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PROBLEM ASPECTS OF HAZARDOUS WASTE MANAGEMENT IN A TECHNOLOGICALLY LOADED REGION

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Abstract. We have assessed the environmental risks caused by the lack of hazardous waste treatment facilities in the industrial region. We have identified such environmental threats as the release of hazardous waste into the environment, uncontrolled flows of hazardous waste that may end up in municipal landfills as household or other hazardous waste. A critical analysis of the existing modern infrastructure in Ukraine, on the basis of which hazardous waste management is carried out, was conducted. The problem of generation and disposal of hazardous waste in the Poltava region was analyzed. A list of the most common hazardous wastes, which are generated in almost all areas of activity and require disposal, was determined. Measures are proposed to reduce the anthropogenic load on t he environment by improving the existing waste management system in one of the industrial centers of the region.

Keywords: hazardous waste, management, waste disposer, environmental safety, anthropogenic impact.

1. Introduction

On July 9, 2023, the Law of Ukraine "On Waste Management" (Pro upravlinnja vidchodamy, 2022) came into force, launching a waste management reform aimed at aligning national legislation with that of the European Union. Reforming the waste management sector involves long-term changes to Ukrainian legislation, a revision of approaches based on best available techniques, and the development of infrastructure in this area. The law introduces a new permitting system, accounting and monitoring mechanisms, electronic reporting through the Waste Management Information System available on the Ministry of Environmental Protection and Natural Resources of Ukraine's online platform "EcoSystem", and multi-level planning.

Currently, regulatory acts have already been approved regarding the procedure for developing regional, local, and enterprise-level waste management plans. Regional plans are intended to identify waste disposal sites that can continue to be used and those that require reclamation, as well as to determine how many and what types of waste treatment facilities need to be constructed. Local plans include a set of interrelated tasks and measures, coordinated in terms of timing and resource provision with all relevant stakeholders, aimed at ensuring sustainable waste management in settlements within the territorial community. These plans are based on the principles of intermunicipal cooperation and are developed according to an assessment of the current state of the waste management system and previously established models. Enterprise, institution, and organization-level plans provide information on the current

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status of the waste management system at the enterprise, planning for system improvements, and monitoring of plan implementtation.

Regulatory acts (Pro zatverdzennja licenzijnych umov…, 2023; Pro zatverdzennja porjadku vydaci…, 2023; Rejestr ocinky vplyvu na dovkillja, 2024) have introduced procedures for obtaining permits for waste treatment, licensing conditions for hazardous waste management, and a standard waste accounting form via the "EcoSystem" platform. Although the services of the information system are not yet fully operational, permits such as licenses and waste treatment authorizations can already be obtainned through the "EcoSystem" platform. Additionally, registries of issued licenses and permits, the Environmental Impact Assessment (EIA) registry, and the service for issuing documents for transboundary waste shipments are accessible and functioning.

We have analyzed the implementation of the waste management reform in Poltava region using the example of the city of Kremenchuk. The analysis identified the lack of infrastructure as a major obstacle to the reform process, along with challenges related to the management of specific waste types. Possible solutions to these issues have been proposed.

2. Experimental part

2.1. Analysis of industrial infrastructure in the region

The city of Kremenchuk is considered the main industrial center of the Poltava region, playing a key role in the economic development of both the region and the country as a whole. The city concentrates major enterprises across various industrial sectors, with more than 86 industrial enterprises, 58 construction organizations of various forms of ownership, and over 16.000 business entities operating there (Vykonavcyj komitet, 2020).

Kremenchuk's industrial sector encompasses nearly all major branches of production, forming the foundation of the region's economic stability:

– Oil refining and petrochemical industry – one of the most significant sectors, responsible for oil processsing and the production of a w ide range of petrochemical products. Key enterprises include PJSC "Ukrtatnafta" and PJSC "Kremenchuk Carbon Black Plant".

– Mechanical engineering and metalworking – represented by the production of large-scale machinery, railcars, wheels, and road equipment. Major enterprises include PJSC "AvtoKrAZ", PJSC "Kremenchuk Wheel Plant", PJSC "Kryukiv Railway Car Building Plant", PJSC "Kremenchuk Foundry", and PJSC "Kremenchuk Road Machinery Plant".

– Food industry – a sector that supplies the population with high-quality dairy, meat, bakery, and confectionery products. It is represented by PJSC "Kremenchuk City Dairy Plant", PJSC "Kremenchuk Meat", SE "Kremenchuk Grain Products Plant", PJSC "Kremenchuk Confectionery Factory "Roshen", LLC "Kremenchuk Bread Plant", PE "Lukas", PE "Ilona", LLC "Marketopt", PE "Suvorov", among others.

– Light industry – includes enterprises producing textile goods and leather products such as PJSC "Kremenchuk Production and Trade Company "Kremtex", the Cost-Accounting Production Company "Ruta", and LLC "Kremenchuk Leather Plant".

– Construction industry – provides the production of reinforced concrete structures and other building materials essential for the infrastructural development of the city and the region, and is represented by the Reinforced Concrete Structures and Products Plant and the Quarry Management Enterprise.

Thanks to its unique combination of industrial traditions and an innovative approach, Kremenchuk remains one of the most important manufacturing centers in Ukraine. A powerful industrial base provides not only domestic needs, but also actively supplies products to the international market. The strategic location of the city and developed infrastructure make Kremenchuk attractive for investors and guarantee its further development as a powerful industrial center.

At the same time, the city's industry is a source of environmental pollution in the Kremenchuk region and contributes to the formation of environmental hazards (Shmandiy et al. , 2024). The high level of concentration of industrial facilities causes the accumulation of a significant amount of household and industrial waste in the city of Kremenchuk, which is an important environmental problem. The largest amount of waste in the Poltava region is generated in the city of Kremenchuk.

It is likely that a significant portion of hazardous waste ends up in containers with household waste or in unauthorized landfills, which creates additional risks to the environment and human health. This assumption

is due to the lack of a developed infrastructure in the region for the treatment of hazardous waste. Although treatment facilities are available and operational in certain regions, these capacities are not sufficient to process the waste generated throughout the country.

2.2. Current status of hazardous waste management in Kremenchuk

We conducted an analysis of existing technologies for hazardous waste management in Ukraine that could be applied in the city of Kremenchuk. The study was based on an analysis of the regulatory framework, namely, the study of domestic legislation and familiarization with international agreements ratified by Ukraine (Pro pryjednannja Ukrainy do Bazelskoi konvencii…, 1999). Changes in legislation, trends in legal regulation and its impact on the waste disposal sector are analyzed.

In accordance with the National Waste Management Strategy in Ukraine until 2030, the development of the Regional Waste Management Plan in Poltava Oblast until 2033 is underway. For the purpose of public awareness, the draft document was posted on the official website of the Poltava Oblast (Departament ekolohii ta pryrodnych resursiv…, 2024).

In 2024, regional public hearings were held on the draft regional plan, where important proposals from local government representatives were considered. But, in our opinion, in order to cover the global problems of the region, it was necessary to involve not only representatives of local government, but also representatives of polluting enterprises and waste processing enterprises in public hearings, who were to voice all pressing problems in the field of waste management.

According to the register of the Ministry of Environment of Ukraine, 34 business entities have licenses in the field of hazardous waste management, of which only a few entities process a wide range of waste. The vast majority of enterprises process only a few types of waste (Rejestr ocinky vplyvu na dovkillja, 2025). In Poltava region, there is only one enterprise that manages waste exclusively in the form of oil/water and hydrocarbon/water mixtures and emulsions.

That is, we can conclude that a number of wastes, such as oil filters, oily waste sand and rags, lead batteries, contaminated containers, roofing felt, slate, sleepers, spent absorbents, etc. are not processed in the Poltava region. This indicates that waste generated in the process of economic activity is either stored at enterprises or transferred to other regions. We believe that for a large industrial region, the lack of waste treatment infrastructure poses an environmental threat, has a negative impact on the surrounding environment, and poses a potential threat to the health and life of the population, i.e., creates an ecological hazard. The partial lack of environmental control during wartime only exacerbates this threat.

We conducted an analysis of the activities of licensed enterprises engaged in the disposal of hazardous waste. Having analyzed the register of business entities in the field of waste management, we came to the conclusion that currently only a few enterprises located in the Odessa region manage the largest amount and range of hazardous waste in Ukraine. The considerable distance to the waste management facility is a significant obstacle to the effective organization of hazardous waste disposal. In addition, the capacity of waste processing enterprises may not be sufficient to meet the needs for the disposal of the vast amount of hazardous waste generated in Ukraine. Given this, we believe that there are problems in the field of hazardous waste management that require significant attention from the community, scientists, government representatives, and investors.

Based on data from open sources, including the registers of the Ministry of Environment of Ukraine, the draft Regional Waste Management Plan in Poltava region until 2033, and the Ecological Passport of the city of Kremenchuk, we have formed a list of waste that is subject to processing and is the most common type of waste generated in the vast majority of both large and small industrial enterprises, institutions, and organizations (see Table). The optimal list of waste is usually formed based on several criteria and standards. First of all, waste is classified according to the sources of waste generation, then it is classified according to physical state (solid, liquid, gaseous) and chemical composition (presence of organic and inorganic substances, toxicity, presence of heavy metals, etc.), the hazardous properties of waste are assessed by establishing the presence of hazardous chemicals or persistent organic pollutants.

Nomenclature of hazardous waste generated at the vast majority of enterprises

No.	Waste group	Departure code	Availability of hazardous waste disposal facilities		Processing operation
			in the Poltava region	in Ukraine	
1	Waste mineral oils	13 01 09* 13 01 10* 13 01 11* 13 01 12* 13 02 04* 13 02 05* 13 02 06* 13 02 07* 13 02 08*	missing	available	R7, R9, R12, R13, D10, D13, D15
2	Waste from industrial off-gas treatment plants	10 02 07* 10 02 13* 10 03 19* 10 05 06*	missing	available	D10, D13, D15
3	Fly ash from coal-fired power plants	10 01 14*	missing	available	D10, D13, D15
4	Unsorted waste batteries	20 01 33*	missing	available	D9, D10, D13, D15
5	Waste oils/water, hydrocarbons/water in the form of mixtures and emulsions	06 05 02* 07 04 11* 12 01 06* 12 01 07* 12 01 10* 16 01 07* 16 12 23*	available	available	D9, D10, D13, D15, R9
6	Clinical and related waste	16 12 46* 18 01 10* 20 01 31*	missing	available	D10, D13, D15
7	Waste from the production, manufacture and use of artificial resins, latexes, plasticizers, adhesives/binding materials	08 01 13* 08 01 15* 08 01 17* 08 01 21* 17 08 01* 20 01 27* 08 03 12* 08 03 17* 08 04 09*	missing	available	D10, D13, D15
8	Asbestos waste (dust and fibers)	16 12 30* 17 06 05* 16 12 27* 17 06 01*	missing	available	D10, D13, D15
9	Bituminous materials	17 05 05* 17 05 07* 19 13 01*	missing	available	D10, D13, D15

The collected data indicate that there is currently an insufficient number of hazardous waste treatment facilities in the Poltava region.

The main operations for hazardous waste treatment in Ukraine include:

– D9 Physico-chemical treatment not specified elsewhere in this Annex, resulting in the formation of final compounds or mixtures which are removed by carrying out operations specified in items D1–D12 of this Annex, including evaporation, drying, calcination, etc.;

– D10 Incineration on land;

– D13 Preliminary waste treatment operations prior to disposal, including sorting, crushing, compaction, granulation, drying, shredding, conditioning, or separation;

– D15 Storage.

– Operations related to the recovery of mineral oils and oil/water mixtures may be carried out under the following recovery codes:

– R7 Recovery of components used to reduce pollution;

– R9 Oil refining or other reuse of oil products;

– R12 Preliminary operations on waste for the operations specified in items R1–R11, preliminary operations prior to recovery, including pre-treatment, including dismantling, sorting, crushing, compacting, granulating, drying, grinding, conditioning, repackaging, separating, mixing or blending prior to submission to any of the operations specified in items R1–R11;

– R13 Storage of waste prior to the operations specified in items R1–R12 (except collection operations).

2.3. Current status of non-hazardous waste management

Based on the results of the analysis of the regulatory framework, publications in scientific journals, conference materials, and interviews with specialists in the field of ecology and waste management, we found that the situation with regard to mixed household waste and non-hazardous waste is not critical. According to the register of the Ministry of Environment of Ukraine, some enterprises in the Poltava region already have permits for waste processing. After monitoring state environmental programs, we found out that measures have been developed aimed at improving existing landfills, rehabilitating unauthorized landfills, and introducing a cluster approach to waste management, which is one of the key elements of regional waste management policy. The draft Regional Waste Management Plan for Poltava Oblast until 2033 explores 3 main scenarios for the formation of optimal coverage zones (clusters) for household waste management:

Scenario 1. Division of Poltava region into 4 clusters taking into account the administrative division of Poltava region.

Scenario 2. Division of Poltava region into 5 clusters.

Scenario 3. Division of Poltava region into 6 clusters.

Based on cost assessment, comparison of alternatives, and expert recommendations, Scenario 3 was selected as the basis for development. This scenario envisions the establishment of six regional landfills in the Poltava region, based on existing landfills and dumpsites, as well as allocated land plots (in the cities of Kremenchuk and Poltava, and in the Hlobynska, Bilytska, Petrivsko-Romenska, and Pyriatynska territorial communities), along with four waste processing facilities located in the villages of Bilyky, Dmytrivka, and Tereshky, and the city of Lubny.

In Kremenchuk, the regional landfill is planned to be established on the site of the currently operating municipal landfill, which, in our view, poses environmental hazards. The landfill covers an area of approximately 28 hectares and has been in operation for over 50 years. There is no anti-filtration protection or other essential engineering safety structures in place; however, there is potential for its reconstruction and continued operation.

Although none of the existing landfills in the region currently meet environmental standards, a strategic direction for their development has already been defined. Key issues have been identified, and solutions for urgent problems in the municipal waste management sector are being developed.

We consider it appropriate to establish a sorting line or station at all r egional landfills in the Poltava region. Additionally, we propose the organization of facilities for processing bulky and renovation waste, as well as green waste treatment. The materials resulting from the shredding of plant waste will be temporarily stored in specially equipped areas until further use – either for covering waste layers within the landfill or for utilization beyond the site.

Packaging waste management (paper and cardboard packaging, glass packaging (glass bottles), ferrous metals, PET bottles, other types of plastics,

wooden packaging, aluminum cans) is the most developed area in the region. There are a certain number of business entities that collect safe secondary raw material waste in the Poltava region. These are private enterprises and individual entrepreneurs (IEPs) that have a permit to process waste, as evidenced by data from the register of the Ministry of Environment of Ukraine. The system of separate collection of resource-valuable waste in the city of Kremenchuk has been implemented and is functioning.

Therefore, it can be stated that the management of mixed household waste and packaging waste in the region is carried out properly, and the prospects for the development of this industry are clearly monitored, as indicated in the draft Regional Plan.

However, through the analysis of the activities of specialized enterprises, we found out that the ways of managing hazardous waste in the Poltava region have not been defined, and the infrastructure is missing. This creates a threat of accumulation of this waste in the places of its generation. The lack of hazardous waste treatment infrastructure in the region can result in waste being released into the environment or into landfills for non-hazardous waste as part of household waste.

3. Results and Discussion

In order to obtain comprehensive information about the current state of hazardous waste disposal technologies in Ukraine and their development prospects, we analyzed data from Environmental Impact Assessment (EIA) reports available on the official website of the Ministry of Environmental Protection and Natural Resources of Ukraine. We also examined the domestic market of proposed waste management technologies by reviewing relevant online sources, scientific journal articles, and conference proceedings.

Our analysis revealed that the companies handling the largest volumes and widest range of hazardous waste– such as UTILVTORPROM LLC (Teplodar) and UKREKOPROM LLC (Odesa) –primarily utilize thermal waste treatment units (Rejestr licenzij na zdijsnennja hospodarskoi dijalnosti..., 2025). In particular, both companies use the UT-3000D thermal incinerator, which is designed for the incineration of both solid and liquid hazardous waste (Fig. 1).

This incinerator ensures environmentally safe waste destruction through high-temperature combustion. Its capacity allows for the disposal of up to 500 kg of waste per hour, or approximately 3650 tons of waste annually. The unit's design includes the following technological components:

– primary combustion chamber (main body of the incinerator);
– secondary combustion chamber (afterburner);
– waste loading hatch;
– ash removal hatch;
– air supply system (forced-draft fan);
– burners for both the primary and secondary chambers;
– control panel.

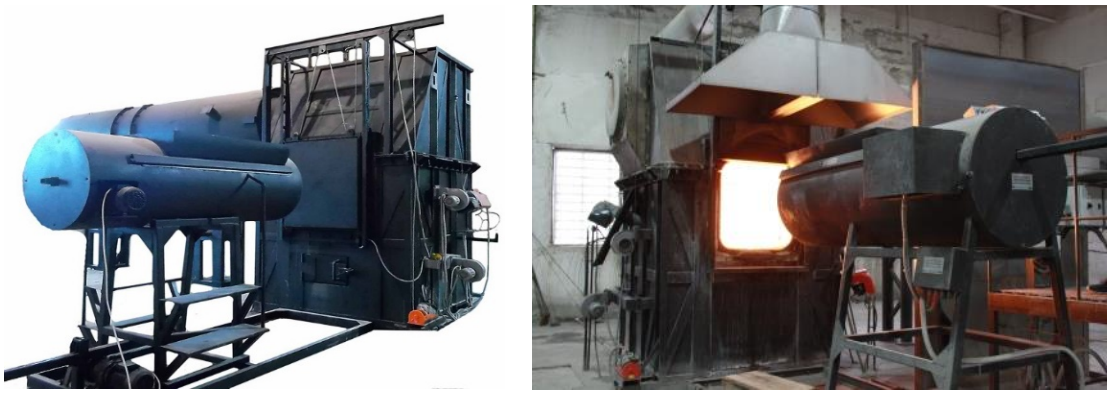

Fig. 1. Thermal waste disposer UT3000D

To prevent the formation of harmful chemical compounds such as dioxins and furans, the technological process involves rapid cooling of flue gases before they are fed into the purification system. To do this, the flue gases are mixed with the required amount of air, cooled and directed to a scrubber in a special installation. The scrubber performs a dual function, namely: it neutralizes chemical compounds formed during combustion and provides mechanical cleaning of the flue gases before they are released into the atmosphere.

In general, the flue gas cleaning system in the UT3000D may include a combination of high-temperature post-combustion, catalytic cleaning, chemical neutralization, cooling, and filtration, which ensures compliance with environmental standards and reduces emissions of harmful substances into the atmosphere.

As a result of waste incineration, ash is formed, which accumulates in special containers. After filling, their contents are taken to a landfill for further safe disposal. It is worth noting that the thermal energy released during incineration has no practical use in this technological process. The main emphasis is on environmental safety and the efficiency of emission treatment, which allows reducing the level of environmental pollution.

Thus, thanks to the use of a thermal recycler, the following waste processing operations are carried out: D15, D13, D10 (Pro upravlinnja vidchodamy, 2022).

To destroy organic waste, UKREKOPROM LLC uses a thermal waste disposer of the UT750D type, Fig. 2.

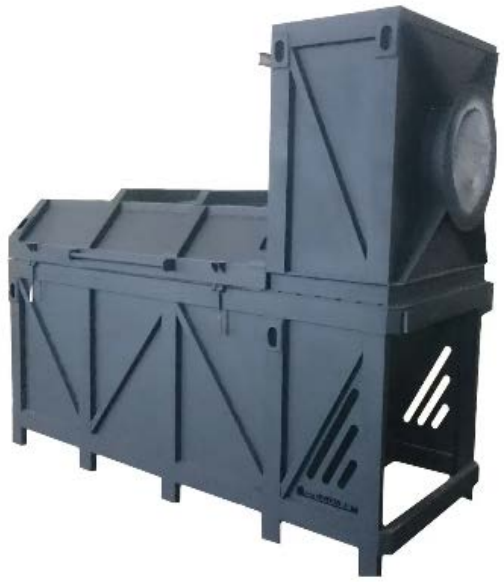

Fig. 2. Incineration plant type UT750D

The thermal incinerator provides environmentally safe incineration of waste of various origins and composition. It is capable of neutralizing animal, biological, medical, food, household, veterinary and other types of waste, and uses a similar incineration technology to the UT3000D incinerator. The combustion rate is 200–250 kg/h, which ensures the utilization of more than 4 thousand tons of waste per year. The temperature regime in the combustion chamber is maintained at 1200 °C, and in the afterburning chamber at the same temperature the oxidetion process is completed. To reduce the harmful impact on the environment, the units are equipped with droplet traps that ensure effective cleaning of flue gases. Each unit has its own gas cleaning system. The capacity of the UT750D unit is usually designed for smaller waste volumes (compared to the UT3000D), but the principles of gas purification are similar. This means that although the purification stages may be similar, the UT750D may have less complex filtration systems or a smaller number of purification process stages. Also, in each specific case, additional or alternative cleaning methods may be used depending on the specifics of the waste being disposed of.

Given the current trend to minimize emissions of pollutants into the atmosphere, the incineration of hazardous waste in high-temperature furnaces is gradually being replaced by more environmentally friendly methods, such as plasma gasification, chemical neutralization, biological decomposition and stabilization. The most promising technologies are plasma decontamination and biological treatment, as they minimize the formation of secondary toxic substances. We consider it relevant and appropriate that some scientists, in particular (Vashchenko et al., 2023), are exploring the prospects for implementing plasma technologies for the processing of hazardous waste. The possibilities of using plasma technology for the disposal of hazardous medical waste are being considered, and plasma technologies for the disposal of industrial and household waste are being investigated. The scientific group of the E. O. Paton Institute of Materials Science and Welding is developing plasma technologies for the disposal and gasification of various types of waste, which may include hazardous components. However, it should be noted that plasma gasification is a relatively new and high-cost technology and requires further research and improvement for large-scale implementation (Matveev & Heletukha, 2019).

Considering the above, we believe that today it is advisable to use thermal waste treatment. The use of this technology can satisfy the waste disposal needs of the entire region. We considered the prospect of installing 2 disposers of the type UTZ000D for hazardous waste and UT750D for animal waste on the territory of one of the operating landfills in Kremenchuk. Although plasma technology provides almost complete destruction of waste, this technology has not yet been widely implemented due to the need for long-term testing and development of mechanisms for safe use. In many countries, waste incineration in UT plants is a common and regulated method, while the implementation of plasma technology requires additional research and adaptation of the regulatory

framework. In addition, plasma technology requires high energy costs, which complicates its economic efficiency. Currently, traditional UT installations are more feasible due to the economic and technical limitations of plasma technology. However, in the long term, plasma processing may become more profitable, especially if technological breakthroughs in energy efficiency occur or equipment costs decrease.

We (Titova et al ., 2024) investigated the set of negative factors in the area of waste disposal sites using the example of the Kremenchuk municipal landfill for household waste, which has been in operation since 1965. In particular, the landfill contains a livestock burial ground, which is intended for the disposal of biological waste. It is currently almost completely filled (Ecological passport, 2020). The territory of the municipal landfill for household waste borders two industrial waste landfills (on the north side – LLC "Eco-Force" and on the south side - PJSC "Kremenchuk Steel Plant"). The municipal cemetery is located in the direction of the groundwater flow, Fig. 3.

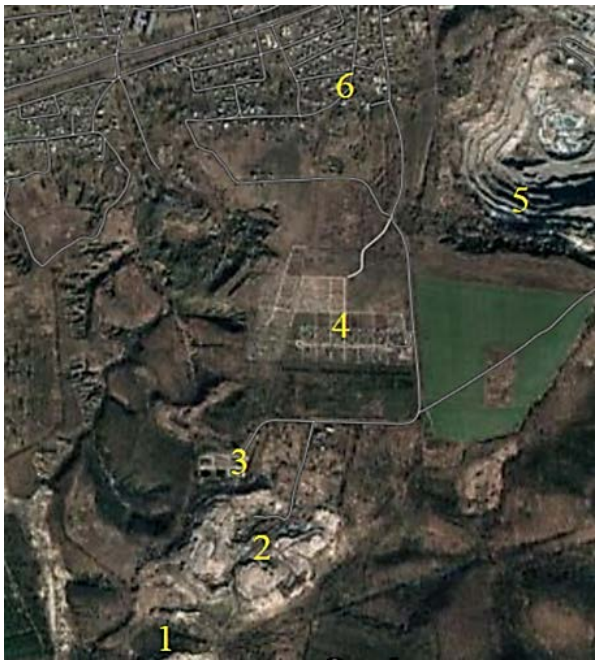

Fig. 3. Location of the Kremenchuk municipal municipal waste landfill. 1 – landfill sludge storage LISh; 2 – livestock burial ground; 3 – hazardous waste landfill; 4 – city cemetery; 5 – quarry; 6 – residential development

According to the results of environmental monitoring in the area where the above-mentioned facilities are located, periodic groundwater contamination was detected, but the concentrations of pollutants decreased significantly as the distance from the facilities increased. Due to the necessity of maintaining existing waste disposal sites and the lack of alternatives for establishing new landfills or hazardous waste management facilities, we believe that currently operating facilities are suitable for continued use, provided that certain environmental protection measures are implemented. These measures include the installation of an anti-filtration barrier and protective structures, conservation of the animal burial site, and planting of greenery, among others.

According to research on actual air pollution levels at the Kremenchuk landfill and within its sanitary protection zone, the concentrations of pollutants do not exceed permissible levels. To improve the hazardous waste management system, we consider it promising to construct a hazardous waste treatment facility on the territory of the existing hazardous waste landfill.

Based on the environmental impact assessment of UT-3000DP and UT-750D incineration units (Zvit, 2025), it was found that the actual concentrations of pollutants in the ground-level atmosphere are below the maximum permissible concentrations, indicating that no excessive negative impact on environmental components is expected from such operations.

It can be assumed that installing the above-mentioned waste incineration units at the studied landfill will have minimal environmental impact, and will reduce the risk of soil and water contamination. However, this assumption requires further analysis, as in practice the equipment may operate under conditions deviating from design specifications, and other toxic substances (e.g., dioxins, furans, heavy metals) may be generated during incineration that are not always accounted for in project calculations. Moreover, the cumulative effect of such pollutants needs careful study.

To draw a precise conclusion, it is advisable to conduct modeling of actual pollution dispersion and a comprehensive environmental risk assessment.

Given the lack of alternatives, we believe that the only viable solution for waste management in the region at present is the reconstruction of existing treatment facilities and the expansion and modernization of hazardous waste processing infrastructure.

Considering economic, environmental and social aspects, we have justified the feasibility of installing hazardous waste disposers of the UT3000DP and UT750D type on the landfill territory. The grounds are the following key arguments:

1. Reducing the volume of waste and, accordingly, reducing the need to create new landfills or expand existing ones.

2. Reducing the level of pollution that occurs as a result of the natural decomposition of waste, which is accompanied by the formation of methane, dioxins, furans and other harmful substances. Incineration in high-temperature chambers allows you to neutralize toxic substances, preventing environmental pollution.

3. Controlled process of hazardous waste disposal, which increases the safety of landfill operations.

4. Reducing the costs of transporting and storing waste, which contributes to more efficient use of resources.

5. Compliance with environmental and sanitary standards, which minimizes the risk of penalties from regulatory authorities.

6. Improving the sanitary situation in the surrounding areas: reducing unpleasant odors, air and groundwater pollution, and preventing the spread of rodents, insects, and infections.

7. Implementation of modern recycling technologies, demonstrating a responsible attitude towards the environment and society.

8. The possibility of obtaining environmental certificates, which opens up prospects for state funding and international grants.

9. Easy integration of equipment that does not require complex infrastructure and can operate on gas or diesel fuel.

10. Creating new jobs, which contributes to the development of the local economy.

Ash and slag produced by incineration of waste may contain toxic or harmful substances, especially if the waste contains hazardous or chemically active components. Therefore, such waste is often classified as secondary hazardous waste that must be disposed of. An important factor when choosing a location for waste disposal facilities is the availability of an operating waste landfill. Waste generated during the incineration process can be disposed of at the site of its generation, which eliminates the problem of removing residues from incineration and transporting them to other regions.

Of course, despite all the advantages of using waste disposers, there are certain disadvantages that should be taken into account when making a decision about their installation. These include: significant capital expenditures for site equipment, purchasing a waste disposer, laying communications; operating costs; flue gas cleaning, obtaining permits, and generation of ash and slag.

4. Conclusions

Summarizing the results of the research, we state that to ensure the implementation of measures within the framework of the reform in the field of waste management, it is necessary to create hazardous waste processing facilities. We consider it advisable to install waste incineration plants in the city of Kremenchuk on the territory of the existing hazardous waste landfill for the following reasons:

1. The city of Kremenchuk is a p owerful technogenically loaded center of the Poltava region, which generates the largest amount of hazardous waste that requires disposal.

2. Availability of a land plot that meets the requirements of environmental legislation for the construction of a waste treatment facility, namely: sufficient distance to residential development, location within the city limits, availability of access roads, availability of a la ndfill for the disposal of residues from waste incineration.

3. Operation of a h azardous waste treatment facility (incineration plant) will reduce the amount of waste that ends up in a hazardous waste landfill.

4. The issue of animal waste disposal will be resolved, making it possible to conserve the animal burial site located in the center of the landfill, which occupies a significant area.

The installation of waste incinerators will not only significantly reduce the volume of waste, but also create a controlled system of its disposal that will meet modern environmental standards and the basic principles of reforming this sector. We believe that for the successful implementation of the project, it is necessary to involve local governments as key partners who can help create favorable conditions for the implementation of the latest environmental technologies.

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