

CENTRALIZED MANAGEMENT OF WASTE WATER PROCEEDING FROM SEPTIC TANKS OF THE RURAL OURENSANO BY MEANS OF NODRIZA PLANTS

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Abstract

The deficient treatment and later spillage of the sludge proceeding from septic tanks in the rural zones of Ourense's Province supposes a high environmental and ecological risk, simultaneously that the associate costs of management are very high. To avoid this and to promote with it the conservation of the environment, Ourense's Deputation has started a program of management of the sludge proceeding from the septic tanks that are located in small rural cores of less than 100 inhabitants, by means of the utilization of Nodriza treatment plants. Later, there are exposed the technical - economic criteria that justify this exposition based on the centralized treatment of the waste water proceeding from septic tanks.

Introduction

The project of Nodriza Plants bases on the installation of treatment plants in geographically centred regions of the rural ourensano, in order to centralize the problem from the management of the resultant sludge from the domestic waste water treatment in the septic tanks, diminishing of this form the costs derived from the transport and management. Once selected the location of every plant, there is designed a plan of periodic withdrawal of the partially digested and slightly uniform sludges from the septic tanks included inside his environment, according to the needs of every core. Finally, the sludge will be transported to the Nodriza Plant for his suitable treatment.

Methods

Ourense's province possesses a widely spread population, a high number of minor cores of population of 1.000 inhabitants (7.008 cores). These demographic conditions of high number of small cores with a high geographical dispersion provoke a clear socioeconomic setback. Given the great dissemination of population and the high number

of cores that need to be provided with the precise infrastructures for the management of the sludges proceeding from septic tanks, it becomes necessary to establish an innovative model of management, since the conventional solutions need a financing very superior to the available one. We understand that the cores with population understood between 100 and 1.000 inhabitants are capable of having purification systems more outposts opposite to the smallest cores, with less than 100 inhabitants.

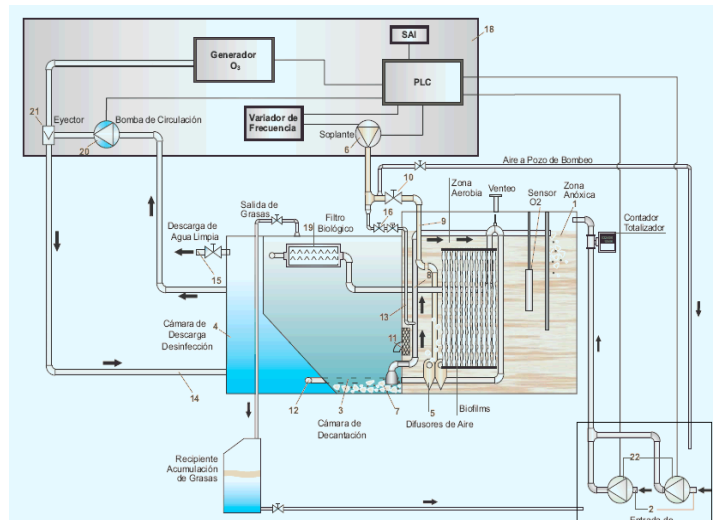
First, a classification of the cores was realized according to the current existing situation of resources of management of sludges proceeding from septic tanks, on which two criteria were applied: population for core and cores with advanced system of waste water treatment. The regions have been established as base of action for being the unit of administrative integration of the town halls, there being made a list of regions of priority action in which there are included those cores of population that fulfill the specified requirements. Thus, they turned out to be selected 3.227 cores of population. The technical solution adopted for this management problem of the sludges proceeding from the septic tanks there bases on the selection of a Nodriza Plant geographically centred on each of the regions, so that the distances balance to crossing from every core to the plant where the sludges are spilt, diminishing of this form the costs derived from the transport. Once selected the location of every Nodriza Plant designs a plan of periodic withdrawal of the sludges from the septic tanks included inside this program, according to the needs of every core, and they are transported to the Nodriza Plant for his suitable treatment. In the plan of withdrawal of every Nodriza Plant there are established schedules of withdrawal and contribution, in such a way that there is avoided the collapse of the well of receipt, as well as to avoid the time of unemployment of the plant, trying to optimize thus the electrical consumption in relation with the flow of treated water. The Nodriza Plant has a design that assume the possible increase of the sufficient endowment to assimilate the increase of the load that supposes the treatment of the sludges in the plant, assuring his combination with the unfluent one. To guarantee the capacity of purification of the biological reactor in ideal conditions, there is kept the relation of contribution of waste water / sludges contribution in the range 10 %-20 %.

Results and discussion

To estimate the demand of management of the waste water proceeding from the tanks of every region, one takes 200 litres as an average endowment for equivalent inhabitant and day (Donoso et al, 2004). First, it is considered that it exists a tank for core of population to gather the flow of waste water that is generated in these small cores. To do a more exact economic valuation, it estimates that the cores of population of less than 50 inhabitants (2.701 cores) have a tank of 8 m³ each one and those of population understood between 50 and 100 inhabitants (526 cores) of a tank of 10 m³, with which, the total volume of existing sludges would be of 26.868 m³. Bearing in mind that will withdraw approximately 80 % of the volume from himself from each one from them in order not to withdraw completely the

biological culture (Brandes, 1978), the total volume of managed sludge will be of 21.494,40 m³. Possessing a complete cycle of retreat of 12 months (20 working days every month), the volume of daily retreat of sludge will be of 89,56 m³. Once measured the distances between every Nodriza Plant and the cores with less than 100 inhabitants, calculates an average for region in order to establish the number of daily trips that there will be able to realize a vehicle of withdrawal and transport during his labor day. In agreement with the average speed of the vehicle for regional and local roads, estimated in 40 Km/h, there decides that during a labor normal day, the vehicle is capable of realizing 6 trips. As a reference, we take a vehicle with a capacity of 8 m³ of suction and transport, perfectly conditioned to realize the labors of retreat of the sludge from every septic tank. The sludge volume managed every day by a vehicle will be 48 m³ sludge/day. From this, the necessary number of vehicles to manage the daily volume of sludge is 2. Considering 7 hours of work/day and a cost of service of 80 €/h can conclude that the costs associated with the management would be of 1.120 €/day of transport, which would suppose a ratio of 12,50 €/m³.

The existing systems of purification in the spread rural one are characterized by his low performance, with high production of excess of biological sludge, with average degree of digestion, of simple functioning but of difficult and expensive management in his set. For the design of the Nodriza treatment facilities, it has been had in account that the existing reparation systems in the rural ourensano characterize for being unitary networks with high incident of infiltrations. Waste water presents a great concentration of sands at his arrival to the treatment systems. This circumstance determined the obligation to install a pre-treatment system, in which there uses the water purified in the Nodriza Plant, who allows obtaining the arid some with less than 3 % of organic content, which facilitates his management as inert residue. The biological system proposed there consists in a treatment plant model STP Nodriza whose functioning bases on a biological process for extended aeration, with returning activated sludge, promoted by the incorporation in the aeration chamber of a device of bacterial fixation media (Biofilm), way of high specific surface to catch and to hold the microorganisms of the residual water, ending with an ozone disinfection process, that it takes as an aim the disinfection and deodorization of the treated water; suitable technology for the joint treatment of domestic waste water and sludges from septic tanks, both for the simplicity of the functioning and for the facilities maintenance.



The sludge treatment in the Nodriza Plant is coded approximately in 0,47 € / m³, included the maintenance, the electrical cost and the investment amortization. The total cost of management would ensue from the sum of both articles, as what we would have a total cost of management of 19,97 €/m³. Then, this quantity would suppose a very important saving compared with the current expense coded in 40 € / m³.

Conclusions

In view of the contributed information, the centralized management of waste water proceeding from septic tanks by means of Nodriza treatment plants supposes a reduction of up to 70 % of the cost associated with the sludge management proceeding from septic tanks. It forms this one of attacking the sludges purification generated in the cores of population endowed with septic tanks, turns out to be much more economic that to adopt the solution, till now usually, of the periodic retreat of the sludge and his dehydrated later one, stabilized, transport and spillage or delivers authorized manager. In addition there is avoided this way the high environmental risk that supposes the deficient treatment that the septic tanks carry out, improving the management of the maintenance of the same ones. This technical solution protects and improves the region, reinforcing the environmental potential of the natural space. Of this form one tries to obtain the creation of the most attractive environment, stimulating the conditions necessary for the improvement of the sustainability in the areas of environment, in the natural spaces and in the water resources.

References

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