Bio Petro Clean

Case study for Naroda Enviro Private Limited
Introduction

BioPetroClean has successfully completed a retrofit upgrade project for Naroda Enviro Projects Limited for their Common Effluent Treatment Plant. One of India's prominent CETP was searching for a solution to their Treatment process in order to achieve SUSTAINABLE HIGH QUALITY OUTPUT.

The target set was to achieve consistent compliance with the Pollution Board norms.

CETP receives nearly 9.6MLD effluent, segregated further in four streams viz. chemical, sewage, food and textile. NEPL required a solution that would treat water and discharge in an easy and cost-effective manner to the nearby river. The two main issues NEPL organization was facing were respect to high levels of Chemical Oxygen Demand (COD) and optimizing the unit performance with a better-treated effluent color. These issues were hindering the CETP to work at its optimum level and preventing the safe discharge of the water outside the CETP.

BPC’s Technology

BPC’s cutting-edge biological method for wastewater treatment offers an elegant and simple solution to overcome the existing challenges of conventional biological methods. The Automated Chemostat Treatment™ (ACT) method is based on maintaining a pre-selected bacterial “cocktail” tailored for the specific wastewater type, at a stable and low concentration all while monitoring the system with a fully automated control unit.

The control unit measures various parameters of the influent, including COD, Total nitrogen, Total phosphate, salinity, turbidity and pH, among others. The control unit is capable of automated nutrient dosing, and thus able to adjust the conditions in the bioreactor in order to maintain a stable output and prevent system upsets.

BPC’s Solution to the client’s need

The Common effluent treatment plant contains in sequence, a primary effluent collection tank, Primary Flash mixer, Primary Clarifier, Equalization Tanks and an anaerobic treatment unit UASB, Tube settlers followed by Activated Sludge Process for the aerobic treatment and a clarifier system.

The BPC solution in this project involved two main stages. As a first step, a feasibility study and extensive analyses of wastewater samples from the client’s site performed at BPC’s laboratory.

Based on the lab simulation results, a detailed engineering design for a retrofit process was completed.

The retrofit design included converting the Equalization Tanks into the ACT1 bioreactor, and splitting the ASP reactor in two parts, the first one converted to ACT2
bioreactor, while the second part remained ASP, major refurbishment of all the chemical dosing system and various piping modifications to accommodate the new process design flow.

The ACT automatic Sampling & control system was delivered to site and integrated with all infrastructure.

Figure 2: aeration refurbishment at the BPC-ACT aerobic reactor

Retrofit Configuration and Implementation

According with the detailed design, BPC performed the modifications for the site infrastructure, to accommodate the new flow process and refurbish the necessary equipment.

Among the most important modifications were the following:

- Converting the Equalization Tank to an ACT bioreactor
- Converting the Anaerobic UASB to an AHR
- Split the large ASP reactor into (BPC Patented) "sequential bioreactors" (The first part converted to ACT and the second remains as ASP after refurbishment).
- Major modifications of the chemical dosing system to allow additional lines of chemical auto-dosing
- Integrating the sampling & control system through-out the entire treatment process.

Figure 3: The sequential mode ACT reactor with ASP bi reactor

The sampling & control system was added (figure 4) to the system to perform online analysis of the various streams throw-out the entire treatment process. The control system will then get all the online analysis to produce control lines for Automatic chemical dosing, air supply and other automatic control mechanisms. The purpose of the sampling & Control system is to maintain stable treatment process.

Figure 4: BPC-ACT skid mounted control unit installed on site at NEPL

Retrofit Results

The retrofit last stage was a three month of commissioning where BPC retrofit performed well, treating NEPL's wastewater adequately for discharge to the environment and the COD outlet was below 500 mg/lit.

The analyzed COD showed 87.5% reduction.
Automated Chemostat Treatment vs. Activated Sludge

During the commissioning period the BPC-ACT and AS performance was reviewed. In the days before BPC retrofit and application of the sequential mode of ACT with ASP, the COD at outlet was received ~1000 mg/lit. However, over the initial period and application of BPC retrofit incoming COD saw a reduction of almost 88%, which gave a value of 500 ppm at the outlet and observed to be within the discharge norms.

Even during the period of increased COD, BPC-ACT continued to treat effluent. The AS system on the other hand was unable to cope with the changing conditions, resulting in an output COD as very severe.

Figure 5: COD level in the Chemical influent (blue), SFT stream (Red) vs. the BPC-ACT outlet (Green). Note that BPC outlet remained stable in spite of a drastic increase and in inlet COD.

The Valuable Contribution of BPC

BPC’s solution for treating the produced water is highly advantageous for the following reasons:

1. High efficiency- The BPC-ACT treatment of produced water can bring highly contaminated water to a purity level that allows for its reuse of benign discharge. The treatment process is completed with a relatively short retention time.

2. Stable in the face of quality upsets (see figure 5 above) – unlike other technologies, BPC-ACT maintains exceptional operation regardless of fluctuating conditions in incoming water quality.

3. Simple implementation into current infrastructure- the retrofit process is based almost entirely on currently available infrastructure, thus considerably reducing the time and costs required for the system’s installation.

4. Simple operation- the system is completely automated, leading to a simple and straightforward operation and eliminating the need for highly skilled operators.

Satisfactory Results

Following completion of this successful retrofit, the NEPL management was very pleased with the system’s performance. The combination of the BPC-ACT bioreactor’s easy operation and high reliability, despite unstable input conditions, yielded treated water that was within the discharge norms of Pollution board. Given how the BPC-ACT solution outperformed the yet alone AS system and the ease with which the retrofit itself was carried out. Furthermore, the up gradation of UASB to AHR gave beneficial reduction to the COD values and help in the treatment of severe COD inlet Chemical stream.
Summary

BPC offers a simple and efficient solution for upgrading old effluent treatment systems to a level that will allow for safe recycling or release of water, as well as lower overall costs and less maintenance. The BPC-ACT solution can easily be integrated into currently existing infrastructure, resulting in a more cost effective and environmentally friendly wastewater treatment. The retrofit process is quick and relatively painless, and leads to a superior and more stable means of effluent treatment.