SELECTION OF THE OPTIMAL VARIANT OF RECULTIVATION OF SLUDGE FIELDS IN KHARKIV CITY

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One of the major environmental problems of a city existence and development is disposal of household wastewater sludge. City wastewater treatment plants generate significant volume of sludge containing organic matter, nitrogen, phosphorus, Sulphur, heavy metals, etc.

Kharkiv waste water treatment plants (WWTP-1 and WWTP-2) produce about 1.1 million cubic meters of sludge per year. Its dewatering and drying applies sludge lagoons of large area (124.56 ha – WWTP-2 (Bezludivsky) and 30.6 ha – WWTP-1 (Dykanivsky)). Sludge/sediment lagoons of WWTP-2 (Bezludivsky) are almost completely filled due to exceeding design loads and there is not much space left for further disposal of dried or wet sludge. Sludge/sediment lagoons of WWTP-1 (Dykanivsky) are out-commissioned, and are not used now and will not be used in future.

Today, sludge from WWTP-1 (Dykanivsky) and WWTP-2 (Bezludivsky), Kharkivvodovidvedennia complex, is pumped to sludge lagoons of WWTP-2 (Bezludivsky), covering great areas, affecting the environment, contaminating soil, surface water, groundwater and the atmosphere.

About 9 000 000 cubic meters of sludge of 95-98% water content was pumped to the sludge lagoons from 1999 to 2016. Considering the constant dynamics of sludge inflow to sludge lagoons and its dewatering under natural conditions, it is impossible to determine the actual volume of sludge accumulated at sludge lagoons.

There are mainly three types of different media in the lagoons we will deal with:

a) sediment in the lagoons (old);

b) disposed dewatered sludge (old);

c) freshly and continuously generated waste sludge from two plants.

It is assumed that the amount of sludge on sludge lagoons is about 9 000 000 cubic meters. The sites are located on the territory of WWTP-2 (Bezludivsky) and WWTP-1 (Dykanivsky).

The main objective of present assignment is to prepare best technical solution for sludge treatment and disposal/reuse. We can solve the sludge problem, to understand the scope and to propose most feasible options in the most cost effective and technically sound way.

The purpose of the study is to assess the state of the sludge lagoons and offer recommendations for the utilization of the sludge accumulated on

these lagoons and the reuse of this land after their release. The study covers the sediments of the sludge lagoons and the newly formed sludge from the treatment facilities.

The following effect is expected from the utilization of the disposed sludge:

Reduction of the greenhouse effect due to reduction of greenhouse gas emissions into the atmosphere;

−Reducing the negative impact of fumes on the environment;

−Reduction of unpleasant smells from sludge pads;

−Exclusion of the possibility of filtrate entering groundwater;

−Prevention of sludge ignition;

−Release of sludge fields and their subsequent application in the city economy.

The expected results of sludge disposal:

−Maximum reclamation of territory under sludge/sediment lagoons;

−Maximum reduction of sludge volume, compared with the volume of sludge after mechanical dewatering taking into account the proposed technology;

−The final product contains no pathogenic compounds, it is completely decontaminated for possible use in other spheres and brings profits for the communal enterprise.

We will evaluate at least the following options of sludge utilization:

−Direct agricultural use;

−Composting and agricultural use;

−Composting and landfilling;

−Drying and granulation for use as fertilizer;

−Drying and granulation for use as fuel;

Digesting, gas production and incineration.

ХАРАКТЕРИСТИКА ЗАБРУДНЕНЬ СТІЧНИХ ВОД КОКСОХІМІЧНИХ ПІДПРИЄМСТВ

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Промислові підприємства є основними споживачами води з водних джерел, які використовується в оборотних системах та технологічних циклах промислових підприємств. Стічні води коксохімічних виробництв – одні з найнебезпечніших в екологічному відношенні джерел забруднення водойм. Це обумовлено тим, що основними забрудненнями фенольних стічних вод є: феноли, роданіди, ціаніди, аміак, смоли, масла, завислі речовини, шкідливі органічні і неорганічні