Faculty of Engineering

Department of Textile Engineering

Title of the Project

Assessing the impact of the Sewage Treatment Plant (STP) of a ready-made garment industry.

Course Title: Project (Thesis)

Course Code: TE-4214

Submitted By:

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Supervised By:

Md. Abdullah Al Mamun

Associate professor

Department of Textile Engineering

This report presented in partial fulfilment of the requirements for the Degree of Bachelor of Science in Textile Engineering

Advance in Apparel Manufacturing Technology

Fall 2022

DECLARATION

We hereby declare that this Thesis (project) has been done by us under the supervision of **Abdullah AL Mamun**, associate Professor of the Department of Textile Engineering, Faculty of Engineering, Daffodil International University. We also declare that neither this Thesis (Project) nor any part of this project has been submitted elsewhere for the award of any degree or diploma. We also declared that our supervisor has the right to cancel this report.

…… ……

Azizul Hakim Faisal — Md. Robiul Hasan Robin

ID: 191-23-580 — ID:191-23-565

Letter of Approval

Date:

To

The Department Head

Department of Textile Engineering

Daffodil Smart City, Ashulia, Savar, Dhaka.

Subject: Approval of Project Report of B.Sc. in T.E. Program.

Sir,

I am just writing to let you know that this Project report titled as "Assessing the impact of Sewage Treatment Plant (STP) of a ready-made garment industry" has been prepared by the student **Azizul Hakim Faisal (ID:191-23-580) & Robiul Hasan Robin (ID:191-23-565)** and is completed for final evaluation. The whole report is prepared based on the proper investigation and information. The student has directly involved in their Project report activities and the report becomes vital to spark much valuable information for the readers.

Therefore, it will highly be appreciated if you kindly accept this Thesis (project) report and consider it for final evaluation.

Yours Sincerely,

.....

Abdullah Al Mamun

Associate Professor

Department of Textile Engineering

Daffodil International University.

ACKNOWLEDGEMENT

Right off the bat, we express our heartiest thanks and thankfulness to the omnipotent ALLAH for His heavenly gift making us conceivable to finish this venture effectively.

We feel appreciative too and wish our significant obligation to our supervisor **Abdullah Al Mamun**, Associate Professor of the Department of Textile Engineering, Daffodil International University, Deep Knowledge and unmistakable fascination of our supervisor in the field impacted us to complete this thesis (project) report. His perpetual persistence, academic direction, ceaseless consolation, consistent and lively supervision, productive analysis, important guidance, perusing numerous substandard drafts and redressing them at all stages have made it conceivable to finish this project report.

We would also like to express our sincere gratuity to **Engineer Md Aktaruzzaman** (STP project Head) **"Snowtex Group**.". Located at **"B 65/3, LAKURIAPARA, DHULIVITA, DHAMRAI, DHAKA-1350"**. For enabling us to complete thesis (project) on Sewage treatment plant and furthermore for his valuable direction all through the thesis (project). We additionally need to thank **Mominur Rahman**, Assistant Professor & Head (In-Charge), Department of Textile Engineering in DIU for his caring assistance to complete our project report and furthermore to other employees and the staff of Textile Engineering of Daffodil International University.

Finally, yet not least, we might want to recognize my folks for their endorsement, support and love and every one of our companions for their assistance and backing to finish the report.

DEDICATION

First, we want to dedicate this thesis (project) to almighty Allah for giving us this opportunity to prove ourselves. Then we want to dedicate our project to our parents. We love them very much, for completing our study they play a vital role to complete. It's a great pleasure for us. Without their help, we cannot complete this thesis (project), so we are very grateful to them. Our parents were very helpful in getting this project. And we also want to dedicate this project report to our honorable teacher & academic supervisor, **Abdullah Al Mamun, Associate professor,** Department of Textile Engineering, Daffodil International University, to give us a lot of support & guideline for making this thesis (project).

Abstract

The Study focuses mainly on the impact of Sewage Treatment Plant on the ready-made garment industry. As Most of the factories are not aware of sewage water that actually impacts very badly to the environment as well as water resources. Sewage water can be reused and safely disposed by sewage water treatment plant (very new technology in Bangladesh). As STP is not available in most industries, we found it in Snowtex Group, located at B 65/3, Lakuriapara, Dhulivita, Dhamrai, Dhaka-1350. Specifically We, tried to describe the basic mechanism and function of a Sewage Treatment Plant in this study. We also checked the water parameter and compare it with the standard parameter and able to show how it is compatible with the environment. These specific parameters are Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), Total Dissolved Solids (TDS), Nitrate, phosphate, Total suspended solids (TSS), Temperature & coliform. We find that the treated water is not harmful and can be reuse to some specific particular purposes. we tried to find out the costing of a Sewage Treatment Plant (STP) and how it affects on this garment factory. As it's a biological plant, operating cost is minimum. Industrial wastewater is fully organic compound and surprisingly no sludge has been produced as it only produces Carbon and Nitrogen gas which emits into the environment and it's also safe. After Completing this study, we have found gap in this project such as they have no laboratory for testing treated disposal water every day to check its parameters. We have suggested setting up a laboratory for STP. So that everyday water parameters can be checked. In this study, we tried to show the benefits of a Sewage Treatment Plant (STP) for garment industries and for environmentally it is a must for safe sewage discharge water according to environmental law. After completing this study, our statement of purpose is to show how a Sewage Treatment Plant can be an asset of a factory with its so many environmental benefits and it's a great practice of Corporate Social Responsibility.

Keyword: Sewage, STP, Organic, Sludge, Laboratory, Cost.

Table Of Content

List of the Figures:

List of the Tables:

CHAPTER 1: Introduction

1.1 Introduction

The ready-made garment sector of Bangladesh makes an evaluation of the economy. The industry is increasingly focusing on product diversification, innovation, technology upgradation, and skill development in a bid to enhance its capabilities and competitiveness in the global market, in the coming days. The country's growth in recent years has resulted in a decline in poverty levels, stable inflation, moderate public debt and greater resilience to external shocks. All of these are possible because of the huge number of workers. Other important resources are also needed, such as Electricity, water, gas, and fuel. Among them, water consumes around 1,500 billion liters of groundwater a year. As most of the garment factories are situated in Dhaka, Gazipur, Savar and Narayanganj areas of use of groundwater in these places is comparatively higher even though high levels of groundwater usage are prevalent in all the hubs that have RMG and textile manufacturing units. The result as per Bangladesh Agriculture Development Corporation's zoning map (2004 and 2010), the groundwater level is lowering and lowering fast, which has emerged as a major concern. As garments have huge workers and a huge amount of water is used by them, so, their use water can be treated and used for many purposes. This used water is known as sewage water and sewage water can be treated by a sewage treatment plant (STP). In Sewage 99.6% of Water 0.4% mostly compress pollutants. Sewage Treatment Plant is not available in Bangladesh, but only a few private organizations setups it in their factories. Among them, the Sewage Treatment Plant in Snowtex Sportswear & Snowtex outerwear is studied here. Biological Sewage Treatment Plant is built in Snowtex. The outlet water of the Sewage Treatment Plant is used for various purposes, like watering the garden, grass into the toilet flush and reserving for fire emergencies. Sewage Treatment Plant disposal water is safe, and water doesn't carry bacteria fungi and viruses that can cause intestinal, lung and other infections.

1.2 Objectives of this study:

- To find out the impact of Sewage Treatment plants on the garment industry.
- To check the water parameters compared with standard Industrial treated water parameters.
- To provide a basic idea of the Sewage treatment plant and its cost.

1.3 Limitations of this study:

- Limited data or information available on the sewage treatment plant, its processes and performance.
- Difficulty in obtaining accurate measurement and data due to the complex nature of the sewage treatment processes.
- Lack of standardization in terms of sewage composition and treatment processes, which can impact the reliability of results.
- Expensive to test treated water parameters and need to send sample to Bureau Veritas India.

1.4 Background and Purpose of the Study

Bangladesh is totally dependent on ready-made Garments (RMG) that have been playing a crucial role to accelerate economic growth through higher export earnings. Moreover, this sector is also creating vast employment opportunities in the country, especially low-skilled, entry-level jobs for young men and women. So, it's high time to think about their wastewater as a huge amount of people are involved in garments. Besides we know the Textile industry where dying or washing occurs must need an Effluent Treatment plant to purify water from toxic chemical contamination. The textile industry is the most water-consuming industry and also generates more waste water too. As per the Bangladesh Environment Conservation Act, 1995 (Amendment 2010) proper management of sludge is mandatory. So, the Textile industry has a must ETP plant. But in ready-made garments (RMG) only cut and sew goods, hence no toxic chemical is used. So ETP is not necessary for garments. But there are lots of human wastewater producing as huge workers involved here. As a result, we need to think about human waste water as it also carries viruses, bacteria and pathogens and try to rescue water. Sewage Treatment Plant can be used in Ready-Made Garments (RMG) in order to remove impurities from Sewage to generate clean water that can be discharged to the environment or reused. The sewage Treatment Plant in Snowtex is fully biological, So the operating cost is very low which we will be calculating in data collection. The function of Sewage Treatment Plant and how it works, only basic ideas will be given here. The positive and negative impact on Ready Made Garments (RMG) will be shown in the study. Sewage treatment plant create a good impression among buyers and much more compatible with compliance and it's a very good corporate social responsibilities (CSR) practice. As STP is not often used in Bangladesh's garment industry, this study's purpose is to show the positive side of STP and realize, that in the sustainable development era, STP is a must for Apparel Industry.

CHAPTER 2: Literature Review

2.1 Literature Review

No studies have been carried out previously on Sewage treatment plants in the ready-made garment industry. Our article that study on sewage treatment plant in the ready-made garment industry is never been published before. The sewage treatment plant is not often used in ready-made garment in Bangladesh, so this study can help to reach the industrial authorities for better understanding of this sewage water treatment plant. As no research happened previously, this research will help the future researcher to be more practical in the ready-made garment industry regarding their sewage waste management system. In the future, every ready-made garment owner will be more interested in setting up a sewage treatment plant. This type of study is needed more to understand the effectiveness of sewage treatment plant. So, researchers should come forward to aware ready-made garment authorities regarding this type of wastewater management system for industrial purposes. We tried to present the actual scenario of sewage treatment plant through this study. How can a sewage treatment plant reduce its impact on the environment will be shown here. We take some standard information from the internet and books to verify the information and data we got from Snowtex group's Sewage Treatment Plant STP.

There are lots of advantages and disadvantages and their performance in treating industrial wastewater.

2.2 Advantages:

1. Improved water quality: Industrial Sewage treatment plants help to improve the quality of water by removing pollutants and contaminants, making safe for reuse and discharge.
2. Compliance with regulations: Sewage Treatment Plants ensure that industries comply with regulations and laws related to sewage discharge, avoiding penalties and fine
3. Reduced environmental impact: STP reduce the impact of industrial wastewater on the environment, preserving and protecting the local ecosystem.

4. Recycling and reuse of water: Treated water can be recycled and reused, reducing the demand for fresh water and conserving these limited resources.

2.3 Disadvantages:

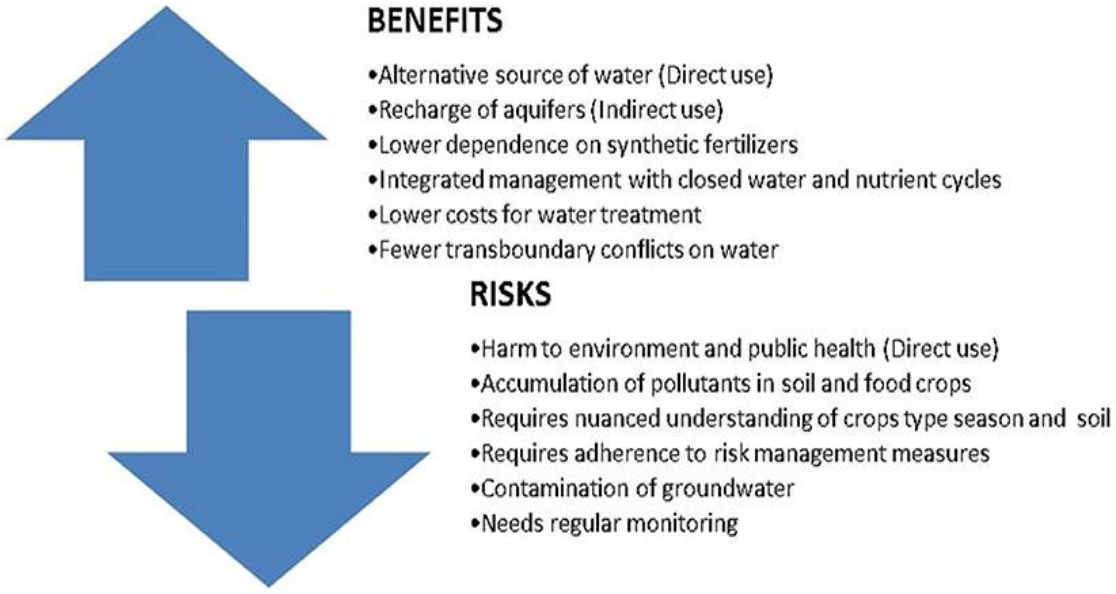
1. High capital needed to establishing sewage treatment plant
2. The process of treating industrial waste water can be complex and requires specialized knowledge and expertise to operate effectively.
3. The treatment process requires a significant amount of energy

There are mainly two types of sewage treatment plant:

1. Biological Sewage Treatment Plant
2. Chemical Sewage Treatment Plant

Among them, the biological sewage treatment plant is studied here as its in Snowtex Group where we are doing our study on a sewage treatment plant.

2.4 Water reuse facts:

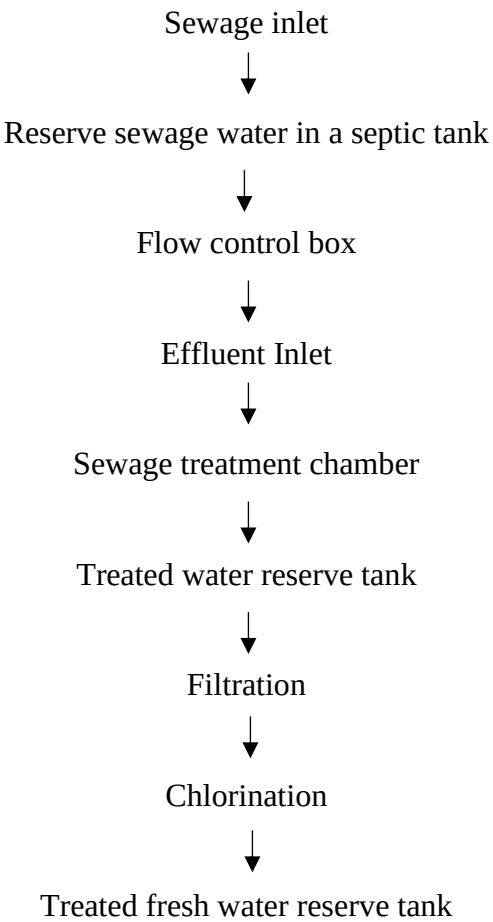


CHAPTER 3: Methodology

3.1 Methodology

The research has carried out on a sewage treatment plant which is inside of Snowtex sportswear and Snowtex outerwear. Snowtex is a garment factory where this study has been done. We tried to find out the advantages and disadvantages of this sewage treatment plant in Snowtex. Eventually, we tried to find out important data on sewage treatment plant which will help to implement this in other factories. We really enjoyed doing this research and in future, we will try to work for the betterment of RMG sectors.

3.2 Process flow chart of studied sewage treatment plant:



3.3 Specification of the sewage treatment plant in Snowtex Group:

Total Area: 6268 sq feet

Capacity: 800000 litres/day

Initial Investment: 70000000 BDT

Monthly Operating Cost: 132525 BDT

3.4 Photos of the Sewage treatment plant of Snowtex Group:

Figure 3.4.1: STP Plant

Figure 3.4.2: STP Chamber

Figure 3.4.3: STP Chamber

Figure 3.4.4: Air Blower

Figure 3.4.5: Pressure Filter

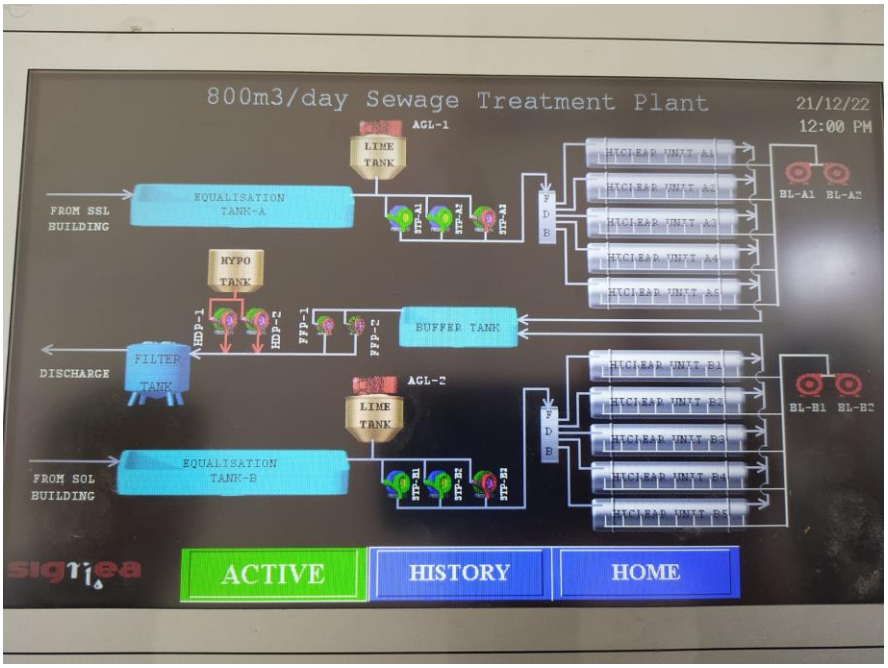


Figure 3.5.6: Process Flow

3.5 Data collection

In the data collection we tried to attach authentic data and 100% original according to Snowtex Group STP Data and all the original sheets are attached here from the factory.

3.5.1 Sewage treatment plant layout:

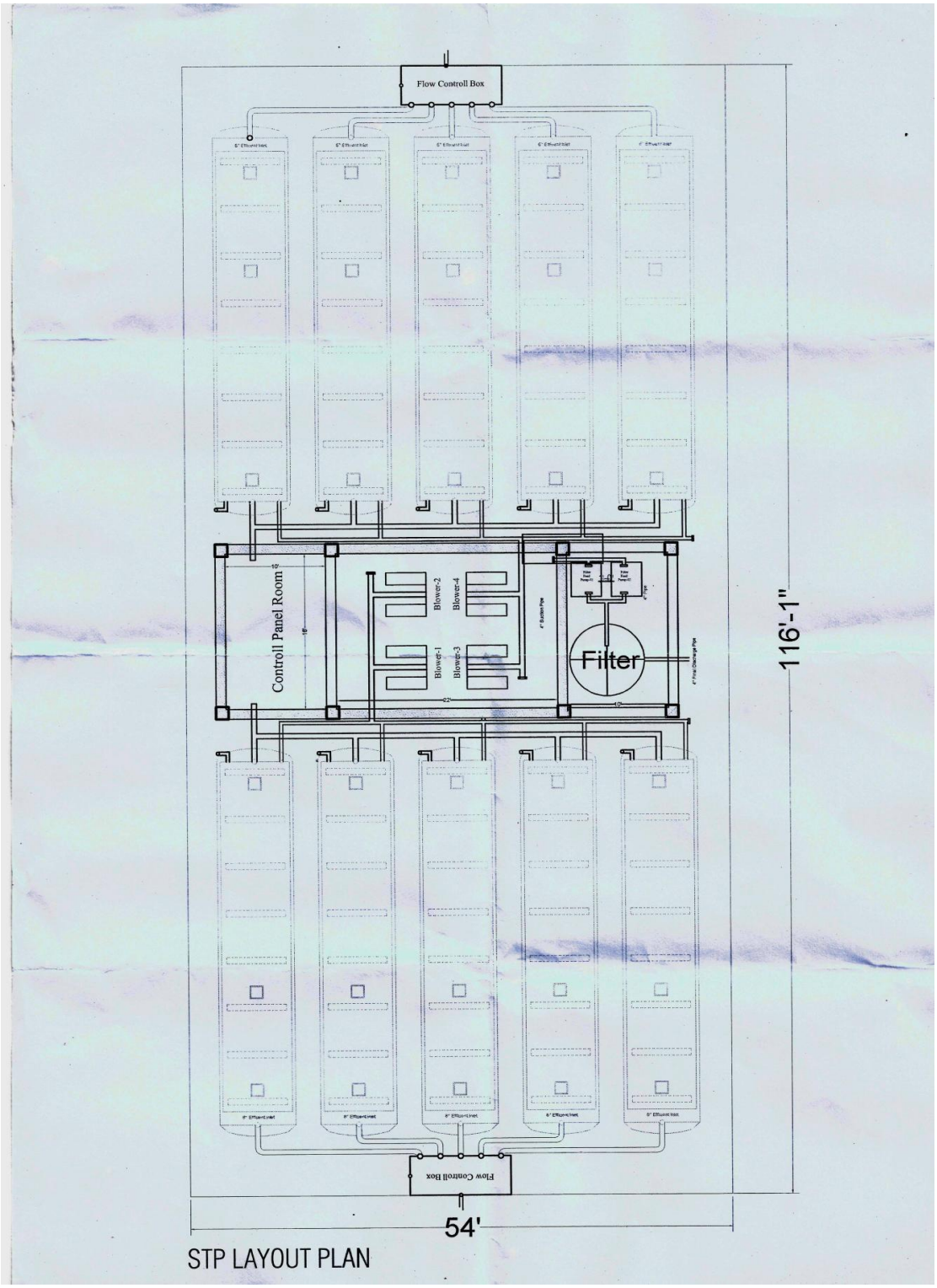


Figure 3.5.1: Layout of Sewage Treatment Plant

3.5.2 Description on layout plan:

The Sewage water treatment plant is 116 feet 1 inch in length and 54 feet in width. There are a total of ten sewage treatment chambers. The south side is for Snowtex Sportswear ltd it means five chambers for Snowtex sportswear and another five on the north side for Snowtex outerwear ltd. These chambers are used for the sewage treatment plant. In the middle portion, there are four blowers, one big filter, a control room and one reserve tank under the blower for treated water and in the rooftop, there is one reserve tank for reserve water after filtration.

3.5.3 Description of this sewage treatment plant mechanism:

On the layout, we can see chambers where sewage treatment occurs. This chamber has three portions. In the first portion, mixing takes place of sewage, mixing is for the dilution of the sewage finely. This mixing is done by high-pressure air. good mixing is necessary for easy access to bacteria. Then in the next portion, sewage has to circulate at high velocity with bacteria. So that air can penetrate into sewage particle and helps the microorganism to work more efficiently in presence of oxygen. After bacteria treatment, gas is produced from organic material. then through the upper pipeline, gas emits and water remains there. In third portion In the third portion water remains with bacteria and bacteria start to die in absence of oxygen. this portion has also an upper gas outline from where the rest of the gas emits. Then water sends to filtration and chlorination for killing the rest of the bacteria. thus we get treated fresh water.

3.5.4 Mechanism of bacteria:

The mechanism of bacteria inside sewage involves the growth and activity of treat wastewater by breaking down complex organic compounds, such as proteins, carbohydrates, and fats, into simpler, more easily biodegradable compounds. This process is known as biodegradation. In an aerobic treatment process, oxygen-loving bacteria are used to decompose the organic matter. These bacteria convert the organic matter into carbon dioxide (CO_2), water (H_2O), and nitrogen compounds (such as nitrates and nitrites) through a series of oxidation reactions. Overall, the reactions taking place inside a biological sewage treatment plant help to remove pollutants and organic matter from the sewage water, making it safe for discharge into the environment or for reuse. microorganisms that are naturally present in wastewater.

These microorganisms, including bacteria, play a crucial role in breaking down organic matter and converting it into simpler compounds. In a biological sewage treatment plant, bacteria are used to

3.5.5 Mechanism of chlorination:

Chlorination is an important step in the biological sewage treatment process as it helps to kill harmful bacteria and pathogens in the treated wastewater. The following are the reasons why chlorination is needed in a biological sewage treatment plant:

3.5.5.1 Pathogen Control:

Chlorination helps to kill harmful bacteria and pathogens in the treated wastewater, reducing the risk of waterborne diseases and improving public health and safety.

3.5.5.2 Disinfection:

Chlorination helps to disinfect the treated wastewater, removing harmful microorganisms and ensuring that the treated wastewater is safe for reuse or discharge into the environment.

3.5.5.3 Compliance with Regulations:

Chlorination helps to ensure that the treated wastewater meets regulatory discharge standards by reducing the levels of harmful bacteria and pathogens in the effluent.

3.5.5.4 Improved Reuse Potential:

Chlorination helps to improve the potential for reuse of treated wastewater by removing harmful bacteria and pathogens that can affect the quality of the effluent.

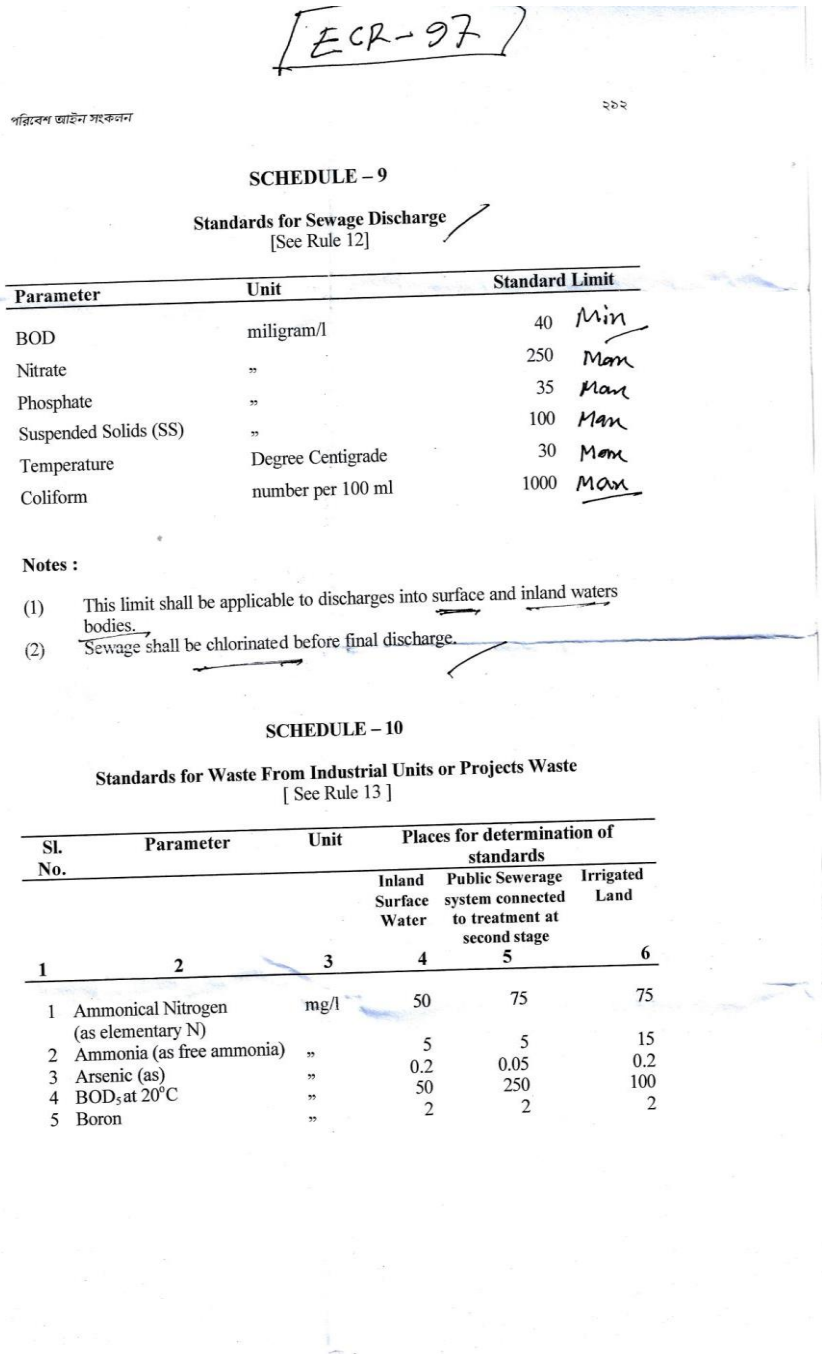
3.5.5.5 Odor Control:

Chlorination helps to control odors in the treated wastewater by neutralizing organic compounds that can produce unpleasant odors.

Overall, chlorination is an important step in the biological sewage treatment process, as it helps to kill harmful bacteria and pathogens in the treated wastewater, reducing the risk of waterborne diseases and improving public health and safety, while also

helping to ensure that the treated wastewater meets regulatory discharge standards and has improved reuse potential.

3.5.6 Standard parameters for STP:



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SCHEDULE – 9

Standards for Sewage Discharge
[See Rule 12]

Parameter	Unit	Standard Limit
BOD	miligram/l	40 Min
Nitrate	,,	250 Max
Phosphate	,,	35 Max
Suspended Solids (SS)	,,	100 Max
Temperature	Degree Centigrade	30 Max
Coliform	number per 100 ml	1000 Max

Notes :

(1) This limit shall be applicable to discharges into surface and inland waters bodies.

(2) Sewage shall be chlorinated before final discharge.

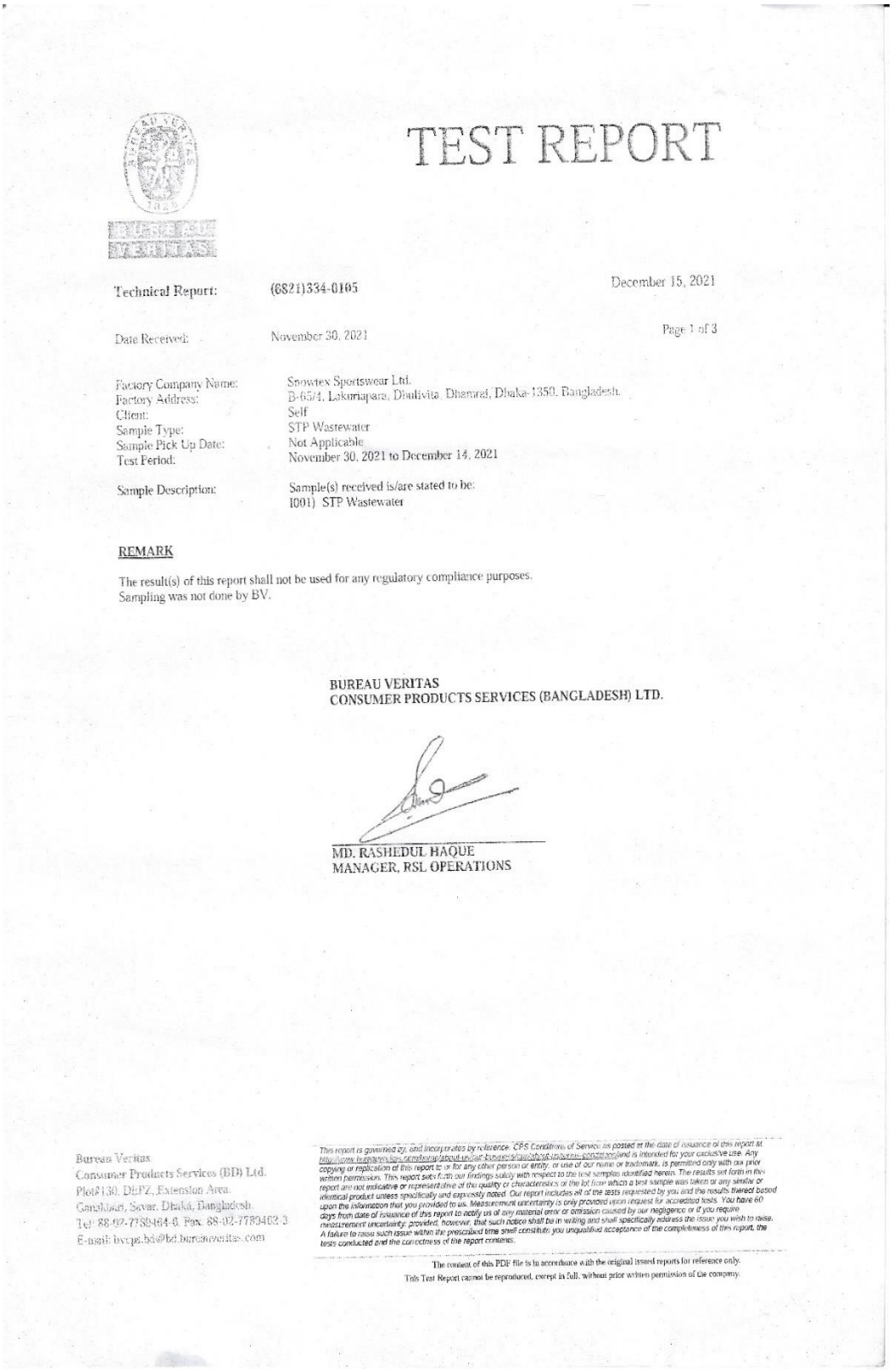
SCHEDULE – 10

Standards for Waste From Industrial Units or Projects Waste
[See Rule 13]

Sl. No.	Parameter	Unit	Places for determination of standards		
			Inland Surface Water	Public Sewerage system connected to treatment at second stage	Irrigated Land
1	2	3	4	5	6
1	Ammonical Nitrogen (as elementary N)	mg/l	50	75	75
2	Ammonia (as free ammonia)	,,	5	5	15
3	Arsenic (as)	,,	0.2	0.05	0.2
4	BOD_5 at 20°C	,,	50	250	100
5	Boron	,,	2	2	2

Figure 3.5.6: STP Standard Parameter

3.5.7 Test report of treated sewage water parameters:



TEST REPORT

Technical Report: (6821)334-0105 December 15, 2021

Page 1 of 3

Date Received: November 30, 2021

Factory Company Name:	Snowtex Sportswear Ltd.
Factory Address:	B-65/4, Lokuriapara, Dhalivita, Dhamrai, Dhaka-1350, Bangladesh.
Client:	Self
Sample Type:	STP Wastewater
Sample Pick Up Date:	Not Applicable
Test Period:	November 30, 2021 to December 14, 2021
Sample Description:	Sample(s) received is/are stated to be: I001) STP Wastewater

REMARK

The result(s) of this report shall not be used for any regulatory compliance purposes.
Sampling was not done by BV.

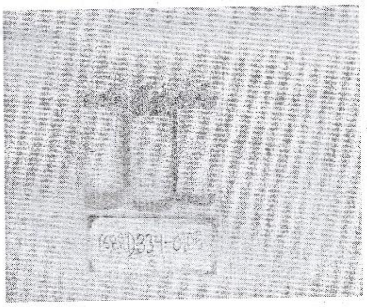
BUREAU VERITAS
CONSUMER PRODUCTS SERVICES (BANGLADESH) LTD.

MD. RASHEDUL HAQUE
MANAGER, RSL OPERATIONS

Bureau Veritas
Consumer Products Services (BD) Ltd.
Plot#130, DEPZ, Extension Area,
Ganakbari, Savar, Dhaka, Bangladesh.
Tel: 88-02-7789464-6, Fax: 88-02-7789462-3
E-mail: bvcps.bd@bd.bureauveritas.com

Photo of the Sample

I001)



Executive Summary

Parameter	Conclusion
pH Value	See result in page 3
Biochemical Oxygen Demand (BOD_5)	
Chemical Oxygen Demand (COD)	
Total Suspended Solids (TSS)	
Ammonium Nitrogen	
Total Dissolved Solids (TDS)	
Dissolved Oxygen (DO)	
Phosphate	
Nitrate	
Total Coliform	
Fecal Coliform	
Ammonia (As free ammonia)	

Test Result

Tested Item(s) : I001) STP Wastewater

Test Parameter	Result I001	Unit	Test Method
pH Value	8.2 at 21.2 ° C	-	Reference to ALPA 4500-H+B & EPA 150.2
Biochemical Oxygen Demand (BOD_5)	29	mg/L	Reference to APHA 5210B & ALPA 5210B (5 days)
Chemical Oxygen Demand (COD)	121	mg/L	Reference to APHA 5220D
Total Suspended Solids (TSS)	44	mg/L	Reference to ALPA 2540D, GB 11901, ISO 11923
Ammonium Nitrogen	0.46	mg/L	Reference to APHA 4500-NH_3 – B & F 22nd Edition 2012
Total Dissolved Solids (TDS)	704	mg/L	Reference to APHA 22nd Edition-2540C:2012
Dissolved Oxygen (DO)	5.45 at 21.2 °C	mg/L	Reference to Hach manual for LDO & In-house
Phosphate	1.43	mg/L	Reference to APHA 4500-P. B. E (2012)
Nitrate	ND	mg/L	Reference to IS 3025 (Part 34): 1988
Total Coliform	114 Bacteria / 100 mL	Bacteria / 100 mL	Reference to ISO 9308-1: 2014
Fecal Coliform	Present / 100 mL	Bacteria / 100 mL	Reference to IS 1622: 1981 (RA 2019)
Ammonia (As free ammonia)	137.5	mg/L	Reference to APHA 4500-NH_3 – N

Note:
Detection Limit (mg/L): 5 (TSS), 2 (COD), 2 (BOD_5), 5 (TDS)
APHA: American Public Health Association Standard Methods for the Examination of Water and Wastewater.
U. S. EPA: United States Environmental Protection Agency.
LDO = Luminenscent Dissolved Oxygen
°C: degree Celsius, mg/L: milligram per liter
ND = Not Detected

Remark : The report [(6821)334-0105] is sub-contracted to India (Testtex India Laboratories Pvt. Ltd.) for Nitrate, Total Coliform, Fecal Coliform & Ammonia (As free ammonia) Tests.

END

3.5.8 Operating cost of Sewage treatment plant:

STP Yearly Costing					
SL No	**Name Of Item**	**Unit**	**Quantity**	**Unit Rate**	**Total Rate**
1	Chlorine	Kg	60	25	1500
2	Lime	KG	360	75	27000
3	Blower Filter	Pcs	4	5000	20000
4	Electrical Maintenance				15000
5	Mechanical maintenance				15000
6	Electricity Cost	KWH	13000	8.6	111800
	Total Cost				**190300**

Table 3.5.8: STP yearly costing

[Note: Data collected from the Snowtex Group's accounts department. Costing may vary from year to year].

Costing calculation:

Initial Investment = 70000000 BDT

Operating cost = 190300 BDT

Estimated life expectancy- 50 years

Depreciation in straight line method:

Depreciation for initial investment/year = 70000000/50 BDT

= 1400000 BDT

Total yearly expenses= 1400000+190300 BDT

= 1590300

Monthly Expenses = 1590300/12

= 132525

Total line = 160

The monthly cost for a line = 132525/160

= 828.28 BDT

Per day cost for a line = 828.28/26= 31.86 BDT

3.6 Types of bacteria used in this STP:

3.6.1 Nitrosomonas-

3.6.2 Nitrobacter-

3.6.3 Pseudomonas-

Figure 3.6: Photos of Bacteria

CHAPTER 4: Result and Discussion

4.1 Test parameters comparison with standard parameter:

Sl No.	Parameters Name	Standard Parameters	Test Result parameters
01	pH Value	6.5 to 8.5	8.2 at 21.2℃
02	Biochemical Oxygen Demand (BOD_5)	40 minimum	29 mg/L
03	Chemical Oxygen Demand (COD)	Less than 250 mg/L	121 mg/L
04	Total Suspended Solids (TSS)	100 maximum	44 mg/L
05	Ammonium Nitrogen	Less than 25 mg/L	0.46 mg/L
06	Total Dissolved Solids (TDS)	2100 maximum	704 mg/L
07	Dissolved Oxygen (DO)	4.5-8	5.45 at 21.2℃
08	Phosphate	35 maximum	1.43 mg/L
09	Nitrate	250 maximum	ND
10	Total Coliform	1000 Bacteria/100ml	114 Bacteria/100ml
11	Fecal Coliform	5,000 MPN/100ml	Present/100ml
12	Ammonia (As free Ammonia)	5	137.5 mg/L

Table 4.1: Comparison between Standard parameter & Test Parameter

4.1.1 Comment:

After comparison of treated sewage discharge water parameters with standard sewage discharge water, we can give a statement that this sewage treatment plant is effective and treated sewage discharge water is not harmful for reuse except drinking water as **Fecal Coliform** is present at water. The Maximum Contaminant Level (MCL) for bacteria in drinking water is **zero total coliform colonies** per 100 milliliters of water as established by the EPA. Water produced through this process is used for **irrigation, hydrants, toilet flushing, cooling water, concrete water**, gardening and many such purposes.

4.2 Costing summary:

After calculating the operating cost, we find that a line cost for STP is 828.28 BDT monthly. Perhaps only BDT cost for a line per day which is quite cheap. According to this studied sewage water treatment plant, no manpower is needed for monitoring as the project engineers claim that the bacteria will perform better if no humans are present there. So, the project is running automatically by Programmable Logic Controller (PLC) and if any problem occurs then inform automatically through signal to project responsible personal. So, for this STP no man is need to run it. That's why operating cost is so low.

4.3 Gaps found in this study:

Regular basis testing is not possible here as the Snowtex group have no equipment and lab for water parameters checking. Moreover, they send water sample to India for testing which is much time consuming and quite expensive. In this type of sewage water treatment plant, it is much important to have the system of waters parameter testing on regular basis to check how effectively it's working. The authorities primarily checking smell of treated water, if bad smell come off then it indicates STP is not working properly then they send sample to Bureau Veritas for testing.

4.4 Suggestions:

As Snowtex group have a huge Sewage treatment plant. It will be effective much more if they set up a laboratory for water parameter testing on regular basis and it will be more acceptable to check hourly and record the test report. Disposal outlet samples will also be need to collected in the laboratory to check the samples after 10-15 days according to international standard.

4.5 Precautions:

As it is a biological Sewage treatment plant, bacteria will be more active and perform well if no human allowed there. The STP of Snowtex Group is totally automatic PLC based. No one is needed there to maintain and operating If any problem occurs then sent signal to control room which is in enough distance from STP. So it is much important to not allowed any person there. Thus, Bacteria will be in good condition and perform effectively.

CHAPTER 5: Conclusion

5.1 Conclusion:

In this study, we tried to investigate whether sewage treatment plant is suitable or not for the garments industry and how they impact on the environment. We feel proud that we have successfully finished this project. We have successfully able to describe the basic functions of Sewage Water Treatment Plant in this study. The discharge effluent water parameters are tested in Bureau Veritas and found that every parameters are compatible with standard discharge water parameters and also comply with local environment rules. The important part is that this sewage treatment plant is effective and satisfied us. This type of waste water management system is not practice in our country. It's a very good CSR activity by Snowtex Group. Hopefully, after this study, many ready-made garment authorities will come forward to set up Sewage Treatment Plant (STP). Water reuse is much more needed now for sustainable development. The fantastic factor is that the operating cost of a STP is not so much, as monthly cost is only 132525 BDT and perhaps a line cost is only 828.28 BDT. After completing this study we have found some problems and hopefully, it will be solve by the authorities within short time. So small factories can also set up STP according their capacity of water. Initial investment is high but it creates good impression to buyers and they always pay for these types of activities as it count as indirect cost. Sewage Treatment Plant is now necessary for sustainable development goal in ready-made garment. No chemical is used in this sewage treatment plant and its fully biological which indicate it will be more sustainable in future. To create a green healthy environment, sewage treatment plant is mandatory for fresh discharge water.

References

http://snowtex.com.bd/Home/Factories

https://www.frontiersin.org/articles/10.3389/fenvs.2020.00030/full

https://www.researchgate.net/publication/283507015_A_Review_on_Textile_Wastewater_Characterization_in_Bangladesh/figures?lo=1

https://www.usgs.gov/special-topics/water-science-school/science/wastewater-treatment-water-use

https://samcotech.com/what-is-a-biological-wastewater-treatment-system-how-does-it-work/

https://clearfox.com/biological-sewage-treatment-plant/

"Biological Wastewater Treatment Systems: Principles, Design and Operation" edited by Isam Shahrour and Ralf Otterpohl.

https://www.bgmea.com.bd/page/AboutGarmentsIndustry

"Wastewater Engineering: Treatment and Reuse" by Metcalf & Eddy, Inc.

"Industrial Waste Treatment Handbook" by Nicholas P. Cheremisinoff

"Sewage Treatment Plant Design" by M. W. Kennedy

"Handbook of Water and Wastewater Treatment Plant Operations" by Frank R. Spellman

"Biological Wastewater Treatment in Warm Climate Regions" by Ahmed H. Al-Musallam

"Environmental Engineering: Fundamentals, Sustainability, Design" by James R. Mihelcic and Julie B. Zimmerman.

"Industrial Water Pollution Control" by R. T. Eglese

"Advanced Waste Water Treatment" edited by H. H. Hahn

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