

## Report on

### Visit to “Zydus Infrastructure Pvt. Ltd, Ahmedabad”

Department of Civil Engineering, GCET had organized one day (01/10/21) educational visit to “**Zydus Infrastructure Pvt. Ltd, Ahmedabad**”. A total of 43 students along with 2 faculty members, Dr. Snehal Popli & Prof. Krunali Patel visited the Pharmez.

#### **Aim of Visit:**

The main aim of the visit is to understand and observe the facilities provided at Pharmez which is managed by Zydus Infrastructure Pvt. Ltd., Ahmedabad. The aim is also to understand the concept of common effluent treatment plant. The aim is also

- Understand how a waste water treatment plant functions.
- To understand the dimension of the facilities and machinery required to recycle water
- To understand the benefits and advantages that the treatment of wastewater will bring to companies and industries; as well as their global impact observed in a better management of water.
- To understand the management and operational costs of a waste water treatment plant.

#### **About the Visit:**

##### **Introduction of the Visit:**

On the 01<sup>st</sup> of October 2021, we visited **the Zydus Infrastructure Pvt Ltd**, also known as PHARMEZ, facilities located on at **Bavla Road NH 8A, Matoda, Ahmedabad 382213**. We visited its exterior facilities briefly, having received an in-vehicle tour of the industry and its different assets. We were also given an in-depth tour of the Common Effluent Treatment Plant (CETP), as well as an elaborate explanation of the different types of procedures that the waste water will undergo until it reaches its final stage of cleanliness.

##### **Introduction of the Zydus Infrastructure Pvt. Ltd,**

**Zydus Infrastructure Pvt. Ltd**, is located at the centre of pharmaceutical industries in Gujarat as well as close to the airport and about 350km away from the nearest port. Its location makes it ripe to include a good connection and transportation of goods and interchange of materials. The area itself is very clean and has a lot of greenery providing a peaceful and apt environment for great functioning and promotes efficiency amongst workers. It is a pharmaceutical industry that has around 48 Hectares of land, with each section or area consisting of about 1 to 5 hectares of land. The land has facilities like ambulance station and

medical station. It has a nursery of plants that provides a great scenery for the visitors as well as the workers. It also has composting areas that utilized the residue of dead plants along with the leftovers of the cafeteria, which is also one of the facilities provided for the workers. This compost is later used for the nutrition of the plants growing in the nursery.

Apart from the above facilities the industry has a CETP which was the highlight of our visit. This area contains testing laboratories, high pressure pumps, Reverse Osmosis (RO) filtration systems, biological treatment units, equalization tanks and neutralization tanks. It is highly equipped to manage the waste water and produce the desired input.

### **Exterior Tour of the Industry area:**

Separated in groups of two we were given an exterior tour of the industrial area through a van cart guided by experts of the area. Commencing from the nursery they enlighten us on how the nursery has been inaugurated by the founders of PHARMEZ, as well as brief us on its importance within the area. We proceeded to the greatly equipped medical area, which was furnished with an ambulance and a fire truck, a denotation that safety was their topmost priority within the field.

As the tour continued, we were taken to the composting area, where there were many sections of collection waste as well as many plants surrounding the area, proving that the compost was indeed effective in providing nutrients to the plants while enhancing their growth.

The plant was also filled with pharmaceutical centres, where medications were being made, tested and assembled. These centres made a big percentage of the area.

Our tour ended and we continued our visit with the water treatment plant.

### **Common Effluent Treatment Plant:**

#### **a. Facility**

Contrary to popular belief the plant didn't take much of the area and was compact yet thoroughly efficient. It contained the following equipment and stations:

- Testing Laboratories
- Washrooms for employees
- Equalization tank
- Neutralization tank
- Coagulation and Flocculation tanks (Separation)
- Clarification tanks
- PVA gel beads tank
- Membrane bioreactor
- Boilers
- Pumps
- RO Filtration centres
- Disposal rooms.

Each facility and equipment is properly managed and in every corner of the plant there is always a reminder of the value of safety within the plant. The plant was clean and although

served the purpose of treating waste water it was well ventilated ensuring that the odour did not become too strong of a stench for a good working environment.

**b. Procedures carried out within the treatment plant:**

**i. Collection:**

Water from all parts of the industries (this is made up of about 48 Hectares) is collected into an **Equalization Tank** where all the water is mixed. This mixing doesn't utilize external chemicals, but it simply has a turbine/ engine that spins the water together making it mix with each other in order to prevent the need for different channels of water treatment because of the different values of pH and presence of numerous affluents. The mixture of the waste water in this manner allows for the waste water to become one, and therefore eliminate the need different channels of treatment. This saves time, fuel as well as reduces to operational costs of the plant.

**ii. Coagulation-Flocculation**

The process of separation may also be known as Coagulation or Flocculation. In this method or tank, a chemical is added which changes the properties of the affluents to make them attracted to one another in order to make them stick to each other making big clusters or flocs that because of the gravity will settle to the bottom of the tank. This is a developed procedure to remove the particles (also referred to as *Colloidal solids*) that are suspended and not dissolved in the waste.

In Coagulation a chemical known as Ferric Chloride or Alum is added in the water, making the suspended particles join together into clumps, which makes filtration easier. It is important that the chemicals used are not toxic nor pollutant to the water that will be reused.

In Flocculation a flocculating agent is used in order to form larger clusters or flocs that are later deposited in a sedimentation tank where the particles settle within the bottom of the tank.

**iii. PVA gel beads tank:**

After the clariflocculation tank, the waste is entered in to the aeration tank. Here, PVA gel beads are utilised as the support media for the growth of microorganisms, where the BOD, Biological/Biochemical Oxygen Demand is reduced. It is important to note that this water is full of pathogens and although the major nutrients for bacteria have been removed, while oxygen is still present within the water, the bacteria will continue to reproduce. There is also the presence of nitrogen and phosphorus which serve as nutrients, so if the BOD is not reduced then the bacteria will continue to thrive and breed increasing the changed of contamination within industries.

There are different ways in which BOD can be reduced through bio-reactors and bio membranes. Theses systems reduced the level of organic matter in the water to make it for utilization in other locations.

At this stage the water no longer is discoloured and color is clear without milky substances nor suspended particles.

#### **iv. Reverse Osmosis -5 Stage/Cycles**

At this stage water is delivered into a RO system in which about 99.9% of the bacteria can be rejected, which is why the system is so popular amongst all other filtration systems available to treat water.

Reverse Osmosis is a water treatment or filtration system that occurs by using high pressure to pass the water through membranes. These specific membranes are capable of removing monovalent ions, multivalent ions, viruses, bacteria and suspended solids. This is a method that doesn't require use of chemicals, and it is also easier to maintain, as ROs are self-cleaning and self-contained units.

The water leaves this stage 99.9% bacterium free and passes on to the next stage.

#### **v. Boiling:**

As stated earlier the RO is efficient in removing 99.9% of the bacteria but to ensure that the other 0.1% is also dealt with, water is passed through boilers and boiled to remove salts. These salts are later collected and the water is ready for usage. It is important to not the output water is not potable water. It can only be used in industries under specific regulations only. Although it is clean and bacteria free it is still not safe for human consumption. These five stages are how waste water can be treated and reused, which demotes the depletion of natural water supply. MEE (Multiple Effect Evaporation system) is also provided.

#### **c. Benefits of Waste water Treatment:**

Water is now becoming more and more scarce as the available sources of freshwater are limited and are continuously depleted. If there is a technology or system through which water can be saved by reusing treated waste water to do things that don't require freshwater, then it will be beneficial in that it allows for saving of money and water resources as well.

It also demotes water pollution. Now new laws and regulations are constantly being passed in order to protect the environment from further pollution. Because of the wastewater treatment water can be disposed of in a safe and clean manner that will not pollute waterbodies.





*Zydus Infrastructures Facilities (over 48 hectares of land)*

