Cost of sludge removal in the stabilization pond using bags - a study of the case WTP of Jaborandi city – São Paulo State

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Abstract Describes we have found the costs for dredging and dewatering sludge with the use of polymers and bag of geotecido in a pond of stabilization option, the municipality of Jaborandi, state of Sao Paulo, operated by SABESP (Sanitation Company of the State of Sao Paulo). One of the available options, indicated for cases where the dehydration need not be daily and it can be in long periods, in this case, with more than 18 years of operation. Not only the possible economic advantage, but the process has operational facility, requiring mainly of area available for installation of geotecido. At the end of every operation it was found that the expenses involved resulted in the cost of R$ 55.86 per cubic meter of silt removed.
Key words: sludge; stabilization ponds; removal; BAG

INTRODUCTION

All forms of biological sewage treatment or even by simple sedimentation generate sludge. Sludge comes from the solid part in the residual water. The stabilization ponds are ways to treat sewage, which by offering operational simplicity, it does not demand continuous and routine removal of sludge, which differs from other forms of treatment of sewage, the sludge builds up inside it over the years. The accumulated sludge inside the ponds reduce the time of hydraulic detention and undermine the efficiency of treatment, besides causing inconvenience being cause of odor, when carried to the surface. Due to the existing time of many sewage treatment systems for the stabilization ponds, over 10 years of operation, operators of the systems are seeking efficient and low cost alternative for removal of the sludge of domestic ponds. In this work we tried to stablish the cost of removal of sludge by the method based on the dredging and dewatering of geomenbranas per bag, and the costs of transport and availability were not considered.

METHODOLOGY

The pond of sewage treatment of Jaborandi with about 18 years of operation, has gone through many changes always focused on operational efficiency of the system. One of the most significant changes was the transformation of anaerobic pond in aerated pond that occurred with the intention to prevent the proliferation of odor once caused by the drag of the material (sludge) deposited at the bottom of the lake before the second anaerobic pond, the optional one.

With this material deposited at the beginning of the optional lagoon a problem occurred: the decreasing time of detention, because of the diminished usable area of the lake. This amendment originally was efficient, but over time it caused operational problems in the first third of the lagoon.

Due to this situation, application of polyelectrolyte and the use of the ABG (in Geotecido) were chosen for the removal of sludge from the interior to the use of dredging, for packaging and dewatering of sludge.

To remove sludge from inside the lagoon, a company was contracted to do the dredging services by the amount of R$ 24.66 / m^3 dredged and a concentration of 2% solids, totaling a cost of R$ 73.980.00 for the dredging of 3,000 m^3, with 1500 m^3 for each of the ABG's.

Before the beginning of dredging services, a bathymetric search was done by the method of “the plate” It was possible to estimate the volume of sludge contained within the optional pond and the volume was measured 4802 m^3 of sewage sludge to a concentration also estimated at 2%. It is worth emphasizing that this method is not accurate and that figure used to set a parameter that formed the basis for the control of the withdrawal of sludge.

The contracted company carried out the service to dredge the silt contained on the first part of the optional lagoon and with the aid of a "raft" consisted of submersible pump, and Sleeves that sent sludge pumped to a tank of homogenization of sludge . It was also in charge of the contracted company to provide a container in steel with 6.00 meters in length and width of 2.40 m, allowing store equipment and tools, since there was only place in a small room and it would not be enough.

From the sludge already dredged into the tank of homogenization other operations were in charge of Sabesp, from the preparation of the polyelectrolyte and its application to the pumping into the BAG'sea cleaning them so that there was a better drainage of leachate.

The supply of ABG and the polyelectrolyte used for the flocculation of sludge was in charge of Sabesp, and the cost of R$ 30300,00 each ABG, and of R$ 9,74 a kg of polyelectrolyte.

We also made tanks to prepare polyelectrolyte, construction of cells for the installation of ABG's, a box (tank) for homogenization of sludge, purchase of plastic tarpaulins for sealing of cells and tank mixture of sludge.

Photo 1: Draga performing the suction of the Jaborandi pond.

Photo 2: BAG prepared for release of sludge

Photo 3: BAG full of sludge in the process of dehydration

All costs involved in the process are described on Table 1

Table 1 – Getting to the cost of voluntary cleanup of the lagoon in Jaborandi; April / May 2007.

Description	Quant.	Value Unit - R$	Total Amount - R$
BAG 18,3X30,0 m	02	30.300,00	60.600,00
Polyelectrolyte emulsion	1780 kg	9,74	17.337,20
Dragage of sludge	3000 m^3	24,66	73.980,00
Hand of outsourced work (cleaning the area, construction of 2 cells with the placement of plastic canvas and 56 m3 of crushed stone and I installation of electric energy in place)	58 dailys	50,00	2.900,00

Plastic canvas of 200 micras 12X48	1152 m^2	1,65	1.900,80
crushed stone I	56 m^3	25,50	1.428,00
Backhoe (construction of the tank and homogenization of cutting slope for construction of 2 cells)	80 hours	70,00	5.600,00
Tipper truck	24 hours	35,00	840,00
Consumption of water, electricity and daily (estimate)			3.000,00
TOTAL			**167.586,00**

Reference: 1 USD = R$ 1.85 (2007/2008)

RESULTS

For WTP of Jaborandi with dehydration through bags, considering the volume dredged 3000 m^3 at a cost of R$ 167 586.00, the cost per cubic meter removed and disgorged was R$ 55,86.

CONCLUSIONS AND RECOMMENDATIONS

There was some difficulty in relation to choose the best pump to be used to dredge because the sludge at the bottom of the pond was extremely dense, and some models of submersible pumps were not, at first, a good yield. In search of the optimization process, the best pump was used with a characteristic of open wheel.
It is recommended for future removal of sludge a better homogenization of sludge dredged, resulting in better efficiency in measuring polyelectrolyte and also a better drainage of sludge inside the BAG.