TRIPURA UNIVERSITY

DEPARTMENT OF MICROBIOLOGY

REPORT ON

VISIT TO

SURFACE WATER TREATMENT PLANT, BORDOWALI

On 27th April 2022

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ACKNOWLEDGEMENT

We would like to express our special gratitude to our teacher **Prof. Shaon Ray Chaudhuri** as well as **Tripura State Pollution Control Board** and **Tripura University** who gave us the golden opportunity to visit Bordowali surface water treatment plant.

Secondly, we would also like to thank our group members and friends who helped us to finalize the report within the limited time.

A FIELD STUDY REPORT ON SURFACE WATER TREATMENT PLANT

INTRODUCTION

Surface water is the water located on the top of Earth's surface. It is used in day to day life for domestic purposes like drinking, cleaning, bathing. While using the available surface water for domestic purposes, it has also been used for irrigation purposes (where there's no necessity of using fresh water). The availability of clean surface water has reduced to great extent and we need to preserve fresh water for future use, if not, it will lead to scarcity of fresh water for potable purposes.

The purpose of surface water treatment plant is to improve its quality and to make it safe for drinking and other day to day domestic purposes. The real challenge is not the population but the lack of clean water availability. Water quality is defined by its physical, chemical and biological properties. Physical properties include temperature, turbidity, odour, colour, solids and salinity. Chemical properties include Alkalinity, TOD, COD, BOD and other inorganic substances like total iron, calcium, magnesium, phosphate, nitrate, etc. Biological properties include the presence of pathogens and enteric bacteria like *Escherichia coli*, Enterococcus, Pseudomonas, Shigella, Salmonella, etc.

Bordowali surface water treatment plant

The Bordowali surface water treatment plant is located at Bordowali, West Tripura. The source of water is Haora River where there is constructed intake well and the water is pumped and sent through inlet pipeline directly to the treatment plant whereby the water undergoes various treatment processes and then finally distributed to consumer.

Components of the treatment plant:

Water from the Haora River, is directly pumped from the intake well and is sent to the treatment plant. The water to be treated undergoes certain process like aeration, flocculation, sedimentation, filtration and then chlorination. These processes are attained by the various components of the water treatment plant.

1. **CASCADE AERATOR**- Water from the intake well flows and comes directly to the cascade aerator in a fountain manner where aeration takes place, and the dissolved oxygen (DO) is forcefully made to increase, the water flows downstream.

2. **DOSING CHAMBER** - On passing through the channel, a dose of alum and lime is added to the dosing chamber and is passed on to the flowing water, this then goes to the next chamber. Alum serve as coagulant to remove turbidity, lime maintain the pH of water and prevent acidification of water.

3. **FLASH MIXER**- The aerated water which is chemically dosed flows to this chamber and is allowed to mix properly by the help of mechanical stirrers. The mechanical stirrers assure a fast and thorough mixing of flocculants with the suspended solids present in the water.

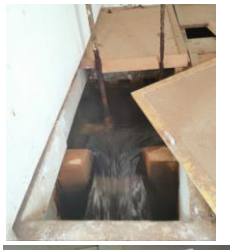
4. **CLARI-FLOCCULATOR**- It is a combination of both flocculation and clarification zone in a single tank. It has two concentric tanks:

    - The inner tank that serve as flocculation basin where the slurry water enters through an inlet. Here again additional flocculants are added for enhancing the rate of flocculation and sedimentation. The 4 movable propeller that is attached to a mechanical part helps in mixing the water and flocculants evenly. Large solid particles when mixed with flocculants tend to coagulate and form large flocs which will make them heavier.

- The outer tank that serve as clarifier where the flocs tends to settle down in the bottom forming a sludge blanket and the clarified water is gradually raised upward and is discharged out from this chamber through an outlet for filtration process.

5. **FILTRATION CHAMBER-** The clear water comes to the filtration chamber and is allowed to filter through rapid gravitational settling down in a filter bed which is made of coarse sand and gravel of five different size. The water on passing through this filter bed gets filtered. Backwash is done once in a day.

6. **INSPECTION CHAMBER-** This chamber is made for inspection purpose; to check the quality of filtered water.



7. **ELECTROCHLORINATOR-** The filtered water then goes for disinfection to remove microorganisms which possibly might be present in the filtered water. Electrochlorinator Machine is use for converting sodium chloride (NaCl) to sodium hypochlorite and is used for disinfection.

8. **UNDERGROUND RESERVOIR-** It is a large tank where treated and chlorinated water is stored till it is sent to the overhead tank for storage and distribution to the surrounding locality.

Bordowali Surface water treatment plant Vs Conventional surface water treatment:

A. Common point in both the treatment plant processes.
   Aeration, coagulation and flocculation, sedimentation, filtration, chlorination and storage are done in both the treatment plant.

B. Difference in Bordowali surface treatment plant from conventional method
   i. Generally in conventional surface water treatment plant, there is screening and grit removal after inlet but in Bordowali water treatment plant screening and grit removal is not done at the plant. It might have been done at the river site.
   ii. In conventional method, there is separate sedimentation and flocculation tank but in Bordowali water treatment plant, flocculation, clarification and sedimentation occur in a single tank i.e., Clariflocculator.

C. Additional feature in Bordowali surface water treatment:-
   i. There is an installation of clariflocculator where flocculation, clarification, sedimentation and clarification takes place in single unit itself. And because of that it has advantage over conventional method as it decreases the surface requirement, reduce the time required for treatment of water and improve efficiency over conventional equipment.
   ii. Electrochlorinator is used for conversion of sodium chloride (NaCl) to sodium hypochlorite so we don't need to use calcium hypochloride (bleaching powder).