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ON SITE WASTEWATER TREATMENT MODEL USED IN URBAN RESIDENTIAL AND TOURISM AREAS

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ABSTRACT

The paper presents some results of the study on On-site sewage treatment and decentralized sewerage system. The study was carried out in lab of the Center for Environmental Engineering of Towns and Industrial Areas during 2001-2002. The study results were applied in practice for sewage treatment in some households in Hanoi and residential and tourism areas in CatBa, Haiphong city.

BACKGROUND

Now a day, environmental sanitary is one of most concerned problems for Environmental managers in urban areas in over the world as in Vietnam. Even in industrialized countries there are also exist difficulties in stability and sustainability of sanitary facilities. Besides the cost of operation and maintenance of the sanitary and sewerage systems is usually high and the energy is consumed in big quantity. Valuable nutrients such as Nitrogen and Phosphor, etc. are unsafely disposed into the environment. Many research results recently show that chemicals and hormone of different kinds are used increasingly day-by-day in domestic purposes and as in Industrial and agricultural production. These substances are discharged into environment from centralized wastewater treatment plants. It will cause damages for long time for human health and surrounding environment.

Recently in the world there appeared a new approach in solving environmental sanitary, guarantying an equity and suitability between needs and capability. This approach is based on using maximally a role of sanitary services users, including a sewerage and wastewater treatment. This is a model so called Household Centered Environmental Sanitation - HCES. This model is based on two principles:

- Minimization of wastes at generated sources as input and at output (including water-wastewater and solid wastes...)
- Solving a problem of environmental sanitary as closed to generated sources as possible.

Following this model, sewerage and wastewater treatment options or alternatives are to be one or combination some of them as follows:

- On site wastewater treatment or wastewater in treated at source of generation,
- Centralized wastewater treatment, using low cost and simple technology,
- Decentralized system, wastewater is treated in small treatment plant, decentralizedly and closely to source of generated sewage. Then treated sewage is reused or directly discharged into water body or in to storm drainage system without requirement of big expensive capital investment. Solid wastes including sludge from sewage treatment plant are treated and then used as fertilizer.

This approach is issued from a point of view of sustainable development, guarantied the equity between human needs and environment, with low cost sanitary service system, and appropriated to the capacity of low income consumers. This approach is also considered as a tool of oriented strategy for planning, improving environmental sanitary service. However, on each country or zone there should be carried out concrete study with the aims to set up suitable measures.

In Vietnam now there are 684 cities and urban areas with inadequate infrastructure systems, including sewerage and sanitary facilities. In most of urban centers there usually occurred flooding. There are only some households, which have septic tanks. The rest discharge sewage

from households directly into combined drainage system without any treatment and then it flows to recipient water body or natural channels and ponds. So these natural water bodies are to be overloaded and auto-purification capacity of water body is decreased and environment became polluted. Environment pollution will affect on public health, ecological resources, landscape and recreational values will be loosed...

If resolve a problem as centralized sewerage and treatment system, there will be required high cost on one side, and on the other side the environmental requirement are not satisfied.

In this context, a problem is posed how to decrease the cost of investment and operation sewerage system and sewage treatment facilities? And at the same time a problem of urban hygiene environment is to be improved? So the study on models of On-site sewage treatment and decentralized sewerage system were carried out.

SOME RESULTS AND PRODUCTS

Baffled septic tank with anaerobic filter - BASTAF

Technology name: BASTAF

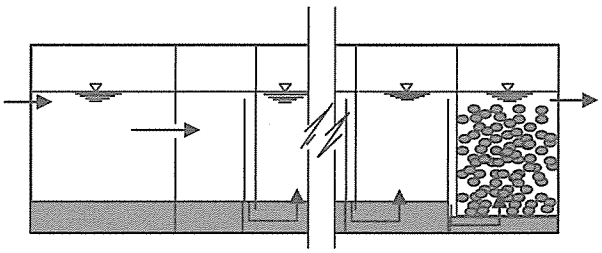


Fig 1. Model BASTAF

Technology description

Sewage is flowed into the first chamber as a role of sedimentation one, then take place of anaerobic fermentation process; During this period there occurred an equalization of flow and concentration of contaminated substances of sewage. Due to baffled plate orienting the stream, in the next chambers the sewage flows from the bottle up to the surface and contact with anaerobic microorganisms in the sludge blanket, which are created at the low layer of the chamber in the dynamic conditions. Organic matters adsorbed by microbes and transferred. Due to different chambers there allowed realizing the process in to two separate phases (acid and alkaline fermentations). BASTAF allows increasing the residential time of sludge, so the effectiveness of wastewater treatment will be increased and consequently the quantity of sludge needed for treatment will be reduced. The last chambers are as anaerobic filters. They play a role of additional wastewater treatment process due to anaerobic microorganisms fixed on surfaces of filter media and prevent the movement of suspended solids out of the tank.

The quality of effluent: After of the treatment the effluent quality is to meet Vietnamese standards as TCVN 5945-1995- Industrial effluent quality standards or the level I according to TCVN 6772 (water quality- domestic wastewater- allowable pollution limit, TCVN 6980-2001- TCVN 6987-2001 depending on type of water receptor.

The fields of application

This model could be

- Applied for on site domestic sewage treatment at households, multi store buildings, Hotels, public buildings as schools, Universities, hospitals or group of households in urban areas or town lets...

- Used for treatment of industrial wastewater the composition of which is assembly to domestic sewage and the content of organic matter is high, such as food processing industries or agricultural handicraft villages...
- The capacity of treatment station is of 50 - 5000m3/day (or served equivalent population is of 500 - 50 000 inhabitants). See fig 3.

Advantages of the BASTAF

- BASTAF is one which very simple in operation and maintenance and has stable efficiency of treatment.
- The cost of investment is low and the expenditure of operation is also low because it does not use electrical energy, chemicals...
- It requires small area, the smell is removed and landscape is prevented.
- The range of use is large.

Level of development

This facility is applied in an industrial scale or in agricultural handicraft villages as in individual households (see fig 2, 3)

Requirements

It is assemble to usual septic tank in installation and operation.

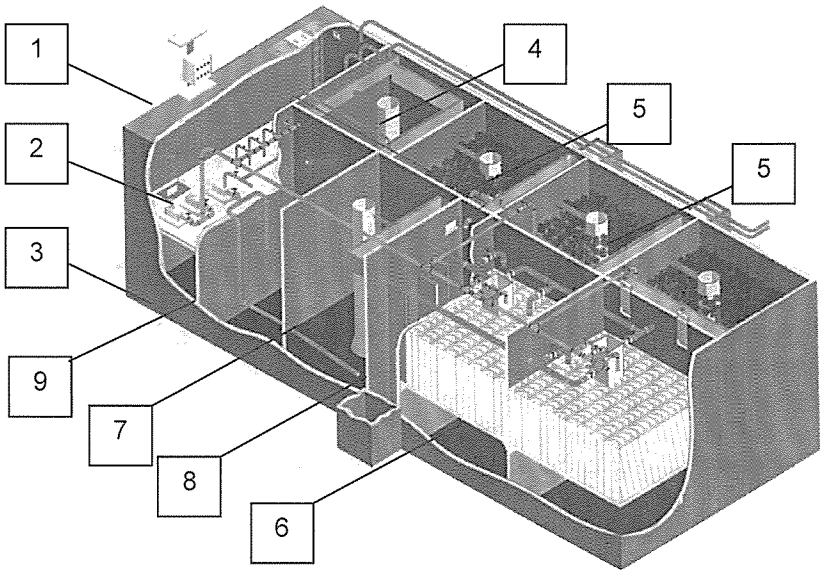
Small-scale wastewater treatment station in combination in one block AFSB-100

This is a small scale was built for sewage treatment in Cat Ba area of Haiphong city and was awarded at Techmart 2003 in Hanoi.

CONCLUSION

A trend now day in the world is that the installations or facilities of wastewater treatment are to be as closed to generated sources as possible. The issues of this orientation will give a benefit not only in economic side, but also in guaranties of environmental quality. So the model presented here is one, which is very suitable to Vietnamese conditions and is used not only in urban or tourism areas, but also as in rural areas.

Fig. 2. The picture of BASTAF



Wastewater treatment station AFSB

1. Operation Panel
2. Machinery chamber
3. Storage of pumping station
4. Primary sedimentation
5. Anaerobic filter
6. Aerobic chamber with

Fig 3. Smal scale wastewater treatment station in combination in one blocAFSB-100

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