INDUSTRIAL TRAINING FIELD REPORT

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Programme: DIPLOMA IN CHEMICAL ENGINEERING (EH110)

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Internship Duration: 22ND OF MARCH 2021 – 16TH OF JULY 2021

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ACKNOWLEDGEMENT

In the name of Allah, the most gracious and merciful. Peace be upon all of you and all praise to Him for all the blessing I have received throughout my life. One of those blessings being given the opportunity to finish my internship and able to finish this field report which concludes my diploma.

First and foremost, I would like to extend my endless gratitude to my awesome supervisor, the one who is generous enough to allocate his precious time guiding me through the programme, Mr Ramesh Gonasagran. Despite his busy schedule and family, Mr Ramesh still managed to facilitate my training at Utilities Gebeng by giving me tasks and assignments that were vital for my growth as a future engineer.

Secondly, not to forget the company that was kind enough to allow me in, training with them, Petroliam Nasional Berhad or famously known as Petronas Berhad. Because of them I was given the exposure to the industry and the reality of the career as an engineer. The training was not an easy task, but lucky for the endless support and encouragement from my family, fellow friends, and respected lecturers the journey made it seems effortless.

Last but not least, I would like to wish Utilities Gebeng and all of Petronas the best of luck in the vast world of engineering and to be recognised and respected even more worldwide.

Table of Contents

1.0 Introduction

Figure 1

The final piece of the puzzle for the completion of the programme - Diploma in Chemical Engineering, is a whole semester of industrial training. The training was aimed to give a glimpse of reality to all students in regard to the work scope in a chemical engineering related industry. Other than that, students can utilize the theoretical knowledge they have had acquired in classes from the previous semesters, as demonstration of these theories can be observed directly in the workforce. Prior to the beginning of the semester, all students were told to apply for a place to undergo their industrial programme, and due to restricted movements and the recent pandemic, securing a place to train sure was a challenge. Personally, I had applied to around 12 companies and was fortunate enough to hear back from two. The two being RP Chemicals and Petronas. I received the offer around the same time and was expected to respond within five working days. Consultation with lecturers and family members helped me a lot during the decision making. Thus, I decided to accept the offer from Petronas.

The department assigned to me was the Utilities Department at Utilities Gebeng. My training was completed under strict and exemplary supervision of Mr Ramesh Gonasagran. The training commenced on March 22nd 2021 and ended on July 16th 2021. The utilities production of Petronas is operated by Gas Processing & Utilities (GPU) Division. This department serves many customers from various industries with a wide range of products to meet their specific needs. There are two complexes of utilities production, namely Utilities Kerteh in Terengganu (UK) and Utilities Gebeng in Pahang (UG).

2.0 Contents

2.1 Company Background & Organizational Chart

Figure 2

Petronas or Natural Petroleum Limited, was established on August 17th, 1974. It is fully owned by the Malaysian Government and some of the subsidiaries are listed in Bursa Malaysia. At the moment, the CEO of the company is Tengku Muhammad Taufik Tengku Aziz. Petronas has more than 100 subsidiaries and around 40 joint ventures where Petronas own at least 50% of stakes. Some of the most noticeable subsidiaries owned by Petronas include Petronas Dagangan Berhad, Petronas Gas Berhad, MISC Berhad, KLCC Properties Berhad, and Petronas Chemicals. The headquarters of Petronas is Tower 1, Petronas Towers, Kuala Lumpur City Centre, 50088, Kuala Lumpur, Malaysia.

Utilities Gebeng is under utilities department of Gas Processing & Utilities division. UG produces wide range of products including electricity, steam, industrial gases, demineralised water, raw water, cooling water, and boiler feed water. The utilities department has proven its excellence by achieving 99.6% reliability for both electricity and steam, and 98.9% for industrial gases. It had also recorded a very high performance on Overall Equipment Effectiveness (OEE) at 99.1% for electricity, 99.4% for steam, and 99.0% for industrial gases. All of these achievements are possible thanks to UG excellent staffs with admirable skills they honed. Utilities Gebeng is located in Gebeng Industrial Area, Kuantan, Pahang.

Figure 3 Utilities Gebeng Layout

There are four separate division within Utilities Gebeng. Firstly, there is a Fire Water System that includes two fire water tank, two diesel fire water pump, and an electric motor fire water pump, this plant is capable of supplying cooling water at 3900 Nm^3/hr. Then, there is the NGU Plant that produces nitrogen at the rate of 8240 Nm^3/hr. They also have a Demineralised Water Plant that produces raw water, potable water, and demineralised water, at the rate of 1200 m^3/hr, 22 m^3/hr, and 550 m^3/hr, respectively. Last but not least, the Cogeneration plant, the largest in terms of scale. This plant produces mainly steam and also electricity. The systems involved in Cogen include four Turbines, four Heat Recovery Steam Generators, a boiler, and an emergency diesel generator. This plant is capable of producing electricity and steam at the rate of 136MW and 580 ton/hr, respectively. Cogen can also provide 1000kW of Emergency Electricity Supply. The utilities produced will be supplied to nearby plants and for its own use.

Utilities Gebeng is located strategically close to other companies and plants like Kaneka, PDH, Linde, Nalco, and many more. By having all these plants nearby, it is beneficial for UG as it can supply utilities to all of the neighbouring plants while increasing its revenue and network. There are networks of pipelines in Gebeng Industrial Area connecting one plant to the others, this makes supplying utilities like industrial gases, steam, and water quick and easy. The organisational chart of Utilities Gebeng changes frequently since staffs get transferred quite often. A general view of the structure would be enough to illustrate the hierarchy.

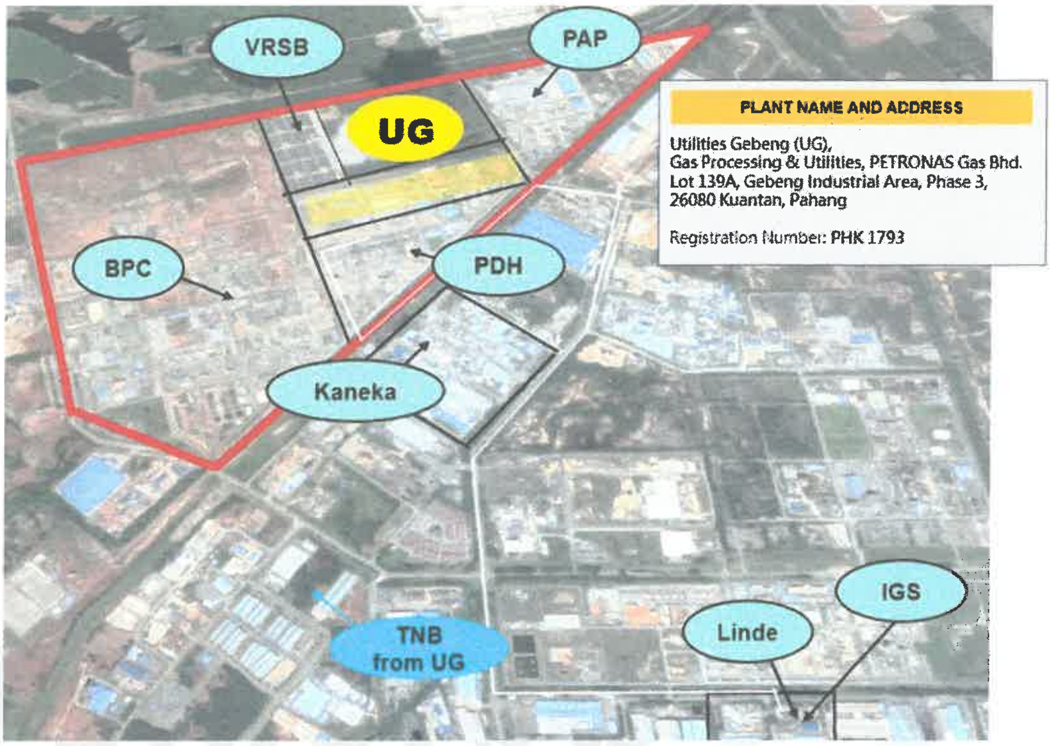

Figure 5 Utilities Gebeng location

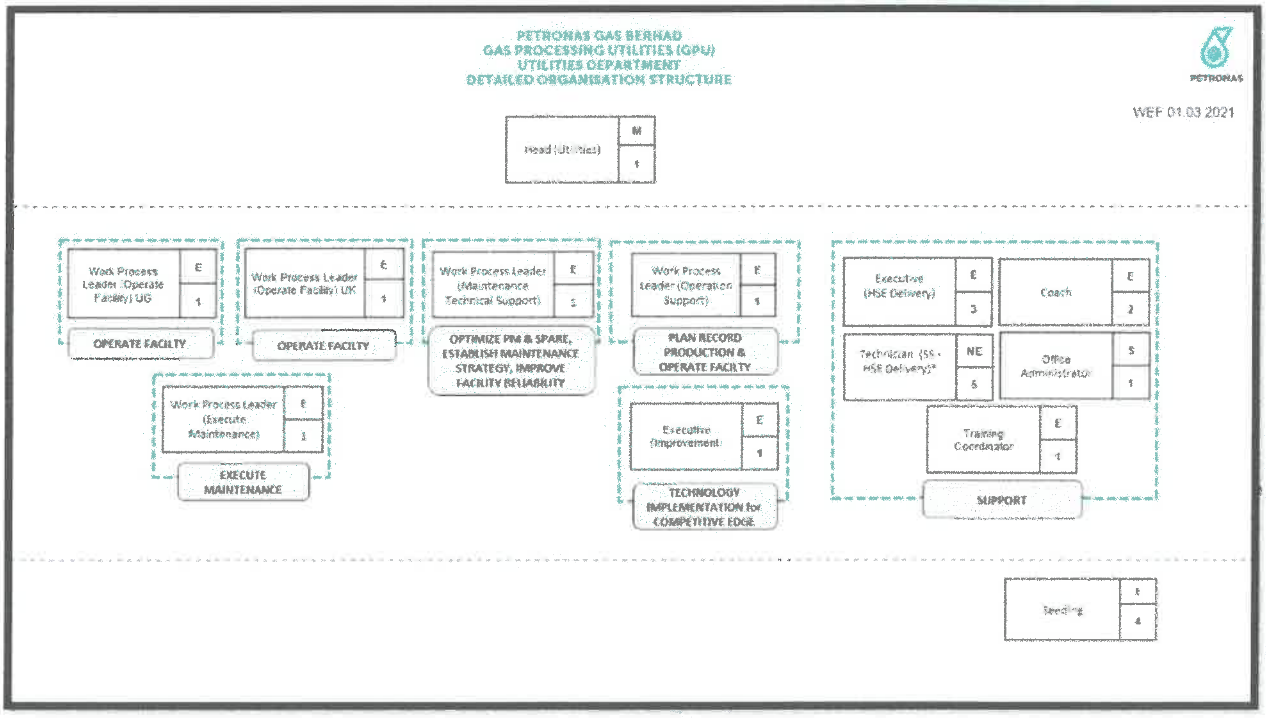

Figure 4 Utilities Gebeng Detailed Organisation Structure

No	Staff Name	Position	Current COC
1	Azli bin Ismail*	Manager	1^{st} Grade Steam
2	Muhammad Fitri Aziz bin Addenan	SS	2^{nd} Grade Steam
3	Zakaria Bin Yahya	Exe (Opn)	NA
4	Nurul Armira binti Zainal Abidin	Exe (Opn)	NA
5	Muhammad Hazri bin Idris	Exe (Mtn)	2^{nd} Grade Steam
6	Muhammad Faris bin Mohd Rusli	Exe (Mtn)	NA
7	Lye Siew San	Exe (Mtn)	NA
8	Ramesh a/l Gonasagran	Exe (Opn)	2^{nd} Grade ICE 2^{nd} Grade Steam
9	Rusdy bin Naiai @ Naim	SS	2^{nd} Grade Steam

Figure 6 Utilities Gebeng current executives

2.2 Process flow

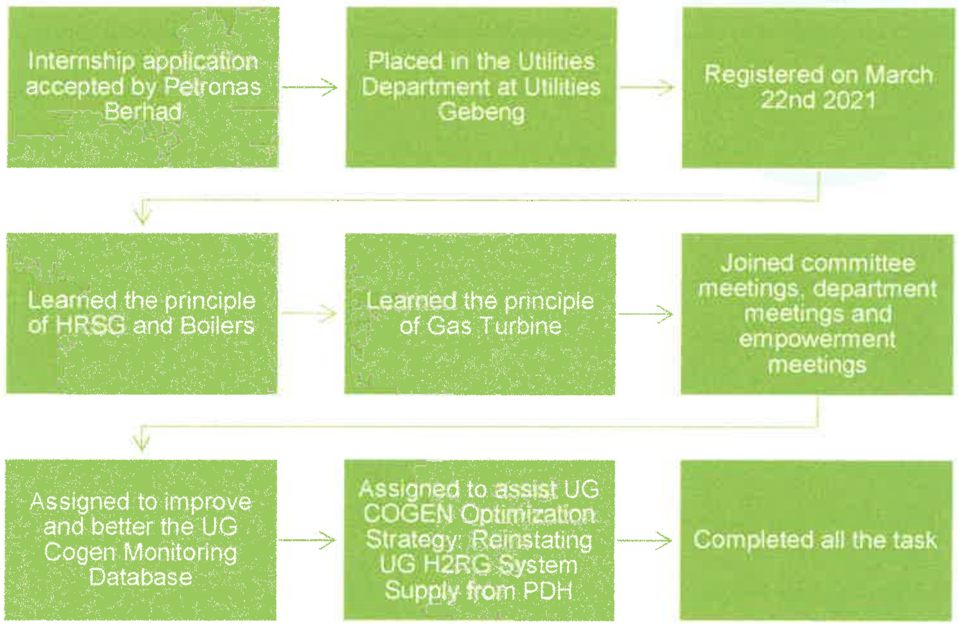

Figure 7 Process Flow of the Internship Programme

Summary of activities

The day of registration, I was given a cubicle as working station at the process control building. A work email was also prepared for me by the IT team to secure the company's confidentiality and ensure complete professional environment. On the first week there, I also sat for safety exam with the HSE department to get a passport that was needed to enter the premise. My daily activity usually consists of me joining in meetings with the teams my supervisor is a part of, like the I&I Empowerment Team that discusses request made by fellow staff members to improve the company, and Management of Change to discuss any changes made in any premises and how to adapt with the changes.

There were also other meetings I have joined like the monthly department meeting that discusses the performance of every plant in Utilities Gebeng, Performance Discussion, Committee meetings, and many more meetings that mainly discusses on improvements, problems, and surfacing or resurfacing issues. Through this exposure I can see how the professionals handle problems, how they solve issues, how they appoint ideas, and many more workplace magic.

If there were no meetings for the day, my supervisor would let me join brainstorming sessions. For instance, I assisted my supervisor alongside some other engineers and operators in a Root Cause Failure Analysis (RCFA) to discuss MOV 1D06 and MOV 1D07 being broken and dislodged that caused Boiler D to be unavailable and incurred maintenance cost. Other than that, I also worked on pending tasks or assignments on my daily working hours. Some tasks were time consuming as it requires a lot of focus. That was all pretty much how my daily routine went.

On the final month there, I was involved in a collaborative project between UG and PDH. During the project, my involvements were mainly assisting operators in doing inspections and integrity check. Direct involvement in the tasks was not possible as I was not competent to execute them. Regardless, the observation alone taught me enough. As the teams were very generous enough to explain to me what they were doing. Not only that, but other projects as well.

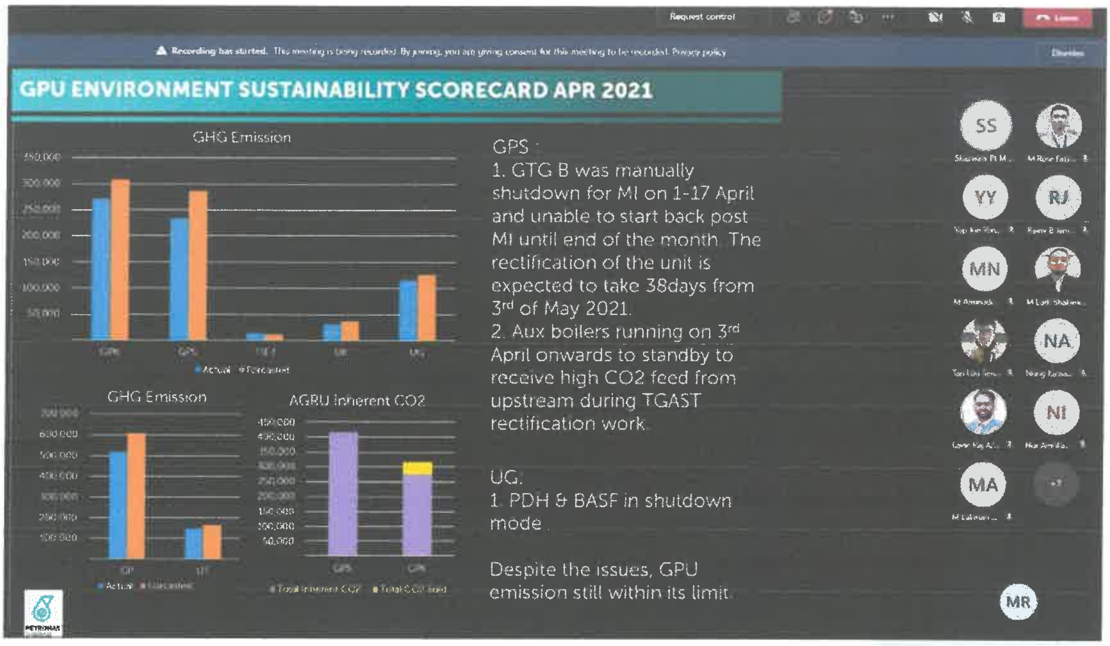

Figure 10 GPU Energy Committee meeting

Figure 9 Health and Safety briefing by HSE and Polis Bantuan.

Figure 11 MOV 1D06 and MOV 1D07 broken and dislodged.

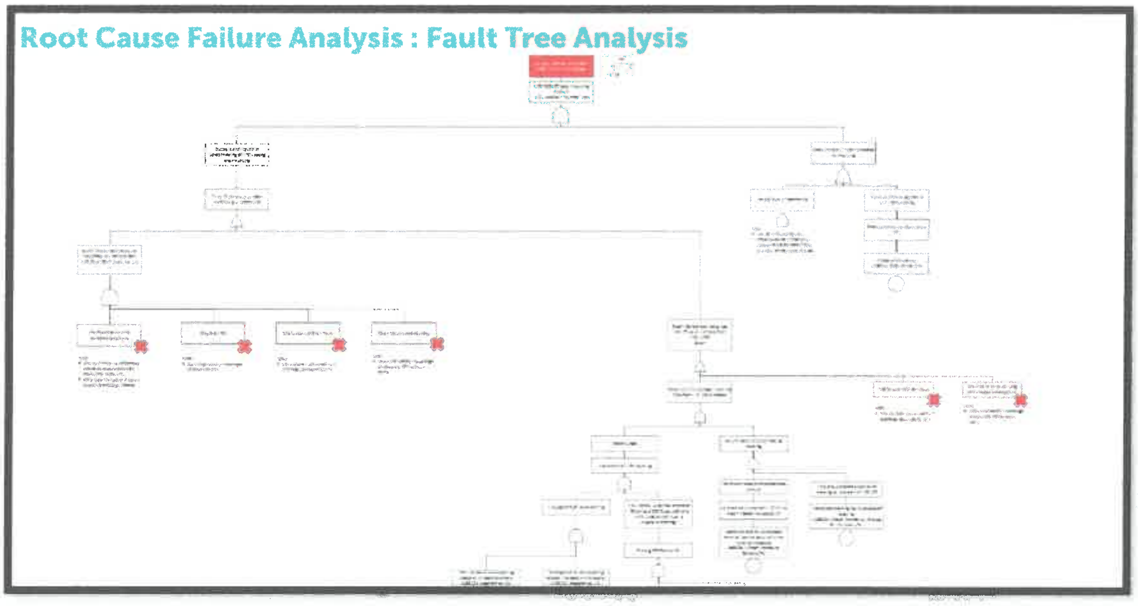

Figure 12 Fault Tress Analysis method of determining root cause.

2.4 Assignment description

Improving Utilities Gebeng Cogeneration Plant Monitoring Database

On March 30th, I was assigned by my supervisor to improve the Cogen database and understand the existing structure of it. The database was just filled with numbers from top to bottom with not much clues to make up for what it was trying to represent. There were 31 sheets representing days of the month and one average sheet that conglomerates all the daily data. Visual representation available at that point was only some line graphs and there were issues with them. The graphs were not correctly linked to the data it was supposed to be representing, making the lines all confusing. Other than that, the data displayed at the average sheet was not in order as the lookup formula was somehow broken. Below are some screenshots on how the database looked like.

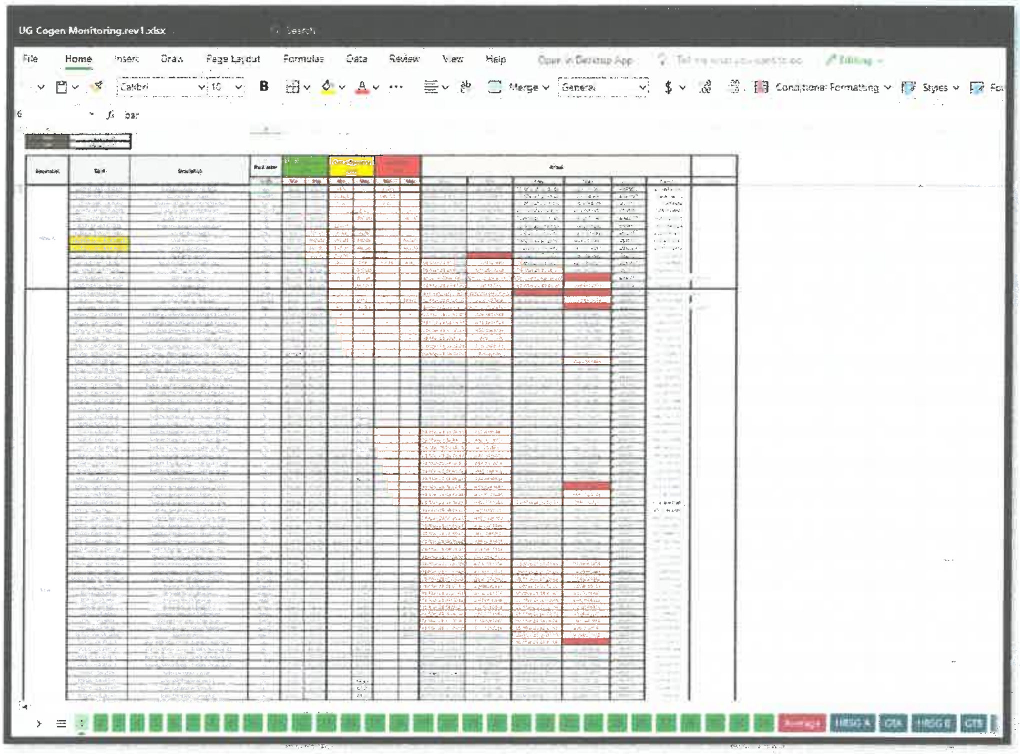

Figure 19 Daily data sheet before improvements

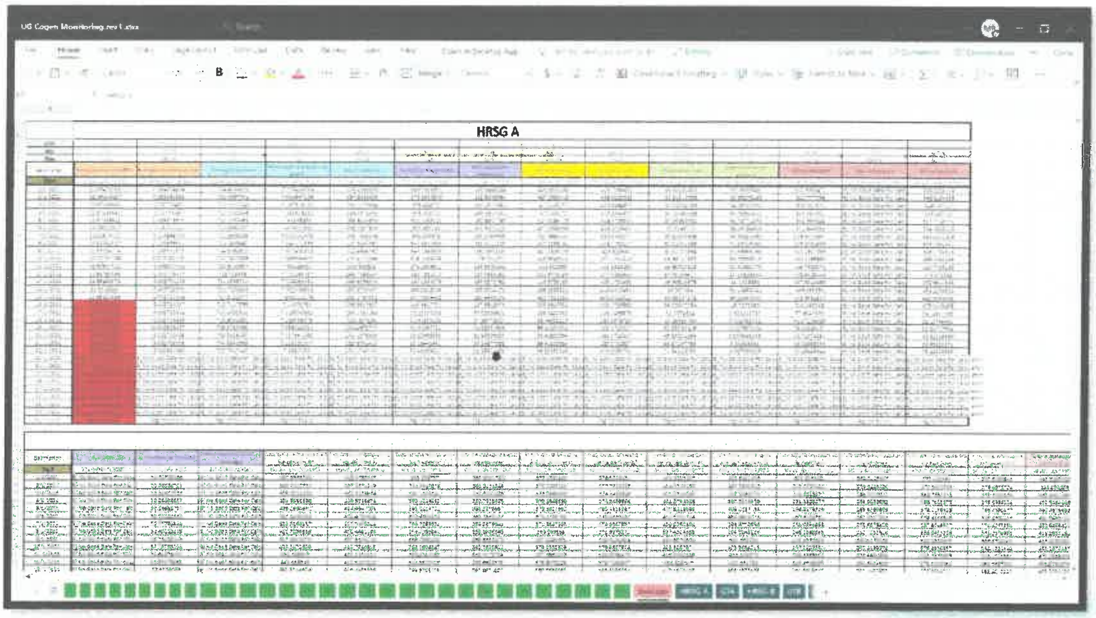

Figure 20 Average data before improvements

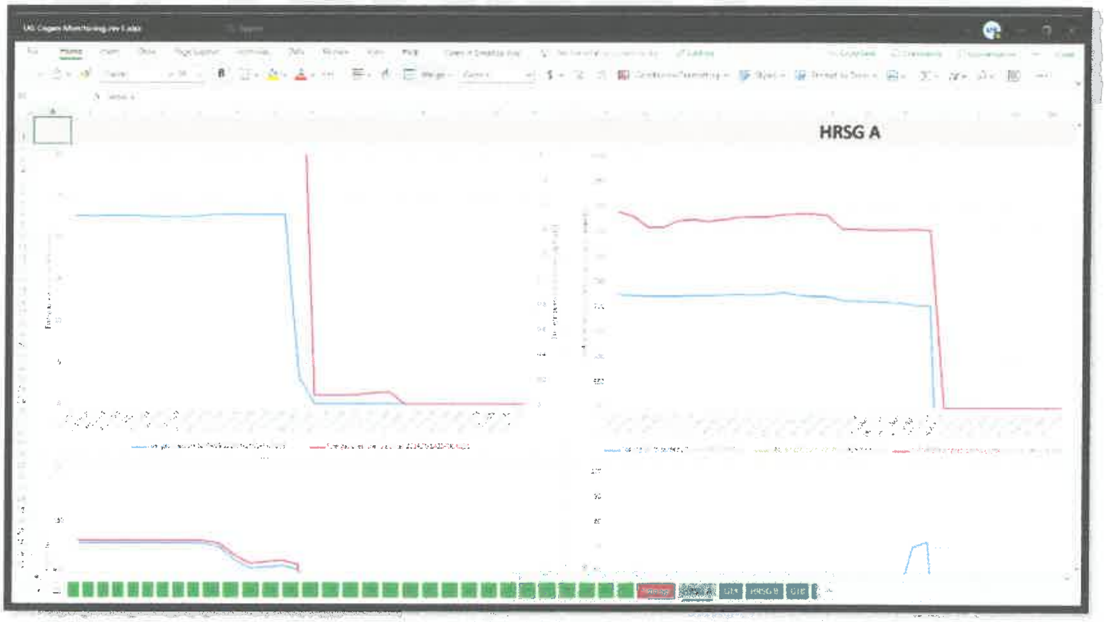

Figure 21 Graph representation before improvements

The first thing I was tasked to work on was the conditional formatting on the daily data. The database is automatically updated by a server. The automated data are listed in the 'Average' column. Each of the data has its own normal operating parameters that it has to obey. If the data for the actual exceeds maximum or depletes below minimum normal operating units, it should be highlighted to indicate the abnormalities. Therefore, the logical approach would simply be developing a conditional formatting that obeys the normal operating units for all of the components. Below is an example of the formatting used to highlight cells that disobey the normal operating units.

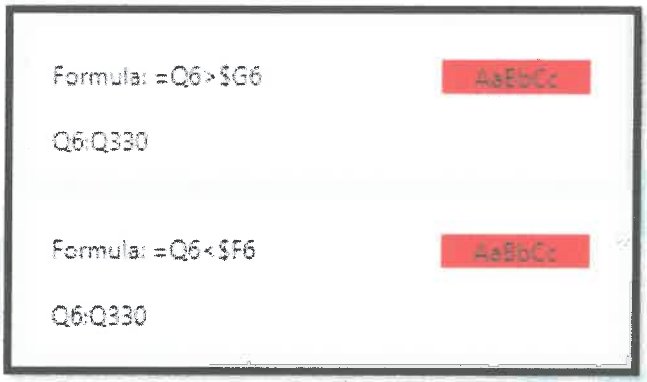

Figure 22 Conditional formatting on daily data

Once finished with the conditional formatting on the daily data, I was then tasked to fix the issues with the lookup formula on the average data sheet. This was challenging for me at first because the links made by the person who worked on the database before me was unknown. Thus, I contacted the intern who worked on it previously, and asked her the naming she used to link all the daily data to other sheets. As I was done being enlightened, the next step became much easier. I used VLOOKUP to automatically mirror the data from all 31 daily data sheets to the average table. Below is the VLOOKUP used in the average sheet.

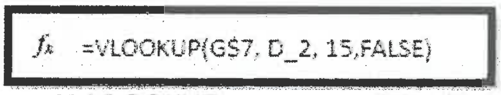

Figure 23 VLOOKUP on average data sheet

Other than that, the improvement I have made includes creating a frontpage that displays compliancy of the main equipment in Cogen. The frontpage of the database is easily accessible as it is interactive. One can simply key in the month and year of the desired data to access the complete information. Shortcuts buttons were also added on the page to make browsing effortlessly swift. Previously, panel operator can only monitor 50 tagging at most at a time. Now, that the database has been improved, they can now monitor all 324 tagging at a time which made the process six times more effective. Below is the screenshot of the frontpage constructed in action.

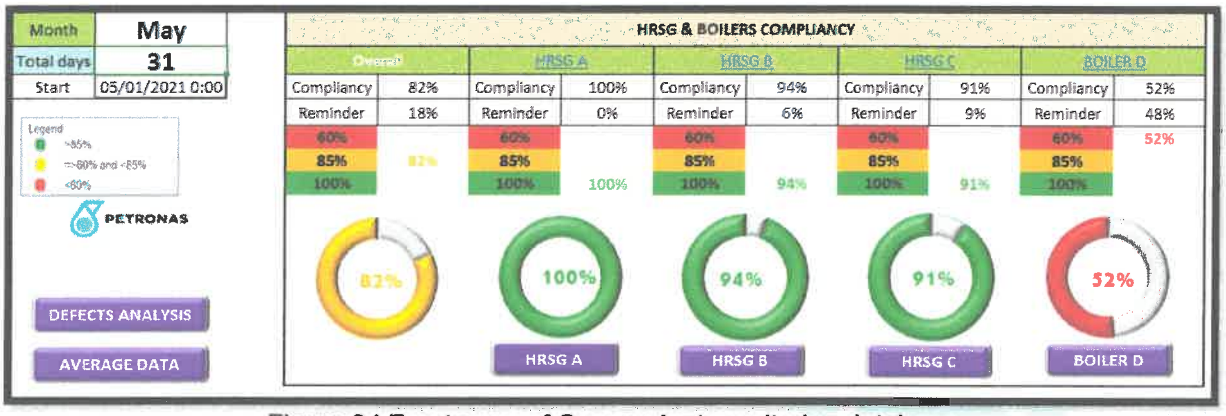

Figure 24 Front page of Cogen plant monitoring database

Furthermore, to avoid issues like miscommunication, a remarks column was also added on the daily data. Panel operator can now leave behind remarks on any components to notify the upcoming operator in shift. This helps a lot to minimize human errors in data monitoring. The remarks will also be mirrored to the defects sheet that was also added to the database.

		OTF Name	
		Saiful Taha	
		Syed	
		Day Shift	
Current	Average	Status	
22.03344345	21.92806724		
726.2497559	755.8594687		
7.740515709	6.15637067		
0.069211088	0.093885095		
588.1199951	605.7971257		
164.7161865	163.6180426		
50.12076569	50.00354004		
426.4605882	427.5665547		
429.5304565	430.0927051		
[illegible]	[illegible]	Diverter damper landing bar damaged	
53.57361603	54.10589582		
518.229248	529.5799675		
Scan Off	No Good Data For Ca	Transmitter faulty	
511.9725952	521.4141846		

Figure 25 Remarks column in daily data showing remarks made by Saiful Taha, a panel operator.

This is in order to make monthly report easier to construct and justifications for any error can now be provided with ease.

No	Component	Tag	Compliancy(Manual)	Equipment	Status(Manual)	Remarks
10	Seal air pressure.	221PIA-1A66-TX.XQ01	0%	HRSG A		
37	Turbine Temperature - Exhaust TC #8	MVUG_GA.TTXD_8	100%	GT A		
38	Turbine Temperature - Exhaust TC #9	MVUG_GA.TTXD_9	100%	GT A		
40	Turbine Temperature - Exhaust #10	MVUG_GA.TTXD1_10	100%	GT A		
49	Flame Detector #1 Flame Intensity	MVUG_GA.FD_INTENS_1	100%	GT A		
50	Flame Detector #2 Flame Intensity	MVUG_GA.FD_INTENS_2	100%	GT A		
51	Flame Detector #3 Flame Intensity	MVUG_GA.FD_INTENS_3	100%	GT A		
52	Flame Detector #4 Flame Intensity	MVUG_GA.FD_INTENS_4	100%	GT A		
61	Bearing Metal Temp - Turbine Bearing #1	MVUG_GA.BTJ1_1	0%	GT A		
102	Seal air pressure.	221PIA-1B66-TX.XQ01	20%	HRSG B		
134	Turbine Temperature - Exhaust #12	MVUG_GB.TTXD1_12	100%	GT B		
135	Turbine Temperature - Exhaust #13	MVUG_GB.TTXD1_13	100%	GT B		
136	Turbine Temperature - Exhaust #14	MVUG_GB.TTXD1_14	100%	GT B		
137	Turbine Temperature - Exhaust #15	MVUG_GB.TTXD1_15	100%	GT B		
138	Turbine Temperature - Exhaust #16	MVUG_GB.TTXD1_16	100%	GT B		
141	Flame Detector #1 Flame Intensity	MVUG_GB.FD_INTENS_1	100%	GT B		
142	Flame Detector #2 Flame Intensity	MVUG_GB.FD_INTENS_2	100%	GT B		
143	Flame Detector #3 Flame Intensity	MVUG_GB.FD_INTENS_3	100%	GT B		
144	Flame Detector #4 Flame Intensity	MVUG_GB.FD_INTENS_4	100%	GT B		
197	Skin temperature	221TIA-1C56B-TX.XQ01	0%	HRSG C		
207	Turb Temp - Wheelspace 2nd Stg Aft Outer #2	MVUG_GC.TTWS2AO2	80%	GT C		
215	Turbine Temperature - Exhaust TC #2	MVUG_GC.TTXD_2	60%	GT C		
216	Turbine Temperature - Exhaust TC #3	MVUG_GC.TTXD_3	80%	GT C		

Figure 26 Defects sheet to monitor all tagging individually.

Furthermore, the graphs are now correctly linked and display intelligible patterns and better scaling. For instance, during a shutdown process all equipment will not be operating, therefore the graph will be y=0 during the shutdown process as shown in the screenshot below.

Figure 27 Improved graph representation.

A troubleshooting guide sheet was also added to the database to assist panel operators on recommended actions in case of abnormalities. Any damages due to abnormalities can be mitigated by having this feature available. This is because operators can now take immediate action to prevent or curb incoming issues by simply referring to recommendations listed for all tagging. Here are some of the troubleshooting recommendations from the sheet.

Unit: GT Area: COGEN	MVUG_G#.XXX		Critical Operating Limit Excursions	
Equipment	Tag XXX	Description	Consequence of Deviation	Corrective Actions
	CSGV	IGV (DGA)	CPD at fixed IGV opening - lower CPD at fixed IGV means degradation of compressor performance	Check pressure transmitter
	itldp1	Air inlet filter dP (mmH20)	1 Clogged air filter causing hi dP alarm, performance drop. 2 May cause compressor surging 3 Lead to gas turbine trip *1 Insufficient air flow to compressor lead to surging resulting gas turbine to trip	1. Check Dp pressure transmitter 2.Check with the local Dp gauge 3. Check self air cleaning functionality 4. Check Supply air pressure for self air filter cleaning 5.Check/verify for any sign of air filter house leak *Check GT air inlet filter local panel for any fault or alarm.
	CPD	CPD (Compressor Pressure Discharge)	1.CPD at fixed IGV opening - lower CPD at fixed IGV means degradation of compressor performance 2. Lead to gas turbine performance degrade 3. Lead to gas turbine overfiring Low CPD Gas Turbine lead to performance degradation: need to plan for offline washing prolong at this condition. **	1.Check pressure transmitter 2 Check Filter Dp 3.Planned for off line compressor wash
	221-TTWS1*-*	WSKALM 1 (S1F01,S1F02,S3A01S3A02) WSKALM 2 (S3F01,S3F02) WSKALM 3 (S1A01,S1A02,S2A01,S2A02,S2F01,S2F02)	1.Deformed of rotor disc	1.Monitoring the temperature 2.Check compressor pressure discharge (CPD)
	221-TTXD-1~18/ (TTXM)	Exhaust temperature.	1. Gas turbine trip *same. possibility . At set point TTRXB +40 deg F	1.verify the exhaust thermocouple 2. check the exhaust temperature deviation 3.Check IGV opening 4.Check the control card healthines 5.Reduce Gas turbine load *check healthiness of Mark V control system.
			Trip if 3 failed out of 4	1. To monitor the flame intensity 2. check the following. -Fuel flow to the combustor [illegible]

Front Page | Troubleshooting Ref | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30

Figure 29 Troubleshooting reference sheet.

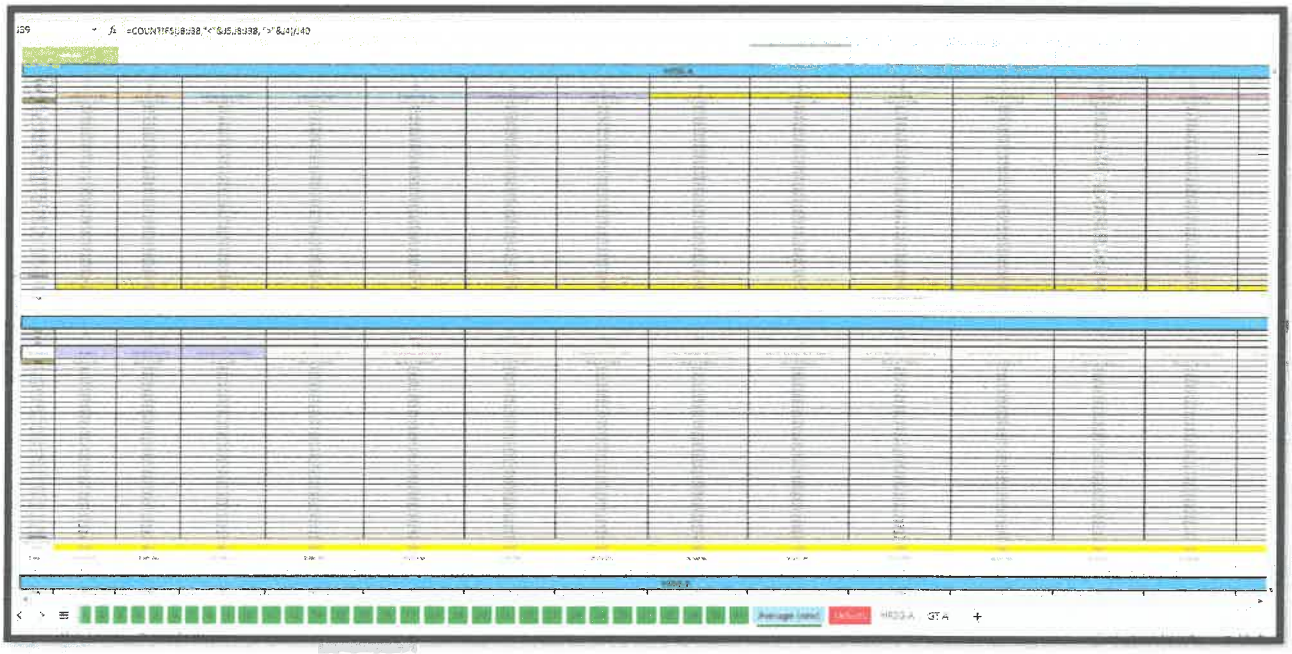

Figure 28 Improved average data sheet.

The finished product has been demonstrated in front of the general manager and panel operators. This database will soon be used in all Utilities department of Petroliam Nasional Berhad and now is currently under final touch ups.

Figure 30 Flow chart of UG Cogen Plant Monitoring database improvement

Utilities Gebeng Cogeneration Optimization Strategy: Reinstating UG H2RG System Supply from PDH

My supervisor had appointed me to assist the operators and other teams on the project to reinstate hydrogen rich gas system supply from Propane Dehydrogenation Plant (PDH) to one of the boilers in Cogen Plant. Prior to this strategy, all boilers in Cogen relied on natural gas to run, and there were some downsides to this practise. This is because, the minimum volumetric flowrate required to run the boilers was too high and this caused overproduction of steam. When the steam produced exceeds demand, it would be discarded. Which was very wasteful. Thus, implementing the action will solve this issue.

The action was deemed strategic due to several sound basis. Firstly, UG has existing H2RG system facilities that have not been utilized since March 2009 because of unstable supply of H2RG from PDH. Meaning, we already have all the main components to make it work. Secondly, PDH has confirmed that they can now supply a stable and continuous flow of H2RG at 2000 Nm^3/hr. Other than that, the HRSG is designed to have H2RG as its primary source of supplementary burners. Which would not require any changes to its design. Lastly, since we have low demand of steam from customers at the moment, we need to find an alternative substitute for natural gas as our fuel for HRSG to reduce price of non-conformance.

Section	Task	Cost (RM) per HRSG	Concerns/Remarks	PIC
ELECT	Replace isolator switch for heater	MYR 0.00	Agreed to proceed with heater servicing but may proceed with commissioning if unable to complete prior to commissioning. Heater servicing may done after commissioning.	Eddy
MSTAT	Drop spool, inspection, Internal and external (remove insulation) pipe visual inspection at H2RG line - Drop spool only	MYR 20,000.00	Not required. Unless any finding during purging	Hazri
	To stroke manual isolation valve	NIL	Aziz to identify all manual isolation valves & provide the list with tag no to Hazri for manual stroke/service.	
	Painting and insulation installation	MYR 30,000.00	To perform during shutdown (3 Days)	
Inspection	Risk based inspection for H2RG header piping - after Mstat remove insulation	MYR 10,000.00	1 Thickness gauging (mapping)	Khalil
C&I	Situational assessment for existing H2 rich flowmeter, PG Pressure tx, temp tx (testing & calibration)	MYR 0.00	Done	Rashidi
	To service shut off valve (UZ 58) and control valve (FIC-1x53) including tuning	MYR 80,000.00	1. UZ58 - Planned to service by end of Apr. 2. FIC-1A53 - Awaiting vendor feedback.	
	To install new low range TX	MYR 0.00	1.To ensure new flowmeter have suitable range.	
System	To verify logic narrative	NIL	1 To configure new TX in HMI	Syafiq
Project Controller	To secure budget		1.To utilise RM100K from CAPEX & the rest from OPEX.	Yasser
Operation	Cause and Effect Matrix for H2RG System	MYR 0.00	Not required. Done during design state & commissioning HRSG B	NIL
	Nitrogen purging	MYR 0.00	1. Aziz to identify the purging point & email marked up P&ID. 2. Will utilize internal Nitrogen Gas (to confirm hose, purging point)	Aziz Safan
	Commissioning	MYR 0.00	-After all maintenance job completed	Aziz Safan
	Total Cost	MYR 169,000.00	To calculate once the situational assessment completed	

Figure 31 List of teams involved and the tasks for each section including cost of implementation.

Firstly, an economic study was conducted to calculate the cost saving possibilities. It is necessary to note that in order to get fire burner running, a minimum energy value rate of 8.4 MW is required. The pricing for H2RG is half of natural gas in terms of its energy content. If the price for natural gas is at RM 18.40/MJ, the price of H2RG would be around RM 9.20/MJ. Even though H2RG has a lower calorific value, it would actually be handy as it would be more flexible to supply specific amount of steam. This is because, when the calorific value is lower, a larger volume of H2RG will be needed to achieve the desired energy. Meaning that now with H2RG available as the supplementary firing for HRSG, a more specific amount of steam can be produced, and wastage can be avoided. Not only that, but this would also bring a significant amount of cost savings for the plant.

1MW = 3600 MJ		
Natural Gas		
Calorific value	38	MJ/Nm3
Pressure	10	bar
Volume per month (30d) to get 7MW	572,968.42	Nm3
Volume per hour to get 7MW	795.79	Nm3
Price chargeable (RM)	379,713.99	
H2RG		
Calorific value	18	MJ/Nm3
Pressure	4.75	bar
Volume per month (30d) to get 7MW	1,209,600.00	Nm3
Volume per hour to get 7MW	1,680.00	Nm3
Price chargeable (RM)	189,856.99	
Cost saving in a month (RM)	189,856.99	
Cost saving in a year (RM)	2,278,283.92	

Figure 32 Full economic analysis on the cost saving

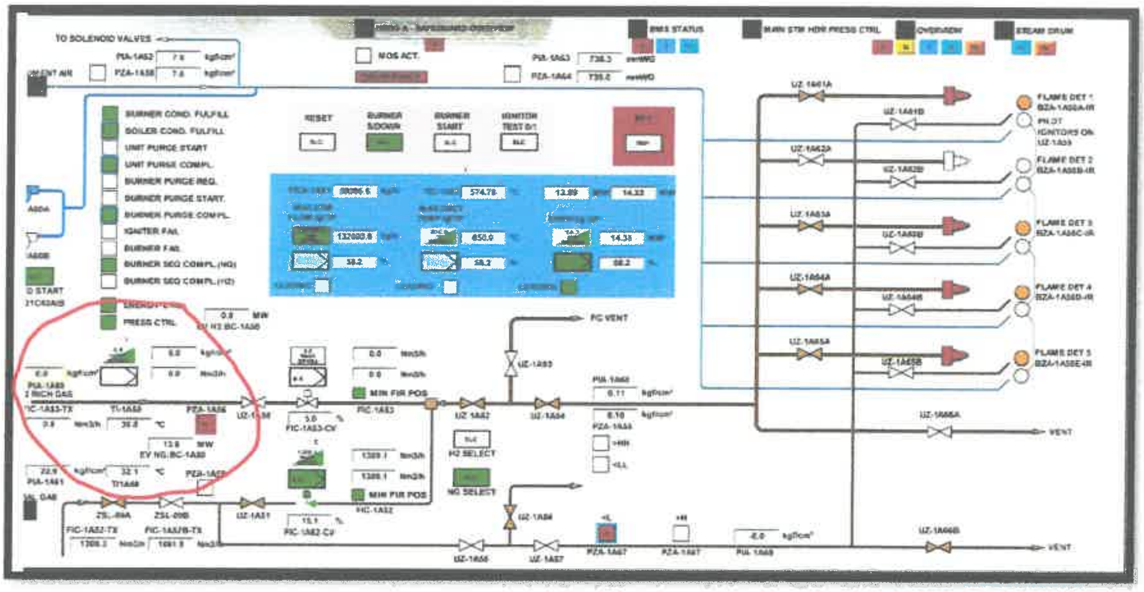

Figure 33 Existing H2 Rich Gas supplementary firing system in HRSG as per design

Figure 34 Contractors removing insulation on the pipeline.

Figure 35 Operators conducting maintenance on existing supplementary firing system for H2RG pipeline.

Once finished with the inspection, the Control and Inspection (C&I) team assessed the existing hydrogen rich flowmeter, which was finished on June 23rd. Once finished with the inspection, some pipelines will be isolated and depressurize so that the transmitter can be tested and calibrated. Calibration of the transmitter was done simply by adjusting the pressure and temperature by using hand-held digital communicator, where the transmitters were injected with currents. This was done to remove any errors in data reading, and to ensure a suitable condition to handle the H2RG. After the inspection is finished, operators installed back any insulation that had been removed. When all of the tasks had finished, operators began nitrogen purging through the pipeline to rid it of any debris or unwanted substance - mainly residual hydrogen from previous run. Nitrogen was chosen for the process because of its characteristic of being inert, that is non-reactive and can simply be discarded without issues to the environment. The purging process could be very noisy, and any leaks of the nitrogen might danger any person nearby, therefore prior to the commencing, the area must be cleared from any personnel and every staff within the radius of the pipelines must be alerted of the noise to minimize hazard.

After finished with nitrogen purging, operators must inspect the pipelines once more for an integrity check and to run a gas test for hydrogen. During the integrity check, liquified residual gases from previous run can be seen pouring out at the flanges of the pipelines, and gas testing showed zero hydrogen gas. Therefore, the nitrogen purging was considered a success.

Figure 36 Liquified residue removed from the pipeline via nitrogen purging.

With that, test run can now begin. The HRSG can now start-up to allow the H2RG to flow smoothly through the pipelines. The flow was slowly pressurized, and thorough monitoring was done throughout the process. Any abnormalities will be recorded to ensure excellent performance. Other than that, leak test must be performed concurrently while the HRSG is running. This test is crucial when handling any type of gas that is flammable or toxic. If a pipeline is cracked and flammable gas leaked out, a small spark can trigger an explosion. Leak test can be done by using gas tester, which is the same device used after purging for residual hydrogen. The test will be done at all flanges on the pipelines. Gas tester used must be able to detect the presence of the gas, which in this case hydrogen gas. Another integrity check includes monitoring the flame intensity of the burner, and the shape of the flames.

When there were no abnormalities or errors detected, the HRSG can now be commenced. The first month of operation is considered as trial period and PDH will not be charging anything during this phase. Overall, the project was a major success.

Figure 38 Gas testing indicates zero H2 during both nitrogen purging and leak test.

Figure 37 Flow chart for Reinstating H2RG system supply from PDH project

3.0 Conclusion

For me, I believe the industrial training was such an awe inspiring and momentous journey, essential for one's self-development. Full disclosure of the industry was perfectly exhibited throughout the four months of my stay there. Being able to participate in numbers of brainstorming sessions, meetings, and projects, had given me immense exposure to the reality of having a career in the chemical engineering industry. Being exposed to the reality also made me realize how important it is for the youth today to be well informed and well prepared to take over the industry in the near future. Our generation would soon become the ones responsible to maintain the good we have today and to improve every aspect of the world we know. Therefore, students should utilize the training to its fullest extent, or else it would become a wasted opportunity. Other than that, students can now practically understand engineering knowledge, in comparison to theoretically learning them in classes.

Thus, to cut to the chase, being a student that understand concepts of things alone would not be enough as the working field is 100% hands on. Therefore, it is imperative for all students to be given the chance to experience the world of working in order to prepare themselves for the future awaits. It is also worth noting that the workplace environment, and how it functions can not simply be taught or learned in classes. It requires direct involvement to be understood. To conclude, it is beneficial indeed for both students and companies to encourage training programme as future employees can be ensured to have had at least some background in the industry. Students and companies are two coexisting benefactors and lifting one another should be encouraged.