COMPARISON OF CONVENTIONAL WATER TREATMENT TECHNOLOGIES WITH SOIL BIOTECHNOLOGY

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ABSTRACT

Water security is one of the major concerns all over the world. It's commonly said that the issue for the rise of the III world war could be water. Many water bodies in India have been adversely polluted or even converted to nallahs (eg, the Nazafgarh Nallah was earlier a river namely Sahibi). Out of many reasons, the main reason form this pollution is that 40% of the untreated wastewater is directly disposed into rivers. Many industries in India are facing problems in either installing or maintaining water treatment plants. The reason could be any but the result is that the major water resources are being heavily polluted depriving the citizens of clean water. A solution to this problem is to recycle the waste water and reuse it. There are many technologies (such as Activated Sludge Process, Up flow Anaerobic Sludge Blanket process etc.) existing which can efficiently treat the waste water and make it fit for discharge into natural water bodies or even to meet the daily water demands.

This work compares the conventional technologies with the innovative Soil Biotechnology (SBT) developed at IIT Bombay. The performances of sewage treatment plants based on activated sludge process (ASP) and SBT, and effluent treatment plants based on rotating biological contactor (RBC) and SBT were compared. The parameters observed were BOD, COD, TDS and TSS. The economic and environmental aspects were also taken into consideration.

Keywords: ASP, BOD, COD, SBT, Yamuna

I INTRODUCTION

Water is always on the top priority while setting up a civilization or township and stays the same throughout the lifetime. With the current trends of population growth (1.9% per year), the Planning Commission, Government of India has estimated that the water demand will increase from 710 BCM (Billion Cubic Meters) in 2010 to almost 1180 BCM in 2050. Hence the concept of using less is difficult to practice because of the unavoidable requirements of the growing population and the need of the hour is to recycle. The concept of recycling is not new, technologies like ASP, UASB, RBC etc. are used on a large scale by many government organisations and private industries. Our aim was to understand the reason of bypassing untreated effluents to rivers like Yamuna especially by the organisations which have their own treatment plants. Hence, we visited the HUDA sewage

treatment plant in Gurgaon, Combined effluent treatment plant in Okhla, sewage treatment plant of AAI in Lucknow and ETP at the factory of Saurav Chemicals Ltd. in Chandigarh. During the visits the samples of treated and untreated water were collected and the feedback of the operators and the owners were recorded.

It was mainly to identify the problems faced in operating the plants based on conventional technologies and how it can be overcome by using SBT.

1.1 Comparison of STPs

The HUDA sewage treatment plant located in sector 9, Gurgaon, Haryana has a capacity to treat 50 MLD of wastewater. It is based on the activated sludge process which requires inlet chamber, screens, grit chamber, primary settling tank, aerators and final settling tank playing their usual roles. To maintain a smooth operation of the plant, the sludge has to be removed and managed on a regular basis as it is produced in bulk. The aerators installed are running at very high rpm consuming grate amount of electricity. There is a foul smell throughout the plant which is a reflection of the grey water around. The location of the plant is far away from the habitation at one corner of the city. There is a dedicated team of staff for operating and maintaining the plant.

On the contrary, the sewage treatment plant of AAI at the Lucknow airport based on SBT is located adjacent to the terminal building. The SBT process requires an ozoniser to eliminate the foul smell, tanks to store untreated and treated water and a bioreactor where the treatment actually takes place. All these are connected using pipes of required diameter along with valves. The aesthetic appearance of the plant is like a garden with no moving parts as in ASP. The plant is maintained by a gardener who doesn't carry any burden of managing the sludge. His only work is to maintain the green plants and regulate the valves.

The samples of the effluent and influent were collected from both the plants and tests were carried out in the laboratory at ITMU, Gurgaon. The results have been recorded in Table 1.

TABLE 1- Comparison of performance parameters of ETPs

	ASP		%age removal	**SBT**		%age removal
	Influent	Effluent		Influent	Effluent	
BOD	279	28	89.96	280	24	91.42
COD	1440	180	87.50	680	80	88.23
TSS	410	42	89.75	195	20	89.76

1.2 Comparison of ETPs

The ETP at the factory of SCL based on SBT, handles 10kld of water which is used in cooling tower after treatment. It is very much functional in the same premises where the workers are doing their jobs. The plant has a similar set up as discussed above which is operated by an odd employ of the factory.

In contrast, the combined effluent treatment plant (CETP) of Okhla industrial area based on physico-chemical processes (involves Screening + Grit Removal + Flow Equalization + Physico-Chemical Treatment+ Dual Media Filtration+ Activated carbon Adsorption) installed by DSIIDC with the objective to collect the effluent of all the industries running in Okhla region and treat it before disposing it to any surface or ground water source. This step was taken because the industries were facing problem in dedicating a large area of their factory campus to set up a treatment plant and that too an isolated one as all conventional technologies demand a place away from human habitat. Even if some industries agree to install an ETP, then operational cost, time and requirement of skilled labour to maintain and operate it was a problem.

The Central Pollution Control Board has reported that the CETP not just of Okhla but also of other regions are not able to meet the mentioned standards and hence not serving the purpose for which they were installed.

The results of the samples collected from the ETPs have been compiled in table 2.

TABLE 2- Comparison of performance parameters of ETPs

	PHYSICO-CHEMICAL		%age removal	**SBT**		%age removal
	Influent	Effluent		Influent	Effluent	
BOD	260	32	87.69	219	18	91.78
COD	3500	256	92.68	4156	218	94.75
TDS	2740	2290	16.42	2520	1995	20.83

FIGURE 1- Aesthetic appearance of ASP and SBT plant

Elements of HUDA Treatment Plant based on ASP

SBT Plant at Lucknow Airport

II CONCLUSION

1. There is not much difference in the performance efficiencies of SBT and conventional technologies.
2. The capital cost is almost similar for SBT and ASP (around 1.5cr for 1MLD).
3. The operational and maintenance cost for ASP is Rs.9/cum and Rs.4/cum for SBT.

4. With time, the efficiency of SBT increases as the microbial layer adapts to the environment whereas for other technologies, old plants need more maintenance and in some cases the effluent quality also deteriorates.
5. SBT provides primary, secondary and tertiary treatment all in a single green unit open to atmosphere which is odourless, simple to operate, easy to maintain (even by a gardener) and could be set up within the area of habitation. On the other hand, for other technologies, separate level of treatments are required that too under the supervision of a skilled labour and all the conventional plants are required to be set up in an area away from habitation as they produce foul smell and harmful by-products.
6. The same technology of SBT applies for Sewage treatment Plant, Effluent Treatment Plant, Grey Water Treatment and other Water Treatment Plant. Out of the conventional technologies, if one is suitable for a STP then it may not be efficient for an ETP i.e. the choice is based on the purpose. In a SBT plant only the dimensions and the media proportion varies.
7. In all, SBT is an innovative, eco-friendly, economic and sustainable concept for water treatment.
8. If a decentralised SBT plant is proposed and installed for all respective industries and housing societies in Delhi NCR region then the pollution of river Yamuna can prevented to a great extent without spending much of money and manpower.

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