieved from: <http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-wastemanagement>
- [19] *WKO wants to attract business to waste recycling* Retrieved from: <https://kursiv.kz/news/vlast-i-biznes/2019-06/v-zko-khotyat-privlech-biznes-k-pererabotke-musora>