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TECHNOLOGY OF TECHNOGENIC DEPOSITS DEVELOPMENT IMPROVING

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ВДОСКОНАЛЕННЯ ТЕХНОЛОГІЇ РОЗРОБКИ ТЕХНОГЕННИХ РОДОВИЩ

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СОВЕРШЕНСТВОВАНИЕ ТЕХНОЛОГИИ РАЗРАБОТКИ ТЕХНОГЕННЫХ МЕСТОРОЖДЕНИЙ

Abstract. As a result of long period of preparation factories operation sludge collectors that are large in size and depth were formed. Content of sludge collectors as a result of technological and geomechanical processes is divided into mineral raw materials concentration that can be re-preparated in certain places. Sludge collectors development is made as a rule for the formation of free capacity for newly generated wastes storing. It does not take into account the location of the places of mineral raw materials concentration and wastes that were generated after re- preparation are placed into the sludge storage again.

In the article improved technological schemes of content extract and preparation wastes content pre- preparation, of the use of generated wastes and of the process water purification are given for conditions of a sludge collector operation finish.

The proposed schemes of mineral raw materials extracting from the sludge collector and their preparation in the semiportable, cleaning pre-enrichment complex represent as a complete eco-targeting cycle of rational nature using and environmental situation improving.

Keywords: sludge collectors, wastes content, re- preparation, water purification, resource intensity increasing, environmental situation improving.

Introduction. Sludge and tailings storages are an integral part of the preparation factory because the liquid component of wastes (pulp) of the process of minerals preparation is dumped into them. Pulp line represents as a pipeline between the preparation factory and sludge collectors with several fixed places of pulp discharge at the dam. The pulp in the pulp line is given under the pressure to eliminate the process of heavy particles sedimentation.

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Whereas during unloading the movement of the pulp is changed to drift, it makes it possible for the force of gravity to dominate that is a necessary condition for the segregation process. So in places of pulp discharge large heavy particles that contain metal deposit then less hard enclosing strata (silicate-carbon compounds) coarse-, medium- and fine-grained sand move then pulverescent particles and also clay and colloidal particles are transferred with water to further distances. Each of the pulp components deposits mainly in the corresponding zone.

As a result of imperfections in engineering processes a part of minerals get into wastes, the magnitude of which depends on the type of process and its technological level and the ability of minerals for preparation as well as the complexity of the extraction from the enclosing strata. Also as a rule by-product valuable raw materials (ore as well as nonmetallic) is contained in the sludge (tails) of preparation.

As a result in the process of the sludge collector filling and segregation of enrichment wastes particles it takes place concentrating of mineral raw materials with specific grain-size composition. Places of technogenic raw materials concentrations represent as an technogenic deposit.

Operation life of sludge collector depends mainly on its capacity because it has limited dimensions. Because of the lack of additional space for new sludge collectors for capacity increasing during production process dams are built up or their clearing is performed.

Sludge collector clearing gives possibility not only to free up capacity for the storage of newly generated wastes but also increases the resource intensity of resource consumption by wastes re-processing with extract of mineral components.

Problem statement. Sludge collectors are:

- the source of the negative influence on the environment;
- objects that occupy a significant land resources;
- repositories of building materials;
- technogenic deposits of unaccounted resources of various mineral components.

It is worth noting that the first two items from the above list are common to all sludge collectors and the last two in case of certain conditions existence. It means that the content of the sludge collector can be suitable to use as construction raw materials only if they have the required properties and qualities. The same can be said about the recognition of impounded sludge wastes deposits – it is possible on conditions that mineral components are contained in the accumulated wastes of industrial conditions.

The only one solution for the problem of the existence (land withdrawal, respectively) and sludge collectors influence on environmental is their elimination by content extracting. In this case there is a need for the implementation (use) or complete destruction of coal washing wastes that should be extracted.

In Ukraine the most quantity of the existing technogenic objects according to the quantity and quality of their contained minerals can be suitable for industrial development.

In the technogenic areas such minerals as iron, manganese, phosphorus, grenades, free gold [1], zircon, ilmenite, uranium and many others are contained.

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Most of the existing technogenic objects are not used and are not recultivated. Their presence on the territory of the country mostly near to the cities causes irreparable damage for the environment and public health.

Experience of technogenic deposits development testifies that the cost price of production of their industrial wastes is in 5-15 times less than from mineral raw materials that are extracted by conventional methods. In addition, the mineral raw materials extraction from technogenic objects will significantly reduce the burden on the bowels with maintaining of the produced commodity output volume, reduce the area of land occupied by placement of dumps and sludge collectors, free the capacity for the storage of newly generated production wastes and minerals preparation.

There are no normative documents for the minerals extraction from the sludge collectors.

At the same time content extraction from sludge storages is carrying out rather active. For this purpose in each case technological scheme that is the most suitable for the given process conditions is developed [2].

As a rule the following technological schemes are used:

- solid by horizontal layers;
- zones development;
- sinker;
- area partings selective development;
- selective development by layers.

It is also possible to classify the scheme of development into:

- transport;
- without transport.

Selection of development scheme is made by comparing the options.

However all applicable sludge storages clearing technologies are characterized by the formation of new wastes in the form of empty sludge (without content of mineral components or with substandard content) and contaminated water.

Thus the technologies used for sludge storages clearing do not allow completely eliminating of an object. In this connection for conditions of sludge collectors operating finish clearing technologies improving with the capacity full release for relief returning in the natural state is a topical issue.

Basic material statement. To clear the sludge storage as a preliminary mineralogical and granulometric makeup of its content by the square and depth should be studied. It is performed mapping with drawing of the mineral raw materials zones. Ore that was lost in the preparation process can be contained in the heavy coarse grains and can be recovered and recycled in the preparation factory. In the silicate-carbonic compounds sands are accumulated, those that are of coarse-grained and medium sand can be used in the glass and clay industry and pulverescent particles can be used in the ceramic industry. The clarified water can be processed at refineries till the state of fresh water.

For practical implementation of the above provisions following technological schemes are substantiated.

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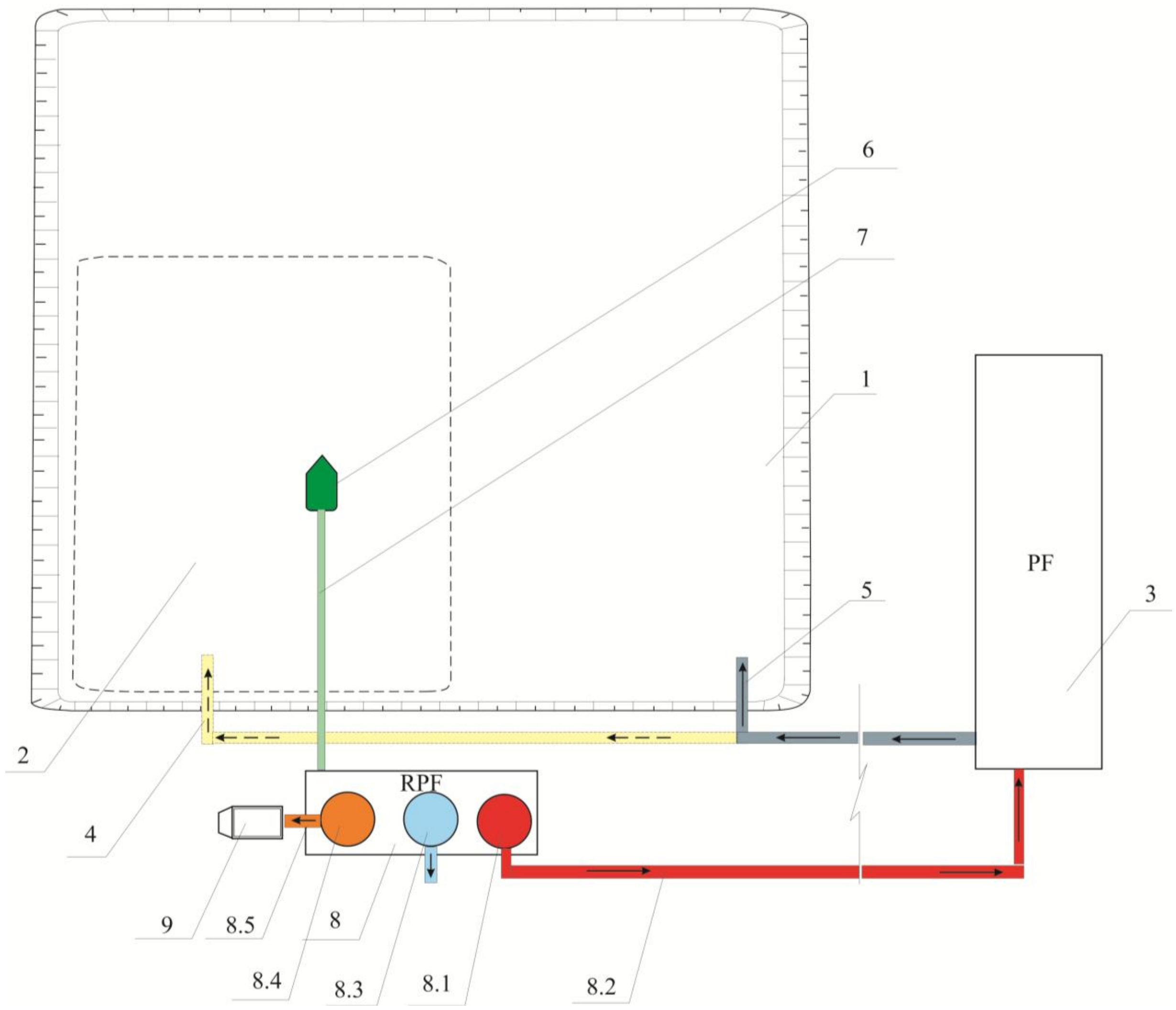
1. Technological scheme of watered sludge storage clearing with a dredger with technogenic raw materials pre- preparation.

To solve the problem it has been developed the technological scheme of technogenic mineral raw materials extraction from the watered sludge collector using a dredger with its pre- preparation and industrial water purification at the semiportable complex (Fig. 1).



1 – capacity of the sludge collector; 2 – site of mineral raw materials extraction; 3 – preparation factory; 4 – pre-position of the pulp discharge; 5 – the current position of the pulp discharge; 6 – dredger; 7 – flexible pipeline; 8 – semiportable cleaning pre- preparation complex; 8.1 - section of sludge pre- preparation; 8.2 - the conveyor; 8.3 – section of water demineralization; 8.4 – section of wastes dehydration and drying; 9 – dump truck

Figure 1 – Technological scheme of technogenic mineral raw materials extraction from sludge collector with its pre- preparation at the semiportable clearing pre- preparation complex

During the preparation process at the preparation factory *3* (see Figure 1) wastes generate – sludge that through slurry pipeline *4*, *5* are transported into the sludge collector *1*. In the sludge collector *1* technogenic mineral raw materials deposit which is suitable for the mineral components extraction forms by changing the pulp discharge site 4 and 5. Place and order of deposits formation are considered in the paper [3].

To increase the capacity of the sludge collector and resource provision of the enterprise sludge from areas of high mineral content *2*, created at the location of pulp discharge in position *4*, are extracted by the dredger *6* on a flexible line *7* are given to the semiportable clearing pre- preparation complex *8*. Complex *8* is located on the dam of the sludge collector in immediate proximity to it what makes it possible to reduce the extracted minerals transport distance.

Complex *8* consists of three sections:

- section *8.1* – equipment for pre- preparation of mineral raw materials that were extracted from the sludge collector;

- section *8.3* – technical equipment for process water purification obtained from the mass extracted from the sludge collector after pre- preparation in the section *8.1* and wastes drying (dehydration) in the section *8.4*;

- section *8.4* - equipment for wastes dehydration obtained from the sludge pre-preparation in the section *8.1*.

Sludge coming through the pipeline *7* is given to the section *8.1*, where by the means of screening, separation and other processes (selected according to the type of mineral component and their washability) is divided into pre- preparated raw materials, process water and wastes. Pre- preparated raw materials are given with the conveyor *8.2* to the enrichment factory *3* or to the consumer (if they satisfy by their quality). Wastes come to the section 8.4 where they are dehydrated, dried and with the conveyor *8.5* are loaded to the dump trucks *9*. Wastes can be used for dams dumping of sludge collector 1, for formation of sections in it, for the construction of roads etc. Process water formed by the dehydration of raw materials extracted from the sludge collector in the section *8.1* and pre- preparation wastes from the section *8.4* to the section *8.3* is cleaned up till it satisfies the regulations for drinking water or fishery water using and is transferred to the consumer or is discharged into surface waters (streams) [4]. The salts formed during water clearing are given to the section *8.4* for dehydration and disposal.

2. Technological scheme of sludge storage clearing with a dragline.

This scheme can be used when sludge storage has a dry surface and water level. For dry part of sludge storage cleaning dragline and trucks can be used. In this case the technological scheme (see Figure *1*) instead of the pipeline *7* dump truck is used and for clearing plant *8.3* a pipeline is built from the water level of settled water.

Thus the proposed schemes of mineral raw materials extracting from the sludge collector and their preparating in the semiportable, cleaning pre- preparation complex represent as a complete eco-targeting cycle of rational nature using and environmental situation improving.

Conclusions.

1. Stored wastes development with their further re-processing or use of wastes as a final product (e.g., the building materials production) will provide the company with additional raw materials resources and free capacities.

2. Preliminary analysis of the content of sludge storage will highlight promising areas for the extraction of useful components and apply them selectively recess, which will reduce the volume of waste re- preparation factory.

3. Full release of the sludge collector capacity makes it possible to return the natural relief and accordingly to restore the natural hydrological processes.

4. Complete cleaning of the sludge collector with all its content helps to improve the environmental situation.

Among the shortcomings of the proposed technologies essential equipment costs can be emphasized.

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Анотація. В результаті тривалого періоду експлуатації збагачувальних фабрик сформувалися значні по площі і глибині шламонакопичувачі. Вміст шламонакопичувачів в результаті технологічних і геомеханічних процесів розділяється за концентрацією мінеральної сировини, яка може бути повторно збагачена, в певних місцях. Розробку шламонакопичувачів ведуть, як правило, для формування вільної ємності для складування відходів, що знову утворюються. При цьому не враховують розташування місць концентрації мінеральної сировини і відходи, що утворюються після повторного збагачення, знову укладають в шламосховища.

У статті для умов закінчення експлуатації шламонакопичувача наведено вдосконалені технологічні схеми вилучення і попереднього збагачення вмісту накопичувачів відходів збагачення, використання відходів, що утворюються і очищення технічної води.

Запропоновані схеми вилучення мінеральної сировини зі шламонакопичувача і збагачення його в напівстаціонарному очисно-передзбагачувальному комплексі, являє собою повний екологічно зорієнтований цикл раціонального природокористування та поліпшення стану навколишнього середовища.

Ключові слова: шламонакопичувачі, склад відходів, повторне збагачення, очищення вод, підвищення ресурсоємності, поліпшення екологічної обстановки.

Аннотация. В результате длительного периода эксплуатации обогатительных фабрик сформировались значительные по площади и глубине шламонакопители. Содержимое шламонакопителей в результате технологических и геомеханических процессов разделяется по концентрации минерального сырья, которое может быть повторно обогащено, в определенных местах. Разработку шламонакопителей ведут, как правило, для формирования свободной емкости для складирования вновь образующихся отходов. При этом не учитывают расположение мест концентрации минерального сырья и образующиеся после повторного обогащения отходы снова укладывают в шламохранилище.

В статье для условий окончания эксплуатации шламонакопителя приведены усовершенствованные технологические схемы извлечения и предварительного обогащения содержимого накопителей отходов обогащения, использования образующихся отходов и очистки технической воды.

Предложенные схемы извлечения минерального сырья из шламонакопителя и обогащения его в полустационарном очистительно-предобогатительном комплексе, представляет собой полный экологически сориентированный цикл рационального природопользования и улучшения состояния окружающей среды.

Ключевые слова: шламонакопители, состав отходов, повторное обогащение, очистка вод, повышение ресурсоемкости, улучшение экологической обстановки.

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