UNIVERSITY OF TECHNOLOGY MARA (UiTM)

INDUSTRIAL TRAINING FIELD REPORT

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Programme: EH110

Student ID : 2018692404

LI Duration : 22nd March 2021 – 16th July 2021 (17 weeks)

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1.0 Introduction

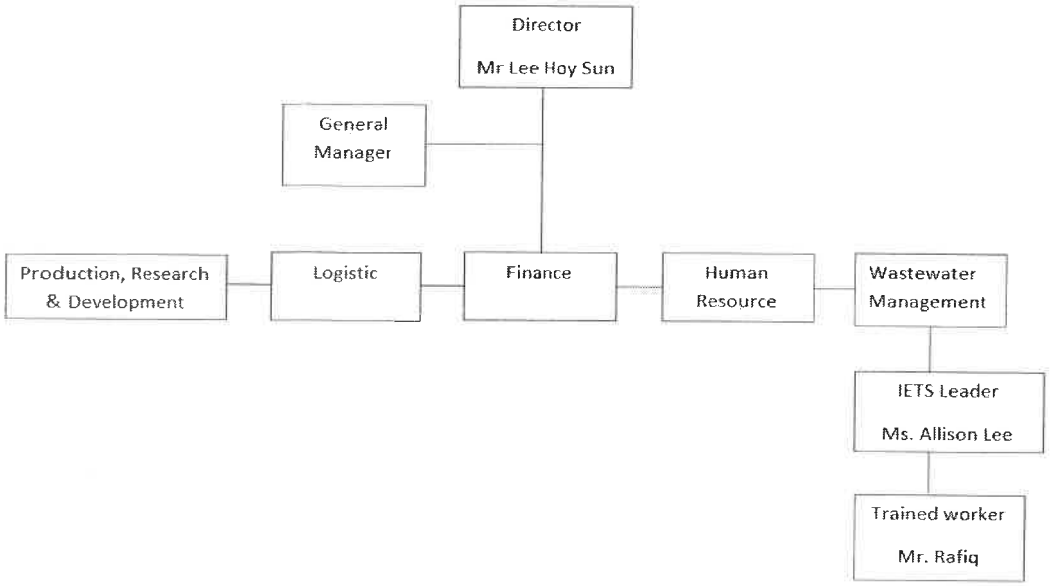
Industrial training is mandatory subjects for all students of Universiti Teknologi MARA (UiTM) as a prerequisite for graduation. The aim for this industrial training is to disclose the actual working environment and types of work that chemical engineers do and appreciate the theoretical knowledge. Moreover, this subject will help the students to perform basic engineering practices, including technical writing report, and improving communication skills with colleagues, handling project, and generating proposal for betterment of the industry.

The purpose of this report is to document the student's daily activities and their project during the 17 weeks of industrial training beginning with 22nd March 2021 until 16th July 2021. I was given an opportunity to undergo my internship at Vegeta Manufacturing Sdn. Bhd. which located in Shah Alam, Selangor. The company operates in the fruit and vegetable preserving and specialty food manufacturing sector. During my industrial training, I was assigned to industrial effluent treatment system (IETS) department. I had the opportunity to gain my knowledge on wastewater treatment plant of this company. I worked under the supervision of the IETS leader, Ms. Allison Lee with the help of Rafiq, a trained worker. There are several tasks need to be done for my industrial training for the wastewater treatment plant. All the work progress directly reported to Ms. Allison Lee.

2.0 Content

2.1 Organization chart

Vegeta Manufacturing Sdn. Bhd. consisted of Director, General Manager, Production, Research and Development (R&D), Logistic (purchasing and marketing), Human Resource Management, Accounting and Finance, Wastewater management.



2.2 History of company

The Vegeta Groups of Companies was established in 1997 as a juice and health food manufacturer based in the center of the Peninsular Malaysia. In year 1999, Vegeta Groups are diversified to skincare and hair care products development and supply the goods of research to the multilevel company until today. Vegeta have a "BETTER" emphasis to produce quality products based on slogan.

"TOTAL COMMITMENT TOWARDS CUSTOMER SATISFACTION, SAFETY, QUALITY & QUANTITY".

At the early stage or at the beginning, Vegeta Groups are specialized in can juice manufacturing like orange, mango, apple, kiwi, lychee, pink guava, tamarind, soursorp and tropical fruit punch. Besides, we also produced energy drink, herbal drink and "asian drink" like soya bean milk, chrysanthemum tea, green tea and grass jelly.

In year 2004, Vegeta Groups had established a production line for the carbonated sport drink and herbal energy drink and export most of the production output to US and Europe market. In year 2005, Vegeta Groups invested for more than 2 million in bio- technology products like collagen and medicated golden sea cucumber peptide" for healthy skin and noni juice.

All stages of the production are stringently monitored and subjected to a HACCP food safety system implementation for the oral production lines and GMP implementation for the external use of the production like skin care and hair care. The in-house laboratory facility tests all in-coming raw ingredients and finished products' microbial and physical properties at predetermined interval.

Today, most of Vegeta products used finest ingredients and natural raw materials for the processing and committed to look for the natural ingredients in the product research and development.

Vegeta Groups of Companies has grown and penetrates the local and international market with an enviable reputation for the products quality consistency and professionalism. Now, our products are marketed in more than 15 countries include USA, Taiwan, Vietnam, India, Mauritius, Iran, Libya, Nigeria, Singapore, Mauritania, Pakistan and China. The Company location of Vegeta Manufacturing Sdn. Bhd. is located at Lot 3813, Lorong 9D, Jalan 4D, Kg. Baru Subang, Seksyen U6, 40150 Shah Alam.

Figure 1: Front view and location of Vegeta Manufacturing Sdn Bhd.

2.3.1 PROCESS DESCRIPTION

2.3.2 Chemical Reaction Process

In the chemical treatment tank, Sodium Hydroxide (NaOH) will be dosed and mixed with the wastewater when the pump at equalization tank is activated (continuous system). The pH of the influent wastewater is adjusted by the NaOH solution via a pH controller, it is to provide effectiveness of the precipitation of dissolved solids. Then, the neutralized water flows into the coagulation tank for dissolved solid precipitation process. Polyaluminum chloride-PAC (coagulant) is dosed to coagulate the dissolved solids to form fine flocs. Next, the coagulated wastewater flows into flocculation tank. Anionic polymer is dosed to form a larger floc size. The flocculated water will be gravity flowed into the primary clarifier.

Primary clarifier is designed to allow the flocs to settle by the gravity over a relatively long period of time. This is due to the fact that gravity provides a natural separation of solids and liquid in the tank. As the floc settle downward, the liquid remains upward, and the partially treated water is flowed into the aeration tanks. While the sludge at the bottom of clarifier is periodically withdrawn to sludge holding tank by using the sludge transfer pump.

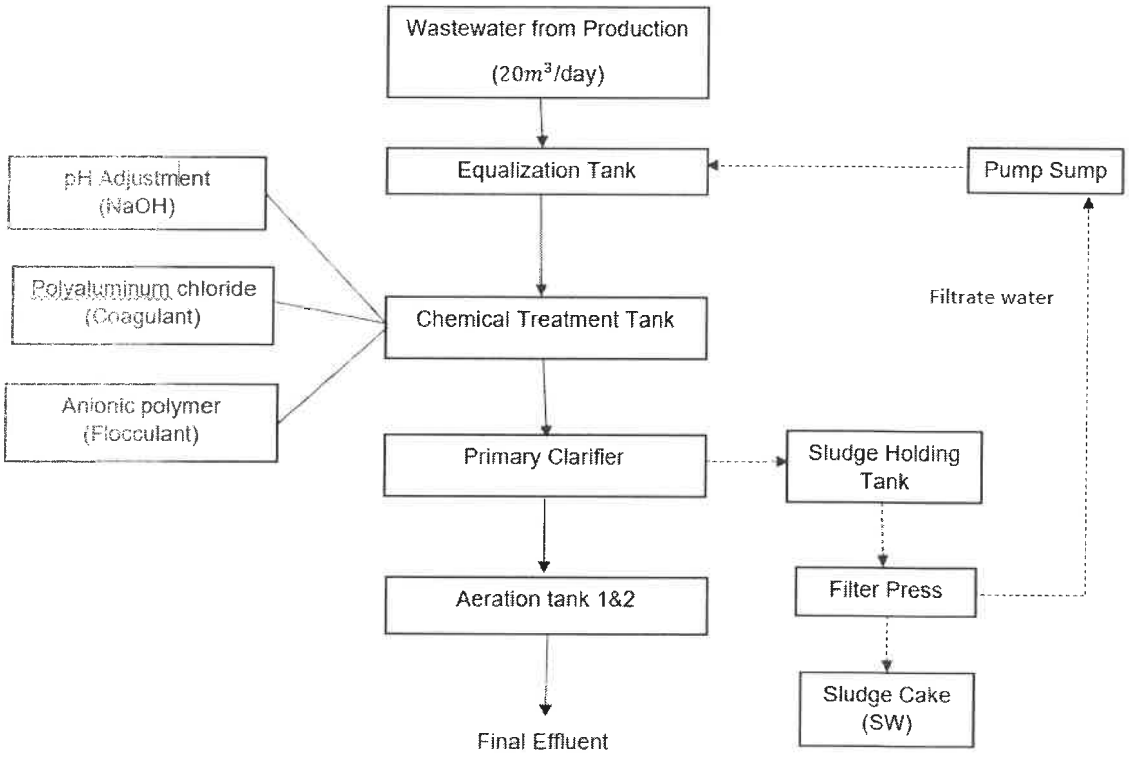
2.3.3 Biological Treatment

In the aeration tanks (aeration tank 1 & aeration tank 2), air supply from blowers and also activated microbial will remove Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) from the wastewater. The microorganism in the activated sludge will utilize organic matter and BOD constituents in the wastewater to maintenance the cell growth. As BOD constituent in the wastewater was used up, the concentration of this pollutant in the water will be reduced. Effluent from the aeration tanks contains suspended biological solids (known as activated sludge) that must be removed prior to discharge. However, the amount of activated sludge is not in large quantities. Thus, secondary clarifier is no longer needed. Therefore, the next step of the secondary treatment process is sedimentation will be in the aeration tank 2. The settled solid at the bottom aeration tank 2 is periodically withdrawn to the sludge holding tank.

2.3.4 Sludge Dewatering System

The solids collection and dewatering system consist of a sludge holding tank. Slurry waste at the bottom of primary clarifier will periodically be removed to the sludge holding tank by using sludge transfer pump. Dewatering is a solid handling process operation. Slurry waste from the sludge thickener is directly dewatered by using filter press to remove access water. This operation reduces the volume and increase the dryness of the solids. Feed slurry typically 2-3% on solid content are pumped through filter press, which yield filter cake typically 25-30% in solids content. Next, the filter cake is removed by using scraper from the filter press. Then, the filter cake to be collected into a jumbo bag and disposed by licensed contractor. The filtrate from filter press is transferred to the pump sump and then to the equalizing tank for further treatment.

2.3.5 Flow diagram process flow



2.4 Brief daily and weekly activity

Overall, working in wastewater treatment plant have many tasks to do during the course of a day. First thing in the morning, we are going to start up our wastewater treatment plant. We must ensure that:

i. the primary clarifier is clear without any sludge/scum floating
ii. clear the unbroken foam from aeration tanks into sludge holding tank
iii. all the chemical tanks are sufficient to be used during the whole day
iv. remove all water in air compressor

Once the plant is running, we took water sample from each aeration tanks (aeration tank 1 and 2) into measuring cylinder for Sludge Volume Index (SVI) test. The volume of water sample needed is 1000ml each tank. Then, we wait for 30 minutes and observed the sludge settling.

Next, the jar test is going to be held after at least 30 minutes after the plant running. The water sample was taking from the flocculation tank. Observe the settling of solids for 2 minutes. While observing, we need to take a picture of the beaker at 1 minute and 2 minutes to report to the supervisor. The determination of the dosage of chemicals are decided by the supervisor.

Then, dewatering a sludge from filter press, which came from the sludge holding tank. We need to open air valve and close the valve connect between sludge holding tank and filter press. After that, we are going to discard rejected juice into pump sump pit. The amount of rejected juice are going to be discard are based on the value of SVI test earlier. Normally, the amount of sugar (contained in rejected juice) for a day are between 5 to 8 kilograms.

In the evening, we are going to remove filter cake from the filter press. Firstly, we must ensure that the air valve is close before open the filter press. We use plastic scraper to remove it and collect the filter cake into jumbo bag. A jumbo bag must not exceed 40 kilograms of filter cake. Then, the weight of the filter cake is recorded.

All these activities are being recorded into performing monitoring report. This report consists of performance monitoring of equalization tank, coagulation and flocculation process, primary clarifier, aeration tanks, sand filter, carbon filter and filter press. This report is to ensure the effluent water is complied with the Standard B of Water Quality Malaysia. Furthermore, this report can be analyses when problems occur during running the wastewater treatment plant.

For weekly activity, we need to go for chemical physical restock check at chemical storage. This task only needed once a week, thus we only done this on every Thursday. These are the chemicals that need to be check:

i. Caustic soda flake
ii. Caustic soda liquid (CSL) 48.5%
iii. Nitric acid 30%
iv. Sulfuric acid 98%
v. Polyaluminum chloride
vi. ECO 125 (Anionic polymer)
vii. Sodium hypochloride
viii. ECO 5580 (Enzyme)
ix. ECO 3600 (Nitrogen)
x. Soda ash

During the MCO 3.0, we are recommended to work at home (WFH) to break the chain of Covid-19 virus. Thus, the supervisor gave us 9 modules to be complete at home. The objective of this task is to expose interns with more understanding on how the company operates and manage the wastewater treatment plant. These are the topics for each module:

Module	Topic
1	The certified environmental professional in IETS operstion (CePIETSO)
2	Understanding the legal framework
3	Characteristics of industrial effluent and discharge impacts
4	Overview of Industrial Effluent Treatment System (IETS)
5	Physical-chemical treatment processes
6	Performance monitoring of common physical-chemical treatment processes
7	Typical measurement in PCP (physical chemical processes)
8	PCP components and instruments
9	PCP maths

2.4 Task assigned

Task	Duration
[illegible]p orientation	22nd March – 26th March
[illegible] treatment method	24th March
[illegible] start up wastewater treatment plant (wwtp)	24th March
[illegible] SVI test	24th March
[illegible]define for Monitoring Peformance Report	22nd March – 26th March
[illegible]mple collection of effluent water	22nd March – 16th July
Modules	25th May – 16th July
Webinar	25th May – 16th July

2.5.1 Wastewater treatment plant briefing

On the 22nd and 23rd of March 2021, I have attended wastewater treatment plant (WWTP) briefing that was presented by Mr Amir, practical student from University Teknologi Mara (UiTM) Shah Alam. He had taught me a lot about wastewater treatment plant at the company and how to conduct the wastewater quality control. I also need to understand about the rules and regulation, safety procedure in IETS, the job scope, and flow of process at each equipment in IETS. It is essential to have knowledge on Wastewater Treatment Plant rules and regulation. The objective of this program is to increase my knowledge on IETS and the role WWTP process. Then, I was given a question sheet before and after the briefing to assess the effectiveness of the briefing. The session then continued with Q&A sessions, where I was given the opportunity to ask our uncertainties. This briefing has increased my knowledge and I was able to understand better about WWTP, its importance, and duties of workers in processing the IETS.

2.5.2 Influent in wastewater treatment plant

In food processing applications, water is used as an ingredient, an initial and intermediate cleaning source, an efficient transportation conveyor of raw materials, or the principal agent for sanitizing plant machinery and work areas. In addition, bottle washing, or cleaning of machines and equipment also requires enormous amounts of clean water. This makes freshwater consumption is an essential cost factor in the production of beverages. As a result of the extensive use of water, the food industry's primary concern is that water and wastewater is handled in the most cost-effective method and reused in whatever capacity possible to reduce costs.

Wastewater from such food industry processing plants contain mainly carbohydrates, such as sugar, pectins, but also flavourings and colouring additives. Wastewater produced is from cleaning process of equipment. Lot of chemicals have been used such as soap, detergent, acids, and waste from raw ingredient such as soybean extract, milk, tea powder, cocoa powder and fruits puree.

2.5.3 Monitoring Report

There are several tasks that need to be complete which is to write a monitoring report in the Performance Monitoring from. Every end of the day, internship need to do report and submit the PM (Performance Monitoring) form to Supervisor. The PM forms consist of Equalizing tank, Coagulation and Flocculation Process, Primary clarifier, Aeration tank, Sand Filter, Carbon filter, and Filter press. The Objective were to ensure them to complied with the Standard B of Water Quality Malaysia, to identify any abnormal issues in the Wastewater Treatment Plant and to establish documented monitoring report for record, keeping and references. I learned that by using the date that been recorded, we can analysed and identify the causes of problem that been occur during running the WWTP.

2.5.4 Sample collection of effluent water

Effluent samples are collected and then analyzed and averaged to evaluate system performance. For onsite and other small flow wastewater treatment systems, the design of the sampling port plays an extremely important role in determining whether the sample collected is representative of system effluent. The effluent sample was collected at least once in a month to be analysed by the laboratory. The objective of sample collection is to obtain reliable data that can support compliance or enforcement activities.

Wastewater sampling in this company is generally performed by one of two methods, grab sampling or composite sampling. Grab sampling is easiest and simple which is all the test material is collected at one time. As such, a grab sample reflects performance only at the point in time that the sample was collected, and then only if the sample was properly collected. For example, grab sampling allows the analysis of specific types of unstable parameters such as pH. I need to take sample from the effluent water to analyse the pH for almost every day. The result will be always at 7 which is neutral. This indicate that the company are comply with the Standard B of Water Quality Control and the water are safe and harmless to disposed into the drain. The finding of this task, I managed to learn how the company managed on collecting their effluent sample in wastewater treatment and how the importance to evaluate the system performance.

2.5.5 Webinar session regarding adjustment of work from home (WFH)

Besides the module assignment given by Ms. Allison, I have given a task to attend webinar such as Ecosystem Restoration to celebrate this year World Environment Day on 7th of June 2021. This webinar is organized by Department of Environment (DOE) Malaysia. From this webinar, the mission of ecosystem restoration is to ensure preservation of environment and water are sustainable by following the international standards while the vision is to ensure preservation of environment and water are sustainable. There are 7 strategies to overcome climate change adaptation framework for water sections in Malaysia:

- Establishing comprehensive study
- Improving existing strategies or measures
- Finding new alternative strategies or measures
- Establishing responsible agencies
- Smart database or management system
- Linking strategies and plans to policy
- Investment for low cost and eco-friendly alternatives

KASA Program 2020-2030 have 4 main plan strategies (consist of 30 initiatives):

- 17 empowered governances
- 4 green growths
- 6 strategic collaborations
- 3 social inclusiveness.

YB Dato Seri Ir. Dr. Zaini bin Ujang, as a Panel 1 stated that when urban development happens, it will give damage to the ecosystem. Thus, we need to overcome unstable ecosystem towards the development. Environmental impact assessment needed to evaluate the consequences environmental impacts of a proposed development.

Next, YBrs. Ms. Norlin binti Jaafar, as a Panel 2 stated that MCO 1.0 gives positive impact towards environment where the natures (river, air, and atmosphere) are recovered based on the data collected by Ministry of Environment and Water. Air Pollutant Index (API) shows the percentage parameter of pollutant gas (SO2, NO2, CO & PM2.5) dropped in major urban cities during that period. As for Water Quality Index (WQI), 9 stations of automatic marine monitoring had increased the WQI. It is because no company or manufacturer were operating during the MCO 1.0. Unfortunately, clinical waste (SW 404) increased by 18.15% in 2020 compared to 2019 due to the pandemic. As for MCO 3.0, Ministry of Environment and Water will focus on Environmental Quality Monitoring Program (EQMP), Electronic Schedule Waste Information System (ESWIS) and Continuous Emission Monitoring System (CEMS). These actions needed to ensure the company that are operating during MCO 3.0 will not damage environment.

There are some responsibilities need to be taken as a youth to ensure environmental sustainability that was point out by Mr. Muhammmad Wafi Anwar bin Roslan which are:

- Spread awareness through social media
- Remind each other toward the issues
- Start "Go Green" at home

Furthermore, he did mention about the narrow-minded thinking such "no matter how much we do, it will get destroy". These behaviors are just other excuses to avoid their responsibilities towards environment. Moreover, youth need to participate any program that are being held either by the government or NGO. Thus, they will earn more experience and knowledge about environment.

On 21st of June 2021, I have attended webinar which is Basic Understanding of Environmental Aspect, Impact, and Risk Assessment. This webinar has been hosted by CSQ Analytics Sdn. Bhd. From this webinar, I learned on how company perform Aspects & Impacts analysis to manage environmental impacts and align with ISO 14001. I also learned about the basic environmental risk, hazard identification, risk assessment, determining control (HIRADC) steps and Environmental Impact Assessment Standard. Then, I have given by Miss Allison to studied various of article that related to the WWTP and IETS until the end of the internship. The finding of this task, I managed to learn and study more knowledge about IETS, the current issues of water especially during Covid pandemic, and problems that related to food processing.

On 2nd July 2021, I have attended the Web seminar "Bukan Tidak Cukup Air" that been accommodated by Ministry of Environment and Water (KASA). According to the host, the water supply situation for Malaysia has changed from one of relative abundance to one of scarcity. Population growth and urbanization, industrialization and the expansion of irrigated agriculture are imposing rapidly increasing demands and pressure on water resources, besides contributing to the rising water pollution. The way forward to a prosperous and sustainable future is to keep development to a level that is within the carrying capacity of the river basins while protecting and restoring the environment. The objective of this webinar to encourage people to protect natural water bodies and their aquatic environments. Moreover, by using new policy, it was hoped to deliver pure water to urban areas in an effective and efficient manner and to increase water supply services to all areas efficiently. In this program, there are few steps that citizen can do it save the water such as turn off water while brushing teeth, don't run water when hand- washing dishes, and turn off water when shampooing your hair. In this seminar, I learned about KASA program and on how their approach people to save water and environment.

3.0 Conclusion

To conclude, the students of CHE110 are obligated to undergo industrial training after semester 5. Through the 17 weeks of internship, the students able to expand their knowledge, experience, and skills. They had used the knowledge and skills they learnt during college at their workplace. Besides, they had learnt their strengths and weaknesses. They able to cope their weakness through guidance by the supervisor as well as the employers of the company. Second, the internship helps to improve the students' communication skills through communicating and cooperating with the company's staffs.

This internship program in Vegeta Manufacturing Sdn. Bhd. gave a great opportunity as a student. This subject helps me expand my mind on real life working experience after spending 17 weeks for this internship. Moreover, I had gained new experience and gain an input specifically in wastewater treatment plant, from start up to run until shut down of the plant. The supervisor is easy to communicate and easy to reach. Ms. Allison helps me to overcome any problems occurred during the whole internships.

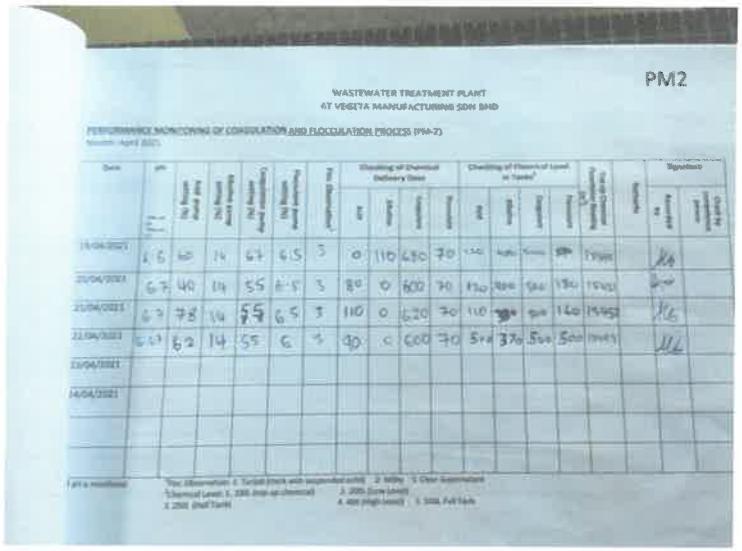
Furthermore, this internship program was able to let me handle and use the equipment in the plant and how optimization is applied in the whole process. This experience and knowledge are surely help me when graduating from University Teknologi Mara (UiTM) Pasir Gudang for completion my Diploma in Chemical Engineering.

Appendices

Figure 2: The Wastewater Treatment Plant at Vegeta Manufacturing Sdn Bhd.

Figure 3: The aeration tanks (Left side: aeration tank 2, Right side: aeration tank 1)

Figure 6: Jar test after 1 minute (left side) and 2 minutes (right side) of observation

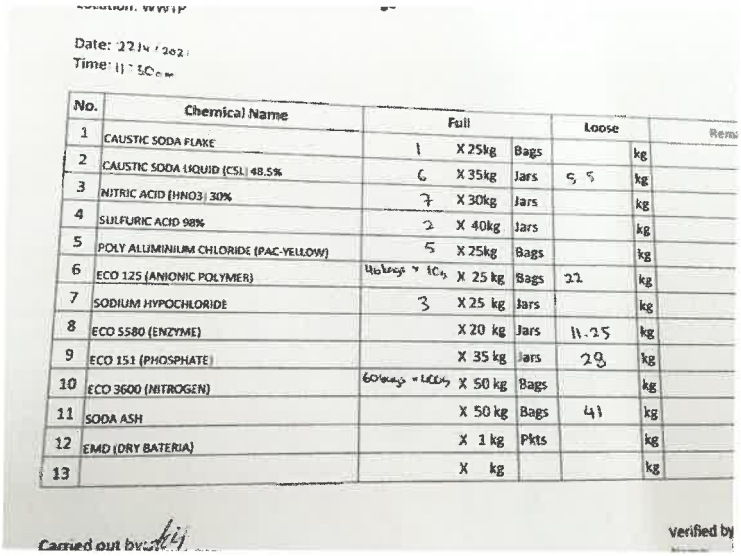


PM2

WASTEWATER TREATMENT PLANT
AT VEGETA MANUFACTURING SDN BHD

PERFORMANCE MONITORING OF COAGULATION AND FLOCCULATION PROCESS (PM-2)

Figure 7: Peformance monitoring sheet at Vegeta Wastewater Treatment Plant.

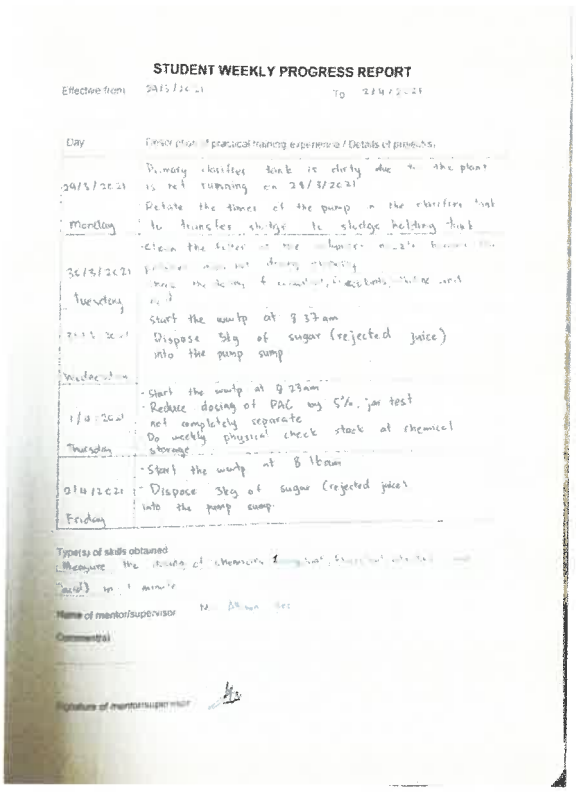


Date: 22/4/2021
Time: 11:30am

No.	Chemical Name	Full		Loose	
1	CAUSTIC SODA FLAKE	1 X 25kg	Bags		kg
2	CAUSTIC SODA LIQUID (CSL) 48.5%	6 X 35kg	Jars	5 5	kg
3	NITRIC ACID (HNO3) 30%	7 X 30kg	Jars		kg
4	SULFURIC ACID 98%	2 X 40kg	Jars		kg
5	POLY ALUMINIUM CHLORIDE (PAC-YELLOW)	5 X 25kg	Bags		kg
6	ECO 125 (ANIONIC POLYMER)	40bags + 1Cs X 25 kg	Bags	22	kg
7	SODIUM HYPOCHLORIDE	3 X 25 kg	Jars		kg
8	ECO 5580 (ENZYME)	X 20 kg	Jars	11.25	kg
9	ECO 151 (PHOSPHATE)	X 35 kg	Jars	28	kg
10	ECO 3600 (NITROGEN)	60bags + 1Cs X 50 kg	Bags		kg
11	SODA ASH	X 50 kg	Bags	41	kg
12	EMD (DRY BATERIA)	X 1 kg	Pkts		kg
13		X kg			kg

Carried out by: Verified by

Figure 8: Physical chemical check stock sheet



STUDENT WEEKLY PROGRESS REPORT

Effective from 29/3/21 To 2/4/2021

Day	Description of practical training experience / Details of problems
29/3/2021 Monday	Primary clarifier tank is dirty due to the plant is not running on 28/3/2021 Rotate the timer of the pump in the clarifiers tank to transfer sludge to sludge holding tank Clean the filter of the clarifiers tank
30/3/2021 Tuesday	Problem with not dosing chemical Check the dosing of chemicals, chlorine unit Start the wwtp at 8.37am Dispose 5kg of sugar (rejected juice) into the pump sump
31/3/2021 Wednesday	Start the wwtp at 8.23am Reduce dosing of PAC by 5% jar test not completely separate Do weekly physical check stock of chemical storage
1/4/2021 Thursday	Start the wwtp at 8.10am Dispose 5kg of sugar (rejected juice) into the pump sump
2/4/2021 Friday	

Type(s) of skills obtained
Measure the dosing of chemicals
Name of mentor/supervisor
Comment(s)

Figure 9: Student weekly progress report which is mandatory for the industrial training